European Commission

Commission's Environmental Statement 2021

Moving towards a sustainable future

#EUGreenDeal

Consolidated version

EMAS
Verified environmental management
REG.NO. BE-BXL-000003

Human Resources and Security

Prepared by the Commission's EMAS Coordination Team with information from EMAS site coordinators and teams in Brussels (OIB, DIGIT, HR), Luxembourg (OIL), the five JRC sites, and DG SANTE at Grange in Ireland.

European Commission - DG Human Resources and Security - D2 Working Environment and Safety.

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2020 results
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European Commission - DG Human Resources and Security - D7 Greening, Safety & Buildings.

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Corporate Summary

FOREWORD

The Commission recognises the importance of Europe continuing its leading role on the global stage in reducing environmental impacts. Its flagship European Green Deal emphasizes the importance of achieving tough emissions reductions in Member States while also signalling the importance of sustainable food supply chains (Farm to Fork strategy) and maintaining biodiversity.

The Commission, through its policies, directives and regulations, ensures that Member States set an example by developing more sustainable economies, through initiatives such as the Clean Energy Package, successive Water Framework Directives, the Circular Economy Package and support for the Paris climate agreement.

In order to reduce the environmental impact of its own everyday activities, in 2005 the Commission became the first EU Institution to implement the Eco-Management and Audit Scheme (EMAS). Initially limited to Brussels, the scheme now includes its eight largest sites in Europe: Brussels, Luxembourg, Joint Research Centres Geel (Belgium), Petten (the Netherlands), Seville (Spain), Karlsruhe (Germany), and Ispra (Italy), along with Directorate General SANTE at Grange (Ireland). The Commission publishes its environmental performance results in the Environmental Statement.

This Corporate Summary of the Environmental Statement includes Commission results up to 2020 aggregated from the eight sites. Eight standalone annexes provide analysis for each site. The Commission met, and in part due to the COVID pandemic, largely exceeded its Corporate 2014-20 targets for core indicators.

The Commission sites have proposed new targets for 2023 to 2030, a difficult exercise given the atypical circumstances and reporting for 2020 and, as in many other places, the difficulty of predicting what our workplace and working practices will be post-pandemic. It is clear however, given tough budgetary constraints, that the Commission will seek to use office space more efficiently, build on the gains in using IT technology to reduce the need for business travel, and allow staff greater freedom to adopt working patterns that improve the work/home balance.

Gertrud Ingestad
Director-General
President of the EMAS Steering Committee

VALIDATION PAGE

AENOR

ENVIRONMENTAL VERIFIER'S DECLARATION ON VERIFICATION AND VALIDATION ACTIVITIES

AENOR INTERNACIONAL, S.A.U., with EMAS environmental verifier registration number ES-V-0001, accredited for the scopes: 99 "Activities of extraterritorial organisations and bodies", 84.1 " Administration of the State and the economic and social policy of the community", 71.2 "Control activities and technical analysis", 72.1 "Research and experimental development in natural sciences and engineering", 72.2 "Research and experimental development on social sciences and humanities", 35.11 "Production of electricity", 35.30 "Steam and air conditioning supply", 36.00 "Water collection, treatment and supply", 37.00 "Sewerage" (NACE Code) declares

to have verified the sites as indicated in the environmental statement of **EUROPEAN COMMISSION**, with registration number BE-BXL-000003

meet all requirements of Regulation (EC) Nº 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community Eco-Management and Audit Scheme (EMAS), amended by Regulation (EU) 2017/1505 and Regulation (EU) 2018/2026.

By signing this declaration, I declare that:

— the verification and validation has been carried out in full compliance with the requirements of Regulation (EC) Nº 1221/2009 amended by Regulation (EU) 2017/1505 and Regulation (EU) 2018/2026,

— the outcome of the verification and validation confirms that there is no evidence of non-compliance with applicable legal requirements relating to the environment,

— the data and information of the environmental statement of the sites reflect a reliable, credible and correct image of all the sites activities, within the scope mentioned in the environmental statement.

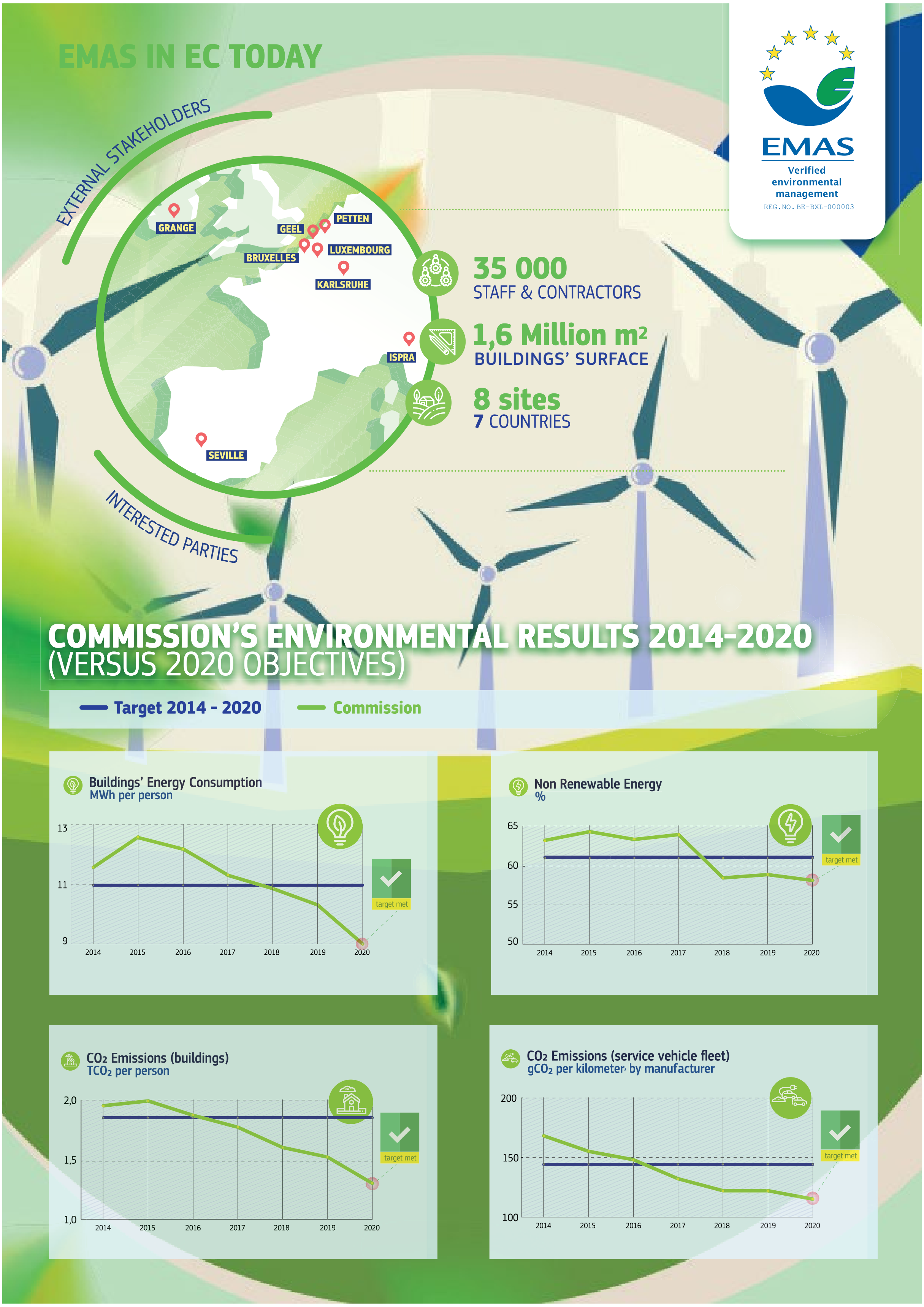
This document is not equivalent to EMAS registration. EMAS registration can only be granted by a Competent Body under Regulation (EC) Nº 1221/2009 amended by Regulation (EU) 2017/1505. This document shall not be used as a stand-alone piece of public communication.

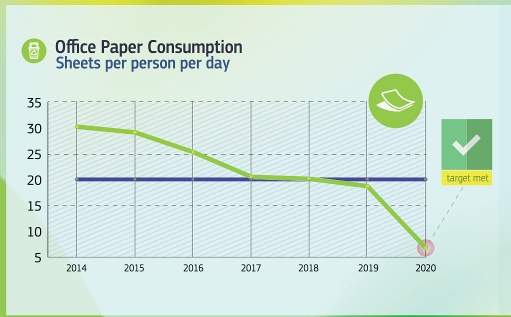
Done at Madrid, on December 13, 2021

Signature

Rafael GARCÍA MEIRO
Chief Executive Officer

EXECUTIVE SUMMARY





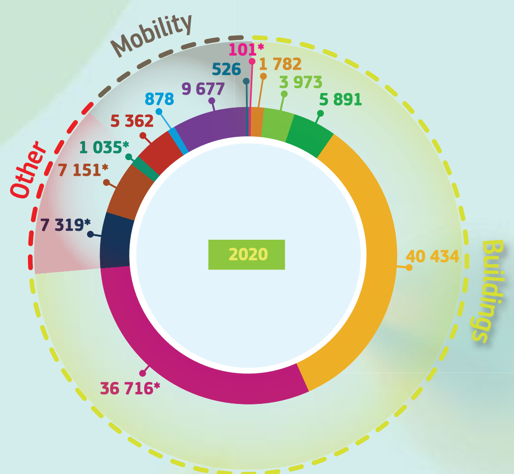
COMMISSION'S CARBON FOOTPRINT (EMAS PERIMETER)

BUILDINGS
- Buildings - Coolant losses (CO_2e)
- Buildings -District heating / cooling
- Buildings (Electricity)
- Buildings (Fuel for heating)
- Fixed assets * - buildings

MOBILITY
- Staff Commuting (contributing sites)
- Missions other
- Missions (air)
- Vehicle Fleet - Fuel Consumption
- Fixed assets * - Commission vehicles

OTHER
- Fixed assets * - IT
- Goods & services contracts *
- Own waste *

* Indicators introduced in 2018



EMAS IS ALSO ABOUT ...

- Legal compliance
- Employee involvement
- Management commitment
- Communication
- Leading by example

Progress in implementing the EU's Eco Management and Audit Scheme (EMAS)

1) Current system scope: The Commission's EMAS system encompasses its eight largest sites in Europe:

- The main administrative sites of Brussels and Luxembourg;
- The five Joint Research Centre sites beyond the headquarters in Brussels: Petten (Netherlands), Geel (Belgium), Seville (Spain), Karlsruhe (Germany), Ispra (Italy); and
- DG SANTE at Grange (Ireland)

While Brussels, DG SANTE at Grange and JRC-Seville host mainly administrative buildings, the remainder also have laboratories, the JRCs in particular have extensive technical infrastructure.

2) Changes in this report: The system has been relatively stable in geographic scope in recent years. Improvements incorporated in 2020 reporting are:

- Further refinement of the carbon footprint at site level, taking into account upstream emissions, following scope expansion in 2018;
- Consideration, in this corporate summary, using high level assumptions of the impact of teleworking through the COVID 19 pandemic; and
- Consideration of targets to 2023 and 2030 for core parameters, that were formulated prior to data for 2020 becoming available, and which in some cases were already met in 2020.

3) Performance against 2014-20 targets for EMAS core indicators: The general positive trend observed for most core parameters up to 2019 accelerated in 2020 with final performance (excluding homeworking impacts) significantly exceeding 2014-20 targets as shown below, in large part to staff absence during the COVID pandemic.

		Commission performance 2014 - 2020 (%)	
No	**Indicator**	**Target**	**Performance**
1a	Total energy consumption (Bldgs) - MWh/p	-5.2	**– 23**
1a	Total energy consumption (Bldgs) -kW/m^2	-5.2	**– 10**
1c	Non renewable energy (bldgs) - %	-3.3	**– 8**
1d	Water consumption - m^3/p	-5.4	**– 38**
1d	Water consumption - L/m^2	-4.8	**– 28**
1e	Office paper consumption - Sheet/p/day (or T/p)	-34	**– 78**
2a	CO_2 emissions (bldgs.) - TCO_2/p	-5.1	**– 34**
2a	CO_2 emissions (bldgs.) - $kgCO_2/m^2$	-5.2	**– 24**
2c	CO_2 emissions (vehicles) - gCO_2/km (manufacturer spec.)	-14	**– 31**
2c	CO_2 emissions (vehicles) - gCO_2/km (actual)	-4.9	**– 20**
3a	Non hazardous waste - T/p	-9.7	**– 57**
3c	Unseparated waste (%) **	-6.0	5 ***
3c	Separated waste (%) ***		**– 54**

Note: *Global Annual Action Plan 2021; **Redefined parameter; ***due partly to large hazardous waste reduction in Brussels in 2020; ****New parameter

The COVID pandemic has accelerated a move towards digital working, more rational buildings use, and a large drop in missions. The reported carbon footprint reduced by 40% from 2019 -20.

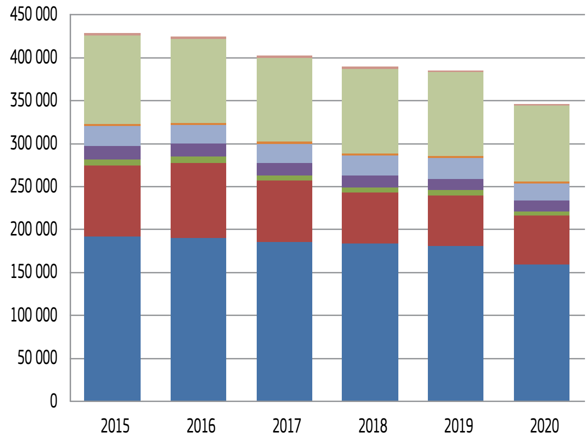
4) High level estimates for the impact of homeworking suggest that the additional energy use and emissions may be significant for Brussels and Luxembourg, and could contribute to additional carbon emissions under some scenarios. Per capita water use may be slightly higher at home, waste generation comparable, and office paper consumption likely much less than 10% of the 2019 value.

5) Going forward: High on the agenda for 2021 and beyond will be the need to:

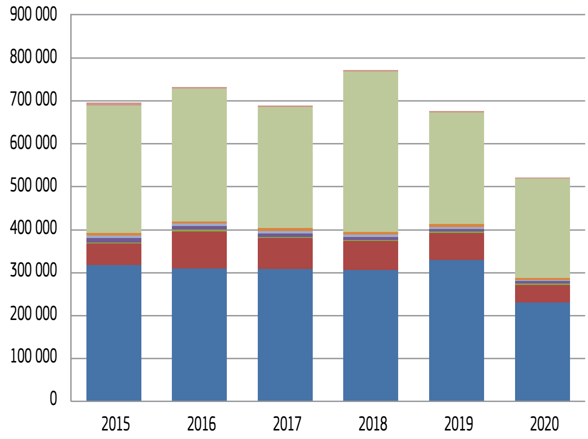
- Contribute to the GHG emissions reduction strategy for 2030 under the Green Deal;
- Work with the European Parliament to encourage take up of EMAS in EC representations and houses of Europe, and integrate four Executive Agencies

COMMISSION PERFORMANCE AT THE EMAS SITES, EVOLUTION OF KEY RESOURCE PARAMETERS

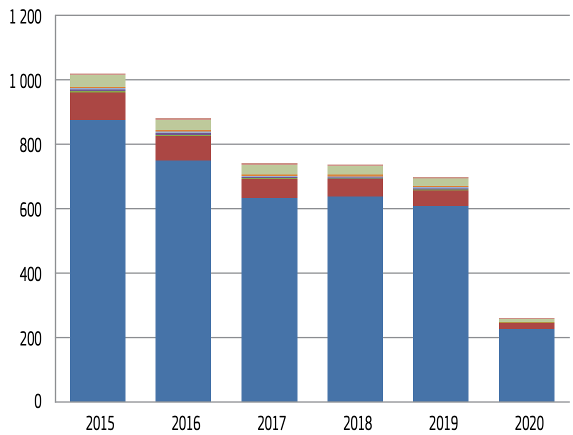
Buildings' energy consumption (MWh)



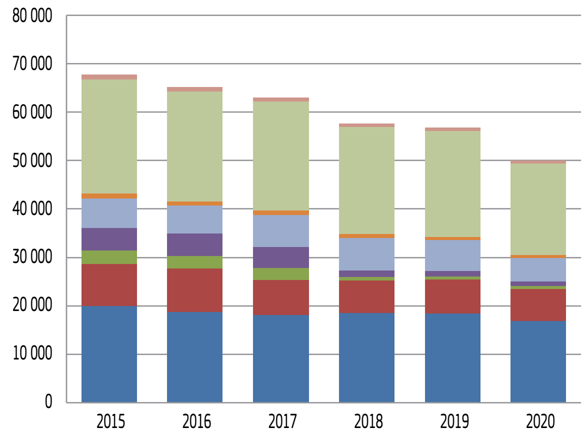
Water consumption (m^3)



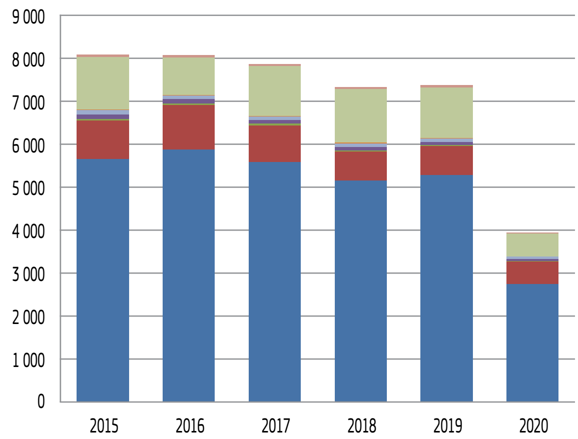
Office paper consumption (tonnes)



Emissions from buildings' energy use (tonnes CO_2e)



Non-hazardous waste generation (tonnes)



Legend

CONTENTS

Annexes A to H are the site reports validated separately during the verification audits at each site, but with common structure page numbers as follows:

		Annex A: Brussels	ANNEX B: Luxembourg	ANNEX C: JRC-Petten	ANNEX D: JRC-Geel	ANNEX E: JRC-Seville	ANNEX F: JRC-Karlsruhe	ANNEX G: JRC-Ispra	ANNEX H: SANTE at Grange
1	Overview of core indicators	A5	B6	C3	D3	E3	F3	G6	H5
2	Description of activities, context, stakeholders	A7	B8	C5	D5	E6	F5	G7	H7
3	Environmental impact of activities	A10	B10	C10	D12	E15	F14	G17	H11
4	More efficient use of natural resources	A12	B12	C10	D14	E15	F14	G19	H13
5	Reducing carbon footprint and air emissions	A17	B16	C14	D20	E20	F19	G30	H16
6	Improving waste management and sorting	A24	B20	C18	D26	E25	F23	G39	H19
7	Protecting biodiversity	A26	B22	C19	D28	E27	F26	G47	H20
8	Green public procurement	A26	B22	C20	D31	E28	F27	G51	H22
9	Legal compliance and emergency preparedness	A27	B22	C20	D31	E28	F27	G54	H22
10	Communication	A28	B24	C21	D33	E29	F29	G56	H23
11	Training	A29	B25	C22	D34	E30	F30	G61	H24
12	EMAS costs and savings	A29	B25	C22	D35	E31	F30	G61	H24
13	Conversion factors	A30	B26	C23	D36	E32	F31	G63	H25
14	Summary buildings table (optional)	A31	B27	C24	D37			G64	H26

1 Introduction and background information

1.1 About this Environmental Statement

The European Commission (EC) implements the Eco-Management and Audit System (EMAS) Regulation[1] which requires organisations to publish an Environmental Statement (ES). The EC achieved its first EMAS registration in 2005 which covered part of its activities in Brussels.

The EC has since expanded the scope of its EMAS registration considerably and developped a site based approach. This ES, which reports on 2020 activities, is the basis for the EMAS registration update for the EC's eight main sites in Europe as listed in Table 1.1 in their order of incorporation into the EC's EMAS registration.

Table 1.1 Commission sites included in the EMAS registration

Country	Commission site	For further detail, see Annex
Belgium	Brussels (EC main administrative centre,with over 40 Directorates and Services plus six Executive Agencies), with buildings located in the Brussels Region and in Flanders. (further detail in Annex A)	A
Luxembourg	Luxembourg (EC second administrative centre)	B
Netherlands	JRC-Petten, (near Alkmaar)	C
Belgium	JRC-Geel, (east of Antwerp)	D
Spain	JRC-Seville	E
Germany	JRC-Karlsruhe	F
Italy	JRC-Ispra (near Milan)	G
Ireland	Facility of the Directorate General of Health and Food Safety, located at Grange, near Trim, County Meath (DG SANTE at Grange)	H

This ES was produced in two phases:

- **Phase 1**: Separate "stand-alone" reports were prepared for each of the eight sites, as Annexes A to H of this report. The same structure was adopted for reporting at each site as described in the previous page; and
- **Phase 2**: The site data was aggregated where possible to produce Commission results which are described in Chapter 2 of this report. Most of the data included in this volume originates in the site annexes.

The remainder of this chapter provides information on EC activities and its environmental management system, as required by the EMAS Regulation.

1.2 What is the European Commission?

The European Commission is the executive arm of the European Union. Alongside the European Parliament and the Council of the European Union, it is one of three main institutions that govern the Union, and by far the largest. The Commission's activities are steered by 27 Commissioners, assisted by over 30 000 civil servants and other staff working in 33 Directorates-General (DGs), 15 services/offices[2] and departments all over the world. Each Commissioner takes responsibility for a particular area of policy and heads one or more entities that are generally known as DGs.

The Commission's primary role is to propose and enact legislation, and to act as 'Guardian of the Treaties', which involves responsibility for initiating infringement proceedings at the European Court of Justice against Member States and others whom it considers to be in breach of the EU Treaties and other Community law. The Commission also negotiates international agreements on behalf of the EU in close cooperation with the Council of the European Union.

1 Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC.

2 http://ec.europa.eu/about/ds_en.htm

The Commission's headquarters are in Brussels (Belgium), but it also has offices in Luxembourg, Grange (Ireland), Geel (Belgium), Ispra (Italy), Karlsrhue (Germany), Petten (Netherlands), Seville (Spain) and many other places, agencies in a number of Member States and representations in all EU countries. On 1st December 2009, the Treaty of Lisbon entered into force giving the Commission the institutional tools needed for the various enlargements and for meeting the challenges of an EU of 27 Member States.

1.3 Why implement EMAS?

The EC developed EMAS in the 1990s as a tool to improve environmental management across Europe. It was designed first for implementation in industrial sectors and then later modifed so that it could be used for less energy intensive and polluting sectors such as public administration.

Since EMAS was introduced, the International Standards Organisation (ISO) developed ISO 14001, the international standard for environmental management which has been more widely adopted both in Europe and worldwide. EMAS remains however a more rigorous system than ISO 14001, with additional requirements such as:

- A commitment to continual improvement;
- An obligation to publish results (Environmental Statement);
- Commitment to demonstrating legal compliance;
- Employee involvement; and
- Registration by a public authority after verification by an accredited/licensed verifier.

The latest version of ISO 14001, (ISO14001:2015) incorporated some elements of the EMAS Regulation, but not some important ones such as mandatory reporting. So while the annexes of the EMAS Regulation have been updated to incorporate the ISO 14001:2015 requirements so that it remains attractive for those who also need ISO 14001 certification, especially for commercial reasons, EMAS will still be considered the "premium" environmental management system. The new version of the EMAS Regulation came into force in September 2018[3].

Since 2018, the EMAS Regulation requires that Registered Organisations take into account the EMAS Sector Reference Document (with Best Environmental Practices) for Public Administrations which came into force in late 2017.

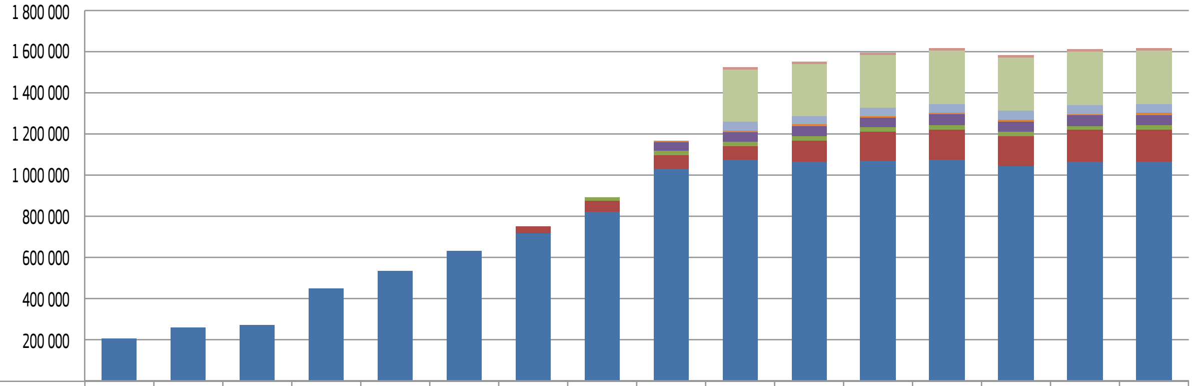
1.4 The development of environmental management through EMAS at the Commission

The Commission's EMAS implementation benefitted from the EMAS III Regulation of 2009, that made it possible to include sites in different countries under one registration. The Commission's EMAS registration which, subject to ongoing administrative procedures by the Brussels EMAS authority, now covers eight sites in seven countries.

Historically and for operational reasons, the Commission separated the EMAS registration of its staff activities (departments) and buildings. The system's communication aspects can be quickly addressed, enabling all staff across the Commission to be included. However, additional buildings in urban settings must be inspected and certified by the national authorities. This is time consuming, and therefore buildings at larger sites (Brussels and Luxembourg) have been added to EMAS each year according to resources available. Smaller sites, such as those of the JRC have been added entirely. Figure 1.1 shows how the "useful" surface area within the EMAS scope has evolved and reflects progress in incorporating new buildings individually at Brussels and Luxembourg, and new sites.

3 Commission Regulation (EU) 2017/1505 of 28 August 2017 amending Annexes 1, II and III to Regulation (EC) No 1221/2009. Registered organisations benefitted from transitional measures until 14 September 2018

Figure 1.1 The evolution of floor space in Commission managed premises[4] to be registered under EMAS (m^2)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	206 166	257 557	272 324	446 562	533 285	633 228	748 748	892 986	1 169 923	1 524 645	1 551 764	1 595 672	1 615 247	1 583 823	1 609 727	1 613 427
Grange										10 010	10 010	10 010	10 010	10 010	10 010	10 010
JRC-Ispra										256 077	253 428	254 356	259 828	261 713	258 539	258 546
JRC-Karlsruhe										41 735	41 735	43 170	43 170	43 170	43 170	43 170
JRC-Seville									6 497	7 017	7 165	7 165	7 580	7 580	7 698	7 756
JRC-Geel									46 390	48 815	50 538	50 538	50 382	50 499	50 525	50 651
JRC-Petten								19 150	19 150	19 458	21 397	20 502	20 842	19 996	19 996	19 996
Luxembourg							27 710	53 808	64 703	66 161	100 221	140 479	145 697	148 847	153 172	156 681
Brussels	206 166	257 557	272 324	446 562	533 285	633 228	721 038	820 028	1 033 183	1 075 372	1 067 270	1 069 453	1 077 739	1 042 008	1 066 617	1 066 617

In 2021 the EC will be seeking, re-registration of eight sites with 1,61 Million square metres of useful floor space, based on reporting for 2020. The number of staff working within the EMAS certified buildings[5] has risen from just over 4 000 in 2005 to more than 35 000 in 2019.

Appendix 1 describes how the Commission implements EMAS, including roles and responsibilities and major system components and requirements.

1.5 Description of activities at the Commission's EMAS sites

Brussels is the main site, the Commission's administrative centre, with a range of buildings dominated by offices but including conference centres, catering facilities, storage depots, print shops, childcare facilities, and sports facilities. The Luxembourg site is of a similar nature, though smaller but also includes a small nuclear laboratory operated by DG ENER.

The five Joint Research Centre (JRC) sites are all incorporated under EMAS and include:

- JRC-Ispra (Italy): a large campus with offices and research facilities, encompassing in addition its own power plant, fire station and water treatment facility, and over 100 heated buildings in total. Most of its nuclear activities (including reactors), are no longer operational. Nuclear plants and storage facilities are under a decommissioning programme that aims to restore "green field" status by 2038.
- JRC-Karlsruhe (Germany) a self-contained site located in a research campus on the outskirts edge of Karlsruhe, with ongoing nuclear activities.
- JRC-Petten (Netherlands) accommodates experimental equipment notably conducting research on fuel cells.
- JRC-Geel (Belgium) contains Van de Graaff and Gelina Nuclear Accelerators, technical installations, and an array of laboratories.
- JRC-Seville (Spain) has advanced computing infrastructure, From an EMAS perspective, it is more similar in nature to the administrative centres of Brussels and Luxembourg, than to the other JRC sites, with the added complexity of being in fully rented premises.

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4 In Brussels this includes space occupied by three Executive Agencies. The premises of all Commission sites have been registered under EMAS other than Luxembourg where the 2019 registration will include 14 of 18 buildings, and Brussels 60 of 61 buildings.

5 In Brussels this also includes Executive Agency staff (from four agencies) in the COVE and other buildings

DG SANTE's site at Grange Ireland is a purpose built low level wooden clad structure dating from 2002 and set in countryside 45km north west of Dublin. It accommodates Directorate F, Health and Food Audits and Analysis, but was previously known as the Food and Veterinary Office (FVO). Many staff members are inspectors or auditors and travel frequently, and typically up to half may be away from the office at any one time. Table 1.2 presents the NACE[6] codes for the Commission's eight EMAS sites

Table 1.2 NACE codes and descriptions of activities at the sites

Code	Description	Brussels	Luxembourg	JRC-Petten	JRC-Geel	JRC-Seville	JRC-Karlsruhe	JRC-Ispra	DG SANTE at Grange
99	Activities of extraterritorial organisations and bodies	√	√	√	√	√	√	√	√
84.1	Administration of the State and the economic and social policy of the community	√	√						√
71.2	Testing and technical analysis		√	√	√		√	√	
72.1	Research and experimental development in natural sciences and engineering			√	√		√	√	
72.2	Research and experimental development on social science and humanities					√			
35.11	Electricity production							√	
35.30	Steam and air conditioning supply							√	
36.00	Water collection, treatment and supply							√	
37.00	Sewerage							√	

Characteristics of the sites in terms of staff and infrastructure are presented below:

Table 1.3 Basic characteristics of the Commission EMAS sites 2020

Site	Staff		Buildings for registration		Useful surface (m^2)	
	EMAS	Total	EMAS	Total	EMAS	Total
Brussels (all EMAS buildings)	29 655	29 941	60	61	1 066 617	1 069 020
Luxembourg	5 240	5 240	15	18	156 881	181 606
JRC-Petten	247	247	12	14	19 996	19 996
JRC-Geel	266	266	17	17	50 651	50 651
JRC-Karlsruhe	309	309	4	4	43 170	43 170
JRC-Seville	382	382	1	1	7 756	7 756
JRC-Ispra	2 411	2 411	376	376	258 546	258 546
Grange	173	173	3	3	10 010	10 010
Total	**38 683**	**38 969**	**488**	**494**	**1 613 427**	**1 640 755**

The Brussels site clearly dominates staff numbers with approximately three times more total staff than the other sites combined. Both Brussels and Luxembourg have buildings and facilities spread out throughout their respective cities and have implemented EMAS gradually. Brussels includes all its occupied buildings[7] within EMAS reporting effectively completing a phased implementation that started with its first EMAS registration in 2005 which included eight buildings.

Luxembourg started EMAS registration for its buildings in 2011 and by 2020 EMAS registered buildings accounted for 82% of floor space and accommodating 85% of staff. It will incorporate the remaining buildings by 2021[8]. As self-contained sites[9], each of the JRC research sites and SANTE Grange were incorporated entirely into EMAS.

6 Statistical classification of economic activities in the EU

7 Buildings managed by OIB, Executive Agencies in COVE and other buildings, PALM building excluded.

8 FISCHER building in 2021 – remaining buildings CPE1 & 2 and Maison d'Europe may be replaced

9 JRC-Seville occupies part of a commercial building.

1.6 Assessing the environmental impacts of European Union policies

The Commission takes environmental issues into account when drafting and revising EU policies, through the impact assessment system usually managed through the Secretary General. This document does not consider the impact assessment system and its application to the myriad of EU policies[10].

The Commission provides financial support for environmental projects via the LIFE programme and others and has policies addressing global warming and in relation to energy and transport. The following pages are among those dedicated to particular policies and important initiatives:

1. Impact assessment system:
   https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/impact-assessments_en
2. EU environment policy and evaluation: http://ec.europa.eu/environment/index_en.htm
3. LIFE+ programme: http://ec.europa.eu/environment/life/index.htm
4. Climate policy: https://ec.europa.eu/clima/policies/eu-climate-action_en
5. Energy strategy: https://ec.europa.eu/energy/topics/energy-strategy-and-energy-union_en
6. Transport policy: http://ec.europa.eu/transport/index_en.htm
7. The European Green Deal: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

The impact assessment system therefore takes into account the environmental impact of EU policies and legislation on Member States. All draft impact assessment reports have to be submitted for quality and scrutiny to the Regulatory Scrutiny Board (RSB)[11]. A positive opinion is in principle needed from the Board for an initiative accompanied by an impact assessment to proceed. RSB opinions[12] are published alongside the final impact assessment report and proposal at the time of adoption. As the responsibility of the adoption of EU policies is shared with the European Council and European Parliament, the EMAS management system is not the appropriate tool for managing these policies.

The Commission's management system therefore addresses the Commission's operational activities, i.e. those that EC management can control or influence.

1.7 The Commission's environmental policy

The corporate environmental policy is a pillar of the environmental management system, and signed by the Director General of the Human Resources Directorate (DG HR) as chair of the EMAS Steering Committee. It is displayed at the entrance of all the EMAS sites and registered buildings. Updated in 2020, it sets out the Commission's political commitments and objectives to reduce the environmental impacts of its everyday work in accordance with the UN Sustainable Development's Goals, by :

- Using natural resources more efficiently, particularly in relation to energy, water and products such as paper
- Continuously reducing our operations' atmospheric emissions (mainly from operation and transport) with the objective of making the Commission climate-neutral by 2030;
- Improving waste management and sorting, where waste prevention measures have been exhausted, so that waste recycling is optimised and residual waste reduced;
- Protecting biodiversity;
- Promoting sustainable and environmentally responsible public procurement procedures for example by introducing appropriate criteria into the tender and contract process, and incorporating life cycle cost considerations where feasible;

10 Detailed information on EU policies available on www.europa.eu

11 http://ec.europa.eu/info/law-making-process/regulatory-scrutiny-board_en

12 http://ec.europa.eu/smart-regulation/impact/ia_carried_out/cia_2015_en.htm

- Ensuring (and demonstrating) compliance with environmental legislation and regulations including in relation to emergency preparedness, thereby reducing pollution risk
- Encouraging staff and contractors to embrace sustainable behaviour through improved internal communication, awareness-raising, and training;
- Enjoying transparent relations and dialogue with external parties, taking into account and addressing stakeholder expectations;
- Improving the EMAS system including ensuring consistency with European Union policies
- Additionally, and though not falling within the EMAS scope, the Commission will ensure through assessments carried out by its services, that in relation to its core business, it will:
- Systematically assess the potential economic, social and environmental impacts of major new policy and legislation
- Ensure the effectiveness of environmental legislation and funding in creating environmental benefits

Some EMAS sites have developed more specific environmental policies.

2 The commission's environmental performance to 2020

This section presents an overview of the individual results for the eight sites participating in EMAS, each of which has a separate report in Annexes A to H and where possible aggregated data representing the Commission. The following chapters (and appendices) provide more detailed analyses.

2.1 Summary of progress towards targets for selected core indicators in 2014-20 and future targets

Table 2.1 summarises the individual sites' and Commission performance trends in recent years and progress towards 2014-20 targets for selected (and often communicated) core parameters. Targets for 2023 and 2030 are also included. The Commission met 2014-20 targets with reductions exceeding 20% for all parameters. Absence of nearly 90% of staff for much of 2020 has resulted in significantly improved performance, even exceeding targets for 2030 for some parameters

Table 2.1 Summary of performance for selected parameters at EMAS sites

Physical indicators (Number, description,unit)	Historic data values					Performance trend (%) since [4]:		Previous target		Future target	
	First EMAS data [1]	2014	2018	2019	2020	First EMAS data [1]	2014	2020 [2,3,4]		2014-23	2014-30
								Δ %	Value	Δ % [3]	Δ % [3]
1a) Energy bldgs (MWh/p)											
Brussels	19.06	**6.95**	6.75	6.34	5.38	**-71.8**	**-22.6**	-5.0	6.60	-11	-18
Luxembourg	8.35	**17.42**	11.75	11.50	10.91	**30.7**	**-37.4**	-5	17	-30	-55
JRC-Petten	37.46	**23.99**	26.41	24.24	19.91	**-46.8**	**-17.0**	-5	23	-8	-14
JRC-Geel	60.62	**51.21**	53.09	49.81	44.35	**-26.8**	**-13.4**	-5	49	-6	48
JRC-Seville	11.17	9.13	6.87	6.29	5.91	**-47.1**	**-35.2**	-8	8	-35	-40
JRC-Karlsruhe	78.64	**64.03**	73.06	76.90	66.30	**-15.7**	**3.5**	-	-	0	0
JRC-Ispra	53.22	**44.32**	43.39	41.92	36.73	**-31.0**	**-17.1**	-6	42	-10	-16
Grange	10.21	**12.69**	10.75	11.27	9.88	-3.3	**-22.2**	-5	12	-19	-34
Commission		**11.57**	**10.86**	**10.31**	**8.95**		**-22.6**	**-5.2**	**10.97**	**-16**	**-26**
1d) Water use (m^3/person)											
Brussels	28.44	**12.57**	11.22	11.54	7.79	**-72.6**	**-38.0**	-8	12	0	-5
Luxembourg	12.26	**14.48**	13.63	12.42	7.86	**-35.9**	**-45.7**	0	14	25	0
JRC-Petten	11.50	**11.14**	8.00	9.83	8.99	**-21.8**	**-19.3**	-5	11	-13	-14
JRC-Geel	79.57	**34.75**	28.97	28.61	22.74	**-71.4**	**-34.6**	-5	33	-18	28
JRC-Seville	42.81	**21.73**	14.66	13.18	13.04	**-69.5**	**-40.0**	-5	21	-45	-50
JRC-Karlsruhe	16.51	**21.03**	19.11	15.22	12.29	**-25.6**	**-41.6**	-5	20	-29	-32
JRC-Ispra	234.4	**125.3**	163.3	112.1	95.3	**-59.3**	**-23.9**	-5	119	-11	-13
Grange	30.66	**27.69**	18.11	16.31	11.50	**-62.5**	**-58.5**	-5	26	-45	-50
Commission		**21.68**	**21.48**	**18.11**	**13.47**		**-37.8**	**-5.4**	**20.51**	**-15**	**-20**
1e) Office paper (sheets/p/day)											
Brussels	77.4	**33.1**	22.7	21.3	7.7	**-90.1**	**-76.8**	-35	21	-40	-50
Luxembourg	32.1	**24.1**	10.9	9.5	3.6	**-88.9**	**-85.2**	-40	14	-50	-55
JRC-Petten	40.0	**15.9**	9.6	19.4	4.7	**-88.2**	**-70.2**	-9	14	0	0
JRC-Geel		**20.4**	11.3	12.4	3.6	0.0	**-82.3**	-5	19	-45	11
JRC-Seville	30.6	**12.6**	12.8	9.7	3.2	**-89.5**	**-74.4**	-5	12	-25	-30
JRC-Karlsruhe		**17.8**	10.8	7.2	0.0	0.0	**-100.0**	-20	14	-22	-24
JRC-Ispra	22.4	**16.5**	12.2	11.0	4.4	**-80.4**	**-73.5**	-20	15	-55	-65
Grange	0.0	**9.9**	18.7	16.5	6.8	0.0	**-32**	-5	9	-22	-25
Commission		**30.2**	**20.1**	**18.7**	**6.8**		**-77.5**	**-34**	**20.0**	**-44**	**-53**

Physical indicators (Number, description,unit)	Historic data values					Performance trend (%) since (4):		Previous target		Future target	
	First EMAS data (1)	2014	2018	2019	2020	First EMAS data (1)	2014	2020 (2,3,4)		2014-23	2014-30
								Δ %	Value	Δ % (3)	Δ % (3)
2a) CO_2 emissions from buildings (tonnes/person)											
Brussels	4.77	**0.71**	0.68	0.65	0.57	**-88.1**	**-19.5**	-5	1	-11	-18
Luxembourg	0.18	**1.73**	1.35	1.36	1.27	0.0	**-26.5**	-5	2	-15	-75
JRC-Petten	14.85	**10.00**	3.14	2.88	2.10	**-85.8**	**-79.0**	-7	9	-73	-76
JRC-Geel	17.57	**14.83**	4.94	4.16	3.88	**-77.9**	**-73.8**	-5	14	-78	3
JRC-Seville	4.54	**3.09**	2.31	1.79	1.30	**-71.4**	**-58.0**	-5	3	-45	-50
JRC-Karlsruhe	19.37	**18.34**	21.21	20.20	15.79	**-18.5**	**-13.9**	-	-	0	0
JRC-Ispra	12.39	**10.27**	9.68	9.40	7.86	**-36.5**	**-23.4**	-6	10	-23	-41
Grange	4.18	**4.91**	3.69	3.65	3.20	**-23.5**	**-34.9**	-5	5	-39	-70
Commission		**1.95**	**1.60**	**1.52**	**1.29**		**-33.8**	**-5.1**	**1.85**	**-29**	**-45**
3a) Non hazardous waste (tonnes/person)											
Brussels	0.300	**0.222**	0.181	0.183	0.092	**-69.3**	**-58.5**	-10.0	0.200	-20	-25
Luxembourg	0.25	**0.103**	0.14	0.13	0.10	**-59.5**	-3.1	0.0	0.1	-35	-40
JRC-Petten	0.08	**0.105**	0.11	0.10	0.07	**-14.9**	**-37.0**	-5.0	0.100	-8	-14
JRC-Geel	0.267	**0.479**	0.292	0.249	0.151	**-43.3**	**-68.4**	-5.0	0.455	-50	0
JRC-Seville	0.000	**0.022**	0.031	0.044	0.014	0.0	**-38.3**	-5.0	0.021	-20	-25
JRC-Karlsruhe	0.000	**0.333**	0.269	0.246	0.194	0.0	**-41.7**	-20.0	0.266	-22	-24
JRC-Ispra	0.474	**0.491**	0.546	0.508	0.218	**-54.1**	**-55.7**	NA	NA	-2	-5
Grange	0.000	**0.251**	0.253	0.230	0.088	0.0	**-65.2**	-5.0	0.239	-10	-12
Commission		**0.237**	**0.197**	**0.195**	**0.101**		**-57.4**	**-9.7**	**0.214**	**-22**	**-26**

Note: NA - not applicable, (1) Earliest reported data: 2005 -Brussels, Grange; 2008 - Karlsruhe; 2010 - Petten, Seville; 2011 - Geel, Ispra, Luxembourg; NB early data for Brussels and Luxembourg is for a small number of buildings only (2) Compared to 2014; (3) EMAS Annual Action Plan 2021 (4) Indicator modified from 2014 to exclude lake water used in cooling circuits

In Luxembourg, for more representative results, reporting[13] for most parameters since 2015 has been for the entire site. Some parameters such as paper supply may be irregular and in large volume particularly in small sites (eg SANTE at Grange), making trends in usage difficult to follow.

The Commission has significantly reduced per capita **buildings' energy consumption**[14] since 2014, including from 2019 to 2020 during the COVID pandemic. JRC-Karlsruhe recorded low consumption in 2014, the baseline year, and is less able to control energy consumption owing to the requirements of the nuclear regulations.

Per capita **water use** has reduced more than a third since 2014, most of this since 2018. Per capita **office paper consumption** has reduced by nearly 80%, with the 2020 value roughly a third of the 2019 value. Reduced buildings' energy consumption in 2020 ensured a drop in the resulting per capita **CO_2 emissions**. The absence of staff for a large part of 2020 also caused a sharp reduction in per capita **non-hazardous waste** generation.

2.2 The COVID pandemic and the impact of homeworking

The figures reported in this Environmental Statement at site level and in this summary have not taken into account the environmental impact of homeworking under the COVID pandemic. Table 2.2 presents high-level estimates of the possible impacts for each of the sites, and are not included elsewhere in this summary or the site annexes. These include three scenarios for home energy consumption, using different assumptions[15] and which lead to a wide range of outcomes for both energy consumption and the resulting emissions.

13 For verification purposes data for EMAS registered buildings only is also available. Reporting only on EMAS registered buildings made it more difficult to discern trends from year to year - particularly when newly registered buildings were very different to existing ones.

14 Measured as final energy (ie through meter readings)

15 Based on hourly heating requirements, considering geographical variations in heating per dwelling and space heating energy mix. Figures assume nearly 90% of staff were homeworking, of whom two thirds were occupying otherwise empty dwellings. Corporate level assumptions used for all the sites,

Table 2.2 Summary of high level estimates of homeworking in relation to 2020 results

1a) Energy consumption of buildings (MWh)	Brussels	Luxembourg	JRC-Petten	JRC-Geel	JRC-Seville	JRC-K'ruhe	JRC-Ispra	Grange
2019 - office	180 853	59 093	6 035	13 049	2 315	24 222	97 749	1 983
2020 - office	159 470	57 166	4 918	11 797	2 259	20 486	88 549	1 709
2020 homework, #1	64 323	13 989	393	577	257	533	3 764	283
2020 homework, #2	12 697	2 467	87	114	89	114	842	62
2020 homework, #3	22 601	4 678	146	203	121	195	1 403	104
1b) Emissions from buildings energy (tonnes CO_2e)								
2019 - office	14 597	5 700	574	857	593	5 800	18 226	541
2020 - office	13 323	5 463	420	813	444	4 652	15 808	469
2020 homework, #1	15 034	3 294	91	135	50	115	657	70
2020 homework, #2	2 897	537	28	26	22	35	203	18
2020 homework, #3	5 226	1 066	40	47	28	50	290	28
2b) Change in commuting emissions, 2019 to 2020 (tonnes CO_2e)								
	-8 240	-3 967	-182	-182	-61	-194	-912	-10
3) Water consumption (m^3)								
2019 - office	329 167	63 815	2 449	7 495	4 849	4 795	261 344	2 870
2020 - office	231 143	41 187	2 221	6 049	4 981	3 797	229 855	1 989
2020 homework, #1	156 039	23 384	1 300	1 400	2 010	1 626	12 686	910
% of 2020 office value	68%	57%	59%	23%	40%	43%	6%	46%
4) Office paper consumption (tonnes)								
2019 - office	608	48	5	3	4	4	24	3
2020 - office	227	19	1	1	1	1	10	1
2020 homework, #1	30	2	0.2	0.2	0.2	0.1	1	0
% of 2020 office value	13%	13%	21%	18%	15%	9%	12%	12%
5) Non haz. waste generation (tonnes)								
2019 - office	5 298	671	24	65	16	78	1 185	40
2020 - office	2 756	521	16	40	5	60	525	15
2020 homework, #1	1 962	67	4	4	6	5	36	10
% of 2020 office value	37%	10%	15%	6%	36%	6%	3%	24%

Figure 2.1: Emissions[16] from office (2019-20), three homework scenarios (2020) and reduced commuting (2019-20), (TCO_2e)

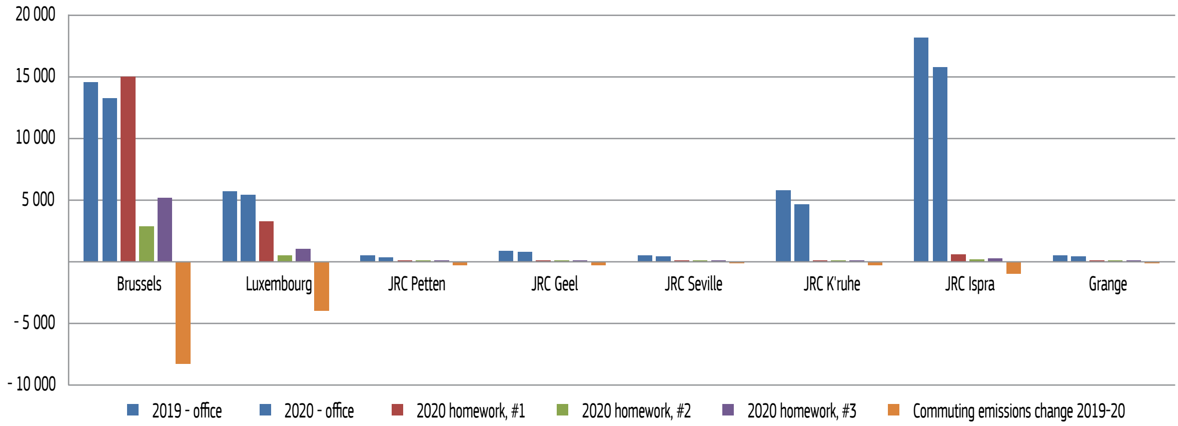


Figure 2.1 shows that relative to 2019 and 2020 office emissions, homeworking emissions are greatest in Brussels and Luxembourg. At these locations they may or may not exceed the likely reduction in commuting emissions resulting from homeworking. The JRC sites with significant non-office infrastructure are proportionately less impacted by homeworking.

16 Emissions from combustion, excluding upstream components

Single scenarios were considered for water and paper use along with waste reduction. Homeworking has drastically reduced paper consumption overall, and the evidence for water and waste generation is less clear-cut.

These figures represent first effort high-level estimations using broad assumptions, and further work is required before incorporating the homeworking impacts within formal site level reporting.

2.3 Status of the Global Annual Action Plan

The EMAS Steering Committee adopted the 2021 EMAS Global Annual Action Plan, prepared in the manner introduced in 2018, and with progress towards the objectives for each site, grouping actions by category. It comprises two main elements, targets under each of the political objectives, and actions to achieve them.

2.3.1 Targets

The 2014-2020 targets were formulated through consultation with the sites. These cover most of the significant aspects that the sites identified. The Commission level target is a weighted average of sites' individual targets. Following a mid-term review of performance from 2014-17, the EMAS Steering Committee revised some **Commission level targets** for 2014-2020 (as above in Table 2.1) for core parameters, making them more ambitious (water use, paper consumption, vehicle fleet emissions, non-hazardous waste).

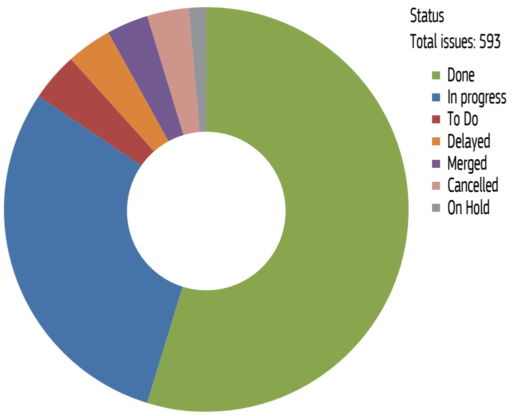
Sites may also develop individual targets or objectives for indicators for which no Commission level target has been set. This may the case for example in the sites with nuclear activity or communication or training activities. In early 2021, targets were also proposed for 2023 (in order to report for the end of the current Commission), and 2030 (deadline for the Commission's carbon climate neutrality target under the Green Deal), complementing work started in the previous Global Annual Action Plan.

However these targets were proposed before the 2020 results were available, which owing to the COVID situation were very low, meaning that some future targets had already been achieved. Targets will be reviewed in 2022 to address this and to take into account corporate level targets arising from the Commission's upcoming communication under the Green Deal.

2.3.2 Number and status of actions

The EMAS Global Annual Action Plan has at its core a database of over 500 actions, past and present, across all the sites that seek to improve the Commission's environmental performance. Every January or February the EMAS Steering Committee formally adopts a new plan, and the February 2021 plan included the actions described below.

Figure 2.2 Status of actions in the EMAS Global Annual Action Plan 2021[17]



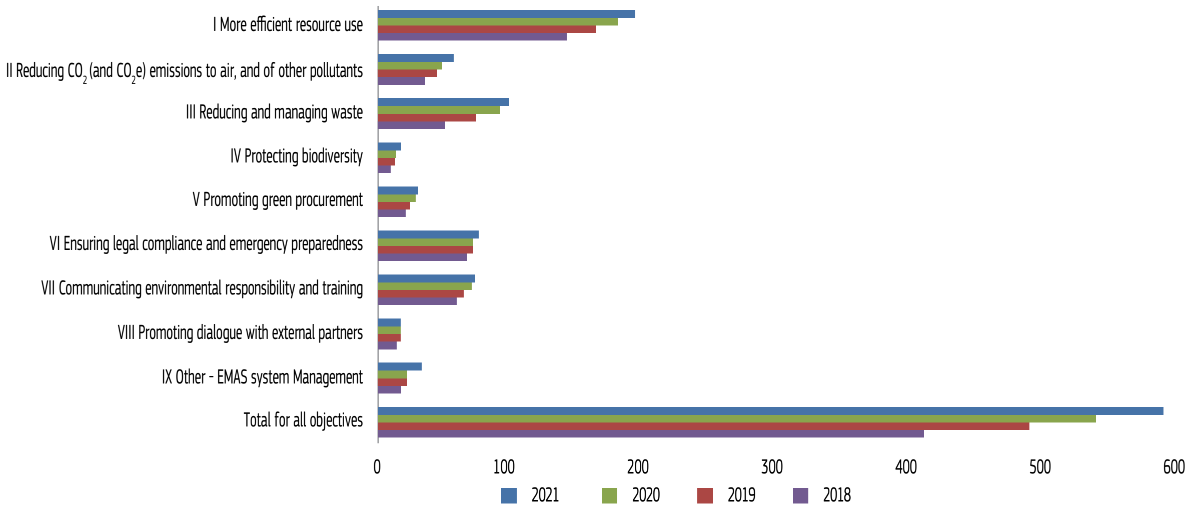
Although roughly half of the actions have been completed, they are retained on the database for reference.

2.3.3 Breakdown of actions by main objective and by site

The actions are distributed across the Commission's main environmental objectives according to Table 2.3 which shows that the Commission continues to add new actions to respond to most environmental objectives.

[17] Global Annual Action Plan as submitted to the EMAS Steering Committee on 5th February 2021, and subsequently adopted on 25th May 2021

Table 2.3 Evolution of actions by main objective in the GAAP, 2018-21



Most main objectives recorded an increase in the number of actions particularly in number **I More efficient resource use** (that includes 22% of all actions are for reducing buildings' energy consumption, and 4% each for reducing water and office paper consumption). No **III Reducing and managing waste** was also important, with the rise for the latter category was in large part due, to the proliferation of actions under DGs ENV and MARE initiative to reduce single use plastics in line with Commission pledges for the Our Ocean Conference in Malta in 2017, and follow-up work in that area. Reducing buildings' energy consumption is the overwhelming priority, the number of actions representing nearly one quarter of all the actions in the database.

Table 2.4 presents the distribution of actions with "active" status, ie those not "cancelled" or "done", or" merged".

Table 2.4 Distribution of active actions by site for main objectives

Main objective	Brussels	Grange	JRC-Geel	JRC-Ispra	JRC-Karlsruhe	JRC-Petten	JRC-Seville	Luxembourg	Total
I More efficient resource use	28	6	5	20	3	3	2	11	78
II Reducing CO_2 (and CO_2e) emissions to air, and of other pollutants	6	2	1	6	0	1	2	3	21
III Reducing and managing waste	10	5	4	10	0	0	4	4	37
IV Protecting biodiversity	0	2	1	4	0	2	1	0	10
V Promoting "green" procurement	4	1	0	4	0	1	1	2	13
VI Ensuring legal compliance and emergency preparedness	8	0	4	1	2	0	0	1	16
VII Communicating environmental responsibility and training	18	1	1	2	0	0	2	2	26
VIII Promoting dialogue with external partners	6	1	0	2	0	0	0	1	10
IX Other - EMAS System Management	15	0	0	0	0	1	0	1	17
Total Unique Issues:	95	18	16	49	5	8	12	25	228

The largest sites, Brussels, Luxembourg and JRC-Ispra have the greatest number of total actions.

Given the relative importance and high number of energy reduction actions (within more efficient resource use), the number of actions that seek to reduce emissions appears relatively low. However this is because most actions that reduce energy consumption also reduce emissions, and these are not counted separately in this this analysis. The data also shows:

- Resource consumption dominated the actions at most sites, Luxembourg and JRC-Seville being exceptions perhaps owing to a larger proportion of rented accommodation.
- There were also many actions relating to communication and legal compliance. Legal compliance actions were a significant proportion of the total at Brussels and Luxembourg because individual buildings in both cities require environmental permits. And JRC-Karlsruhe operates under extensive legal operating requirements and is very closely monitored by the German authorities owing to its nuclear activities. The JRC sites and DG Grange at SANTE don't require registration of individual buildings because their special legal status permits them to be incorporated into EMAS as a whole.

- The relatively large number of actions for more efficient resource use, and waste is in line with important international policy developments. To slow global warming by limiting greenhouse gas emissions, at the United Nations Climate Change Conference in Paris 2015 (COP 21) all 195 countries adopted the first universal climate change agreement aiming to limit temperature rise to well under 2 degrees Celsius by the end of the century. Under the agreement the EU sought to reduce CO_2 emissions by 40% in 2030, although the Commission under the Green Deal plans to increase this to 55%. The Commission has also called for a climate neutral Europe by 2050, and the Commission has itself declared an ambition to become greenhouse gas neutral by 2030.

The EU recently adopted the circular economy package to reduce waste generation and under which by 2030 the EU should achieve common municipal waste recycling target of 65%, 75% target for recycling packaging waste, and an EU wide landfill reduction target of 10%.

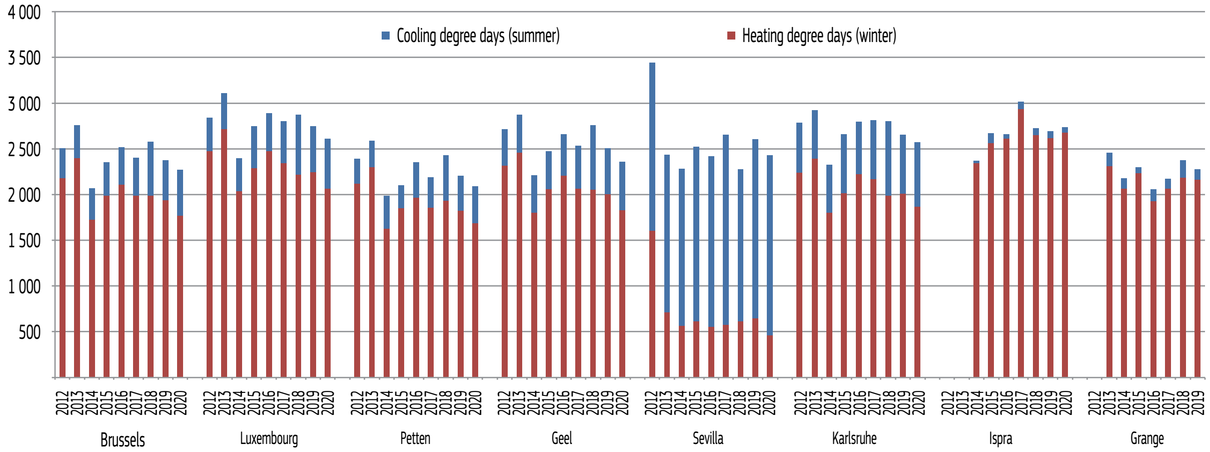
3 Making more efficient use of natural resources

3.1 Energy consumption

3.1.1 Climate influence

Climate influences buildings' energy consumption. One simple means of describing the annual variability in climate is with temperature[18]. Figure 3.1 shows the annual number of heating degree-days and cooling degree-days[19] for meteorological stations near the Commission EMAS sites since 2012.

Figure 3.1 Heating and cooling degree-days for weather stations close to the EMAS sites



Comparing the total number of degree-days from year to year at a site will suggest whether to expect in a given year, and all other factors being equal, more or less energy consumption than in previous years. Figure 3.1 shows that:

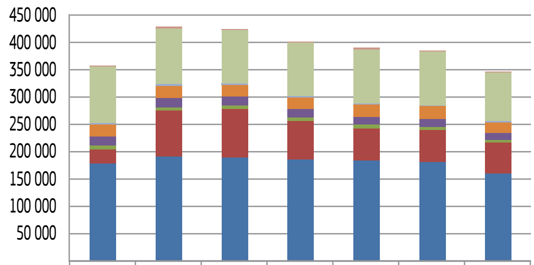
- all sites except JRC-Ispra recorded fewer total degree days in 2020 than in 2019
- for most sites the reduction is notably in the number of heating degree days, indicating milder winter conditions
- 2014, the baseline year for all 2014-20 reduction targets, is challenging for energy consumption, as the three largest consumers (Brussels, Luxembourg, and JRC-Ispra) all record the lowest number of degree days in that year suggesting lower heating and cooling requirements, and therefore making it difficult to demonstrate improvement in the following years.

[18] But factors such as humidity and windspeed are also important.

[19] Source of monthly degree day data: www.degreedays.net, station references EBBR (Brussels), ELLX (Luxembourg), INHLAKMA1 (JRC-Petten), EBBL (JRC-Geel), EDSB (JRC-Karlsruhe), LEZL (JRC-Seville), LIMC (JRC-Ispra), EIDW(DG SANTE at Grange)

3.1.2 Energy use in buildings, breakdown by site

Figure 3.2 Buildings' energy consumption at EMAS sites, 2014-20 (MWh)



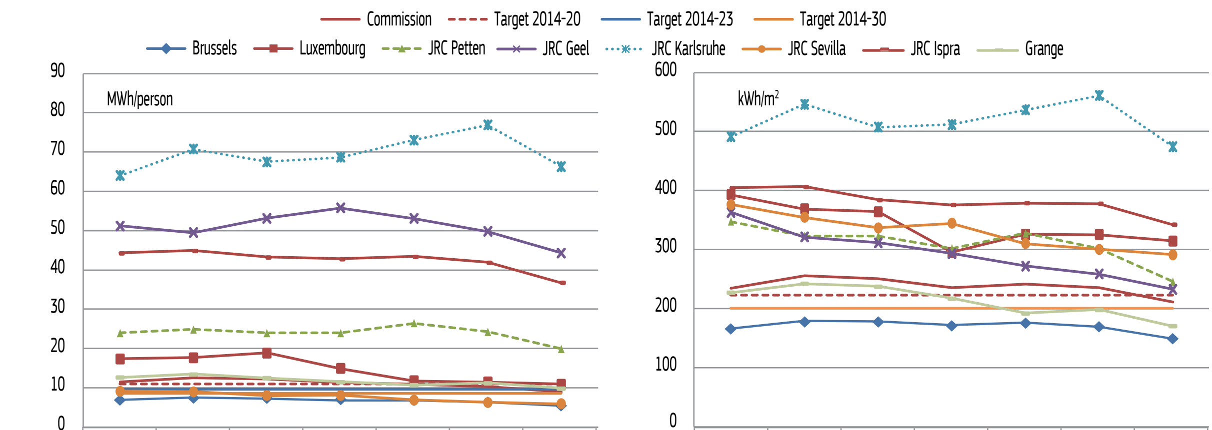
	2014	2015	2016	2017	2018	2019	2020
Total	357 753	428 537	424 917	402 274	389 696	385 301	346 354
Grange	2 271	2 425	2 378	2 177	1 925	1 983	1 709
JRC-Ispra	103 555	103 038	97 716	97 591	99 152	97 749	88 549
JRC-Karlsruhe	2 639	2 542	2 414	2 612	2 351	2 315	2 259
JRC-Seville	20 489	22 786	21 889	22 104	23 158	24 222	20 486
JRC-Geel	17 719	16 243	15 737	14 777	13 750	13 049	11 797
JRC-Petten	6 766	6 913	6 623	6 298	6 551	6 035	4 918
Luxembourg	25 988	82 609	87 795	71 232	58 942	59 093	57 166
Brussels	178 326	191 982	190 364	185 485	183 868	180 853	159 470

Figure 3.2 shows that Brussels and JRC-Ispra[20] account for a large proportion of energy consumption at the Commission sites, reflecting that they have the largest amount of infrastructure.

Luxembourg is the third highest overall consumer of energy. There has been a 10% reduction to in 2020 from 385 to 346 k MWh largely resulting from the COVID pandemic.

Figure 3.3 shows the evolution in per capita and per square meter buildings energy consumption for the EMAS sites, together with the Commission value obtained by aggregating and the values for individual sites and the target for the period 2014-2020.

Figure 3.3 Buildings' energy consumption at EMAS sites, 2014-20 (MWh/p, kWh/m²)



	2014	2015	2016	2017	2018	2019	2020
Commission	11.6	12.6	12.2	11.3	10.9	10.3	9.0
Target 2014-20	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Target 2014-23	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Target 2014-30	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Brussels	6.95	7.47	7.17	6.83	6.75	6.34	5.38
Luxembourg	17.42	17.70	18.87	14.88	11.75	11.50	10.91
JRC-Petten	23.99	24.87	24.00	23.95	26.41	24.24	19.91
JRC-Geel	51.21	49.52	53.16	55.76	53.09	49.81	44.35
JRC-Karlsruhe	64.03	70.77	67.56	68.64	73.06	76.90	66.30
JRC-Seville	9.13	8.98	8.05	8.11	6.87	6.29	5.91
JRC-Ispra	44.32	44.89	43.28	42.86	43.39	41.92	36.73
Grange	12.69	13.47	12.52	11.58	10.75	11.27	9.88

	2014	2015	2016	2017	2018	2019	2020
Commission	235	256	251	235	241	235	211
Target 2014-20	222	222	222	222	222	222	222
Target 2014-30	201	201	201	201	201	201	201
Brussels	166	180	178	172	176	170	150
Luxembourg	393	369	364	296	326	325	315
JRC-Petten	348	323	323	302	328	302	246
JRC-Geel	363	321	311	293	272	258	233
JRC-Karlsruhe	491	546	507	512	536	561	475
JRC-Seville	376	355	337	345	310	301	291
JRC-Ispra	404	407	384	376	379	378	342
Grange	227	242	238	217	192	198	171

The data shows that:

The Commission met its 2014 to 2020 targets for per capita and per square metre emissions with a marked decrease in 2020 compared to 2019, meaning that the Commission also met its 2023 target. (The 2023 target for energy consumption per square metre appears higher than the 2020 target, owing to uncertainty about medium term performance and real estate changes.)

The JRC sites with laboratory or heavy experimental apparatus (Karlsruhe, Geel, Ispra and Petten) have the highest per capita energy consumption from 20 to 80 MWh per annum. The predominantly office dominated sites of Brussels, Luxembourg, Grange and JRC-Seville consumed between 6 and 12 MWh per capita. JRC-Seville continued its trend of reducing both energy consumption by both measures since 2017 largely due to works undertaken

20 JRC-Ispra has its own power plant to produce electricity based on gas (methane).

on the building, likely due in part to a long-term campaign to encourage the landlord to develop more sustainable infrastructure. JRC-Geel achieved improvements in its district heating system using its Building Management System. Karlsruhe has the highest consumption figures, and this is due to the legal requirement to continue full time circulation of air through the nuclear facilities (a permanent flow of around 300 000 m^3).

Table 3.1 describes the types, and number of actions that the sites have identified to reduce total energy consumption of buildings, whether as a primary or secondary objective. Details of individual actions are available in the Global Annual Action Plan (GAAP) actions database.

Table 3.1 Site level actions in the EMAS Global Annual Action Plan to reduce buildings' energy consumption

	Description	BX	LX	PE	GE	KA	SE	IS	GR
STUDIES AND AWARENESS	Awareness/ communications campaigns	1					2		
	Energy action plan or audits, studies	10	3	1	2	1		2	1
	Management review, trends analysis	2	1	1				2	
LIGHTING; MOVEMENT MOTION	Lighting	3	5		5	2		1	1
	Movement sensors	1	1		1			1	
IT	PC turnoff (auto)	1					1		1
	IT cloud strategy	1							
	IT server room consol. strategy	1						1	
	IT-add cold corridors in server rooms		2						
OPERATIONAL OPTIMISATION	Metering and measurement, BMS EMS	1			7	1		3	1
	Use emergency gen-erator. less				1				
	Comfort hours optimisation	5	1						
	End of year buildings closure	2							
	Block/ replace thermostatic valves		2						1
	Air flow optimisation	1							
	Space optimisation							1	
	Optimise heating set point temperatures	1							
BUILDING STANDARDS	Insulation (roof, pipe or unspecified)	2	4	1	1	1		2	1
	New building and standards, or refurbishment, disuse/ demolition of old buildings				1			6	
LARGE INVESTMENT	Upgrade transformers				2				
	Replace cooling towers with free air or other cooling improvements		4		2				
	Geothermal energy or heatpumps				1			1	
	HVAC upgrade				1	2		5	
	Heat transfer system (new)					1			
OTHER	Introduce SPS sintering					1			
	Replace white goods				1				

Sites generally have a have a large number of prioritised actions (too many to list here) and are required to undertake measures with a payback period of less than 5 years. There are a wide variety of actions at most sites, which reflects the significance of the indicator and that many of the actions to reduce buildings energy consumption reduce CO_2 emissions. Studies and audits have been conducted at most sites and actions involving relatively "quick wins" such as relating to lighting and insulation have been widespread. Luxembourg and JRCs Geel, Karlsruhe and Ispra list several actions with larger "investment" projects. (The JRC sites generally have site development plans for 2030).

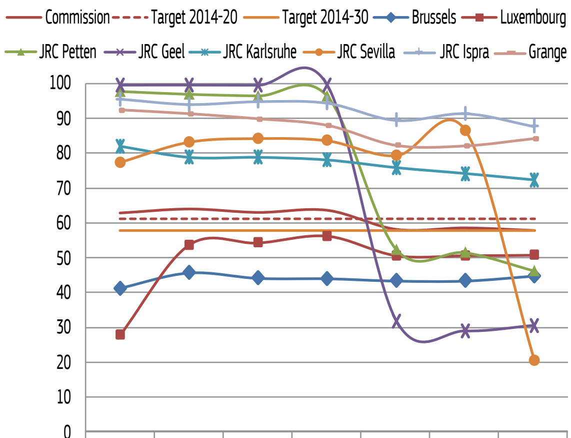
The sites identified the following **key** actions in the 2021 Global Annual Action Plan:

- Brussels: Refurbishing buildings in line with EPB directive; energy audits; optimising comfort hours including holidays; upgrading lighting and sensors; task force energy to analyse ROI and energy savings; adapting lighting in parking; energy reporting tool; liaising with landlords on high consuming buildings (energy, water); central air optimisation; long term optimisation of heating set point temperatures; identify potential to install voltaic panels; end of year close down; monitoring buildings' baseline outside working hours, shutting down and adapting buildings in response to COVID;

- Luxembourg: construction of JMO2 buildings (BREEAM excellent design rating); reduce temperatures at end of year closure; install LED lighting, assess potential to improve energy performance with open space floors;
- JRC-Ispra: Demolition plan to remove old buildings; apply BREEAM to construction of selected JRC buildings; implement site development plan considering the new Buildings Energy Certification Policy; implement site generated renewable thermal energy (heat pumps) (407); Install photovoltaic panels;
- JRC-Geel: Buildings management system (BMS) optimisation of air compressors or technical equipment in specific buildings; replacing cooling collector; install higher efficiency transformers; install LED street lighting; assess impact of reducing GELINA accelerator pulse frequency;
- JRC-Petten: Implementing automated energy information system; Improving external insulation in building 310
- DG SANTE at Grange: Tender for electricity from renewables; life cycle analysis; and heating from geothermal origin.

3.1.3 Buildings energy from renewable sources

Figure 3.4 Percentage of Commission buildings' energy generated from non-renewable sources



	2014	2015	2016	2017	2018	2019	2020
Commission	62.8	64.0	63.0	63.6	58.2	58.7	57.9
Target 2014-20	60.8	60.8	60.8	60.8	60.8	60.8	60.8
Target 2014-30	58	58	58	58	58	58	58
Brussels	41.2	45.7	44.1	44.0	43.3	43.3	44.8
Luxembourg	27.8	53.7	54.2	56.2	50.6	50.6	50.8
JRC-Petten	97.8	97.0	96.5	96.4	52.3	51.5	46.2
JRC-Geel	99.5	99.5	99.5	99.5	31.8	28.9	30.5
JRC-Karlsruhe	82.0	78.8	78.8	78.0	75.8	74.1	72.2
JRC-Seville	77.4	83.2	84.2	83.6	79.3	86.5	20.4
JRC-Ispra	95.5	94.0	94.8	94.3	89.4	91.4	87.7
Grange	92.5	91.4	89.9	88.1	82.3	82.2	84.3

Figure 3.4 shows that the Commission has reduced the percentage of buildings metered energy consumption generated from non-renewable sources from 63 to 58 % between 2014 and 2020, and has met the 2020 target. The 2023 and 2030 Commission targets struggle to show improvement on the 2020 target largely because the most evident strategic options such as electricity from renewable sources have already been adopted.

Both Brussels and Luxembourg have been purchasing almost all of their electricity from renewable sources, the former introducing its renewable energy contract in August 2009, and in the last couple of years both JRC-Geel and JRC-Petten have followed (in 2018), and JRC-Seville in 2020.

Several sites have developed photovoltaics capacity to generate energy on site (especially JRCs Petten and Ispra). Both JRCs Ispra (starting in 2015) and Petten use ground source heat pumps, along with Brussels (in building MO15). A wood chip boiler, served by sustainable forests in the immediate region, generates part of Luxembourg's heating supply.

JRC-Geel is supporting the development of a local energy supply from superheated groundwater at 3km depth that is under development by its supplier VITO. Although the high pressures involved in the reinjection process have triggered small tremors that have required further site investigation prior to authority approval.

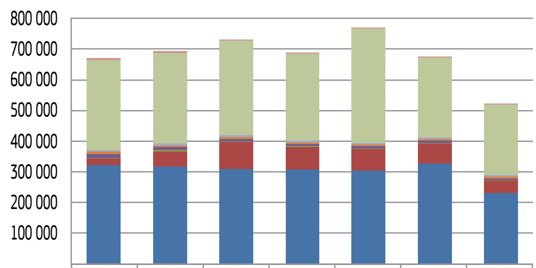
Lake water abstraction reduces JRC-Ispra's requirement for cooling energy, although rising temperatures in Lake Maggiore have been a challenge in recent years. Other examples of actions to increase the proportion of renewable energy include monitoring systems for photovoltaic panels (JRC-Ispra), and geothermal heat pumps.

The sites identified the following **key** actions in the 2021 Global Annual Action Plan:

- Luxembourg: Construction of JMO2 BREEAM design 'excellent' rating;
- JRC-Ispra: Installation of renewable site generated energy heat pumps; photovoltaic panels; Installation of photovoltaic panels;
- JRC-Petten: Installation of photovoltaic panels;
- DG SANTE at Grange: Sign contract for electricity from renewable sources.

3.2 Water use

Figure 3.5 Water use at EMAS sites, 2014-20 (m³)

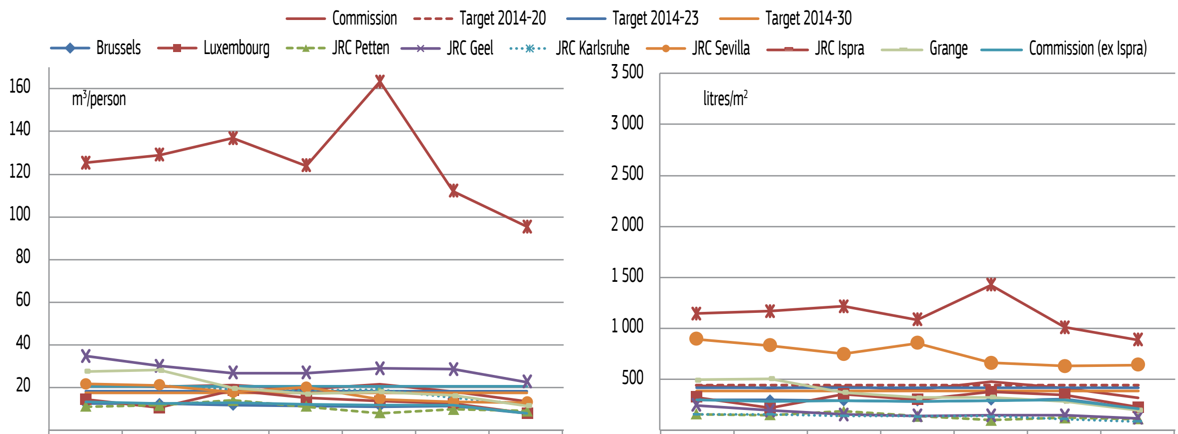


	2014	2015	2016	2017	2018	2019	2020
Total	670 128	694 406	733 072	689 080	771 246	676 784	521 222
Grange	4 956	5 069	3 754	3 219	3 241	2 870	1 989
JRC-Ispra	292 866	295 838	309 077	282 182	373 192	261 344	229 855
JRC-Karlsruhe	6 281	5 963	5 356	6 474	5 013	4 849	4 981
JRC-Seville	6 730	6 717	6 235	6 005	6 058	4 795	3 797
JRC-Geel	12 023	9 861	7 950	7 142	7 503	7 495	6 049
JRC-Petten	3 141	3 250	3 877	2 950	1 984	2 449	2 221
Luxembourg	21 604	49 016	86 589	72 669	68 366	63 815	41 187
Brussels	322 527	318 692	310 234	308 439	305 889	329 167	231 143

Figure 3.5 shows that Brussels and JRC-Ispra are the greatest water consumers. The Commission reduced its water consumption by 23% from 677 to 521 k m³ in 2020, due in part to the COVID pandemic.

JRC-Ispra's water use indicator was redefined in 2021 to exclude water used in the extensive cooling circuits across the site, and therefore to provide a more comparable usage to the other sites.[21] The site also contains fire services, a water treatment works, sports centres and supplies residential properties, leading to relatively high per capita usage.

Figure 3.6 Water use at EMAS sites, 2014 -20 (m³/p, litres/m²)



	2014	2015	2016	2017	2018	2019	2020
Commission	22	20	21	19	21	18	13
Target 2014-20	21	21	21	21	21	21	21
Target 2014-23	18.3	18.3	18.3	18.3	18.3	18.3	8.3
Target 2014-30	17.4	17.4	17.4	17.4	17.4	17.4	17.4
Brussels	13	12	12	11	11	12	8
Luxembourg	14	11	19	15	14	12	8
JRC-Petten	11	12	14	11	8	10	9
JRC-Geel	35	30	27	27	29	29	23
JRC-Karlsruhe	21	21	19	19	19	15	12
JRC-Seville	22	21	18	20	15	13	13
JRC-Ispra	125	129	137	124	163	112	95
Grange	28	28	20	17	18	16	11
Commission (ex Ispra)	13	13	13	12	12	12	8

	2014	2015	2016	2017	2018	2019	2020
Commission	440	414	432	403	477	413	318
Target 2014-20	418	418	418	418	418	418	418
Target 2014-23	417	417	417	417	417	417	417
Target 2014-30	391	391	391	391	391	391	391
Brussels	300	299	290	286	294	309	217
Luxembourg	327	219	359	302	378	351	227
JRC-Petten	161	152	189	142	99	122	111
JRC-Geel	246	195	157	142	149	148	119
JRC-Karlsruhe	161	161	144	139	140	111	88
JRC-Seville	895	832	748	854	661	630	642
JRC-Ispra	1 144	1 167	1 215	1 086	1 426	1 011	889
Grange	495	506	375	322	324	287	199
Commission (ex Ispra)	297	280	294	280	294	301	211

The data show that:

- The Commission reduced per capita water consumption in Brussels since by a third since 2014.
- The JRCs at Seville, Geel and Ispra have recorded the largest reductions in consumption over the last three to four years, with JRC-Ispra introducing several infrastructure related initiatives. Improving the network and reducing leaks enabled JRC-Ispra to follow a rise in consumption in 2018 with a larger decrease in 2020.

[21] Unlike other sites, JRC-Ispra was designed to use its own intake (from nearby Lake Maggiore). Indeed, this low cost and readily available water supply was one reason to select the site to host EURATOM facilities

- The Commission's water consumption in 2020 met the 2014-23 and 2014-30 reduction targets, as these later targets had been formulated before 2020 results became available and which were much lower than for 2019.

Table 3.2 describes the types, and number of actions that the sites have identified to reduce water consumption whether as a primary or secondary objective. Further details are available in the Global Annual Action Plan

Table 3.2 Site level actions in the EMAS Global Annual Action Plan to reduce water consumption

	Description	**BX**	**LX**	**PE**	**GE**	**KA**	**SE**	**IS**	**GR**
STUDIES / AWARENESS	Studies, improve plans, drawings				1		1		1
OPERATIONAL OPTIMISATION	Check metering devices							1	
	Improved monitoring system	1		1	3			4	1
	Water saving devices on taps or water dispensers	1	1				1		
	Remove hot water to sanitary rooms		1						
	Reduce water pressure		1						
LARGE INVESTMENT	Connect cooling network to buildings							1	
	Introduce or improve rainwater recycling				2				
	Modify, remove or replace cooling towers		5		2				
	Infrastructure (HVAC) upgrade and optimization							1	
	Install cascade of pumps and variators		1					1	

Several actions at Luxembourg involve reducing the number of cooling towers. Several actions primarily target another indicator (usually 1a, reducing energy consumption of buildings). This includes replacing air conditioning systems that use water with free air based cooling is one reason for reduction at several sites.

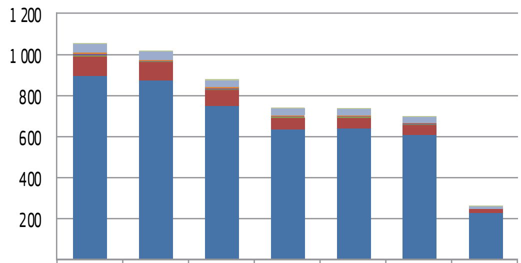
The sites identified the following **key** actions in the 2021 Global Annual Action Plan:

- Brussels: Liaising with landlords on high consuming buildings; installation of water fountains near conference/meeting rooms;
- Luxembourg: Construction of JMO2 building; negotiate with DRB owner for more efficient taps;
- JRC-Ispra: Monitor performance of water dispensers installed end 2018;
- JRC-Geel: Analyse the feasibility of monitoring water consumption of building air humidifiers, install monitoring systems to detect abnormal consumption of water purifying systems, replace cooling towers;
- JRC-Petten: Automated monitoring system;
- JRC-Seville: Launching a specific guide for good environmental practices at the office space aimed to reducing the water consumption; delayed because of restrictions due to COVID;
- DG SANTE at Grange: General program including more efficient flushing of toilets and rainwater harvesting.

3.3 Paper consumption

Figure 3.7 shows annual total paper consumption at the Commission, which in both Brussels and Luxembourg applies to the whole Commission site, rather than only EMAS registered buildings.

Figure 3.7 Total paper consumption at the EMAS sites, 2014-20 (tonnes)



	2014	2015	2016	2017	2018	2019	2020
Commission	1 054	1 018	881	741	737	697	259
Grange	1.8	3.5	6.3	3.7	3.3	2.9	1.2
JRC-Ispra	41	36	32	30	28	24	10
JRC-Karlsruhe	3.6	3.8	3.3	3.7	4.3	3.5	1.2
JRC-Seville	6.0	4.8	4.8	3.6	3.6	2.1	0.0
JRC-Geel	7.4	3.6	5.9	3.2	3.1	3.4	1.0
JRC-Petten	4.7	5.8	2.4	3.0	2.4	4.8	1.2
Luxembourg	96	86	77	58	54	48	19
Brussels	894	875	750	634	639	608	227

Total paper consumption comprises:

i) Office paper - A3 or A4 typically used for printing in offices and representing about 80% of total paper consumption, and

ii) Print shop paper - used in high quality or large format printing usually for publications and used at fewer sites.

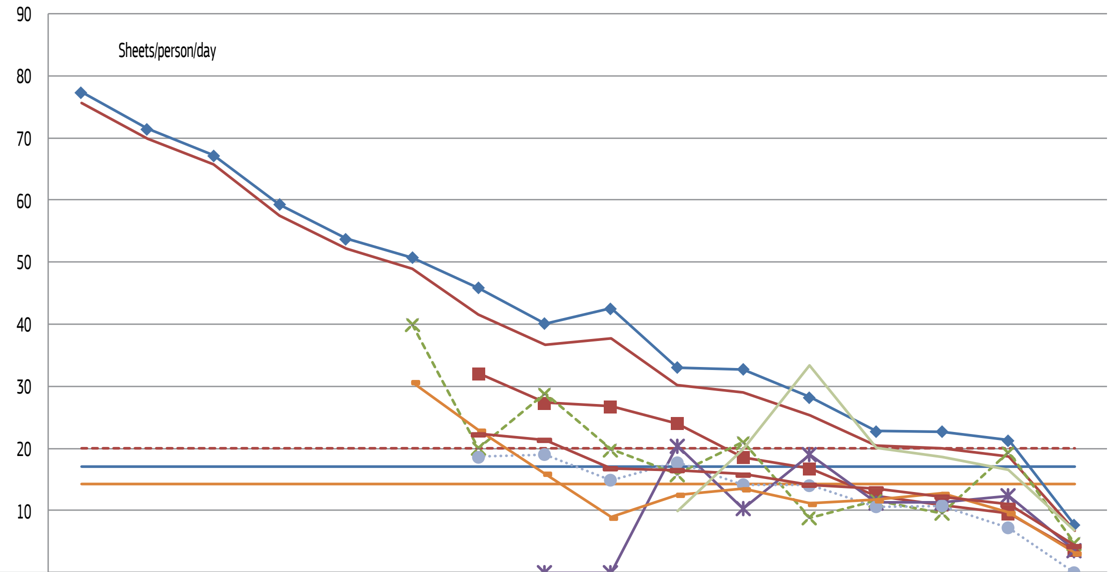
Brussels, as expected, was by far the largest consumer of paper in 2020, followed by Luxembourg and Ispra with these three sites responsible for more than 95% of the total.

Largescale homeworking in 2020 resulted in a Commission wide 65% reduction in total paper consumption from 697 in 2019 to 259 tonnes in 2020.

The large reduction in 2020 saw the Commission meeting its 2014-23 and 2014-30 targets, as indicated in Figure 3.8, which also demonstrates a very long-term steady decline in paper consumption in Brussels since 2005.

3.3.1 Office paper

Figure 3.8 Office paper consumption at EMAS sites, 2005-20 (sheets/person/day)[22]



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Commission	76	70	66	57	52	49	42	37	38	30	29	25	20	20	19	7
Target 2014-20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Target 2014-23	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
Target 2014-30	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Brussels	77	71	67	59	54	51	46	40	43	33	33	28	23	23	21	8
Luxembourg							32	27	27	24	19	17	12	11	10	4
JRC-Petten						40	20	29	20	16	21	9	12	10	19	5
JRC-Geel								0	0	20	10	19	11	11	12	4
JRC-Karlsruhe							19	19	15	18	14	14	11	11	7	0
JRC-Seville						31	23	16	9	13	13	11	12	13	10	3
JRC-Ispra							22	21	17	17	16	14	14	12	11	4
Grange										10	20	33	20	19	17	7

[22] 211 days/year; Data from HR Processes and Information systems unit and used since 2014

The reduction in office paper consumption shown in Figure 3.8 accelerated with a very significant decrease in 2020, due to the COVID pandemic, with the number of sheets per day printed representing about a third of the Commission target.

While continual promotion of electronic circuits and communication explains much of the decrease, plus the use of lower density paper, over the years much pre-COVID improvement is also due to the installation of badge operated network printer system that replaced many individual printers.

Luxembourg and the JRC sites have lower consumption than Brussels. Peaky trends at the smaller sites can be due to bulk orders, and the reported figures reflect purchase rather than consumption. All sites achieved over 50°% reduction in 2020 compared to 2019.

Table 3.3 shows the type of actions that have been undertaken at site level to reduce paper consumption.

Table 3.3: Site level actions in the EMAS Global Annual Action Plan to reduce office paper consumption

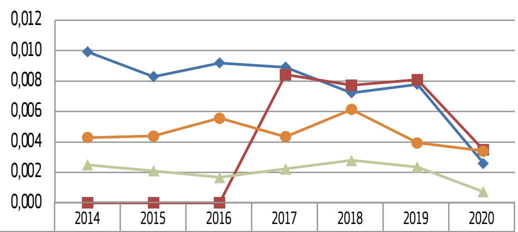
	Description	BX	LX	PE	GE	KA	SE	IS	GR
STUDIES AND AWARENESS	Raising awareness with communication				1		2		
	Staff training on multifunctional device						1		
OPERATIONAL OPTIMISATION	Better inventory measurement			1					1
	Data monitoring analysis				1		1		
OTHER	Use lighter paper (reduce from 80gm!)				2				
	"Paperless working, various"	4	5		1			2	1
	Use paper supply with higher recycled content	1							

The sites identified the following **key** actions in the 2021 Global Annual Action Plan:

- Brussels: Use more recycled paper; favour compulsory purchase of ecological items from office supply catalogue;
- Luxembourg: Receive contractual reports and documents only electronically; electronic conference information for participants;
- JRC-Ispra: General paper reduction program;
- JRC-Petten: Plan to better manage the paper inventory;
- JRC-Seville: General paper reduction campaign;
- DG SANTE at Grange: General paper reduction program based on technology.

3.3.2 Print shop paper consumption

Figure 3.9 Evolution of print shop paper consumption at the EMAS sites, 2014-20 (tonnes/person)



	2014	2015	2016	2017	2018	2019	2020
Brussels	0.0099	0.0083	0.0092	0.0089	0.0072	0.0078	0.0026
Luxembourg	0.0000	0.0000	0.0000	0.0084	0.0077	0.0081	0.0035
JRC-Seville	0.0043	0.0044	0.0056	0.0043	0.0061	0.0039	0.0034
JRC Ispa	0.0025	0.0021	0.0017	0.0022	0.0028	0.0024	0.0007

JRCs Petten, Geel, Karlsruhe and Grange have no print shop and/or undertake a negligible amount of printing, and are therefore not included in Figure 3.9.

Luxembourg switched from conventional offset printing to using digital presses in 2013, but started reporting again in 2017. JRC-Seville contracts a large amount of offset printing per capita compared to other sites. JRC-Ispra prints for other JRC sites.

The Commission reduced per capita print shop output heavily in 2020, particularly in Brussels and Luxembourg.

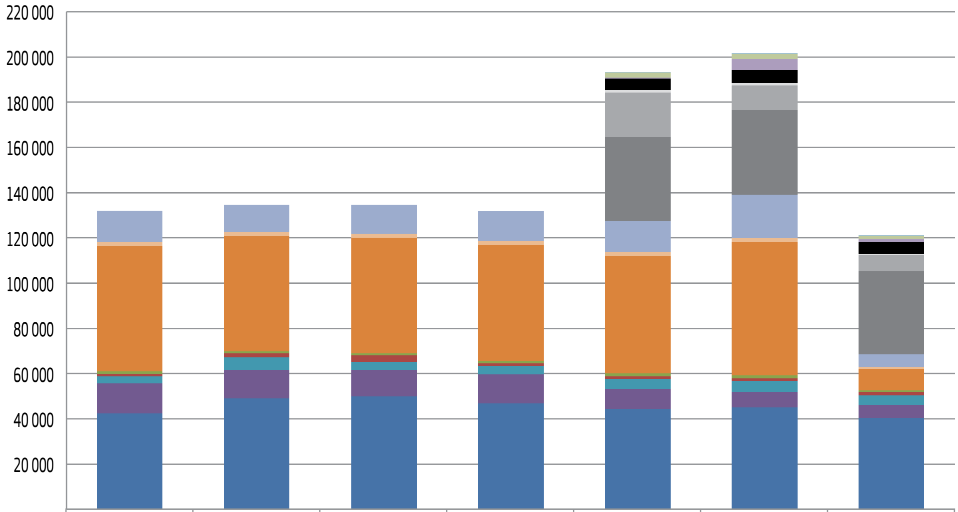
4 Reducing the carbon footprint, other greenhouse gases and air pollutants

4.1 Overview of total emissions

Figure 4.1 shows the evolution of the main categories of emissions comprising the Commission's carbon footprint. The Commission significantly expanded its reporting in 2018, to include fixed assets (buildings and IT), purchased goods and services, waste and upstream emissions due to energy consumption.

Further additions in 2019 included fixed assets (embodied energy of Commission vehicles and of infrastructure for renewable energy), and a fuller assessment of upstream emissions, for example in relation to green electricity contracts.

Figure 4.1 The Commission's reported carbon footprint, 2014-20* (tonnes of CO_2e)



	2014	2015	2016	2017	2018	2019	2020
Total	132 043	134 735	134 689	131 880	193 123	201 396	120 845
Other category (Ispra)	0	0	0	0	168	143	143
Own waste	0	0	0	0	2 007	2 137	1 035
Catering	0	0	0	0	521	4 936	1 455
Service contracts	0	0	0	0	5 062	5 581	5 212
Paper supply	0	0	0	0	946	923	341
Fixed assets - Commission vehicles	0	0	0	0	174	173	101
Fixed assets - IT	0	0	0	0	19 557	10 954	7 319
Fixed assets - buildings	0	0	0	0	37 211	37 561	36 716
Staff commuting	13 908	12 103	12 725	13 086	13 611	19 137	5 362
Missions (excluding air)	1 643	1 795	1 814	1 633	1 597	1 635	878
Missions (air, RFI 2) and air taxi	55 467	50 870	51 005	51 572	52 286	59 147	9 677
Vehicle fleet - fuel consumption	970	981	1 005	950	951	945	526
Buildings - coolant losses	1 121	1 840	2 958	1 182	1 317	1 172	1 782
Buildings - district heating/cooling	3 314	5 329	3 479	3 859	4 562	4 865	3 973
Buildings - electricity	13 158	12 673	11 822	12 741	8 746	7 096	5 891
Buildings - fuels for heating	42 464	49 145	49 881	46 857	44 406	44 989	40 434

*The scope was significantly increased in 2018, and reporting has improved. Reporting revisions in 2020 are where possible back calculated at least to 2018. The 2019 emissions include approximately 10 k tonnes that were estimated as 'unreported' in the 2019 Environmental Statement.

The effect of the COVID pandemic on staff missions emissions is evident with a reduction of more than 75%. Emissions from electricity generation reduced in 2020 compared to 2018, and 2019, and as expected emissions from commuting, catering and own waste also reduced as expected with increased staff absence.

The slight downward trend in buildings related emissions (excluding the new categories included in 2018/9) is due in large measure to reduced emissions from electricity, as sites move to sources from renewable contracts, as well as a reduction, since 2015, of gas used for heating the buildings. Table 4.1 shows the result of the COVID pandemic, and the work to improve reporting of the carbon footprint.

Table 4.1 – Main components of the Commission's carbon footprint, tonnes CO_2e[23] (2018 - 2020)

Main contributors	2018	2019 tonnes CO_2e	2020	2018	2019 % of total	2020
Buildings energy and refrigerant losses	59 032	58 123	52 080	31	29	43
Buildings fixed assets	37 211	37 561	36 716	19	19	30
Missions	53 883	60 782	10 555	28	30	9
Staff commuting	13 611	19 137	5 362	7	10	4
IT fixed assets	19 557	10 954	7 319	10	5	6
Other (waste, goods/services, vehicle fleet)	9 828	14 840	8 814	5	7	7
Sum	**193 123**	**201 396**	**120 845**	**100**	**100**	**100**

Note: Staff commuting data for 2018 excludes Luxembourg

The data show that in 2020, under COVID conditions, emissions from buildings energy emissions and the embodied (fixed energy) increased from 47% to 73% of the carbon footprint. IT fixed assets represented a smaller proportion in 2019, and 2020 as several coefficients used in the calculation have been revised downwards, and the rollout of laptops has continued, along with the phasing out of desktops and individual printers.

4.2 Scope and detailed per capita emissions by site in 2020

The Commission chairs the Inter-institutional environment group (GIME) and in November 2017 adopted a common methodology for calculating carbon emissions in response to the European Court of Auditor (ECA) 2014/14 special report on the subject.

Appendix 2 describes the different components, and conversion factors used when calculating the Commission's footprint for 2020. For coherence (and simplicity), the central coordination team recommends that EMAS sites use these values, but the sites can (exceptionally) choose different values, for example at the request or under guidance of national authorities.

4.2.1 Scopes defined

For the purposes of Greenhouse Gas (GHG) reporting, emissions fall under different "scopes"[24]:

- Scope 1: "Direct" emissions typically arising from own fuels combustion (e.g. boilers, furnaces), owned transport (Commission owned or operated vehicles), process emissions and fugitive emissions (refrigeration and air conditioning leaks);
- Scope 2: "Indirect" emissions from energy consumed but produced by others (purchased electricity, heat, and steam cooling); and
- Scope 3: Other "indirect" emissions including, transport related activities (commuting and business travel, distribution), fixed assets, purchased goods and services, waste disposal (waste, recycling), purchased materials and fuels (e.g. extraction, processing and production), fixed assets.

More than one scope may be associated with a particular type of energy use. When the Commission consumes gas for heating, or either petrol or diesel for its vehicle fleet, the reported emissions result from not only combusting the fuel (scope 1) but also from the extraction and supply (scope 3).

The additional parameters added for reporting in 2018/9 permit the embodied emissions of renewable energy supply infrastructure to be considered, as well as the emissions used to produce Commission fleet vehicles – although in both cases, the contribution to the carbon footprint is relatively small.

4.2.2 Uncertainty

As shown in the following section, compiling a carbon footprint is very data intensive, and relies on a large number of conversion factors. Both the data and factors have associated degrees of uncertainty, and these increase with scope, especially for factors. Energy invoices provide consumption data with a high level of precision (considered

23 All carbon emissions in this chapter are expressed as CO_2e (carbon dioxide equivalent, which allows for warming effects related to combustion and release of refrigerants to be included, as well as other warming gases).

24 http://www.ghgprotocol.org/calculation-tools/faq

+/-5% accuracy), as they are based on calibrated meter readings. The factors used to convert the consumption to emissions are based on physical/chemical properties that are well known, and similarly have low uncertainty.

While input data is from invoices, or databases (eg IT equipment), the uncertainty remains low. But estimating the Global Warming Potential of refrigerants over 100 years, which may be composed of two or more substances leads to factors considered to have around 30% uncertainty. The factors used to estimate emissions from the construction of buildings, IT equipment, and food that all have very complex supply chains are subject to (frequently updated) research and uncertainties of 50%.

Therefore adding additional elements, beyond scope 1 and 2 necessarily involves considerable additional resources while providing answers that are more uncertain. It is important therefore to use a consistent approach year to year.

4.2.3 Per capita emissions by site – detailed summary for 2020

Table 4.3 presents the categories of the Commission's footprint, as calculated for each site in 2020.

Table 4.3 Per capita equivalent (CO_2e) emissions by scope and site 2020 (tonnes)

	Brussels	Luxembourg	JRC-Petten	JRC-Geel	JRC-Seville	JRC-Karlsruhe	JRC-Ispra	Grange
Scope 1: Own fuel use and direct loss	**0.48**	**0.89**	**1.73**	**1.82**	**0.22**	**0.04**	**6.79**	**1.65**
Fuel for bldgs: mains gas	0.437	0.827	1.701	1.260	0.221	Na	6.547	0.000
Fuel for bldgs: tanked gas (1) (biogas)	N.a.	N.a.	N.a.	N.a.	N.a.	N.a.	N.a.	0.000
Fuel for bldgs: diesel	Ne	Ne	Ne	0.009	Ne	0.009	0.010	1.601
Biomass	N.a.	0.001	N.a.	N.a.	N.a.	N.a.	N.a.	N.a.
Commission vehicle fleet	0.010	0.013	0.018	0.015	Ne	0.033	0.012	N.a.
Refrigerant (2)	0.030	0.047	0.010	0.539	0.000	0.000	0.224	0.046
Scope 2: Purchased energy	**0.01**	**0.39**	**0.00**	**1.79**	**0.94**	**15.05**	**0.00**	**1.11**
External electricity supply (grey)	0.012	0.195	N.a.	N.a.	0.942	8.272	N.a.	1.112
External electricity supply contract (renewables), combustion	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
District heating (combustion)	N.a.	0.192	N.a.	1.786	N.a.	6.773	N.a.	N.a.
Scope 3: Other indirect sources	**1.82**	**2.08**	**2.61**	**4.77**	**1.00**	**3.47**	**3.42**	**3.11**
Fuel for bldgs: mains gas (upstream)	0.092	0.174	0.358	0.265	0.049	0.000	1.265	N.a.
Fuel for bldgs: tanked gas (upstream) (1)	N.a.	N.a.	N.a.	N.a.	N.a.	N.a.	N.a.	Ne
Fuel for bldgs: diesel (upstream)	Ne	Ne	Ne	0.002	Ne	0.002	0.002	0.349
Commission vehicle fleet (upstream)	0.002	0.003	0.005	0.004	Ne	0.008	0.003	N.a.
Site generated renewables (upstream) (3)	0.000	0.002	0.045	0.000	0.000	0.000	0.027	Ne
External grey electricity supply, line losses	0.001	0.017	N.a.	N.a.	0.084	0.736	N.a.	0.099
Ext. 'renewables' electricity contract (upstream + line loss)	0.026	0.045	0.000	0.278	0.000	0.000	0.015	0.000
District heating (upstream)	N.a.	0.030	N.a.	0.282	N.a.	1.070	N.a.	N.a.
Business travel: air (combustion) + (including air taxi)	0.283	0.066	0.195	0.201	0.086	0.242	0.221	0.741
Business travel: rail (combustion)	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Business travel: hire car (combustion)	0.001	0.046	0.000	0.005	0.001	0.071	0.003	0.000
Business travel: private car (combustion)	0.010	0.013	0.018	0.015	0.000	0.032	0.052	0.000
Commuting (combustion) (4)	0.111	0.254	0.298	0.277	0.064	0.254	0.188	0.024
Fixed assets - buildings	0.948	0.820	0.771	2.029	0.398	0.358	1.156	1.494
Fixed assets - IT	0.165	0.242	0.242	0.608	0.278	0.589	0.243	0.140
Fixed assests - Commission vehicles	0.002	0.003	0.004	0.001	Ne	0.015	0.003	N.a.
Paper supply	0.010	0.004	0.010	0.005	0.005	0.000	0.005	0.007
Service contracts	0.107	0.279	0.650	0.700	0.023	0.088	0.055	0.134
Catering (5)	0.036	0.041	0.000	0.051	0.001	0.000	0.054	0.022
Own waste	0.021	0.037	0.012	0.049	0.004	0.000	0.068	0.096
(Other category) - Ispra	N.a.	N.a.	N.a.	N.a.	N.a.	N.a.	0.059	N.a.
Sum	**2.31**	**3.35**	**4.34**	**8.38**	**2.16**	**18.55**	**10.21**	**5.86**

Notes: N.a. – Not applicable, Ne - Negligible
(1) Grange is the only site with tanked gas rather than mains gas; (2) refrigerant losses reported as zero at Seville (maintenance register), Karlsruhe (according to protocol - less than 3%); (3) Geothermal, biomass, PVs, (for JRC-Geel electricity supply for heat pumps includes upstream emissions) (4) Can include Commission bus service when appropriate (5) JRCs Petten, Karlsruhe and Seville use restaurants outside the site boundary. A small cafe within the Karlsruhe boundary was closed for much of 2020.

The main observations arising from Table 4.3, an untypical year are:

- Carbon footprints ranged from less than 5 tonnes/person (Brussels, Luxembourg, Petten, Seville the sites; other than JRC-Petten) with a high proportion of offices) to more than 10 tonnes/person (Ispra and Karlsruhe) sites with extensive experimental facilities.
- Scope 1 emissions (own fuels use and direct losses) usually represent a small proportion of the total emissions. JRC-Ispra is the exception with its gas fired tri-generation plant that accounts for over half of the total.

- Scope 2 emissions (purchased energy) is particularly high for JRC-Karlsruhe, which relies on electricity and district heating for almost all of its buildings' energy requirements. The combination of high energy consumption and relatively low proportion of renewables in the energy mix generates considerable per capita emissions.
- Scope 3 emissions (other indirect sources) represent the greatest proportion of the carbon footprint for sites other than JRC-Karlsruhe and JRC-Ispra. In 2020 they were nearly three times the combined total for Scopes 1 and 2. By definition Scope 3 emissions are more difficult to manage with management having "indirect" control. (This means that particular attention is required in the tendering process to ensure that contracts include the measures necessary to reduce emissions).

There are Commission targets for both Scope 1 and 2 emissions. **Further discussion of different categories of emissions are presented in Appendix 3, as follows**

3.1 Emissions due to buildings' energy consumption

3.2 Emissions due to refrigerant or coolant loss

3.3 CO_2e emissions from the site vehicle fleet

3.4 Staff missions, breakdown by EMAS site

3.5 Staff missions breakdown by DG/Service

3.6 CO_2e emissions from commuting

3.7 Alternatives to missions and commuting

3.8 Fixed asset emissions (buildings)

3.9 Fixed asset emissions (Information Technology)

3.10 Emissions from purchased goods and services

3.11 Emissions from waste disposal

3.12 Total air emissions of other pollutants

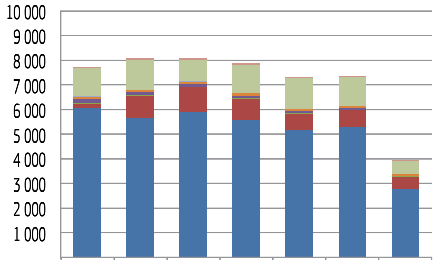
5 Improving waste management and sorting

Waste management practices vary from site to site. Some, such as JRC-Geel, consider all waste generated on site to be the Commission's direct responsibility and therefore include all contractors' waste in their waste reporting system, and JRC-Karlsruhe, that due to its nuclear status must ensure that all site waste generated is disposed of by very tightly controlled channels. In other sites, the quantity of waste directly disposed by contractors may not be included in the site's figures. As indicated in Appendix 3.11, only 0.4 to 0.5% of emissions due to waste disposal arise from landfilling, underlining the importance of the circular economy.

5.1 Reducing non-hazardous waste generation[25]

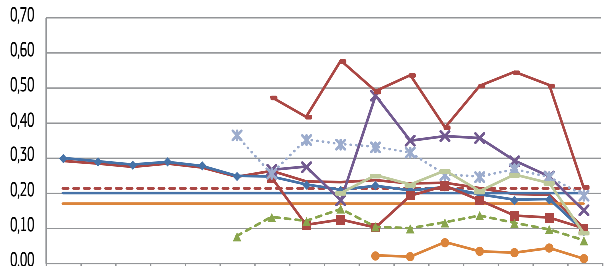
Figure 5.1 data indicate that in 2020 the Commission, assisted by the COVID pandemic, reduced its non-hazardous[26] waste generation by 47%, from 7 373 tonnes in 2019 to 3 939 tonnes. Figure 5.2 shows the evolution of per capita waste generation at Commission sites and Commission level targets.

Figure 5.1 Generation of non-hazardous waste at EMAS, 2014-20 (tonnes)



	2014	2015	2016	2017	2018	2019	2020
Commission	7 735	8 084	8 082	7 857	7 332	7 377	3 939
Grange	45.0	40.5	50.2	38.7	45.2	40.4	15.2
JRC-Ispra	1 148	1 235	878	1 155	1 247	1 185	525
JRC-Karlsruhe	107	102	82	80	85	78	60
JRC-Seville	6.4	5.5	18.1	11.3	10.7	16.1	5.2
JRC-Geel	166	115	108	95	76	65	40
JRC-Petten	29.6	27.8	32.2	35.9	28.4	24.2	16.3
Luxembourg	153	904	1 032	860	681	671	521
Brussels	6 081	5 654	5 882	5 580	5 158	5 298	2 756

Figure 5.2 Evolution of non-hazardous waste generation at EMAS sites (tonnes/person)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Commission	0.29	0.28	0.28	0.28	0.27	0.25	0.26	0.23	0.23	0.24	0.23	0.23	0.21	0.20	0.20	0.10
Target 2014-20	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Target 2014-23	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Target 2014-30	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Brussels	0.30	0.29	0.28	0.29	0.28	0.25	0.25	0.22	0.21	0.22	0.21	0.22	0.20	0.18	0.18	0.09
Luxembourg							0.25	0.11	0.12	0.10	0.19	0.22	0.18	0.14	0.13	0.10
JRC-Petten						0.08	0.13	0.12	0.16	0.10	0.10	0.12	0.14	0.11	0.10	0.07
JRC-Geel							0.27	0.28	0.18	0.48	0.35	0.36	0.36	0.29	0.25	0.15
JRC-Karlsruhe						0.37	0.26	0.35	0.34	0.33	0.32	0.25	0.25	0.27	0.25	0.19
JRC-Seville										0.02	0.02	0.06	0.03	0.03	0.04	0.01
JRC-Ispra							0.47	0.42	0.58	0.49	0.54	0.39	0.51	0.55	0.51	0.22
Grange									0.20	0.25	0.23	0.26	0.21	0.25	0.23	0.09

The Commission reduced non-hazardous waste generation from nearly 300 kg/person in 2005[27] to less than 200 kg/person in 2019. It halved between 2019 and 2020, to less than half the 2014-20 target while also meeting the 2014-23 and 2014-30 targets. There is some fluctuation in recent years particularly of sites newer to EMAS implementation.

JRC-Seville cooperated with its landlord to develop a new waste management plan. In Luxembourg the relocation of staff from the Jean Monnet (JMO) building generated considerably more waste in 2016 and 2017. JRC-Ispra site's rate of waste generation has fluctuated in recent years owing to variable infrastructure works across the site, but reduced by 7% in 2019 before more than halving in 2020, owing largely to the impact of the COVID pandemic.

The Commission has sought particularly since 2018 to reduce the use of single use plastics (SUP) in its vending machines and catering facilities, and part of this involved replacing non-recyclable cups and installing water fountains. The corporate EMAS Coordination team was initially able to identify and report on 49 actions across the eight EMAS sites demonstrating progress in this initiative, and these have progressed considerably.

25 Definition of non-hazardous and hazardous waste according to the EU Waste Directive 2008/98/EC

26 It should be noted that at some sites contractors' construction and demolition waste is included in the total (JRCs Petten, Geel) and this can give rise to significant year-to-year fluctuations. Works at JRC-Ispra contribute to significant year on year variation

27 Commission performance from 2005 to 2009 is based heavily on Brussels data

The sites identified the following types (and numbers) of actions to reduce non-hazardous waste in the 2021 EMAS Global Action Plan.

Table 5.1: Site level actions in the EMAS Global Annual Action Plan to reduce non-hazardous waste generation

	Description	BX	LX	PE	GE	KA	SE	IS	GR
STUDIES / AWARENESS	Raise awareness	1		1	1			1	
	Improve waste management procedures, GPP	2	1				1		1
OPERATIONAL OPTIMISATION	Contractor to report on their own waste		2						
	Improve demand management in self restaurants	1					1		
	Improve demand management for childrens' facilities	1							
	Improve demand management for printed publications or improve publication process						2		
	Reduce number of bins	1	1		1				
	Replace plastic cups with alternatives, or other reusable crockery	2	1		1				2
	Reduction of single use plastic (SUP)	6	1				3	8	3
	Replace disposable cups with porcelain		1						
	Stop using "set de table" in canteens		1						
	Reuse (unused) office supply		1						
	Organic waste recycling						1		
LARGE INVESTMENT	Install water fountains or dispensers	2						1	1
IT	Replace printing devices (JRC policy)						1		

Brussels has the greatest number of actions, and several are to reduce SUP. Brussels and JRC-Ispra have moved towards installing water fountains. JRC-Karlsruhe implemented many waste reduction initiatives associated with plastic many years ago. JRC-Geel reduced SUP generation by introducing glass bottles and drinking water fountains in 2019, while JRC-Ispra has also continued its commitment to avoid the use of SUP, and encouraging staff to do so, through awareness campaigns.

The sites identified the following **key** actions for reducing non-hazardous waste generation in the 2021 Global Annual Action Plan:

- Brussels: Raise waste contractor's awareness; centralised waste sorting stations pilot project extended to additional buildings; create waste working group; replace offset printing technology; tender for digital press using water based inks; ecological supplies in office supply contract; tenders for upcycling and recycling of office furniture; inter-institutional tender for collection and recycling of bulky items; avoid SUP by promoting green events;
- Luxembourg: General waste reduction campaign including for educators and children; extend pilot for common waste points to additional buildings; include in tenders the obligation for contractors to deal with and report on the waste they produce linked to activities in the Commission; receive contractual reports and documents only electronically; electronic conference information for participants;
- JRC-Ispra: Improve waste indicators; promote waste reduction and separation; increase percentage of recycled urban waste; optimise control of the new storage facility for special waste; general paper reduction program;
- JRC-Geel: set up waste segregation islands to replace individual bins; organise eco workshops in waste reduction campaigns; study feasibility of installing meters on 2 main industrial waste water tanks; plastic cups at fountains replaced by biodegradable ones;
- JRC-Petten: general awareness campaign;

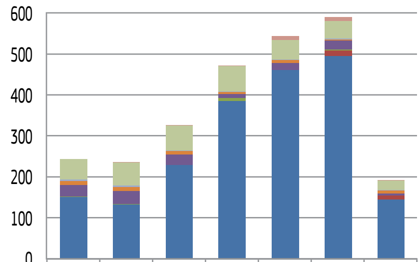
- JRC-Seville: reduce SUP in vending machines; identify operator for better management of paper waste; general paper reduction campaign;
- DG SANTE at Grange: Reduce waste to landfill.

5.2 Reducing hazardous waste generation[28]

The Commission generates far less hazardous than non-hazardous waste. Figure 5.3 shows again that, largely owing to the COVID pandemic, the Commission reduced the waste generated by 71% from 590 to 173 tonnes. Per capita hazardous waste (Figure 5.4) for the Commission as a whole was up slightly in 2019 but met the 2014-20 target in 2020. JRC-Petten made a hazardous waste disposal in 2017, not having done so in 2016, and Luxembourg's figure increased in 2017 owing to JMO closure.

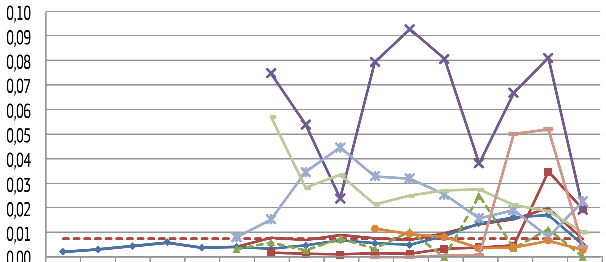
Year to year comparisons for the research sites may not always be appropriate because some hazardous wastes are stockpiled prior to disposal, and the type and quantity of waste will vary with the experimental program. For this reason the EMAS Steering Committee decided to discontinue the hazardous waste generation target.

Figure 5.3 Hazardous waste generation at EMAS sites, 2014-20 (tonnes)



	2014	2015	2016	2017	2018	2019	2020
Commission	244	235	326	472	544	590	193
Grange	0.0	0.0	0.1	0.1	9.0	9.1	0.7
JRC-Ispra	50	57	61	63	48	43	24
JRC-Karlsruhe	3.3	2.6	2.4	1.1	1.3	2.4	1.1
JRC-Seville	10.5	10.3	8.2	5.1	6.0	2.6	7.0
JRC-Geel	27.4	30.4	23.9	10.1	17.3	21.2	5.1
JRC-Petten	1.0	2.9	0.0	6.5	0.9	2.8	0.0
Luxembourg	0.0	0.0	0.0	0.0	0.0	13.8	9.7
Brussels	152	132	230	386	461	495	145

Figure 5.4 Evolution in hazardous waste generation at EMAS sites, 2005-20 (tonnes/person)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Commission	0.002	0.003	0.004	0.006	0.004	0.004	0.008	0.007	0.009	0.008	0.007	0.010	0.013	0.015	0.020	0.007
Target 2014-20	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Brussels	0.002	0.003	0.004	0.006	0.004	0.004	0.003	0.005	0.007	0.006	0.005	0.009	0.014	0.016	0.017	0.005
Luxembourg							0.002	0.001	0.001	0.001	0.001	0.003	0.004	0.005	0.035	0.019
JRC-Petten						0.003	0.006	0.003	0.007	0.003	0.010	0.000	0.025	0.004	0.011	0.000
JRC-Geel							0.075	0.054	0.024	0.079	0.093	0.081	0.038	0.067	0.081	0.019
JRC-Karlsruhe						0.008	0.015	0.035	0.045	0.033	0.032	0.025	0.016	0.019	0.008	0.023
JRC-Seville										0.012	0.009	0.008	0.004	0.004	0.007	0.003
JRC-Ispra							0.057	0.028	0.033	0.021	0.025	0.027	0.027	0.021	0.019	0.010
Grange										0.000	0.000	0.001	0.001	0.050	0.052	0.004

Some of the actions included in the EMAS Annual Action Plan to reduce hazardous waste included:

- JRC-Geel: Increasing staff awareness on the origins of hazardous waste; and improved monitoring;
- JRC-Ispra: new purpose built hazardous waste shed; daily presence of an onsite waste operator; clarification of procedures for controlled waste;
- Brussels: replacing offset printing technology;
- Luxembourg: re-using out of date H & S equipment for training (548); phase out single use batteries.

JRC-Ispra also was able, as part of its nuclear decommissioning programme, to sign an agreement with the Radiopharmaceutical Chemistry Department of the Czech Technical University in Prague to transfer a cyclotron, thus avoiding it being dismantled and processed as nuclear waste. The transfer took place in 2019-2020.

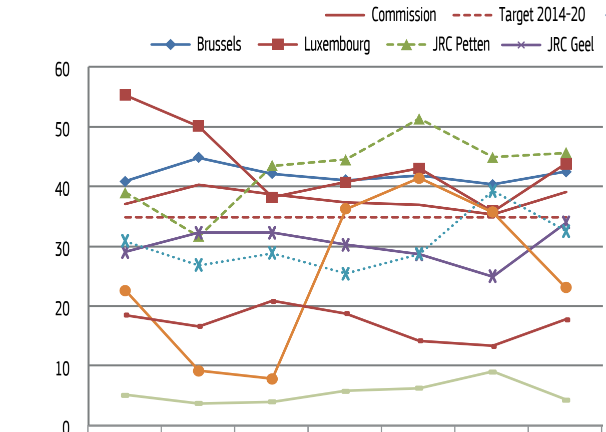
5.3 Sorting waste into reusable waste streams

The indicators used to measure progress in sorting waste were modified, so the percentage of unsorted waste (Figure 5.5) is now used instead of the percentage of sorted waste, to provide a value that should decrease over time in common with other targets. An entirely new parameter - per capita unsorted waste (tonnes/person) appears in Figure 5.6.

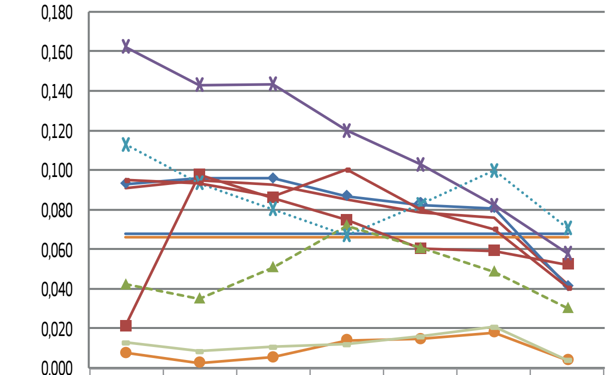
[28] Such as batteries, oils, greases, toners, fluorescent tubes, chemicals mineral oils, etc

Figure 5.5 Unsorted waste as proportion of total waste at EMAS sites, 2014-20 (%)

Figure 5.6 Unsorted waste at EMAS sites, 2014-20 (tonnes/person)



	2014	2015	2016	2017	2018	2019	2020
Commission	37.1	40.3	38.7	37.3	36.9	35.4	39.0
Target 2014-20	34.9	34.9	34.9	34.9	34.9	34.9	34.9
Brussels	40.8	44.8	42.2	41.0	41.8	40.3	42.4
Luxembourg	55.3	50.1	38.2	40.7	43.0	35.8	43.8
JRC-Petten	39.0	31.7	43.5	44.5	51.3	44.9	45.6
JRC-Geel	29.0	32.2	32.3	30.2	28.6	24.9	33.9
JRC-Karlsruhe	30.8	26.8	28.8	25.4	28.7	39.2	32.5
JRC-Seville	22.6	9.2	7.8	36.2	41.4	35.6	23.1
JRC-Ispra	18.5	16.6	20.9	18.7	14.2	13.3	17.7
Grange	5.1	3.7	4.0	5.8	6.3	9.0	4.3



	2014	2015	2016	2017	2018	2019	2020
Commission	0.091	0.095	0.093	0.085	0.078	0.076	0.042
Target 2014-23	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Target 2014-30	0.066	0.066	0.066	0.066	0.066	0.066	0.066
Brussels	0.09	0.10	0.10	0.09	0.08	0.08	0.04
Luxembourg	0.02	0.10	0.09	0.07	0.06	0.06	0.05
JRC-Petten	0.04	0.03	0.05	0.07	0.06	0.05	0.03
JRC-Geel	0.16	0.14	0.14	0.12	0.10	0.08	0.06
JRC-Karlsruhe	0.11	0.09	0.08	0.07	0.08	0.10	0.07
JRC-Seville	0.01	0.00	0.01	0.01	0.01	0.02	0.00
JRC-Ispra	0.09	0.09	0.09	0.10	0.08	0.07	0.04
Grange	0.01	0.01	0.01	0.01	0.02	0.02	0.00

Figure 5.5 shows that following a steady Commission reduction from 2015 to 2019, in 2020 there was a significant rise, as this was the pattern at most sites. Grange and JRC-Ispra continued to see significant reductions in 2020. The increase observed in 2020 may be due to the absence of staff during the pandemic, resulting in less strict adherence to waste sorting protocols.

JRCs Seville and Ispra have the lowest proportion of unsorted waste, and Grange has achieved less than 5% in recent years. This low value is in part due to Grange's waste contractors undertaking additional sorting post collection. Brussels had improved waste sorted through improved awareness and the successful introduction of new waste collection points, initially installed as pilot trials in several DGs. The calculation of 2023 and 2030 targets has been problematic, perhaps owing to redefinition of the indicator.

Figure 5.6 shows that per capita unsorted waste reduced by 45% from 2019 to 2020 and the Commission already met the 2023 and 2030 targets. Approximately 0.5% of waste goes to landfill with JRC-Ispra and Grange sites reporting this mode of disposal.

Table 5.2 summarises the types of initiatives of actions included in the 2021 Global Action Plan to reduce waste sorting, and the number of actions per site.

Table 5.2 Types and number of site level actions in the EMAS Global Annual Action Plan to improve waste sorting

	Description	BX	LX	PE	GE	KA	SE	IS	GR
STUDIES, AWARENESS	Staff awareness		1	1	1			2	1
	Documentation and procedures	1			2		1	1	
	Contractor awareness	1	2						
	New tender for waste management contract	2	1				1		
OPERATIONAL OPTIMISATION	New clearance procedure for controlled areas				1				
	Contractor to manage own waste		1						
	Standardise waste contractors management		1						
	Signing and distribution of bins	2	1						
	Introduce waste sorting stations, or new storage areas	2	1		2				
	Centralised organic waste collection from restaurants/ cafés		2						
	Replace plastic cups be biodegradable ones				1				
	Collect coffee grounds								1

There are several actions seeking to improve waste sorting with Brussels, Luxembourg and Geel appearing to be the most active. Involving contractors is an important element of several actions.

5.3.1 Recycling obsolete IT and office equipment:

DG DIGIT has an agreement contract with Oxfam Solidarity (Oxfam) since 2006 and since 2017 with Close the Gap, for the “removal and recycling, for humanitarian purposes”, of goods no longer used by the Commission but still useful beyond their economic life, and thus providing a useful social outcome. The sales fund their humanitarian and welfare activities. Through the agreements, DG DIGIT aims to reuse on average at least 70% of units collected from the Commission.

Table 5.3 shows actual recycling rates for IT collected in Brussels (and Luxembourg), indicating that far higher rates were achieved until 2017. The data includes material collected in Luxembourg which is transferred to processing facilities in Belgium.

Table 5.3 Number of IT and telephony items collected and recycled in Brussels and Luxembourg

	Year of collection										
Parameter	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Collected items	15 462	12 531	19 360	24 744	27 513	30 918	23 969	18 133	15 988	30 001	31 483
Processed items [1]	15 301	12 531	19 251	19 935	27 375	30 918	23 554	18 088	15 988	28 893	31 483
Items for second hand use	12 509	10 960	17 469	17 298	24 759	27 952	21 736	14 287	10 549	14 357	12 935
Second hand use (%)	82	87	91	87	90	90	92	79	66	49	41
Recycled or dismantled (%)	18	13	9	13	10	10	8	21	34	51	59
Weight of collected items (tonnes)	42.72	34.62	53.49	68.37	76.02	72.33	45.00	67.50	55.54	207.40	117.50

Note 1 - processing could take place in following years, (source DG DIGIT)

Left over equipment is transferred to authorised operators on behalf of Recupel, the non-profit organisation responsible for recycling electrical and electronic waste in Belgium. During the annual audit of Oxfam Solidarity under its EMAS registration, the auditor verified that its recycling measures complied with environmental regulations and noted the generally good progress it had made in relation to legal requirements.

The data reported are for IT and telephony, with the split between the two available since 2017. Although recycling of combined IT and telephony has fallen below 70% in 2018 and 2019, IT alone has remained above 70% according to data from Oxfam and Close the Gap. If docking stations are excluded, re-use of IT was 85% in 2018 and 84% in 2019. Charities report that they cannot sell docking stations as they are generally not used in homes. Since the Commission has implemented telephony through its IT equipment it has disposed of most of its fixed phone sets. But the charities send these to Recupel for dismantling as there is no market for them. The recycling rate of telephony was 23% in 2018 and 0% in 2019.

The high re-use rates for IT equipment were achieved despite the falling cost of new goods, which make older IT equipment less attractive. This is due to the generally good quality of the collected items, and systematic recycling effort made by Oxfam in the context of its EMAS registration and by Close the Gap through the ISO9001, ISO14001, OHSAS18001, R2 and WEEELABEX certificates of its partners.

Oxfam reports the weight of IT material collected and this is incorporated into the Brussels waste reporting. The amount of collected by Oxfam (including donations to Close the Gap) fell from 68 tonnes in 2017 to 56 tonnes in 2018 and more than doubled in 2019.

Similar donations of IT were organised in the JRC's sites of Brussels, Ispra and Petten. With a global amount of 342 items in 2020 [29]

ICT strategies such as replacement of desktop by laptops, removal of personnal printer, spliting of computer and screen life cycles[30], replacement of fixed line phones with VoIP software solution explains the variations in terms of volume and weight. Recycled office equipment under the same contract amounted to over 500 tonnes in 2016 and 2017, but reduced to 256 and 247 tonnes respectively in 2018 and 2019. Table 5.4 shows the evolution for different categories of IT equipment.

Table 5.4: Evolution of reported IT inventory from 2018 to 2020 at Commission sites*

Category of equipment	**2018**	**2019**	**% change 2018-9**	**2020**
Computers and screens				
Desktop PCs	23 908	14 299	-40.2	13 244
Laptops	28 267	35 769	26.5	43 690
Docking stations	26 074	35 217	35.1	41 504
Flatscreens	61 041	63 308	3.7	71 494
Printers and scanners				
Individual printers	7 361	3 503	-52.4	2 602
Network printers and copiers	5 911	5 394	-8.7	5 345
Scanners	495	385	-22.2	356
Fax machines	242	168	-30.6	145
Telephones and faxes				
Simple (portable) phones	160	150	-6.3	201
Smartphones	9 062	9 314	2.8	7 444
Fixed line telephones	43 376	30 884	-28.8	17 549
Servers and switches				
Informatics server	6 160	5684	-7.7	5 855
Firewall router switch	2 392	2490	4.1	7 267
Video equipment				
Projectors	845	673	-20.4	641
Videoconference installations	1 418	1 194	-15.8	1 435
Televisions	437	523	19.7	579

* All sites, although JRCs Seville and Karlsruhe data included from 2020

The data in Table 5.4 indicates

- Desktops are being replaced by laptops and docking stations;
- The number of individual and network printers, scanners, fax machines and most video equipment has reduced; and
- Fixed line telephones have been replaced by VoIP solution.

[29] https://webgate.ec.europa.eu/connected/docs/DOC-250318

[30] CRT monitors and Desktop computers had roughly the same life expectancy. Since LCD screens were introduced, computers are replaced more frequently than the standalone screens which have a higher life expectancy.

6 Protecting biodiversity

Table 6.1 summarises the required EMAS biodiversity indicators including "nature oriented areas" both onsite and offsite[31].

Table 6.1 Biodiversity indicators in 2020

Site	Brussels	Luxembourg	JRC-Petten	JRC-Geel	JRC-Karlsruhe	JRC-Seville	JRC-Ispra	Grange
Total use of land (m^2)	285 928	138 339	332 500	380 316	72 000	12 094	1 602 965	90 000
Per capita	10	26	1 346	1 430	233	32	665	513
Total sealed area (m^2)	181 864	104 029	59 909	70 512	72 000	23 487	659 528	18 000
Per capita	6	20	243	265	233	61	274	102
Nature oriented area onsite (m^2)	104 064	34 310	75 591	309 804	162 000	12 094	943 437	18 250
Per capita	3	7	306	1 165	524	32	391	104
Nature oriented area offsite (m^2)			197 000					18 000
Per capita			798					102

The data shows that JRCs Petten and Geel are the most sparsely populated sites, with JRC-Ispra and DG SANTE at Grange also occupying several hundred square meters of land per person. The experimental JRC sites have relatively extensive sealed areas, due to the widespread presence of experimental apparatus. There is also plenty of room for nature at the experimental JRC sites. JRC-Petten is involved in managing natural areas outside the site perimeter.

Volunteer groups organise occasional activities in Brussels and these have included incorporating potted plant areas at locations in front, or inside buildings' open courtyards. Activities at JRC-Petten, JRC-Geel and DG SANTE at Grange are discussed below. **Key actions** in the 2021 Global Action Plan included:

- JRC-Geel: Preparing an updated biodiversity assessment and action plan for the forested areas and setting up priorities based on the 2020 biodiversity study;
- JRC-Ispra: Developing a multi-annual plan in line with Action 7 of the EU Biodiversity Strategy;
- JRC-Petten: Developing and updating the NATURA 2000 Control Plan with the Dutch authorities;
- JRC-Seville: Identification of specific biodiversity actions for the JRC-Seville site.

6.1 Natura 2000 site at JRC-Petten

Staff from an external company analyzing the nature in the Natura-2000 dune area adjacent to the JRC-Petten premises

Part of the JRC-Petten site is located in a Natura 2000 protected habitat, and the site is one of the stakeholders involved in its management. Developing and implementing a NATURA 2000 plan is an important aspect of site activities.

The site is located among sand dunes only hundreds of metres from the coastal beaches. There is a large presence of sea gulls and particularly during the mating season, or after the chicks are born, they can become aggressive to staff who need to access roof areas for maintenance.

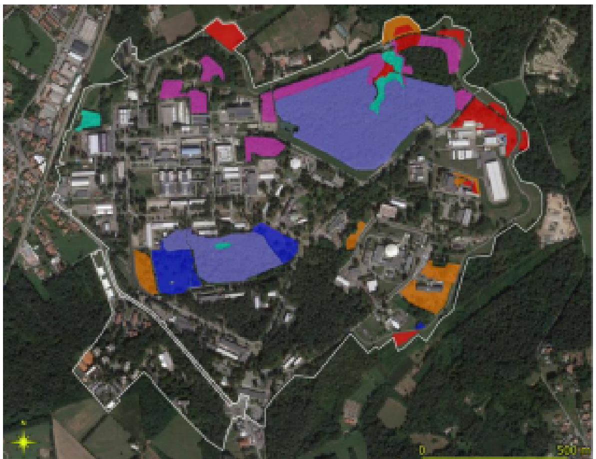
[31] Where an organisation participates in the management of an area outside its perimeter

6.2 JRC-Geel's forestry management

A forestry management plan at JRC-Geel aims to restore diversity in the surrounding forest. In recent years, pine has become overwhelmingly dominant at the expense of native broad leaf species. JRC-Geel - Forest management plan, monitoring fauna/flora and creating new habitat including insect hotels are listed in the Annual Action Plan.

JRC-Geel – Insect hotels near buildings B60, B20, B051 and screen bucket system to transfer toads during mating season

6.3 JRC-Ispra's habitat mapping and species protection



	Wetlands: surface waters and swamps EU habitat 3150: Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
	Grasslands: high-diversity plant communities– priority habitat for Directive Habitat EU habitat 6230*: Species-rich Nardus grasslands and EU habitat 6510: Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
	Dry hay meadows EU habitat 6510 .Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
	Wet hay meadows EU habitat 6510 "Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)"
	Wet woodlands: alder woodland and mixed alder-oak woodland – priority habitat for Directive Habitat EU habitat 91E0* Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
	Dry woodlands: oak woodland EU habitat 9190 Old acidophilous oak woods with Quercus robur on sandy plains

JRC-Ispra habitat map, and zoning for forest works

Although there is no formally designated protection area at JRC-Ispra, the site is nonetheless very engaged in biodiversity related issues having recently conducted a study to record the main plant species and natural habitats and map the different types of green areas.

A field survey recorded the population of different species of amphibians, including a protected species of frog. The site used the BREEAM certification process for the refurbishment of a new building under which it evaluated its ecological impact from construction to operation and designed mitigation measures for implementation.

An action to improve the perimeter of a wooded area of the site started in 2020. During 2020-22, exotic forest species will be eliminated to prevent dead branches (or the trees themselves) from falling.

In addition JRC-Ispra is planning to reduce the number of invasive alien species by removing American pokeweed, and cutting the Pygmy Bamboo.

6.4 Ecological enhancement at Grange

DG SANTE at Grange projected landscape enhancement

Several activities listed in the Global Annual Action Plan are for ecological enhancement.

Such activities have included the planting of native trees, the creation of meadowlands, and allotments for staff.

More recently, DG Grange committed to a five-year biodiversity project that will conserve and restore indigenous flora and fauna. In addition to the net biodiversity gain, increased carbon adsorption is expected as the landscaping scheme establishes and matures. In 2020, owing to the COVID epidemic, the activities under the 5 year plan were restricted to encouraging meadow growth to provide nectar for insects including bees, butterflies and hoverflies.

DG SANTE at Grange, Grass cut for potential agricultural use

DG SANTE at Grange: Saplings of native species

7 Promoting Green Public Procurement (GPP)

7.1 Incorporating GPP into procurement contracts

The EMAS sites have been recording the proportion of procurement procedures that include environmental criteria, beyond the requirements of the financial procedures, as shown in Table 7.1. Alternative approaches are being developed, as described in Section 7.2, in an effort to provide more information on the strength of the measures adopted.

Table 7.1 Contracts greater than 60k EUR with additional "eco" criteria (%)

Site	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brussels	0	94	80	100	82	93	100	100	100
Luxembourg	65	92	100	100	94	83	100	71	93
JRC-Petten	NR	NR	NR	NR	NR	NR	76	76	76
JRC-Geel	NR	NR	NR	NR	22	33	35	29	29
JRC-Karlsruhe	NR	NR	8	8	8	28	26	36	27
JRC-Seville*	NR	NR	1	2	1	1	2	13	15
JRC-Ispra	NR	17	32	9	9	10	17	12	17
Grange	0	0	2	4	100	100	100	100	100

NR - Not Recorded; *Total number, not % reported prior to 2019

In recent years both Brussels and Luxembourg have increased the number of their procurement contracts, managed by the Infrastructure Offices OIB and OIL respectively, that include some form of "green" criteria in the contract or award process, in addition to the standard clauses. The JRC sites and Grange have also started to incorporate such criteria.

DG ENV chairs an inter-service working group on developing and promoting GPP as part of the Commission's response to its obligations under the Circular Economy Package.

7.2 Rating the level of sustainability achieved in contracts through GPP

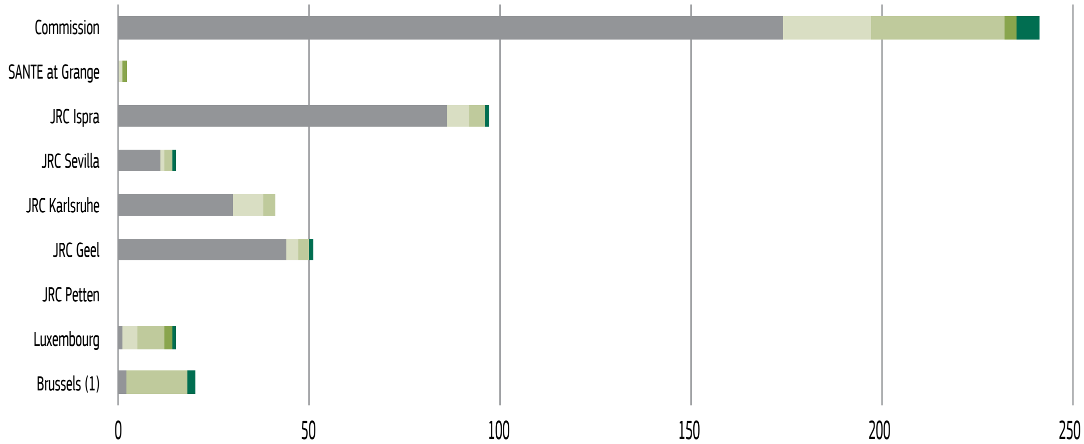
The Commission started, in 2018, to use the European Court of Auditor's recommended grading scale[32] to show the degree to which tenders incorporate sustainability, as follows:

- Not green: Tender documents without environmental considerations or have clauses without impact on purchasing approach
- For light green to very green a main difference is in the weighting of the environmental criteria as a share of the total (for price and quality), as follows:
    - Light green: < 10%;
    - Green 10% to 25%, and
    - Very green >25%
- Green by nature: Where the primary purpose is "green", for example construction of a green roof, or consultancy services to improve environmental performance

Figure 7.1 presents the results at site level for the five categories:

[32] Scale recommended in P41 Annex to the European Court of Auditors Special Report 2014/14 - How do the EU institutions and bodies calculate, reduce and offset their greenhouse gas emissions? This approach may eventually supersede that described in Section 7.1

Figure 7.1 Breakdown of the extent of incorporating GPP criteria in 2020



	Brussels (1)	Luxembourg	JRC-Petten	JRC-Geel	JRC-Karlsruhe	JRC-Seville	JRC-Ispra	SANTE at Grange	Commission
Not green	2	1	0	44	30	11	86	0	174
Light green	0	4	0	3	8	1	6	1	23
Green	16	7	0	3	3	2	4	0	35
Very green	0	2	0	0	0	0	0	1	3
Green by nature	2	1	0	1	0	1	1	0	6

Note: (1) 'Green' total includes light 'green' and very 'green'

Under this approach, 68% of contracts were 'not green' in 2018, but this increased to 74% in 2019 before recovering to 72% in 2020. A relatively small proportion of contracts at the larger experimental sites JRC-Ispra had any degree of greening. JRC-Petten has yet to adopt the new GPP criteria.

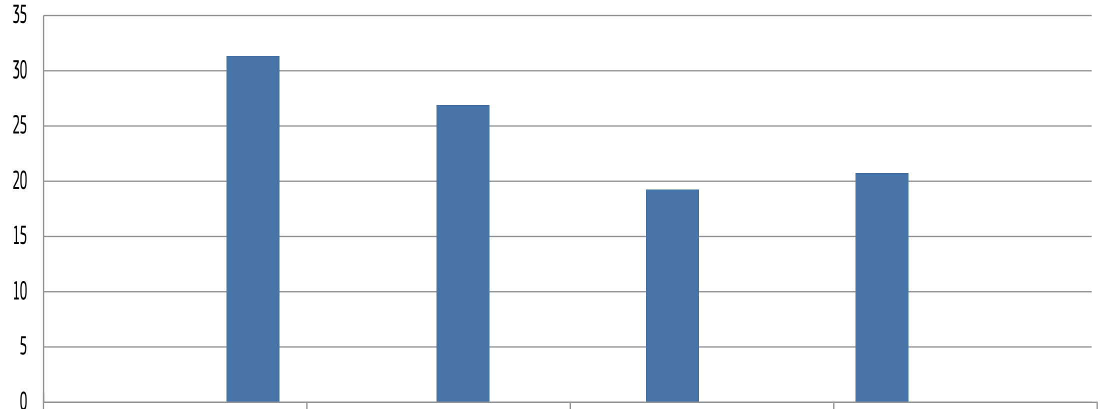
7.3 IT procurement – computers

DG DIGIT is responsible for IT across the Commission sites. It uses environmental criteria in the technical evaluation of all invitations to tender for the purchase of IT hardware and incorporates these criteria into the financial evaluation. Where pertinent the financial evaluation includes the cost of energy consumed by the equipment during its lifecycle.

The Commission's desktop computers have improved performance while reducing power consumption. The E. TEC[33] value of desktops produced in 2014 was 94 kWh/year, but this reduced to 65 kWh/year by 2017. Since 2017, laptops have been replacing desktops with an eventual Commission target of 100% mobile computers by 2021. This saves more energy as laptops have evolved from requiring half the consumption of desktops to a third in the most recent models (Figure 7.2).

[33] A standard measure of annual total energy consumption

Figure 7.2 Improved power consumption in Commission laptop computers



	2019-2011	2012-2014	2015-2017	2018-2019
Average of E.TEC (kWh/year)	31.34	26.88	19.25	20.72

Laptops in framework contracts

Other operational activities serve to reduce the Commission's IT consumption, including consolidating servers in fewer locations, and insisting on high performance levels for IT data centres in Luxembourg.

7.4 Purchasing through the office supply catalogues

Data in Table 7.4 shows that Brussels and Luxembourg have reduced the percentage of non "green" products in the standard office supply catalogue. Since 2012, at both Brussels and Luxembourg the percentage of "green" items has roughly doubled. JRC-Ispra has a smaller proportion of "green" products in the catalogue, but a large number of items.

Table 7.4 Proportion and number of items in the office supply catalogue that are not "green"

	Percentage of items that are not "green"									Number of items that are not 'green'								
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Brussels	73	64	64	54	53	52	52	53	53	464	328	328	385	416	392	386	124	125
Luxembourg	82	77	74	77	74	64	65	46	45	438	303	263	302	244	206	201	83	82
JRC-Ispra	74	74	76	76	68	70	72	71	72	433	433	517	529	500	475	532	506	517

7.5 Specialist advice on Green Public Procurement

The Commission supports an inter-institutional consultancy contract coordinated by the European Parliament through which a helpdesk can provide tailored advice on how to incorporate more sustainable elements into individual contracts. Under the Green Deal initiative, the Commission hopes to improve the procedures and guidance available in the tendering process to ensure that GPP is considered in a systematic way.

8 Demonstrating legal compliance and emergency preparedness

8.1 Prevention and risk management

Sites have their own standard operating procedures including internal and external audits that are required to demonstrate compliance with operating licenses and legislation. Sometimes environmental and health and safety compliance are integrated. The approach is described in the site annexes to this report and depends on the site, who retains overall responsibility.

The corporate EMAS coordination team (HR.D2) organises an annual internal auditing exercise for all the eight sites which is conducted on the Commission's behalf (and participation), by an external consultant. This is an EMAS system requirement.

The sites are also subject to annual EMAS external verification audits, the successful completion of which is a prerequisite for EMAS registration. In 2020 the verification audit took place mainly in June. The consulting company used 12 auditors to visit the eight sites over 23 days, with usually two or three per site.

HR.D2 encourages the external auditors to take into account the resources available to Commission staff when formulating their findings, and prioritise accordingly. The audits identify, in increasing order of urgency of response:

- Good practices;
- Scopes for improvement (SFI) – which can be considered as professional advice with no obligation;
- Observations – findings which if not addressed, could become non-conformities;
- Minor non conformities – findings to be addressed immediately but not a systems threat;
- Major non-conformities – serious findings that put the system at risk and address immediately.

The Commission records and follows up all audit findings using workflow software (JIRA). The external verifiers must immediately approve auditees' actions to address both minor and major conformities. The Commission monitors the number of EMAS non-conformities each year as shown in Table 8.1.

Table 8.1 Non-conformities from EMAS verification audits at Commission sites

Site	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brussels system coordination	6	0	2	2	0	0	1	0	0	1
Brussels (OIB and other)	15	5	1	1	3	1	0	1	0	0
Luxembourg	19	3	0	0	2	4	6	4	0	0
JRC- Petten			1	1	1	1	4	4	1	4
JRC- Geel				3	3	2	4	4	0	0
JRC- Sevilla				1	0	0	0	2	5	3
JRC- Karlsruhe					5	4	1	0	3	2
JRC- Ispra					0	0	0	1	1	0
DG SANTE at Grange					4	3	4	3	3	0
Total	**40**	**8**	**4**	**8**	**18**	**15**	**20**	**19**	**13**	**10**

The total number of non-conformities has been decreasing since 2017. Since 2016, HR.D2 has circulated to site management a summary of the main outcomes of each verification exercise including a "heat map" showing how the audit findings correlate with different parts of the EMAS Regulation. These have highlighted:

- Several good practices (for all the sites[34])
- Observations and scopes for improvements on several horizontal themes including the need to:
  - Measure training effectiveness,
  - Incorporate better checking of data prior to verification audits,

[34] Including JRC-Ispra's annual external stakeholder initiative "EMAS Round Table" with regional authorities, which resulted in signing a Sustainable Development Agreement with the Lombardy Region in 2019, when it also achieved a record participation.

8.2 Improving compliance (and performance) by registering more buildings under EMAS (Brussels and Luxembourg only)

All buildings in Brussels and Luxembourg have their own environmental permits issued by the local authorities. Registering individual Commission buildings in Brussels and Luxembourg under EMAS helps to ensure that the Commission complies with the permits, of which up to 20 or 30 could be undergoing modifications at any one time, and in so doing delivering ever-improving environmental performance.

It also ensures the Commission adheres to additional local regulatory requirements, such as COBRACE in Brussels that are mandatory targets for reducing energy consumption. Owing to the administrative workload associated with incorporating new buildings in EMAS (including system implementation, data preparation and reporting internal and external audits), the scope of the Commission's system has expanded gradually by adding a "manageable" number of buildings every year.

EMAS reporting for Brussels in 2015 reached a milestone with all occupied buildings (62) included for the first time. However, the real estate portfolio changes from year to year, with typically either one or two buildings entering or leaving the estate. In 2018 three buildings were not included in the scope, but in 2019 both MO15 and MERO buildings underwent successful audits were added to the Brussels registration, and in 2021 the registration will include 60 of 61 buildings.

In Luxembourg, reporting on environmental performance has included all buildings and 15 out of 18 are EMAS registered representing 84% of useful floor space (156 681 m^2 of 181 606 m^2).

As indicated in Table 1.3, 488 of 494 building structures (99 %) are registered in the Commission's EMAS scope in 2020, representing 98 % of useful floor space (1 613 427 m^2 out of 1 640 755 m^2).

The JRC experimental sites and DG SANTE at Grange are self-contained and each wholly registered under EMAS, therefore it is not necessary to register building by building as in Brussels and Luxembourg where the Commission's premises are spread across the cities.

8.3 Emergency preparedness

Each Commission site has structures and procedures for responding to emergencies. A page on the EMAS intranet corporate portal (MyIntracomm) explains the different emergencies in Brussels and Luxembourg with links to all pages related to the follow-up of incidents and emergencies. This was necessary because for these large centres multiple services share responsibility for emergency preparedness and response making it sometimes difficult to see exactly where responsibilities lie between the Security Office, Health and Safety services, infrastructure services, etc.

In addition, summary sheets of emergency contact numbers are circulated to offices, and HR.D2 also prepared an intranet page to relay air quality alerts from the local authorities in Brussels. Automatic SMS to staff can also convey emergency information, for example, when buildings evacuations enter into force and when they are lifted.

9 Communication and training

9.1 Internal communication and training

This section describes the corporate communication and training actions common for all the Commission sites. Every year, HR.D2 prepares detailed corporate communication and training action plans, sets up corporate internal communication campaigns, supports individual services in setting up local staff awareness campaigns, updates EMAS training material and delivers training and technical support to the EMAS Site Coordinators and to the EMAS Correspondents Network (Brussels and Luxembourg). The more important actions are outlined below.

9.1.1 Leadership and commitment

During 2020, the Commission's senior management took an active role demonstrating leadership and commitment in relation to the environmental management system and environmental issues in general. Specifically:

9.1.1.1 How the Commission could become climate neutral by 2030

In December 2019, when the Commission's European Green Deal pledged that the Commission would "present a comprehensive action plan… to implement itself the objectives of the Green Deal and to become climate neutral by 2030.", the EMAS Steering Committee had already commissioned a feasibility study on this topic coordinated by DG Climate Action (CLIMA).

Paving the way towards the "Greening the Commission communication", DG CLIMA Director-General **Mauro Petriccione** presented on 10/09/2020 the final study[35] to Director-General of DG Human Resources and Security (HR) **Gertrud Ingestad**, building on EMAS work started in 2005, mapping Commission's current GreenHouse Gas (GHG) emissions and suggesting how to reduce them and how to improve emissions monitoring. Finally, it sets out three different scenarios for the Commission to reach climate neutrality by 2030, as well as the estimated associated costs.

Director-General **Gertrud Ingestad,** DG HR noted that "DG HR is currently preparing a 'Greening the Commission' Communication, setting out how the Commission itself can contribute to collective efforts for climate action and achieve climate neutrality by 2030. This study is an important contribution to that Communication, and it confirms we are moving in the right direction – we are already putting in place measures to reduce our climate footprint in all the domains it identifies. But, it also gives us some new ideas – on managing missions and external visits, for example. We will look carefully at all the suggestions made and will look for the most effective ways of reducing emissions. Whatever the outcome, we will of course keep staff informed and involved in the further evolution of the Communication!"

9.1.1.2 EU Mobility Week: promoting zero-emission mobility for all

The 19th year of EUROPEAN**MOBILITY**WEEK (16-22/09) was celebrated across Europe from 16-22 September. Thousands of towns and cities from over 40 countries hosted their own events, shining a spotlight on the importance of zero-emission mobility for all. This is and its well-known car-free day, when streets close for motorised traffic and open for pedestrians, cyclists, hoverboarders, e-scooter riders and more!

[35] https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/climate_neutral_commission_study_en.pdf

EU Transport Commissioner **Adina Vălean** said: "This year is a big challenge for our towns and cities. But the pandemic also showed us that people appreciate and expect our cities to become safer, cleaner and accessible to all. During this week and beyond, our partner cities from all around Europe will show how greener and more digital European towns and cities could look."

9.1.1.2 Special October edition of Velomai a big success

Close to 1 600 staff from 11 different EU institutions and agencies all over the world took part in this year's unusual Velomai challenge – October edition, in which leisure rides accounted for a number of the 250 000 kilometres travelled. In an interactive online ceremony on 12/11/2020 featuring DG HR Director-General **Gertrud Ingestad**, the winners were announced and received their trophies and diplomas.

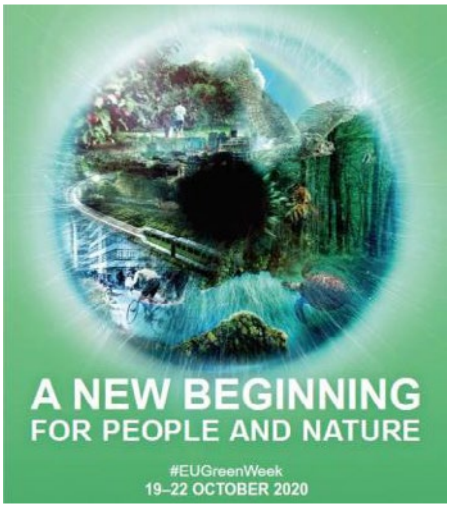
The competition under the slogan "Zero pollution, bike solution" run throughout the month of October and was kept fun by publishing 300 stories and 450 photos on the Velomai app. Reflecting the bicycle's growing popularity, nine European institutions, eight agencies, 16 delegations and six European Schools took part in the competition. Participants came from all over the world, including El Salvador, Israel, Japan, Somalia, Colombia, China, Gaza and Zambia.

9.1.1.3 First-ever 'Sustainable Events and Conferences' competition winners revealed Green Deal commitment in practice

On 08/10/2020, in a mostly online ceremony featuring Commissioner for Budget and Administration **Johannes Hahn**, the winners of the Commission's first-ever Sustainable Events and Conferences Competition were revealed - showing that the Commission truly 'walks the talk' when it comes to sustainability and reducing the carbon footprint. The ceremony was jointly hosted by **Gertrud Ingestad**, Director-General of DG Human Resources and Security (HR) and **Carlos Alegria**, acting Director-General of DG Interpretation (SCIC).

Asked why it is so important to have such a competition, VIP guest Commissioner for Budget and Administration **Johannes Hahn** said "The Commission always has to lead by example. In that respect, I think it's important to demonstrate that in the way we organise and conduct conferences and events we should be aware of the footprint we are producing and try to reduce it with all the means we have."

9.1.1.4 EU Green Week: a new beginning for people and nature



EU Green Week, Europe's biggest environmental event, was organised as a 100% virtual event from 19-22/10/2020, focusing on how protecting and restoring nature can stimulate recovery and create jobs, helping us to build a healthier and more resilient society.

In the words of Commissioner for Environment, Oceans and Fisheries **Virginijus Sinkevičius**: "Without nature, there is no life on Earth. It's time to reverse biodiversity loss and damage to nature. As we emerge from the pandemic, we have a chance to create a more sustainable economy, one that doesn't destroy our life support system but protects, restores and heals it instead."

Biodiversity is in crisis around the globe. The latest Commission report on the State of Nature shows Europe's biodiversity faring little better than the rest of the world. In an effort to tackle the problem, the Commission adopted an EU Biodiversity Strategy in May[36]. EU Green Week explained the thinking behind this new approach, highlighting the contribution biodiversity can make to society and the economy, and the role it can play in stimulating recovery in a post-pandemic world.

9.1.2 Communication to staff

9.1.2.1 Corporate seasonal communication campaigns:

There were three main corporate communication campaigns during 2020:

- The award ceremony of the first corporate competition on sustainable conferences and events (October);
- The Volunteer for a Green Change initiative (October);
- The Less Waste, More Action - Waste Reduction campaign (November-December)

01 The award ceremony of the first corporate competition on sustainable conferences and events

The competition addressed the sustainability of both internal events and external conferences, either in Commission premises or outside, which took place during 2019, in pre-COVID days. The evaluation criteria – in full accordance to the Guidelines on organising sustainable meeting and events at the Commission[37]- were: venue, accommodation and participants' travel, conference material, catering, social impact and communication aspects. The award ceremony was web-streamed[38] and attended by more than 200 participants. The winners were:

- In the category 'internal events', **DG Translation's Irish unit** took the prize for the organisation of the annual St. Patrick's Day party, which - among many other 'green' innovations - featured sustainable catering with plenty of homemade food, partly organic food, and a large vegetarian selection of dishes offered (at least 50% dishes were plant-based).
- The top prize in the second category, 'external events in Commission premises', was won by **JRC-Ispra**, for the Summer School 'Non-Animal Approaches in Science'. Many aspects of the event impressed the jury, including an ECO reusable mug given to each participant to be used during the whole event for both water (offered at water stations in jars and fountains) and coffee/tea, offered in thermos flasks. Besides the winner, there were two special mentions in this category. The first, **DG Health and Food Safety (SANTE)** for its innovative ideas on sustainable catering, as well the food donation scheme for the leftovers, at the event 'Time's up for food waste! Setting the EU action agenda towards 2030'. The second, **DG Interpretation (SCIC)**, received a special mention for the innovative promotional material of the event 'International Annual Meeting on Language Services, Documentation and Publication' by offering to each participant an symbolic "eco-bracelet" representing the planting of one tree in a rural area in Romania.

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36 https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en

37 https://ec.europa.eu/environment/emas/pdf/other/EC_Guide_Sustainable_Meetings_and_Events.pdf

38 https://webcast.ec.europa.eu/ceremony-of-sustainable-events-awards

- Finally, the third category was divided into two sections, according to the number of participants. **DG Maritime Affairs and Fisheries (MARE)** was top of the podium for events with under 1 000 participants. An innovative and eco-friendly voting system using discarded items such as plastic bottles and bottle caps was just one of the 'Post-2020: Local Action in a Changing World' conference's many green points. **DG Research and Innovation (RTD)** took home the top prize in the over 1 000 participants section for the 2019 Research and Innovation Days. The event featured an energy efficient venue with good access by public transport and no parking facilities available on site, as well as zero emission EU-funded hydrogen buses available to reduced-mobility participants. **DG Regional and Urban Policy** (**REGIO)** received the second prize in the category for the sustainability of the European Week of Regions and Cities 2019, an especially complex paperless and plastic-free Brussels-based event involving regions and cities – some 9 000 participants in total. Joint second on the podium was also **DG MARE** for the European Maritime Day 2019, a 100% plastic-free conference and exhibition (3 200 participants). Last but not least, **DG Economic and Financial Affairs** (**ECFIN)** received a special mention in the category for its innovative idea for digital participation in the Brussels Economic Forum 2019.

To benefit from the expertise gained in these events, DG SCIC organised a webinar on how to organise sustainable conferences and events on 15 October, with the participation of experts from the winning events of DG MARE and JRC-Ispra.

02 Volunteer for a Green Change initiative

"Volunteer for a Green Change", the first corporate green volunteering action co-organised by EMAS and Corporate Social Responsibility (CSR) teams, mainly took place during EU Green Week from 20-22 October**.** Colleagues in Brussels, Luxembourg and Ispra took part in a limited number of green volunteering actions with local NPOs, NGOs, associations and public agencies, bringing much needed immediate support but also laying the foundations for longer term greening collaborations in line with EU Deal Deal.

This corporate green volunteering initiative aimed to raise staff awareness of the issues being tackled locally by civil society; to offer an opportunity for staff to demonstrate their interest in and commitment to Green Deal priority areas; and to support local NPOs, many of whom have been struggling to keep going as a result of COVID-19.



Green volunteering activities included local clean-ups, sorting donated clothes and toys for redistribution to people living in poverty, supporting second-hand / social inclusion actions and working on organic farms. There were online workshops on zero-waste lifestyle and guided-visits to an urban herb garden. Moreover, the sustainable food choices sub-committee of EUStaff4Climate compiled and promoted a 100% plant-based cookbook. The overall programme also included during November a tree-planting action in Ispra, an online zero waste workshop for staff of EU Institutions in Luxembourg, and an online Hackathon on sustainability (EC Green Hackathon) in collaboration with local Belgian NGOs/associations.

The First 'Volunteer for a Green Change' initiative was an instant hit with more 300 colleagues taking part in green-themed volunteering activities. It aimed at highlighting issues being tackled locally by civil society while allowing staff to demonstrate their interest in, and commitment to, Green Deal priority areas.



03 Less Waste, More Action": Waste Reduction Campaign

In the framework of the European Week for Waste Reduction (EWWR, 21-29/11/2020) focused on "invisible waste", the EMAS coordination team (HR.D2) organized the **"Less waste, more action 2020" initiative** aiming to inspire the Commission staff to further reduce its daily waste with special focus on digital waste, digital mindfulness and clean-up.

The novelties of this year's campaign included:

- **A Photo challenge "Less waste, more action 2020" initiative (13/11 – 11/12)**, on further reducing EC-staff's daily waste following the **5 Rs principles: Refuse, Reduce, Reuse, Recycle and Rot.**
- **19/11: Zero waste lifestyle online workshop for EU Institutions' staff in Luxembourg:** Zero-waste experts from the EMAS eco-team of Eurostat (ESTAT) organised a free online workshop addressed at EU institutions' staff in Luxembourg, where provided information on shopping with less packaging and organic composting practices; offering very easy alternatives to reduce the environmental impact in everyday life (approx. 100 participants).
- **25/11: Zero waste lifestyle online workshop** where information on waste is provided, in particular plastics, but also food, textile and digital waste, etc.; offering very easy alternatives to reduce the environmental impact in everyday life, by the EMAS Correspondent[39] in DG Agriculture and Rural Development (AGRI) (approx. 60 participants).
- **Digital clean-up tips and tricks** by DG Informatics (DIGIT) on digital mindfulness and clean-up tips and tricks, in order the reduce EC-staff's digital footprint, as well as digital detox, the right to disconnect during the current teleworking setting.

In addition, several innovative and original initiatives took place across services, for example:

[39] EMAS contact-point in every DG/service acting as the intermediate on environmental issues between local staff and HR.D2.

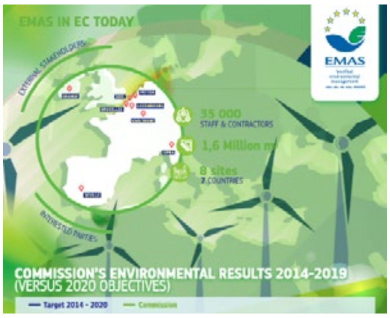
- The EMAS team in DG Budget (BUDG) has organised on 19/11 a **virtual workshop on how to reduce your waste at home**, make your own body cream, find leisure activities that are 'social distancing proof' and stay fit at the same time.
- DG Translation (DGT) issued **Green DGTips e-Newsletter** during November and December;
- DG Education and Culture (EAC) and DG Financial Stability, Financial Services and Capital Markets Union (FISMA) both set up successful actions to **remove personal printers**;
- European Research Council Executive Agency (ERCEA) circulated a **Green November e-Newsletter** and organised an **online seminar on circular fashi**on (8/12);
- European Education and Culture Executive Agency (EACEA) set up a **virtual Adventskalender** and shared tips and tricks (via **short videos**) on how to make life environmental friendlier.
- DG Agriculture (AGRI) circulated an **online Green Xmas flyer** and participated in a **Living Lab Russia event** organized by the EU Delegation in Russia.

9.1.2.2 Additional campaigns

Additional corporate environmental campaigns have been conducted in relation to:

- **29/06: Lunchtime conference by DG Climate Action (CLIMA)** on the draft findings of the "Feasibility and scoping study for the Commission to become climate neutral by 2030", addressing how much could the Commission reduce its greenhouse gas emissions in-house by 2030, what would that take, how would that change the way we work and whether we can draw useful ideas from our experience with the COVID crisis (approx. 150 participants).

- **The 4th edition of the inter-institutional VéloMai challenge** (October 2020): The action resulted from successful collaboration among several actors: HR units, the fit@work programme [40], EMAS Site Coordinators and EU Cyclists' Group (EUCG). Several local events were also organised at site level (as described in the site Annexes). Some 1 591 colleagues hopped on their bicycle and took up the challenge. They cycled around 250 000 kilometres during 41 500 rides. As a member of the organisational committee put it "is not just about cycling, but also about building a community of cyclists".
- **Green tips for remote working and lockdown** campaign during March-April;
- The **greening your summer** - "The art of sustainable holidays" campaign before the summer holidays in June-early July;
- The **"Keep it Green this Christmas"** campaign before the end of the year holidays
- The **publication of the Environmental Statement 2020** (data 2019) and an **on-line promotional brochure[41]** highlighted the main results.
- Communication to staff on the **EMAS highlights** in relation to the EMAS Steering Committee's meeting on 6/10/2020 on the "Feasibility and scoping study for the Commission to become climate neutral by 2030" and the extension of EMAS scope to the Executive Agencies and the EC Representations across member states.



HR.D2 also promoted the **Inter-institutional Green Public Procurement (GPP) helpdesk**, coordinated by the European Parliament. It is open to all Commission services since 2017, as well as to 7 other EU Institutions. There has been one GPP Helpdesk's event on Public Buildings' Design, Construction and Maintenance on 8/12 (approx. 100 participants). The Infrastructure Office of the Commission in Luxembourg (OIL) presented one of the most technologically advanced building projects of the European Institutions. The almost 200 000 sq. m project for the JMO2 building, will offer working space for 3 600 people. New technologies, BREEAM certification and the

40 fit@work is the Commission's cross-cutting, multi-annual health and wellbeing programme.
41 https://ec.europa.eu/environment/emas/pdf/CEEnvironmentalPerformance_4pager_2021Europa_Web.pdf

impact assessment on the environment and wellbeing of this project. In addition, articles were published on the electronic newsletter of the RUF Network (Network of Commission's Financial Officers and Procurers, managed by DG Budget).

9.1.2.3 Other corporate communication

In addition, the Commission:

- Published six articles in the Commission's on-line news portal "Commission en Direct";
- Published five articles on the new Simpler.Smarter.Together section on Commission's intranet;
- Made several announcements on the Commission's intranet;
- Revised the overall structure and further improved the internal EMAS webpages.

9.1.2.4 Communication actions initiated by the EMAS Correspondents

EMAS Correspondents organised local environmental actions in the **19 DGs/services**, compared with 26 services in 2019, despite the constraints imposed by the physical lockdown on all EC-sites since March 2020. Characteristic examples included sustainable mobility promotional actions in the framework of VeloMai-October edition (e.g. local photo competitions, video messages), online lunchtime discussions on staff awareness, climate change and the Commission's efforts. There were greener (nearly zero waste) lifestyle and zero waste online workshops, as well as webinars on waste reduction and recycling staff awareness and promoting more sustainable conferences and events and paperless working approaches and new ICT tools. Electronic Newsletters were launched by several EMAS teams and green committees and eco-teams continued to brainstorm with local staff on environmental matters. Local urban gardens were created with the support of volunteers and colleagues planted trees at home and participated in local photo competitions supporting this action.

In 2021, the Commission will organise its main communication campaigns around the EU Green Deal and focus on what the Commission and its staff will do to meet the 2030 climate neutrality challenge. New initiatives will include:

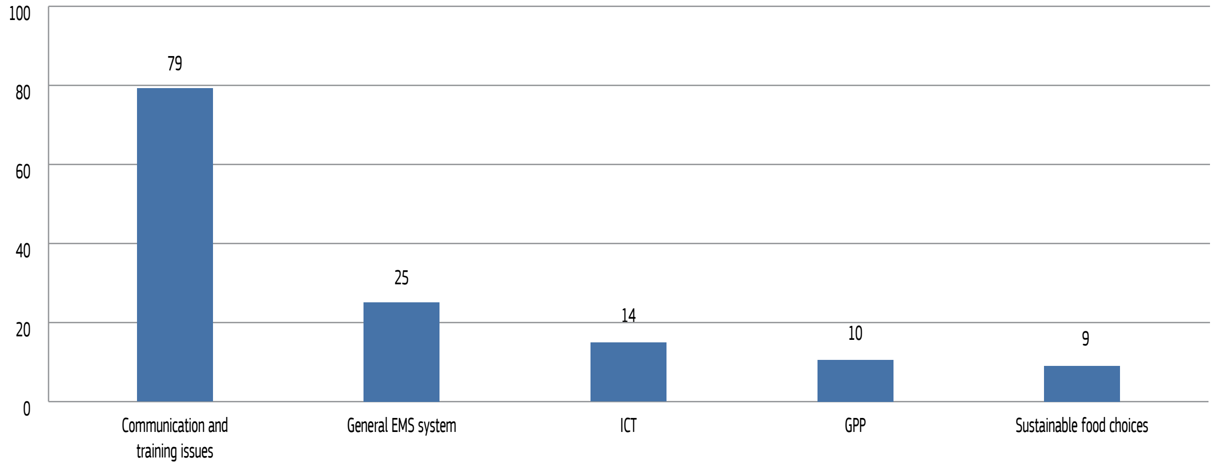
- Design of new visual graphic material in order to promote the "key messages" of the **new EC's Environmental Policy** towards climate neutrality by 2030 to a wider audience, via mainly online tools, and link it with the upcoming Communication on Greening the Commission;
- HR.D2 will contribute, support and promote EMAS actions in the **EC Executive Agencies and EC Representations** across member states;
- HR.D2 will contribute, support and promote EMAS / Greening the Commission actions as part of the **Modernisation communication campaign: Simpler, Smarter, Together** with success stories concerning "EMAS in EC" during 2020-2022, as well as the **internal corporate communication relevant to the EU Green Deal** during 2020-2024.

9.1.3 Dialogue with internal stakeholders

The Commission has a corporate register of internal questions and suggestions submitted via the EMAS in EC functional mail-box and Staff Forums, which recorded **158** entries in 2020 (compared with 328 in 2019, 185 in 2018, 188 in 2017 and an average of 40-60 entries during the previous years), all of which received responses. This significant decrease during 2020 may be attributed to the "COV19 pandemic shock-effect" that shifted the interest of staff to practical issues on how to deal with the new lockdown /teleworking reality after March 2020. It should be also noted that all physical events and trainings were cancelled (e.g. EC Newcomers' Open Day, EMAS spring campaign, Velomai, EU Green Week). Nevertheless, EC colleagues' interest and commitment reappeared strongly during the last months of the year.

The three most popular environmental topics for Commission's staff are i) communication and training issues, as a direct reaction to specific EMAS staff awareness corporate initiatives (e.g. award ceremony on sustainable conferences and events, corporate green volunteering initiative and waste reduction campaign on digital waste), ii) general EMS system issues (especially in relation to specific EMAS objectives and KPIs to be included in Commission services' Management and Strategic plans), and iii) ICT issues, especially relevant to the environmental impact of teleworking.

Figure 9.1 The main topics of interest of internal stakeholders' inquiries/suggestions in 2020



In addition, at a local level, EMAS Site Coordinators and EMAS Correspondents keep records of questions and suggestions from staff along with responses.

The Commission conducted a two yearly on-line survey on staff environmental behaviour and awareness in November 2019, with a response rate of 27% (2,415 participants) higher than average for internal EC staff surveys.

The **next EMAS staff survey** in 2021 also addresses lessons-learned from the COV19 lockdown that will contribute to the "new normal" and efforts to reach Commission's climate neutrality objective by 2030.

9.1.4 Communication among EMAS Correspondents and Site Coordinators

As shown in the table below the annual survey demonstrated only a slight drop in the performance of the Commission's EMAS teams in relation to 2019, despite the difficulties created by the COV19 lockdown since March 2020 and the fact that we experienced the highest turn-over in the EMAS teams (with 25 new members). This has been achieved only due to the high commitment and enthusiasm of the new EMAS team members and strong support by their senior management. Overall, **37 out of 46** EMAS teams demonstrated a performance above average (in relation to 35 out of 42 in 2019), representing **88%** of the total population (in relation to 83% in 2019). This is mainly the result of (i) the noteworthy environmental awareness support by the local volunteer groups (currently active in 6 out of the 8 sites and in 16 DGs/services), (ii) the increased number of local EMAS action plans in 24 DGs/services (in relation to 15 in 2019) and (iii) the increased contacts of the EMAS teams with senior management (currently in 6 sites and 31 DGs/services, in relation to 23 in 2019).

Survey year[42]	**2013** (max. 10)	**2014** (max. 10)	**2015** (max. 10)	**2016** (max. 10)	**2017** (max. 9)	**2018** (max. 10)	**2019** (max. 9)	**2020** (max. 9)
Average EMAS team score	5,3	5,5	4,4	4,3	3,6	4,6	6,5	6,1

In 2020, there was no service without an assigned EMAS Correspondent, compared with one in 2019 and all new EMAS teams had attended a relevant introductory training. HR.D2 planned several steps to strengthen the EMAS correspondent (ECOR) role. These included: (i) provision of additional hands-on trainings and practical toolboxes, (ii) enhanced role of the EMAS Correspondents as the contact-points for the compilation of the "Sound Environmental Management" section in their DGs/services' Management plans 2020 and Strategic plans 2020-2023 and (iii) creating a corporate group of environmental volunteers across the Commission to support the first corporate green volunteering initiative Volunteer for a Green Change, as well as promotion of additional synergies among ECORs.

42 The criteria are: participation in the annual survey, presence at the network meetings and training sessions, presence of local volunteers, local action plans, evidence of direct contact with top management, implementation of centrally prepared campaigns and local actions.

Moreover, five (5) EU Executives Agencies participated in corporate EMAS campaigns (REA, ERCEA, EACEA, EASME and INEA[43]) and four (4) (REA, ERCEA, EACEA and EASME) took part in the annual EMAS Network Survey, with an exceptional average performance of **8**.

Lastly, REA, ERCEA, EACEA and EASME participated with great success in the EMAS internal audit exercise during December 2020, due to (i) the high commitment of these Executive Agencies' EMAS Correspondents and eco-teams and (ii) their senior management's leadership and engagement in their respective "greening agenda".

In 2021, HR.D2 will work to improve the EMAS network's efficiency via synergies with the local Logistics Proximity teams[44], the Account Management Centres (AMCs)[45], as well as local groups of environmental volunteers and mentorship programs among the EMAS Network.

9.1.5 Training

Corporate level EMAS training organised during 2020 included:

9.1.5.1 EMAS training for all staff

EMAS training for newcomers: In Brussels, since November 2016, this has consisted of an interactive 1hr 45 min session held every 2-3 months entitled "EMAS basics for EC Newcomers". A similar session was introduced in Luxembourg in 2018.

Between January to March 2020, there have been in total 4 physical training sessions with 139 participants (3 sessions in Brussels and 1 session in Luxembourg). As part of the COV19 lockdown measures, all physical training have been cancelled since end of March 2020. HR.D2 has designed an online "EMAS basics for all" training offered to all staff across EC-sites since October 2020 on a monthly basis with approx. 100 participants/session. This online version received very positive feed-back and received several interesting environmental suggestions by the participants across EC-sites, including Representations in member states. In total **432 colleagues** attended an EMAS basics training in 2020, in relation to 269 participants in 2019. The most common topics of interest included the upcoming Greening the Commission Communication, the Commission's carbon footprint from teleworking and the reduction of GHG emissions' related to missions and sustainable commuting.

The efficiency of the corporate EMAS trainings is monitored via the biannual EMAS staff surveys, as well as the standard evaluation surveys conducted via the EC training IT tool (EU Learn). According to the 2019 EMAS staff survey, the overall awareness of environmentally friendly behaviour at work is at an all-time high with **84%** of staff feeling well or reasonably well informed about it. The next survey will be performed in 2021.

In addition, a 10-15 minute presentation is included in the introductory program for Commission newcomers in the JRC-sites and Grange[46] and in few other DGs/services e.g. DG Energy (ENER) and DG Mobility and Transport (MOVE) and Eurostat (ESTAT).

Lastly, the EMAS section in the new Commission's Training Portal (including a variety of training material from e-books to documentaries, videos and cartoon animations) was updated and further enriched.

In 2021 (i) the online "EMAS basics for all" sessions will be intensified in periodicity, aiming to reach out to at least 600 participants and extend the scope to include the environmental impact of teleworking, and (ii) HR.D2 will define ad-hoc tools to monitor the efficiency of EMAS-related trainings offered to EC-staff (e.g. via EMAS staff survey 2021) and adapt the EMAS documentation accordingly.

[43] Since 1st of April 2021, the Executives Agencies have been reorganised and EASME was renamed into EISMEA and INEA to CINEA, while a new executive agency HADEA was created.

[44] The new Logistics Proximity Teams (LPTs), coordinated by the Office for Logistics and Infrastructure in Brussels (OIB), took over the tasks carried out by the Building Managers, Inventoried Items Managers (GBIs) and Office Supplies Managers (GDFs).

[45] The Account Management Centre in DG HR is a new Directorate, which takes over responsibility for the local HR services which were previously delivered by HR units in each DG. (From 16 February 2017, the Account Management Centre is your??? first point of contact for all your??? personal HR issues.)

[46] The periodicity of the newcomers' presentations depends on the number of new staff. Information relevant to JRC and Grange newcomers' trainings are provided in the relevant annexes.

9.1.5.2 Environmental Management System (EMS) Training

There were three (3) training sessions for new EMAS Correspondents (ECORs), i) one physical training on 11th February 2020 (13 participants), ii) one online session on 25th August 2020 (10 participants) and iii) a second online session on 08th September 2020 (8 participants). In total, **31 members of the EMAS teams** (in relation to 24 in 2019) have attended an induction EMAS training. It should be noted during 2020, all new EMAS Correspondents have attended an EMAS training despite the high turn-over rate (25 new members).

Following the suggestion of the EMAS Site Coordinators, there have been two sets of Site Coordinators' workshops during 2021 (approx. **15 participants/workshop**): (i) one physical workshop between 05-06/03 in JRC-Geel focused on EMS improvements and (ii) three (3) virtual half-day workshops on 20/11, 24/11 and 27/11 that focused mainly of EU Green Deal implications on the Global EMAS Action Plan, communication and training actions. This brought together the EMAS Site Coordinators for all EC sites. These gatherings are essential to ensure mutual learning and to harmonise local EMAS implementation.

In addition, there have been (i) introductory trainings to the EMAS teams in EC Representations in Vienna on 28/10 and 11/12 (**6 participants**) and (ii) preparatory training as part of EMAS internal audit for the 4 Executive Agencies: REA, EASME, EACEA and ERCEA during 16-17/11 (**8 participants**).

The efficiency of the corporate EMAS trainings addressed to the EMAS Network is monitored via the annual EMAS Network survey and the subsequent benchmarking exercise (see paragraph 9.1.4). The 2020 survey revealed a continuing high average of **6.1** for the network of EMAS Correspondents/Site Coordinators (and an impressive average of **8** among the Executive Agencies), demonstrating that the network has been performing exceptionally well despite the COV19 lockdown strain. Concerning the EMAS teams in EC Representations in Vienna and Valetta, a GAP analysis will be performed during 2021, in order to prepare the ground for their gradual inclusion to the EMAS scope.

In 2021, HR.D2 will (i) also host two EMAS site coordinators' workshops, (ii) set up a **mentorship programme for members of the EMAS Network** and exploit the full potential of new collaborative tools available (e.g. MS Teams) and (iii) define ad-hoc tools to monitor the efficiency of EMAS-related trainings offered to EMAS Network (e.g. via the annual EMAS Network benchmarking exercise, GAP analysis for EC Representations) and adapt the EMAS documentation accordingly.

9.1.5.3 Specialised courses

Selected staff whose activities may have potentially significant environmental impacts may benefit from externally provided environmental training sessions. Examples are the energy counsellor's course by Brussels Environment (IBGE) and eco-driving training for Commission drivers. External suppliers provide these training sessions. HR.D2, as a system requirement, has however established a register of training needs for such staff and is seeking to map the current offer of specialist trainings arranged by the sites. During 2020, the majority of the EMAS Site Coordinators updated this register.

In 2021, the Commission will design and offer GPP trainings for EC Financial Officers/Procurers/Project Managers, in collaboration with GPP experts from JRC-Ispra, DG BUDG and DG ENV, in the framework of the Inter-institutional GPP Helpdesk thematic conferences/events.

9.2 External communication

9.2.1 Environmental Statement and websites

This document is the "go to" document for most responses to questions on the subject. It contains information from the all the EMAS sites (as annexes) and is subject to external verification. It is published on DG ENV's EMAS website[47]. Since 2019, two pages of infographics have been added as part of the Executive Summary, demonstrating visually the main EMAS highlights and achievements.

Additional "EMAS in EC" webpages have been created at:

(a) The Commissions Europa homepage under: "About us" / "Services, standards and principles" / "Environmental impact" at:

http://ec.europa.eu/civil_service/admin/green/index_en.htm

(b) The homepage of DG ENV on Europa: http://ec.europa.eu/dgs/environment/index_en.htm

In 2020, the "EMAS in EU Institutions" section at the official EMAS website (approx. 3 000 hits/year) was updated including overall environmental results and best-practices and success stories by the 12 EMAS-registered EU Institutions and bodies, as part of an inter-institutional communication project in the framework of the Inter-institutional Group on Environmental Management (GIME).

In 2021, in the framework of the EU Green Deal, the EMAS logo and information about "EMAS in EC" will have a more prominent position at the Commission's official Europa homepage.

9.2.2 Press announcements

The participation of EU Institutions in firstly purely digital Earth Hour 2020, as well as the highlights of the Commission's environmental performance have been promoted via EMAS in EU Institutions section of the official EMAS website on Europa managed by DG ENV.

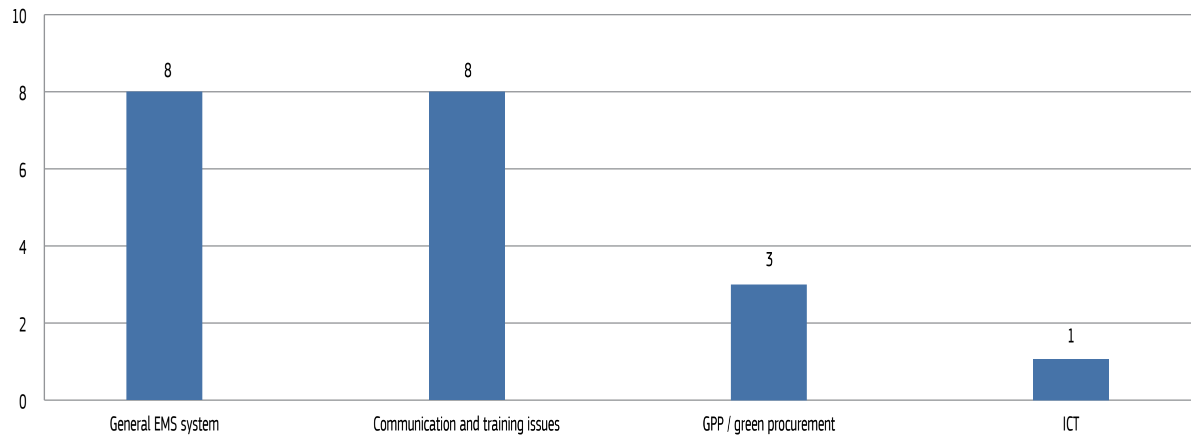
9.2.3 Parliamentary questions

HR.D2 responded to three parliamentary questions in 2020, in relevance to energy sources in the buildings of European Institutions and emissions from professional travel (missions).

9.2.4 Communication with external stakeholders

HR.D2 responded to all **20** external queries recorded during 2020 (in relation to 58 in 2019, 45 in 2018 and 30 in 2017 and significantly increased from 8 in 2016). The significant decrease in the Commission's EMAS team outreach is due to the suppression of the periodic meetings and external communication actions related to Group Interinstitutionnel de Management Environnemental (GIME), chaired by the Commission during the COV19 lockdown. The three most popular topics of interest for external stakeholders were EMAS communication/training issues in relation to specific successful Commission's actions, the "EMAS in EC" operational procedures and documentation (especially in relation to the upcoming Greening the Commission Communication) and events by the inter-institutional GPP Helpdesk.

Figure 9.2 The main topics of interest of external stakeholders' inquiries/suggestions in 2020



[47] http://ec.europa.eu/environment/emas/emas_registrations/emas_in_the_european_institutions_en.htm

Inter-institutional collaboration was established on specific themes on a regular basis with EU or international organisations. These include the European Parliament, the General Secretariat of the Council, the European Economic and Social Committee, the European Committee of the Regions, the European Central Bank, the European Court of Auditors, the European Court of Justice, the European Investment Bank, the European Decentralised Agencies, Inter-agency Greening Network and other EU bodies.

Unfortunately, the 28th edition of the EU Institutions' Open Day in May 2020 was cancelled due to the COV19 lockdown, even though the hard efforts on the preparation on a 100% plastic-free and gadget-free event, in collaboration with the EMAS coordination team (HR.D2).

Lastly, during 2020 the following external communication initiatives were organised:

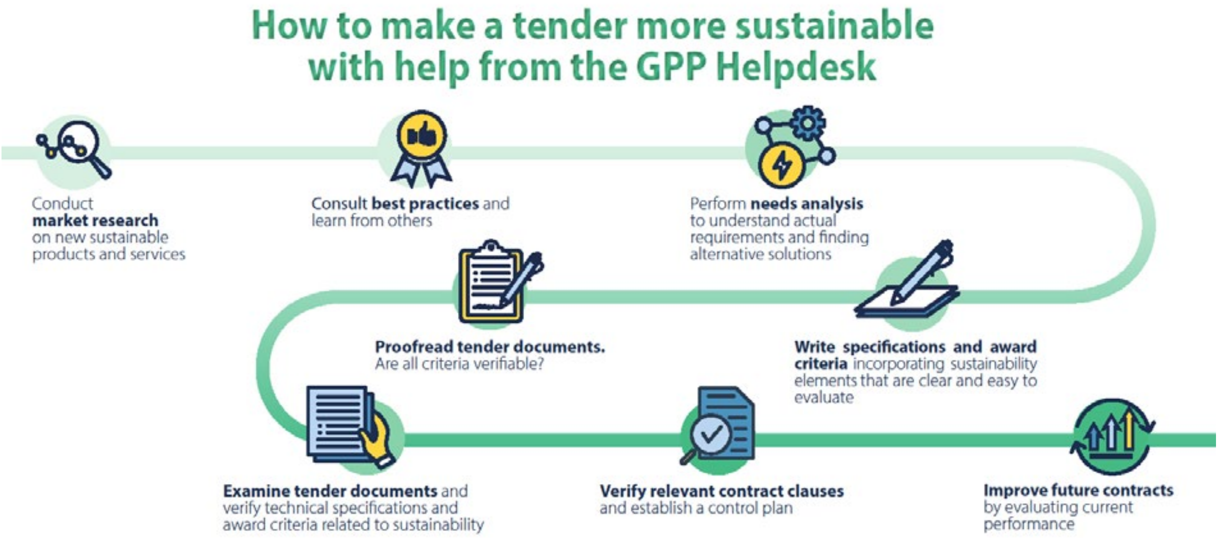
- as part of the global **Earth Hour** movement, a common announcement was issued on 28th of March by 34 EU Institutions and bodies (6 new ones in relation to 2019) regarding the first purely digital Earth Hour, coordinated by the Commission.
- Collaboration with the **UN Sustainability Group** – UN Greening the Blue, exchanging best-practices on EMAS /Greening the Commission practices;
- HR.D2 participated in the virtual **Inter-agency Greening Network** meeting on 15/10/2020.

In 2021, the Commission will continue to play a leading role among EU Institutions and bodies, in promoting EMAS implementation, as well as in green public procurement (GPP). Moreover, HR.D2 will coordinate the organisation of **Interinstitutional Virtual EMAS Days 2021** in the autumn 2021.

9.2.5 Information for suppliers and sub-contractors

The Register on EMAS information sessions for EC suppliers and sub-contractors was considered obsolete and withdrawn, since the annual follow-up of the common template (Annex 2 to EMS-PRO-001) concerning the needs and expectations of external stakeholders both at corporate and site level, already covers all the additional requirements of the revised Annexes of EMAS Regulation III.

In 2021, the Commission will (i) continue to disseminate information about its environmental management system (EMAS) and its climate neutrality objective to its main suppliers and sub-contractors; (ii) as well as promote and implement the main principles of Green Public Procurement (GPP) in its own tenders/contracts via the support of the **Inter-institutional Green Public Procurement Helpdesk** coordinated by the European Parliament.



10 Costs of implementation and resource reductions

The Commission estimates costs of implementing EMAS and savings that can be associated with reduced resource consumption (for some parameters). The availability of data varies from site to site and by year.

10.1 Costs of staff and contracts for implementing EMAS

Table 10.1 summarises the estimated direct cost of human resources of Commission staff[48] along with those of consultancy, and other contracts directly linked with coordinating EMAS implementation.

Table 10.1 Direct total and per capita costs of implementing EMAS for each site (EUR)

Site	2014	2017	2018	2019	2020	Change in 2019-20	Per person costs in: 2014	2017	2018	2019	2020	Change in 2019-20
HR.D2+ECOR network [1]	1 007 252	1 049 252	1 119 252	1 133 252	1 147 252	14 000	30.7	30.5	32.1	32.0	31.4	-0.6
Brussels	132 000	138 000	148 000	150 000	152 000	2 000	4.82	4.89	5.19	5.18	5.08	-0.1
Luxembourg	462 000	483 000	370 000	375 000	380 000	5 000	114	100.9	73.8	73.0	72.5	-0.5
JRC-Petten	66 000	69 000	74 000	75 000	76 000	1 000	234	262	298	301	308	6.5
JRC-Geel	66 000	69 000	74 000	75 000	76 000	1 000	191	260	286	286	286	-0.5
JRC-Karlsruhe [1]	71 000	74 000	79 000	80 000	81 000	1 000	222	230	249	254	262	8.2
JRC-Seville	132 000	138 000	148 000	150 000	152 000	2 000	457	429	433	408	398	-10
JRC-Ispra [1]	383 760	486 945	491 928	473 595	476 515	2 920	164	214	215	203	198	-5
Grange [1]	47 400	49 356	51 856	56 100	56 600	500	265	263	290	319	327	8
Commission	**2 367 411**	**2 556 553**	**2 556 035**	**2 567 947**	**2 597 367**	**29 420**	**67.3**	**69.8**	**68.8**	**68.0**	**66.7**	**-1.3**
of which % contracts	10.2	13.1	12.6	11.8	11.6							

Note: Includes all staff at Luxembourg and Brussels sites, based on sites participating in verification
1 – Sites reporting contract support costs

The size of the teams supporting the EMAS system at the sites has been relatively stable for several years, and consequently the cost per staff member has fluctuated between 65 and 70 EUR. JRCs Petten, Geel, Karlsruhe and DG SANTE at Grange report the equivalent of less than one employee (as Full Time Equivalent). A slight cost reduction was recorded in 2019-20.

10.2 Savings from reduced energy consumption in buildings

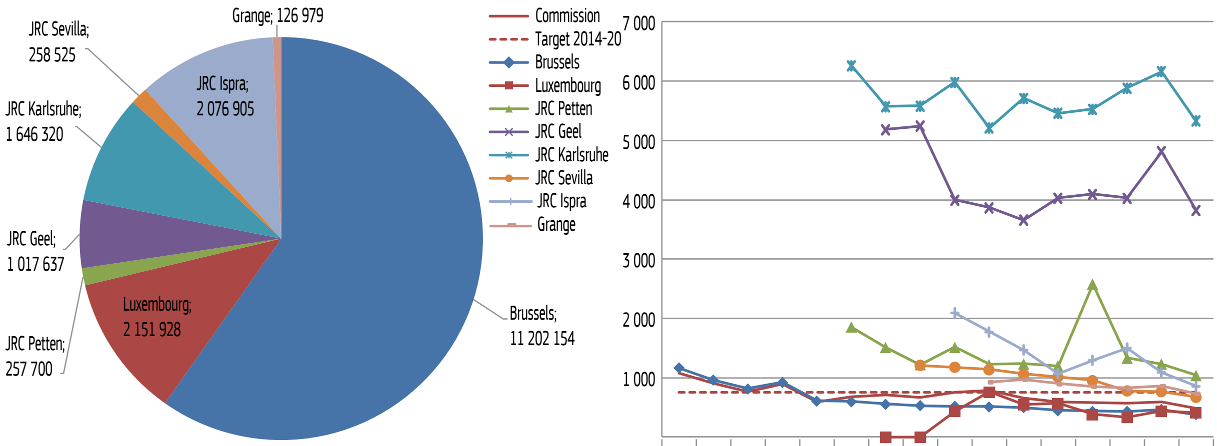
Energy consumption represents the greatest single resource cost recorded under the environmental system. Figure 10.1 shows energy costs in 2020 along with the evolution of per capita expenditure in recent years.

Per capita costs varied widely between the sites in pre-COVID years with those comprising mostly office buildings, (Brussels and Luxembourg) both below 500 EUR and JRC sites with their more energy intensive experimental and/or nuclear activities such as JRC-Geel and Karlsruhe close to 5 000 and 6 000 EUR respectively. The COVID pandemic resulted in significantly reduced costs in 2020. The Commission easily met its 2014-20 target value[49] of 750 EUR/p for per capita energy consumption in recent years. Financial targets for resource consumption will not apply in future.

48 Using standard average cost of administrators published by DG BUDG for the Financial units, 152 000 EUR in 2020.

49 The EMAS Steering Committee has discontinued targets for resource consumption costs, as resource consumption is itself subject to targets

Figure 10.1 Building energy costs in 2020 (EUR) and evolution of per capita costs (EUR/p)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Commission	1 083	905	770	894	597	681	716	670	758	786	662	595	581	574	590	484
Target 2014-20	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
Brussels	1 168	961	815	924	611	600	557	530	521	515	497	449	437	435	467	378
Luxembourg							0	0	434	765	549	567	386	336	436	411
JRC-Petten						1 858	1 510	1 221	1 520	1 225	1 237	1 199	2 580	1 335	1 232	1 043
JRC-Geel							5 181	5 241	3 995	3 866	3 659	4 029	4 095	4 029	4 811	3 826
JRC-Karlsruhe						6 263	5 572	5 583	5 981	5 210	5 711	5 461	5 528	5 885	6 161	5 328
JRC-Seville								1 211	1 177	1 142	1 062	1 014	956	779	769	677
JRC-Ispra									2 093	1 775	1 466	1 072	1 294	1 499	1 089	861
Grange										931	971	901	853	829	864	734

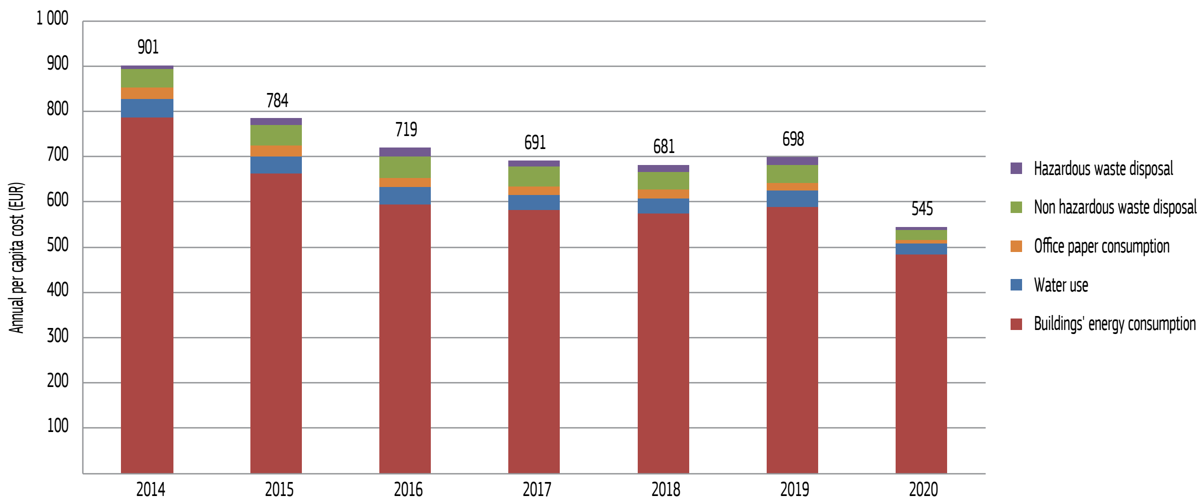
Note: Brussels data in 2005 applied to 8 buildings, since 2014 most buildings are included

Brussels continues to reduce its per capita costs, year after year and overall by two thirds since its first EMAS registration in 2005. Luxembourg's costs nearly doubled in 2014 because two data centres were included in EMAS reporting but have since fallen because the site now reports operational data for the whole site. A rise in 2019 reflects higher energy prices.

10.3 Costs of energy, water, paper and waste disposal

The per capita costs for non-energy resource consumption parameters and for waste disposal, at typically 20 to 50 EUR, is far lower than for buildings energy consumption as demonstrated in Figure 10.2. Resource costs reduced considerably in 2020 owing to the COVID pandemic for all the parameters.

Figure 10.2 Evolution of Commission per capita costs for energy, water, paper and waste disposal, 2014-20



While the unit cost for disposal of hazardous waste is greater than that for non-hazardous waste, the much smaller volumes of the former lead to overall costs that are typically one third to one quarter for the latter. The data suggest cumulative savings of approximately 19 Mio EUR since 2014 based on per capita costs applied to the EMAS population, of which about one third in the last year is due to the COVID pandemic.

11 Lessons learned and the way forward

This report summarises the Commission's overall performance using data from the eight largest Commission sites in Europe. It represents consolidation of an EMAS system that started with Brussels in 2005, incorporated Luxembourg in 2012, and then the five experimental JRC sites and DG SANTE at Grange in Ireland by 2014. It will seek eventually to include EC representations in Member States.

11.1 Conclusions

1. The COVID pandemic that resulted in homeworking for almost all staff for most of 2020 resulted in a reduction of Commission core environmental performance indicators. Consequently, the Commission met its 2014 to 2020 targets, generally by a large margin.
2. The EMAS site coordinators engaged in an exercise to define site level targets for core environmental performance parameters for 2023 and 2030 for the Global Annual Action Plan. The exercise was subject to considerable uncertainty, particularly under existing 'non-normal' conditions it is not yet evident how the working environment will change.
3. Having enlarged the scope for reporting particularly for the carbon footprint in 2018-9, further small improvements were included, on expert advice, including a better quantification of embodied energy of fixed assets for electricity sourced from renewable sources, and more complete reporting or estimating of the carbon footprint components at all sites.
4. The Corporate coordination team, in consultation with several site coordinators, made high-level estimates of the impact of homeworking on certain core parameters. Heating energy is the most important parameter, as this is a large contributor to carbon dioxide emissions. Several approaches were used to estimate values and these provided a wide range of estimates. Important assumptions include the percentage of staff who would work at home, in a house that would otherwise be unoccupied.
5. In 2020, buildings represented 73% of the carbon footprint (43% operation, 30% construction). This was a far greater percentage than in 2018 and 2019, because of much reduced mission travel, which represented 9%.

11.2 Going forward

The following courses of action are required in order to continue to improve environmental performance, and to meet stakeholder expectations.

6. Incorporate under EMAS operational requirements resulting from the Commission's own Green Deal communication.
7. Improve the Carbon Footprint calculation. The following are required to have a more robust system
    - Build on the high-level estimates made to incorporate homeworking impacts, to develop a more systematic approach. This could benefit from site-specific data from the JRC home environmental impact calculator and other data sources. Once a systematic approach is developed, it will be necessary to estimate the contribution in pre COVID years.
    - Develop a single, Commission wide survey for a uniform estimation of commuting across the EMAS sites
    - Work with internal partners (including and especially the PayMaster's Office (PMO) to ensure that the basis for reporting of missions, is as broad as possible, taking advantage of the future development of the IT tool (MIPs). This requires:
        - an inventory of sources of data on missions;
        - consideration of how to link information on emissions to offers for travel so that appropriate decisions can be made on travel options;

8. Continue discussions with DG COMM and the European Parliament in order to agree a procedure for incorporating the Commission Representations and Parliament Houses of Europe in Member States within the EMAS Regulation. The Commission will learn from gap analyses performed in the representations in Austria and Malta.

9. Formally incorporate the Executive Agencies into the EMAS Commission's registration (four in 2021 and two in 2022).

10. Owing to the more onerous data and reporting requirements, we will seek to **improve data collection and reporting** that currently uses spreadsheets and has recently moved online to SharePoint from CIRCABC, but also incorporates TEAMS.

APPENDICES

1 EMAS implementation in the Commission

1.1 Who implements EMAS in the Commission?

A College of Commissioners Decision[50] ensures EMAS implementation at a high level. DG.HR's Director General chairs the **EMAS Steering Committee**[51] (ESC) which meets twice yearly. It defines environmental policy, adopts the annual global action plan, sets environmental objectives and monitors progress. In addition, and due to the Commission's decentralised organisation, management and line managers not directly involved in the ESC or without formally defined EMAS roles also participate in the system at different levels of responsibility. A working group of the Commission's Management Board has recently been established to encourage closer links particularly between DG HR, SG and BUDG.

A team based in Brussels within **HR.D2,** the Working Environment and Safety Unit of DG HR, assumes day to day coordination. The **EMAS Management Representative** is responsible to Management for EMAS implementation, and is the contact point for external organisations such as IGBE (Brussels Environment) and other EU Institutions. Two other full time staff members work predominantly on system coordination and on communication and training, and are assisted by a part time colleague.

The Commission's size and geographic spread, requires HR.D2 work with a network of over 40 staff across the Commission services whose job descriptions include their EMAS responsibilities. The network includes:

1. **EMAS site coordinators** at each of the eight sites are HR.D2's main contacts and responsible for implementing EMAS at the site level. They report on performance, contribute to the Environmental Statement and participate in preparing site level objectives and actions;
2. **EMAS correspondents** (Brussels only) provide a link between their directorate-general/department and HR.D2, particularly for communication; and are nominated by their services. They participate in formal meetings on average three times a year, usually before the start of information campaigns.

Other staff contribute to EMAS, particularly those in facilities management, for example by providing data for reporting on resource consumption or waste generation, or when participating in internal and verification audits. Communication campaigns and training target all staff to improve environmental behaviour, and whose attitudes are gauged every two years by surveys.

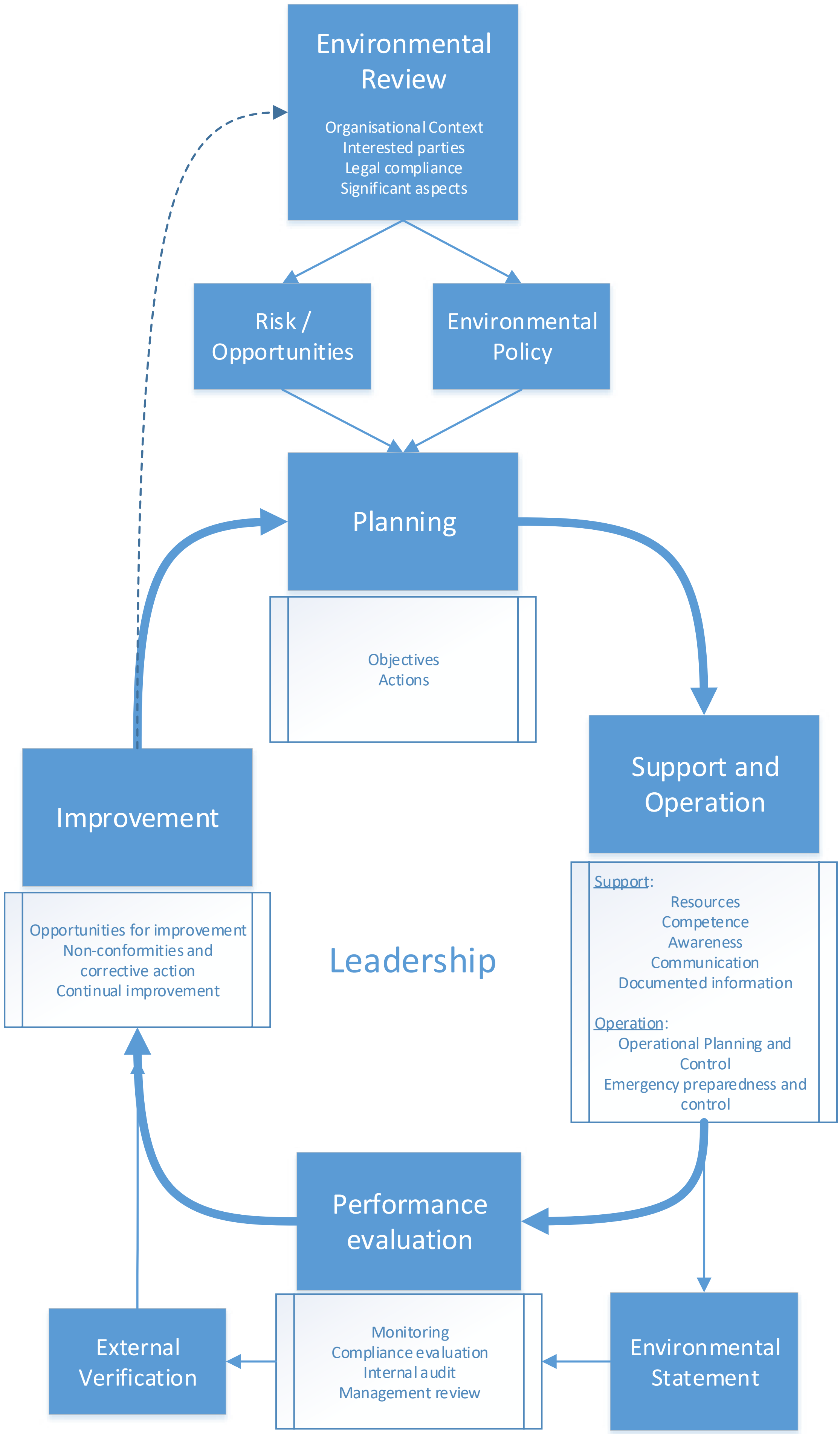
1.2 Key components of the EMAS system

Figure 1 shows the main elements of the EMAS system with the steps required to achieve and maintain an EMAS registration.

50 COMMISSION DECISION C(2013) 7708 of 18.11.2013 on the application by the Commission services of the Community eco-management and audit scheme (EMAS).

51 The Steering Committee is made up of the following directorates-general and services: BUDG, CLIMA, DIGIT, ENER, ENV, HR, JRC, MOVE, SG, SANTE, MARE, RTD, SCIC, OIB and OIL (and several Executive Agencies are in the process of applying).

Figure 1 The EMAS Cycle



Further description of some of the elements are defined below. Most of the activities occur annually, but the whole cycle is completed in three years for practical purposes. The size and spread of the Commission's premises across Europe dictates that activities such as auditing are phased over the three year cycle.

1.2.1 Environmental review

The Environmental Review provides a global overview of environmental considerations and a basis for defining strategy and objectives. The Commission defines its operational context, legal obligations and determines which environmental aspects[52] related to its activities, products and services have (or may have) a significant impact on the environment and on the environmental management system (EMAS).

It also considers the needs and expectations of interested parties, and decides which of these can become obligations in the management system. The EMAS sites each considers these elements although context and interested parties are also defined at corporate level. This helps define actions taking into account risk and opportunity.

1.2.2 System documentation

HR.D2 maintains the system documentation of which the most important elements are the EMAS Handbook, which provides a system overview and defines roles and responsibilities. Sites must apply the three "central" procedures (i) EMAS environmental review; ii) Monitoring, reporting and planning and iii) Management of audits and verifications findings) or equivalent alternatives, and may develop their own standard operating procedures to cover local conditions.

1.2.3 Monitoring of indicators and setting of objectives

EMAS requires organisations to continually improve their environmental performance, so they must identify indicators to measure and set objectives. While indicator and objective definition logically follows the environmental review conducted at each site and may therefore vary from site to site, Annex IV of the EMAS Regulation nevertheless defines "core" indicators for which data is expected to be collected, including energy efficiency, material efficiency, water consumption, waste generation, biodiversity and emissions.

According to the Regulation, and as an administrative organisation, the Commission expresses the core indicators first as output per person. The total number of employees within the EMAS area, is therefore a common denominator of most indicator measurements. In addition, in facilities managers use indicators, such as energy consumption and gas emissions that are commonly expressed per square metre.

Every year the Commission updates its Global Annual Action Plan. This comprises:

- a review of the evolution of indicators against targets, and the setting or future targets; and
- an update in the status of existing actions and the identification of new actions to improve environmental performance and meet targets.

The EMAS Steering Committee approves the Global Action Plan annually. After consultation with the sites the ESC adopted medium term objectives for the period 2014-2020 for several indicators, and has since to 2014-23 and 2030 horizons.

Data tables contained in the individual reports for each site in Annexes A to H include indicators that can be grouped under eight main headings encompassing the political objectives set out in the Environmental Policy and as shown below in Table 1. Not all sites report on all parameters:

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52 Aspects evaluation undertaken according to Annex 4 of EMAS PRO 001 and considers for each aspect considering frequency, severity, breach of law, magnitude, applicable legislation, stakeholders concern, previous incidents and the possibility of taking action

Table 1 Summary of main policy objectives and associated indicators

No	Environmental Policy Objective	Indicators
		Physically based parameters[53]
I	More efficient use of natural resources	a) Total energy consumption (buildings), b) total energy consumption (fleet vehicles , c) renewable energy use (%), d) water consumption, e) paper consumption
II	Reducing CO_2 emissions, (including CO_2 equivalent of other gases) and other air pollutants	a) CO_2 emissions from buildings energy consumption, b), other greenhouse gas emissions (as CO_2 equivalent from buildings (ie refrigerants), c) vehicle CO_2 emissions (manufacturer (and actual), e) actual total air emissions including SO_2, NO_x, PM. Also evaluated are emissions from other business travel, and for six sites, commuting, and for additional criteria adopted in 2018 and 2019 (fixed assets for buildings, IT, Commission vehicle fleet service contracts, and waste disposal).
III	Improving waste management and sorting	a) Non-hazardous waste, b) hazardous waste and c) unseparated waste (% of total, tonnes/person).
IV	Protecting biodiversity	a) Total use of land, b) sealed area, c) nature oriented area on/off site
		Communication/training "soft" parameters[54]
V	Promoting "greener" procurement	a) Percentage of contracts over 60.000 EUR incorporating additional "green" criteria and, b) degree of greening achieved in contracts according to criteria adopted [55]c) percentage, fraction and value of "green" products in the office supply catalogue,
VI	Ensuring legal compliance and emergency preparedness	a) Risk prevention and management, b) progress in registering for EMAS, c) non-compliance in external EMAS audits and d) emergency preparedness.
VII	Improving communication (sustainable behaviour of staff; suppliers, and training)	a) Centralised formalised EMAS campaigns, b) environmental training for new colleagues, d) staff awareness (through two yearly external survey), e) register of training needs and f) response to internal questions.
VIII	Enjoying transparent relations with external partners	a) Response to external questions, b) register of local and regional stakeholders (needs and expectations) and c) dialogue with external partners.

This document summarises results for each site along with a Commission wide summary presented in the order in the above table and consistent with the Global Annual Action Plan.

1.2.4 Legal compliance

The Commission maintains European, National and, where relevant, Regional registers of applicable legislation for its sites. It applies host country legislation, and requires its contractors to do so, with a particular focus on maintenance and inspection contracts. Expectations and needs of interested parties can become an obligation for the Commission if accepted.

In addition to complying with general legislation applicable to its facilities, the Commission must fulfil the requirements of environmental permits that are granted by the authorities. In Brussels and Luxembourg individual buildings each have their own environmental permit. The Commission seeks, when it is not the permit holder for example when renting premises, to ensure that the permit holder is compliant.

Each site is responsible for its own legal compliance which is checked through sampling each year as part of the activity of two audit campaigns that HR.D2 organise and coordinate:

- "verification" audits to maintain the EMAS registration and which will take place in the spring; and
- "internal" EMAS audits in the autumn.

HR.D2 also monitors the follow-up of these audit findings on a corporate register and reports on progress twice yearly to EMAS Steering Committee. Furthermore, each site undertakes routine operational checks and puts in

[53] Usually requiring invoices and/or measurements for their definition. For several resource consumption parameters, technical staff may also report results per square metre. This applies to "useful surface" areas which are often defined in lease or service contracts.

[54] Results obtained in these areas will ultimately be seen through improvements in the areas of policy objectives I to IV, and most parameters measured input based.

[55] As per recommendations of the ECA Special Report of 2014 on how the European Institutions measure and mitigate their Carbon Footprints.

place corrective actions under the normal working conditions (usually infrastructure services and/or health and safety units).

The sampling method for buildings audits takes into account that the Commission is a multi-site organisation with EMAS buildings or facilities in eight sites across seven countries. The buildings and facilities of the sites of JRC-Geel (Belgium), JRC-Petten (The Netherlands), JRC-Seville (Spain), JRC-Karlsruhe (Germany), JRC-Ispra (Italy) and DG SANTE at Grange (Ireland) are verified each year. However the administrative buildings of the Commission headquarters Brussels and Luxembourg are verified on a sampling method based on the EMAS users guide[56]. Any new buildings entering into the scope are verified the year they enter along with some previously registered buildings. On average 12 buildings have been visited in recent years[57].

1.3 Corporate organisational context and interested parties

The evaluation of the context and interested parties has been undertaken for each site individually and is described in the corresponding annexes to this report.

The most important corporate level contextual issue was the high level of expectations for the system versus the relatively limited resources available for implementation. These expectations arise from the political, social and technological context but also the culture of excellence and staff expectations. Implementation requires constant efficiency improvements and some negative prioritising of EMAS actions. The associated risk is summarised as a high level of stress and delivery constraints, but this offer the opportunity to promote the EMAS and its achievements at the Commission.

HR.D2 has identified needs and expectation of 14 interested parties in relation to the EMAS system at corporate level, with reputational risk being the most common. This is mainly due to their expectations of information, support, coordination which exceed the available means. Internal interested parties are more concerned by operation support and cooperation. The major target to respond to their expectations is to maintain a high level of quality in the EMAS deliveries and coordination.

As a more targeted part of the exercise to identify stakeholders needs and expectations at corporate level, the services represented on the Steering Committee have expressed their views resulting in an external study proposed and financed by DG CLIMA to investigate possible pathways to climate neutrality by 2030. This was particularly relevant in the context of the Commission's Green Deal but puts additional demands on the heavily stretched EMAS Coordination team who are sought by internal stakeholders to provide high level briefings, and further assistance, and guidance.

1.4 Environmental impact of Commission activities, indicators and targets

Each site reviews its environmental impact in order to identify those that are significant and determine how they should be managed. Details are presented in the sites' annexes to this report, and summarised in Table 2.4. There is no separate review for the Commission as a whole.

Table 2 also includes objectives for Commission wide indicators associated with the target for 2014 - 2020 performance. The table indicates that resource consumption, particularly in relation to energy, CO_2 emissions and other air emissions along with managing waste generation are particularly significant at most sites.

56 Commission Decision (EU) 2017/2285 of 6 December 2017 Amending the user's guide setting out the steps needed to participate in EMAS, under Regulation (EC) n° 1221/2009 of the European Parliament and of the Council on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS).

57 The guide requests verification of the square root of the number of buildings multiplied by 2 for a registration renewal. That means for Brussels and Luxemburg a minimum of 17 buildings in the three years period before the registration renewal (based on 2019 figures).

Table 2: Significant environmental aspects at EMAS sites 2020, associated indicators and Commission level targets for 2014-2020

A/ Significance of aspects at site level									B/ Indicator and Commission level target for 2014-20 (where stated)			
Political objective group and significant aspect	**BX**	**LX**	**PE**	**GE**	**SE**	**KA**	**IS**	**GR**	**Indicator**	**Units**	**Target %** [(1)]	**Target**
1) Efficient resource use												
Buildings energy consumption	√	√	√	√	√	√	√	√	1a Total energy consumption (bldgs.)	MWh/p kW/m^2 EUR/p	– 5.2 – 5.2 – 4.6	11.0 222 749
	√						√		1c Non-renewable energy use (bldgs.)	%	– 3.3	60.8
Vehicle energy consumption	√						√		1b vehicle energy consumption	MWh/p kW/m^2		
Water consumption	√	√	√	√			√		1d Water consumption	M^3/p L/m^2 EUR/p	– 5.4 – 4.8 – 1.3	64.1 1 308 55.0
Paper consumption	√		√	√			√		1e Office paper consumption	T/p Sheet/p/d	– 34 – 34	0.0198 20.0
2) Reducing emissions to air												
CO_2 emissions (from buildings energy consumption)	√	√	√	√		√	√		2a CO_2 emissions (buildings)	TCO_2/p $kgCO_2/m^2$	– 5.1 – 5.2	1.86 37.6
Equivalent CO_2 emissions refrigerants (from buildings)	√			√	√	√	√	√	2b Refrigerant losses	TCO_2/p $kgCO_2/m^2$		
Emissions from transport, including all missions and commuting (indicators only applies to Commission vehicle fleet)	√						√		2c CO_2 emissions (vehicle fleet) manufacturer actual	gCO_2/km gCO_2/km	– 14 – 4.9	144 260
Emissions of particles, dust, noise etc	√		√				√	√	2d Bldgs emissions(NO_x,SO_2, PM_{10}	Tonnes/p		
Nuclear emissions		√	√	√		√	√					
3) Improving waste management												
Non hazardous waste	√	√	√	√			√	√	3a Non-hazardous waste	T/p	– 9.7	0.214
Hazardous waste	√	√	√	√			√	√	3b Hazardous waste	T/p		
									3c Separated waste	%	+6.0	66.7
Wastewater/liquid waste	√	√	√	√			√	√	3d Non dom. wastewater discharge	m^3/p		
Nuclear waste						√	√					
4) Protecting biodiversity												
Protecting biodiversity	√						√		4a Use of land, sealed area	m^2/p		
5) Promoting green procurement												
Contractor behaviour	√						√		5a Contracts with “eco” criteria Degree of greening criteria	%		
6) Legal compliance and emergency preparedness												
Ensuring emergency compliance and preparedness	√		√	√								

1.5 EMAS objectives and UN Sustainable Development Goals (SDG)

The 17 SDGs are part of the 2030 Agenda for Sustainable Development, which includes a Political Declaration and a High Level Political Forum for follow up. They apply to all countries, incorporating economy, environmental and social pillars of sustainability, and underpinned by the ‘5Ps’ (people, planet, prosperity, peace and partnership). Countries report on progress in voluntary annual reports.

They have been referred to as the 'closest thing' the world has to an overall plan. The 17 high level objectives were developed by working groups of the UN Member States and other organisations, and include a total of 169 targets under the 17 headings. They follow on from the Millenium Develoment Goals that applied only to developing countries. The 17 SDGs can be grouped as follows:

- 1 to 5 - parameters carried over from the Millenium Development Goals
- 6 to 11 - new areas
- 12 to 15 - the 'green' agenda
- 16 - peace
- 17 - means of implementation and partnership

Table 3 shows the coherence of the Commissions main EMAS objectives and core indicators with certain SDGs. There is considerable overlap in the definition.

Table 3 EMAS core indicators of global objectives and selected SDGs

	Selected Sustainable Development Goals											
EMAS global objectives and associated core indicators	**3 Global health and wellbeing**	**4 Quality education**	**6 Clean water and sanitation**	**7 Affordable and clean energy**	**9 Industry innovation and infrastructure**	**11 Sustainable cities and communities**	**12 Responsible consumption and production**	**13 Climate action**	**14 Life below water**	**15 Life on land**	**16 Peace, justice and strong institutions**	**17 Partnerships for the goals**
1) Efficient resource use												
1a Total energy consumption (buildings)				X	X	X	X	X				
1c Non-renewable energy use (buildings)				X	X	X	X	X				
1b vehicle energy consumption				X	X	X	X	X				
1d Water consumption			X						X			
1e Office paper consumption							X			X		
2) Reducing emissions to air												
2a CO_2 emissions (buildings)				X	X			X				
2b Refrigerant losses				X				X				
2c CO_2 emissions (vehicle fleet) manufacturer, actual	X				X			X				
2d Buildings emissions (NO_x,SO_2, PM_{10})	X							X				
Nuclear emissions	X											
3) Improving waste management												
3a Non-hazardous waste							X		X	X		
3b Hazardous waste	X						X		X	X		
3c Separated waste							X		X	X		
3d Non domestic wastewater discharge					X	X	X		X			
Nuclear waste	X											
4) Protecting biodiversity												
4a Use of land, sealed area, natural areas										X		
5) Promoting green procurement												
5a Contracts with "eco" criteria						X	X					
6) Legal compliance and emergency preparedness											X	X
7) Communicating environmental responsibility and training		X									X	X
8) Promoting dialogue with external partners							X				X	X

2 Carbon footprint: factors and technical elements

Table 1 Summary of components, and recommended factors used in the carbon footprint

No	Description	Scope 1	Scope 2	Scope 3	
1	Mains gas for buildings PCI	Combustion 0,205 $kgCO_2e/kWh$		Upstream supply 0,039 $kgCO_2e/kWh$	
2	Tanked gas for buildings [1]	Combustion 0,230 $kgCO_2e/kWh$			
3	Gas oil for buildings [1]	Combustion 0,266 $kgCO_2e/kWh$		Upstream supply 0,058 $kgCO_2e/kWh$	
4	Commission vehicle fleet (petrol) [2]	Combustion 2,28 $kgCO_2e/L$		Upstream supply: 0,528 $kgCO_2e/L$	Fixed asset 0,04 $kgCO_2e/km$
5	Commission vehicle fleet (diesel) [2]	Combustion 2,5 $kgCO_2e/L$		Upstream supply: 0,658 $kgCO_2e/L$	Fixed asset 0,04 $kgCO_2e/km$
6	Refrigerant losses: (100 Year GWP, as $kgCO_2e/kg$ for Kyoto protocol gases) [3]	R410A (1 920), R134A (1 300), R404A (3 940), R407C (1 620), R407D (1 627), R507A (2 240), R422D (2 470), R23 (12 400), R32 (675), R427A (2 020), R508B (13 396), SF6 (23 500), R227A (2640), ISCEON89 (3805), R600A R290 (3), R32 (677), R12 (10 200), R452A (2139)			
7	Refrigerant losses: (100 yr GWP $kgCO_2e/kg$ commercial sources or calculated)	R22 (1760), NAF SIII (1447)			
8	Electricity supply: ($kgCO_2e$/kWh)		Contract factor	Supplier line losses: 10% of emissions	Upstream losses: 9% of emissions
9	District heating: ($kgCO_2e/kWh$)		Contract factor	Upstream factor 15,8 %	
10	Renewables for bldgs. energy **(6 categories).** [1]			Upstream supply (as $kgCO_2e/kWh$) i) photovoltaic (0,055) ii) biomass (0,019); iii) geothermal pumps (0,045); iv) offshore wind (0,0148); v) onshore wind (0,0127); vi) hydroelectricity (0,006);	
11	**Business travel: (5 categories)**			Air, rail, hire car emissions supplied by third party as calculated for missions booked through the Commission travel Agency via MIPS. Air taxi for Brussels only separate data from third party. Private car emissions established by ratio	
12	**Fixed assets – buildings (7 categories)** Factors in $kgCO_2e/m^2$ for the following construction types: [1]			i) Not specified – offices (650) , ii) Steel - industrial building (275), iii) Steel - parking underground (220), iv) Steel - restaurants (183), v) Concrete - industrial buildings (825), vi) Concrete - parking underground (656), vii) Construction type concrete - restaurants (550) **Design life, depends on site/building conditions, typically 30 to 50 years (c)**	

No	Description	Scope 1	Scope 2	Scope 3
13	**Fixed assets – IT equipment (17 categories)** Factors in $kgCO_2e$/unit for the following items: (***** denotes factor reduced since previous year) (1)			i) PC desktop (**169**); ii) Docking station (80); iii) Flat screen (**235**); iv) Laptop (**156***); v) Individual printers (110); vi) Network printers & copiers (2940), vii) Fax machines (1470); viii) Scanners (1470); ix) Telephones (simple) (20); x) Telephones (smartphone and Iphones) (**29***); xi) Telephones (fixe) (17); xii), Servers, (**600***) ; xiii) Projectors (94) ; xiv) Videoconference installations (**500***); xv) Televisions (**500***); xvi) Other small IT devices (firewall router switches) (81); xvii tablet (9 to 11 inch (**250**) **Design life 4 years (c)**
14	**Goods and services contracts (non catering – 6 categories)** Factors in $kgCO_2e$ per named unit (1)			i) Security contract (FTE) (561); ii) Cleaning contract (FTE) (1180); iii) Other service contracts - consultants (kEUR) (110); iv) Other service contracts - translators (kEUR) (110); v) Other service contracts - (kEUR) (110); vi) Purchased paper, used or new (tonnes) (919);
15	**Goods and services contracts (catering – 7 categories)** Factors in $kgCO_2e$ per tonne			i) beef (12800); ii) pork (2420); iii) fish (2870); iv) chicken (2140); v) milk (937); xii) Other dairy products (average yoghurt and butter) (6185); xiii) coffee (3140)
16	**Waste disposal (11 categories)** Factors in $kgCO_2e$ per tonne (1)			i) Incinerated waste – domestic waste (362); ii) incinerated waste – food (47); iii) methanisation – food (87); iv) Recycled/reused – paper (33); v) Recycled/reused – cardboard (33); vi) Recycled/reused – wood (33); vii) Recycled/reused – glass (33); viii) Recycled/reused - plastic PMC (880); ix) Recycled/reused – others (357); x) Hazardous waste - all types (706); xi) Landfill (probably mostly projects) (33)

Notes (1) Europe average from ADEME, Base Carbone 2018; (2) France value from ADEME, Base Carbone 2018; (3) IPCC 5th Assessment Report (2014, from p 731) https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf, As referenced by ADEME, Base Carbon 2018 (100 year GWP values) All factors supplied and revised by Commission's internal EMAS auditor

The factors for energy consumption include both scope 1(combustion) and scope 3 (upstream) components, the latter being typically 20 to 30% of the former. Scope 2 emissions are restricted to purchased electricity from the grid, which is applicable to all sites, and also to district heating which is available at a minority of sites for example Luxembourg and Karlsruhe.

Scope 3 comprises emissions from a wide range of sources. The categories added in 2018/19 (items 12 to 16 in the above table), include 48 subcategories with potential data requirements at each site.

The conversion factors used each year are relatively stable when based on physical or chemical properties of fuels, or refrigerants. They can be updated more frequently when considering for example the embodied energy of IT equipment that depend on complex supply chains. Of the 16 factors used for estimating embodied energy for IT equipment, five reduced in 2019, some of these, for example relating to servers, or laptops by quite a large margin. This reflects updated and improved methods of estimating the emissions and more efficient production processes.

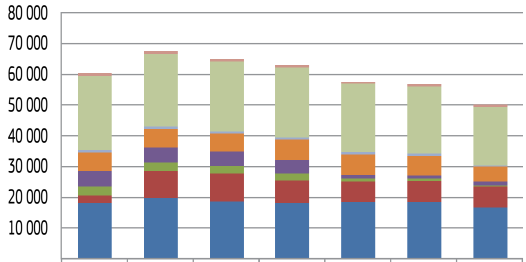
Evaluating emissions for buildings and IT equipment is based on amortisation: the emissions are spread evenly across the assumed lifetime of the assets. The sites have used values they consider "appropriate" to their premises for buildings emissions. DG DIGIT provides information for calculating emissions from IT equipment for Brussels, Luxembourg and Grange, but not for the JRC. DG DIGIT has used an accounting lifetime of 4 years to determining how many units in each category of equipment have been amortised.

3 Trends in selected components of the commission’s carbon footprint

3.1 Emissions due to buildings’ energy consumption

Buildings energy consumption represents the part of the Carbon Footprint over which the sites have the most control. Figure 1 presents the relative contribution of individual EMAS sites in 2020. Brussels and JRC-Ispra together account for nearly two thirds of CO_2 emissions, with JRC-Seville and Grange responsible for very small amounts.

Figure 1 EMAS sites’ CO_2e emissions from buildings’ energy consumption, 2014-20 (tonnes)



	2014	2015	2016	2017	2018	2019	2020
Commission	60 287	67 660	65 040	62 967	57 595	56 800	49 973
Grange	879	958	877	768	661	643	553
JRC-Ispra	23 997	23 545	22 623	22 545	22 116	21 921	18 962
JRC-Karlsruhe	892	976	839	899	789	660	495
JRC-Seville	5 868	6 085	5 757	6 605	6 724	6 364	4 880
JRC-Geel	5 130	4 663	4 676	4 388	1 281	1 089	1 033
JRC-Petten	2 819	2 788	2 451	2 364	779	717	520
Luxembourg	2 584	8 720	9 090	7 276	6 785	6 965	6 671
Brussels	18 118	19 924	18 726	18 122	18 461	18 440	16 860

JRC-Ispra accounts for a significantly greater proportion of the total emissions (and Brussels significantly less), than their respective contributions for energy consumption reflecting that for Brussels, electricity is supplied from renewable sources.

At JRC-Ispra the co-generation gas plant provides for a more efficient energy supply for the site, than would be provided by the market. The grid supplies a small amount of electricity.

The Commission reduced emissions in 2020 by 12%, from 57 k tonnes to 50 k tonnes CO_2e.

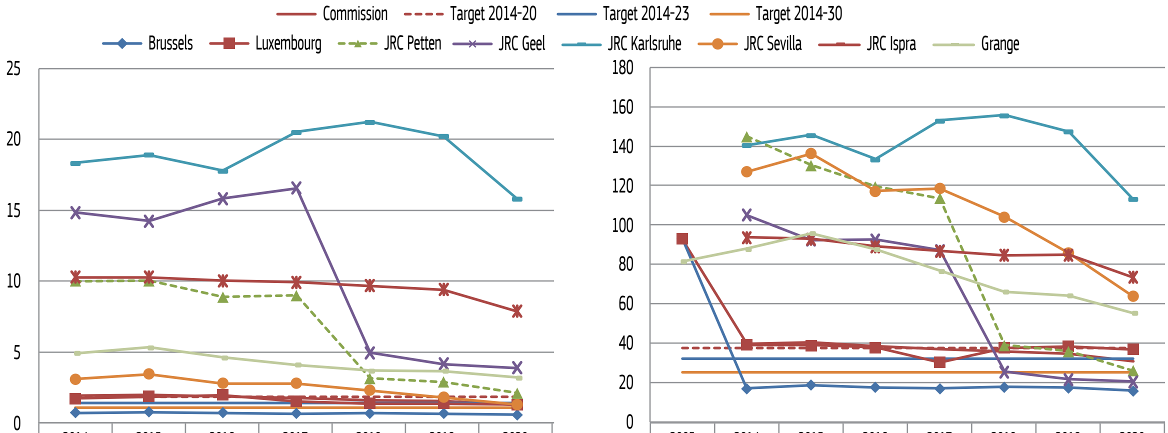
Figure 2 shows the historical trends in per capita and per square metre buildings emissions along with the aggregated Commission value and the 2014-20 target.

The COVID 19 pandemic resulted in a 15% reductions in per capita emissions and a slightly lower reduction in emissions per square metre achieving the 2023 target for both. The data show that in the last year and over the longer term, overall Commission emissions have reduced along with those for most of the sites.

JRC’s Geel and Petten significantly reduced their emissions in 2018 by switching to an electricity contract with predominantly renewable sources, and at JRC-Geel by employing heat pumps in one of the main buildings. Seville followed in 2020. Although such contracts result in low or zero emissions for energy use, there is a small amount representing embedded emissions of the renewable sources.

Overall, the Commission has reduced emissions gradually since all sites have been included in reporting in 2011, and had met both 2014-20 targets by 2018. There are relatively few actions that directly target reducing CO_2e emissions from buildings, as this is often an additional benefit of actions that reduce energy consumption.

Figure 2 EMAS sites' CO_2e emissions from buildings' energy consumption, 2014-20 (tonnes/person, kg/m²)



	2014	2015	2016	2017	2018	2019	2020
Commission	1.95	1.99	1.87	1.77	1.60	1.52	1.29
Target 2014-20	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Target 2014-23	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Target 2014-30	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Brussels	0.71	0.78	0.70	0.67	0.68	0.65	0.57
Luxembourg	1.73	1.87	1.95	1.52	1.35	1.36	1.27
JRC-Petten	10.0	10.0	8.88	8.99	3.14	2.88	2.10
JRC-Geel	14.8	14.2	15.8	16.6	4.9	4.2	3.9
JRC-Karlsruhe	18.3	18.9	17.8	20.5	21.2	20.2	15.8
JRC-Seville	3.09	3.45	2.80	2.79	2.31	1.79	1.30
JRC-Ispra	10.3	10.3	10.0	9.9	9.7	9.4	7.9
Grange	4.91	5.32	4.62	4.09	3.69	3.65	3.20

	2005	2014	2015	2016	2017	2018	2019	2020
Commission	92.8	39.5	40.4	38.3	36.8	35.6	34.7	30.5
Target 2014-20	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5
Target 2014-23	32	32	32	32	32	32	32	32
Target 2014-30	25	25	25	25	25	25	25	25
Brussels	93	17	19	18	17	18	17	16
Luxembourg		39	39	38	30	37	38	37
JRC-Petten		145	130	120	113	39	36	26
JRC-Geel		105	92	93	87	25	22	20
JRC-Karlsruhe		141	146	133	153	156	147	113
JRC-Seville		127	136	117	119	104	86	64
JRC-Ispra		94	93	89	87	85	85	73
Grange	81	88	96	88	77	66	64	55

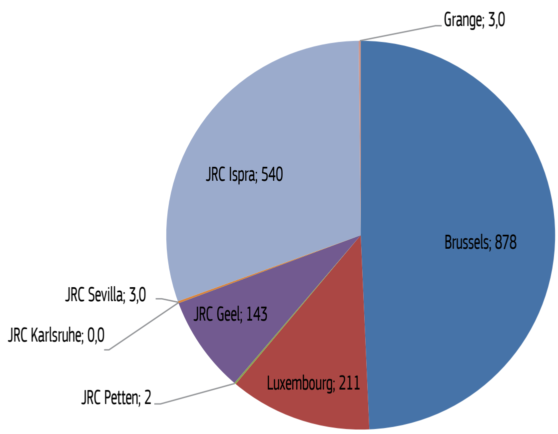
The sites identified the following **key** specific actions in the 2021 Global Annual Action Plan:

- JRC-Geel: life cycle analysis; and heating from geothermal origin;
- Luxembourg: Urban heating system;
- JRC-Ispra: life cycle analysis for buildings projects over 1 Million EUR;
- JRC-Petten: photovoltaic installations;
- DG SANTE at Grange: use bio Liquid propane gas (LPG) instead of LPG to heat water during the summer and avoid using diesel.

Notwithstanding the actions described above, Commission experience suggests that reducing emissions in existing buildings is extremely difficult and that a buildings policy that promotes occupation of newer, more efficient buildings will lead to greater gains.

3.2 Emissions due to refrigerant or coolant loss

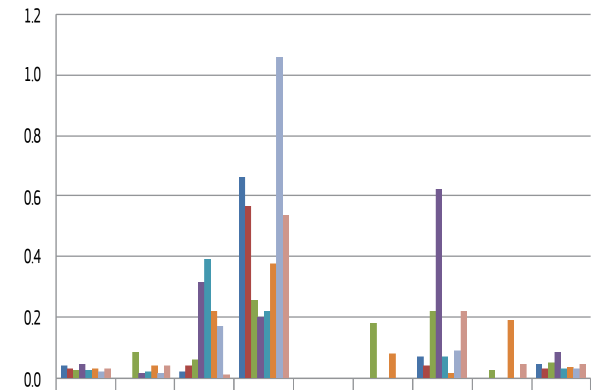
Figure 3 CO_2e losses from refrigerant leaks at the Commission sites in 2020 (tonnes)



Refrigerants have Global Warming Potentials (GWP) typically between 1 000 and 10 000 meaning that a leak of just a few kilograms can have the equivalent atmospheric global warming impact of several tonnes of CO_2e. But they typically account for no more than 1 to 2% of buildings' CO_2e emissions. Between 15 and 20 refrigerants are recorded in EMAS reporting at JRCs Ispra and Geel, and fifteen at JRC-Petten.

Figure 3 shows that the four largest sites are responsible for over 95% of the total emissions. Figure 4 shows that the experimental sites tend to have the greatest per capita emissions.

Figure 4 Refrigerant losses recorded at EMAS sites, 2013-20 (tCO_2e/person)



	Brussels	Luxembourg	JRC Petten	JRC Geel	JRC Karlsruhe	JRC Sevilla	JRC Ispra	Grange	Commission
2013	0,043	0,000	0,020	0,662	0,000	0,000	0,073	0,000	0,045
2014	0,030	0,000	0,042	0,566	0,000	0,000	0,039	0,000	0,032
2015	0,028	0,087	0,059	0,258	0,000	0,182	0,224	0,026	0,052
2016	0,049	0,018	0,318	0,202	0,000	0,000	0,624	0,000	0,084
2017	0,027	0,023	0,393	0,222	0,000	0,000	0,071	0,000	0,032
2018	0,030	0,043	0,222	0,378	0,000	0,079	0,016	0,191	0,034
2019	0,019	0,017	0,170	1,059	0,000	0,000	0,089	0,000	0,031
2020	0,029	0,040	0,010	0,539	0,000	0,000	0,224	0,046	0,046

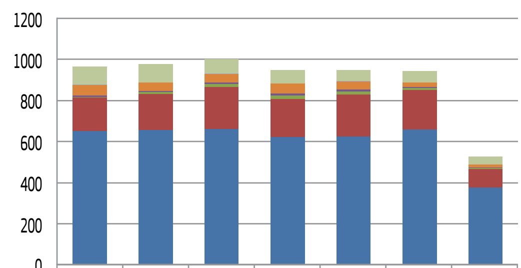
The recent increase recorded at JRC-Geel was due to expanded reporting. JRC-Karlsruhe continues to report no losses during normal operation under its protocol (less than 3%). Overall the Commission's total and per capita refrigerant losses have remained relatively stable since 2017.

Total losses reduced significantly at JRCs Ispra and Petten in 2018, but increased in 2019, and were higher in 2020. JRCs Geel and Petten that accommodate large experimental installations requiring cooling or insulation. Release of R404a is responsible for a large proportion of the JRC-Geel emissions.

3.3 CO_2e emissions from the site vehicle fleet

Emissions from vehicle fleet represent a very small, but highly visible, proportion of the total carbon footprint. Figure 5 shows CO_2 emissions from Commission fleet vehicles. The three largest sites also have the largest vehicle fleets, and also generate the most emissions.

Figure 5 CO_2e emissions from Commission fleet vehicles at EMAS sites, 2014-20 (tonnes)



	2014	2015	2016	2017	2018	2019	2020
Grange	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JRC-Ispra	88.8	87.2	70.1	64.6	54.0	54.4	36.4
JRC-Karlsruhe	1.2	1.1	0.7	1.0	0.8	0.8	0.2
JRC-Seville	50.9	41.1	43.8	48.3	40.8	21.8	12.8
JRC-Geel	8.8	8.6	8.0	8.2	7.3	6.1	5.3
JRC-Petten	1.6	8.7	14.7	16.3	15.5	10.6	5.6
Luxembourg	162.5	171.9	202.6	187.3	204.2	193.0	88.8
Brussels	653.3	659.3	662.7	622.6	625.9	657.5	376.9

Total vehicle fleet emissions in reduced slightly since 2016, but by 44% from 2019 to 2020 (944 to 526 tonnes), with Brussels and Luxembourg accounting for over 90 % of the total.

Table 1 shows the evolution of vehicle fleet size and distances covered for the Commission EMAS sites. The Commission has reduced the size of its vehicle fleet since 2015 by nearly 30%.

In 2018 and 2019 the overall fleet size was little changed, as was the total distance driven and the total kms per vehicle, averaging nearly 19 500 km.

Table 1 Site vehicle fleet characteristics

Site	Fleet vehicles (average)						Total kms					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
Brussels	117	107	129	126	131	129	2 477 072	2 829 675	2 508 253	2 311 311	2 346 590	1 432 721
Luxembourg	25	30	30	33	32	32	665 992	771 824	731 060	812 152	781 567	322 876
JRC-Petten	4	4	4	4	4	4	30 513	55 440	61 324	56 473	45 396	21 963
JRC-Geel	7	7	7	7	7	7	NR	NR	NR	NR	11 909	6 940
JRC-Karlsruhe	11	11	12	12	12	12	137 616	133 520	124 944	104 666	77 749	94 250
JRC-Seville	1	1	1	1	1	1	4 356	3 192	4 016	3 859	5 521	714
JRC-Ispra (1)	122	123	121	110	110	119	286 517	240 217	208 053	192 277	200 893	149 008
Grange	1	1	1	1	0	0	NR	NR	NR	NR	NR	NR
Commission	288	284	218	207	210	217	3 607 221	4 036 796	3 640 578	3 483 666	3 469 625	2 028 472

NR: Not reported; (1) Total kms and kms/vehicle presented for conventional (petrol or diesel) vehicles, ie 87 in 2017, in 74 in 2018

There were slightly more vehicles in 2020 compared to both 2018 and 2019, however the COVID pandemic resulted in a significant reduction in distance driven. Table 2 indicates the type of vehicle in Commission site fleets in 2020.

Table 2: Number of vehicles by type at Commission sites in 2020

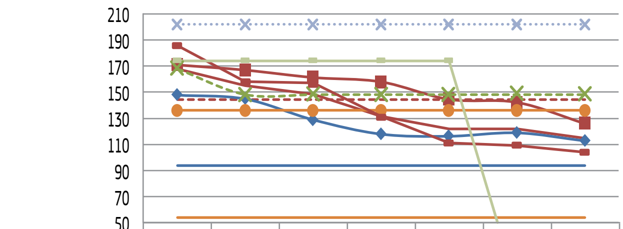
Type of vehicles	Brussels	Luxembourg	JRC-Petten	JRC-Geel	JRC-Seville	JRC-Karlsruhe	JRC-Ispra	JRC Grange
Electric	13	4	1	1	0	2	41	0
Hybrid	41	8	0	0	0	0	1	0
Euro 6	65	18	0	1	0	4	5	0
Euro 5	0	1	2	1	0	5	1	0
Euro 4	0	1	0	0	1	1	39	0
Euro 3	0	0	0	0	0	0	18	0
Euro 2	0	0	0	1	0	0	4	0
Euro 1	0	0	0	0	0	0	6	0
Euro 0	0	0	0	0	0	0	4	0
Total vehicle fleet	129	32	4	7	1	12	119	0

Brussels and JRC-Ispra lead the way with electric vehicles that are widely used for local journeys. Most of the Commission vehicle trips in Luxembourg are longer distance, for which electric vehicles currently lack sufficient range. JRC-Ispra has increased the number of electric vehicles from 3 in 2014 to 41 in 2020.

Brussels has increased the number of charging points to 13, four for new service vehicles and has installed charging points for staff in several Brussels buildings. Further installations are ongoing for staff vehicles. Luxembourg recently purchased seven electric and hybrid vehicles, a significant step forward.

The Commission uses manufacturer's specified tailpipe emissions as a core indicator in order to encourage the purchase of vehicles that emit less when they operate, as shown in Figure 6.

Figure 6 Manufacturer tailpipe emissions[58] for vehicle fleet at EMAS sites, 2014-20 (gCO_2e/km)



	2014	2015	2016	2017	2018	2019	2020
Commission	168	155	148	132	122	122	115
Target 2014-20	144	144	144	144	144	144	144
Target 2014-23	94	94	94	94	94	94	94
Target 2014-30	54	54	54	54	54	54	54
Brussels	148	145	129	118	116	119	113
Luxembourg	171	167	161	158	145	142	126
JRC-Petten	168	148	148	148	148	148	148
JRC-Geel							
JRC-Karlsruhe	202	202	202	202	202	202	202
JRC-Seville	136	136	136	136	136	136	136
JRC-Ispra	186	158	157	132	111	109	104
Grange	174	174	174	174	174	0	1

Figure 6 demonstrates that the Commission met its 2014 -20 target for reducing the emissions of its fleet through purchasing decisions that have seen the 2014-20 target achieved.

The sites have set aggressive targets for 2023 and 2030, eventually more than halving the manufacturer's tailpipe emissions to 54 gCO_2e/km by 2030.

The Global Annual Action Plan contains the following examples of site level actions to reduce CO_2 emissions for the vehicle fleet:

- Detailed energy efficiency plan – Brussels
- Sustainable mobility plans - JRC-Seville and JRC-Ispra
- Bike policies and facilities – JRC-Ispra and Luxembourg
- Study or introduce new electric vehicles –Brussels, Luxembourg, JRC-Ispra, or hybrid vehicles Brussels, Luxembourg, JRC-Ispra
- Install charging stations for service and private e-vehicles – JRC-Seville, JRC-Ispra

[58] Note: For Petten, Geel and Karlsruhe, total includes some specific utility equipment not included in these categories

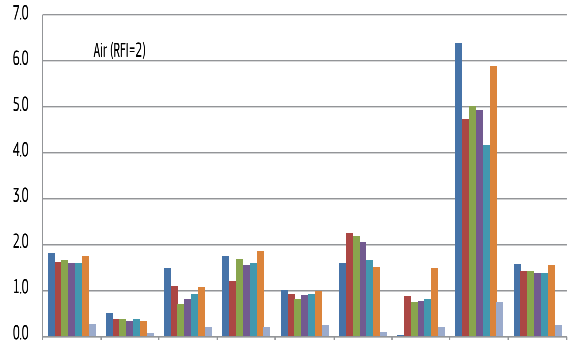
3.4 Staff missions, breakdown by EMAS site

The Commission has estimated CO_2 emissions for missions undertaken by staff at the EMAS sites using data provided by the Commission's travel agency[59] which made use of the Commission's proprietary management system[60]. The data indicate that air travel accounts for over 90% of missions emissions.

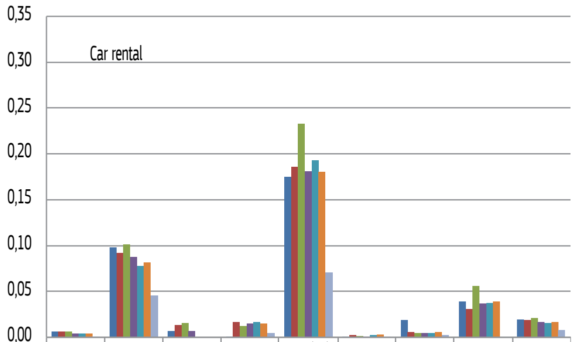
The overall warming effect of aircraft emissions, especially at higher altitudes, i.e. for flights exceeding 400 - 500 km, is greater than that produced by CO_2 emissions alone. This is because other jet engine emissions such as soot and water vapour are thought to contribute to an overall warning effect between two and four times that generated by CO_2 emissions alone. Although there is considerable uncertainty, and research is ongoing, a radiative forcing[61] index (RFI) of 2[62] was used to calculate flight emissions.

Figure 7a-c shows the per capita emissions for the main modes of transport booked with the Commission's travel agency.

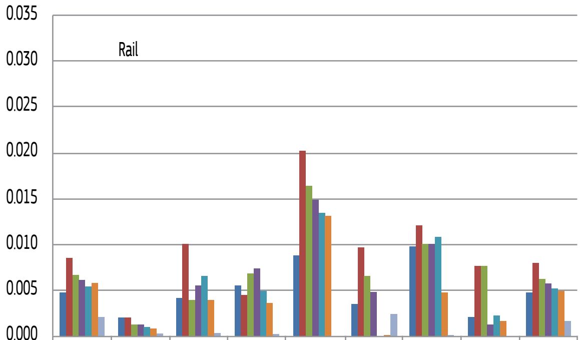
Figure 7a-c Per capita emissions for missions by air (RFI=2), car rental and rail [63] (tonnes CO_2e)



	Brussels	Luxembourg	JRC Petten	JRC Geel	JRC Karlsruhe	JRC Sevilla	JRC Ispra	Grange	Commission
2014	1.83	0.51	1.48	1.74	1.01	1.61	0.02	6.38	1.57
2015	1.63	0.38	1.11	1.20	0.91	2.25	0.89	4.74	1.42
2016	1.65	0.36	0.71	1.68	0.81	2.18	0.75	5.01	1.43
2017	1.59	0.34	0.82	1.56	0.90	2.05	0.76	4.93	1.39
2018	1.60	0.37	0.91	1.60	0.92	1.67	0.81	4.17	1.39
2019	1.75	0.34	1.08	1.86	0.99	1.52	1.48	5.88	1.55
2020	0.27	0.07	0.20	0.20	0.24	0.09	0.21	0.74	0.24



	Brussels	Luxembourg	JRC Petten	JRC Geel	JRC Karlsruhe	JRC Sevilla	JRC Ispra	Grange	Commission
2014	0.0065	0.0979	0.0072	0.0003	0.1748	0.0012	0.0191	0.0392	0.0194
2015	0.0063	0.0916	0.0136	0.0168	0.1860	0.0028	0.0057	0.0308	0.0193
2016	0.0068	0.1010	0.0157	0.0129	0.2327	0.0019	0.0048	0.0559	0.0215
2017	0.0041	0.0880	0.0072	0.0153	0.1816	0.0012	0.0049	0.0373	0.0170
2018	0.0040	0.0779	0.0000	0.0162	0.1934	0.0027	0.0052	0.0382	0.0159
2019	0.0044	0.0821	0.0000	0.0154	0.1804	0.0036	0.0053	0.0397	0.0167
2020	0.0012	0.0459	0.0000	0.0046	0.0711	0.0009	0.0026	0.0000	0.0079



	Brussels	Luxembourg	JRC Petten	JRC Geel	JRC Karlsruhe	JRC Sevilla	JRC Ispra	Grange	Commission
2014	0.0048	0.0022	0.0043	0.0056	0.0088	0.0037	0.0098	0.0022	0.0049
2015	0.0086	0.0021	0.0102	0.0046	0.0203	0.0097	0.0122	0.0077	0.0081
2016	0.0068	0.0013	0.0040	0.0069	0.0165	0.0067	0.0102	0.0077	0.0063
2017	0.0062	0.0013	0.0056	0.0075	0.0150	0.0049	0.0102	0.0014	0.0059
2018	0.0055	0.0011	0.0067	0.0050	0.0135	0.0001	0.0109	0.0023	0.0052
2019	0.0059	0.0009	0.0041	0.0037	0.0132	0.0001	0.0049	0.0017	0.0051
2020	0.0021	0.0004	0.0004	0.0003	0.0001	0.0024	0.0001	0.0000	0.0017

There has been a substantial reduction in emissions associated with air travel owing to the COVID pandemic, with per capita emissions approximately one fifth of the 2019 value.

DG SANTE at Grange has the highest per capita emissions for air travel because staff include a high proportion of food and veterinary inspectors who conduct frequent missions throughout the world.

Luxembourg staff travel far less frequently by air, but in common with JRC-Karlsruhe, conduct more journeys by rental car for which per capita emissions (for sites other than Karlsruhe), are less than a tenth of those for air.

It is important to note that:

59 American Express report emissions for air train and hire cars, as calculated by Atmosfair who use an approach developed with the German environmental authorities. Note that travel arrangements for Ispra staff are not generally made through this agency so figures are under reported in 2013, 2014, estimations made from 2015.

60 Commonly known as MIPS.

61 Radiative forcing is a measure of man's contribution to disturbing the natural balance between incoming solar radiation and reflected outgoing radiation as measured at the top of the troposphere, the atmospheric layer extending 10 to 18km from the earth's surface, where weather processes occur.

62 RFI=2 considered (minimum) acceptable (Internal Audit Report, Carbon Footprint of the European Commission, May 2018

63 Reduced from Agency data, corrections applied to account for journeys not booked through the Commission's travel agency

- Per capita rental car emissions are roughly one twentieth those for rail travel, and rail emissions roughly one hundredth of those for air travel and reduced in 2019, whereas they increased for both car hire and air travel.

3.5 Staff missions breakdown by DG/Service

Although reporting under EMAS is site based, increasingly (and particularly since the inception of the Green Deal), individual DGs and services have wanted to know about their own missions emissions, particularly for air travel. This is available upon request and is based upon analysis of PayMaster's Office (PMO) supplied data obtained from the Commission's Travel Agency. Per capita annual CO_2 equivalent emissions fell into the following ranges in 2019:

- > 5 tonnes - 5 DGs/services
- 1 to 5 tonnes - 23 DGs/services
- <1 tonne - 17 DGs/Services

There has been no analysis to date by DG/Service for 2020 because of the atypical conditions which saw overall missions emissions reduced by more than 75%.

3.6 CO_2e emissions from commuting

The Commission estimated commuting emissions for 2020 'pro rata' from 2019 data, to account for the 91/2 months when nearly 90% of staff were homeworking. Estimates of emissions generated by staff commuting are available for most sites and use mobility survey data, although these are not undertaken annually. OIB undertakes a survey for Brussels staff every 3 years, the latest in 2017, to inform its local mobility plan that is a requirement of local legislation, but the 2020 exercise was postponed owing to the COVID pandemic.

The greatest reported per capita emissions are for those predominantly rural research sites, where public transport is not a viable option. JRC-Geel, Karlsruhe and Ispra have per capita emissions between 0,5 and 1 tonne. Commuting emissions for Luxembourg are relatively high owing to cross border travel from Belgium, France and Germany, but this should reduce because the Luxembourg authorities have implemented a heavily subsidised public transport policy (mPass), and are building a tram system. In 2019, JRC-Seville held a successful staff awareness campaign on sustainable mobility. Luxembourg estimated its commuting emissions for the first time in 2020.

3.7 Alternatives to missions and commuting

Additional generic actions to reduce emissions are recorded in Table 3.

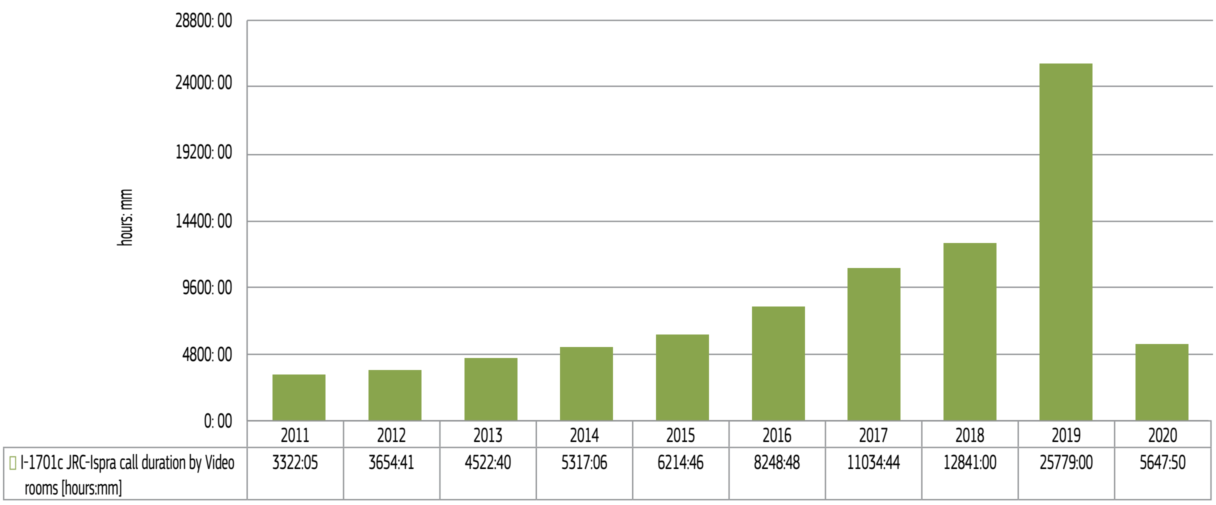
Table 3 Actions at site level in the EMAS Global Annual Action Plan to reduce emissions from mobility

	Description	BX	LX	PE	GE	KA	SE	IS	GR	COM
2	Reducing emissions from business travel									
a	Promote VCs over missions						•			
a	Develop emissions calculator									•
a	Promote bikes, bike facilities, schemes	•	••							
a	Investigate/promote e-bikes		•							
a	Investigate/promote e-bikes	••••	•					••		
c	Introduce new electric or hybrid vehicles	•					•	•		
c	Install charging for service and private e-vehicles									
	Reducing emissions from personal travel									
a	Commuting study pilot				•					
a	Carbon footprint from commuting						••			•
a	Promote car pooling					•				
a	Promote public transport range (including transborder)	•••								
b	Plan/investigate to install e-charging for cars (and /or bikes)	•			••	•	•••			
	Reducing total emissions									
a	Site plans for sustainable mobility						••	•		
a	External validation of HR.D2 approach to carbon footprint									•
a	Develop common approach document for carbon footprint (response to ECA)									•
a	Implement LCA for organisation's impact							•		
a	Implement "smart" policy							•		
b	Install heat pump							•		

a. Operational optimisation
b. Studies and awareness
c. Large investment

DG DIGIT has steadily increased the amount of video conferencing infrastructure available across the Commission responding particularly to DG SCIC's requirements for meeting rooms. Some sites, including JRC-Ispra have demonstrated their increased use in the last few years, as shown below.

Figure 8 Call duration by JRC-Ispra Video Rooms



3.8 Fixed asset emissions (buildings)

These accounted for nearly 20% of the carbon footprint in pre-COVID years, and more than 30% in 2020. The annual rate of emissions depends on the design life[64] selected to calculate amortisation, and which varies between sites. Older buildings may be "amortised" in relation to the CO_2e emissions required for their construction. Table 4 shows the factors [65] used to calculate these emissions, which are subject to a relatively high degree of uncertainty (50%), along with the total reported emissions and emissions for 2020.

Table 4 Total and annual buildings (fixed asset) emissions for 2020 (tonnes CO_2e)

	Unspecified construction	Steel construction			Concrete construction			Emissions	
		industrial	underground		industrial	underground			
	offices	buildings	parking	restaurants	buildings	parking	restaurants	Total	2020
Conversion factor ($kgCO_2e/m^2$)	650	275	220	183	825	656	550		
Site									
Brussels	686 829					317 719	6 847	1 011 395	28 919
Luxembourg	115 369				3 396	32 879		151 654	4 298
JRC-Petten	4 900	1 168			593			6 661	190
JRC-Geel	6 477	449			31 671		366	38 859	538
JRC-Seville									
JRC-Karlsruhe									
JRC-Ispra	90 343	697			68 925		3 188	162 386	3 247
DG SANTE at Grange	6 442			18				6 460	258
	910 358	**2 314**		**18**	**105 584**	**350 598**	**10 400**	**1 377 415**	**37 451**

3.9 Fixed asset emissions (information technology)

While conversion factors relating to the 16 categories of IT equipment are also subject to considerable uncertainty (50%), they can change as research evolves. Of the factors in Table of Appendix 2 that reduced in 2019, several related to larger equipment such as servers and video equipment. Equipment in use for longer periods or reduced inventories are alternative explanations for reduced IT emissions.

Table 5 shows the categories of IT equipment responsible for the largest annualised emissions in 2019 and 2020. Flat screens and network printers and copiers provide the largest per capita emissions.

Table 5 Annualised total and per capita emissions (Tonnes, CO_2e) for selected IT (fixed asset) categories 2018-2020

Category of IT equipment	Total 2018	2019	2020	Per capita 2018	2019	2020
Desktop PC	1 251	460	91	0.04	0.02	0.00
Docking stations	563	973	1 106	0.02	0.03	0.04
Flat screen	3 944	3 797	1 054	0.14	0.13	0.04
Laptop	5 461	1 011	1 171	0.19	0.03	0.04
Network printers & copiers	1 752	1 454	1 364	0.06	0.05	0.05

3.10 Emissions from purchased goods and services

This accounts for a relatively small proportion of the carbon footprint, but includes emissions related to catering, specifically seven categories of the most carbon intensive foods served, including meat, dairy and coffee). The data presented in Table 6 includes sites which manage their own canteens. Per capita annual emissions for

[64] Design life in years - Brussels, Luxembourg, Petten 30, Geel 60 (varies by building), Ispra 50 , Grange 25

[65] There is a large difference in the factors for steel and concrete construction. Offices of an unspecified nature must be considered to be largely made from concrete given the relatively high value of this factor.

catering at reporting sites in 2019 ranged from 0,11 to 0,22 tonnes, but in 2020 were much lower owing to staff absence under COVID conditions.

Table 6 Catering emissions for seven energy intensive food groups in 2020, (tonnes CO_2e)

Category	Brussels	%	Luxembourg	%	JRC-Geel	%	JRC-Ispra	%	Grange	%
Beef	564.0	51.7	102.8	48	6.6	49	34	26	2.2	58
Pork	136.2	12.5	17.7	8	1.4	10	19.9	15	0.13	3.3
Fish	171.2	15.7	48.0	22	3.1	23	39	30	1.12	29
Chicken	142.1	13.0	16.4	8	0.8	5.7	14.7	11.2	0.00	0.0
Milk	17.4	1.6	8.8	4.1	0.7	5.5	3.6	2.7	0.00	0
Other dairy (avg yogurt/butter)	48.4	4.4	15.0	7.0	0.9	6	11.8	9.0	0.01	0.2
Coffee	12.3	1.1	6.1	2.8	0.1	0.8	7.9	6.0	0.37	9.6
Total reported emissions (tonnes CO_2 e)	**1 092**	100	**215**	100	**13.5**	100	**131**	100	**3.8**	100
Total reported emissions (tonnes CO_2 e /person)	0.036		0.041		0.051		0.054		0.022	

The COVID pandemic reduced catering services significantly in 2020, where in Brussels eventually most canteens were closed. Eventually, the new catering contract that was due to commence in Brussels in 2021 will permit data to be collected for the over 10 000 meals served daily, and will increase the figure per capita emissions for this category considerably. The catering related emissions for JRC-Karlsruhe are likely to be very limited as within the site boundary a small coffee bar offers a very limited range of food options. Data for 2020 suggests that the equivalent emissions were a quarter to a third of 2019 emissions.

3.11 Emissions from waste disposal

Table 7 shows emissions from the 11 categories of waste disposal in recent years.

Table 7 Emissions generated through waste disposal from 2018 to 2020 (tonnes CO_2e)

	Tonnes			**Percentage of total**		
Waste Disposal Category *	**2018**	**2019**	**2020**	**2018**	**2019**	**2020**
Incinerated waste - domestic waste	2 733	2 699	1 541	36.3	34.9	39.7
Incinerated waste - food	0.00	0.00	0.00	0.0	0.0	0.0
Methanisation - food	394	456	231	5.2	5.9	5.9
Recycled/reused - paper	2 496	2 519	1 231	33.2	32.6	31.7
Recycled/reused - cardboard	14	12	10	0.2	0.2	0.2
Recycled/reused - wood	89	58	51	1.2	0.8	1.3
Recycled/reused - glass	78	88	48	1.0	1.1	1.2
Recycled/reused - plastic PMC	190	198	84	2.5	2.6	2.2
Recycled/reused - others...	946	920	380	12.6	11.9	9.8
Hazardous waste - all types	551	748	286	7.3	9.7	7.4
Landfill (probably mostly projects)	34	27	18	0.5	0.3	0.5
Total	**7 525**	**7 726**	**4 064**	**100**	**100**	**100**

These account for account for a very small part of the carbon footprint, with four sites reporting less than 0,1 tonnes per person total annual emissions. Overall, however, they represented nearly 4% of the Commission's carbon footprint in 2018-19, falling to around 3% in 2020 Landfill represents 0.4 to 0.5% of the total emissions arising from waste disposal. Incinerated waste and paper recycling are the two largest sources of CO_2e emissions.

3.12 Total air emissions of other pollutants

The EMAS regulation requires the reporting of emissions of 'other' air pollutants, where appropriate (including as a minimum NO_x, SO_2 and PM_{10}). The results for 2018 to 2020 are as follows:

Table 8 'Other' air emissions at Commission sites in 2018-20 (kg)

Site	Emissions in 2018 of:					Emissions in 2019 of:					Emissions in 2020 of:				
	NO_x	SO_2	PM_{10}	VOC	CO	NO_x	SO_2	PM_{10}	VOC	CO	NO_x	SO_2	PM_{10}	VOC	CO
Brussels	16 151	62	84	1 771		15 921	61	83	1 746		14 377	55	75	1 577	
Luxembourg	4 171	16	22	457		4 140	18	22	454		4 173	18	22	458	
JRC-Petten	448	NM	NM	65		417	NM	NM	65		308	NM	NM	52	
JRC-Geel	362	13	2	41	2	384	12	3	43	2	377	4	2	42	
JRC-Karlsruhe	NA	NA	NA	NA		NA	NA	NA	NA		NA	NA	NA	NA	
JRC-Seville	NR	NR	NR	NR	NR	21	NR	NR	NR	NR	25	NR	NR	NR	NR
JRC-Ispra	21 962	NA	NA	NA	30 886	37 322	NA	NA	NA	46 092	24 450	NA	NA	NA	25 240
Grange	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Commission	**43 094**	**91**	**108**	**2 335**	**30 888**	**58 205**	**90**	**107**	**2 308**	**46 094**	**43 709**	**77**	**99**	**2 128**	**25 240**

NA - Not Applicable, NR - Not Recorded, NM - Not Measured

In relation to these emissions:

- Brussels, owing to the large number of buildings, (and consequently boilers) is one of the two main contributors of NO_x. JRC-Ispra's gas plant generates electricity and is therefore responsible for a large proportion of the reported NO_x emissions and the only site to report a significant amount of CO emissions in addition to the highest quantity of NO_x.
- JRC-Petten includes physical measurements and calculations for NO_x and whereas VOC data is based on purchase and consumption of solvents, but SO_2 and PM_{10} are excluded as the authorities consider them negligible.
- Owing to its active nuclear activities, Karlsruhe filters and tests its air emissions regularly for nuclear (alpha and beta) particles.

European Commission

Environmental Statement 2021

2020 results

Annex A: Brussels

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Cover illustration: L-86/84 building new facade

Environmental Statement 2021

2020 results

Annex A: Brussels

For further information on environmental performance in Brussels please contact:
Functional mailbox: OIB-RE3-EMAS@ec.europa.eu
Or visit EMAS page on My Intracomm EMAS system (europa.eu)

Foreword

The mission of the OIB[1]- ensuring that the Commission staff works in functional, safe and comfortable facilities, as well as providing quality support and well-being services, based on a client-oriented approach in an environmentally friendly and cost-effective way - remains the driver behind the actions aiming at reducing the environmental impact of its activities. This approach has allowed the OIB, as manager of the Commission's headquarters in Brussels, to play a very important role in improving the Commission's environmental performance.

This annex to the Environmental Statement in which the results in 2020 are illustrated, show strong achievements in reduction of energy, water and office paper consumptions, CO_2 emissions, as well as further improvements in waste production and sorting. They bear witness of the continuous efforts put forward by the OIB through concrete actions in these areas.

The COVID 19 pandemic situation, and the decisions taken by the Commission as a response, namely compulsory teleworking for non-critical staff and the extra ventilation of Commission buildings to ensure a safer working environment, had a considerable impact on last year's performance. This framework has also contributed to the start of a deep reflection on the real-estate portfolio of the Commission in Brussels, to which the OIB actively participates.

In this future of environmental challenges, such as the Green Deal and the Greening of the Commission policy objectives and the new regional legal framework, the EC services and in particular the OIB will continue to strive hard to the improvement of the Commission's environmental performance. The OIB proudly contributes to the sustainability of the Commission as an Institution and of the European Union as a whole.

Signed
Marc Becquet
Head of Service
OIB - Office for Infrastructure and Logistics in Brussels

[1] OIB - Office for Infrastructure and Logistics in Brussels

Contents

ANNEX A: BRUSSELS – Administrative activities

Brussels is the largest site in the European Commission real estate portfolio hosting the headquarters of the Commission, including its flagship building the Berlaymont. The Office for Infrastructures and Logistics in Brussels (OIB) has the mission of ensuring a functional, safe and comfortable workplace for more than 29 000 staff members, spread across over 1 000 000 m^2 of mostly office space.

A1 Overview of core indicators at Brussels since 2005

OIB has been collecting data on core indicators for the Brussels site since 2005. Their values in 2005 and from 2014 to 2020 are shown in Table A1, along with performance trend, and targets where applicable for 2020.

Table A1: Historical data, performance and targets for core indicators for Commission level reporting[2]

Physical indicators:	**Historic data values**					**Performance trend (%) since:**		**Previous Target**		**Future Target**	
(Number, desciption and unit)	2005 (1)	**2014**	2018	2019	2020	2005	2014	2014-2020		2014-2023	2014-2030
								Δ % (2)	value (2)	Δ % (3)	value (3)
1a) Energy bldgs (MWh/p)	19.06	**6.95**	6.75	6.34	5.38	**-71.8**	**-22.6**	-5.0	6.600	-11.0	-18.0
1a) Energy bldgs (KWh/m²)	373	**166**	176	170	150	**-59.9**	**-9.8**	-5.0	158	-4.0	-12.0
1c) Non ren. energy use (bldgs) %		**41.2**	43.3	43.3	44.8		**8.7**	0.0	41.2	0.0	-5.0
1d) Water (m³/p)	28.44	**12.57**	11.22	11.54	7.79	**-72.6**	**-38.0**	-8.0	11.56	0.0	-5.0
1d) Water (L/m²)	556	**300**	294	309	217	**-61.0**	**-27.7**	-4.0	288	0.0	-5.0
1e) Office paper (Tonnes/p)	0.081	**0.033**	0.022	0.021	0.008	**-90.7**	**-76.8**	-35.0	0.033	-40.0	-50.0
1e) Office paper (Sheets/p/day)	77	**33**	23	21	8	**-90.1**	**-76.8**	-35.0	21	-40.0	-50.0
2a) CO_2 buildings (Tonnes/p)	4.77	**0.71**	0.68	0.65	0.57	**-88.1**	**-19.5**	-5.0	0.671	-11.0	-18.0
2b) CO_2 buildings (kg/m²)	93	**17**	18	17	16	**-83.0**	**-6.2**	-5.0	16.0	-4.0	-11.0
2c) CO_2 vehicles (g/km, manu.)	249	**148**	116	119	113	**-54.7**	**-23.8**	-25.0	111	-25.0	-40.0
2c) CO_2 vehicles (g/km, actual)		**213**	227	236	222		4.2	-5.0	213		
3a) Non haz. waste (Tonnes/p)	0.300	**0.222**	0.181	0.183	0.092	**-69.3**	**-58.5**	-10.0	0.200	-20.0	-25.0
3c) Unseparated waste (%)	46.1	**40.8**	41.8	40.3	42.4	-7.9	**3.9**	-5.2	38.7	-10.0	-10.0
3c) Unseparated waste (T/p)		**0.093**	0.082	0.081	0.041					-20.0	-20.0
Economic indicators (Eur/p)											
Energy consumption (bldgs)	1 168	**515**	435	467	378	-67.7	-26.7				
Water consumption		**46.7**	42.1	43.3	29.8		-36.3				
Non haz. waste disposal			29.5	29.8	15.0						

Note: (1) Earliest reported data, for a reduced scope of buildings (2) compared to 2014; (3) EMAS Annual Action Plan 2020
* Target for %improvement for the period 2014-2020, reviewed in 2018
(upwards for indicators already met, while keeping the ones not yet achieved- decision EMAS Steering Committee Sept/2018)

2 Energy data refer to final energy, actual consumption as invoiced by the suppliers

Reporting and the COVID pandemic:

Reporting for 2020 retains the same approach for continuity, as previous years, and is therefore based on site activity and total staff numbers. The data will therefore reflect the impact of a very significant staff absence on facilities operation.

The EMAS corporate coordination team has made 'high level' estimates of home consumption, due to telework under COVID, as described separately in the Corporate summary.

The potential to systematically include the impact of teleworking in annual reporting will be explored as more site-specific information becomes available.

Since EMAS registration in 2005 consumption for all parameters has reduced considerably. The pandemic situation due to the COVID19 virus has had a massive impact in the daily operations of the European Commission, and therefore in its environmental performance. As a result, per capita figures in 2020 show a substantially improved performance since 2019 for every parameter, reflecting also on the performance since 2014 and the attainment of the targets 2014-2020. Energy consumption show a steep decrease of 15% and 12% measured per person and per square metre in relation to 2019. CO_2 emissions in buildings follow the same trend, showing a reduction of 11% measured per capita and 7.0% measured per m^2 when compared with 2019 figures. Water consumption was reduced by a staggering 32% and 30% (per capita and per m^2, respectively), consistent with the lower occupancy of the buildings. The same phenomenon occurred with non-hazardous waste production per capita, which decreased by 50.3% compared to the previous year. Not surprisingly, office paper consumption per person dropped 62%, confirming the impact of the pandemic on the printing needs of the Commission.

Consequently, all targets set for 2020 were achieved – although these had already been met in 2019 (for energy and water measured per person, office paper consumption and non-hazardous waste generation, while for vehicle fleet CO_2 emissions the target had almost been achieved as well), 2020 performance confirmed it. The evolution of the EMAS system in Brussels is as shown below:

Table A2: EMAS baseline parameters

	2005	2014	2015	2016	2017	2018	2019	2020
Population: staff in EMAS perimeter	4 033	25 667	25 698	26 562	27 148	27 254	28 522	29 655
Population: total staff	21 203	27 392	27 089	26 927	28 225	28 494	28 948	29 941
No. buildings for EMAS registration	8	62	62	62	62	58	60	60
Total no. operational buildings		62	62	64	64	61	61	61
Useful surface area in EMAS perimeter, (m^2)	206 166	1 075 372	1 067 270	1 069 453	1 077 739	1 042 008	1 066 617	1 066 617
Useful surface area for all buildings, (m^2)		1 075 372	1 069 673	1 082 004	1 090 075	1 069 020	1 069 020	1 069 020

Surface measured according to Brussels Energy Performance of Buildings legislation specifications

Staff in the EMAS perimeter includes those working for Executive Agencies that are located in buildings managed by the Commission and within the EMAS scope[3]. EMAS applies to the whole of the Brussels site. From year to year however, there may be changes in the total number of buildings as the portfolio of occupied buildings evolves on a regular basis. Only one building is not registered under EMAS in 2020, PALM, for which a major refurbishment is foreseen.

A2 Description of Brussels activities[4], context and key stakeholders

A2.1 Activities

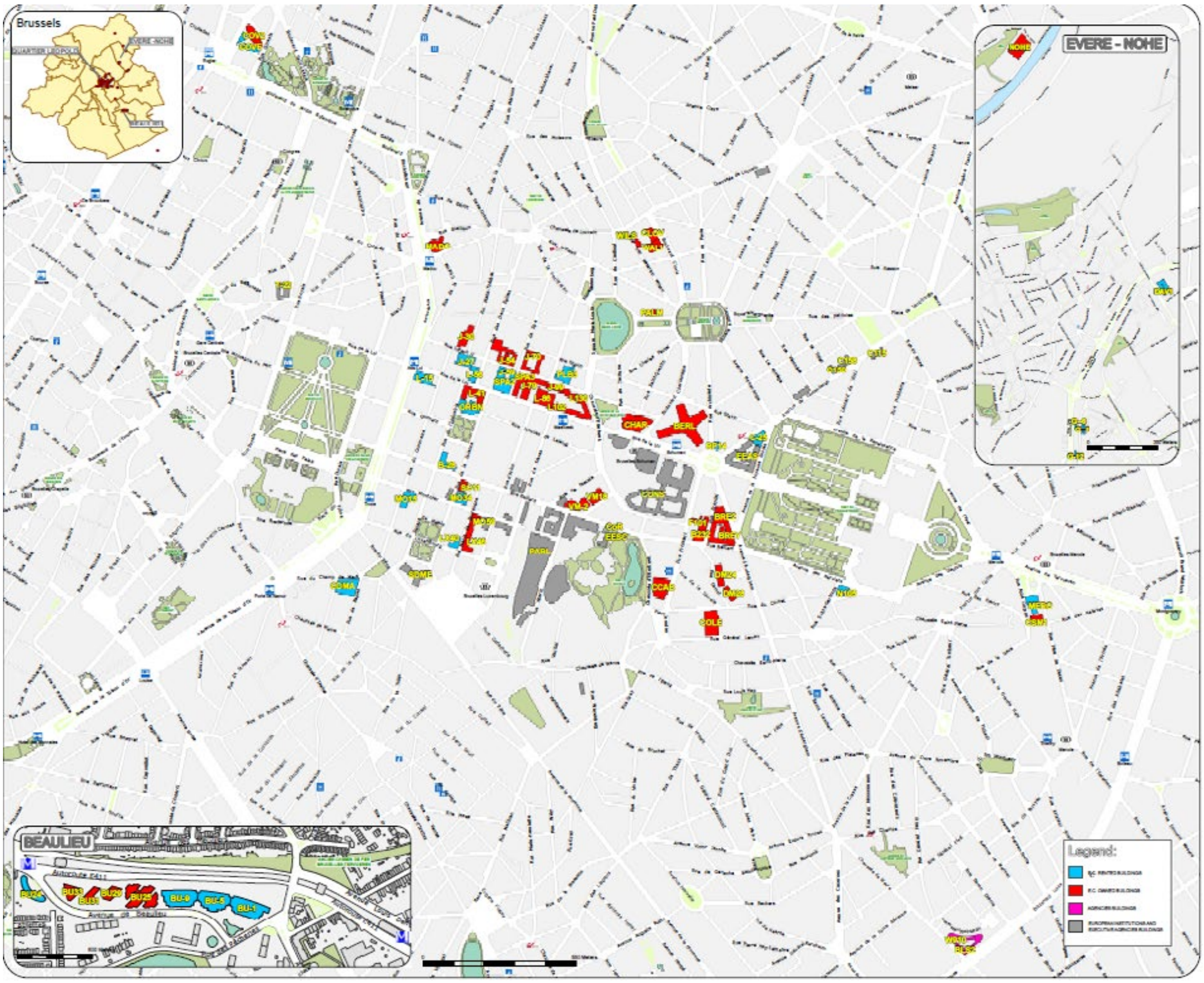
Most of the Commission's activities in Brussels are classic administrative tasks. Other services, include 22 cafeterias, 13 canteens, restaurants, archives, print shops, a car fleet, a medical service, crèches and after school day care centres.

Many of the buildings are located around the European Quarter on the Eastern side of Brussels. A cluster of 10 buildings is located further afield in the south east of the city, in the "Beaulieu" area. A further few buildings are located outside the centre to the north and the south of Brussels including three office buildings, printing and

3 Staff figures in 2017 and 2018 were corrected (double counting of agencies staff in building COVE).

4 NACE codes associated with Brussels activities are: 99 – Activities of extraterratorial organisations and bodies; 84.1 Administration of the state and the economic and social policy of the community.

central mail facilities in the Commune of Evere. The map on page A7 shows the geographical distribution of the buildings in Brussels (with two, KORT- historical archives in Kortenberg and OVER- a sports centre, in the Flemish Region). Table A14 shows a summary of some of the main characteristics of the buildings. The largest buildings are BERL, CHAR and MADO, together representing 23% of the area (over 247 000m²) more than 30% of the electricity consumption and 25% of the gas consumption.



A2.2 Context – risks, and opportunities

According to the new EMAS regulation, the Commission defines its operational context, its legal obligations and determines which environmental aspects related to its activities, products and services have (or may have) a significant impact on the environment and on the environmental management system (EMAS). It also considers the needs and expectations of interested parties, and decides which of these can become obligations in the management system.

All these elements, as well as the context and interested parties are addressed at site level. These aspects provide the basis to define appropriate actions taking into account both risks and opportunities. The Environmental Review provides a global overview of environmental considerations and a basis for defining strategy and objectives.

A2.2.1 External issues and circumstances affecting Brussel's environmental performance

This analysis follows the PESTLE [5] framework, allowing for the identification of both risks and opportunities. The list below, showing reference to actions for the most important points, integrates the suggestions made by the external verifier during the audit in 2019 and takes stock of the impact of the pandemic situation occurred in 2020 :

[5] PESTLE criteria– Political, Economic, Social, Technological, Legal, Environmental

1. Economic – Budget variations influence possible investments to reduce resource consumption. Significative energy savings, leading to relevant reductions in the carbon footprint of the EC depend on substantial investments in the real estate portfolio.
2. Social- Changes in individual and collective behaviour due to external factors (such as a pandemic) may have a considerable effect on the working environment of the Institution, its energy consumptions and respective impacts. This may create the right atmosphere for structural changes in crucial areas such as working methods and real estate management.
3. Environmental - Variation of seasonal temperatures from one year to another have an important impact on energy consumption and generate variable buildings performances. The regulation of a large number of technical installations is complex, but there is an opportunity to use technological development for better efficiency and more rapid actions.
4. Legal – There is a growing number of environmental regulations and regional legal framework to apply to the large portfolio of buildings in Brussels. It may become more difficult to comply with requirements. Close collaboration with local authorities and regulatory bodies help improve the environmental performance whilst ensuring legal compliance.

A2.2.2 Internal issues and circumstances affecting Brussel's environmental performance

These have been analysed using ASCPF[6] criteria. With regard to risks and opportunities, the two most important are as follows:

1. Activities – Brussels' site has a large portfolio of aging buildings, and OIB manages a large range of activities and number of contractors, which increase the complexity of implementing many environmental initiatives. However, there is an opportunity to act at many different levels and to initiate a wide scope of actions.
2. Culture & employees – OIB has a client oriented culture and the needs of its clients have to be addressed. Combining political objectives and operational realities may represent a challenge, as well as meeting clients' expectations. However, both the political objectives and the clients' expectations set the bar for further improvements.

A2.3 Stakeholders (interested parties), compliance obligations risks and opportunities

The table below summarises the main OIB stakeholders, organised in "clusters" due to their large number, especially in terms of contractors and suppliers.

[6] ASCPF criteria – Activities, Strategic direction, Culture and employees, Processes and systems, Financial

Table A.3a: Summary of main stakeholders' requirements to be addressed in the management system as obligations

Stakeholder Group	Stakeholder needs & expectations	EMS obligations
European Institutions	Development plans and operational activities run according the policy laid out at Institutional level	To ensure a high quality service whilst complying with political and budgetary constraints (example, the implementation of the EMS).
Clients	Correct and timely facility management services by OIB, in compliance with environmental legislation	Implementation by management: quality of the facility management services and modern infrastructure supplied by the OIB (examples, meetings between DGs and OIB to improve the quality of the service provided, and continuous improvement of the environmental performance).
Suppliers / contractors	Information on environmental requirements, targets and technical specifications	Implementation by management: to define appropriate environmental criteria at the relevant stages of the procurement and project management process (examples, use of GPP toolkit and environmental requirements in tenders).
Staff	Responsible environmental behaviour, transparent communication regarding environmental procedures and impacts	Infrastructure and operational services quality; communication plan: environmental engagement by OIB, reflecting the needs and aspirations of the staff, through communication plans and activities (example, communication to staff on OIB initiatives like Velo Mai, sorting stations or posters on building environmental profile).
Regulatory authorities	Compliance with Regional and EMAS regulations.	To ensure legal compliance on OIB facility management activities, insofar contractors and suppliers as well as the staff are concerned. Legal Register; Communication to management; Implementation by management; Compliance Evaluation and audits (example, Site Management Reviews and reports on the performance of the EMS)
Policy makers	Strategic and operational plans compliant with National and Regional regulations and targets (example Energy Efficiency Directive)	Implementation of the EMS: to promote the OIB role of leading by example regarding environmental compliance and practices, by setting challenging targets and plans to comply with the ones set to other public or semi-public actors (example, the actions under the EED).
General Public	Transparent communication, accountability	Proactive planning and communication giving reassurances on OIB activities to the public, press and NGOs (example, the publication of the Environmental statement).
Neighbours	Transparent communication, accountability	Proactive planning and communication, as well as corrective measures, if necessary, giving reassurances on OIB activities to the public.

A3 Environmental impact of Brussels activities

The Commission fully updated its assessment of environmental aspects for the Brussels site in 2021 (following the three-year EMAS cycle), the results of which are summarised in the table below.

Table A3b: Summary of significant environmental aspects for the Brussels site

Aspect group	Environmental Aspect	Environmental impact	Activity, Product or Service	Indicators	Risk	Opportunity
1) Air	Emissions of CO_2, NO_x, SO_x and VOCs.	Resources depletion, air emissions, global warming, acid rain	Heating & cooling systems	T/year	Less performant installations increase gas consumption, emissions and resources depletion	Environmental performance improved by renewed installations and better regulation
	Emissions of CO_2, NO_x, SO_x and VOCs.	Resources depletion, air emissions, global warming, acid rain	Fleet use	T/year	Less performant vehicles increase fuel consumption, emissions and resources depletion	Reduction of parking space, through compliance with COBRACE regulation, could decrease emissions
2) All	Fire prevention	Air, soil and water contamination	Emergency preparedness	n° of incidents	Impact on business continuity	Regular drills improve awareness and preparedness
3) Biodiversity	Land use	Resources depletion, loss of biodiversity, land degradation	Real Estate Management	m^2/total	Air and soil degradation	Impulse for a better use of the space used, fostering biodiversity also through staff participation
4) Life cycle	Contruction/ Renovation	Resources depletion, air emissions, soil-water contamination, transport	Real Estate Planning	LCA (Life Cycle Analysis) based on EN 15978 standard	Poorer quality works lower environmental performance	Environmental performance improved by quality renovation works
5) Resources	Gas, Fuel	Resources depletion, air emissions, global warming	Energy	MWh/y/ person	Less performant installations increase electrical consumption, emissions and resources depletion	Environmental performance improved by renewed installations and better regulation
	Electricity	Resources depletion, air emissions, global warming	Energy	MWh/y/ person	Less performant installations increase electrical consumption, emissions and resources depletion	Environmental performance improved by renewed installations and better regulation
	Water	Resources depletion	Water consumption	m^3/y/ person	Less performant installations increase water consumption, emissions and resources depletion	Environmental performance improved by renewed installations and better regulation
	Office supplies and furniture	Resources depletion, air emissions, global warming	Office work	Green criteria	GPP criteria may have a potential impact on price	GPP criteria help the markeplace go greener
6) Soil/Water contamination	Chemicals disposal/ leaks of chemicals/ leaks of Gasoil	Soil/Water contamination	Maintenance	n° of incidents	Non compliance with regulations could hinder the use of the building	Environmental performance improved by compliance with better regulation

Aspect group	Environmental Aspect	Environmental impact	Activity, Product or Service	Indicators	Risk	Opportunity
7) Waste	Hazardous waste	Air, soil and water contamination	Maintenance	T/person	Non compliance with waste management flows could hinder the use of the building	Improving waste management flows represents an improvement opportunity in itself.
	waste production: organic / non organic.	Air, soil and water contamination	Production of meals	T/y/person	Poorer organic waste management reduces the quantities sent to gas production (bio-méthanol)	Improving management of organic waste reduces quantity of waste being incinerated
	Waste	Resources depletion, pollution	Waste	Green criteria	Although all plastic items are recycled or incinerated, the risk is resources depletion (oil based products). Potential impacts on cost.	To lead by example.

* These indirect aspects are managed via a series of specific mechanisms, including impact analysis (see Corporate volume point 2.1), and regulatory measures.

A4 More efficient use of natural resources

A4.1 Energy consumption

Buildings energy consumption data should take in consideration the context of climatic conditions. Analysis of degree data for 2020 suggests that climatic conditions were warmer over the summer (more 15%, requiring more cooling) and winter (more 9%, requiring less heating) than the previous year.

Table A4: Indicative climate conditions

Indicative climate conditions (1)	2012	2013	2014	2015	2016	2017	2018	2019	2020
Heating degree days, heating required	2 184	2 397	1 722	1 986	2 111	1 991	1 989	1 940	1 771
Cooling degree days, cooling required	325	360	345	365	409	415	584	435	499
Total degree days	2 509	2 757	2 067	2 351	2 520	2 406	2 573	2 375	2 270
kWh/person/degree day (2)	**3.08**	**2.65**	**3.36**	**3.18**	**2.84**	**2.84**	**2.62**	**2.67**	**2.37**

(1) www.degreedays.net; monthly data for EBBR station (15.5 C reference temperature)
(2) using buildings energy consumption data for Brussels site

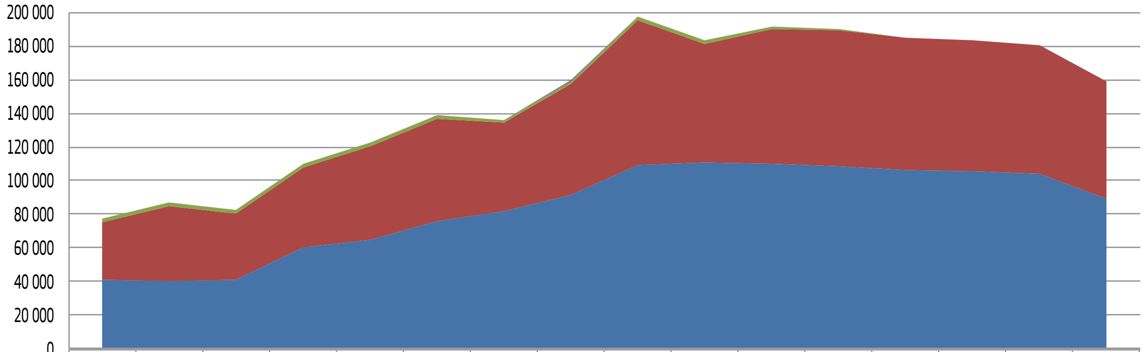
A4.1.1 Buildings

Figure A1 shows the evolution of total annual final energy consumption in the EMAS perimeter while Table A14 (at the end of this document) provides indicative data for individual buildings. The total has increased over time as more buildings were registered under EMAS each year, with almost all buildings included since 2014. Electricity[7] represented 53% of the total in 2005, peaked at 62% in 2014 (a mild year) having stabilised at 57% since 2017.

As mentioned above, the pandemic situation has had a significant impact in almost all indicators, with energy consumption showing a 12% reduction since 2019.

[7] Solar PV data is theoretical.

Figure A1 Annual buildings energy consumption (MWh) in the EMAS perimeter[8] (indicator 1a)

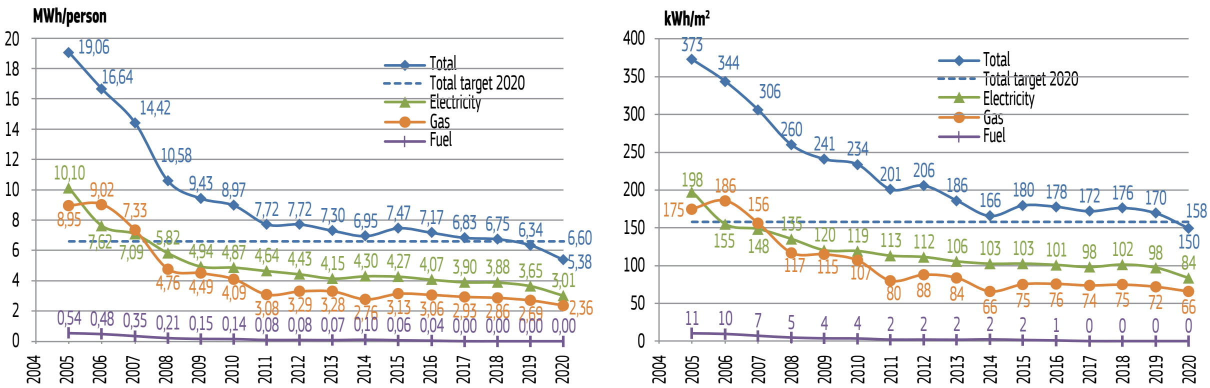


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	76 856	87 169	82 220	109 920	122 669	139 218	135 761	159 499	192 234	178 326	191 982	190 364	185 485	183 868	180 853	159 470
solar PV								43.4	9.4	9.8	26.3	26.5	25.5	28.2	28.0	28.1
diesel	2 176	2 506	1 969	2 166	2 011	2 240	1 471	1 737	1 933	2 570	1 617	993	0	0	0	0
mains supplied gas	33 931	44 754	39 824	47 309	56 410	61 311	52 633	66 264	86 501	70 881	80 556	81 180	79 510	78 024	76 829	70 127
electricity	40 749	39 909	40 427	60 445	64 247	75 666	81 656	91 498	109 254	110 435	109 782	108 165	105 949	105 816	103 996	89 315

Note: Diesel (fuel oil) is no longer used for heating buildings, only a small amount is consumed during periodic testing of emergency diesel generators.

Per capita and consumption per square metre are presented in figures A2 and A3.

Figures A2 and A3: Evolution of total annual energy consumption for Brussels EMAS buildings



Total energy consumption for EMAS buildings (indicator 1a) reduced by 65% and 54% per capita and per square metre respectively since the first EMAS registration in 2005, up until 2019. The reduction in both indicators follows similar trends. The overall gas consumption[9] has decreased a further 9% in 2020, while electricity consumption was reduced by 14%. This result translates in a reduction of 15% measured per person and 14% measured per square metre. Constantly changing climatic conditions risk having an impact on energy consumption, but guaranteeing a comfortable working environment for Commission staff remains OIB's paramount concern.

Primary and normalised energy and the regional regulation for energy performance

Aiming at more comparable reporting on energy consumption, OIB decided to report also on energy performance, using primary and normalized energy data. This analysis gives further detail than final energy, as it incorporates heating degree-days in the performance evaluation. This will also allow for a more accurate follow-up of the measures to be implemented under the regional legislation PLAGE (Plan Local d'Action de Gestion Énergétique), which will use this metric (kWh/m²) and 2019 as reference year (according with the information received so far).

The indicator kWh/m² in the table below shows the average of the Environmental Building Performance (EBP) certificates for the buildings in the EMAS scope, as issued by the regional authorities (Brussels Environment).

[8] Which has expanded steadily since first registration in 2005.

[9] Since heating uses gas in all buildings, fuel consumption is insignificant in comparison to that of electricity and gas, as it is only used for emergency units, and not reported in this data.

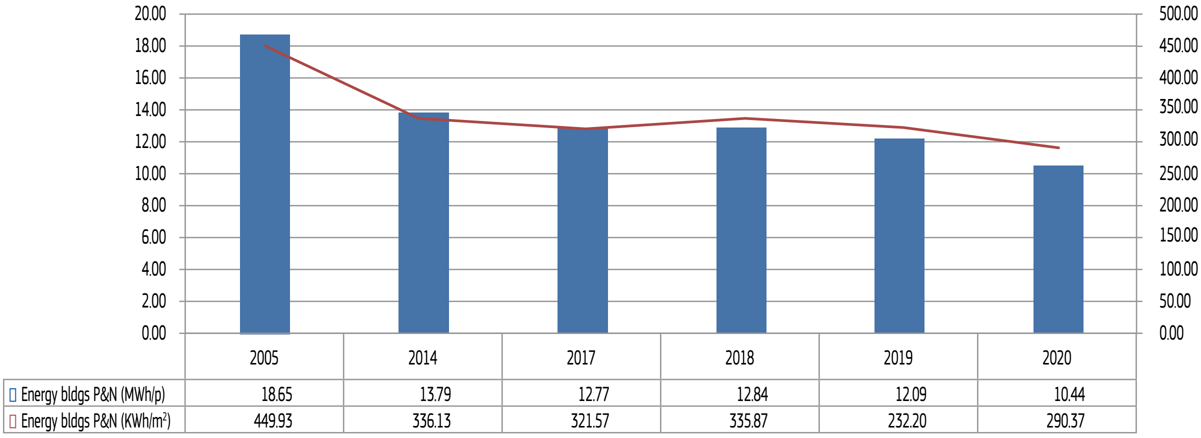
Table A4a: Primary & normalized energy

Primary & Normalised Energy	**Historic data values**						**Performance trend (%) since:**					**Target**	
(Number, description and unit)	2005	2014	2017	2018	2019	2020	2005	2014	2017	2018	2019	2020/2014	
												Δ % (2,3)	value (2,3)
1a) Energy bldgs P&N (total MWh)	395 527	354 035	346 573	349 978	344 728	309 715	- 21.7%	- 12.5%	- 10.6%	- 11.5%	- 10.2%	- 5.0	336 333
1a) Energy bldgs P&N (MWh/p)	18.65	13.79	12.77	12.84	12.09	10.44	- 44.0%	- 24.3%	- 18.2%	- 18.7%	- 13.6%	- 5.0	17.10
1a) Energy bldgs P&N (KWh/m²)	449.93	336.13	321.57	335.87	323.20	290.37	- 35.5%	- 13.6%	- 9.7%	- 13.5%	- 10.2%	- 5.0	416.67
staff (source déclaration EMAS)	21 203	25 667	21 148	27 254	28 522	29 655							
m²	879 089	1 053 255	1 077 739	1 042 008	1 066 617	1 066 617							

(1) Primary and normalised energy (P&N): = electricity final consumption (invoices)*2,5 (reference for BE))+(gas consumption(invoices)*DD factor)

(2) Degree days factor =total year degree days / total degree days BE reference http://www.gaznaturel.be/fr/particulier/degres-jours

Figure A4a: Primary & normalized energy



The table and graph (A4a) above show not only the very significant reductions made since 2005, but also that 2019 figures were already below the 2020 target (if these targets had been set using primary and normalised energy), both per person and per square metre (below the 2020 target by 29% per person and by 22% per m²). Results for 2020 dropped even further, because of the low occupancy of the buildings, to 10.4 MWh/person and 290 kWh/m².

The Annual action plan includes 20 active measures prioritising the reduction of energy consumption, grouped and summarized here below:

- Energy efficiency plans, under the Energy Performance of Buildings (EPB) directive[10] as well as following recommendations from energy audits.
- Comfort and lighting hour's optimization.
- Upgrading of lighting systems and installation of motion detectors.
- Insulation of heating pipes.
- Closure of buildings during the End of Year holiday period.
- Optimization of air flows.
- Launching of call for tender for energy meters.
- Communicating with building owners on energy saving measures.

Two new actions were introduced in the final stages of 2020:

- Inspection of buildings, outside the occupancy hours, to detect any lighting or HVAC equipment working which should normally be idle.
- Powering down of buildings, adapting energy consumption to the low occupancy of the buildings.

[10] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

A4.1.2 Vehicles

Table A5: Summary vehicle energy consumption

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total (MWh/yr)	2 535	2 468	2 292	2 313	2 322	2 177	2 170	2 208	1 266
MWh/person	0.123	0.094	0.089	0.090	0.087	0.080	0.080	0.077	0.043
kWh/km (per 1000 kms)				0.47	1.34	0.97	1.09	1.04	0.00
Diesel used (m^3)	219.4	215.4	201.0	203.9	197.8	177.6	144.1	132.1	54.0
Petrol used (m^3)	10.63	8.16	6.46	5.33	13.40	21.88	60.68	85.39	73.49

As expected, total annual vehicle energy consumption[11] illustrated above shows a massive reduction due to the lower number of kilometres made by the fleet, because of the pandemic (-39%, 1 432 721 instead of 2 346 590 in 2019).

A4.1.3 Renewable energy use in buildings and vehicles

The following table shows the evolution in non-renewable energy use for the buildings.

Table A6: Renewable and non-renewable energy use in buildings (MWh and percentage of total)

Contribuutions to renewable energy	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
i b) electricity contract 1 (% renewables)	0	0	0	0	0	0	0	0	0	0	0	0
electricity contract 1 (MWh renewable)	0	0	0	0	0	0	0	0	0	0	0	0
viii) (PV) (% renewable)	100	100	100	100	100	100	100	100	100	100	100	100
(MWH renewable)	0	0	0	43.4	9.4	9.8	26.3	26.5	25.5	28.2	28.0	28.1
Total renewables (MWh)	**36 621**	**71 883**	**77 573**	**86 967**	**103 801**	**104 875**	**104 273**	**106 440**	**103 916**	**104 266**	**102 548**	**88 073**
Total renewables (%)	**29.9**	**51.6**	**57.1**	**54.5**	**54.0**	**58.8**	**54.3**	**55.9**	**56.0**	**56.7**	**56.7**	**55.2**
Total non ren. energy use, (MWhr/yr)	**86 048**	**67 335**	**58 188**	**72 532**	**88 434**	**73 451**	**87 709**	**83 924**	**81 569**	**79 602**	**78 305**	**71 396**
non ren. energy as part of total, (%)	**70.1**	**48.4**	**42.9**	**45.5**	**46.0**	**41.2**	**45.7**	**44.1**	**44.0**	**43.3**	**43.3**	**44.8**

The overall share of renewable energy represented 55% of the total buildings energy consumption, and this was achieved by purchasing electricity from renewable sources since August 2009. No additional renewable energy sources were installed on site in 2020.

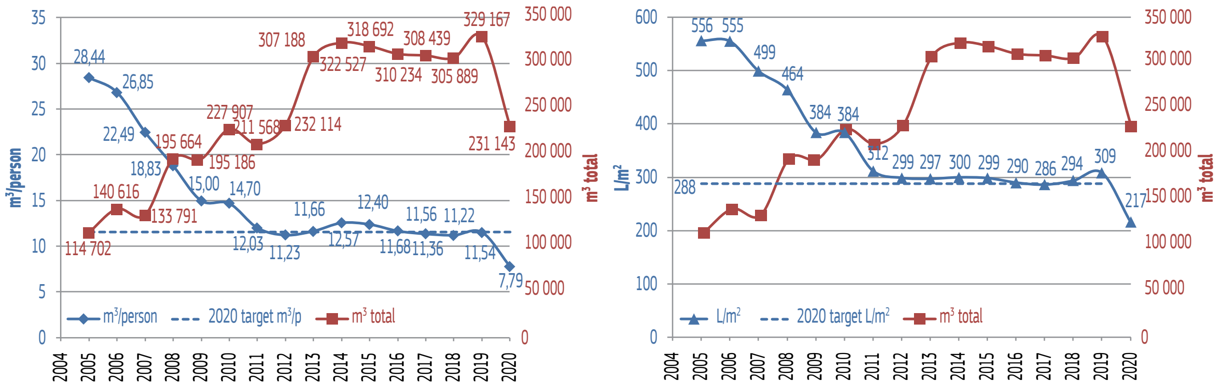
In 2018 a first batch of 20 plug-in hybrid vehicles were added to the fleet, replacing mostly diesel engine cars, adding to the 13 fully electric already in use since 2017. In 2020 the number of plug-in hybrid cars has increased by 9, adding to the 12 in the previous year. The total of full electric/plug-in hybrid vehicles is now 54, representing 42% of the fleet that includes also 10 armoured vehicles, which have an impact in fuel consumption/km.

Since 2017, 122 electrical chargers were installed across 12 Commission buildings (B-28, BERL, BU25, CHAR, CSM1, F101, J-79, LX46, MADO, NOHE, ORBN and OVER), and the target is to make such facilities available in all Commission car parks by 2023. This project seeks to facilitate the use of electric cars, in line with the general policy of promoting greener transport modes, going beyond the Brussels Region's requirement (10% of parking spaces in existing buildings equipped with electric chargers by 2023).

[11] The emission factor was harmonised for whole Europe (10.62 instead of 11.10), based on the updated version of the Carbontrust study (Conversion factors 2016- www.carbontrust.com)

A4.2 Water consumption

Figures A4 and A5: Evolution of total annual water consumption for Brussels EMAS buildings



Note total consumption increased up until 2013 because reporting was only for EMAS registered buildings

Note total consumption increased up until 2013 because reporting was only for EMAS registered buildings

Figures A4 and A5 show a considerable reduction in water consumption since the initial EMAS registration in 2005, with the 2019 value representing only 27% and 39% of the 2005 figure when measured on a per capita and per square metre basis respectively. The rising trend in total water consumption before 2013 is related to the steady growth of the EMAS area in that period.

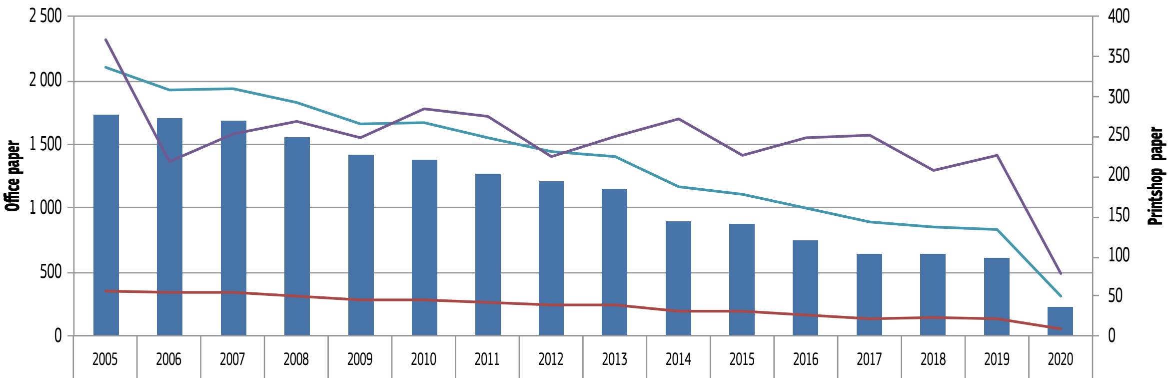
As already mentioned, water consumption in 2020 shows a significant decrease due to the low occupancy of the buildings during the lockdown: overall figures and per m² have dropped by 32%, and per person 30%.

Saving measures undertaken since 2015 include improved water management, installation of leak detection systems and loss prevention mechanisms. Water saving devices (tap aerators) have been installed in 10 priority buildings[12] and subsequently across most of the remaining buildings. Initiatives aiming at the reduction of Single Use Items, such as the installation of water fountains in the cafeterias, may have an impact in overall consumption, as well as warmer temperatures during summer months, requiring for an increased use of water for cooling and humidification.

A4.3 Office and printshop paper

Total office and printshop paper consumption at Brussels shows a long-term downward trend as shown below.

Figure A6: Evolution of total paper consumption at Brussels



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Office paper (tonnes)	1 727	1 703	1 681	1 557	1 412	1 376	1 271	1 212	1 150	894	875	750	634	639	608	227
Total paper consumption (tonnes)	2 098	1 921	1 933	1 825	1 660	1 661	1 545	1 436	1 400	1 166	1 100	998	886	845	834	304
Office paper (A4 sheet equivalent) x1 Million	346	341	337	312	283	276	255	243	238	191	187	160	136	137	130	48
Printshop paper (tonnes)	371	218	252	268	248	285	274	224	250	272	225	248	251	206	226	78

12 Action 58 in the EMAS Global Annual Action Plan

Per capita breakdown is represented below:

Figure A7: Evolution of total paper consumption at Brussels (per capita)

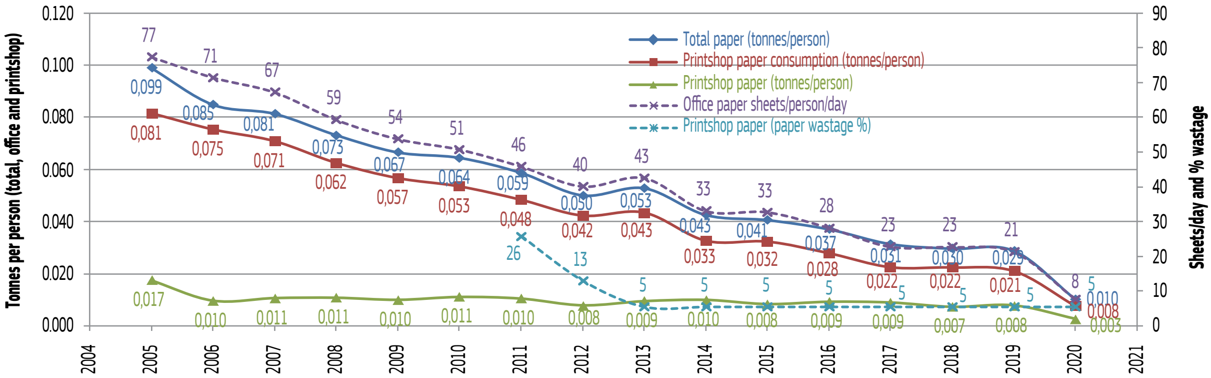


Figure A7 shows that paper consumption[13] (kg/person) follows a long lasting downwards trend, reducing by more than 70% since 2005. In 2019 there was a 4.8% reduction over 2018 as consumption fell from 639 tonnes to 608 tonnes.

In 2020 however, this indicator shows a staggering 65% reduction, again due to the pandemic: printing behaviour has changed dramatically in 2 days! The European Commission and its staff have shown a remarkable capacity to adapt to new working circumstances, moving towards the goal of becoming a paperless organization.

This reduction deepens the trend underway, which is down to continued efforts to increase digital circulation and management of documents, use of scanned documents, email and e-signing transfer of documents, replacing paper signatories as well as the use of double-sided printing when paper is necessary. The new print-on-demand network printers, installed in all Commission buildings in 2019, have also contributed to this result.

The consumption of higher-grade paper in the print shop has followed the above-mentioned trend, with a similar 66% reduction compared with 2019.

The following actions have sought to reduce paper consumption:

- close monitoring of paper consumption;
- improving electronic processes;
- fostering the use of electronic signature and distribution of documents.

A5 Reducing carbon footprint and air emissions

A5.1 Carbon footprint

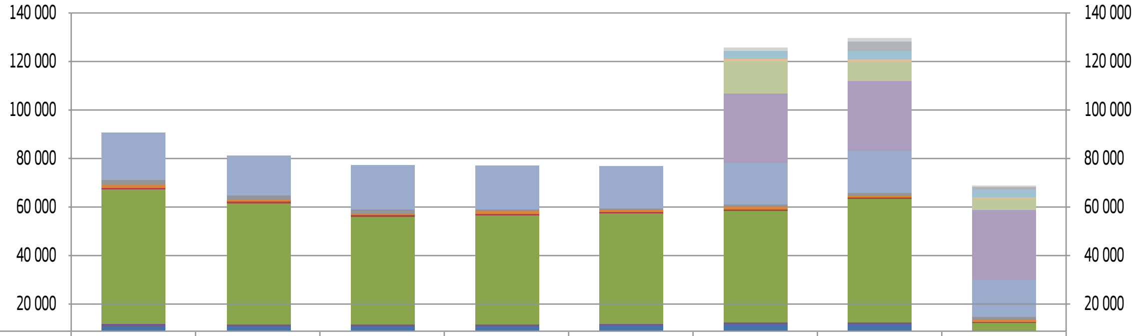
Figures A8 and A9 show the contribution of components[14] of the Commission's carbon footprint measured as equivalent tonnes of CO_2 emissions (T CO_2e) for Brussels[15].

[13] Historically reported for total Commission staff.

[14] Figures regarding potentially important contributors such as fixed assets, such as service contracts over which management has more limited influence, are included only as of 2018. Goods and service contracts do not include catering.

[15] Air travel emissions calculated using RFI = 2; Conversion factor used to calculate equivalent emissions for fuel consumption include combustion (scope 1) and small upstream component (scope 3)

Figure A8: Annual CO_2 (and equivalent) emissions (Tonnes CO_2e)



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	90 710	81 255	77 282	77 088	76 807	125 829	129 688	68 921
Own waste	0	0	0	0	0	1 394	1 423	642
Catering	0	0	0	0	0	0	3 852	1 092
Service contracts	0	0	0	0	0	3 285	3 612	3 210
Paper supply	0	0	0	0	0	845	834	304
Fixed assets - Commission vehicles	0	0	0	0	0	116	117	72
Fixed assets - IT	0	0	0	0	0	13 400	7 855	4 929
Fixed assets - buildings	0	0	0	0	0	28 466	28 919	28 381
Buildings - fuels for heating	19 685	16 456	18 272	18 204	17 508	17 181	17 187	15 701
Buildings - electricity	1 967	1 662	1 652	522	614	1 281	1 253	1 159
Buildings - district heating/cooling	0	0	0	0	0	0	0	0
Buildings - coolant losses	1 150	821	763	1 315	749	847	556	878
Vehicle fleet - fuel consumption	704	653	659	663	623	626	657	377
Missions (air, RFI 2)	55 427	50 176	44 352	44 835	45 494	46 070	51 052	8 460
Missions (excluding air)	927	815	912	877	773	754	805	392
Staff commuting	10 850	10 672	10 672	10 672	11 046	11 565	11 565	3 325

Up until 2017 (and based on the reported data, which didn't include fixed assets), the largest contributors were emissions due to air travel for missions, combustion of fuels for buildings energy consumption, and combustion of fuels for staff commuting. Starting 2018, the Commission also reports on additional categories of scope three emissions[16], such as fixed assets (buildings and IT), contracts for goods and services as well as waste production. As shown in table A7, emissions from buildings, as fixed assets, are estimated at over 28 000 tonnes, representing over 20% of the total, and thus becoming the second largest source of emissions, underlining the importance of real estate policy.

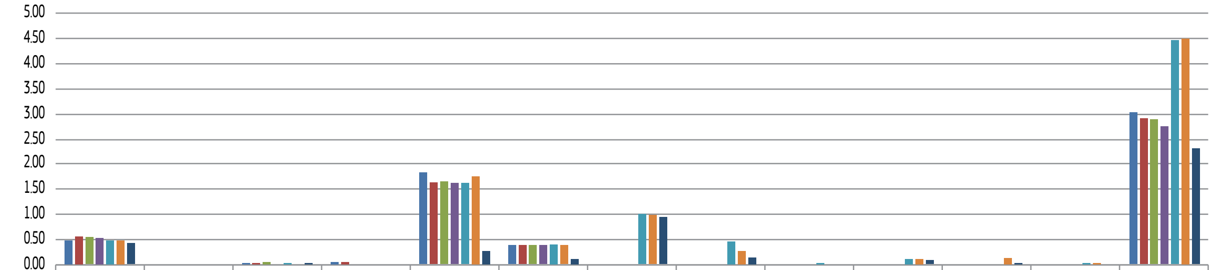
Gas consumption for buildings heating is the third largest component, 50% higher than emissions estimated from commuting. Emissions due to electricity consumption are very low because almost 100% of the supply comes from renewable sources.

As for previous indicators, CO_2 emissions in 2020 have dropped considerably compared with 2019: -46% in total emissions, with air travel emissions, staff commuting, fuel for heating and IT fixed assets as the main contributors to this reduction.

For the first time, this table shows an estimation for the carbon footprint of the catering activities, calculated back to 2019 for reference.

16 Reporting for buildings and fleet energy use also includes upstream emissions

Figure A9: Carbon footprint elements (tonnes CO_2e/person)



	Fuel for bldgs: mains gas	Commission vehicle fleet	Refrigerants	External electricity supply (grey)	Business travel: air (combustion) + (including air taxi)	Commuting (combustion) (4)	Fixed assets - buildings	Fixed assets - IT	Paper supply	Service contracts	Catering	Own waste	Sum
2014	0.50	0.02	0.03	0.06	1.83	0.39	0.00	0.00	0.00	0.00	0.00	0.00	3.0
2015	0.56	0.02	0.03	0.06	1.64	0.39	0.00	0.00	0.00	0.00	0.00	0.01	2.9
2016	0.55	0.02	0.05	0.02	1.67	0.40	0.00	0.00	0.00	0.00	0.00	0.00	2.9
2017	0.53	0.02	0.03	0.02	1.61	0.39	0.00	0.00	0.00	0.00	0.00	0.00	2.7
2018	0.52	0.02	0.03	0.02	1.62	0.41	1.00	0.47	0.03	0.12	0.00	0.05	4.4
2019	0.50	0.02	0.02	0.01	1.76	0.40	1.00	0.27	0.03	0.12	0.13	0.05	4.5
2020	0.44	0.01	0.03	0.01	0.28	0.11	0.95	0.16	0.01	0.11	0.04	0.02	2.3

The data in Figure A9 show the carbon footprint per person, with 2018 representing a significant increase due to the inclusion of the above-mentioned additional scope 3 data (4.5 tonnes CO_2e/person instead of 2.7). Figures for 2020 data confirm the overall trend with a further decrease to 2.3 tonnes CO_2e/person.

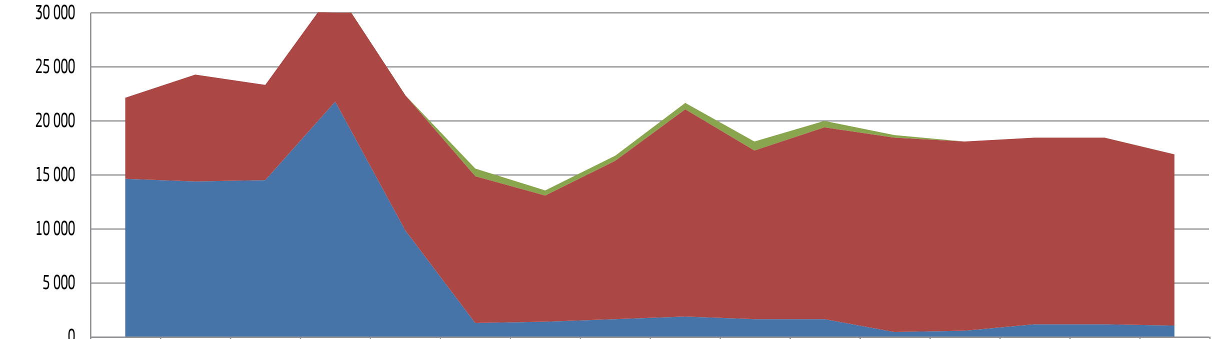
A5.2 CO_2 emissions from buildings

A5.2.1 Buildings (energy consumption)

The evolution of total emissions from buildings energy consumption is shown in Figure A10, followed by per capita and per square metre in Figure A11. These follow broadly the same trend as energy consumption. Emissions due to electricity consumption reduced considerably in 2009, when a green electricity contract was first signed and accounting currently for over 95% of the total electrical consumption.

It is worth mentioning that energy consumption, and the related CO_2 emissions, have not dropped as one might expect in buildings that have remained mostly empty for over 9 months in 2020. The Commission has decided to extra ventilate the buildings (4 hours every day), as well as using strictly 100% fresh air (not recycled, as it is common practice by the OIB, for energy saving reasons), in order to guarantee the safest work environment possible to the colleagues obliged to work in Commission premises. This decision has had a considerable impact in energy consumptions, which have been estimated to be approximately +3% in electricity and +10% in gas (during the heating months, October until December).

Figure A10: CO_2 emissions from buildings heating in the EMAS perimeter, (tonnes)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	19 238	20 514	18 897	25 531	21 618	13 364	11 702	15 036	21 652	18 118	19 924	18 726	18 122	18 461	18 440	16 860
fuel oil						739	486	573	638	848	534	328	0	0	0	0
mains gas	7 472	9 855	8 769	10 418	12 421	13 501	11 590	14 591	19 048	15 608	17 738	17 876	17 508	17 181	17 187	15 701
electricity	14 670	14 367	14 554	21 760	9 945	1 362	1 470	1 647	1 967	1 662	1 652	522	614	1 279	1 252	1 157

Figure A11: CO_2 emissions from buildings heating in the EMAS perimeter, (tonnes per person and kg per square metre)

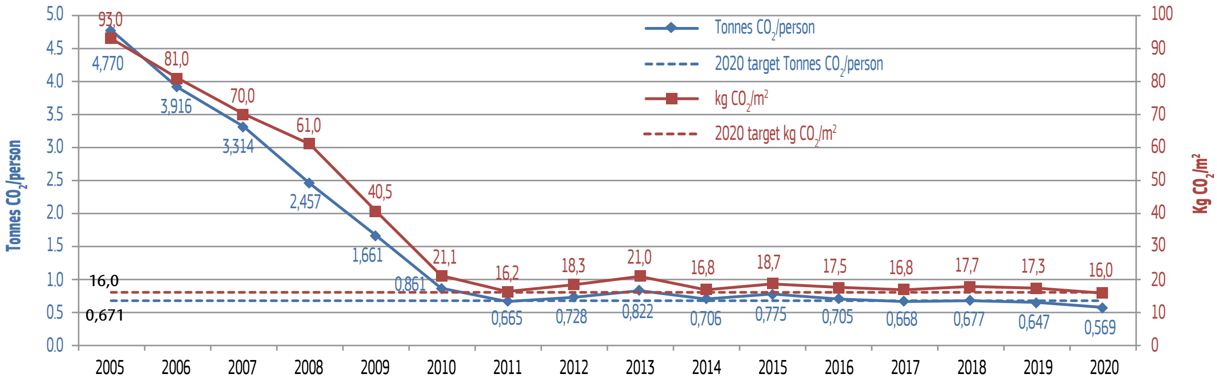


Figure A11 shows that CO_2 emissions have reduced considerably since the first EMAS registration in 2005, with a large drop since purchasing around all electricity from 100% renewable sources in August 2009 (and assuming that renewable electricity does not generate CO_2 emissions). Consequently, emissions are largely unchanged since 2011, which is consistent with Figures A1 and A2 that show gas consumption has decreased very slightly over this period on a per person and square metre basis.

Values in 2020 show the same trend as the majority of the indicators, bearing witness of the impact of the pandemic.

A5.2.2 Buildings -other greenhouse gases (refrigerants)

A **refrigerant** is a substance, commonly a fluid, used in refrigeration cycles. In previous years, special attention was given to fluorocarbons, particularly R22 gas, which were phased out in compliance with the legislation on ozone depletion. A large-scale operation was launched in 2014-2015 either replaced installations containing R22 by new ones using a different gas (operation “lift & drop”), or by removing R22 and recharging with a new gas (operation “retrofit”).

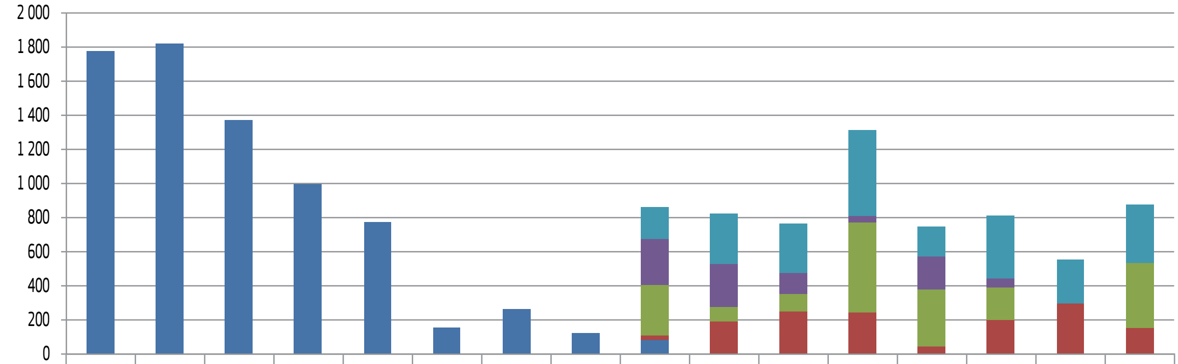
Table A7: Emissions of equivalent CO_2 emissions (tonnes) from cooling installations

	2005	2014	2015	2016	2017	2018	2019	2020
Total (TCO_2 e)	**1777**	**821**	**763**	**1315**	**749**	**847**	**556**	**878**
tonnes CO_2 equiv/person	0.084	0.030	0.028	0.049	0.027	0.030	0.019	0.029
kg CO_2 equiv/m^2	0.009	0.001	0.001	0.001	0.001	0.001	0.001	0.001

OIB has monitored the total quantity of refrigerants in technical installations (excluding catering), and losses since 2005. Figure A12 shows that 2020 figures are close to the figures of 2017-2018 (2019 was an atypical year with lower incident rate).

Each kilogram of refrigerant lost may be equivalent to between 1 000 and 5 000 kg of CO_2e.

Figure A12: Losses of refrigerants in Brussels EMAS perimeter, (tCO_2e)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total (TCO_2 e)	1 777	1 822	1 370	995	771	154	261	127	1 150	821	763	1 315	749	847	556	878
R407C									188	293	285	501	175	366	262	342
R404A									274	253	126	43	197	52	0	0
R134A									296	85	104	529	330	189	0	382
R410A									24	190	248	241	47	202	294	154
R22A	1 777	1 822	1 370	995	771	154	261	124	82							

The phasing out and substitution of refrigerants type R404a or R134a, used in kitchen cooling equipment, and R407c, R410a, used in HVAC installations, is scheduled for 2025 or 2030, following the applicable legislations, which are closely monitored.

A5.3 CO_2 emissions from vehicles

A5.3.1 Commission vehicle fleet

Table A9: Fleet vehicle characteristics and tailpipe CO_2 emissions

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of vehicles (avg. fleet size)	160	120	114	117	107	129	126	131	129
of which electric/hybrid engine				10	10	13	33	45	54
of which Euro 6 engine				56	74	98	93	73	65
of which Euro 5 engine				51	23	18	0	0	0
Internal fleet efficiency (litres/100km)	8.7	8.6	8.4	8.4	7.5	8.0	8.9	9.3	8.9
CO_2 emissions									
i) from diesel (tonnes)	693	681	635	644	625	561	455	418	171
ii) from petrol (tonnes)	29.9	22.9	18.1	15.0	37.7	61.5	171	240	206
Total vehicle tailpipe emissions	**595**	**704**	**653**	**659**	**663**	**623**	**626**	**657**	**377**

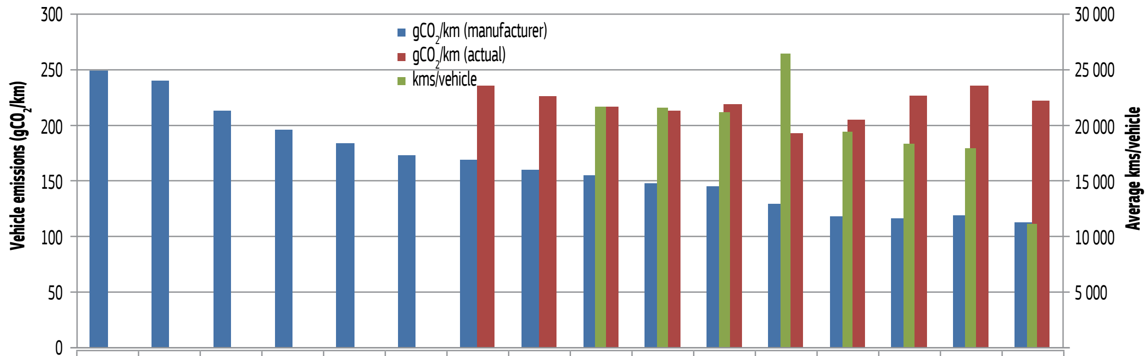
Brussels operates a vehicle fleet of 129 leased cars (as counted in 31/12), a number that has stabilised since 2017 as indicated in Table A9. In 2019 and 2020, both the number and the proportion of cars with Euro 6 engines decreased, following the inclusion in the fleet of an extra 12 and 9 plug-in hybrid vehicles (respectively), which, adding the full electric vehicles, represented in 2020 42% of the whole fleet.

The CO_2 emissions have steadily decreased since 2013. Table A9 also shows a switch from diesel to petrol engines, demonstrated by the respective CO_2 emissions: while in 2013 CO_2 emissions from diesel represented 97% of the total, in 2020, it dropped to 45% only.

The confinement rules in the response to the pandemic have also influenced the use of the car fleet, reflected in a significant reduction of the mileage and therefore of the related CO_2 emissions, by more almost 60%.

Figure A13 shows how vehicle emissions (per km) and average vehicle use have evolved across the years.

Figure A13: Emissions per km and distance travelled per vehicle



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
gCO_2/km (manufacturer)	249	240	213	196	184	173	169	160	155	148	145	129	118	116	119	113
gCO_2/km (actual)	0	0	0	0	0	0	236	227	217	213	219	193	205	227	236	222
kms/vehicle	0	0	0	0	0	0	0	0	21 694	21 547	21 172	26 446	19 444	18 344	17 913	11 106

Initiatives undertaken since 2015 include systematic replacement of vehicles having reached the end of their economic life cycle with more environmentally friendly models, featuring lower engine capacity, hybrid technology or electric motors. The OIB provides drivers with 'eco-driving' training and since 2015, it uses the "ecoscore" label for cars, advised by the Brussels Capital Region, in its car fleet management.

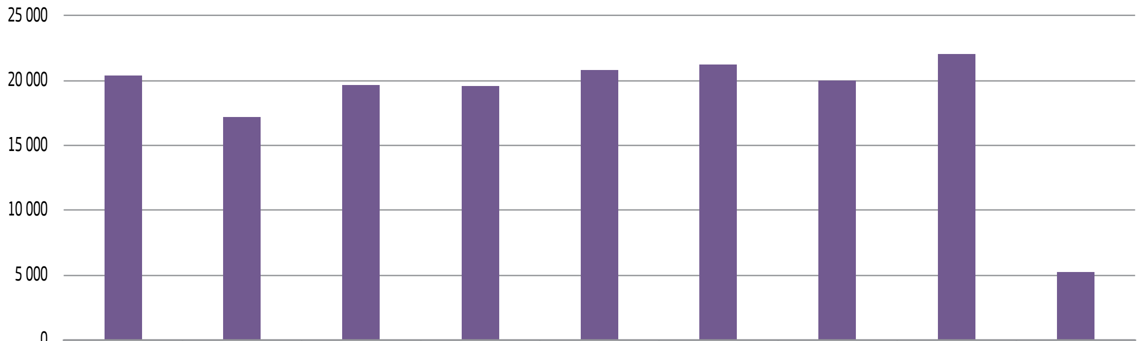
A5.3.2 Missions and local work based travel (excluding Commission vehicle fleet)

There were no specific site level targets since 2014 or management approved action plans to reduce CO_2 emissions from missions. Ongoing initiatives undertaken at corporate level in 2015 to encourage staff to consider less energy intensive alternatives for mission travel included:

1. evaluating the use of videoconferencing within the Commission;
2. promoting videoconferencing in DGs and using monthly utilisation reports;
3. continuing to promote the use of service bicycles; and
4. continuing to distribute tickets for journeys on public transport within Brussels.

Figure A14 shows the number of trips undertaken using service bicycles to attend internal or external meetings or events in Brussels.

Figure A14: Trips made by Commission bicycle



	2012	2013	2014	2015	2016	2017	2018	2019	2020
Annual total	20 434	17 139	19 636	19 577	20 814	21 224	20 013	22 050	5 210

Overall, each year around 20 000 trips are made using Commission bikes. Figures for 2020 show a massive reduction of more than 76% compared with 2019, again due to the impact of confinement measures. These trips include the ones using the 75 electrical bikes (out of 320) introduced to the fleet in the last 3 years.

A5.3.3 Commuting

Initiatives undertaken in 2020 concerning commuting included:

1. continued financial support for public transport season tickets for staff who give up the right to permanent access to a parking space ;

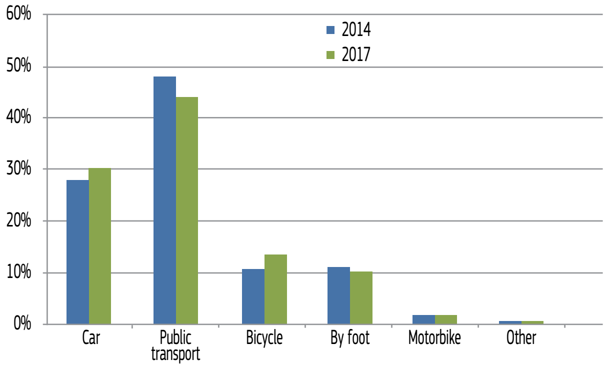
2. installing additional bicycle parking places (currently over 5 200) and showers in Commission buildings;
3. promoting the "Bike to Work" and "Bike Experience" schemes of external organisations;
4. compliance with the regional legislation COBRACE, aiming at the reduction of parking space in office buildings

These measures, aiming to promote the use of sustainable modes of transport by staff were continued in 2020, to some extent. Indeed, the pandemic has also induced a change of behaviours regarding mobility, with a significant reduction of the use of public transport and an increased use of bicycle or car when staff had to come to the office.

The graph below shows the split between the main commuting modes used by the EC staff in Brussels in 2017, compared with 2014 figures (date of the previous triannual Mobility Survey- the presentation of a new survey has been postponed by Brussels Environment due to the COVID pandemic). Public transport is consistently the main and preferred commuting mode, followed by private car and bicycle.[17]

As mentioned above, the decision to make teleworking compulsory (by the Belgian Authorities, followed by the Commission), had a very strong impact on commuting related CO_2 emissions: a reduction of 71% in 2020 when compared with 2019 (estimated at 3 325 tonnes instead of 11 565).

Figure A14a: Commuting modes for EC Staff in Brussels



A5.4 Total air emissions of other air pollutants (SO_2, NO_2, PM)

Brussels is one of several European cities experiencing high levels of airborne pollution. The EC occupies more than 60 buildings with large HVAC (Heating, Ventilation, and Air Conditioning) installations, and uses a fleet of over 100 predominantly diesel vehicles, even though their numbers and percentage of the total have been reduced to 50% (65 over 129). The Commission must ensure that it is contributing positively to improve this situation.

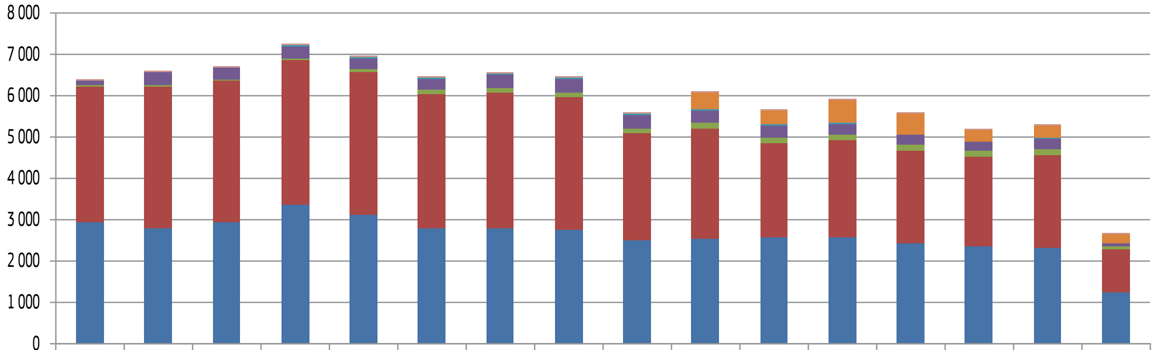
The pollutants typically released into the air are those of combustion; therefore, boilers and vehicle engines constitute a source of pollution. OIB started to collect data in 2013 to improve reporting on these atmospheric pollutants, and the Commission completely phased out fuelled boilers, in 2017.

[17] Source: 2017 Mobility Survey

A6 Improving waste management and sorting

A6.1 Non hazardous waste

Figure A15: Evolution of total non-hazardous waste in Brussels (tonnes)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	6 359	6 581	6 692	7 230	6 936	6 423	6 529	6 443	5 562	6 081	5 654	5 882	5 580	5 158	5 298	2 756
Total (tonnes/ person)	0.300	0.291	0.282	0.290	0.278	0.249	0.248	0.225	0.210	0.222	0.209	0.218	0.198	0.181	0.183	0.092
(Oxfam contract non WEEE)										404.1	348.6	527.7	506.0	256.1	305.1	187.0
Glass	12.5	15.5	19.1	21.5	27.4	32.5	31.4	37.4	33.3	29.4	26.5	25.6	23.0	27.7	40.1	13.6
Organics	83.7	293	281	292	273	248	314	313	302	311	289	261	243	213	244	79
PMC	46.9	35.8	42.0	49.8	54.5	102	121	127	121	116	123	142	147	144	151	59
Paper and card	3 265	3 438	3 420	3 500	3 454	3 238	3 249	3 219	2 590	2 675	2 274	2 349	2 212	2 167	2 223	1 070
Unsorted waste	2 951	2 799	2 929	3 366	3 127	2 804	2 813	2 747	2 516	2 545	2 594	2 577	2 449	2 351	2 334	1 231

Figure A15 indicates that waste generated[18] per person has reduced by 39% since 2005 until 2019 (183 kilograms instead of 300). In 2020, as expected, figures have dropped by more than 50% to 92 kilos per person, consequence of the low occupancy of the Commission buildings in Brussels. Unsorted waste and paper/carton continue to make up a large percentage of the waste produced (over 83%). From 2014 to 2016, data include the weight of office furniture recovered by Oxfam under a contract that was also used for recycling/reuse of obsolete IT equipment. Since 2017 this procedure was replaced by the sorting of the materials (metal and wood) performed at the OIB's warehouse (and then recovered by Suez) as well as the return to the suppliers (for chairs and desks) for reuse/recycling. (For DIGIT IT obsolete equipment, see section A6.2).

In overall terms, and since 2017, the figures show a transfer of unsorted waste to other categories, which is a positive indicator of a better sorting behaviour by the staff.

Principles of circularity were incorporated into a new waste management contract that came into force in May 2017. OIB has launched other initiatives on waste management since 2015, which are still ongoing, such as:

1. improving the selective sorting of waste using sorting bins in areas and buildings for public use;
2. promoting the implantation of collaborative working areas which reduces the number of waste containers available and consequently improve waste sorting; and
3. reducing the number of individual bins.

The measures introduced in previous years aiming to reduce the use of Single Use Plastic items continued to receive great attention. The OIB has successfully launched a series of initiatives in this regard, namely the full replacement of plastic cups in water fountains and vending machines by recycled and recyclable paper ones and the use of specific bins aimed at this type of waste, spread all over the Commission buildings in Brussels. Wooden stirrers replaced plastic stirrers in cafeterias and restaurants, and the latter removed from vending machines. In addition, it is no longer possible to order plastic cups for catering services and events. As of 2018, this approach was applied to all the restaurants and cafeterias in all buildings in Brussels, where new water fountains were installed.

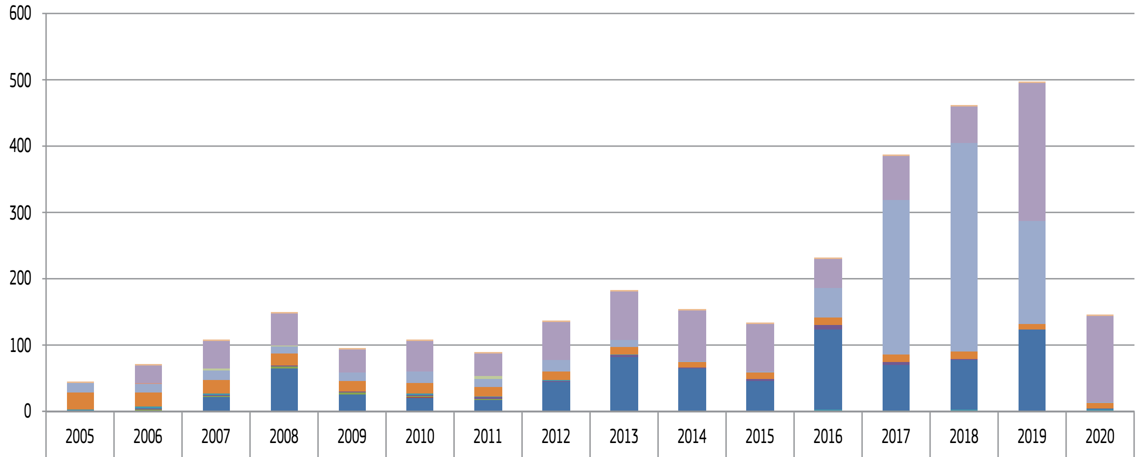
[18] Historically reported for total Commission staff

A6.2 Hazardous waste

Per capita hazardous waste generation represents 5% of total waste. Since 2014, data supplied by DG DIGIT relating to the weight of IT material collected by Oxfam (and more recently by Close the Gap) for recycling and re-use have been incorporated in the hazardous waste data, and the data series extrapolated back to 2006. In 2019, these figures increased from 55 to 207 tonnes, due to higher quantities of PCs, laptops and portable phones collected.

Data for 2020 show a strong reduction in the categories linked to building maintenance, which have seen their operations reduced to a strict minimum because of the compulsory confinement.

Figure A16: Evolution of total hazardous waste in Brussels (tonnes)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	43	69	105	147	93	106	87	135	180	152	132	230	386	461	495	145
Total (tonnes/ person)	0.002	0.003	0.004	0.006	0.004	0.004	0.003	0.005	0.007	0.006	0.005	0.009	0.014	0.016	0.017	0.005
(Oxfam contract WEEE 20 01 35)		26	41	48	36	46	33	57	73	76	72	45	68	56	207	131
Diverse chemical waste	1.188	0.334	3.044	1.092	0.000	0.000	4.701	0.071	0.140	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mineral Oil	0.000	2.121	0.015	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oil and fat	13	12	14	12	13	17	12	18	11	2	1	44	234	316	156	2
Cartridges	26	21	19	16	15	16	14	13	11	7	10	11	11	10	8	7
Paint-toner	1.466	2.456	2.514	1.075	0.772	1.369	1.207	1.194	0.271	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chemical batteries	1.470	1.589	1.836	1.563	1.913	1.927	2.002	1.748	2.120	2.350	3.239	6.195	4.393	1.806	0.819	0.793
Chemical-fixer-developing agents	0.002	3.195	1.244	2.378	2.059	1.855	2.446	0.150	0.126	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Microfiches	0.004	0.000	0.001	0.115	0.000	1.330	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maintenance of buildings/lifts	0	0	22	65	25	21	17	44	83	64	45	122	68	76	123	2
Medical waste	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2.55	2

A6.3 Waste sorting

OIB seeks to maximise the sorting of waste into potentially useful recycling streams, and minimise the amount of unsorted "general" waste. 2020 figures are not be representative, due to the low occupancy of the buildings, which explains why Table A10 shows that the proportion of total waste sorted has slightly decreased from 59.7 to 57.6%.

The success of the introduction of sorting stations, allowing for a better waste sorting in offices, has continued throughout 2020. From installation mostly in buildings with open office spaces, starting in 2018 as a pilot project, it was extended in 2019 and 2020 to more buildings to a current 18. By the end of 2020, 771 stations have been installed, including at the entrance of each Commission building in Brussels. All floors in the flagship building of the BERL have been equipped with these sorting stations.

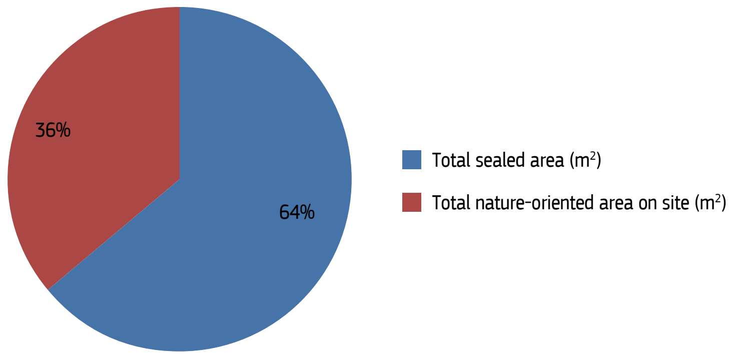
Table A10: Evolution of waste sorting at the Commission in Brussels

	2005	2014	2015	2016	2017	2018	2019	2020
Percentage of waste sorted	53.9	59.2	55.2	57.8	59.0	58.2	59.7	57.6
Percentage of waste not sorted	46.1	40.8	44.8	42.2	41.0	41.8	40.3	42.4

A7 Protecting biodiversity

The OIB continuously strives to improve the environmental impact in the building sector, despite the urban character of the site, including adopting several measures contributing, directly or indirectly, to protect biodiversity and including:

1. integrating and managing several green areas in its buildings;
2. managing a green park at the Overijse site, with an area of 13 000 m^2;
3. introducing infrastructure measures such as green roofs in building projects such as the one at Overijse (roof 1 800 m^2);
4. opting for green procurement of goods and services: (e.g. where possible integrating environmental considerations in the selection of construction materials).



The figure above shows the percentage of nature oriented area over the total, 104 064m^2 over a total of 285 928m^2 [19], which represents 3,5m^2 per capita.

The OIB will launch a new project in 2021, exploring other possibilities of introducing biodiversity protection in an urban environment (action 505 in the Global Annual Action Plan), namely by elaboration an inventory of the possible spaces and fostering cooperation with the NGOs active in the community and scientific expertise.

A8 Green Public Procurement

A8.1 Incorporating GPP into procurement contracts

OIB aims to apply “green” public procurement principles into its contracts exceeding 60 000 EUR (following the thresholds defined in the EC Financial Regulation), and has increased the number of contracts including such criteria in the last few years (in 2020 this was achieved in all contracts).

In 2016, a new IT programme, PPMT, was introduced, allowing for a closer identification and follow-up of the GPP criteria indicator included in OIB procurement. OIB uses a three level classification of the tenders (green, not green and green by nature), which gives sufficient detail in the analysis of the environmental criteria. Since 2018, tenders have been ranked according to their degree of incorporating of sustainable criteria from not green, to green by nature. In 2020, of 18 contracts 16 were considered as “green” and two as “green by nature”, while the remaining two had no environmental features.

Action 54 of the Commission’s Global Annual action plan has, since 2012, sought to integrate systematically GPP or environmental criteria in call for tenders’ terms of reference and technical specifications.

[19] Nature oriented surface as included in the maintenance contract of the buildings’ surroundings; total area corresponds to the plot area of all buildings

A9 Demonstrating legal compliance and emergency preparedness

A9.1 Management of the legal register

Several units within the OIB are registered users of the Regulation Monitoring contract REMO, for legislation relating to EMAS, technical equipment and persons with reduced mobility, launched by the European Parliament. This monitors new regulations, and enables the OIB (through emails and links to designated users) to be up-to-date on relevant legislation. The EMAS team at OIB performs an analysis of the new legislations and highlights its potential impacts, suggesting the course of action necessary to guarantee compliance.

The Brussels environmental legal register (for the Brussels and Flemish regions) is updated every year by an external consultant, and checked by OIB, ensuring the completeness and adequacy of the registers in relation to the Commission's obligations. The EMAS page in OIB's intranet site invites potential interested services to contact the EMAS team asking for further support on the follow-up of legislative matters.

In Brussels, occupying a building requires an environmental permit, issued by the regional authorities. In order to obtain these, the Commission must comply with the environmental legislation. Brussels Environment, the regional environment and energy administration department, performs legal compliance audits of the buildings on a regular basis. In addition, internal EMAS audits performed by specialist external consultants and the external verification exercise check how the Commission demonstrates legal compliance in relation to environmental legislation. From these audits, we can conclude that all buildings in the Brussels site are compliant, and that the Commission engages in regular dialogue with local authorities on the subject.

A9.2 Prevention and risk management

OIB records statistics relating to the findings of buildings inspections of health, safety and environment. These audits and inspections are based on permits and legal requirements for each building and technical installation. Out of 1 635 reports issued in 2020, 54% had no remarks, while 38 % stated minor and 9% major non-conformities.

One major non-conformity was recorded in 2020 EMAS related, concerning the required control by a laboratory of the emissions from heating equipment bigger than 1 MW, which will be integrated in the inspections of the SECT[20] contract. A number of previous controls have been updated to better meet environmental needs:

Table A10a: Health & safety controls

Test/control	Reference	No. buildings controlled 2020
Cogeneration systems and associated air analysis	6G	30
Air conditioning installations over 15 years old	6F & 6J	11 + 45
Generators and associated air analysis	6H	3
Boilers and associated air analysis	6A	66
Gas supply installations	6B	67
CO in parking and underground levels (48h)	7B	33
Fine particles (copy machines)	7C	59

A9.3 Emergency preparedness

Beyond the procedures and services in place at the European Commission, concerning emergency preparedness and response related to health, safety and security incidents at work (24/7 helpdesk line 22222), the OIB monitors the application of the legislation on well-being at work, in particular the evaluation of risks and corrective measures with an impact on the environment.

With regard to technical issues, the OIB also manages the 24/7 helpdesk line 55555, which deals with technical incidents in the buildings (related lighting, heating, cooling, water, etc.).

[20] Service externe de contrôles techniques

A10 Communication

A10.1 Internal communication

Internal communication may involve Commission staff and contractors. A summary of the actions (aimed at Commission staff in all buildings, and not only OIB's) is included below.

Table A11: Summary of main internal communication actions in 2020

Action description	Participation at Brussels site level	Dates in 2020
OIBNet and flatscreens	The first corporate competition on sustainable conferences and events (europa.eu)	February
OIBNet and flatscreens	End of year energy-saving action 2019 (europa.eu)	February
OIBNet and flatscreens	Ciano aux côtés des banques alimentaires européennes (europa.eu)	March
OIBNet and flatscreens	Zero Waste Lifestyle @Home (europa.eu)	May
OIBNet and flatscreens	How to buy an e-bike (europa.eu)	May
OIBNet and flatscreens	Don't see red in traffic jams. Go green! (europa.eu)	June
OIBNet and flatscreens	Lunchtime conference by DG CLIMA on the draft findings of the "Feasability ans scoping study for the Commission to become climate neutral by 2030" (europa.eu)	June
OIBNet and flatscreens	World Environment Day 2020: It's time for Nature (europa.eu)	June
OIBNet and flatscreens	Avantages du télétravail et actions à entreprendre pour l'environnement (europa.eu)	July
OIBNet and flatscreens	Plastic Free July (europa.eu)	July
OIBNet and flatscreens	VeloMai – October edition - Save the date (europa.eu)	July
OIBNet and flatscreens	Avantages du télétravail et actions à entreprendre pour l'environnement (europa.eu)	July
OIBNet and flatscreens	Greening the Commission: Let's walk the talk together (europa.eu)	September
OIBNet and flatscreens	New on line EMAS basics training for all staff (europa.eu)	September
OIBNet and flatscreens	European Mobility Week kicks off with focus on zero emissions (europa.eu)	September
OIBNet and flatscreens	Velomai springs back in the autumn! (europa.eu)	October
OIBNet and flatscreens	Sustainable at work webinar (europa.eu)	October
OIBNet and flatscreens	Nugget 18: How to buy an e-bike? (europa.eu)	October
OIBNet and flatscreens	Volunteer for a Green Change (europa.eu)	October
OIBNet and flatscreens	Green Public Procurement Public Buildings' Design, Construction and Maintenance (europa.eu)	November
OIBNet and flatscreens	Les îlots de tri, premières observations encourageantes (europa.eu)	November
OIBNet and flatscreens	A successful first corporate "Volunteer for a Green Change" (europa.eu)	November
OIBNet and flatscreens	The European Green Deal – for our health and wellbeing (europa.eu)	November
OIBNet and flatscreens	Keep it Green this Christmas ! (europa.eu)	December
OIBNet and flatscreens	Stepping up energy savings in Brussels over the Christmas break (europa.eu)	December
OIBNet and flatscreens	Dressing Green Seminar (europa.eu)	December

A10.2 External communication and stakeholder management

Table A12: The main external actions conducted by Brussels in relation to environmental matters:

Action description	Participation at Brussels site level	Organisation and external stakeholders	Dates in 2019
Communication with Regional authorities	Planning, organization, participation, follow-up and reporting on audits performed by the IBGE or the Fire Department (SIAMU); training and seminars taken at IBGE facilities; participation in meetings, held at IBGE, concerning the future legislation on energy savings and the legislation COBRACE, as well as the annual EMAS meeting; frequent contacts with building owners and property managers.	OIB and IBGE, SIAMU and property owners and managers	Through-out the year

A11 Training

A11.1 Internal training

Table A13: Action plan training

Description	Participation at Brussels site level	Participants (estimated)	Dates in 2020
Training for newcomers	Assisting HR COORD in trainings for newcomers	60	Several throughout the year
Presentation of the sorting stations	Each installation of the new sorting stations is followed by a short presentation to the EMAS correspondents and other staff, including senior management	50	Several throughout the year

A11.2 External training

The EMAS coordination team at OIB followed several training sessions during 2019 on the following subjects:

- Circular economy;
- Public Buildings Design, Construction and Maintenance;
- Energy management;
- Roll-out of IPMVP (International performance measurement verification protocol).

Two of the members of the EMAS team at OIB are Energy Building Performance (EBP) public buildings registered certifiers and EBP advisers. Another member of the team has successfully completed the IRCA[21] training in ISO 14001 lead audit. Another one has completed a Master's degree in Environmental Sciences and Management at ULB (Université Libre de Bruxelles).

As in previous years, the EMAS team at OIB welcomed a trainee under the Blue Book Program in the European Commission.

A12 EMAS Costs and saving

For several years, the costs associated with running EMAS in terms of staff time and that of supporting contracts and savings have been monitored. The estimated costs associated with parameters such as energy and water consumption and waste generation and disposal have also been estimated. These are presented in Table A14.

Table A14: EMAS administration and energy costs for buildings in the EMAS area

Parameter	2005 (1)	2014	2015	2016	2017	2018	2019	2020
Total Staff (EMAS Office Buildings)	4 033	25 667	25 698	26 562	27 148	27 254	28 522	29 655
Total Staff (Commission)	21 203	27 392	27 089	26 927	28 225	28 494	28 948	29 941
EMAS administrative cost (EUR)/staff		**4,82**	**4,95**	**4,98**	**4,89**	**5,19**	**5,18**	**5,08**
Total energy cost for EMAS office buildings (EUR)	4 710 826	13 221 363	12 762 057	11 923 315	11 871 153	11 854 129	13 313 172	11 202 154
Total energy cost for all Commission buildings (3) (EUR)	24 766 587	14 109 930	13 452 851	12 087 158	12 342 098	12 393 467	13 512 015	11 310 190
Total per capita energy cost for EMAS office buildings (EUR/person)	**1 168**	**515**	**497**	**449**	**437**	**435**	**467**	**378**
Electricity (Eur/person)	845	395	365	341	343	342	395	327
Gas (Eur/person)	307	113	129	107	95	93	71	51
Fuel (Eur/person)	16	7	3	1	0	0	0	0

Notes:

a. Unit costs: Assume 2005 same as 2006, 2008 still under review

b. Including, in 2016 Executive Agencies in Commission managed buildings

c. Assuming non EMAS area have similar costs for energy as EMAS area

Energy is by far the largest single resource cost. As in most of the other indicators, the pandemic situation also affected these results in 2020, showing a sharp reduction of the energy costs per person (-19.2% compared with 2019). Energy costs decreased significantlysince2014, baseline year for the previous EMAS objectives (by 20% in total costs and by over 26% in costs per person)

[21] International Register of Certified Auditors

A13 Conversion factors

Table A15: Conversion factors used in producing data for the Brussels site[22]

Parameter and units	2005 - 10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
kWh from on litre diesel (1), (8)			11,1	11,1	11,1	11,1	11,1	11,1	11,1	10,6	10,6
KWh from one litre petrol (1)			9,4	9,4	9,4	9,4	9,4	9,4	9,4	9,4	9,5
Paper Density (g/m^2)	80	80	80	78	75	75	75	75	75	75	75
Kg CO_2e from 1 KWh of electricity (3)	0,275	0,275	0,275	0,275	0,275	0,275	0,275	0,275	0,275	0,275	0,275
Kg CO_2e from 1 KWh natural gas PCI (5)	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,205	0,205
Kg CO_2e from 1 KWh domestic fioul (5)		0,270	0,270	0,270	0,270	0,270	0,270	0,270	0,270	0,266	0,266
GWP of R22 (2)	1 810	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760
GWP of R410A (2)				1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920
GWP of R134A (2)				1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
GWP of R404A (2)				3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940
GWP of R407C (2)				1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620
Kgs CO_2e from one litre diesel (6)				2,50	2,50	2,50	2,50	2,50	2,50	2,50	2,50
Kgs CO_2e from one litre petrol (6)				2,28	2,28	2,28	2,28	2,28	2,28	2,28	2,28
Annual cost of one FTE (4)			132 000	132 000	132 000	134 000	134 000	138 000	148 000	150 000	152 000
Number of working days in the year (7)				211	211	211	211	211	211	211	212

Notes:

(1) Beginner's Guide to Energy and Power, Neil Packer 2011 available at http://studylib.net/download/18346856

(2) IPCC 5th Assessment Report (2014, from p 731 on) https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf

(3) IGBE, 2013

(4) Figure from DG BUDG Finance unit network (RUF) for AD staff and in place at the beginning of reportingyear

(5) Base carbone, ADEME, 2017 Europe average, (combustion only, excluding upstream emissions)

(6) Base carbone, ADEME, 2017 value for vehicle fleet, France (combustion only, excluding upstream emissions)

(7) Used for estimating emissions from commuting, source DG HR A.3

(8) Harmonized factor for Europe based on Carbontrust study (updated), conversion factors 2016 www.carbontrust.com

The full set of factors used (included for fixed assets, buildings and IT) is provided in Appendix 2 of the Corporate summary of the Environmental Statement.

22 Source: IPCC 5th Assessment Report (2014, please see from p 731 on) https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf and summarised in Base Carbone, ADEME, 2017

A14 Site breakdown: characteristics of buildings and performance of selected parameters (indicative data)

Building	Address	Occupant	EMAS registration	Useful surface area (PEB in m²)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	Electricity	Mains gas	Water (m³)	Non hazardous waste (tonnes)	Comment
1) Building essential details 2020:						**2) Building use 2020**									**3) Energy sources and amount (MWh for 2016)**		**4) Water and waste consumption**		
BRUSSELS																			
B232	Rue Breydel 4	SANTE	BXL 2009/016	11 584	509	X									969 604	695 597	2285.2	17.16	
B-28	Rue Belliard 28	DIGIT, RTD	BXL 2007/009	14 987	874	X	X								1 739 868	422 219	2002.9	39.09	
BERL	Rue de la Loi 200	Collège, SG, SJ, COMM, OIB, EPSC, HR	BXL 2005/001	151 410	2 327	X	X	X							19 479 507	11 781 228	27862.8	180.17	
BRE2	Avenue d'Auderghem 19	HR, BUDG	BXL 2005/002	18 747	634	X	X				X				1 403 381	913 763	4840.4	31.87	
BREY	Avenue d'Auderghem 45	BUDG, DEFIS, GROW, HR	BXL 2009/015	35 198	899	X	X	X							3 012 200	2 421 897	17576.5	89.91	Includes HT and LT
BU-1	Avenue Beaulieu 1-3	REGIO	BXL 2008/013	13 911	441	X					X				1 064 162	1 186 915	3627.4	121.77	Includes figures for waste for buildings BU-5 and BU-9.
BU24	Avenue de Beaulieu 24	CLIMA, EEAS	BXL 2012/043	6 425	115	X									313 440	336 702	834.7	26.73	
BU25	Avenue de Beaulieu 25	CNECT	BXL 2012/044	18 130	578	X									1 282 727	883 135	1685.7	61.88	
BU29	Avenue de Beaulieu 29	REGIO	BXL 2011/033	6 131	239	X	X								515 503	242 299	933.4	41.93	
BU31	Avenue de Beaulieu 31	CLIMA	BXL 2011/034	6 185	215	X									381 559	315 456	1376.9	0.00	Includes figures for waste for BU33.
BU33	Avenue de Beaulieu 33	CNECT	BXL 2011/035	6 843	200	X									668 793	278 260	915.0	0.00	

Building	Address	Occupant	EMAS registration	Useful surface area (PEB in m^2)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	Electricity	Mains gas	Water (m^3)	Non hazardous waste (tonnes)	Comment
1) Building essential details 2020:						2) Building use 2020									3) Energy sources and amount (MWh for 2016)		4) Water and waste consumption		
BU-5	Avenue de Beaulieu 5-7	ENV, REGIO	BXL 2005/003	11 843	284	X	X	X							1 132 410	1 016 045	2710.1	0.00	Figures for waste included in BU-1.
BU-9	Avenue de Beaulieu 9-11	ENV, OIB	BXL 2005/004	13 040	453	X					X				958 088	1 233 835	3548.9	0.00	Figures for waste included in BU-1.
C-25	Avenue de Cortenbergh 25	EPSO, DIGIT		8 574	149	X									640 693.76	586 920	1069.6	9.42	
CCAB	Rue Froissart 36	SCIC	BXL 2013/049	18 634	539	X	X	X							2 538 382	1 957 741	4105.8	38.23	
CDMA	Rue du Champ de Mars 21	RTD, JRC	BXL 2009/017	19 096	674	X	X								1 518 092	1 931 740	1903.2	70.89	
CHAR	Rue de la Loi 170	ECFIN, COMM, TRADE, IAS, REFORM	BXL 2013/050	55 342	1 478	X	X	X							4 768 316	3 108 745	13201.2	85.81	
COVE-COV2	Placer Rogier 16	DIGIT, RTD + Agencies	BXL 2014/055	71 430	1 939	X	X	X							5 819 588	5 355 284	31931.1	87.73	
CSM1	Rue Père de Deken 23	OIB	BXL 2011/026	12 276	648	X	X								715 659	719 662	1698.0	28.43	
DM24	Rue Demot 24	MOVE, ENER, EAS, SANTE, EPSO	BXL 2014/055	15 827	572	X	X								1 154 636	963 217	2851.5	34.66	
DM28	Rue Demot 28	MOVE	BXL 2013/051	11 277	436	X									752 104	883 354	2538.0	25.18	
F101	Rue Froissart 101	SANTE, JUST	BXL 2010/031	8 351	249	X	X								533 383	576 010	1711.2	23.47	
G--1	Avenue de Genève 1	DGT, OIB, AGRI, DIGIT	BXL 2011/037	12 580	287	X			X						928 664	393 545	1821,1	50,91	

Building	Address	Occupant	EMAS registration	Useful surface area (PEB in m^2)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	Electricity	Mains gas	Water (m^3)	Non hazardous waste (tonnes)	Comment
1) Building essential details 2020:						**2) Building use 2020**									**3) Energy sources and amount (MWh for 2016)**		**4) Water and waste consumption**		
G-12	Avenue de Genève 12	DGT	BXL 2011/038	16 946	582	X	X								1 002 858	1 333 883	2902.1	46.11	
G--6	Avenue de Genève 6	DGT	BXL 2011/039	17 240	477	X	X	X							1 016 894	1 019 450	2544.5	54.03	
J-27	Rue Joseph II 27	EMPL	BXL 2009/019	13 265	441	X	X								975 465	583 985	1470.0	37.78	
J-30	Rue Joseph II 30	OLAF	BXL 2009/020	18 157	551	X	X								2 605 866	1 185 827	2948.1	36.54	
J-54	Rue Joseph II 54	DIGIT, DEVCO, EMPL, NEAR, INTPA	BXL 2007/012	19 739	634	X	X								1 230 838	980 354	3719.4	33.00	
J-59	Rue Joseph II 59	DEVCO	BXL 2010/030	9 396	286	X									638 762	387 639	2237.8	22.42	
J-70	Rue Joseph II 70	EAC, OSP	BXL 2010/029	20 082	671	X	X								1 208 909	1 555 344	2260.2	40.08	Electricty in J-70 is exclusively LT.
J-79	Rue Joseph II 79	CDP-OSP, MARE, TAXUD	BXL 2009/021	16 134	498	X	X								1 245 128	785 844	1982.7	27.36	
J-99	Rue Joseph II 99	MARE	BXL 2014/056	8 281	323	X									489 449	292 766	2054.1	25.18	
L102	Rue de la Loi 102	AGRI, SCIC	BXL 2013/052	4 935	155	X									232 452	219 115	546.9	59.94	Waste figures included in L-86
L130	rue de la Loi, 130	AGRI	BXL 2014/057	37 043	1 124	X	X	X							2 862 895	2 918 051	7436.8	22.28	Includes HT and LT
L-15	Rue de la Loi 15	NEAR	BXL 2013/053	17 482	520	X	X								1 190 674	742 418	1740.3	45.63	
L-41	Rue de la Loi 41	DEVCO, INTPA	BXL 2009/022	27 864	922	X	X	X							1 834 159	1 474 417	3154.0	59.57	
L-56	Rue de la Loi 56	COMM ,Galileo	BXL 2012/046	9 666	375	X									737 134	466 233	1277,9	11,67	

Building	Address	Occupant	EMAS registration	Useful surface area (PEB in m²)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	Electricity	Mains gas	Water (m³)	Non hazardous waste (tonnes)	Comment
1) Building essential details 2020:						**2) Building use 2020**									**3) Energy sources and amount (MWh for 2016)**		**4) Water and waste consumption**		
L-86/L-84	Rue de la Loi 86	ECHO	BXL 2011/032	13 355	459	X	X								1 257 009	1 241 276	3138.0	64.98	Includes L102 waste figures
LX40	Rue de Luxembourg 40	TAXUD, JUST	BXL 2013/054	7 803	257	X									482 125	359 238	817.9	18.44	
LX46	Rue de Luxembourg 46	HOME, JUST	BXL 2010/023	17 478	555	X									1 313 812	1 642 781	3628.2	31.54	Includes consumption MO59
MADO	Place Madou, 1	DIGIT, IAS, COMP,AGRI	BXL 2014/058	40 716	1 192	X	X	X							3 327 669	3 020 148	11339.1	80.67	
MERO	Av. Tervuren, 41	PMO	2020	13 145	495	X	X								626 817	717 708	1397.5	30.40	
MO15	Rue Montoyer 15	DIGIT	2020	11 543	539	X	X								707 996	102 346	1253.5	17.72	
MO34	Rue Montoyer 34	DIGIT, HR	BXL 2005/007	12 820	381	X		X							1 314 158	743 691	2897.0	32.18	Includes waste figures ofr SC11.
MO59	Rue Montoyer 59	JUST	BXL 2010/024	8 671	272	X	X										SEE LX46	23.18	Consumption included in LX46.
N105	Avenue des Nerviens 105	GROW	BXL 2010/025	9 546	342	X									714 242	907 669	4147.6	17.58	
ORBN	square Frère Orban, 8	RTD	BXL 2014/059	25 141	788	X	X	X							1 315 087	1 060 518	1654.1	39.03	
PLB3	Philippe Le Bon 3	EMPL, HR et Formation	BXL 2015/060	16 584	236	X	X	X							1 252 780	735 726	4065.5	35.52	

Building	Address	Occupant	EMAS registration	Useful surface area (PEB in m²)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	Electricity	Mains gas	Water (m³)	Non hazardous waste (tonnes)	Comment
1) Building essential details 2020:						**2) Building use 2020**									**3) Energy sources and amount (MWh for 2016)**		**4) Water and waste consumption**		
SC11	Rue de la Science 11	HR	BXL 2005/008	9 002	226	X	X								613 836	564 688	1975.5	20.58	Figures for waste included in MO34.
SPA2	Rue de SPA 2	FISMA	BXL 2012/047	19 567	594	X	X								1 113 297	901 083	6179.5	58.84	
SPA3	Rue de Spa 3	TAXUD, EMPL	BXL 2012/048	12 288	494	X									678 842	612 444	2638.9	25.51	
VM18	Rue Van Maerlant 18	EAC, SCIC, OP	BXL 2010/028	9 330	144	X	X		X						925 018	800 276	1844.0	39.15	Figures for waste include figures for VM-2.
CLOV (2)	Boulevard Clovis 75	OIB	BXL 2007/010	6 274	20		X	X	X		X				417 075	498 488	4957.9	57.20	
DAV1 (2)	Avenue de Bourget 1-3	OIB	BXL 2007/011	12 600	122		X			X					1 060 865	908 073	913.1	56.71	
WILS (2)	Rue Wilson 16,	OIB	BXL 2007/010	2 544	4				X								See Clov	12.56	Electricity and gas for WILSON are included in CLOVIS figures (one single EAN)
VM-2 (2)	Rue Van Maerlant 2	Cercles de Loisirs, le Foyer, Brasserie	BXL 2010/027	15 960			X	X							958 046	1 021 247	2576.6	0.00	Waste figures included in VM18.

Building	Address	Occupant	EMAS registration	Useful surface area (PEB in m²)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	Electricity	Mains gas	Water (m³)	Non hazardous waste (tonnes)	Comment
1) Building essential details 2020:						**2) Building use 2020**									**3) Energy sources and amount (MWh for 2016)**		**4) Water and waste consumption**		
COLE (2)	Rue du Cornet 41-45 Rue G.Leman 60	OIB	BXL 2011/026	8 850	74		X		X		X				525 747	994 844	2714.6	56.06	
KORT	Industriepark Gullendelle, Vinkstraat 3 3070 KORTENBERG	OIB.Archives Historiques	VL 2015/002	1 070	10							X			756 371.5	546 265	180.6	33.72	
WALI	Boulevard Clovis 53	OIB	BXL 2015/061	5 679	145		X	X	X		X				269043	413 584	1729.5	22.90	
OVER	Dennenboslaan, 54-3090 OVERIJSE	OIB	2015	2 600	7									X	122 441.25	186 002	1788.8	18.12	
BRUSSELS TOTALS				**1 066 617**	**29 655**										**89 314 520**	**70 126 989**	**231 143**	**2 379**	

European Commission

Environmental Statement 2021

2020 results

Annex B: Luxembourg

EMAS
Verified environmental management
REG.NO. BE-BXL-000003

Prepared by the EMAS Site Coordination Team for Luxembourg:
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Cover illustration: OIL Communication

Environmental Statement 2021

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Annex B: Luxembourg

For further information on environmental performance in Luxembourg please contact:
Functional mailbox: OIL-EMAS@ec.europa.eu
Or see EMAS page on https://myintracomm.ec.europa.eu/staff/EN/buildings-transports/environment/Pages/index.aspx

Foreword

The Office for Infrastructure and Logistics in Luxembourg (OIL) ensures that all activities associated with the housing of staff, the management of social welfare infrastructure and the logistics of the Commission in Luxembourg are carried out to the best standards. This includes for example building management, transport services for staff and goods, office supplies administration, catering and after-school childminding services.

OIL strives to reduce the overall environmental impact of all aspects of its activities in accordance with corporate policy. This environmental statement summarises the environmental performance of the Commission for Luxembourg and the measures taken to mitigate the impact of our activities in 2020.

With the COVID-19 pandemic, 2020 was an unprecedented year, with the majority of staff teleworking as from March 2020. This led to a decrease in waste generation and transport as well as paper and water consumption. However, energy does not show a significant reduction in consumption, due to health-related measures such as increased ventilation with 100% fresh air.

Early 2020, the Ecobox system was introduced in the canteens to reduce single-use packaging and food waste. Public transport in Luxembourg became free of charge in March 2020; since then, OIL has established a new scheme to subsidise cross-border public transport. Actions were also put in place in the field of waste sorting: new bins for ink-based office supplies were put at staff's disposal and a pilot project for new sorting islands started in the Ariane and Drosbach buildings.

In December 2020, OIL published the EMAS environmental building profiles on its website, showing how each building performs in terms of energy, water and waste management.

For the first time, the Commission in Luxembourg reports on the impact of commuting. The Corporate Summary of the Commission's Environmental Statement 2021 also includes a general estimate of the impact of teleworking. The potential to systematically include the impact of teleworking in the annual report will be explored as more site-specific information becomes available.

After the forthcoming adoption of the Communication on Greening the Commission, OIL will most certainly have an important role to play in putting in place the actions to implement the Green Deal and stands ready to meet the challenge.

Signed
Thomas KIRCHNER
Director (acting)
Office for Infrastructures and logistics Luxembourg (OIL)

Contents

ANNEX B: Luxembourg – Administrative activities

Luxembourg is the European Commission's second largest site and in 2020 hosted 5 240 staff, an increase of 2% over 2019. 12 Commission's Directorates Generals (DG) are present with more than 50 staff members. In total, 20 DG are represents and hosted in 18 buildings[1]. The vast majority of buildings are located in Luxembourg City.

The activities are mainly of administrative nature, with some support and logistics services (like catering, offices supplies, childcare facilities, etc.). Luxembourg also hosts the main data centres of the Commission and a radiation protection laboratory.

The Office for Infrastructure and Logistics in Luxembourg (OIL) manages the Commission's buildings and logistics in Luxembourg and coordinates implementation of the Commission's Eco Management and Audit System (EMAS) for the site.

1 Including Publications Office.

B1 Overview of core indicators at Luxembourg since 2011

Table B1: Historical data, performance and targets of core indicators used in Commission level reporting

Physical indicators:	**Historic data values, all buildings since 2015**					**Performance trend (%)**		**Target**		**Future targets**	
(Number, desciption and unit)	2011 (1) EMAS	2014 EMAS	2018 Total	2019 Total	2020 Total	2011	2014	2014 to 2020		2014-23	2014-30
								Δ % (2)	value (2)	Δ % (3)	Δ % (3)
1a) Energy bldgs (MWh/p)	8.35	17.42	11.75	11.50	10.91	**30.7**	**-37.4**	-5.0	16.55	-30.0	-55.0
1a) Energy bldgs (KWh/m²)	229	393	326	325	315	**37.7**	**-19.9**	-5.0	373	-15.0	-45.0
1c) Non ren. energy use (bldgs) %		27.8	50.6	50.6	50.8		**82.4**	0.0	27.8	-8.0	-60.0
1d) Water (m³/p)	12.26	14.48	13.63	12.42	7.86	**-35.9**	**-45.7**	0.0	14.48	25.0	0.0
1d) Water (L/m²)	352	327	378	351	227	**-35.6**	**-30.5**	0.0	327	60.0	20.0
1e) Office paper (Tonnes/p)	0.034	0.024	0.011	0.009	0.004	**-89.5**	**-85.1**	-40.0	0.014	-50.0	-55.0
1e) Office paper (Sheets/p/day)	32	24	11	10	4	**-88.9**	**-85.2**	-40.0	14.4	-50.0	-55.0
2a) CO_2 buildings (Tonnes/p)	0.18	1.73	1.35	1.36	1.27		**-26.5**	-5.0	1.6	-15.0	-75.0
2a) CO_2 buildings (kg/m²)	5	39	37	38	37		-6.0	-5.0	37.1	0.0	-70.0
2c) CO_2 vehicles (g/km, manu.)	191	171	145	142	126	**-34.0**	**-26.3**	-15.0	145	-20.0	-30.0
2c) CO_2 vehicles (g/km, actual)	240	260	251	247	275	**14.6**	**5.6**	-5.0	247		
3a) Non haz. waste (Tonnes/p)	0.245	0.103	0.136	0.131	0.099	**-59.5**	-3.1	0.0	0.103	-35.0	-40.0
3b) Hazardous waste (Tonnes/p)(4)	0.0017	0.0015	0.0046	0.0348	0.0194	1 011.7	1 230.1				
3c) Unseparated waste (%)	61.8	55.3	43.0	35.8	43.8	**-29.1**	**-20.8**	-45.0	30.4	-30.0	-40.0
3c) Unseparated waste (T/p)	0.0	0.0	0.1	0.1	0.1					-50.0	-65.0
Economic indicators (Eur/p)											
Energy consumption (bldgs)		765	336	436	411		-46.3				
Water consumption		61.54	57.93	52.79	33.41		-45.7				
Non haz. waste disposal		35.07	52.86	49.84	36.93		5.3				

Note: (1) Earliest reported data
(2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018)
(3) Draft figures from the Global Anual Action Plan 2021
(4) 2014-20 indicator discontinued

Table B1a: Historic data values for EMAS buildings only

	2011 EMAS	2014 EMAS	2015 EMAS	2016 EMAS	2017 EMAS	2018 EMAS	2019 EMAS	2020 EMAS
1a) Energy bldgs (MWh/p)	8.35	17.42	14.40	11.77	11.32	11.50	11.58	11.43
1a) Energy bldgs (KWh/m^2)	229	393	342	328	315	330	329	328
1c) Non ren. energy use (bldgs) %	0.00	27.83	64.6	53.2	54.8	50.5	49.6	50.6
1d) Water (m^3/p)	12.26	14.48	11.32	13.71	13.48	12.60	11.79	8.34
1d) Water (L/m^2)	352	327	269	382	375	362	335	239
2a) CO_2 buildings (Tonnes/p)	0.18	1.73	0.90	1.22	1.20	1.19	1.20	1.19
2a) CO_2 buildings (kg/m^2)	5	39	21	34	33	34	34	34
3a) Non haz. waste (Tonnes/p)	0.25	0.10	0.20	0.10	0.12	0.12	0.13	0.09
3b) Hazardous waste (Tonnes/p)	0.002	0.001	0.001	0.002	0.003	0.004	0.038	0.021
3c) Separated waste (%)	61.8	55.3	26.2	47.0	49.8	44.9	34.8	41.1

Until 2014, indicators were reported only for buildings included in the EMAS registration. Since 2015, indicators include all Commission buildings in Luxembourg[2]. Figures prior to 2015 are therefore not really comparable with the ones of the 2015 – 2020 period.

The evolution of indicators for all buildings since 2011 is shown in table B1, for EMAS registered buildings in table B1a.

Reporting for 2020 retains the same approach for continuity, as previous years, and is therefore based on site activity and total staff numbers.

The data will therefore reflect the impact of a very significant staff absence on facilities operation.

The EMAS corporate coordination team has made 'high level' estimates of home consumption, due to telework under COVID, as described separately in the Corporate summary.

The potential to systematically include the impact of teleworking in annual reporting will be explored as more site specific information becomes available.

In 2020, most of the indicators exhibited a downwards trend, which must be analysed in the light of the COVID-19 pandemic, with most staff having teleworked since March 2020. Paper and water consumption as well as transport showed an important reduction. The printshop showed a sharp reduction in paper comsuption due to its closure for several months in 2020 and the decision of the Publications Office to reduce in house production of printed material.

Energy consumption did not significantly reduce despite teleworking because of increased ventilation in the buildings made necessary for health reasons.

In 2020, the Fischer building entered the EMAS scope. The building hosts the Commission's training and learning centres in Luxembourg.

The evolution of the key parameters of the EMAS system in Luxembourg is shown below.

Table B2: EMAS baseline parameters

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population: staff in EMAS perimeter	759	1 315	1 422	1 492	2 378	3 912	4 059	4 277	4 355	4 494
Population: total staff	3 999	3 997	4 048	4 043	4 667	4 653	4 786	5 016	5 138	5 240
No. buildings for EMAS registration	2	3	4	6	7	10	11	14	14	15
Total no. operational buildings	13	14	14	14	17	19	19	18	18	18
Useful surface area in EMAS perimeter (m^2)	27 710	53 808	64 703	66 161	100 221	140 479	145 697	148 847	153 172	156 681
Useful surface area for all buildings (m^2)	187 912	198 807	198 807	198 807	223 997	241 023	241 023	180 923	181 623	181 606

Almost 85% of the staff is hosted in EMAS registered buildngs.

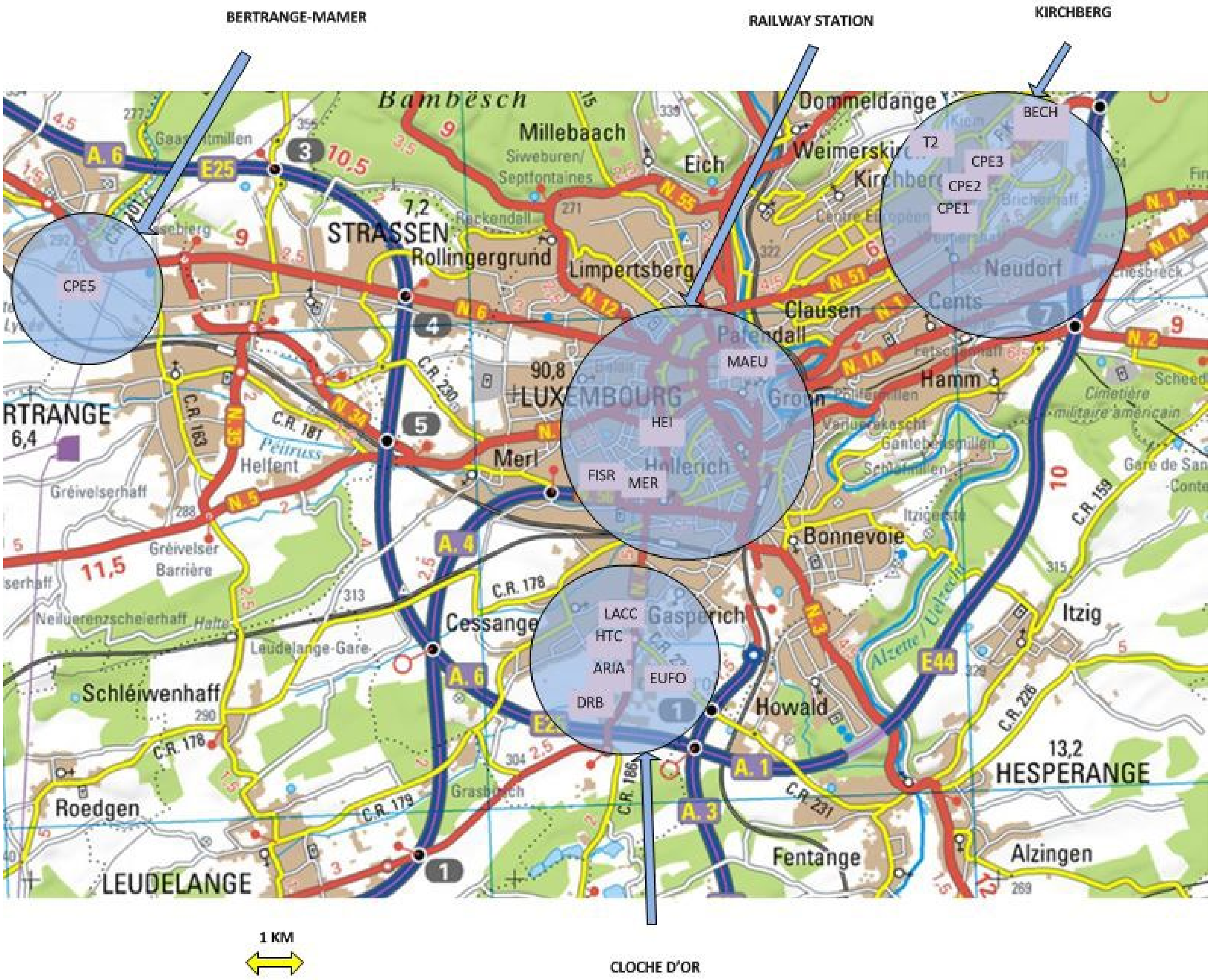
[2] Reporting yearly only for buildings in the EMAS scope can make it difficult to analyse performance trends as the building(s) added in a given year can be very different from those already within the scope (for example data centres). In 2014, the year used to establish baseline for 2020 targets, reporting did however include data centres, which explains the large rise in energy consumption compared to 2011.

B2 Description of Luxembourg activities and key stakeholders:

Most of the Commission's activities in Luxembourg are administrative and are supported by canteens, restaurants, cafeterias, archives, a vehicle fleet, medical services, a day nursery and study centre. The Publications Office manages its own printshops and DG ENER a radiation protection laboratory.

Luxembourg hosts most of the Commission data and telecom centres, in Windhof, Hitec and Betzdorf. Figure B1 shows the location of Commission buildings in Luxembourg.

Figure B1: Location of EMAS and other buildings in Luxembourg



Most buildings are located in the Kirchberg area, in the centre of the City of Luxembourg or to the South of the city at Cloche d'Or. However, CPE 5 is 15 km West of Luxembourg in Bertrange-Mamer (close to the European school II) while Windhof is close to the Belgian border. The Hitec (HTC) data centre is located in the Cloche d'Or area and is situated in the basement of the Hitec office building. Betzdorf data centre is located North-East of Luxembourg City.

Commission services in the Cloche d'Or and Kirchberg area serve typical administrative functions. The Euroforum (EUFO) building also accommodates a radiation protection laboratory (DG ENER). CPEs cater entirely to children of staff with inter-institutional crèches, after school and study centres. The newly renovated Fischer building in central station area hosts the Commission's training and learning centres in Luxembourg.

Other than the Foyer Européen, which is owned by the European Union, and the EUFO, CPE3 and CPE5 buildings, for which the Commission has long-term leases with purchase options, all Commission buildings are leased. The buildings and the year when they were or are scheduled to be EMAS registered are listed in the table B3 below.

Table B3: Commission buildings in Luxembourg

EMAS Surface
Non-EMAS Surface

Number	Building	EMAS year	Surface occupied for activities (m²)	% of EMAS surface of total surface	Staff **	Year of construction	Year of acquisition or leasing	Occupation type
1	DRB	2012	27 124	14.94	1 002	2003	B: 2006; A: 2009; D: 2010	Rental
2	HITEC (office)	2012	4 194	2.31	102	1996	2005	Rental
3	EUFO	2013	26 098	14.37	576	1995 and 2003	1995, 2003	Emphyteosis with purchase option
4	CPE 5	2014	10 895	6.00	70	2011	2011	Emphyteosis with purchase option
5	HITEC (data centre)*	2015	252	0.14	0	2005-2007	2006	Rental
6	WINDHOF (data centre)*	2015	1 206	0.66	7	2005-2007	2007, 2009	Rental
7	BECH	2016	34 060	18.75	881	1996 and 1999 F4	1998, 2005	Rental
8	ARIANE	2017	13 624	7.50	558	1999	2015	Rental
9	LACCOLITH	2017	11 292	6.22	422	1999	2015	Rental
10	T2	2017	15 342	8.45	485	2016	2016	Rental
11	CPE 3	2018	5 218	2.87	60	1996	1996, 2009	Rental with purchase option
12	FOYER (HEI)	2019	1 192	0.66	5	1920	2009	Owner
13	WINDHOF - Telecom Centre*	2019	274	0.15	0	2005-2007	2015	Rental
14	BETZDORF (data centre)*	2019	2 384	1.31	0	2010-2012	2016	Rental
15	FISCHER	2021	3 526	1.94	1	2004	2005	Rental
16	CPE 1 & 2	Will be replaced	4 370	2.41	48	avant 1984	1984	Rental
17	MERCIER	Will be replaced	19 626	10.81	686	1970, 1984	I: 1973, 1998; II: 1985	Rental
18	Maison de l'Europe - MAEU	Will be replaced	929	0.51	12	avant 1974	2005	Rental
TOTAL			**181 606**	**100.00**	**4.915**			
EMAS TOTAL			**156 681**	**86.28%**	**4.168**			

In red = figures updated compared to 2019

* Most of the surfaces are above ground. Underground parkings are excluded. For data and telecom centres and for DRB storages, underground surface is also considered

** Population on 30/03/2021 based on COMREF database

The main real estate project for the Commission in Luxembourg is the construction of a new seat, the JMO2, in the Kirchberg area. The initial delivery of this building is scheduled in two phases, end February 2023 and end February 2024.

JMO2 will replace most of the rented office buildings: DRB, HTC, BECH, ARIANE, LACC and T2.

The Mercier building currently hosting the Publications office will be replaced within 3-4 years as it will be demolished in the medium-term. The CPE 1 and CPEs buildings dating from the 1980s, are coming to their life end. The "House of Europe", currently hosted at MAEU should be relocated in the coming years. For these reasons, these buildings will not be included in the EMAS scope.

Following the EMAS regulations, OIL has carried out for the site of Luxembourg :

- A context analysis, with internal and external elements influencing the environment
- A stakeholders analysis, with the internal and external entities, bodies, persons with whom the EC, and OIL in particular, has a link

- An inventory of the EC activities and their environmental impact, including a method to define which activities have the most significant aspects.

This analysis helps the EC in Luxembourg to define its objectives and actions concerning environmental issues. It has been carried out and is updated everytime it is necessary, at least once a year. This analysis defines the two main issues: mobility and real estate.

However, it should be noted that the Commission is preparing a new communication and an action plan on greening the Commission, which wil cover buildings and office space as well as behaviours, such as mobility. The EMAS scheme will play a role in its implementation.

Mobility

The Commission makes considerable efforts in negotiations with local stakeholders, both public and private, in order to improve the mobility of its staff (see B4 below). After public transport is free within the country (from March 2020), the Commission had analysed the possibilities to reimburse the costs related to travels across the border and put up a scheme starting from 1st of March 2020.

Real estate

The Luxembourg state's involvement in some Commission real estate projects influences where Commission sites are located. For example, when the Commission decided to leave the JMO, the authorities put the T2 office building and Betzdorf Data centres at its disposal, free of charge, for several years.

The Luxembourg state is also responsible as "Maître d'ouvrage" for the construction of the JMO2 building. The Luxembourg Public Building Administration and the Commission are in constant contact to implement this project ensuring that local legislation (for example concerning the number of parking places), the EU internal rules (manual of accommodation conditions, Manual of "Immeuble Type"...) and environmental considerations are addressed.

The Commission rents space in some buildings (Drosbach, Laccolith, Bech) that have other occupants. This can complicate the management of activities with an environmental impact such as the energy consumption, the waste sorting, the data collection.

An additional expectation for 2019 was to take into account recommendations in the EMAS Sectoral Reference Document for Public Administrations. The document has been analysed, presented and discussed at successive EMAS site coordinator workshops in 2019 and 2020. We consider that existing reporting at site level largely takes into account feasible recommendations.

B3 Environmental impact of Luxembourg activities

OIL reviews the site's environmental aspect analysis annually and updates its action plan as new buildings enter into the EMAS scope. Below is a summary of the main aspects and measures that were undertaken or ongoing in 2020.

Table B4: Summary of significant environmental aspects and mitigating measures in 2020 for the Luxembourg site

Aspect group	Environmental aspects	Environmental impact	Measures and actions
Resource consumption (Energy)	Building heating, lighting, wood chip heating generator, steam generators, data centres	Pollution, climate change, exploitation/ depletion of natural resources	◆ In certain buildings, diminishing the temperature during the closing week of the offices at the end of the year (272)
Resource consumption (water)	Water for sanitation and installations, water consumption	Reduced potable water sources potable impact on aquatic diversity	◆ Negotiations with DRB building owner to install more efficient taps (73)
Resource consumption	Office furniture, equipment and services	Depletion of resources	◆ Promotion campaign to buy more eco-friendly furniture in the catalogue (494) ◆ Reuse unsused office supply items (493) ◆ Green selection/award criteria in procurement procedures
Air	Building heating and cooling, transport for missions and logistics commuting	Air Pollution Risks for biodiversity and climate change- Destruction of the ozone layer	◆ Signature of Veloh convention (404) ◆ Replacement of petrol cars with two electric cars and five hydrid-cars. In total, on 31/12/2020, OIL has 4 electric vehicles, 9 hybrid cars and 2 mild hybrid cars (497). ◆ Two existing (car) parking spots for visitors have been transformed to bicycle parking spots in DRB building (534). ◆ Since public transport is free of charge in Luxembourg country, Jobkaart and M-Pass are no longer relevant measures. However, the Commission subsidises public transport cards for transborders commuters staff since March 2020. ◆ OIL maintains a fleet of service bikes ◆ OIL – in cooperation with DG HR – has organised the VeloMai campaign to promote bike to work. In that scope, free of charge city bikes cards have been distributed
Air	Air emissions from the nuclear laboratories	Radioactivity	DG ENER's radiation protection laboratory ISO 17025 accredited since 2016. No specific measure in 2019
Waste	Generation of various household waste (for example packaging, paper, cardboards, metals)	Odours, greenhouse gases, pollution of the air, water and/or soil Impacts on biodiversity	◆ Since 2016, every new maintenance contractor of OIL takes care of its waste (147) and reports on it (546) + OIL.03 control (149) ◆ Reduction of single use plastic items in the catering by introducing Ecobox system (419) ◆ Continuous information of cleaning contractor on the needs for better waste sorting (148) ◆ Pilot project on recycling stations in ARIA and DRB buildings (487) ◆ Info-session to waste sorting / management for EU staff ◆ Awareness raising activities on waste in CPEs (449) ◆ Donation of dismantled IT equipment (implemented by DIGIT)
Waste (waste Water discharge)	Water discharged nuclear laboratories	Water pollution, risks of eutrophication reduced potable water sources potable-Impact on aquatic biodiversity	No waste water was discharged by DG ENER in 2020.

()= Number of action included in the Commission's EMAS Global Annual Action Plan (GAAP)

In the mid-term, the flagship project for OIL is the construction of the new JMO2 building. The ambition for the future main seat of the Commission in Luxembourg is to obtain the BREEAM Excellent label. OIL team strives to reach this objective.

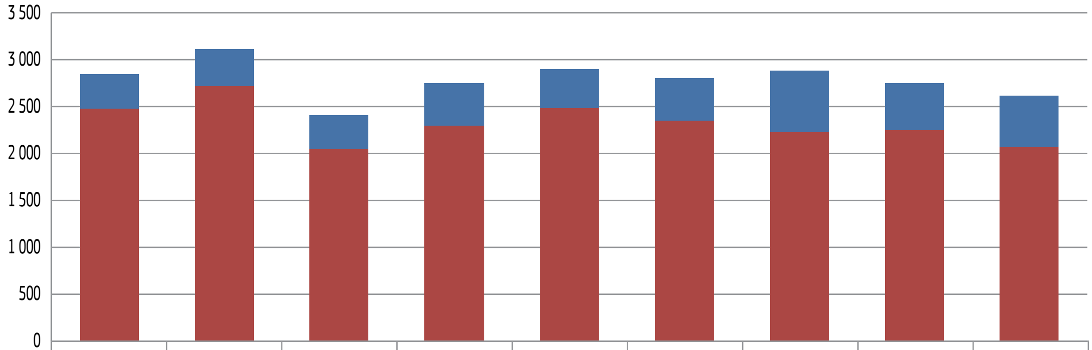
Other real estate projects like the relocation of the Publications Office (to replace the Mercier) or the construction of a new Child Care facility (to accommodate children in the garderie and in study center) also intend to have buildings with a higher environmental performance than the current ones.

B4 More efficient use of natural resources

B4.1 Energy consumption

Apart from the pandemic crisis in 2020, also climatic conditions influence buildings energy consumption data and should be taken into account. Winter season in 2020 saw slightly fewer heating degree days as in 2019 and there were slightly more cooling degree days in 2020 as in 2019 (545 compared to 505).

Figure B2: Total annual degree-days in Luxembourg, 2012-2020 (1)



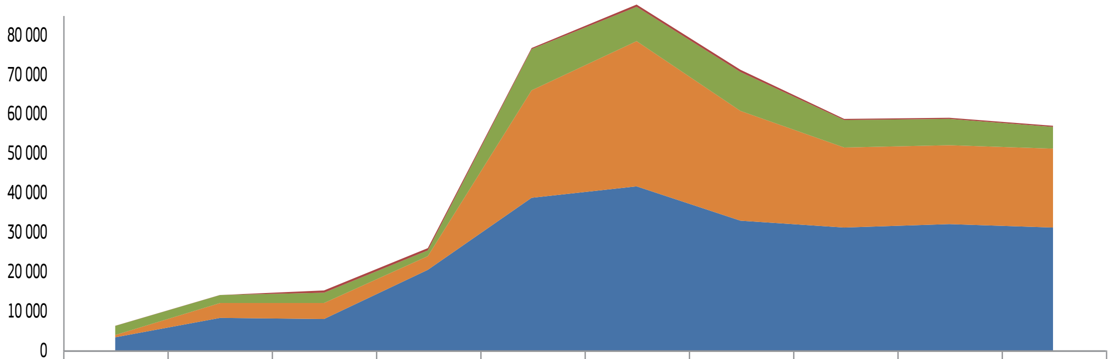
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total degree days	2 841	3 108	2 395	2 745	2 891	2 799	2 877	2 749	2 614
Cooling degree days	365	390	357	457	410	454	655	505	545
Heating degree days	2 476	2 718	2 038	2 288	2 481	2 345	2 222	2 244	2 069
kWh/person/degree day (2)	3.78	3.45	7.27	6.45	6.53	5.32	4.08	4.18	4.17

B4.1.1 Buildings

The evolution of total annual energy consumption is presented in Figure B3. Up to 2015, it was influenced by the number of buildings incorporated in the EMAS perimeter. The peak in 2016 is mainly due to the rental of three new office buildings to replace the JMO end of 2015 and a new data centre in 2016.

Energy consumption in 2020 decreased marginally due to the pandemic situation and high proportion of home working. The decrease was not more important due to the uncertainty of the situation, which meant that the buil-digns were never really closed and consumed energy. In addition, the impact of 100% fresh air ventilation due to health reasons increased further the energy consumption even while the staff worked from home.

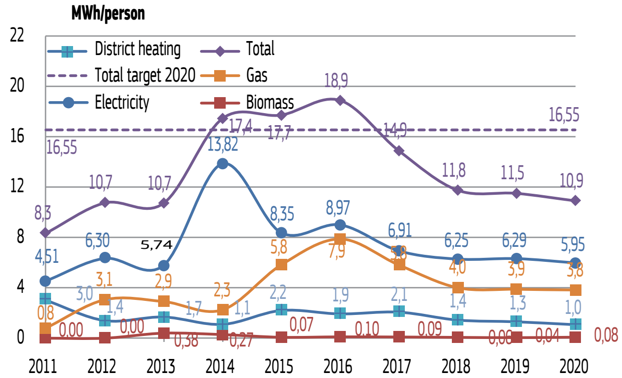
Figure B3: Annual buildings energy consumption (MWh) (EMAS registered buildings to 2014, all buildings from 2015 (indicator 1a)



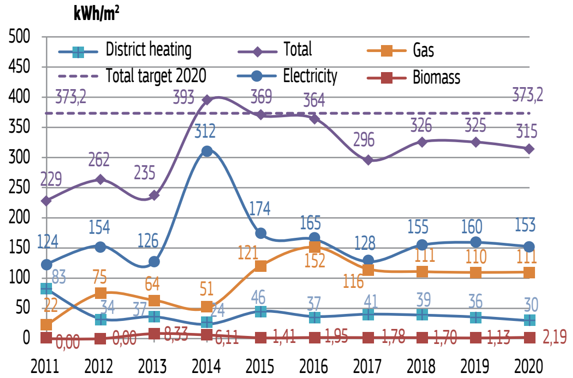
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019
Total energy buildings	6 335	14 124	15 230	25 988	76 681	87 795	71 229	58 941	59 087	57 160
vii) renewables - biomass			539	404	317	469	429	308	206	398
v) district heating	2 292	1 815	2 375	1 603	10 244	8 929	9 867	7 140	6 589	5 495
ii) mains supplied gas	618	4 020	4 149	3 361	27 161	36 670	27 875	20 150	19 996	20 100
i) total supplied electricity	3 425	8 289	8 167	20 620	38 958	41 727	33 058	31 343	32 296	31 167

Figures B4 and B5: Evolution of total annual energy consumption (per capita and per square metre)

B4



B5



Diesel consumption is not included as it is negligible.

Per capita and per m² consumption have decreased slightly and remain below the 2020 targets.

For data centres, the figures of electricity consumption include only electricity used by the Commission's IT equipment installed in specific rooms. The energy used to cool the relevant rooms/space is not included as the owners of the data centres do not communicate such data. The large peak in 2014 in both graphs is due to the inclusion of data centres in the scope.

Actions prioritising the reduction of energy consumption (indicator 1a) are included in the annual action plan (see table B4). The majority of actions in this field focus on technical improvements for heating and cooling systems where possible, for example the modernisation of Mercier chiller unit or studying the optimization of the cold production in EUFO building.

B4.1.2 Vehicles

At the end of 2020, the Luxembourg site had a fleet of 32 vehicles (including DG ENER vehicles). Two Publications Office vehicles were included in the fleet in 2018.

The vehicles are used to transport people and goods within Luxembourg City, for longer missions mainly between to Brussels or Strasbourg, but also throughout EU countries. OIL made 31 missions in 2020 for DG ENER transporting equipment to nuclear premises across Europe.

The majority of OIL's missions cover longer distances and relatively few kilometres are accumulated in Luxembourg.

Table B5 Summary vehicle energy consumption (indicator 1b)

	2013	2014	2015	2016	2017	2018	2019	2020
Total (MWh/yr)	535	560	592	698	645	703	648	298
MWh/person	0.38	0.38	0.13	0.15	0.13	0.14	0.13	0.06
Diesel used, (m^3)	48.5	50.5	53.3	62.8	58.6	61.3	54.0	24.5
Petrol used, (m^3)	0.7	1.0	1.3	1.5	0.7	3.8	7.9	4.1

In 2020, the per capita consumption of Commission service vehicles decreased considerably (0.06 MWh per person) due to the pandemic situation. The cars travelled 322 876 km which is almost half of the km in 2019 (781 919 km).

After a pilot test in 2018, the Commission has signed a service level agreement with European Parliament in May 2019 to enable Commission staff to use the Parliament's shuttle between Luxembourg and Brussel.The service is also open to colleagues working in Brussels. Staff is satisfied with the service. During the pandemic crisis, the service was stopped and has not restarted yet.

B4.1.3 Renewable and non-renewable energy use in buildings

Table B6: Renewable and non-renewable energy use in the buildings (indicator 1c)

Source of renewable and non renewable energy	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Electricity from renewables (%)	100	100	100	89	97	95	93	90	90	89
Electricity from renewables (MWh)	3 425	8 289	8 167	18 352	37 945	39 698	30 758	28 072	28 979	27 751
Site biomass (% renewable)			100	100	100	100	100	100	100	100
Site biomass (MWh)			539	404	317	469	429	308	206	398
Renewables (MWh)	**3 425**	**8 289**	**8 706**	**18 756**	**38 262**	**40 167**	**31 187**	**29 115**	**29 185**	**28 149**
Renewables (% of total energy)	**54**	**59**	**57**	**72**	**46**	**46**	**44**	**49**	**49**	**49**
Electricity from non-renewables (%)				11	3	5	7	10	10	11
Electricity from non-renewables (MWh)				2 268	1 013	2 029	2 300	3 271	3 317	3 416
Mains supplied gas (% non renewable)	100	100	100	100	100	100	100	100	100	100
Mains supplied gas (MWh)	618	4 020	4 149	3 361	27 161	36 670	27 875	20 150	19 996	20 100
District heating and cooling (% non renewable)	100	100	100	100	100	100	100	90	100	100
District heating and cooling (MWh)	2 292	1 815	2 375	1 603	10 244	8 929	9 867	6 404	6 589	5 495
Non renewables (MWh)		**5 835**	**6 524**	**7 232**	**44 347**	**47 629**	**40 045**	**29 827**	**29 908**	**29 017**
Non renewables (% of total energy)		**41**	**43**	**28**	**54**	**54**	**56**	**51**	**51**	**51**

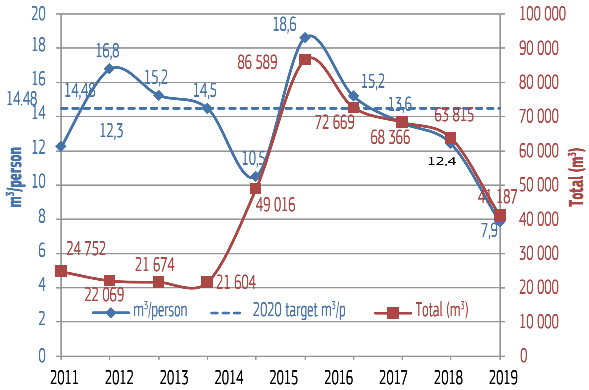
Renewable electricity (indicator 1c) accounted for 89% of total supplied electricity in 2020. The Commission contracted for electricity from 100 % renewable sources since 2013. The electricity supply for all data and telecom centres – directly purchased by the property owners from the energy companies – comes also from 100 % renewable sources. But the electricity provided to the Drosbach building owner for the cooling system is non renewable. The biomass is used in the wood-fuelled boiler at CPE5. The urban heating system in CPE 1&2 also partly works with biomass energy.

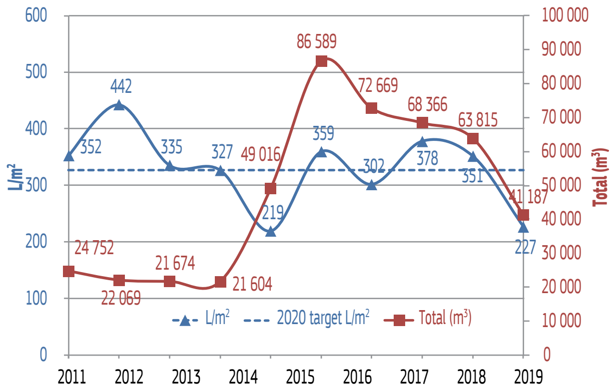
The sudden increase in renewable energies from 2014 to 2015 is a result of including the data centers (with 100% renewable electricity) into the EMAS scope. However, in 2015, OIL started reporting data on all the buildings, which explains the drop in the ratio.

The proportion of renewable energy should increase in future, as district heating and cooling systems will increasingly be supplied by renewable energy sources (it was planned to provide bio-waste energy in Cloche d'Or from 2020 on but the plans were delayed due to pandemic).

B4.2 Water consumption

Figures B6 and B7: Evolution of total annual water consumption for buildings (indicator 1d)





All buildings are considered for the first time in 2015 (only EMAS buildings until then), which explains the increase between 2014 and 2015. In 2015, the staff previously hosted in the JMO building had to move to three new rented buildings with a considerable increase in consumption in 2016.

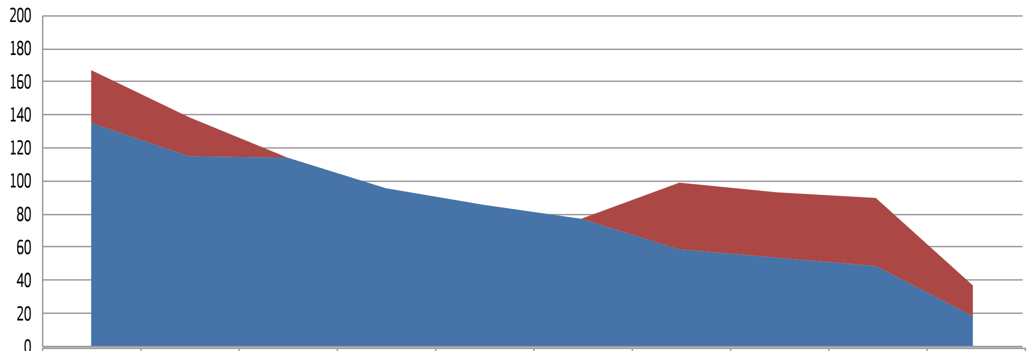
The total water consumption shown by the red line of figures B6 and B7 show a stable decrease until 2020, the data for 2020 shows a more important decrease, marked by the high increase of home working and weak presences of staff in the office buildings.

B4.3 Office and printshop paper

The evolution of office paper in Luxembourg and per capita breakdown is presented below.

Figures B8 and B9: Evolution of paper consumption (totals, and per capita)

B8



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Office (A4 sheet equivalent) x1 000 000	27.1	23.1	22.9	20.5	18.3	16.4	12.4	11.5	10.3	3.9
Total paper consumption (tonnes)	167	138	114	96	86	77	99	93	90	37
Offset paper (tonnes)	32	23					40	39	42	18
Office paper (tonnes)	135	115	114	96	86	77	58	54	48	19

B9

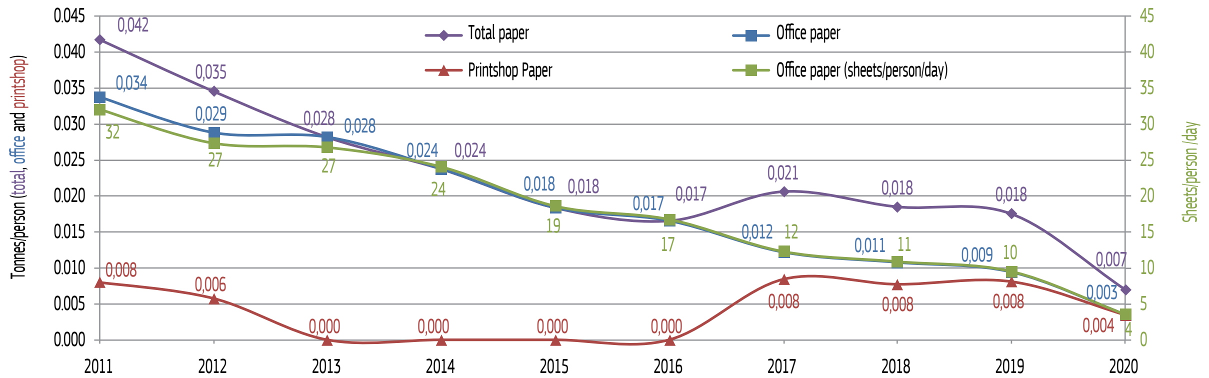


Figure B8 shows how office paper use has reduced over time. The Commission started to report separately on paper used in the printshops of OIL and OP starting from 2017, with corrections made retroactively. Since then, the data was included on general paper. Following a recommendation of the EMAS verifier, the way to calculate has also been updated in 2019, with corrections made back from 2017 on. Previously, quantities were calculated based on paper ordered by the OP. Now they are calculated based on the real number of copies registered on the printers.

In 2020, the office paper consumption was around 4 million equivalent A4 pages for office paper, which is considerably less than in 2019 due to extensive teleworking. The number of pages per person per day shown in figure B9 has decreased from 10 to 3.6. The A4 paper density has been decreased from 80 to 75g/m² since 2014 contributing to the reduction of the global tonnage. OIL is considering the possibility of further reducing the paper density.

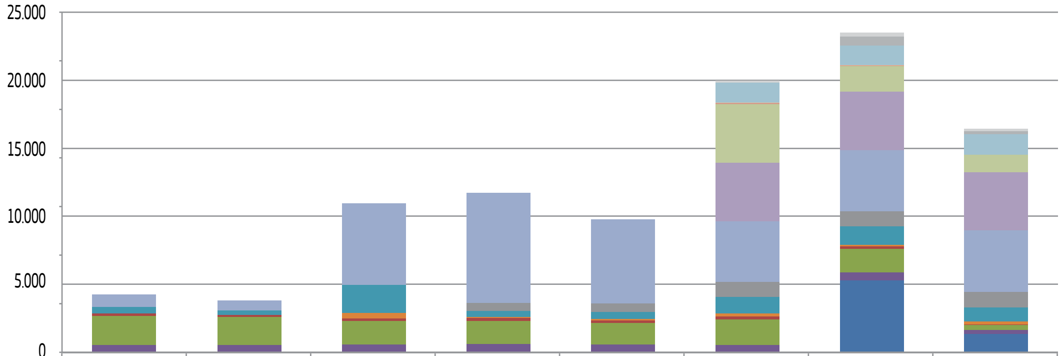
Paper used by the Publications Office print shop is considered for the total paper consumption in tons but not for the number of office sheets.

Since 2019, OP is managing the two printshops in Luxembourg. Their publications are directed to the public, therefore using a paper with a higher density and weight than the normal office paper. The printshop showed a sharp reduction in paper comsumption due to its closure for several months in 2020 and the decision of the Publications Office to reduce in house production of printed material.

B5 Reducing air emissions and carbon footprint

B5.1 Carbon footprint

Figure B10: Carbon footprint contributors for Luxembourg (Tonnes CO_2)



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	4 245	3 822	10 940	11 702	9 755	19 961	23 502	16 433
Own waste	0	0	0	0	0	158	276	195
Catering	0	0	0	0	0	0	642	215
Service contracts	0	0	0	0	0	1 441	1 464	1 464
Paper supply	0	0	0	0	0	54	48	19
Fixed assets - Commission vehicles	0	0	0	0	0	41	39	16
Fixed assets - IT	0	0	0	0	0	4 350	1 868	1 270
Fixed assets - buildings	0	0	0	0	0	4 279	4 298	4 298
Buildings - fuels for heating	914	740	5 981	8 082	6 146	4 442	4 478	4 508
Buildings - electricity	0	0	0	564	639	1 119	1 151	1 164
Buildings - district heating/cooling	477	322	2 059	445	491	1 224	1 335	999
Buildings - coolant losses	0	0	407	85	108	218	89	211
Vehicle fleet - fuel consumption	155	163	172	203	187	204	193	89
Missions (air, RFI 2)	2 149	2 067	1 752	1 691	1 611	1 878	1 749	347
Missions (excluding air)	550	530	570	633	573	554	575	311
Staff commuting	0	0	0	0	0	0	5 296	1 329

Note: RFI 2 used for air travel emissions

As can be seen in figure B10, buildings is the main component of the carbon footprint. Until 2018 the buildings portfolio evolved each year (two Data centres incorporated in 2014, one in 2016, three new office buildings in 2015, JMO abandonned in 2017) and figures were difficult to compare but since then, the situation is more stable.

For CO_2 emissions due to commuting, OIL has made a high-level assumption based on statistics. The calculation will be refined once a detailed mobility study can be carried out. OIL has started collecting data about indirect emissions (scope 3) linked to the construction of the buildings EC occupies, to IT equipment, to service contracts (guards, cleaning…) and to food consumption. The results have been included in the environmental statement from 2019 on (data 2018) and the data collection was refined for 2020 (data 2019).

Indirect emissions linked to buildings count for the biggest part. Buildings older than 30 years are not included in the calculation as their construction is considered to be amortised in terms of carbon footprint.

Table B7: Per capita CO_2 or equivalent (CO_2e) emissions 2013 to 2020 by scope (tonnes)

	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Fuel consumption and fugitive emissions								
Fuel for bldgs: mains gas	0.53	0.41	2.06	1.69	1.24	0.85	0.85	0.83
Fuel for bldgs: tanked gas (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01
Refrigerant leaks	0.00	0.00	0.17	0.02	0.03	0.05	0.02	0.05
Scope 2: Purchased energy								
External electricity supply (grey),	0.00	0.00	0.00	0.13	0.15	0.20	0.19	0.19
External electricity supply contract (renewables), combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (combustion) (2)	0.07	0.05	0.19	0.10	0.10	0.25	0.26	0.19
Scope 3: Other indirect sources								
Fuel for bldgs: mains gas (upstream)	0.12	0.09	0.46	0.37	0.27	0.19	0.18	0.17
Fuel for bldgs: tanked gas (upstream) (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet (upstream)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Site generated renewables (upstream) (3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
External grey electricity supply, line losses	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02
External 'renewables' electricity contract (upstream with line loss)	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05
District heating (upstream) (2)	0.26	0.17	0.68	0.02	0.02	0.04	0.04	0.03
Business travel: air	0.53	0.51	0.38	0.36	0.34	0.37	0.34	0.07
Business travel: rail	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business travel: hire car	0.10	0.10	0.09	0.10	0.09	0.08	0.08	0.05
Business travel: private car	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01
Commuting (combustion) (4)	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.25
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	0.85	0.84	0.82
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	0.87	0.36	0.24
Fixed assests - Commission vehicles	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Paper supply	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Service contracts	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.28
Catering	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.04
Own waste	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.04
Total	**1.7**	**1.4**	**4.1**	**2.9**	**2.3**	**4.2**	**4.8**	**3.4**

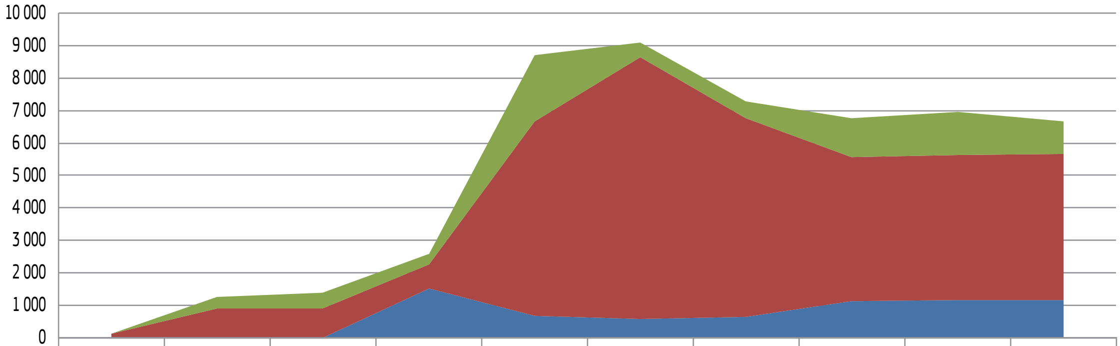
(1) Grange is the only site with tanked gas rather than mains gas
(2) Not all Commission sites
(3) Can include Commission bus service when appropriate
(4) Geothermal, biomass, PVs

B5.2 CO_2 emissions from buildings

B5.2.1 Buildings (energy consumption)

Figures B11 to B13: CO_2 emissions from buildings heating, tonnes (B11) and tonnes/person (B12), kg/m² (B13), (indicator 2a)

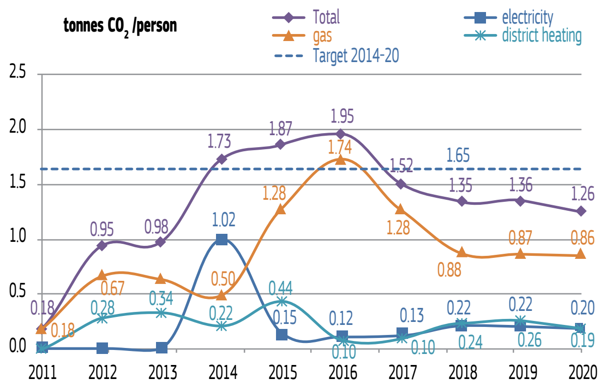
B11



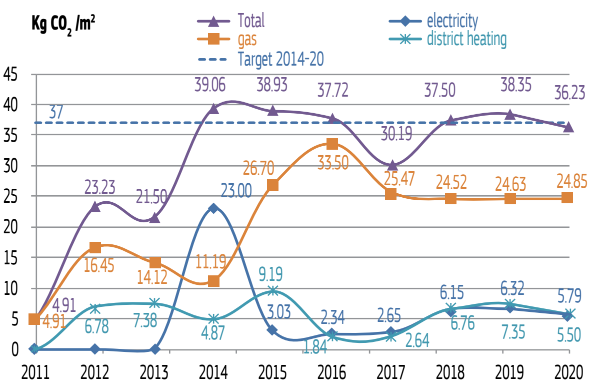
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	136	1 250	1 391	2 584	8 720	9 090	7 276	6 785	6 965	6 671
district heating/cooling		365	477	322	2 059	445	491	1 224	1 335	999
mains gas	136	885	914	740	5 981	8 075	6 138	4 437	4 473	4 500
electricity	0	0	0	1 522	680	564	639	1 113	1 147	1 156

Figure B12 and B13: CO_2 emissions from buildings' energy consumption (tonnes/person, and kg/m²)

B12



B13



CO_2 emissions per capita and per square meter have continued to decrease in 2020 compared to 2019.

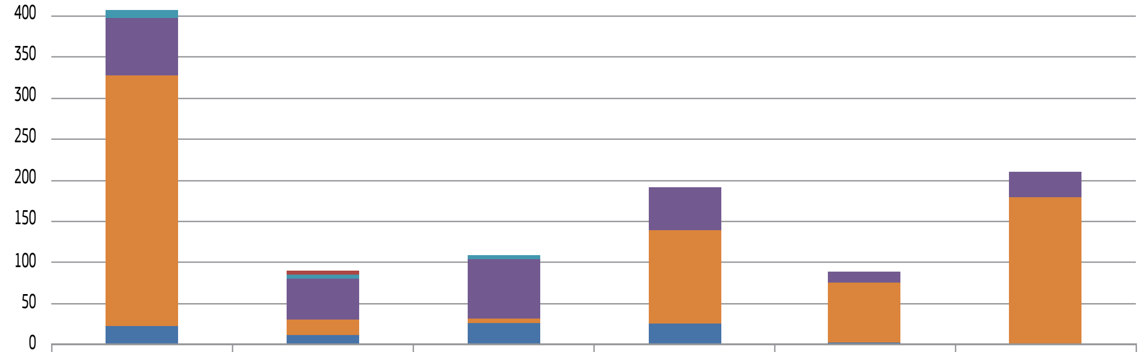
CO_2 emissions reductions are generally considered a consequence of actions targeting a reduction in energy consumption. It is likely that more renewable energy sources will be used to provide district heating and cooling generated, therefore probably decreasing CO_2 emissions.

B5.2.2 Buildings – other greenhouse gases (refrigerants)

The HVAC[3] installations containing Hydrofluorocarbons (HFCs) are managed by the building owners who, at the Commission's request, provide inspection results relating to refrigerants. Losses have been registered for five types of gases.

[3] HVAC : Heating Ventilation Air Conditioning

Figure B14: Total losses from gases



	2015	2016	2017	2018	2019	2020
TOTAL (as tCO_2equiv)	407	89	108	191	89	211
R417A	0	4	0	0	0	0
R407C	9	4	4	0	0	0
R404A	70	50	72	51	13	32
R134A	305	19	5	114	73	179
R410A	23	12	26	26	3	0

All equipments with other HFCs gases like R22 have been decommissioned.

B5.3 CO_2 emissions from vehicles (indicator 2c)

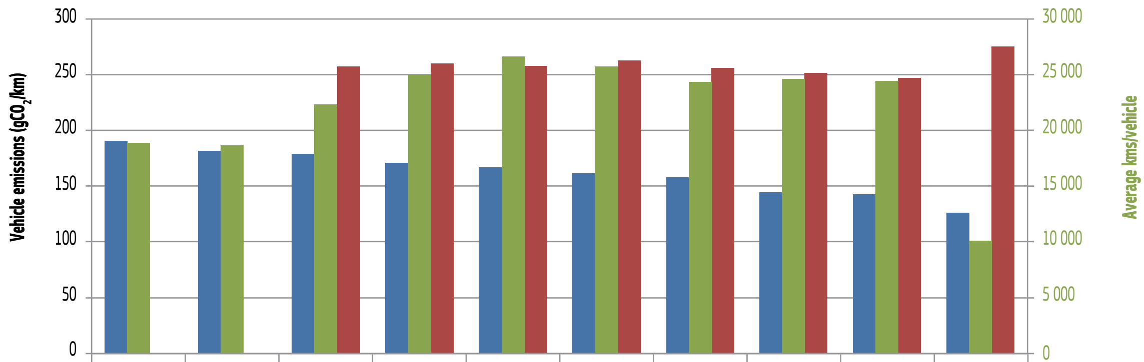
B5.3.1 Commission vehicle fleet

Table B8: Total emissions from the Luxembourg vehicle fleet

	2013	2014	2015	2016	2017	2018	2019	2020
Site vehicle CO_2 emissions (tonnes)	155	163	172	203	187	204	193	89
tonnes CO_2/person	0.038	0.040	0.037	0.044	0.039	0.041	0.038	0.017
i) from diesel (tonnes)	153	160	168	199	185	194	171	77
ii) from petrol	2.0	2.9	3.6	4.1	2.0	10.6	22.2	11.6

There is a considerable decrease in CO_2 indicators for Commission's vehicle fleet in 2020 compared to 2019 as fewer missions were performed in 2020, due to the COVID-19 pandemic.

Figure B15 Emissions per km and distance travelled per vehicle



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
gCO_2/km (manufacturer)	191	182	179	171	167	161	158	145	142	126
gCO_2/km (actual)			257	260	258	263	256	251	247	275
kms/vehicle	18 899	18 626	22 331	24 956	26 640	25 727	24 369	24 611	24 424	10 090

There has been a relatively steady downward trend in manufacturer emissions, reflecting the improved performance of newer vehicles (with the best performance in their class) replacing old ones.

The decision has been to gradually replace all Commision owned fleet cars by less polluting leased cars. The first two hybrid and first two electric cars were integrated into the fleet in 2018. The advantage of leasing fleet vehicles is that newer, less polluting, vehicles can regularly replace older cars. In 2020, there were 8 hybrid and 4 electric cars in the fleet.

The increase in actual emissions per km can be explained by the fact that during the period when the Commission was closed down due to the pandemic, the missions that still continued were mail missions between Luxembourg and Brussels with diesel vehicles.[4]

B5.3.2 Missions and local work based travel (excluding Commission vehicle fleet)

After a pilot test in 2018, the Commission has signed a service level agreement with European Parliament in May 2019 to enable Commission staff to use the Parliament's shuttle between Luxembourg and Brussel.The service is also open to colleagues working in Brussels. Staff is satisfied with the service. During the pandemic crisis, the service was stopped and has not restarted yet

B5.3.3 Commuting

Even though the majority of staff worked from home during almost 7 months in 2020, OIL continued with measures to promote more environmentally friendly transport means for staff. These measures included the following:

- Setting up a new scheme to partially reimburse the public transport ticket for staff members living abroad (Germany, France or Belgium), as all public transport is free of charge in Luxembourg starting from 1st of March 2020 and the schemes for Jobkaart and M-Pass were no longer relevant. The new scheme applied retroactively starting from 1st of March 2020. In 2020, there were 115 requests reimbursed in the sum of 14 317.94€.
- Providing buildings with bicycle parking and showers to encourage staff to cycle to work.
- Providing and ensuring the regular maintenance of a fleet of service bikes to be used between Commission buildings. There were only 165 service bicycle journeys in 2020 as most of the staff worked from home.
- Participating in campaigns to promote public transport use and soft mobility (for more details, please see below).

B5.4 Total air emissions of other air pollutants (SO_2, NO_2, PM)

These are currently not evaluated.

B6 Improving waste management and sorting

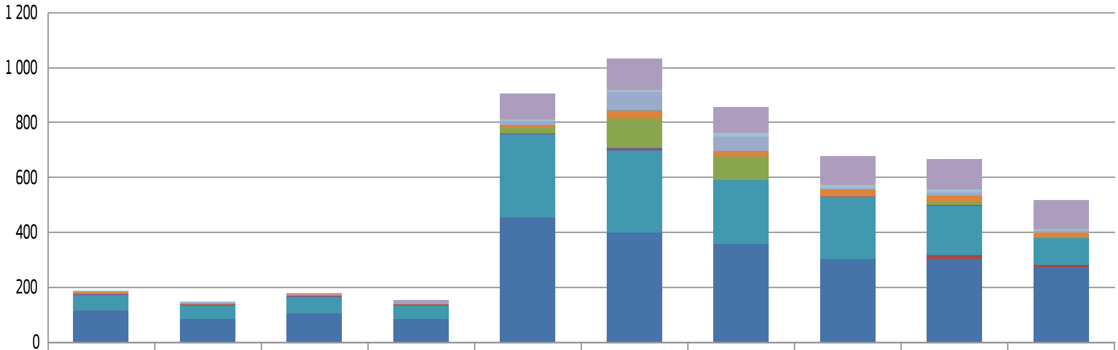
From 2019 on OIL has started to record waste generated by contractors not directly managed by the OIL waste manager. This mostly concerns oil and fat from degreasers, garden waste and kitchen waste from child-minding facilities. These data were not fully available for the years 2017-2018 and are therefore not included in the figures.

2020 was marked by the fact that the majority of staff worked from home for almost the whole year. The buildings were however not completely closed, some services continued (for example catering), therefore the drop in waste quantities is not so remarkable. In addition, due to the way the data was provided by Luxembourg City that managed the residual and organic waste for the Commission until 1st of January 2021, the quantities do not reflect the real situation – Luxembourg City only provides estimation of weight based on the standard number of containers evacuated per week (except for BECH and EUFO buildings).

[4] Figures for 2011 and 2012 have been removed has the way they were calculated is considered to be not relevant. Actual emissions include upstream emissions which increases the total by approximately 25%

B6.1 Non-hazardous waste

Figure B16: Evolution of total non-hazardous waste in Luxembourg (tonnes)

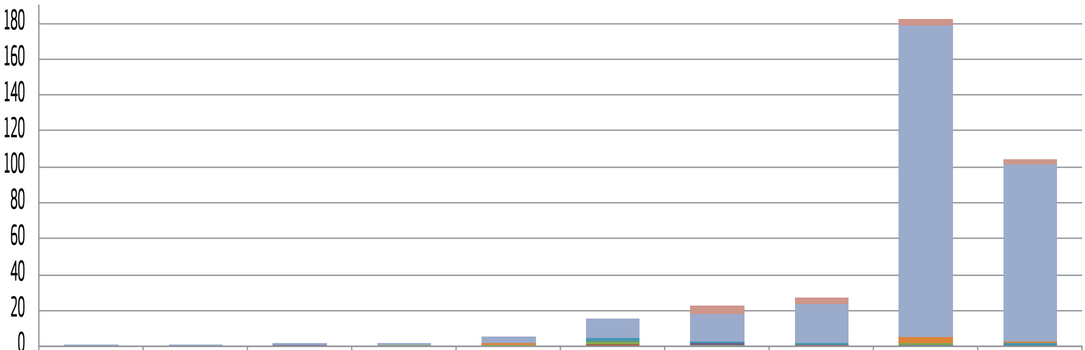


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	186.1	145.1	176.8	153.0	903.6	1032.0	860.4	680.8	670.8	520.7
Total (tonnes/person)	0.245	0.110	0.124	0.103	0.194	0.222	0.180	0.136	0.131	0.099
Kitchen waste (200108)	0.0	0.0	1.2	9.5	91.7	112.4	93.7	102.2	109.7	104.2
Valorlux (150102)	1.2	1.0	2.0	2.5	7.1	6.7	13.7	11.5	11.2	5.1
Metal drinks cans	0.1	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wood (200138)	3.1	1.5	1.4	0.8	13.8	67.6	51.8	6.6	10.6	8.1
Storage tins	1.1	0.8	0.6	0.4	0.1	1.5	0.0	0.0	0.0	0.0
Glass (150107)	4.1	3.6	3.4	3.2	10.8	27.3	21.2	25.5	24.3	17.5
Metals (17045)	0.7	0.4	0.5	0.4	19.8	109.2	84.0	0.4	10.1	2.0
Plastic (150102, 200139)	3.9	3.1	3.0	1.7	4.2	8.9	1.3	2.1	3.4	1.4
Paper and card (200101)	56.2	48.5	57.6	48.6	300.6	298.5	232.7	225.9	179.9	97.6
Contractors waste (mainly garden 200201)	NR	NR	NR	NR	NR	NR	NR	NR	13.8	9.7
Unsorted waste (200301, 200307)	115.9	86.0	106.8	85.8	455.5	399.8	357.7	302.6	304.0	272.5

The quantity of non-hazardous waste measured on a per capita basis has continued to decreased from 222 kg in 2016 to 99 kg in 2020.

B6.2 Hazardous Waste

Figure B17: Evolution of total hazardous waste in Luxembourg (tonnes)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	1.32	1.66	1.48	2.17	5.95	15.22	18.25	23.28	178.55	101.46
Total (tonnes/person)	0.002	0.001	0.001	0.001	0.001	0.003	0.004	0.005	0.035	0.019
Other Hazardous waste (160107, 170103...)							4.01	4.04	3.87	2.72
Oil and fat (200125)	0.35	0.26	0.27	0.38	0.70	0.62	0.53	0.63	0.59	1.17
Electric cables (200136)	0.65	1.07	0.71	1.25	3.67	10.7	15.3	21.0	173.15	98.15
Cartridges (80312)	0.00	0.00	0.00	0.14	0.69	0.00	0.00	0.02	3.06	1.62
Data support	0.00	0.00	0.00	0.00	0.38	1.69	1.31	0.72	0.20	0.15
Used containers (150110)	0.00	0.00	0.15	0.00	0.00	0.00	0.27	0.07	0.12	0.00
Used batteries (200133)	0.05	0.05	0.00	0.04	0.34	1.78	0.97	0.45	0.48	0.27
Medical waste (180103)	0.28	0.29	0.35	0.36	0.02	0.48	0.12	0.42	0.24	0.00
Contractors waste (misc., mainly 200125)	NR	NR	NR	NR	NR	NR	NR	NR	0.76	0.11

In 2020, the list of hazardous waste was reviewed to reflect the applicable legislation, with data support, plastic wrap, polystyrene and ceramic waste being redefined as non-hazardous waste.

B6.3 Waste sorting

Table B9: Percentage of waste sorted at the Commission in Luxembourg

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percentage of waste sorted	61.8	58.6	59.9	55.3	50.1	38.2	40.7	43.0	35.8	43.8
Percentage of waste not sorted	38.2	41.4	40.1	44.7	49.9	61.8	59.3	57.0	64.2	56.2

There has been an increase in the waste recycling rate in 2020.

In 2020, OIL took several measures in order to improve waste management.

Starting from January 2020, the Ecobox can be used in OIL's canteens. As part of the EMAS policy, this initiative reduces the volume of waste, by reducing not only the number of single-use packaging, but also the amount of food thrown away/wasted. In OIL canteens, for a deposit of 5 euros, the staff can take away their meal in an Ecobox and either return the washed box later to receive their deposit back or exchange the Ecobox for a newly professionally washed container to take another meal.

Since June 2020, OIL has also installed 60-litre blue bins for office stationary waste in the main entrances or in the canteen / restaurant of each building.

B7 Protecting biodiversity

In 2019, OIL has carried out an estimation of the land use with regard to biodiversity. The total use of land of the EC in Luxembourg, taking into account the part occupied by the EC in shared buildings, amounts around 138 000 m^2. 75% of this surface is sealed (buildings, parkings, roads ...) while 25% can be considered as nature-oriented (lawn, garden, green patios ...).

In the contract for maintenance of lawns, patios and outdoor plantings, the contractor is encouraged to use eco-friendly products. The present contractor is ISO-14001 certified.

The BREEAM Excellent label that OIL and the Luxembourg authorities want to reach for the new JMO2 building also include criterias concerning the biodiversity.

B8 Green Public Procurement (GPP)

B8.1 Incorporating GPP into procurement contracts

OIL aims to integrate environmental criteria into its contracts. Out of 15 contracts signed in 2020, each worth more than 60 000 euros, only 1 contract did not including such criteria.

B8.2 Office supplies

Office supplies are delivered by a single provider. There was a modification of office supplies catalogue in October 2019. In 2020, 55% of the products in the catalogue are considered to be green.

B9 Demonstrating legal compliance and emergency preparedness

The EMAS regulation requires EMAS certified organisations to provide evidence of legal compliance with environmental legislation, including permits. Such compliance is necessary for the release of the environmental permits from the Luxembourgish authorities for each building of the European Commission in Luxembourg.

In 2020, OIL conducted actions in the following fields:

- Implementation of a table concerning the EMAS incidents to meet a requirement in the new procedure on environmental accident/incidents and emergency preparedness for OIL put in place in 2019,
- In-depth analysis of the operating/environmental permits in relation with the new Law "Commodo-Incommodo". OIL has completed the first stage of the project consisting in an analysis of the environmental permits for buildings managed by OIL carried out in cooperation with the contractor.

In the second stage, it would be beneficial to present the results of the analysis to the management meeting and continue to monitor the updating and control actions for each building in cooperation with other involved units.

B9.1 Management of the legal register and checking/establishing legal compliance

OIL used an external contractor to put in place a legal compliance system. Changes in legislation are communicated to relevant parties to follow up and are followed up through an action plan.

Furthermore, in 2020, OIL continued to participate in the "Atelier Veille réglementaire" under the supervision of DG HR. It is a way to mutualise the resource and to cross check the legal information. The external technical office in charge explains during the workshop the way to implement the legislation and which actions has to be taken into account. The workshop takes place 4 times a year.

DG ENER undertakes its own regulatory monitoring.

B9.2 Prevention, risk management and emergency preparedness

Only four fire drills organised by the owners of the DRB (Wings A / B-D-E) and LACC buildings were carried out on the Luxembourg site during the year 2020. The fire drills scheduled in other buildings have been canceled due to the COVID-19 health crisis.

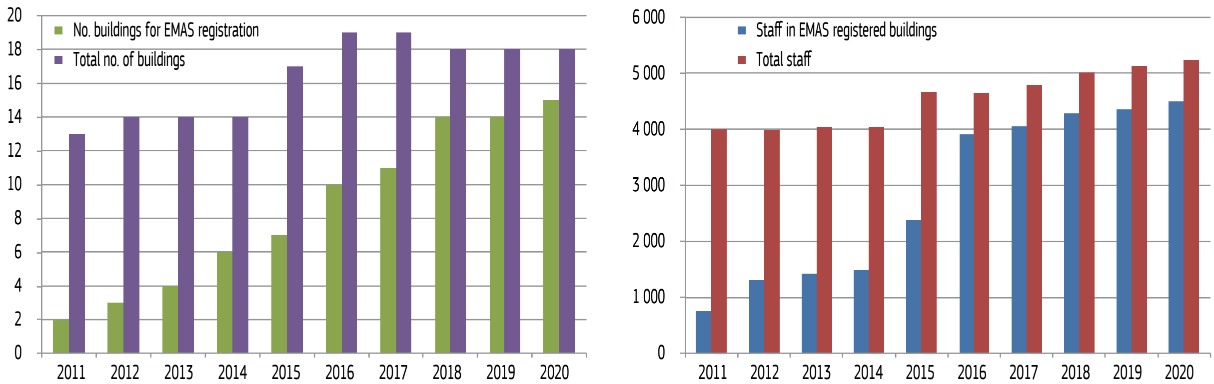
Due to the COVID-19 health crisis, no training to prevent and manage risks took place during the year 2020.

B9.3 Integrating more buildings in the EMAS registration

Figures B18 and B19 below represent respectively the evolution in the number of buildings in Luxembourg that will be included in the next update of the EMAS and the number of staff they accommodate.

Figure B18 and 19: Evolution of number of buildings in EMAS and the number of staff they accommodate

B18 **B19**



The buildings included in the EMAS registration (including the Fischer building) account for 86 % of the surface area and 86% of staff in Luxembourg (see tables B2 + B3 and comments for the future evolution).

B9.4 Conformity with the EMAS system

OIL monitors the EMAS internal audit and verification audit findings in collaboration with DG HR and is responsible for addressing them (non-conformities, scopes for improvement, observations). In 2020, continued efforts were made in closing non-conformities. No new non-conformities were detected in 2020.

B9.5 Compliance with environmental and other permits

The Luxembourg authorities issue environmental permits for each Commission building in Luxembourg.

In 2020, continous improvements were made in the following topics:

- Continued improvements to further review and track permits and legal requirements while managing the new legislation for a good legal monitoring.
- Completion of the file concerning the update of the operating permit for the DROSBACH Building Wing E for the Project Management Team Real Estate Projects under the Lease Agreement.

- DG ENER has its own operating authorisation issued by the Ministry of Health for nuclear activities in EUROFORUM.

Based on these elements, we can conclude that the Luxembourg site is compliant with the applicable legislation and engages in regular dialogue with the relevant stakeholders (building owners and local authorities) on this subject.

B10 Communication

B10.1 Internal communication

The main communication events and messages during 2020 were the following:

- EMAS waste reduction awards 2019: 6 January in Visio conference with DG HR. The winners for the most impactful waste reduction event were DG MARE and OIL (in cooperation with OP).
- ECOBOX: 20 January, ECOBOX were made available in all OIL canteens. As part of the EMAS policy, this initiative reduces the volume of waste, by reducing not only the number of single-use packaging, but also the amount of food thrown away/wasted.
- Green Valentine's Day: 12 February. Promotion of the EMAS team's tips and tricks for having an eco-friendly Valentine's Day instead.
- New Fobu bins: 11 June. OIL has installed 60-litre blue bins for office-supplies waste in the main entrance or in the canteen / restaurant of each building. The exact locations of the bins in the various buildings was communicated to staff on 8 July
- Use of service bikes: 11 June. Information on the health precautions to be applied when using service bicycles.
- Reimbursement of cross-border season tickets: 29 July. Staff was informed that OIL offers a partial refund of cross-border season tickets. This measure supports the Commission's sustainable mobility policy for the home to work trips of its staff. On 1 October, a reminder of this new scheme was sent to all staff.
- Recycling Stations: 17 September. OIL launched a pilot project in the Ariane building, with recycling islands in the corridors that will replace private waste bins in the offices.
- VéloMai 2020: 23 September. The 6th edition of the fit@work interinstitutional cycling challenge, which usually takes place in May, was held from October 1 to 31, 2020
- Zero-waste lifestyle online workshop: 19 October. In the framework of the corporate Volunteer for Green Change initiative, zero-waste experts from the ESTAT EMAS eco-team and the OP organised a free online workshop addressed at EU institution staff in Luxembourg, where they provided information on shopping with less packaging and organic composting practices; offering very easy alternatives to reduce the environmental impact in everyday life.
- Green Public Procurement: 24 November. Online conference on Public Buildings' Design, Construction and Maintenance. The conference included a presentation on new technologies used in the JMO2, its BREEAM certification and the impact assessment on the environment and wellbeing of the project.
- Energy performance of buildings: 30 November. Posters with building consumption on plasmas.
- Energy-saving mode in buildings during end-of-year holidays: 18 December. As usual at the end of the year, OIL took some energy-saving measures in the Commission buildings.

- In addition to this, OIL provided regular information on transport issues: road and train works, reorganisation of bus lines, new free public transport policy from March 1, 2020
- OIL continues to manage the OIL EMAS and OIL MOBILITY functional mailboxes to respond to staff enquiries on environment and mobility topics. A new functional mailbox was created for cross border transport ticket reimbursement scheme

B10.2 External communication and stakeholder management

The Commission has regular contacts with the Luxembourg authorities, particularly the Ministry of Sustainable Development and Infrastructure and Luxembourg City. In addition, there have been regular contacts with associations playing an important role in the field of waste management, energy efficiency and mobility.

In particular, the Commission is in contact with the SuperDreckskëscht (SDK) – a body that operates for the Luxembourgish Ministry of Sustainable Development and Infrastructures in fields of information and awareness, regarding issues related to waste management and prevention, and disposal of dangerous substances. SDK delivers a quality label for buildings of bodies respecting their specifications concerning waste management. The Commission is labelled SDK since 2007. Since 2019, every building managed by OIL with a waste room has obtained the SDK label.

The Commission maintains close working relationships with other institutions in Luxembourg via the inter-institutional working group EcoNet. Main participants are the European Parliament, European Court of Justice, Court of Auditors and European Investment Bank. The group shares experiences, coordinates actions and strives for having a common approach towards the local authorities on environmental issues. Ten EcoNet meetings were held in 2020.

B11 Training

B11.1 Internal training

Training sessions for newcomers at the Commission, held by DG HR in full cooperation with OIL, have started again in 2018[5]. There were one presential and 3 online sessions with total of 50 participants.

B11.2 External training

15 Commission drivers have benefited from a training session in 2020, organised by an external contractor. 4 drivers also took a refresher course for category C driving licence.

B12 EMAS Costs and saving

Table B10: EMAS administration and energy costs for buildings in the EMAS area

Parameter	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Direct EMAS Cost (EUR)	396 000	462 000	462 000	469 000	469 000	483 000	370 000	375 000	380 000
Total Direct Cost per employee	99	114	114	100	101	101	74	73	73
Total buildings energy cost (Eur)		1 755 676	3 091 906	2 559 940	2 637 907	1 848 159	1 686 966	2 242 531	2 151 928
Total buildings energy cost (Eur/person)		434	765	549	567	386	336	436	411
Total fuel costs (vehicles) (Eur)		49 328	51 752	54 780	64 574	59 496	65 798	63 540	29 394
Total energy costs (Eur/person)		12	13	12	14	12	13	12	6
Total water costs (Eur)		92 115	91 817	208 318	368 001	308 841	290 556	271 214	175 043
Water (Eur/person)		65	62	45	79	65	58	53	33
Total paper cost (Eur)		82 102	69 120	61 690	59 521	83 261	84 624	84 125	33 893
Total paper cost (Eur/person)		20	17	13	13	17	17	16	6
Waste disposal (general) - unit cost/tonne		335	342	342	342	321	390	382	372
Waste disposal (general) - Eur/person		42	35	66	76	58	53	50	37

The total direct EMAS coordination costs has increased slightly in 2020. However, all the other costs have decreased considerably.

[5] A first session took place on April 27, 2018

B13 Conversion factors

Table B11: Conversion factors used in calculations for Luxembourg reporting

Parameter and units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
kWh of energy provided by one litre diesel (1)	0	0	10.89	10.89	10.89	10.89	10.89	10.89	10.62	10.58
kWh of energy provided by one litre petrol (1)	0	0	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.46
Office Paper Density (g/m^2)	80	80	78	75	75	75	75	75	75	75
Kgs CO_2 from 1 kWh of electricity (2)			0.000	0.671	0.671	0.256	0.256	0.256	0.256	0.256
Kgs CO_2 from 1 kWh natural gas with upstream (4)	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.224	0.224
Kgs CO_2 from 1 kWh tanked gas (4)			0.000	0.000	0.204	0.204	0.204	0.204	0.230	0.230
Kgs CO_2 from 1 kWh diesel - fioul for buildings with upstream (4)	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.330	0.324	0.324
Kgs CO_2 from 1 kWh from district heating with upstream (3)	0.083	0.201	0.201	0.201	0.201	0.201	0.201	0.323	0.333	0.315
GWP of R410A (4)			1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920
GWP of R134A (4)			1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
GWP of R404A (4)			3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940
GWP of R407C (4)			1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620
Kgs CO_2 from one litre of diesel with upstream (car fleet) (4)		3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
Kgs CO_2 from one litre of petrol with upstream (car fleet) (4)		2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81

Notes:

(1) www.carbontrust.com, Conversion factors 2016 - harmonized values for European countries

(2) Only for the small part of electricity not coming from renewable sources. Source : supplier

(3) Ponderated value of contract factors

(4) Source: note ADEME Base Carbone, emissions for energy consumption include both combustion and upstream components

Since 2016 conversion factors have been revised and applied retroactively, for diesel and petrol, in order to better reflect upstream emissions.

B14 Table B12 characteristics of buildings and performance of selected parameters (indicative data)

Building	Main occupants	Office	Data and telecom centre	Creche/ child care	Depot, large storage	Caféteria	Self restaurant	Printing and mail sorting	Medical service	Workshop	Sports/ recreation centre	Electricity	Mains gas	Urban heating	Water (m^3)	Non hazardous waste (tonnes)
1) Building essential details		**2) Building use**										**3) Main energy sources and amount (MWh)**			**4) Water and waste consumption**	
ARIA	OIL DGT	X				X	X					1 536.64	1 761.86		5 273.18	54.12
BECH	ESTAT	X				X	X					3 611.11	6 356.32		3 892.80	53.12
CPE 1 et 2	OIL			X		X			X			202.87	-	730.87	1 506.00	24.35
CPE 3	OIL			X		X	X		X			378.94	627.23		2 008.50	74.41
CPE 5	OIL			X		X	X		X			498.42	543.71		5 051.00	27.23
DRB	DIGIT PMO ECFIN HR CHAFEA	X			X	X	X	X	X	X	X	6 401.56		2 678.62	4 895.10	97.26
EUFO	ENER CNECT	X				X	X					3 984.00	2 582.20		3 113.00	41.61
HEI		X				X	X				X	114.44	171.44		554.67	25.83
HTC	SANTE	X				X						58.61	992.24		439.46	
LACC	DGT	X				X						303.12	6 089.59		9 440.81	18.33
T2	DGT	X				X	X					595.48	877.77		2 532.16	30.56
MAEU	COMM	X				X						80.01	185.61		255.00	
MER	OP	X				X	X	X				2 470.10		2 085.50	2 848.05	69.79
FISR		X				X						270.14	106.55		261.90	0.26
HTC (DC)	DIGIT		X									404.14			-	
WIND (DC)	DIGIT		X									4 070.96			-	
WIND - Telecom Centre	DIGIT		X									482.22				
BETZ (DC)	DIGIT		X									5 939.22			-	
Building not identified																2.90
TOTALS												**31 401.98**	**20 294.52**	**5 494.99**	**42 071.63**	**519.75**

European Commission

Environmental Statement 2021

2020 results

Annex C: JRC-Petten

EMAS
Verified environmental management
REG.NO. BE-BXL-000003

Prepared by the "EMAS Site Coordinator" in JRC-Geel instead of "the Coordination Team"
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ANNEX C: JRC-PETTEN – Administrative and research activities

Reporting and the COVID pandemic: Reporting for 2020 retains the same approach for continuity, as previous years, and is therefore based on site activity and total staff numbers. The data will therefore reflect the impact of a very significant staff absence on facilities operation.

The EMAS corporate coordination team has made 'high level' estimates of home consumption, due to telework under COVID, as described separately in the Corporate summary. The potential to systematically include the impact of teleworking in annual reporting will be explored as more site specific information becomes available.

The mission of the Joint Research Centre (JRC)-Petten is to serve as the point of reference for the Commission, Member States and research organisations providing scientific and technical support to Energy, Transport and Climate policies. This is supported by studies, installations for conducting long term tests and experimental research. The EMAS scope at JRC-Petten includes the entire site within the JRC boundary. This excludes the HFR (High Flux Reactor), this is not in the EMAS scope.

C1 Overview of core indicators at Petten since 2010

JRC-Petten have been collecting data on core indicators for the Petten site since 2010. Their values in 2010 and from 2014 to 2020 are shown in Table C1, along with performance trend and targets where applicable for 2023 and 2030.

Table C1: Historical data, performance and targets for core indicators for Commission level reporting

Physical indicators: (Number, desciption and unit)	**Historic data values**					**Performance trend (%) since:**		**Target**		**Future targets**	
	2010 (1)	**2014**	2018	2019	2020	2010	2014	2014-20		2014-23	2014-30
								Δ % (2)	value (2)	Δ % (3)	Δ % (3)
1a) Energy bldgs (MWh/p)	37.46	**23.99**	26.41	24.24	19.91	**-46.8**	**-17.0**	-5.0	22.792	-7.5	-13.6
1a) Energy bldgs (KWh/m²)	472	**348**	328	302	246	**-47.9**	**-29.3**	-5.0	330	-7.5	-13.6
1c) Non ren. energy use (bldgs) %		**97.8**	52.3	51.5	46.2		**-52.8**	-5.0	92.9	-50.0	-55.0
1d) Water (m³/p)	11.50	**11.14**	8.00	9.83	8.99	**-21.8**	**-19.3**	-5.0	10.581	-13.0	-14.0
1d) Water (L/m²)	145	**161**	99	122	111	**-23.4**	**-31.2**	-5.0	153	-13.0	-14.0
1e) Office paper (Tonnes/p)	0.04	**0.02**	0.01	0.02	0.00	**-88.9**	**-72.0**	-9.0	0.015	-40.0	-50.0
1e) Office paper (Sheets/p/day)	40	**16**	10	19	5	**-88.2**	**-70.2**	-9.0	14.4	0.0	0.0
2a) CO_2 buildings (Tonnes/p)	14.85	**10.00**	3.14	2.88	2.10	**-85.8**	**-79.0**	-7.0	9.296	-73.0	-76.0
2b) CO_2 buildings (kg/m²)	187	**145**	39	36	26	**-86.1**	**-82.1**	-7.0	134.7	-73.0	-76.0
2c) CO_2 vehicles (g/km, manu.)		**168**	148	148	148		**-11.7**	-8.0	154.2	-12.0	-21.0
2c) CO_2 vehicles (g/km, actual)		**357**	275	234	256		**-28.5**	-8.0	328.8		
3a) Non haz. waste (Tonnes/p)	0.078	**0.105**	0.115	0.097	0.066	**-14.9**	**-37.0**	-5.0	0.100	-7.5	-13.6
3b) Hazardous waste (Tonnes/p)	0.0032	**0.0034**	0.0036	0.0112	0.0000	**-100.0**	**-100.0**				
3c) Separated waste (%)	27.1	**39.0**	51.3	44.9	45.6	**68.1**	**17.0**	-5.0	37.0	-7.5	-13.6
3c) Unseparated waste (T/p)		**0.0**	0.1	0.0	0.0		**-28.6**			-7.5	-13.6
Economic indicators (Eur/p)											
Energy consumption (bldgs)		**1 225**	1 335	1 232	1 043		**-14.8**				
Water consumption	23.0	**22.3**	16.0	19.7	18.0	**-21.8**	**-19.3**				
Non haz. waste disposal	7.0	**9.4**	10.3	8.7	5.9	**-14.9**	**-37.0**				

Note: (1) Earliest reported data; (2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018); (3) Draft figures from the Global Anual Action Plan 2021; (4) 2014-20 indicator discontinued

The core indicators show that since 2010 there has been substantial progress in reducing the environmental impact of building energy usage, with a reduction of the energy consumption by 46%. This reflects efforts from the last ten years to improve energy efficiency; installing insulation, more efficient heating and improved building management. The amount of non-renewable energy in buildings is on a plateau since 2015, there were no new PV panels in recent years. Energy consumption decreased in line with the 2020 heating degree days.

Water consumption is monitored per building and has generally decreased since 2010. In 2019 an increase, which could only be explained by research with steam production, was detected. Compared to 2019 a reduction in water consumption was recorded in 2020. All toilets are equipped with sensor controlled sanitary tapware that is used to prevent continuous water flow by stopping the water supply after pre-set time.

Paper consumption significantly decreased in 2020 compared with last year due to the transition to teleworking caused by the COVID-19 pandemic.

In 2020, the energy consumption decreased. Since 2018, JRC-Petten has purchased electricity through a consortium, which is active on the electricity market for large accounts. The contract for the delivery of electricity is for four years and guaranties of origin, greening the purchased electricity are included in the contract.

CO_2 emission per kilometre from site service vehicles performance generally decreased since 2010, there were no changes to the vehicle fleet. The manufacturer and actual emissions are below the target of 2020 due to past changes in the vehicle fleet.

Non-hazardous waste decreased by 37 % since 2014. The Unseparated waste rate slightly increased compared to 2019. Separation rate is the amount of sorted materials like paper, glass, wood, hazardous, plastic and electronic waste as part of the waste total with the category unsorted household waste. New waste stream bins were introduced on site in late summer 2020.

The evolution of the EMAS system baseline parameters in JRC-Petten is as shown below.

Table C2: EMAS baseline parameters

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population: total staff	232	229	266	263	282	278	276	263	248	249	247
Total no. operational buildings	14	14	14	14	14	17	16	12	12	12	12
Useful surface area for all buildings (m^2)	18 400	18 400	19 150	19 150	19 458	21 397	20 502	20 842	19 996	19 996	19 996

In 2020 JRC-Petten staff numbers decreased slightly, the other parameters remained stable.

The total premises of JRC-Petten are EMAS registered. Buildings, which have water, electricity and gas consumption are reported as operational.

C2 Description of JRC-Petten activities and key stakeholders

The JRC is a Directorate-General of the European Commission employing over 3000 staff, including scientists and researchers as well as administrative and support staff from across the EU. Its offices and sites are located in Brussels (BE), Geel (BE), Ispra (IT), Karlsruhe (DE), Petten (NL) and Seville (ES).

On the JRC-Petten site, the European Commission conducts scientific research and delivers technical support and administrative activities for partners in relation to energy, transport and climate policies. Increasingly research is based on modelling studies, which generates a more administrative workload. The research is based on the results of laboratory work in facilities for hydrogen fuel cell testing, hydrogen storage tank testing and optimisation, battery testing and at several locations advanced material testing for nuclear and other high tech industries.

The JRC-Petten hosts EC staff from four different JRC directorates; C, G, I and R. From DG HR there is the Account Management Centre, AMC8.

While JRC-Petten staff and AMC8 staff report to different Directors, the site operates under the responsibility of a site-Director, Piotr Szymanski, Director of the Directorate for Energy, Transport and Climate.

The scientific activities fall under the responsibility of:

Directorate C: the mission of the Joint Research Centre's Directorate for Energy, Transport and Climate is to provide support to Community policies and technology innovation related to:

- **Energy** – to ensure sustainable, safe, secure and efficient energy production, distribution and use
- **Transport** – to foster sustainable and efficient mobility in Europe
- **Climate** – to provide scientific and technical analyses in support to integrated air quality, climate and related policies

Directorate C unit 01: the Energy Storage Unit performs scientific research into energy storage technologies in support of European energy and transport policies. This includes battery technologies, hydrogen storage, distribution and sensing, and electrochemical conversion in fuel cells. Particular attention is given to the establishment of harmonized methods for characterizing the performance of the technologies in terms of efficiency, emissions, reliability and safety.

Directorate C unit 03: the mission of the Energy Security, Distribution and Markets Unit is to aid and inform the European Institutions, Member States and relevant stakeholders on issues relevant to ensuring the proper design and functioning of the energy markets and the digitalization of energy systems, and the uninterrupted physical availability of energy products and services at an affordable price for all consumers. The unit assesses how different policy options help shape an energy system resilient to shocks, disturbances, and adverse trends, whilst satisfying European society's energy needs.

Directorate C unit 07: Knowledge for the Energy Union Unit. Their mission is to support EU policies related to the Energy Union through knowledge management.

Directorate G unit 04: the mission of the Nuclear Reactor Safety and Emergency Preparedness Unit is to provide fundamental knowledge, scientific and technological data for materials innovation, physical model development and numerical simulations and to contribute to the development of nuclear codes & standards with the aim to contribute to the safe operation of current and future innovative and advanced nuclear reactor systems.

Directorate G unit 10: the mission of the Knowledge for Nuclear Safety and Decommissioning Unit is to manage and disseminate knowledge generated by the scientific units of Directorate Nuclear Safety and Security (Dir. G) by mapping, collating, analysing, quality checking and communicating in a systematic and digestible way all the relevant scientific data, methods, tools and to monitor knowledge available worldwide. Attention to be given to anticipating knowledge needs, mapping knowledge gaps and suggesting research topics to be carried out in the JRC.

Support services are provided by the following units;

Directorate R Unit 02: the mission of the Site Support Petten Unit is to support and coordinate the implementation of support service functions on the Petten Site in a client responsive manner and in compliance with all applicable rules and regulations acting as a focus of service support to the Directorates of the Petten Site. To provide technical support for the scientific programmes of the site and to develop and maintain the infrastructure of the site.

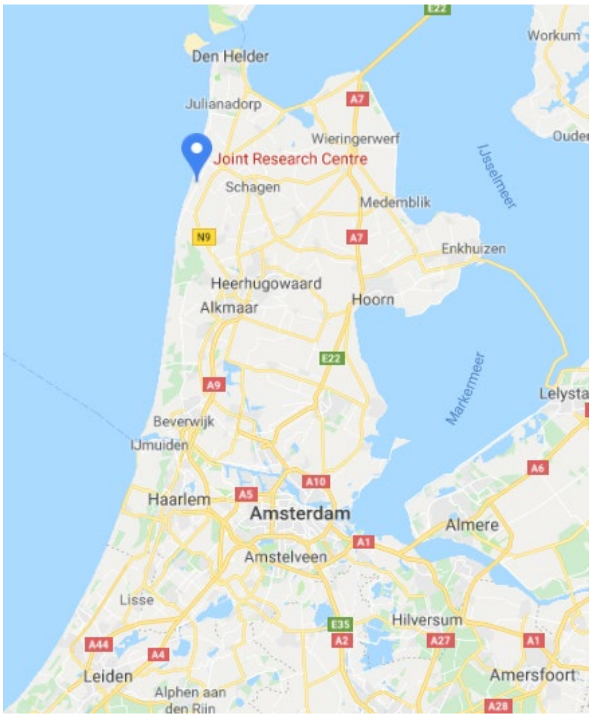
Directorate I Unit 05: the mission of Directorate I is to set up and operate Competence Centres which will develop, provide and apply analytical tools, methods and integrated solutions to better support all Commission Services for the conception, implementation and evaluation of EU policies.

Directorate general HR, AMC8: the mission of AMC.8 is to ensure effective local HR services for the JRC, with a high level of customer service and in full respect of the rules in place.

Figure C1 : Petten-site photo

The site is located in an extensive area of coastal dunes in Noord-Holland, the Netherlands, and 50 kilometres North West of Amsterdam.

Figure C2: map of the north west of the netherlands



The premises contain 26 buildings of which three administrative; the other buildings are laboratories, workshops, storage and utility installations for research and the support of research. The site is located on the Petten Research Centre Campus together with TNO, (formerly ECN) and the Nuclear Research and consultancy Group (NRG) which is operator and license holder of the High Flux Reactor. Curium (formerly Mallinckrodt Medical B.V.) is the fourth occupant of the campus and produces medical isotopes. The scope of this report is only for JRC-Petten. The research activities on-site, test installations and laboratories make the site a type C premise under Dutch legislation “activiteitenbesluit”, requiring that activities and emissions are permitted. The site environmental permit was renewed in 2016 in good cooperation with the authorities. The new permit requirements are mainly goal oriented and well manageable.

Due to the COVID pandemic an active communication with interested environmental stakeholders was extremely difficult and partly suspended. Until 2019 the interested environmental stakeholders actively communicated with were:

National forestry: There were several communications held with the national forestry to discuss a nature management plan for the Natura 2000 area outside the active research location.

Flora & Fauna committee: Participation to several meetings of the Flora and Fauna Committee

Energy and Health Campus (EHC), The EHC is an initiative of the province of North-Holland. They aim to stimulate the Petten campus as Development Company which stimulates restructuring, innovation projects, research, and marketing for economic development. JRC participates in the Steering Committee

Schagen Municipality, communication with the municipality about a permit for a fence renewal

Stakeholder's analysis:

For the development of the context of the organisation an analysis is made of the stakeholders who interact with JRC-Petten. The figure below is a graphical representation of the found distribution in the defined quadrants. This figure is a result of the ranking of stakeholder groups based on summation of the scores from individual stakeholders. The relation of stakeholder groups and individual stakeholders is visible in table C3 JRC-Petten summary of stakeholders.

Figure C3: Stakeholder analysis

	Stakeholder groups
1	European Commission
2	EMAS
3	Employees
4	Regulatory government
5	Policy makers
6	Other European Institutions
7	Local communities
8	Insurances
9	General Public
10	Suppliers/contractors
11	Media society
12	Partners
13	Customers
14	NGOs

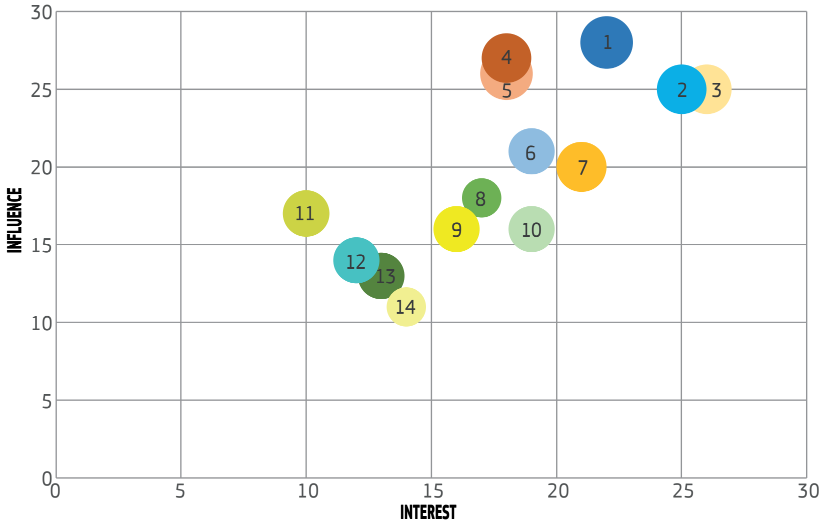


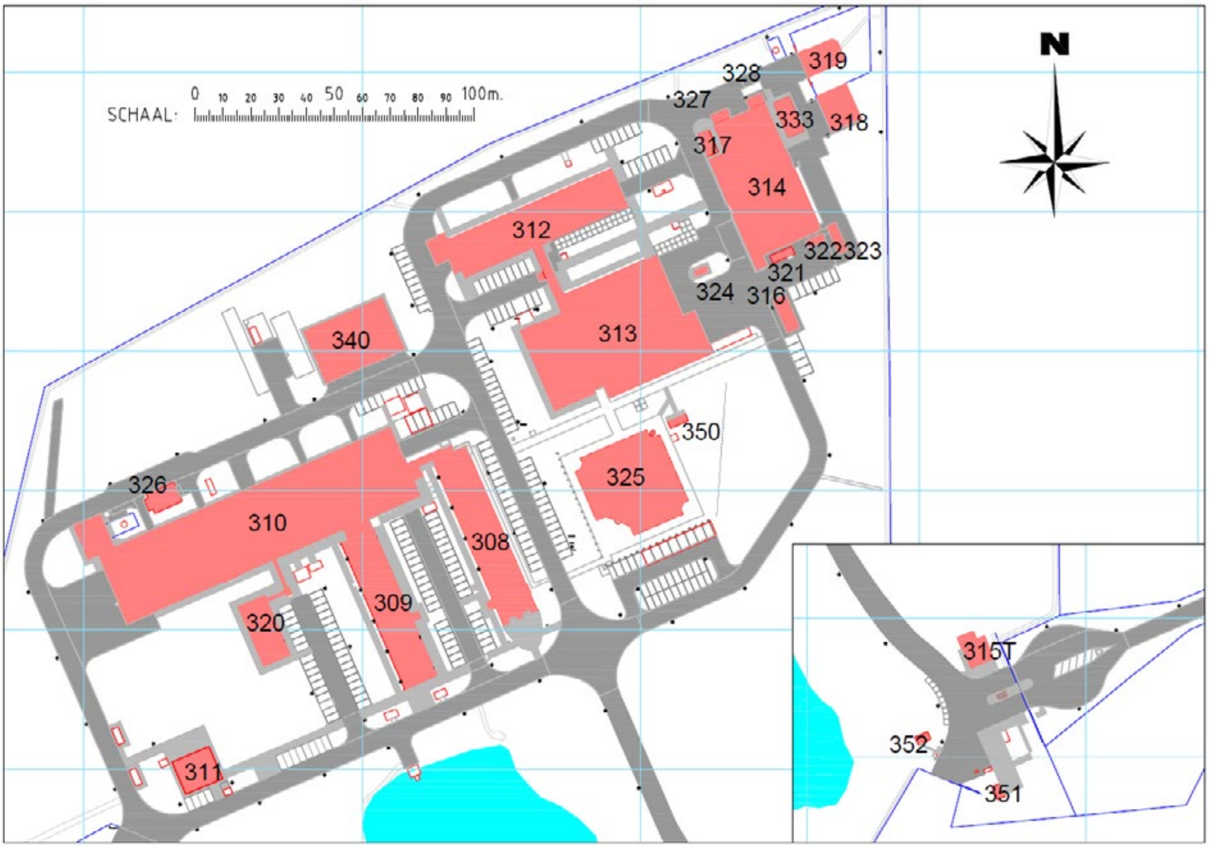
Table C3: JRC-Petten summary of stakeholders

Stakeholder group	**Stakeholder identification**	**Interest, needs and expectations**
Other european Institutions	◆ Council & parliament ◆ Member states ◆ Commission panels ◆ EC citizens	◆ Services responding well to DGs' demands ◆ Minimal costs on energy/waste/soil ◆ Rely on founded research forpolicy making ◆ Multi-annual investment plans: they decide on investments: refurbishment, construction,... ◆ Site development plan
European Commission	EC, DG JRC	JRC-Petten is part of the EC and is providing sound scientific support for policy making.
Policy makers	◆ European Commission ◆ Dutch national legislation ◆ Province North-Holland	Contribution to environmental policy and COP 2030 targets on energy
Suppliers / contractors	◆ Products: e.g. lab chemicals, lab instruments, ◆ Services: e.g. maintenance companies, cleaning, catering, gardening, waste company, architects and consultants,, construction companies	Maintaining their contracts, continue their delivery
Employees	◆ Employees & workers councils	Safe and modern working environment, trust and respect, be kept informed on environmental policy, targets and performance, employer that is caring about environment and sustainability
Customers	DGs: ENER, RTD, DEVCO, TRADE, TAXUD, HOME	Timely and correct delivery of policy support, no specific requirements on environmental criteria.
Local communities	◆ Research campus partners (ECN, NRG, Curium, EHC) ◆ Neighbours ◆ Flora and Fauna committee	No calamities, minimized transports and waste. Coordination in area development. Local communities want to be timely informed about incidents / calamities. They want to know the installations and their risks.

Regulatory government	Regulatory bodies: ◆ RUD, province NH, Hoogheemraadschap Hollands noorderkwarier ◆ Safety region NHN ◆ Inspectie SZW ◆ Omgevingsdienst Noordzeekanaalgebied (ODNZKG)	Compliance with regulations
EMAS	EMAS verifiers, EMAS organization	Improve the environmental performance, receive the EMAS registration, transparency, Training of staff members, awareness-raising of environmental topics
Media and society	◆ Press/TV/radio ◆ Society in general / public opinion	News value (when something goes wrong or outstanding projects). Indirect influence on impact through image effects.
Partners	◆ policy advisors ◆ other JRC sites ◆ OECD	Knowing our competences (to partner or compete)
NGOs	◆ NGO: e.g. Natuur & Milieu	Nature protection, no pollution
Insurances	◆ Fire insurances ◆ Nuclear liability insurance	Minimized risk on incidents or calamities,
General Public	◆ Citizens	Transparency

Figure C4 presents the floorplan of the Petten-site and gives a brief description of the buildings usage. Detailed information about the activities in buildings is presented in table C17.

Figure C4 : JRC-Petten site plan



Building	
308, 309, 315T	Offices
310, 311, 312, 313, 314, 320, 325, 333, 340	Experimental hall, laboratories, offices
316, 317, 318, 319, 321, 322, 323, 324, 326, 327, 328, 350, 351, 352	Storage, distribution, infrastructure

C3 Environmental impact of JRC-Petten activities

Table C4: Summary of significant environmental aspects for the Petten site

Aspect group	Environmental aspect	Environmental impact	Activity, product or service
Resources	Electricity & fossil fuel consumption	Reduction in natural resources	Heating, cooling, ventilation, electrical equipment and transport
	Paper consumption		For office activities, printing, training and communication requirements
	Water consumption		For sanitary and technical installations
Air	CO_2, NO_x, VOC emissions	Air pollution, climate change	Energy consumption, Internal transport Transport: work-related travel and journeys to and from work (organisation and personal)
	HFC gas emissions	Global Warming	Used in refrigerators and cooling systems
Local aspects	Noise	Disturbance of neighbourhood	Ventilation
Waste	(Hazardous) waste production	Air, water and/or soil pollution, biodiversity risks	Laboratories, sanitary installations, cleaning, maintenance, office activities, IT and catering
Water	Wastewater discharge	Risk of eutrophication, water pollution	Sanitary and technical installations
Bio- diversity	Choice of products and their origin	Destabilisation of ecosystems	For catering and gardening
	Choice of sites and type of buildings	Destruction of natural habitat, relief, visual pollution	In the context of the Commission's buildings policy (Life cycle approach)
Environmental Risks (legal compliance and emergency preparedness)	Load losses, malfunctions, leakages, spills of chemicals, gas, waste, etc	Air, water and/or soil pollution.	In the context of delivery, storage and use of chemicals/fuel. Research installations, laboratories, technical installations
(Indirect) financing	Indirect environmental aspects linked to programmes to be financed	Environmental impact caused by third parties	Taking the environment into account in project selection and evaluation
(Indirect) public procurement	Environmental performance of contractors. Sustainability and impact of products and services selected.	Environmental impact caused by third parties	Integration of environmental clauses in contracts: influence of contract through 'sustainable' purchases, life cycle approach

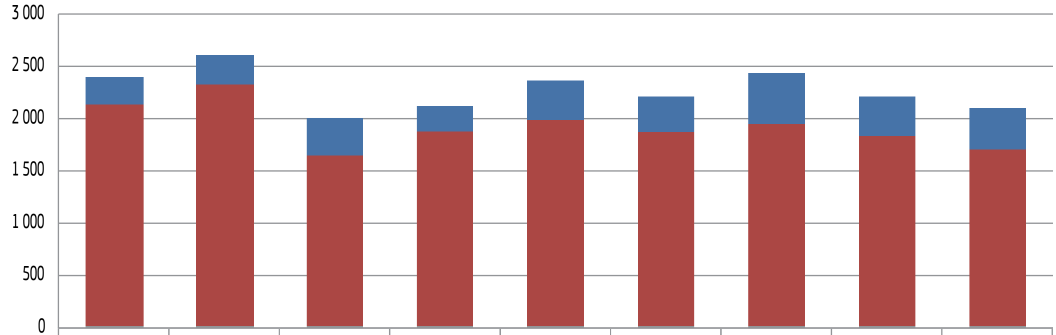
C4 More efficient use of natural resources

C4.1 Energy consumption

Buildings energy consumption data should be considered in the context of climatic conditions. Analysis of degree data[1] shows that the energy for building heating and cooling need would be expected to be about 10 % more than in the reference year 2014

[1] Monthly data for INHALKMA1 station (15,5C reference temperature), www.degreedays.net; using buildings energy consumption data for Petten. (Caution: Temperature is one variable affecting buildings' energy requirement, others include humidity and wind conditions).

Figure C5: Total annual degree days at Petten, 2012-2020

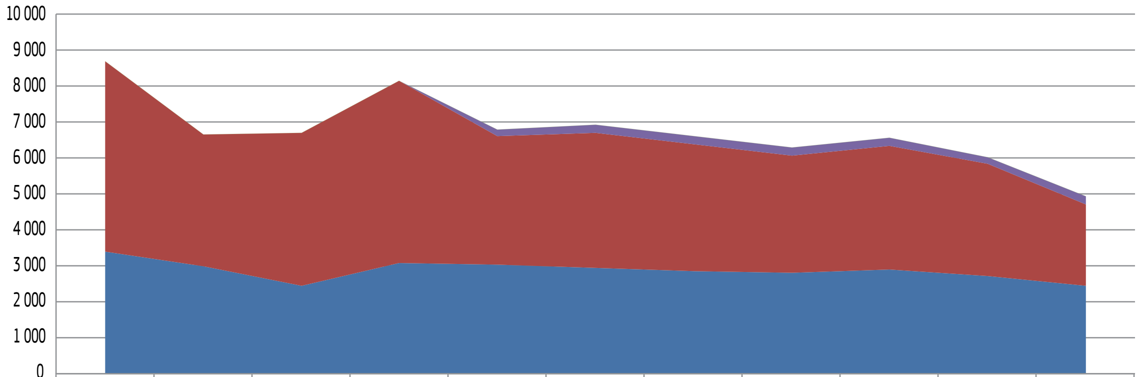


	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total degree days	2 389	2 591	1 983	2 102	2 351	2 190	2 431	2 205	2 089
Cold degree days, cooling required	272	290	354	250	386	333	494	381	401
Hot degree days, heating required	2 117	2 301	1 629	1 852	1 965	1 857	1 937	1 824	1 688
kWh/person/degree day	10.55	11.95	12.10	11.83	10.21	10.93	10.87	10.99	9.53

C4.1.1 Buildings

The evolution of total annual energy consumption is presented in Figure C6, per person and consumption per square metre is presented in figures C7 and C8.

Figure C6: Annual buildings energy consumption (MWh) in the EMAS perimeter (indicator 1a)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	8 690	6 665	6 707	8 143	6 766	6 913	6 623	6 298	6 551	6 035	4 918
diesel								14			
solar PV	0	0	0	0	148	208	230	227	217	205	201
mains supplied gas	5 290	3 675	4 281	5 061	3 598	3 795	3 543	3 255	3 427	3 105	2 271
electricity	3 400	2 990	2 426	3 082	3 020	2 910	2 850	2 802	2 906	2 724	2 444

In line with the heating degree data and due to the COVID pandemic we see a decrease (19%) of energy demand for buildings in 2020 compared to 2019 (this is below 2014 consumption). It is to be noted that the total energy consumption (MWh) also includes the energy from the geothermal pumps (1.3 MWh in 2020), which is not illustrated in figure C6.

Figures C7 and C8: Evolution of total annual energy consumption for Petten EMAS buildings

Figure C7

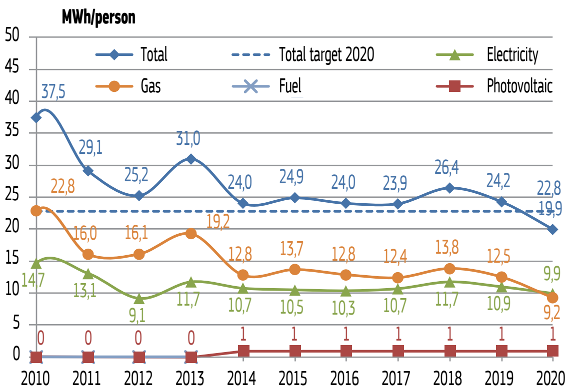
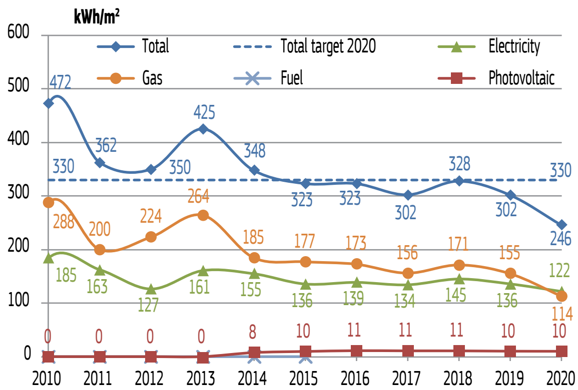


Figure C8



The plateau in overall energy consumption for buildings, identified in the previous exercise, continues. The JRC-Petten EMAS targets for 2020 (5% reduction for the period by 2014 to 2020) were reached. Due to periodical operational changes we see some annual variation in per capita, and per square metre consumption. Photovoltaic production declined slightly in 2020. There were no new panels but a small loss in efficiency.

The most significant action prioritising the reduction of energy consumption (indicator 1a) in the Annual action plan are summarised below.

Table C5: The most important action targeting indicator 1a (buildings energy consumption)

Action	Building(s)	Description of latest progress
Action: Insulation panels on the outside of building 310	INFRA	Contractual issues resolved, new company to be found, currently in progress.

C4.1.2 Site Vehicles

Table C6: Vehicle energy consumption (indicator 1b)

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total (MWh/yr)	6.24	6.12	5.42	29.49	50.05	55.77	53.02	35.65	18.83
MWh/person	0.023	0.023	0.019	0.106	0.181	0.212	0.214	0.143	0.076
Diesel used (m^3)	0.400	0.010	0.097	1.499	2.702	3.409	3.243	2.118	1.489
Petrol used (m^3)	0.200	0.638	0.463	1.398	2.189	1.979	1.879	1.397	0.325

Total annual vehicle energy consumption illustrated above is less than 1% of that for buildings. There are 4 site service vehicles which are used for internal goods transport, missions, taxi support to Schiphol and Petten. Vehicle efficiency has not changed, as there were no changes to the vehicle fleet. A decline of 47% compared to 2019 is the result of a decrease of usage of vehicles for missions due to the pandemic.

C4.1.3 Renewable energy use in buildings and vehicles

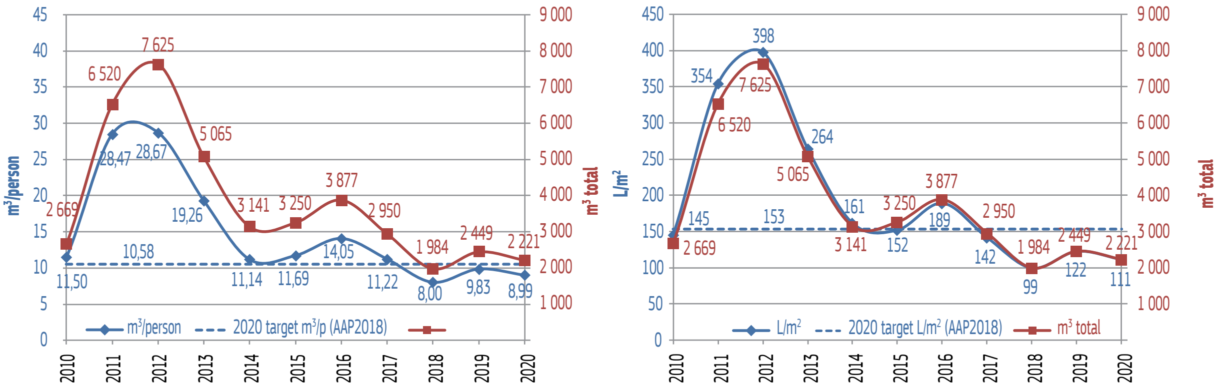
Table C7: Non-renewable energy use in the buildings

Source of energy	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019
Main supplied electricty (MWh)	3 400	2 990	2 426	3 082	3 020	2 910	2 850	2 802	2 906	2 724	2 444
from non renewables (%)	100	100	100	100	100	100	100	100	0	0	0
Mains supplied gas (MWh)	5 290	3 675	4 281	5 061	3 598	3 795	3 543	3 255	3 427	3 105	2 271
from non renewables (%)	100	100	100	100	100	100	100	100	100	100	100
Site generated PV (MWh)					148	208	230	227	217	205	201
from renewables (%)	100	100	100	100	100	100	100	100	100	100	100
Total renewables (MWh)	**i**				**148**	**208**	**230**	**227**	**3 124**	**2 930**	**2 647**
Total renewables (%)			**0.0**	**0.0**	**2.2**	**3.0**	**3.5**	**3.6**	**47.7**	**48.5**	**53.8**
Total energy use, (MWhr/yr)			**6 707**	**8 143**	**6 618**	**6 705**	**6 393**	**6 071**	**3 427**	**3 105**	**2 271**
Toal non ren energy as part of total, (%)			**100.0**	**100.0**	**97.8**	**97.0**	**96.5**	**96.4**	**52.3**	**51.5**	**46.2**

The portion electricity generated of total renewables by on-site solar panels is significant (7,59%), on sunny days buildings receive all of their electricity from the solar panels. In 2018 JRC-Petten greened the mains supplied electricity by purchase of Guaranties of Origin from sustainable resources (Dutch biomass). As a result, since 2018, nearly half of the site's energy consumption has been from renewable sources.

C4.2 Water consumption

Figures C9 and C10: Evolution of total annual water consumption for JRC-Petten (indicator 1d)

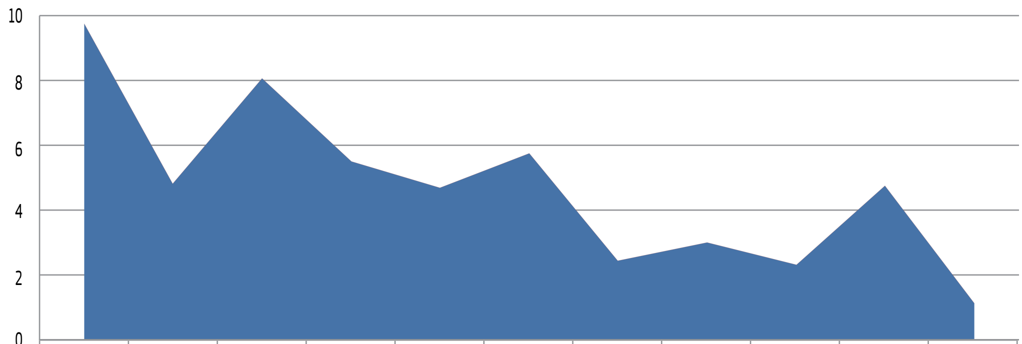


On-site water consumption decreased to a historical low in 2018. In 2019 there was an increase again, which may be due to scientific activities. In 2020 the water consumption decreased slightly, achieving the 2020 target.

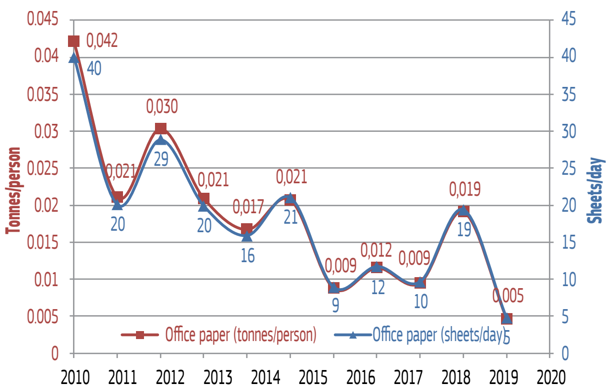
C4.3 Office and print shop paper

The evolution of office paper consumption at Petten and per capita breakdown presented below.

Figures C11 and C12: Evolution of paper consumption at Petten (totals, per person)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Office (A4 sheet equivalent) x1 000 000	1.96	0.97	1.62	1.10	0.94	1.23	0.52	0.65	0.50	1.02	0.25
Total paper consumption (tonnes)	9.77	4.832	8.07	5.503	4.707	5.762	2.42	3.03	2.35	4.7585	1.153
Offset paper (tonnes)	0	0	0	0	0	0	0	0	0	0	0
Office paper (tonnes)	9.77	4.83	8.07	5.50	4.71	5.76	2.42	3.03	2.35	4.76	1.15

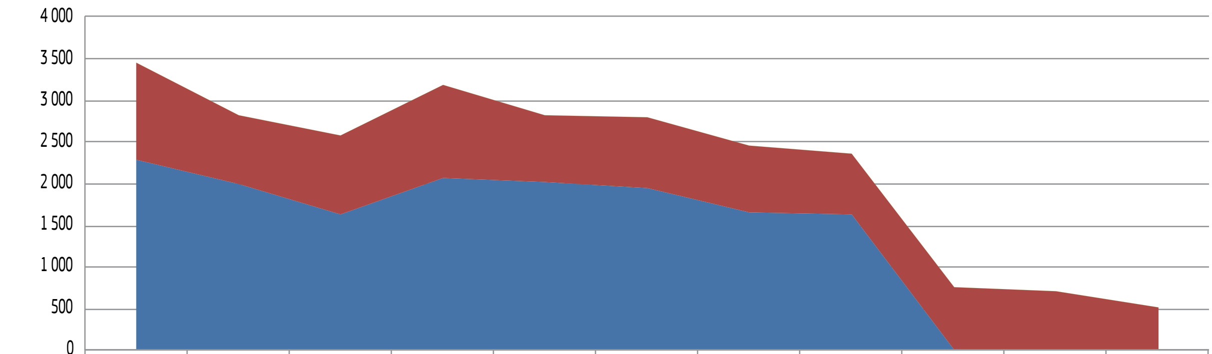


Paper use at Petten site has a long-term downward trend. The calculation of paper consumption in Petten was based on purchased paper, which changed in 2020 to printed sheets. In 2020 the paper consumption dropped to a historical low. This drop can be explained due to the teleworking transition of the majority of staff members due to the COVID pandemic.

C5 Reducing air emissions and carbon footprint

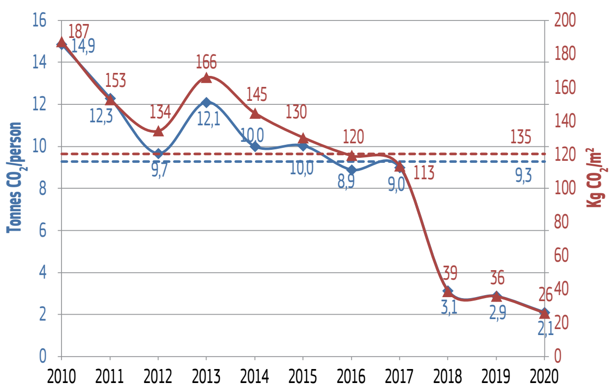
C5.1 CO_2 emissions from buildings a) Buildings (energy consumption)

Figure C13: Total emissions from buildings' energy consumption, tonnes (indicator 2a)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	3 446	2 816	2 571	3 182	2 819	2 788	2 451	2 364	779	717	520
diesel								5			
mains gas	1 165	809	943	1 114	792	836	780	717	755	695	508
electricity	2 281	2 006	1 628	2 068	2 026	1 953	1 671	1 643	12	11	0

Figure C14: CO_2 Emissions per capita and square metre



CO_2 emissions from buildings energy consumption were massively reduced in 2018 due to greening the electricity by certificates of origin.

The EMAS indicators 2a and 2b show the achievement of the 2014-20 target. The positive trend is continued in 2020 and indicates the continuous reduction of CO_2 for buildings energy consumption aiming to reach the 2023 EMAS target. In the total carbon footprint, this is significant as can be seen in figures C17 and C18.

C5.1.1 Buildings other greenhouse gases (refrigerants)

Table C8: Emissions of equivalent CO_2 emissions (tonnes) from cooling installations (indicator 2b)

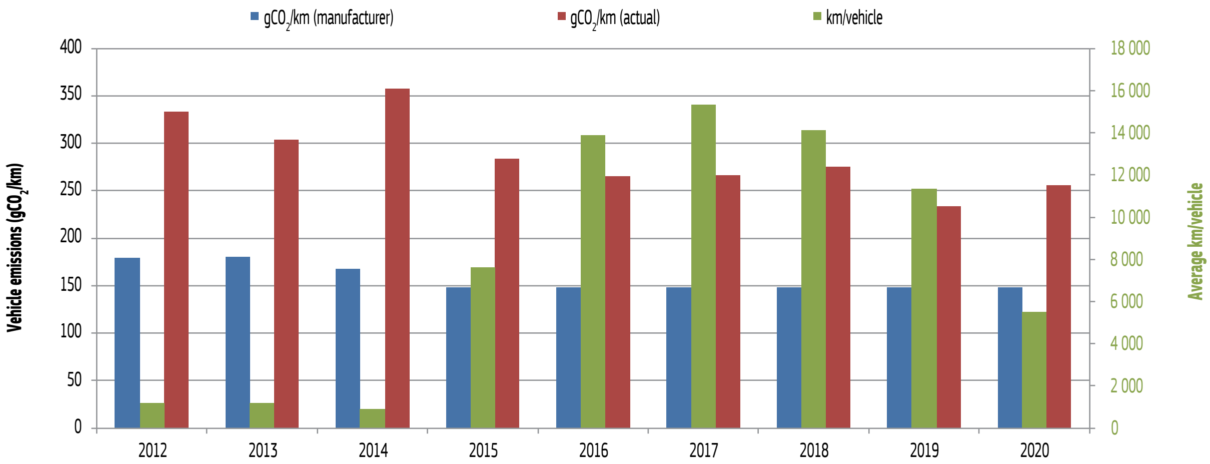
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
R410a (t CO_2 e)	2.51	0.00	0.00	0.00	82.56	48.07	0.00	28.34	2.40
R407C (t CO_2 e)	0.00	5.33	11.98	0.00	5.25	0.00	0.00	13.93	0.00
R507A (t CO_2 e)	0.00	0.00	0.00	16.50	0.00	55.41	27.95	0.00	0.00
Total (t CO_2 e)	2.51	5.33	11.98	16.50	87.81	103.48	55.11	42.27	2.40
Total Tonnes CO_2e /person	0.01	0.02	0.04	0.06	0.32	0.39	0.22	0.17	0.01
Total Tonnes CO_2e /m²	0.000	0.000	0.001	0.001	0.004	0.005	0.003	0.002	0.000

In 2020, there were limited losses from cooling installations. Some R410a losses were discovered.

C5.2 CO_2 emissions from vehicles (indicator 2c)

C5.2.1 Commission vehicle fleet

Figure C15: Fleet CO_2 emissions and fleet usage



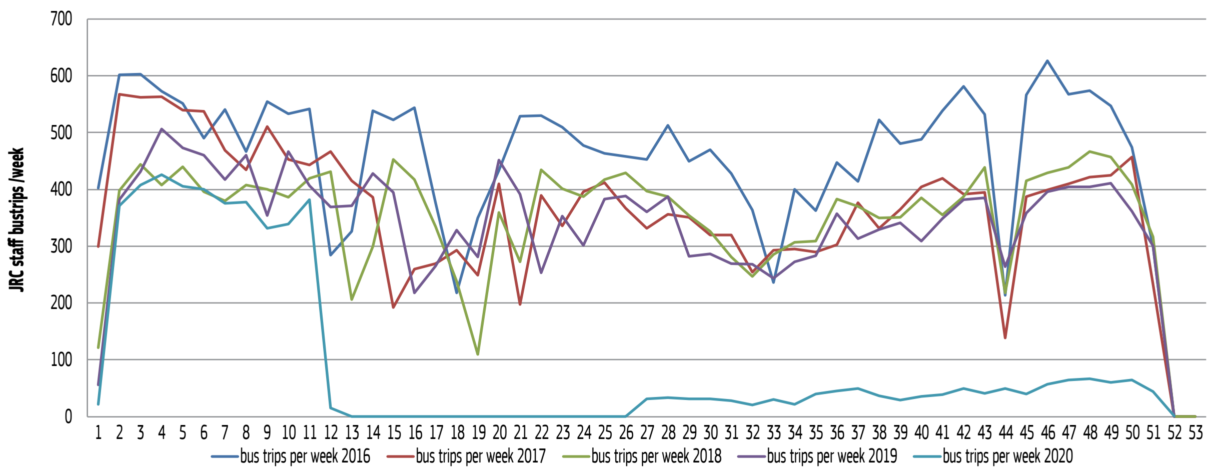
The use of the site vehicle fleet decreased significantly more than a half in 2020 to an average of 5490 km per vehicle. There were no changes in vehicle fleet in the last four years and therefore manufacturer emissions per km were unchanged. The 'actual' values include upstream emissions from fuel supply and add about 25% to the total.

C5.2.2 Missions and local work based travel (excluding Commission vehicle fleet)

Missions and commuting emissions fall under scope 3 – a broad category of emissions, which includes emissions from manufacture of products procured (e. g. paper production, IT, buildings), services provided by subcontractors, and emissions generated in the extraction, production, and distribution of energy carriers. Figures C17 and C18 present the emission in total tonnage for the Petten site and the tonnage per person annually.

C5.2.3 Commuting

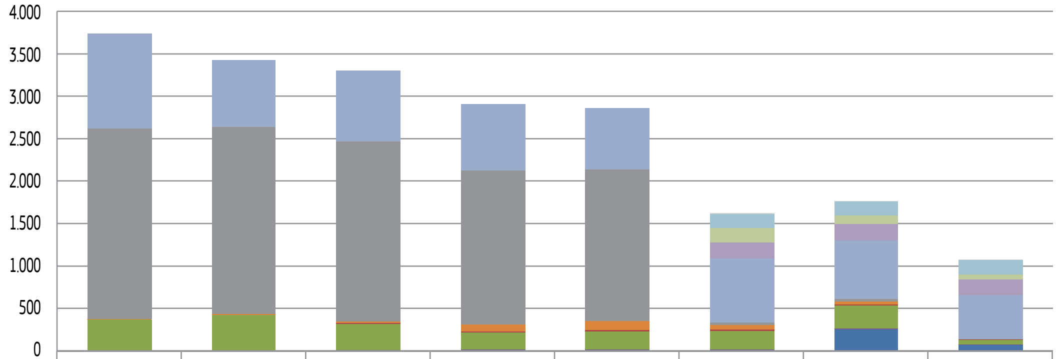
Figure C16: Petten bus service weekly usage



The sudden drop of bus usage in 2020 due to the COVID pandemic is visible in week 12. The trend of a decreased bus usage continued until the end of the year.

C5.3 Carbon footprint

Figure C17: Carbon footprint elements (Tonnes CO_2 or equivalent)



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	3 734	3 427	3 301	2 909	2 855	1 620	1 767	1 071
Own waste	0	0	0	0	0	6	6	3
Catering	0	0	0	0	0	0	0	0
Service contracts	0	0	0	0	0	160	160	160
Paper supply	0	0	0	0	0	2	2	2
Fixed assets - Commission vehicles	0	0	0	0	0	3	2	1
Fixed assets - IT	0	0	0	0	0	169	101	60
Fixed assets - buildings	0	0	0	0	0	190	190	190
Buildings - fuels for heating	1 114	792	836	780	721	755	695	508
Buildings - electricity	2 244	2 199	2 119	1 813	1 783	24	23	11
Buildings - district heating/cooling	0	0	0	0	0	0	0	0
Buildings - coolant losses	5	12	17	88	103	55	42	2
Vehicle fleet - fuel consumption	2	2	9	15	16	16	11	6
Missions (air, RFI 2)	366	418	308	197	216	226	269	48
Missions (excluding air)	2	4	13	17	16	14	9	4
Staff commuting	0	0	0	0	0	0	256	74

The carbon footprint in 2020 is considerably decreased compared to 2019, in line with the earlier values.

The carbon footprint summary is extended with extra scope 3 environmental impacts from waste, IT and contracting of external support. The addition of "fixed assets" buildings is the carbon emission made during construction divided by 35 for the yearly amount of CO_2. Fixed assets IT is the collection of equipment we use, the annual CO_2 load is based on a five-year amortization. Supply contracts are the external experts and services like security guards and cleaning.

Table C9: Carbon footprint per scope (tonnes of CO_2/person)

	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Fuel consumption and fugitive emissions								
Fuel for bldgs: mains gas	3.47	2.30	2.46	2.31	2.23	2.49	2.30	1.70
Fuel for bldgs: tanked gas (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet	0.01	0.00	0.02	0.04	0.05	0.05	0.03	0.02
Refrigerants	0.02	0.04	0.06	0.32	0.39	0.22	0.17	0.01
Scope 2: Purchased energy								
External electricity supply (grey),	7.86	7.19	7.02	6.06	6.25	0.00	0.00	0.00
External electricity supply contract (renewables), combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (combustion) (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scope 3: Other indirect sources								
Fuel for bldgs: mains gas (upstream)	0.77	0.51	0.55	0.51	0.50	0.55	0.49	0.36
Fuel for bldgs: tanked gas (upstream) (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet (upstream)	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00
Site generated renewables (upstream) (3)	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05
External grey electricity supply, line losses	0.67	0.61	0.60	0.51	0.53	0.00	0.00	0.00
External 'renewables' electricity contract (upstream with line loss)	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00
District heating (upstream) (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business travel: air (combustion)	1.39	1.48	1.11	0.71	0.82	0.91	1.08	0.20
Business travel: rail (combustion)	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00
Business travel: hire car (combustion)	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00
Business travel: private car (combustion)	0.01	0.00	0.02	0.04	0.05	0.05	0.03	0.02
Commuting (combustion) (4)	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.30
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	0.77	0.76	0.77
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	0.68	0.41	0.24
Fixed assests - Commission vehicles	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Paper supply	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Service contracts	0.00	0.00	0.00	0.00	0.00	0.65	0.64	0.65
Catering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Own waste	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.01
(Other category) - Ispra								
Sum	**5.67**	**4.36**	**4.25**	**3.97**	**4.08**	**6.37**	**6.02**	**6.02**

(1) - Grange is the only site with no mains gas supply
(2) - Can include Commission bus service where appropriate
(3) - Only applies to Brussels
(4) - Not all sites
Note: excludes commuting

The combustion of mains supplied gas for buildings is the main contribution to the carbon footprint, accounting for 34% of the total.

C5.4 Total air emissions of NO_x

Table C10: NO_x emission

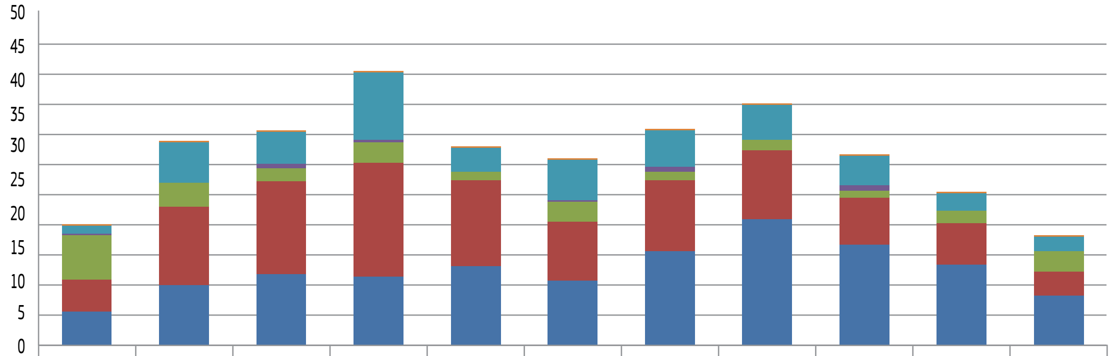
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total NO_x emission (tonnes)	0.805	0.540	0.685	0.800	0.614	0.748	0.624	0.425	0.448	0.417	0.308
Change %		-33	27	17	-23	22	-17	-32	5	-7	-26

NO_x is generated by heating installation as by-product of the combustion, more when the temperatures are high. In 2017 we had a significant decline due to the new low temperature heating installation in building 310. A reduction of 50% in NO_x emissions has been achieved since 2014, the reference year for 2014-20 core indicators performance targets.

C6 Improving waste management and sorting

C6.1 Non-hazardous waste

Figure C18: Evolution of total non-hazardous waste in Petten (tonnes)

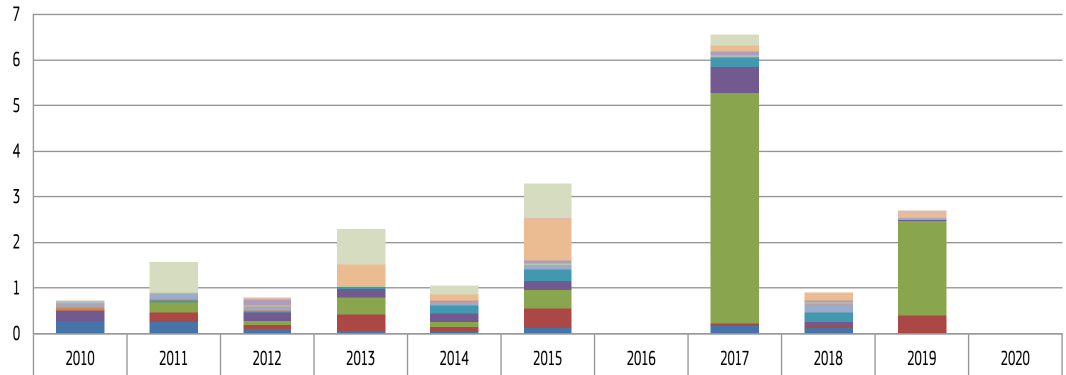


	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	18.0	30.3	32.0	40.8	29.6	27.8	32.2	35.9	28.4	24.2	16.3
Total (tonnes/person)	0.08	0.13	0.12	0.16	0.10	0.10	0.12	0.14	0.11	0.10	0.07
Metal	1.3	6.0	4.8	10.1	3.7	6.0	5.4	5.1	4.5	2.7	2.2
Glass	0.2	0.0	0.6	0.5	0.0	0.3	0.9	0.0	0.7	0.0	0.0
Wood	6.5	3.6	2.1	2.9	1.1	3.1	1.2	1.7	1.0	1.8	3.0
Paper and cardboard	4.9	11.6	13.9	17.1	12.9	8.7	10.7	10.2	7.1	6.2	3.7
Household waste	5.1	9.1	10.6	10.2	11.9	9.7	14.0	18.9	15.0	12.1	7.4

In 2020 the total amount of non-hazardous waste remained below the 2014 value; in most categories the values are lower than the last years. Furthermore, it can be seen that the amount of paper waste further decreases. Household waste has reduced significantly since 2017 owing to staff probably reducing their waste due to EMAS campaigns. The decrease in 2020 is also explained due to the pandemic.

C6.2 Controlled waste

Figure C19: Evolution of total hazardous waste in Petten (tonnes)



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	0.73	1.35	0.72	1.93	0.96	2.89	0.00	6.55	0.90	2.79	0.00
Total (tonnes/person)	0.003	0.006	0.003	0.007	0.003	0.010	0.000	0.025	0.004	0.011	0.000
Developer	0.00	0.67	0.00	0.77	0.20	0.74	0.00	0.24	0.00	0.00	0.00
Asbestos material	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.07	0.00
Mercury containing objects	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Lead-acid battery	0.02	0.00	0.03	0.48	0.13	0.90	0.00	0.11	0.17	0.07	0.00
Fire extinguisher	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flourescent lamps	0.00	0.00	0.13	0.00	0.00	0.06	0.00	0.09	0.05	0.02	0.00
Medical waste	0.01	0.01	0.01	0.01	0.00	0.04	0.00	0.01	0.03	0.01	0.00
Spray cans	0.01	0.00	0.01	0.00	0.04	0.01	0.00	0.00	0.01	0.00	0.00
Solvent	0.06	0.14	0.07	0.00	0.05	0.08	0.00	0.03	0.17	0.04	0.00
Paint	0.06	0.00	0.02	0.01	0.01	0.03	0.00	0.00	0.01	0.00	0.00
Metal containing waste	0.01	0.06	0.02	0.04	0.16	0.23	0.00	0.21	0.20	0.00	0.00
Waste oil	0.24	0.00	0.21	0.21	0.20	0.20	0.00	0.57	0.09	0.03	0.00
Electrical equipment (WEEE)	0.00	0.22	0.08	0.37	0.10	0.41	0.00	5.05	0.00	2.06	0.00
Laboratory mixed waste	0.00	0.22	0.08	0.37	0.10	0.41	0.00	0.06	0.05	0.37	0.00
Batteries	0.28	0.25	0.11	0.06	0.05	0.14	0.00	0.18	0.13	0.03	0.00

The amount of disposed hazardous waste increased in 2019. But this was due to the transport of electronic-waste (WEEE) in 2019 that had been collected in 2018 and 2019. WEEE is a main contributor to hazardous waste. In 2020 there was no hazardous waste collected on site due to the renewal of the waste contract.

C6.3 Waste sorting

Table C11: Percentage of waste sorted at JRC-Petten

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Percentage of waste sorted	27.1	28.8	32.5	23.9	39.0	31.7	43.5	44.5	51.3	44.9	45.6
Percentage of waste not sorted	72.9	71.2	67.5	76.1	61.0	68.3	56.5	55.5	48.7	55.1	54.4

The percentage of sorted waste increased slightly compared to 2019. In late summer 2020 new waste bins were installed on site, supporting the increased separation of different waste streams. A new waste contract will come into effect in 2021.

C7 Protecting biodiversity

Due to a new calculation of the different parts of surface required by Annex IV, the following values count for the Petten site:

1. Total use of land in m^2: 332 500 m^2
2. Total sealed area in m^2 59 909 m^2
3. Total nature-oriented area on site: 75 591 m^2
4. Total nature-oriented area off site 197 000 m^2.

Slightly over a third of the JRC-Petten site is designated under Natura 2000.

Figure C20: Initiating Nature management plan

Staff from an external company analyzing the nature in the Natura-2000 dune area adjacent to the JRC-Petten premises

According to Annex IV, land-use with regard to biodiversity is an important aspect. In 2019 an external company was asked to perform a nature management plan for the Nature oriented area, a Natura-2000 dune area adjacent the JRC-Petten premises. The results were delivered in 2020 and three different scenarios to improve the biodiversity and protect endangered species and habitats were suggested. In 2021 JRC-Petten received a budget to implement the advanced scenario for nature preservation and restoration in order to achieve the goal to sustain biodiversity on site.

C8 Green Public Procurement

C8.1 Incorporating GPP into procurement contracts

No new specific actions have been undertaken in 2020 but environmental criteria have systematically been considered when defining selection and award criteria in procurement, where possible.

C9 Demonstrating legal compliance and emergency preparedness

C9.1 Management of the legal register

JRC-Petten maintains a register of legal requirements for environmental aspects which is updated every six months. The site has a contract with an external legal consultancy filtering the applicable legislation in an online tool. JRC-Petten has access to the online tool and extracts the register of legal requirements from there. Additionally, the register is updated after having meetings (online) with the external legal consultancy informing about new and/or changing legislation. Any significant change with significant impact is communicated to the relevant staff. Examples of relevant changes were; labelling of lithium batteries during transport, authority changes in asbestos removal. The Environmental license for the JRC-Petten site was obtained on 24th of June 2016.

C9.2 Prevention and risk management

The Petten site applies risk based management for safety and environmental aspects; work place assessments, general risk inventories and risk assessments for specific tasks.

C9.3 Emergency preparedness

The organisation's emergency plans were revised in 2017 based on 44 identified emergency scenarios. They are based on risk management methodologies and also cover environmental risks. In 2019 again there was an exercise for an environmental relevant scenario, a possible fire in a battery storage location. Contacts with the local quick response team (QRT, formerly fire brigade, operated by the neighbour organisation NRG), have been established in order to identify environmental risks. Due to the pandemic no exercises for emergency preparedness could be performed.

C10 Communication

C10.1 Internal communication

In 2020 there were

- 2 newcomer trainings
- 3 internal environmental communications
- 1 presentation to the C.1 Energy storage unit
- 2 Safety and environmental tours

C10.2 External communication and stakeholder management

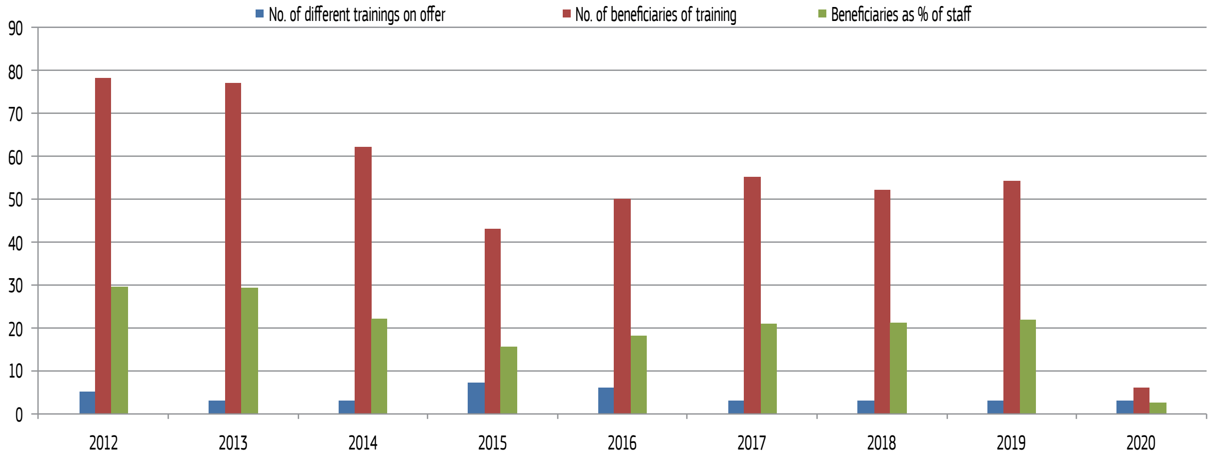
Table C13: External stakeholder communication

Stakeholder	Purpose
Municipality Schagen	In the context of the fence of the site (Omgevingsvergunning)
Province Noord-Holland	In the context of geothermal well, inspection of reported values
Hoogheemraadschap Hollands Noorderkwartier	In the context of wastewater pollution measurements
Omgevingsdienst Nordzeekanaalgebied	In the context of yearly notification with regard to heat storage in the geothermal system
AMART	Wastewater pollution measurements 'afvalwaterputten'
Flora & Fauna committee	Foster and stimulate bio diversity
Municipality Schagen (RUD)	Check on granted and planned permits
Energy and Health Campus (EHC)	In the context of the fence and zoning plan of the site
National forestry	Collaboration in nature management and biodiversity
JRC DG HR	Communication of stakeholders expectations

C11 Training

C11.1 Internal training

Figure C21: Evolution of site based training



In 2020 the Petten site organised two newcomer sessions for a total of 6 newcomers. The drop of site based trainings can be explained due to the COVID pandemic and the absence of a Site Environmental Officer until June 2020.

C11.2 External training

The JRC-Petten EMAS site coordinator and the JRC-Petten Environmental officer participated to the following two EMAS site coordinators workshops.

- Geel, March 5-6, 2020
- MS Teams, November 20 – 27, 2020

C12 EMAS Costs and saving

Table C14: EMAS administration and energy costs for buildings in the Petten EMAS area

Item	Costs											Change in last year
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Total Direct EMAS Cost (EUR)	0	0	66 000	66 000	66 000	67 000	67 000	69 000	74 000	75 000	76 000	1 000
Total Direct Cost per employee	0	0	248	251	234	241	243	262	298	301	308	6
Total buildings energy cost (Eur)	430 950	345 762	324 714	399 680	345 359	343 937	330 934	678 460	331 126	306 750	257 700	-49 049
Total buildings energy cost (Eur/person)	1 858	1 510	1 221	1 520	1 225	1 237	1 199	2 580	1 335	1 232	1 043	-189
Total fuel costs (vehicles) (Eur)	0	0	820	970	821	4 046	6 796	7 400	7 034	4 849	2 423	-2 426
Total energy costs (Eur/person)	0	0	3	4	3	15	25	28	28	19	10	-10
Total water costs (Eur)	5 338	13 040	15 250	10 130	6 282	6 500	7 754	5 901	3 968	4 897	4 442	-455
Water (Eur/person)	23	57	57	39	22	23	28	22	16	20	18	-2
Total paper cost (Eur)	15 632	7 731	12 912	8 805	7 531	9 219	3 872	4 848	3 760	7 614	1 845	-5 769
Total paper cost (Eur/person)	67	34	49	33	27	33	14	18	15	31	7	-23
Waste disposal (general) - unit cost/tonne	90	90	90	90	90	90	90	90	90	90	90	0
Waste disposal (general) - Eur/person	6.98	11.90	10.82	13.98	9.43	9.00	10.50	12.28	10.31	8.74	5.94	-2.79
Waste disposal (hazardous) - unit cost/tonne	750	750	750	750	750	750	750	750	750	750	750	0
Waste disposal (hazardous) - Eur/person	2.36	4.41	4.41	2.04	2.55	4.12	4.12	4.12	4.12	4.12	4.12	0.00

C13 Wastewater quality

Table C15: Wastewater quality tested at JRC-Petten

Emissions to wastewater		2013	2014	2015	2016	2017	2018	2019	2020
Substance	**Limit mg/m³**								
Chloride (Cl-)	-	210	200	240	120	250	160	140	120
Release of heavy metals to the sewer system									
Mercury (Hg) - Limit 10mg/m³	10	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	<0.1	0.15
Cadmium (Cd) - Limit 20mg/m³	20	<0.4	<0.4	<0.4	<0.4	<0.4	0.53	0.46	0.56
Zinc (Zn)	The sum of 5 metals < 5000	300	120	120	140	180	210	150	220
Copper (Cu)		160	180	170	160	220	330	210	290
Nickel (Ni)		5	5	5	8.2	7.9	19	5.3	7.3
Chromium (Cr)		5	5.8	6.3	<5	<5	<5	<5.0	<5.0
Lead (Pb)		5	5	0	<5	<5	<5	<5.0	8.8
Arsenic (As)		1.5	1.5	0	<1.5	1.5	1.8	<1.5	4.8
Metals: the sum of the 5 highest values - 5000 mg/m³		475	316	301	308	408	565	365	531
EOX (plug monsters) organohalogen compounds -	1 000	<100	<100	<100	<100	<100	NR	-35	45
Silver and organic solvents									
Silver	1 000	330	330	300	310	-	-	-	-
organic solvents (sum Aromats + sum Chloranilifates)	1 000	2.5	2.5	2.5	2.5	0.626	NR	NR	NR
Wastewater discharge (m³)									
Wastewater from chemical laboratiries in 312 (m³)*	-	not emptied	4	4	4	2.8	2.9	2.10	2.11
The total discharge of waste water to the sewers (m³)	-	5 567	3 060	3 060	3 150	2 784	2 785	2 786	2 787

*Collected in separate tanks and emptied by an external certified company, in m³

Wastewater discharge and quality is measured yearly during a week determined by the authorities and during which the discharge volume is measured along with concentration of heavy metals, organic solvents and chlorides. The data from this measurement is used as basis for taxation. For monitoring purposes we conduct two separate investigations each year on four emission points, each located in different laboratories. These results give an indication of whether concentrations comply with legal limits for end of pipe discharge for the site.

C14 Conversion factors for JRC-Petten

Table C16: Conversion factors for JRC-Petten

Parameter and units	2012	2013	2014	2015	2016	2017	2018	2019	2020
kWh of energy provided by one litre diesel	10.89	10.89	10.89	10.89	10.89	10.89	10.89	10.62	10.89
kWh of energy provided by one litre petrol	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42
Paper Density (g/m²)	80.0	80.0	80.0	75.0	75.0	75.0	75.0	75.0	80.0
Kgs CO_2 from 1 kWh of electricity (if grid average..)	0.671	0.671	0.671	0.671	0.586	0.586	0.000	0.000	0.671
Kgs CO_2 from 1 kWh natural gas	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.244	0.24
Kgs CO_2 from 1 kWh diesel fuel	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.324	0.33
Kgs CO_2 from one litre of diesel	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
Kgs CO_2 from one litre of petrol	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81
Annual cost of one FTE (EUR)	132 000	132 000	132 000	134 000	134 000	138 000	148 000	150 000	132 000

The conversion factors for CO_2 are adapted for values sourced by: Base Carbone, ADEME, 2017

C15 Site breakdown performance of selected parameters

Table C17: Site breakdown in building usage

Building	Address	Occupant	EMAS registration	Useful surface area (m^2)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	IT Server centre	Power generation	Water treatment plant	Lab/experimental (non nuclear)	Nuclear lab/experimental
JRC-PETTEN																			
308	Office building	JRC-Petten	NL 2013/01	**2227**	75	x													
309	Office building	JRC-Petten	NL 2013/01	**1994**	75	x													
310	Large experimental hall	JRC-Petten	NL 2013/01	**4083**	0													x	x
311	Smart grid laboratory	JRC-Petten	NL 2013/01	**340**	0													x	
312	Office building with some smaller laboratories	JRC-Petten	NL 2013/01	**4536**	50	x												x	
313	Offices, central store, mechanical workshop, storage, library, gym	JRC-Petten	NL 2013/01	**2668**	40	x						x	x	x	x			x	
314	Office, laboratory,	JRC-Petten	NL 2013/01	**1408**	15	x												x	
315a	Temporarily reception building	JRC-Petten	NL 2013/01	**82**	2	x													
316	Gas storage	JRC-Petten		0	0							x							
317	Boiler room	JRC-Petten		0	0							x							
318	Gasses distribution	JRC-Petten		0	0							x							
319	laboratory "Bunker"	JRC-Petten		0	0													x	
320	Offices	JRC-Petten	NL 2013/01	**240**	5	x													
321, 322, 323	Small storage	JRC-Petten		78	0							x							
324	Chemical waste storage	JRC-Petten		13	0							x							
325	Office building with some smaller laboratories	JRC-Petten	NL 2013/01	**1601**	15	x												x	
326	Gasses distribution	JRC-Petten		40	0							x							
327, 328	Small storage	JRC-Petten		36	0							x							
329	Bicycle and motor garage	JRC-Petten		68	0							x							
333	Controlroom Bunker	JRC-Petten	NL 2013/01	**65**	0								x					x	
340	Storage (maintenance, cars, workshop)	JRC-Petten	NL 2013/01	**752**	0							x	x						
351, 352	Small infra buildings	JRC-Petten		30	0							x							

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Annex D: JRC-Geel

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Cover illustration: Drangonfly at JRC-Geel - Original photo Christophe Korn.
Christophe KORN, European Commission, Joint Research Centre in Geel (JRC-Geel). Winners of the interinstitutional art competition 'Our home, our planet' (June 2017)

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ANNEX D: JRC-GEEL – Scientific Activities

JRC-Geel was founded in 1957 under the Treaty of Rome (The Treaty establishing the European Atomic Energy Community, Article 8) and started operating, in 1960, under the name of the "Central Bureau for Nuclear Measurements (CBNM)". In 1993, it was renamed the "Institute for Reference Materials and Measurements (IRMM)" to reflect the new mission of the Institute, covering a wider range of scientific domains including food safety and environmental protection. On 1 July 2016, as part of a major re-organisation of the JRC, the centre was renamed "JRC-Geel".

Over more than sixty years of its existence, the number of facilities on the JRC-Geel site has expanded to host new non-nuclear and nuclear activities. All facilities and infrastructure have been progressively and steadily renewed and maintained.

Since the EMAS registration of the European Commission (encompassing implicitly all its Directorates in 2011), JRC-Geel has started to develop environmental measures and strategies to involve in EMAS.

D1 Overview of core indicators at JRC-Geel since 2011

Since 2011, JRC-Geel has been collecting data on its site which are identified as core indicators. The data values compiled in 2011 and from 2014 to 2020 are shown in **Table D1**, along with performance trends and targets where applicable for 2020.

Reporting and the COVID-19 pandemic:

Reporting for 2020 retains the same approach for continuity, as previous years, and is therefore based on site activity and total staff numbers.

The data will therefore reflect the impact of a very significant staff absence on facilities operation.

The EMAS corporate coordination team has made 'high level' estimates of home consumption, due to telework under COVID-19, as described separately in the Corporate summary.

The potential to systematically include the impact of teleworking in annual reporting will be explored as more site specific information becomes available.

Table D1: Historical data, performance and targets for core indicators proposed for Commission-level reporting

Physical indicators:	Historic data values					Performance trend (%) since:		Target 2014-20		Target 2014-23		Future targets 2014-30	
(Number, description and unit)	2011 (1)	**2014**	2018	2019	2020	2011	2014	Δ % (2)	value (2)	Δ % (2)	value (2)	Δ % (3)	Value (3)
1a) Energy bldgs (MWh/p)	60.62	**51.21**	53.09	49.81	44.35	**-26.8**	-13.4	-5	48.649	-6.0	48.137	-7.5	47,369
1a) Energy bldgs (KWh/m^2)	427	**363**	272	258	233	**-45.5**	**-35.8**	-5.0	344.8	-29.0	257.7	-35.0	235,9
1c) Non ren. energy use (bldgs) %	0	**99.5**	31.8	28.9	30.5		**-69.3**	-5.0	94.6	-71.0	28.9	-75.0	24,9
1d) Water (m^3/p)	79.57	**34.75**	28.97	28.61	22.74	**-71.4**	**-34.6**	-5.0	33.011	-18.0	28.494	-20.0	27,799
1d) Water (L/m^2)	560	**246**	149	148	119	**-78.7**	**-51.5**	-5.0	234	-40.0	148	-45.0	135
1e) Office paper (Tonnes/p)		**0.022**	0.012	0.013	0.004		**-83.4**	-5.0	0.020	-45.0	0.012	-50.0	0,011
1e) Office paper (Sheets/p/day)		**20**	11	12	4		**-82.3**	-5.0	19.4	-45.0	11.2	-50.0	10,2
2a) CO_2 buildings (Tonnes/p)	17.57	**14.83**	4.94	4.16	3.88	**-77.9**	**-73.8**	-5.0	14.086	-78.0	3.262	-90.0	1,483
2b) CO_2 buildings (kg/m^2)	124	**105**	25	22	20	**-83.5**	**-80.6**	-5.0	99.8	-82.5	18.4	-90.0	10,5
2c) CO_2 vehicles (g/km, manu.)		**Not avail**	0	0	0			0.0	0	0.0	0	0.0	0
2c) CO_2 vehicles (g/km, actual)		**Not avail**	Not avail	0	0			0.0	N/A	0.0	N/A		N/A
3a) Non haz. waste (Tonnes/p)	0.267	**0.479**	0.292	0.249	0.151	**-43.3**	**-68.4**	-5.0	0.455	-50.0	0.240	-55.0	0,216
3b) Hazardous waste (Tonnes/p) (4)	0.075	**0.079**	0.067	0.081	0.019	-74.3	-75.8						
3c) Unseparated waste (%)	16.4	**29.0**	28.6	24.9	33.9	**106.5**	16.8	-5.2	27.5	-14.5	24.8	-15.0	24,7
3c) Unseparated waste (T/p)		**0.162**	0.103	0.082	0.058		-64.3	0.0	0.000	-58.0	0.068	-64.0	0,058
Economic indicators (Eur/p) (4)													
Energy consumption (bldgs)	5 181	**3 866**	4 029	4 811	3 826	-26.2	-1.1	-5.0					
Water consumption	84.0	**39.0**	87.3	89.8	72.1	-14.1	85.0	-5.0					
Non haz. waste disposal	0.0	**0.0**	156.0	145.5	118.0								

Note: (1) Earliest reported data; (2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018); (3) Draft figures from the Global Anual Action Plan 2021: (4) 2014-20 indicator discontinued

The evolution of the EMAS system in JRC-Geel is shown below in **Table D2**.

Table D2: EMAS baseline parameters

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population: total staff	331	322	341	346	328	296	265	259	262	266
Total no. operational buildings	14	14	14	15	16	16	16	16	16	17
Useful surface area for all buildings, (m^2)	46 996	46 996	46 390	48 815	50 538	50 538	50 382	50 499	50 525	50 651

Besides a 1.5 % rise in the number of staff in 2020, a slight increase of the useful surface area for all buildings (0.2 %) can be observed in **Table D2** as a result of the construction of a new high voltage cabin in building B040 and the new building B225 dedicated to the reception of the goods.

D2 Description of JRC-Geel activities[1] and key stakeholders

D2.1 Activities

The JRC, a Directorate-General of the European Commission (EC), is under the responsibility of Mariya Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth. The JRC employs over 3,000 staff, comprising scientists, researchers as well as administrative and support staff coming from all over the EU. Its offices and sites are located in Brussels (BE), Geel (BE), Ispra (IT), Karlsruhe (DE), Petten (NL) and Seville (ES). The JRC is a key player in providing scientific and technical support to EU policies foreseen by the Horizon 2020 Work Programme; the EU's programme for research and innovation.

JRC-Geel hosts EC staff from seven different Directorates (Directorates A, D, E, F, G, I and R of the JRC and a small group of staff of DG HR) in 17 different buildings.

While JRC-Geel staff reports to different Directors, the site operates under the responsibility of a single Site Director, Guy Van den Eede, the acting Director of the F Directorate for Health, Consumers and Reference Materials since 16 November 2019.

The scientific laboratory activities fall under the responsibility of:

- Directorate E: Space, Security and Migration

  Unit E.5 Transport and Border Security's mission is to contribute to improving transport safety levels in the EU in a growing, and increasingly intermodal transport system; provide standards, tools and services which can be deployed throughout the transport sector and used for harmonised reporting for maritime, air and rail traffic as well as border security aspects; evaluate the impact of new technologies on the security of the shipping container supply chain and technological support to the EU's Maritime project on the Common Information Sharing Environment for maritime surveillance.

- Directorate F: Health, Consumers and Reference Materials with units F.4, F.5, F.6.
  - Unit F.4 Fraud Detection and Prevention's mission is to produce, collect and validate the evidence base necessary for detecting and preventing fraud in the food chain and contribute to the fight against illicit consumer products.
  - Unit F.5 Food and Feed Compliance's mission is to support the harmonised implementation of food and feed legislation through the provision of reliable measurement solutions and standards for evidence based decision-making concerning the safety of the food chain. Unit F.5 also supports EU policy makers in tackling upcoming policy initiatives in the field of food and feed market authorisations and controls, such as for food allergens, contaminants, feed additives, food contact materials and Genetically Modified Organisms (GMOs). JRC-F.5 additionally operates all JRC-hosted European Union Reference Laboratories related to food safety and GMOs.
  - Unit F.6 Reference Materials' mission is to perform pre-normative research, to provide science-based policy advice and to develop, disseminate and promote measurement standards in support of EU policies for biotechnology, health, environment, energy and engineering including advanced materials and nanotechnology.

[1] NACE codes associated with Geel activities are: 99 – Activities of extraterritorial organisations and bodies; 71.2 Testing and technical analysis; 72.1 Research and experimental development in natural sciences and engineering

- Directorate G: Nuclear Safety and Security

  Unit G.2 Standards for Nuclear Safety, Security and Safeguards' mission is to provide high-quality reference nuclear data, measurement standards, science-based policy advice and training in support of EU policies related to nuclear safety, security and safeguards. Unit G.2 operates two accelerator-based nuclear data facilities, an underground laboratory, radionuclide metrology and nuclear reference materials laboratories. The unit cooperates closely with international organisations and offers relevance-driven open access to its nuclear facilities for external researchers from EU Member States and countries associated to the Euratom Research Programme.

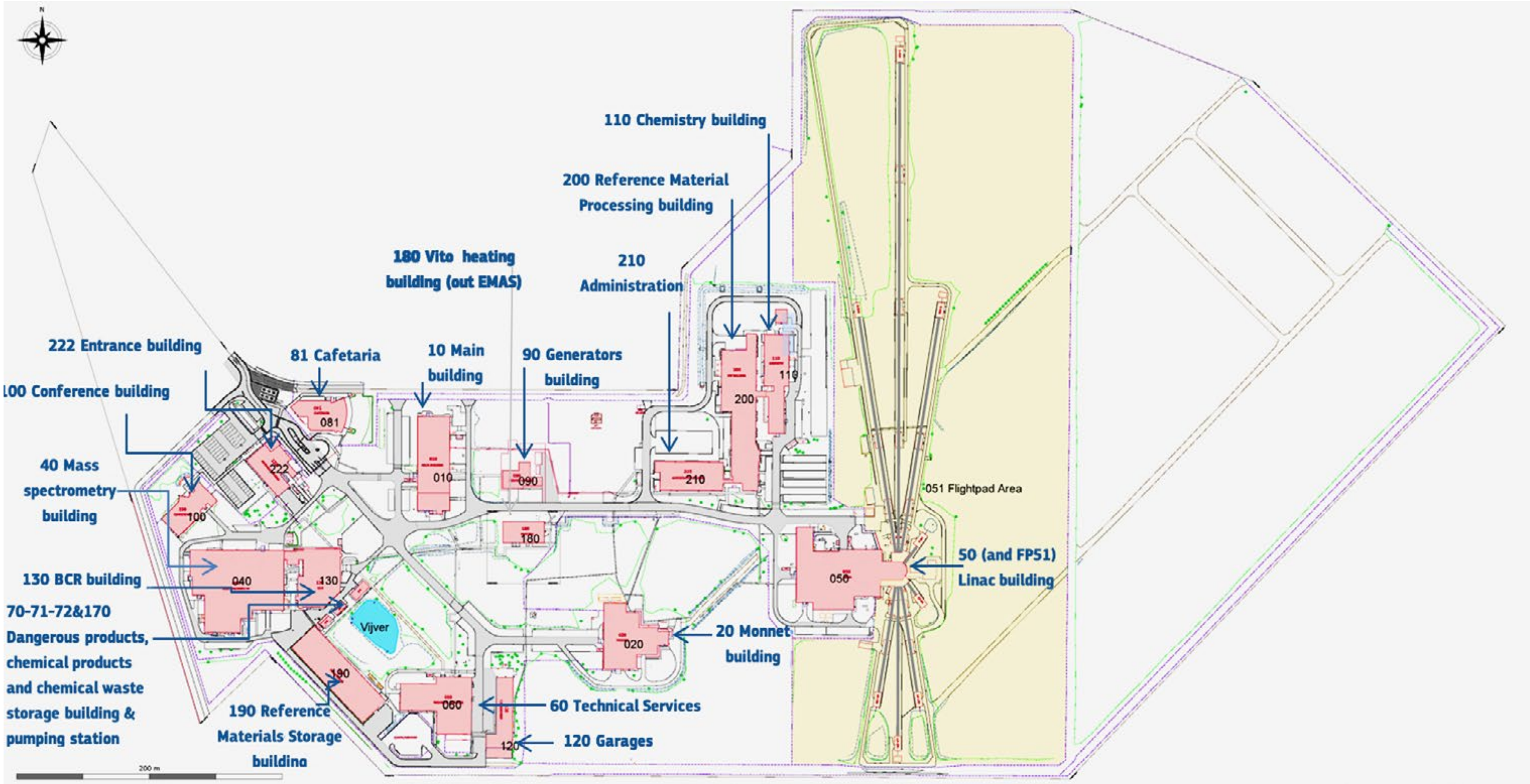
JRC-Geel's units of Directorates A (Strategy, Work programme and Resources), D (Sustainable Ressources), I (Competences), R (Support Services) carry out scientific, technical and support tasks without maintaining laboratories on the site.

JRC-Geel is located 80 km northeast of Brussels and 7 km north of Geel in Belgium as shown in **Figure D1**.

The facilities are spread throughout the site as shown in **Figure D2**.

Figure D1: Location of JRC-Geel (North of the city of Geel)

Figure D2: JRC-Geel site layout



D2.1.1 Analytical laboratories

JRC-Geel houses many analytical laboratories carrying out cutting edge chemical, biochemical, microbiological, biotechnological, and physical analytical work in fields such as food safety and quality, environment, clinical measurements, aviation and nuclear safety and security. The biotechnological and biochemical research are performed at JRC-Geel in biosafety levels 1 and 2 laboratories allowing work with hazardous materials.

These laboratories are equiped with sophisticated analytical instrumentation enabling multiple applications with a full range of spectrometric techniques including isotopic mass spectrometry, chromatography and hyphenated techniques and state-of-the-art sample preparation techniques.

JRC-Geel also owns mass metrology instrumentation enabling ultra-precise weighing.

D2.1.2 Reference materials processing and storage facility

JRC-Geel is a major certified reference material (CRM) producer, recognised worldwide and market leader in provision of GMO reference materials, among others. The range of reference materials produced at JRC-Geel varies from pure chemicals (including nuclear materials) to clinical, agricultural, food and environmental samples, so called matrix reference materials. To cope with the increasing world-wide demand for new reference materials for a broadening range of applications, JRC-Geel renewed its reference materials processing installations, in 2010, to create a unique scientific and technical facility among the major CRMs' producers. By combining specialised laboratories and its versatile pilot plant, this facility has been able to bridge the gap between laboratory and industrial scale and offers the capability to process simultaneously four different reference materials without any risk of cross-contamination.

JRC-Geel holds advanced storage facilities for keeping the reference materials, under the best conditions, before shipment. The CRM storage building accommodates refrigerated rooms (both cool and freeze) operating at temperatures ranging from 18 °C to - 40 °C as well as ultra low temperature freezers going down to - 80 °C. Storage conditions in JRC-Geel are monitored constantly. JRC-Geel has currently over half a million reference material samples in stock of more than 700 different CRM types.

D2.1.3 Nuclear laboratories

Measurements of neutron-induced reactions, cross-section standards and absolute measurements of radiation, i.e. radionuclide metrology, have been key activities at JRC-Geel since it started operating in 1960. Besides neutron data for standards, JRC-Geel has broadened its activities to nuclear management including safety of operating reactors, handling of nuclear waste and waste transmutation and investigating alternative reactor systems and fuel cycles. The preparation and production of certified nuclear reference materials made in restricted laboratories is an additional core activity in the nuclear area.

GELINA, the linear electron accelerator facility, has the best time resolution of its type combining i) a high-power pulsed linear electron accelerator, ii) a post-accelerating beam compression magnet system, iii) a mercury-cooled uranium target, iv) and flight path of 400 m. It is a multi-user facility serving up to 12 different experiments simultaneously. JRC-Geel also hosts the MONNET facility i.e. a 3.5 MV Pelletron Tandem accelerator for the production of continuous and pulsed ion beams. Furthermore, it operates a laboratory for ultra-sensitive radioactivity measurements inside the 225 m deep underground laboratory, HADES, located close to the premises of the Belgian Nuclear Research Centre. This shared facility is outside the EMAS scope.

Two nuclear areas are dedicated to the production of nuclear targets and certified nuclear reference materials. The controlled areas are equiped with multiple gloveboxes and dedicated equipment for the safe handling and preparation of the sample materials and targets.

D2.1.4 Explosives detection & transport security laboratories

JRC-Geel hosts the Commission's in-house experimental facilities for research on security screening equipment, comprising state-of-the-art detection equipment typically found at airport security check-points, such as X-ray screening equipment, security scanners and explosive-trace detection device. In that respect, JRC-Geel develops test materials and test methods to verify the performance of the specific equipment through technical assessments and methodology testing for priority applications, e.g. aviation security, first responders, border control and law enforcement.

D2.2 Context – risk and opportunities

JRC-Geel is located on a 38 ha site rented from the Belgian Centre for Nuclear Research SCK-CEN on the territory of the municipality of Mol (Belgium Flanders Region). It is legally bound to the regional regulations on environmental protection as well as to Belgian federal regulations regarding the environmental aspects of its nuclear activities.

D2.2.1 External issues affecting JRC-Geel's environmental performance[2]

The analysis, looking at the main external issues affecting JRC-Geel's environmental performance, considering both risks and opportunities, was updated in 2020 and highlights five main domains with a notable impact.

1. Political and legal:

    - Environment and climate changes become one of the highest political priorities having repercussions on the JRC-Geel environmental objectives. Besides the 2030 climate and energy targets (COP 2030) that the JRC-Geel is striving to achieve to mitigate the environmental and climate changes, the European Commission has decided to enforce in its policy the European Green deal which aims to reach Carbon neutrality by 2030-2050. For a scientific site as JRC-Geel carrying out high energy consuming research activities with an unneglectable carbon footprint, these environmental policies are really challenging and might compromise the fulfilment of ambitious objectives (waste segregation, CO_2 emissions etc.) and meeting its delivery commitments expected by its stakeholders. Alternatively, these requirements "offer" the possibility to reflect and identify new energy saving technologies or process alternatives addressed in the site development plan elaborated at JRC-Geel, and justify the necessary investments.

2. Economic

    - Economic uncertainties engendered by Brexit can be an obstacle to investments planned for financing of projects aiming at improving energy performance of the site (refurbishment, insulation, new buildings etc.). The energy "constraints" (increase energy costs: electricity, gas etc.) have also negative consequences by decreasing the possibility to proceed with other investments essential to meet EMAS targets. This could create an opportunity to develop projects focusing on lowering energy consuption justifying the necessary "investments".
    - The COVID-19 pandemic, which has resulted in a general confinement, has a definite impact on the JRC-Geel targets. The health crisis and the cessation of activities may lead to a reallocation of budgets to remedy emergency situations. Alternatively, the pandemic makes it possible to reduce mobility and resource consumption (energy, etc.), which are beneficial for reducing our carbon footprint.

3. Technological

    - To "respond to COP30 "exigences", JRC-Geel has looked to innovating technologies such as the geothermal heat recovery currently developed by VITO ("Vlaamse Instelling voor Technologisch Onderzoek") for the forthcoming distribution of warm water for heating its premises. The seismology activity makes this technology a risk in its implementation that may affect JRC-Geel defined targets. When installed, this technology will be a real opportunity to use a new green energy and a way to reduce the carbon footprint.
    - JRC-Geel seeks to improve the means for reducing its environmental footprint. The digitalisation of processes set at JRC–Geel and the incentives for electrical cars allow lowering the use of resources emitting carbon.

4. Environmental

    - The climate changes (global warming, frequent heat waves, increased heavy rains, storms,) affect the energy performance at JRC-Geel such as the need of higher energy from the HVAC systems for cooling.

[2] Identified using PESTLE criteria: Political Economic, Social, Technological, Legal, Environmental

5. Social

   - Developing "clear and transparent" communication of environmental impact on the society will increase its awareness and commitment to EMAS compliance.
   - Teleworking, either desired by the staff or forced by the pandemic can affect the management of environmental issues. These changes of working conditions are likely beneficial for the reduction of CO_2 emissions.

D2.2.2 Internal issues affecting JRC-Geel's environmental performance[3]

The daily functionning of JRC-Geel also triggers risks and opportunities influencing the environmental performance. The main internal issues are summarised below.

1. Activities

   - The nuclear activities carried out at JRC-Geel require extensive operational control and safety measures. The frequent visits and expertise of the inspection bodies could be an opportunity to continuously improve environmental performance and minimise risks.
   - The different installations and activities of JRC-Geel are highly energy consuming, the main one being the GELINA facility. The high costs caused by running this core activity could be minimised by investing in improved insulation and heat recovery.

2. Strategic direction

   - The EC decision for implementing EMAS affects positively the environmental management and performance of JRC-Geel.
   - The reorganisation of scientific units across the JRC sites settled in the different European countries has resulted in an higher amount of travel having a negative envionmental impact. Promotion of videoconferencing and sustainable event organisation could mitigate this risk.

3. Culture & employees

   - The reduction and aging of staff are critical for the JRC-Geel performance since it implies potential risks in terms of continuation of activities and a potential lack of knowledge transfer. Strengththening the environmental culture of JRC-Geel staff could increase its commitment and proactivity in preventing/solving any emerging issues.

4. Financial procedures, processes and system

   - The complexity and heaviness of the administrative procedures (procurement, financial, document system) can delay the delivery and, as a consequence, the activities carried out on site. Efforts made to simplify the procedures and the development of the e-procurement could help in this respect.
   - The "lack"/delay of implementation of a defined quality management tool can be a risk for the good management of documentation (use of obsolete docmentations) and the different management processes (non conformities etc.). The creation of a quality management office and the deployment of a common quality management tool will help to have a structured and harmonised documentation.
   - The externalisation of services on the JRC-Geel site requires sound contract management to avoid any incidents or non-compliance with EMAS/legal requirements The implementation of a procedure dealing with the process to work with third parties allows the follow up of the completion of the tasks and their compliance.

D2.3 Stakeholders' (interested parties) compliance obligations

JRC-Geel environmental performance also directly depends on the influence and interest of its main stakeholders. The major stakeholders identified by JRC-Geel during the annual analysis review of 2020 are represented in **Figure D3**.

[3] Identified using ASCPF criteria: Activities, Strategic Direction, Culture and employees, Processes and systems, Financial

Figure D3: Stakeholders' analysis

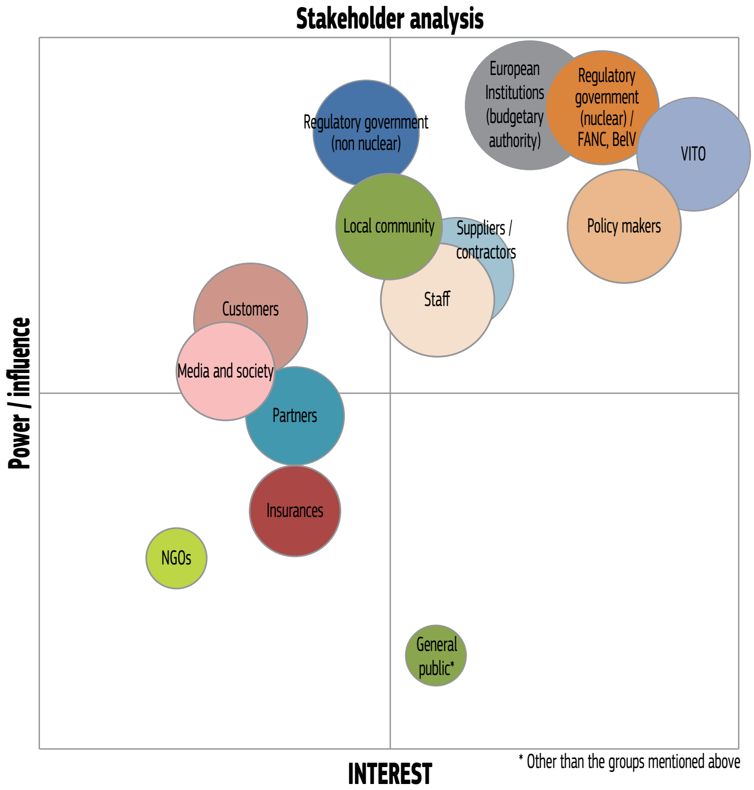


Figure D3 shows that among the 14 identified stakeholders, eight present a determining influence and interest on JRC-Geel environmental performance.

- The European Institutions have the main influence on the JRC-Geel environmental performance since they are the budgetary authority and the promoter of EMAS. The set-up of the Green Deal policy (end of 2019) heightens the expectations of the European institutions towards the JRC-Geel's results and the carbon neutrality.
- The nuclear activities at JRC-Geel make FANC (the Federal Agency for Nuclear Control), BelV (its technical subsidiary) and NIRAS (National Agency for Radioactive Waste and enriched Fissile Material) critical influencers of JRC-Geel environmental performance with regards to the nuclear aspects. These important stakeholders have also a clear interest that JRC-Geel strive to fulfil the legal requirements.
- The regulatory authorities of the Flanders region count on the full compliance with the applicable regulations. JRC-Geel demonstrates its adherence to the relevant laws through its annual declarations, reporting and the management of its environmental licence.
- VITO (Flemish Institute for Technological Research) has a major influence on the JRC-Geel's environmental performance through the supply of "central heat" which will be replaced in the coming years by geothermal heat. The foreseen replacement by the geothermal heat should drastically improve JRC-Geel's energy efficiency and lower its carbon footprint.
- Policy makers, at EU level as well as national and regional level, have strict requirements defined in their established regulatory and policy standards that the JRC-Geel shall be in conformity with and impact its environmental performance. The Commission takes to heart leading by example and complying with these standards;
- The local community is vigilant about the emergency safeguard measures JRC-Geel implements as well as the actions taken to mitigate local disturbances, in particular, noise in the direct neighbourhood. To reassure the local community, JRC-Geel both invites the "neighbourhood" to a yearly meeting to address these concerns and answers, in a timely manner, to the received complaints.
- Contractors are key players in the environmental performance of JRC-Geel as most of the infrastructure and/or maintenance work are outsourced. In 2020, JRC-Geel hired the company Bureau DW bvba,

specialised in Biodiversity, to develop a biodiversity action plan and forest fire prevention plan which have positive impacts on JRC-Geel environmental aspects and attract increasing interest regarding the protection of the environment and emergency preparedness.

- Staff has an essential role in the improvement of the environmental performance as it is a major "resource consumer" at JRC-Geel and will better commit for a conscious consumerism or implement best environmental practices on site when fully involved as foreseen in the EMAS-compliant management system.

The analysis of the stakeholders' needs and expectations shows that, notwithstanding compliance with the European, Federal (Belgian) and Regional (Flemish) regulations, the major needs and expectations of JRC-Geel stakeholders are included in the EMAS regulations. This is particularly true for the requirements regarding communication and ensuring that JRC-Geel respects all relevant legislation.

An additional expectation for 2020 was to take into account recommendations in the EMAS Sectoral Reference Document for Public Administrations, even if only partly applicable owing the additional laboratories and research activities at JRC-Geel. This has been analysed, presented and discussed at successive EMAS site coordinator workshops in 2019 and 2020. We consider that existing reporting at site level largely takes into account feasible recommendations, and further analysis is presented in the Corporate Summary.

The following environmental compliance obligations apply to JRC-Geel:

- Having an Environmental Management System (EMS) in line with the EMAS Regulation (Commission Decision C(2013) 7708 of 18/11/2013);
- Contributing to the objectives adopted by the EMAS Steering Committee, in particular the ones adopted for the period 2014-2020 (Note DG-HR/D.2/RV/CSM/MR of 24/01/2018);
- Using the core criteria of Green Public Procurement whenever applicable; and
- Ban the use of single use plastic.

D3 Environmental impact of JRC-Geel

D3.1 Environmental aspects

In the course of 2020, JRC-Geel updated its environmental aspects register. The aspects and the respective environmental impacts of the identified activities taking place on the site were assessed. Activities carried out in restricted areas were separately registered per building. The register includes the installations classified in the Environmental Regulation VLAREM II.

Table D3: Summary of significant environmental aspects for JRC-Geel

Aspect group	Environmental aspect	Environmental impact	Activity, product or service
Resources	Electricity & fossil fuel consumption	Reduction in natural resources	Heating, cooling, ventilation, electrical equipment and transport
	Paper consumption		For office activities, printing, training and communication requirements
	Water consumption		For catering, sanitary and technical installations
	Helium consumption		NMR[4]; mass spectrometers
Air	CO_2, SO_x, NO_x, CO, VOC emissions	Air pollution, climate change	Energy consumption, Internal transport Transport: work-related travel and commuting (organisation and personal)
	HFC gas emissions	Global Warming	Used in refrigerators and cooling systems
Local aspects	Noise	Disturbance of neighbourood	Ventilation
Waste	(Hazardous) waste production	Air, water and/or soil pollution, biodiversity risks	Laboratories, sanitary installations, cleaning, maintenance, office activities, IT and catering.
Water	Waste water discharge	Risk of eutrophication, water pollution	Sanitary and technical installations (cooling towers)
Biodiversity	Choice of products and their origin	Destabilisation of ecosystems	Catering and gardening, cleaning
	Choice of sites and type of buildings	Destruction of natural habitat, relief, visual pollution	In the context of the Commission's buildings policy (Life cycle approach)
Environmental risks (legal compliance and emergency preparedness)	Load losses, malfunctions, leakages, chemical spills, gas, waste, etc.	Air, water and/or soil pollution.	In the context of delivery, storage and use of chemicals/fuel used for maintenance of the technical installations, laboratory work, waste management, storage and fire prevention
(Indirect) financing	Indirect environmental aspects linked to programmes to be financed[5]	Environmental impact caused by third parties	Taking the environment into account in project selection and evaluation
(Indirect) public procurement	Environmental performance of contractors. Sustainability and impact of products and services selected[6].	Environmental impact caused by third parties	Integration of environmental clauses in contracts: influence of contract through 'sustainable' purchases Life cycle approach.

The evaluation of the environmental aspects register reveals that the main aspects for JRC-Geel consist of the use of energy, water and emissions to air and water.

4 NMR: Nuclear Magnet Resonance is a chemical analysis method, using high magnetic fields and radio waves. The high magnetic field is generated by electromagnets cooled with liquid helium

5 To protect local biodiversity, to minimise natural resources losses and reduce emissions relating to construction/development projects, etc.

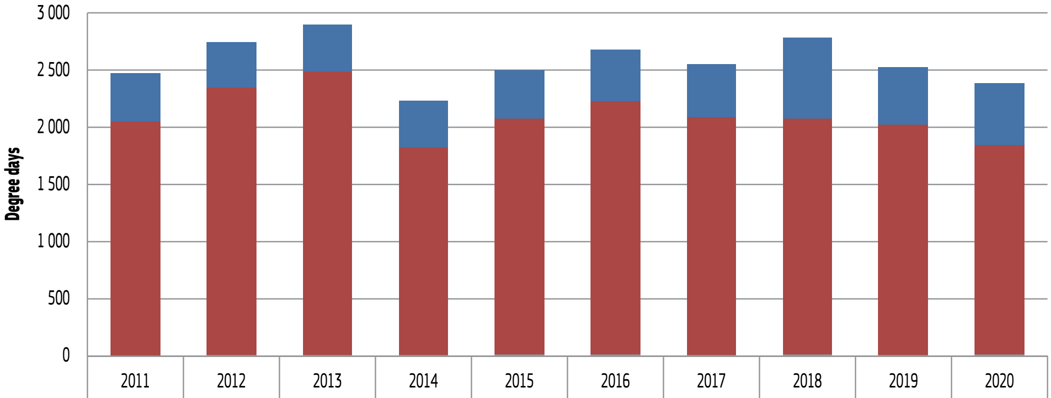
6 For example: transport, use of natural resources, the lifecycle of the product, recycling, waste management, etc.

D4 More efficient use of natural resources

D4.1 Energy consumption

The general climate changes are having an impact on the buildings' energy consumption. Degree day data[7] presented in **Figure D4** shows a trend with increasing number of cold degree days (requiring cooling) with the existence of a peak in 2018. The number of hot degree days (necessitating heating), on the contrary, continues to decrease in 2020 as from 2016.

Figure D4: Total annual degree days at JRC-Geel, 2011-2020

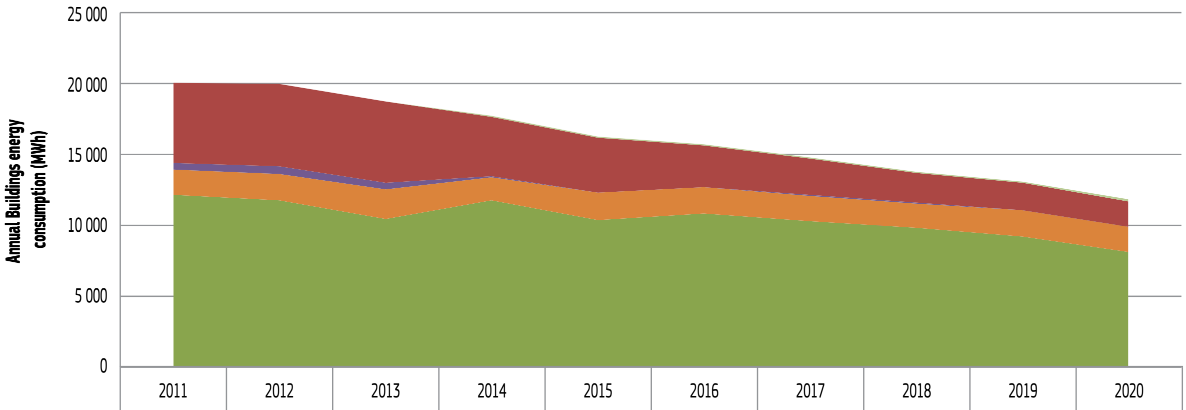


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total degree days	2 478	2 713	2 873	2 209	2 473	2 659	2 534	2 761	2 506	2 362
Cold degree days (CDD), cooling required	421	395	412	407	414	452	465	704	503	529
Hot degree days (HDD), heating required	2 057	2 318	2 461	1 802	2 059	2 207	2 069	2 057	2 003	1 833
kWh/person/degree day	0	22.82	19.14	23.18	20.02	19.99	22.01	19.23	19.87	18.78

D4.1.1 Buildings

The evolution of total annual energy consumption is presented in **Figure D5** and both **Figures D7** and **D8** when expressed per capita and per square metre respectively.

Figure D5: Annual buildings energy consumption (MWh) at JRC-Geel (indicator 1a)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	20 066	19 937	18 756	17 719	16 243	15 737	14 777	13 750	13 049	11 797
electricity heat pumps				84	75	79	74	74	74	101
hot water	5 700	5 799	5 747	4 153	3 837	2 937	2 579	2 113	1 913	1 779
diesel	449	490	490	78	26	27	32	36	33	9
mains supplied gas	1 759	1 902	2 108	1 673	1 963	1 860	1 791	1 718	1 827	1 812
electricity	12 158	11 745	10 411	11 730	10 343	10 833	10 301	9 809	9 202	8 096

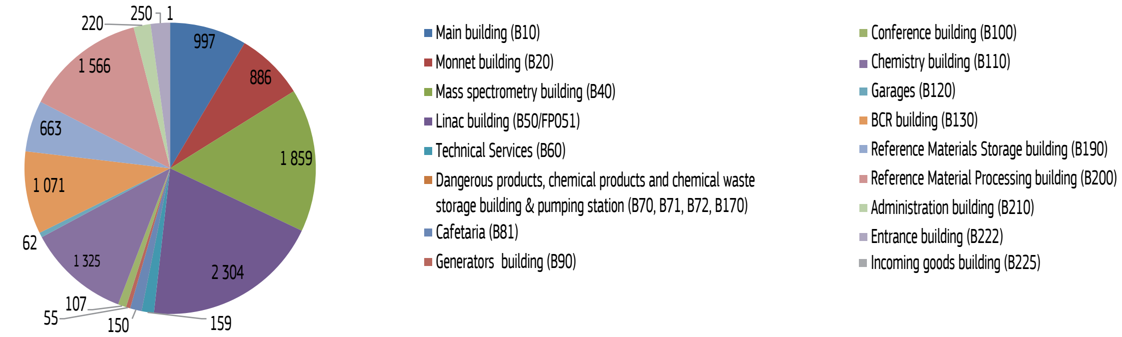
In 2020, around 80 % of the total energy is consumed by six out of the 17 buildings **(Table D4)**; the Linac building - B050 (hosting the linear accelerator) being the most intensive energy user (almost 20 %) as shown in **Figure D6** and **Table D4** listing the top 6 energy consumers. The classification of the main energy consumers remains the same as in 2019.

[7] Monthly data for Kleine Brogel station (15,5 °C reference temperature), www.degreedays.net using buildings energy consumption data for JRC-Geel.

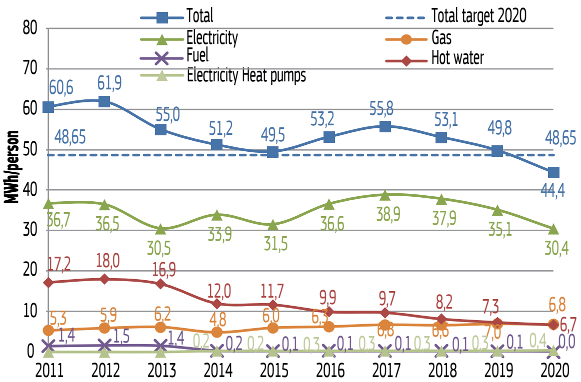
Table D4: JRC-Geel top 6 buildings' energy consumption in 2020

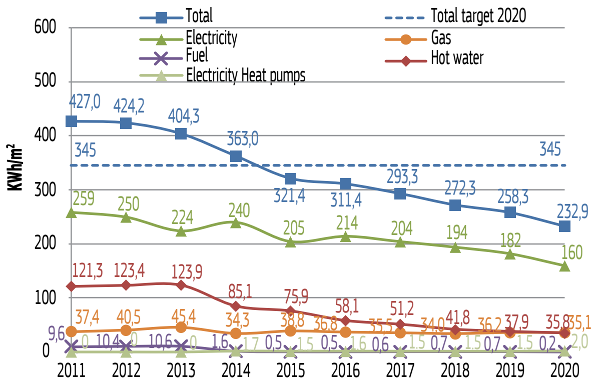
Building	B 050 Linac	B 040 MS	B 200 RMPB	B 110 Chemistry	B 130 BCR	B 10 Main	Total of 6
% total energy consumed	19.74	15.92	13.41	11.35	9.17	8.54	**78.13**

Figure D6: Energy consumption distribution per building in 2020 (MWh)



Figures D7 and D8: Evolution of total annual energy consumption for JRC-Geel buildings





The overall decrease in energy consumption in 2020 compared to 2019 (around 10 %) is largely attributed to around 12 % decrease in electricity use, a -7 % lowering of hot water consumption (district heating), a 73 % reduction of the Diesel consumption and a small decrease of main gas consumption (0.8 % decrease). These energy reductions are directly correlated to the COVID-19 pandemic as most of the activities were stopped leading to a low utilisation of vehicles on site and other energy resources. In addition, these decreases are the result of several actions put into place: a better efficiency of the newly installed power transformers in buildings 60 and 20 as well as the replacement of the street lighting by LED lights with automatic brightness control.

Electricity consumption still remains the first contributor of the overall energy consumption of the buildings on the Geel site.

The decrease of energy consumption in 2020, allows to reach the 2020 objectives both per capita (44.4 MWh/p versus 48.65) and per square meter (232.9 kWh/ m^2 versus 344.8).

The most significant actions prioritising the reduction of energy (indicator 1a) in the Annual Action Plan are summarised in **Table D5**.

Table D5: Most important actions targeting indicator 1a (buildings energy consumption)

JIRA #(1)	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-392	R.6	All site- JRC-Geel	2018	Replacement of existing JRC-Geel street lighting with LED lighting.	Single	Completed end 2019.
EMAS GAAP-394	R.6	All buildings- JRC-Geel	2016	Identification/inventory of electric boards relevant to HVAC for the analysis of electricity consumed by cooling installation and connection of power meters to BMS.	Continuous	Completed end 2019.
EMAS GAAP-451	R.6	4 buildings- JRC-Geel	2019	Renewal of high voltage installations.	Multi-stage	Completed end 2019.
EMAS GAAP-455	R.6	2 buildings- JRC-Geel	2019	BMS optimisation B040 and B110.	Multi-stage	2020 – Works on going. To be completed spring 2021.
EMAS GAAP-456	R.6/G.2	1 Building- JRC-Geel	2019	Electricity impact assessment of the reduction of GELINA accelerator pulse frequency.	Single	Completed spring 2020.
EMAS GAAP-551	R.6	2 Buildings- JRC-Geel	2020	BMS optimisation B050 and B200.	Multi-stage	2020: B200 completed – B050 to be finalised summer 2021.
EMAS GAAP-552	R.6	2 Buildings- JRC-Geel	2020	Replacement of electric transformers.	Multi-stage	Completed end 2020.
EMAS GAAP-573	R.6	5 Buildings JRC-Geel	2021	BMS optimisation of the air compressors running conditions to reduce the use of natural resources.	Multi stage	To start in 2021.
EMAS GAAP-574	R.6	1 Building JRC-Geel	2021	Replacement of the MS-1 cooling collector	Single	To start in 2021.
EMAS GAAP-575	R.6	1 Building JRC-Geel	2021	Replacement of existing transformer with high efficiency one in B100	Single	To start in 2021.

(1) JIRA is a workflow implemented by the EMAS corporate coordination to record and track response to internal and verification audit findings at EMAS sites.

D4.1.2 Vehicles

JRC-Geel has 7 fleet vehicles on site. Besides the 2 fork lifts, a fire engine and a tractor, JRC-Geel also owns 3 vehicles one of which is a recently purchased electrical car used for deliveries on site.

While the fire engine (Unit G.2), tractor and Unit R.6's forklift utilise diesel, the second forklift (Unit G.2) consumes propane[8]. The Security services's vehicle allowing the guards to perform their inspection rounds and escorting deliveries as well as the remaining car are conventional petrol based engines (Euro 2, and Euro 6).

Table D6 summarises the evolution of the Fuel and energy consumption used by JRC-Geel's vehicles.

[8] Propane figures are based on the number of gas bottles ordered per year.

Table D6: Summary vehicle energy consumption (indicator 1b)

	2014	2015	2016	2017	2018	2019	2020
Total (MWh/yr)	30.42	29.67	27.71	28.53	25.30	21.33	18.44
Diesel used (m^3)	0.851	0.714	0.860	1.037	0.799	0.782	0.923
Petrol used (m^3)	2.032	2.111	1.734	1.659	1.605	1.159	0.753
Propane used (kg)	157.5	157.5	157.5	126.0	116.0	165.0	121.0

In 2019, the replacement of a conventional car by an electric one (JIRA Action GAAP-459) explains the first observed reduction of energy consumed by the JRC-Geel vehicles. In 2020, the total energy consumption related to the vehicles' use decreased by 13.55 % compared to 2019. The general decrease is mainly due to the pandemic's effect as less activities were performed at the JRC-Geel site.

The total annual vehicle energy consumption measured represents about 0.16 % of that measured for the buildings.

D4.1.3 Renewable energy use in buildings

Table D7: Renewable (and non-renewable) energy use in the buildings (indicator 1c)

Energy source	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Electricty (MWh non-renewable)	12 158	11 745	10 411	11 730	10 343	10 833	10 301	500	0	0
(% electricity from non-renewables)	100	100	100	100	100	100	100	5.1	0	0
Electricity (MWh renewable)	0.00	0.00	0.00	0.00	0.00	0.00	0,00	9308.74	9202.00	8096.00
mains supplied gas (MWh non-renewable)	1 759	1 902	2 108	1 673	1 963	1 860	1 791	1 718	1 827	1 812
(% mains gas from non-renewables)	100	100	100	100	100	100	100	100	100	100
supplied diesel (MWh non-renewable)	449	490	490	78	26	27	32	36	33	9
(% diesel from non renewables)	100	100	100	100	100	100	100	100	100	100
district heating/cooling (MWh non-renewable)	5 700	5 799	5 747	4 153	3 837	2 937	2 579	2 113	1 913	1 779
(% from non renewables)	100	100	100	100	100	100	100	100	100	100
Site geothermal (MWh renewable)				83.84	74.95	79.40	74.00	74.00	74.00	101.18
(% from renewables)				100	100	100	100	100	100	100
Total renewables (MWh)				**83.84**	**74.95**	**79.40**	**74.00**	**9382.74**	**9276.00**	**8197.18**
(% from renewables)				**0.47**	**0.46**	**0.50**	**0.50**	**68.24**	**71.08**	**69.48**
Total non ren. energy use, (MWhr/yr)		**19 937**	**18 756**	**17 635**	**16 168**	**15 657**	**14 703**	**4 367**	**3 773**	**3 600**
(% from non renewables)		100	100	99.5	99.5	99.5	99.5	31.8	28.9	30.5

As of 2019, the electricity contract established in 2018 allows the supply of 100 % electricity of renewable origin. The consumption of other non-renewable energies also decreased as an effect of the pandemic.

D4.2 Water consumption

Figures D9 and **D10** show the evolution of total annual water consumption for JRC-Geel (indicator 1d) per capita and per square meter respectively.

Figure D9: Evolution per capita

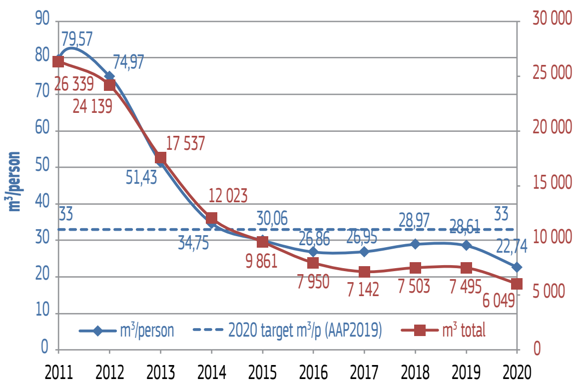
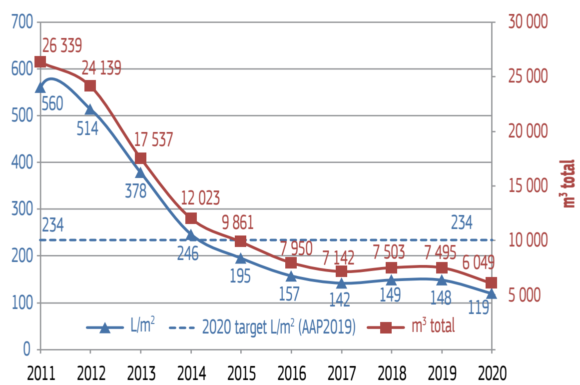


Figure D10: Evolution per m²



Since the first reporting in 2011, the water consumption has unceasingly decreased until 2016 for both per capita and per square meter data. After a two years increase (2017-2018), due to an increased need of water for cooling installations to overcome the warm climatic conditions over the year and several technical problems on both water purifiers and cooling systems, the water consumption declines again. This decrease is the result of the gradual replacement of old water cooling towers by dry (air based) coolers and the exchange for more performant chillers. In addition, the monitoring system (connected to the BMS) installed on the different cooling towers, in the framework of various environmental improvement actions, has been extended to the water purifiers in all JRC-Geel buildings. This monitoring system which records on a regular basis the water consumption, detects any abnormal elevation of the water consumption triggered by a malfunction (e.g. defective valve) or a leak and generates a warning which helps to take faster corrective measures.

Since 2015, three different buildings (B200, B210, B222) have been connected to the rain water tank and the quantities consumed registered (Table 8a). The data is part of the water consumption per building highlighted Table D23. The consumption of the rain water is yearly less than 7 % of the total consumption.

Table D8a: Rain water consumption by three buildings

year	2016	2017	2018	2019	2020
Rain water consumption (m^3)	496	467	436	448	279
Percentage of Total consumption	6.2	6.5	5.8	6.0	4.6

The noticeable decrease of the water consumption (around - 19 %) and rain water (- 38 %) observed in 2020 versus 2019 is explained by the low activities carried out due to restricted number of people allowed to be on site during the COVID-19 pandemic.

Four main actions included in the EMAS annual action plan aim to reduce water consumption (see **Table D8**).

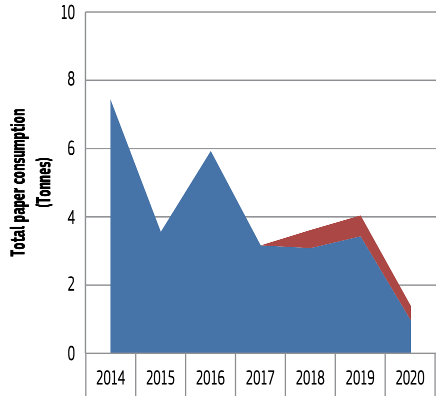
Table D8: Main actions to reduce water consumption in JRC-Geel

JIRA #	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-288	R.6	Building 040	2017	Replacement of B040 cooling towers.	Multi-stage	2021 – Technical specification to be fine-tuned. 2020 – On Hold – Waiting for completion of GAAP-574 for fine-tuning of technical specifications.
EMAS GAAP-454	R.6	Building 040	2019	Replacement of B040 cooling collector.	Multi-stage	Completed spring 2020.
EMAS GAAP-457	R.6	Buildings 10, 110, 130 & 200	2019	Installation of water monitoring systems to control abnormal water consumption of the various water purifier systems.	continuous	To be completed 1st trimester 2021.
EMAS GAAP-576	R.6	All buildings-JRC-Geel	2021	Analysis of the possibility to monitor water consumption of the various building air humidifiers on site.	Multi stage	To start in 2021.

D4.3 Office and Print shop paper

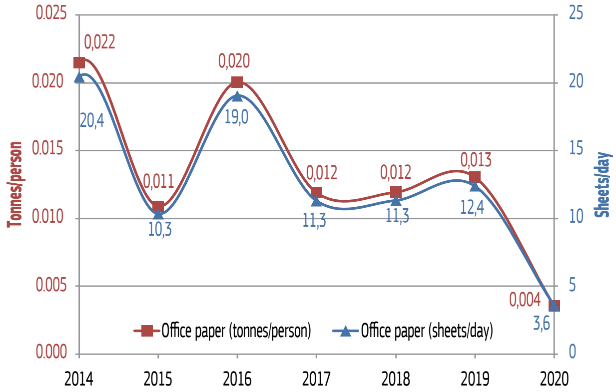
The evolution of total and per capita office paper consumption illustrated in **Figures D11** and **D12** is based on the paper purchasing data. The overall paper consumption decreased of 65.7 % in 2020 compared to 2019 due to the combined reduction of both office (-72.2 %) and print shop paper (- 30.16 %). The minimal number of staff on site during the pandemic explains this important saving of paper.

Figure D11: Evolution of total paper consumption at JRC-Geel (tonnes, sheets)



	2014	2015	2016	2017	2018	2019	2020
Total paper consumption (tonnes)	7.44	3.57	5.93	3.15	3.62	4.05	1.39
Printshop paper (tonnes)	0.00	0.00	0.00	0.00	0.53	0.63	0.44
Office paper (tonnes)	7.44	3.57	5.93	3.15	3.09	3.42	0.95
Office (A4 sheet equivalent) x 1 000 000	1.49	0.72	1.19	0.63	0.62	0.68	0.20

Figure D12: Per capita consumption of office paper (tonnes, sheets per day)



The status of actions to reduce paper consumption is presented below (**Table D9**):

Table D9: Main actions for reducing paper consumption in buildings

JIRA #	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-158	R.6	All staff- JRC-Geel	2015	Raise awareness of paper consumption through communication.	Continuous	2020-Action closed as paper is automatically part of the communication when the environmental statement is presented to staff via Connected, Blogs and displays. 2019 – Figures communicated via Connected. 2018 – Figures communicated via Connected. 2017 – Figures communicated via info screens. 2016 - The figures of the distributed paper per building were communicated to staff in order to achieve a behaviour change resulting in decreased in paper use.
EMAS GAAP-458	R.6	All buildings	2019	Extension of the use of lighter paper (70 or 75 g/m^2) to more buildings following the tests.	Multi-stage	Completed in 2019. Only 75 g/m^2 office paper is used at JRC-Geel site.

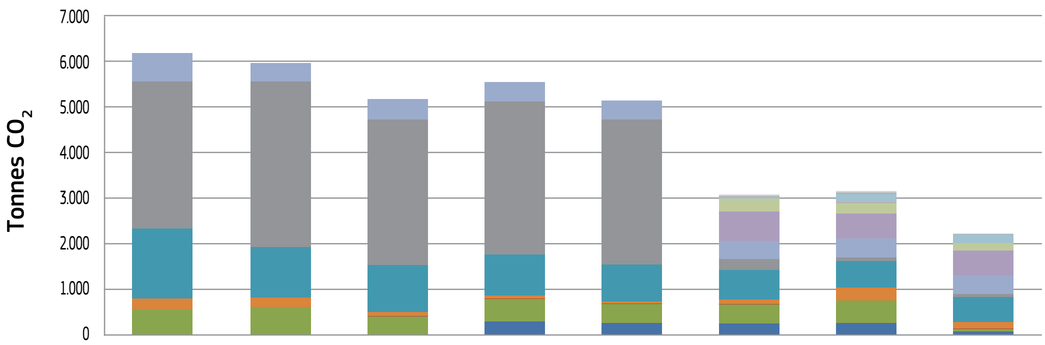
Following feasibility tests performed in 2018 on the possibility to reduce paper consumption by the use of lighter paper weight (60, 70 and 75 g/m^2 instead of 80 g/m^2), the 75 g/m^2 paper was found to be the most suitable with the best ratio (quality/lower footprint). As a result, since 2019, 75 g/m^2 paper is ordered instead of 80 g/m^2 paper. During the transition period (2019-2020) when both 75 g/m^2 and remaining 80 g/m^2 paper were used on site, JRC-Geel reported for convenience its total paper consumption as 80 g/m^2 paper (not a combination of both paper types). As of 2020, only 75 g/m^2 paper is used and reported at the JRC-Geel site.

D5 Reducing air emissions and carbon footprint

D5.1 Carbon footprint

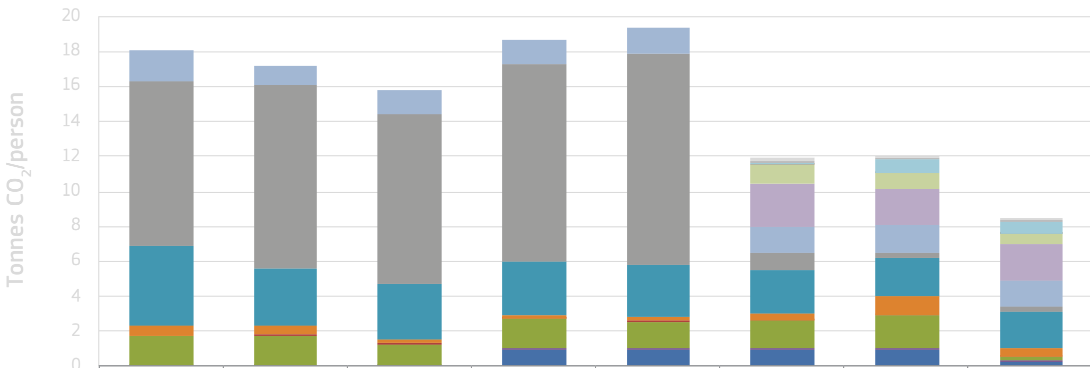
The carbon emissions due to different sources are detailed in **Figures D13** and **D14**:

Figure D13: Carbon footprint (CO_2 or equivalent emissions) 2013-2020 (Tonnes)



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	6 179	5 949	5 168	5 536	5 133	3 082	3 150	2 229
Own waste	0	0	0	0	0	31	29	13
Catering	0	0	0	0	0	31	28	14
Service contracts	0	0	0	0	0	20	187	186
Paper supply	0	0	0	0	0	4	4	1
Fixed assets - Commission vehicles	0	0	0	0	0	0	1	0
Fixed assets - IT	0	0	0	0	0	291	236	162
Fixed assets - buildings	0	0	0	0	0	647	538	540
Buildings - fuels for heating	626	394	441	418	405	390	420	409
Buildings - electricity	3 219	3 627	3 198	3 350	3 185	237	78	74
Buildings - district heating/cooling	1 534	1 109	1 024	908	797	653	591	550
Buildings - coolant losses	226	196	85	60	59	98	278	143
Vehicle fleet - fuel consumption	0	11	11	10	10	9	7	5
Missions (air, RFI 2)	571	602	395	496	412	413	487	53
Missions (excluding air)	3	9	14	12	12	11	10	5
Staff commuting	0	0	0	281	251	246	256	74

Figure D14: Carbon footprint elements (Tonnes CO_2 / person)



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	18.12	17.19	15.75	18.70	19.37	11.90	12.02	8.38
Own waste	0.00	0.00	0.00	0.00	0.00	0.12	0.11	0.05
Catering	0.00	0.00	0.00	0.00	0.00	0.12	0.11	0.05
Service contracts	0.00	0.00	0.00	0.00	0.00	0.08	0.71	0.70
Paper supply	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01
Fixed assets - Commission vehicles	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	1.12	0.90	0.61
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	2.50	2.05	2.03
Buildings - fuels for heating	1.84	1.14	1.34	1.41	1.53	1.51	1.60	1.54
Buildings - electricity	9.44	10.48	9.75	11.32	12.02	0.92	0.30	0.28
Buildings - district heating/cooling	4.50	3.20	3.12	3.07	3.01	2.52	2.26	2.07
Buildings - coolant losses	0.66	0.57	0.26	0.20	0.22	0.38	1.06	0.54
Vehicle fleet - fuel consumption	0.00	0.03	0.03	0.03	0.04	0.04	0.03	0.02
Missions (air, RFI 2)	1.67	1.74	1.20	1.68	1.56	1.60	1.86	0.20
Missions (excluding air)	0.01	0.03	0.04	0.04	0.05	0.04	0.04	0.02
Staff commuting	0.00	0.00	0.00	0.95	0.95	0.95	0.98	0.28

The total CO_2 emissions decreases in 2020 (around - 29 %) as well as per capita (- 30 %) compared to 2019.

The different contributors to the carbon footprint have a lower impact in 2020 compared to 2019. The paper supply (- 66 %), own waste (- 55 %) the goods (catering) (- 52 %) and building coolant losses (- 48 %) are the main posts participating to the reduction of the CO_2 carbon footprint besides the commuting (around – 71 %) and mission (- 88 %) combining the mission by air (- 89 %) with mission using other transport means (excluding air – 45 %)).

Table D10: Carbon footprint per capita CO_2 or equivalent (CO_2 e) emissions 2013-2020 by scope (Tonnes)

	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Own fuel use and direct losses	**2.16**	**1.52**	**1.38**	**1.38**	**1.50**	**1.63**	**2.40**	**1.82**
Fuel for bldgs: mains gas	1.11	0.87	1.08	1.13	1.22	1.20	1.29	1.26
Fuel for bldgs: tanked gas (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel	0.39	0.06	0.02	0.02	0.03	0.04	0.03	0.01
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Refrigerant leaks	0.66	0.57	0.26	0.20	0.22	0.38	1.06	0.54
Scope 2: Purchased energy	**13.20**	**12.87**	**12.11**	**13.08**	**13.68**	**2.73**	**1.95**	**1.79**
External electricity supply (grey)	8.70	9.66	8.99	10.43	11.08	0.55	0.00	0.00
External electricity supply contract (renewables), combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (combustion) (2)	4.50	3.20	3.12	2.65	2.60	2.18	1.95	1.79
Scope 3: Other indirect sources	**2.75**	**2.81**	**2.27**	**4.24**	**4.20**	**7.54**	**7.67**	**4.77**
Fuel for bldgs: mains gas (upstream)	0.25	0.19	0.24	0.25	0.27	0.27	0.27	0.26
Fuel for bldgs: tanked gas (upstream) (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel (upstream)	0.09	0.01	0.00	0.01	0.01	0.01	0.01	0.00
Commission vehicle fleet (upstream)	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Site generated renewables (upstream) (3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
External grey electricity supply, line losses	0.74	0.82	0.76	0.89	0.94	0.05	0.00	0.00
External 'renewables' electricity contract (upstream with line loss)	0.00	0.00	0.00	0.00	0.00	0.32	0.30	0.28
District heating (upstream) (2)	0.00	0.00	0.00	0.42	0.41	0.34	0.31	0.28
Business travel: air (combustion)	1.67	1.74	1.20	1.68	1.56	1.60	1.86	0.20
Business travel: rail (combustion)	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Business travel: hire car (combustion)	0.00	0.00	0.02	0.01	0.02	0.02	0.02	0.00
Business travel: private car (combustion)	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Commuting (combustion) (4)	0.00	0.00	0.00	0.95	0.95	0.95	0.98	0.28
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	2.50	2.05	2.03
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	1.12	0.90	0.61
Fixed assests - Commission vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper supply	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01
Service contracts	0.00	0.00	0.00	0.00	0.00	0.08	0.71	0.70
Catering	0.00	0.00	0.00	0.00	0.00	0.12	0.11	0.05
Own waste	0.00	0.00	0.00	0.00	0.00	0.12	0.11	0.05
Total	**18.12**	**17.19**	**15.75**	**18.70**	**19.37**	**11.90**	**12.02**	**8.38**

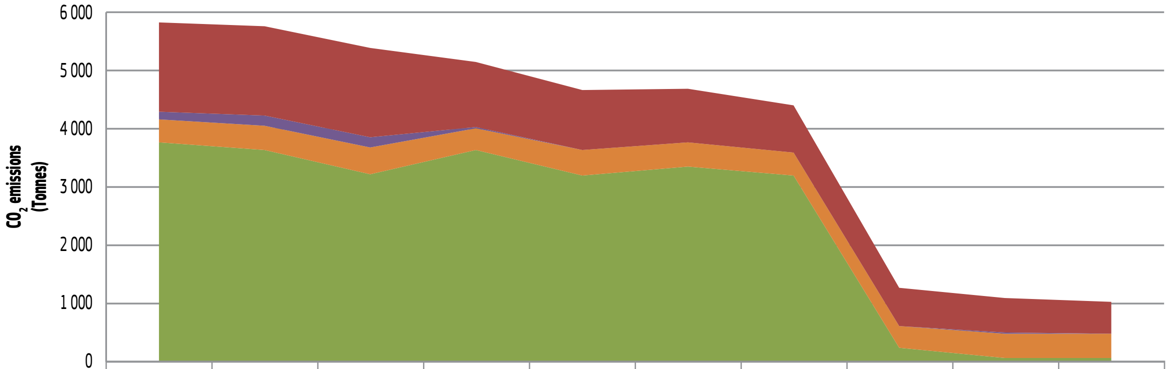
(1) - Grange is the only site with no mains gas supply
(2) - Can include Commission bus service where appropriate
(3) - Only applies to Brussels
(4) - Not all sites

D5.2 CO_2 emissions from buildings

D5.2.1 Buildings (energy consumption)

The annual CO_2 emissions generated by energy consumption of buildings and the respective contributions of energy sources are presented in **Figure D15**.

Figure D15: CO_2 emissions generated by buildings energy consumption



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total (tonnes)	5 817	5 761	5 380	5 130	4 663	4 676	4 388	1 281	1 089	1 033
district heating/cooling	1 522	1 548	1 534	1 109	1 024	908	797	653	591	550
diesel	148	162	162	26	8	9	10	12	11	3
mains gas	387	419	464	368	432	410	394	378	409	406
electricity	3 760	3 632	3 219	3 627	3 198	3 350	3 185	237	78.41	73.87

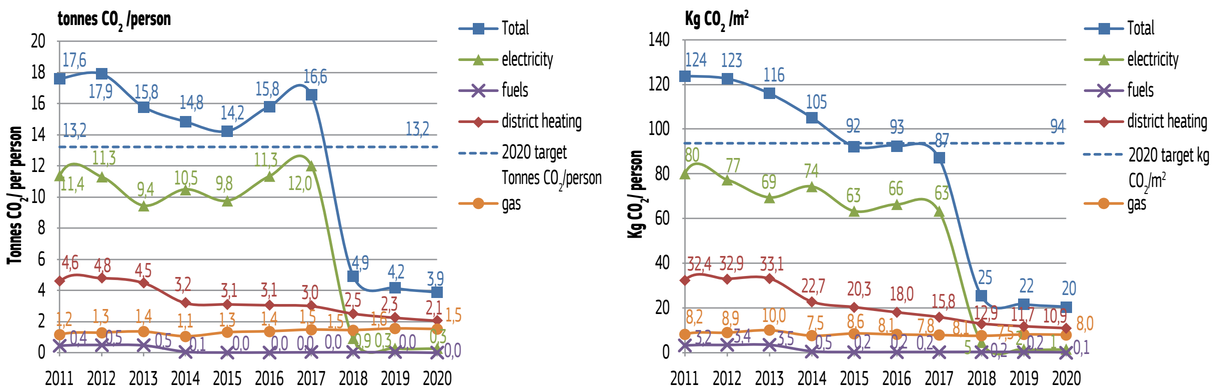
The 2020 introduction of a new factor, estimating the CO_2 emission generated by the renewable energy sources (i.e. total upstream for renewable electricity), would trigger an artificial increase of CO_2 emission in 2020 while the impact has clearly decreased. To be able to compare the data with the previous years, this factor has also been taking into account in the calculation of the CO_2 emissions for 2018 and 2019.

Consequently, the CO_2 emissions generated by buildings energy consumption follow a constant negative trend from 2011 to 2020 (82.2 % decrease) with a reduction of about 80 % compared to 2014.

The decrease in CO_2 emissions observed in 2019 derives from the full supply of electricity from renewable sources and the lower CO_2 emission due to a reduction of the district heating. The replacement of cooling installations/devices participates to the CO_2 emission reduction. This reduction is also due to the optimisation of technical equipment operation using the BMS system. These developments allow JRC-Geel to easily meet the 2020 target for CO_2 emissions per square meter as well as per capita.

These CO_2 emissions are expected to be further reduced in the near future (2021-2023) with the activation of the geothermal heating supply.

Figures D16 and D17: CO_2 emissions derived from building energy consumption (per capita, per m²)



Figures D16 and D17 show emissions from building energy consumption per capita and per m².

The different actions set up to specifically reduce CO_2 emissions at JRC-Geel are listed in **table D11**. Many other actions to reduce energy consumption and consequently the CO_2 emissions are detailed in Section D4.1.

Table D11: Main actions planned to further reduce the CO_2 emissions

JIRA #	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-301	R.6	All buildings - JRC-Geel	2017	Heating from geothermal origin: new contract to be signed.	Single	Completed. Contract (C931626) signed in 2017. As of beginning 2024, hot water for heating should be from geothermal origin.
EMAS GAAP- 459	R.6	JRC-Geel Site	2019	Replacement of one of the Central Store cars with an electric one.	Single	Completed in 2019. New electric car in operation.
EMAS GAAP- 460	R.6	JRC-Geel Site	2019	Installation of a quick charging pole for charging electric cars.	Single	2020 – Cancelled as new visitor centre to be designed including charging poles. 2019 – Technical specifications under preparation.
EMAS GAAP-553	R.6	JRC-Geel Site	2020	Retrofit/renewal of cooling installations.	Multi-stage	2020 – Technical analysis completed; works on going. B100 and B190 completed.

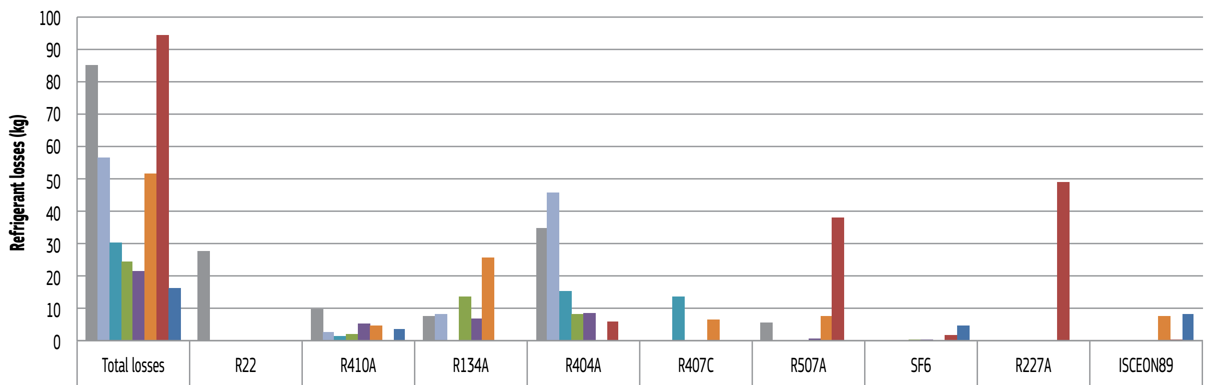
D5.2.2 Buildings -other greenhouse gases (refrigerants)

Figures D18 and **D19** depict the evolution in recorded gas losses from refrigerating Units.

The legislative act adopted by the European Commission in 2006 (2006 F-gas Regulation) to control emissions from fluorinated greenhouse gases (F-gases), required the declaration of hydrofluorocarbons (HFCs). In 2013, this requirement expanded to R22. The 2006 F-gas Regulation was reinforced in 2014 with the EU Regulation No. 517/2014 on fluorinated greenhouses gases aiming to strengthen measures to contain the polluting emissions of fluorinated gases (F-gases).

The full implementation of the EU Regulation No. 517/2014 was accompanied in 2016 and 2018 with additional requirements and the need to report on the insulating gas SF6 and the cooling gas (ISCEON89) used in various freeze dryers.

Figure D18: Losses of refrigerants at JRC-Geel (kg) (indicator 2b)

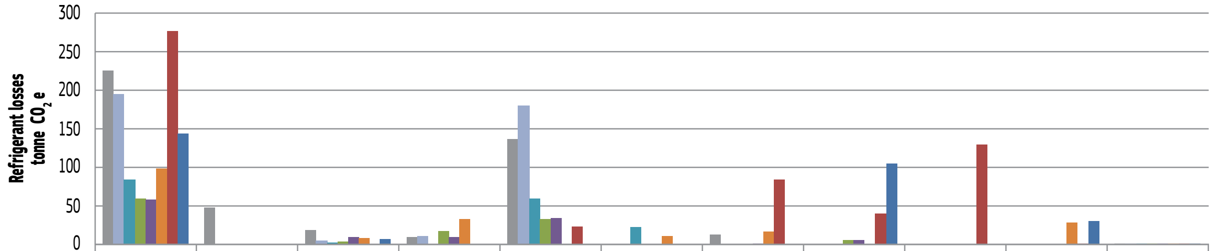


	Total losses	R22	R410A	R134A	R404A	R407C	R507A	SF6	R227A	ISCEON89
2013	85.00	27.50	9.80	7.50	34.60	0	5.60	0	0	0
2014	56.40	0.00	2.60	8.00	45.80	0	0.00	0	0	0
2015	30.19	0.00	1.43	0.00	15.21	13.55	0.00	0	0	0
2016	24.22	0.00	2.02	13.66	8.31	0	0.00	0.23	0	0
2017	21.30	0.00	5.08	6.95	8.49	0	0.55	0.23	0	0
2018	51.59	0.00	4.45	25.66	0.00	6.42	7.52	0.00	0	7.54
2019	94.45	0.00	0.00	0.00	5.89	0.00	37.85	1.71	49.00	0.003
2020	16.24	0.00	3.74	0.00	0.00	0.00	0.00	4.50	0.00	8.00

Between 2013 and 2017, the renewal of installations and improved maintenance allowed the reduction of gas losses. In 2018, significantly greater losses were reported due to gases with GWP higher than 2500 such as ISCEON89 and R227A added to the list.

Besides these additional gases, significant gas losses of R134A, 407C, 507A were recorded in 2018 due to gas leaks in old installations. A retrofit/replacement action plan was set-up to improve the situation (EMAS GAAP-553). In 2019, a large contribution of the gas losses emanated from R404A, R507A and SF6 and was mainly due to leaks on technical and fire protection installations. In 2020, gas losses declined significantly by 82.6 % but unneglectable losses of R410A, SF6 and ISCEON89 with a high global warming potential occurred.

Figure D19: Losses of refrigerants at JRC-Geel (tonnes CO_2 e) (indicator 2b)



	Total losses	R22	R410A	R134A	R404A	R407C	R507A	SF6	R227A	ISCEON89	Total losses t CO_2e / person
2013	225.8	48.4	18.8	9.8	136.3	0	12.5	0	0	0	0.66
2014	195.8	0	5	10.4	180.5	0	0	0	0	0	0.57
2015	84.6	0	2.7	0.0	59.9	22	0	0	0	0	0.26
2016	59.8	0	3.9	17.8	32.7	0	0	5.41	0	0	0.2
2017	58.9	0	9.8	9	33.5	0	1.2	5.41	0	0	0.22
2018	97.8	0	8.5	33.4	0	10.4	16.8	0	0	28.69	0.38
2019	284.6	0	0.0	0.0	23.2	0	84.8	47.24	129.36	0.01	1.06
2020	143.4	0	7.2	0.0	0.0	0	0.0	105.75	0.00	30.44	0.54

Refrigerant losses represent about 6.5 % of JRC-Geel's carbon footprint as reported in D5.1. Upgrading installations (linked with the decommissioning of old ones containing R22), improved maintenance and close follow-up are responsible for the gradual reduction in losses from refrigerants.

The observed increase in 2018 was due both to the full implementation of regulation N.517/2014 taking into account cooling installations not managed by R.6 unit, and to old equipment which is in the process of being replaced.

Within the fluorinated gas regulation No. 517/2014, a replenishment ban for F-gases with a GWP (Global Warming Potential) ≥ 2500 entered into force on 1 January 2020. In this context, JRC-Geel is analysing the possibility to switch to alternative gases in existing installations or to replace old ones.

D5.3 CO_2 emissions from vehicles

D5.3.1 Commission vehicle fleet

Table D12: Fleet vehicle characteristics and tailpipe CO_2 emissions

	2014	2015	2016	2017	2018	2019	2020
Total (MWh/yr)	30.42	29.67	27.71	28.53	25.30	21.33	18.44
MWh/person	0.088	0.090	0.094	0.108	0.098	0.081	0.069
CO_2 emissions (tonnes)							
From Diesel	2.69	2.26	2.72	3.28	2.52	2.47	2.91
From Petrol	5.71	5.93	4.87	4.66	4.51	3.26	2.11
From Propane	0.36	0.36	0.36	0.29	0.27	0.38	0.28
Tailpipe emissions (CO_2)	8.76	8.55	7.95	8.23	7.30	6.11	5.31
Tailpipe emissions (CO_2/person)	0.025	0.026	0.027	0.031	0.028	0.023	0.020

The emissions related to JRC-Geel fleet vehicles were significantly reduced in 2019 compared to 2018 both at total energy level (almost 16 %) and per capita (17 %) and currently represent less than 0.25 % of the emissions due to energy consumption. This improvement was mainly attributed to the reduction of tailpipe emissions.

D5.3.2 Local work based travel (excluding Commission vehicle fleet)

To minimise its CO_2 footprint, JRC-Geel encourages its staff to use bicycles on site during transfers between buildings. For this purpose, JRC-Geel made available a total of 90 bicycles with 29 white bicycles for use by everyone on site, the remainder being allocated to specific groups (technical services, guards, fire brigade).

D5.3.3 Commuting

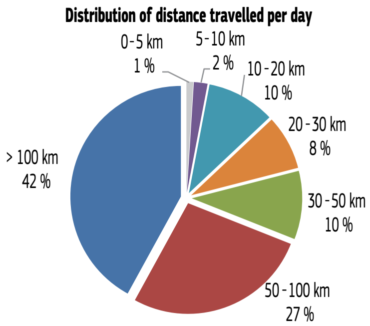
Despite the registration of JRC-Geel to the next mobility survey forecasted in 2020, to comply with the governmental obligations, the Belgian Federal Government did not launch the exercise due to the COVID-19 pandemic and postponed it until summer 2021. There was therefore no mobility study since the last survey organised in 2017 to which the the European Commission participated as a whole (including JRC-Geel).

The last survey that JRC-Geel conducted internally to determine commuting habits of staff and estimate the corresponding carbon footprint was in 2016. This survey could highlight that:

- People living in the surroundings of JRC-Geel premises were more inclined to come by bike or walk to work.
- The remotness of the site and the limited public transport with efficient connections "discourage" people living in the neighbouring towns (Mol/Geel) to take a bus operated by De Lijn, serving stops close to the site and the European School. People commute preferably by car to minimise the time spent in the public transport and by convenience since they can drop off and pick up their children of school age from their respective schools on their way to and from work. This was examplified by the fruitless pilot study conducted in 2015 to assess the feasibility of a shuttle service for persons working on the site.

In this 2016 mobility survey, answered by 132 staff members, the average daily commuting distance travelled (excluding journeys by bicycle, on foot or as a car passenger (including car-pooling)) was 4 469 km/day i.e. 33.86 km/person/day. The distribution of journey length is presented in **Figure D20**.

Figure D20: Distribution of daily commuting distance



The lock down of the site during the COVID-19 pandemic in 2020 led to the drastic decrease in commuting. While far from being accurate, a rough estimation of the mobility for critical staff and authorised people to come on site to perform technical activities can be made based on the 2016 survey. During the lock down, around 10 % of the staff was allowed to access the site which correspond to 27 staff members (over the 266 staff members reported in 2020).

By keeping 33.86 km/person/day estimated in the 2016 survey with an average emissions of 133 g CO_2/km[9], and the number of working days of 211, the annual CO_2 emissions due to commuting is 0.95 Tonnes CO_2/person. Therefore for a number of staff members of 27 people, the annual CO_2 emissions reached 25.65 Tonnes in 2020; This corresponds approximatively 1.05 % of the site's carbon footprint for 2020.

D5.4 Total air emissions of other air pollutants (SO_2, NO_2, PM)

Emissions from other air pollutants are rather limited and relatively stable. This is explained by the fact that most of the buildings are heated by natural gas and hot water supplied by Vito. The other sources of emissions (arising from diesel) arise mostly from testing or using the emergency generators which run less than 100 hours per year since 2014. The higher emissions in 2019 are linked to the higher consumption of gas.

Table D13: Total air emissions of other air pollutants (SO_2, NO_x, PM_{10})

	2013	2014	2015	2016	2017	2018	2019	2020
Total air emissions buildings (tonnes) as minimum (SO_2, NO_x, PM_{10})	0.791	0.436	0.470	0.447	0.434	0.420	0.444	0.425

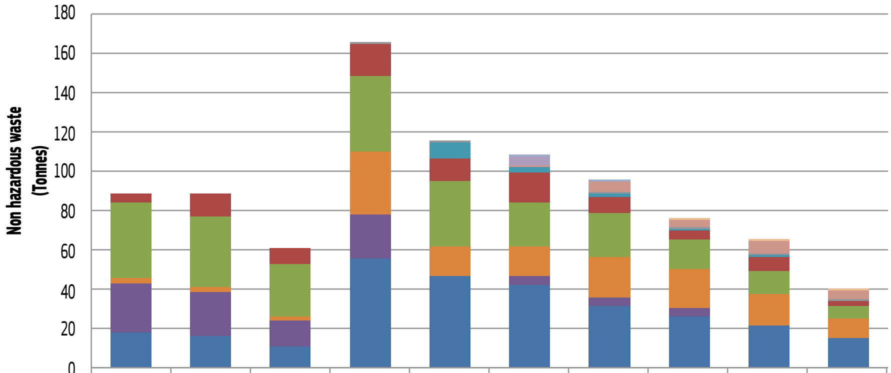
9 https://www.statista.com/statistics/260028/average-co2-car-emission-levels-in-eu-27/, or average over 10 years https://www.smmt.co.uk/reports/co2-report/

D6. Improving waste management and sorting

D6.1 Non hazardous waste

The evolution of non-hazardous waste disposed of from JRC-Geel is represented in **Figure D21**.

Figure D21: Evolution of non-hazardous waste disposed



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	88.33	88.72	61.50	165.80	115.01	107.66	94.95	75.74	65.16	40.28
Total (tonnes/person)	0.27	0.28	0.18	0.48	0.35	0.36	0.36	0.29	0.25	0.15
Non Dangerous frying oil cat 3. (200125)							0.00	0.36	0.34	0.34
Non Dangerous sox lamps (160216)							0.00	0.008	0.008	0.000
Plastics (200139)						0.045	0.056	0.004	0.23	0.04
Wine samples (020304)						4.45	0.00	0.00	0.00	0.00
Swill (200108)	0.00	0.00	0.00	0.00	0.00	0.76	5.49	3.57	6.40	5.00
Packaging waste: PMD (150106)	0.00	0.00	0.00	1.16	0.54	0.69	0.95	0.67	0.89	0.70
Glass (200102, 150107)	0.00	0.00	0.00	0.037	7.83	2.14	1.19	0.98	0.89	0.30
Wood (170201, 200138)	4.20	12.02	8.54	16.28	11.88	15.46	8.22	4.74	7.20	2.70
Metal (191202, 200140)	38.18	35.28	26.98	37.72	33.24	22.32	22.16	15.00	11.28	6.30
Paper and cardboard (200101)	2.72	2.62	1.62	32.65	14.64	14.84	20.87	19.50	16.41	9.50
Building, brick and stone (170102, 170301)	24.66	22.64	13.66	21.84	0.00	4.50	4.26	4.26	0.00	0.00
Residual; mixed (070299, 080318, 191210, 191212, 200301, 200307)	18.57	16.16	10.70	56.12	46.88	42.46	31.76	26.65	21.52	15.40

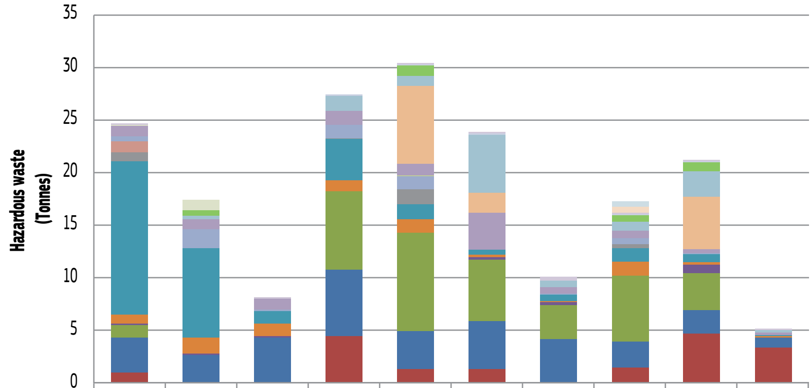
JRC strives to reduce its waste production by putting into place an efficient sorting and waste management process. Waste data before 2014 are only indicative. No comparability can be done due to changes in the waste management, legislation and EURAL codes classification. Since 2014, the quantities of non-hazardous waste follow a negative trend going from 165.8 tonnes of waste to 40.28 tonnes in 2020 (i.e a 75.7 % reduction). The 38 % reduction of the total waste between 2019 and 2020 results of the combined decrease of the different waste types and in particular plastics[10] (- 83.8 %), wood (- 66.4%) and glass (- 62.5 %).

D6.2 Hazardous Waste

The evolution of hazardous waste disposed of from JRC-Geel is shown in **Figure D22**.

[10] PMD waste quantities have been segregated from the plastics under which the waste collector has categorised the waste.

Figure D22: Evolution of hazardous waste disposed



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	24.74	17.34	8.12	27.44	30.38	23.86	10.09	17.30	21.22	5.11
Total (tonnes/person)	0.075	0.054	0.024	0.079	0.093	0.081	0.038	0.067	0.081	0.019
Hazardous medical waste (170903)							0.00	0.46	0.00	0.00
Expired medicines, dangerous (070513)							0.00	0.65	0.00	0.00
Fluorescent lamps and mercury containing objects (200121, 160307, 060404)	0.18	0.00	0.06	0.00	0.08	0.11	0.31	0.11	0.11	0.01
Waste from mechanical processes (191211)	0.07	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste from production of water for industrial use including resins (190905)	0.00	0.00	0.00	0.05	0.04	0.07	0.07	0.12	0.11	0.03
Batteries and accumulators (160601, 200133)	0.03	0.52	0.01	0.06	0.96	0.01	0.03	0.66	0.80	0.07
Pressurised gasses and lab chemicals (160504, 160506, 200119)	0.00	0.34	0.00	1.41	1.03	5.57	0.58	0.74	2.39	0.14
Antifreeze, PCB (160114, 160209)	0.00	0.00	0.00	0.00	7.36	1.93	0.00	0.00	5.03	0.00
Packaging waste, absorbents, cleaning cloth, filters (150110, 150202)	1.00	0.92	1.09	1.31	1.12	3.43	0.62	0.74	0.45	0.25
Cooling gasses (140601)	0.00	0.00	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00
Waste oil (130205, 130301, 130802)	0.43	1.87	0.08	1.27	1.29	0.03	0.05	0.62	0.12	0.06
Waste from thermal processes (100804)	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint, ink, glue, resin containing hazardous substances (080111, 080317, 200127)	0.92	0.00	0.08	0.09	1.36	0.03	0.00	0.37	0.00	0.02
Waste from organic chemical processes (070101, 070103, 070104, 070701, 070704)	14.60	8.50	1.19	3.86	1.46	0.41	0.58	1.36	0.64	0.08
Waste from inorganic chemical processes (060106, 060205, 060399)	0.87	1.58	1.15	1.14	1.32	0.26	0.22	1.25	0.32	0.09
Asbestos (170605)	0.05	0.08	0.15	0.02	0.00	0.25	0.24	0.08	0.73	0.03
Electric & electronic, AEEA (160213,160214, 200136)	1.23	0.00	0.00	7.34	9.34	5.92	3.12	6.20	3.54	0.00
Biological waste (180103)	3.29	2.68	4.30	6.36	3.60	4.46	4.27	2.48	2.32	0.98
Radioactive waste	1.04	0.00	0.00	4.49	1.36	1.40	0.00	1.49	4.65	3.36

The hazardous waste quantities fluctuate per year depending on the scientific activities performed at JRC-Geel in support to the EU policy.

From 2017 to 2019, the quantity of hazardous waste increased. The main contribution seen in 2019 was related to nuclear waste, antifreeze, PCB product, pressurized gas and lab chemicals when compared to 2018. In 2020, a strong decrease (around 76 %) of hazardous waste is observed correlated with the reduction of scientific ativities on site during the COVID-19 pandemic. From the waste produced, most of the categories go beyond a 70 % decrease. Few, such as the radioactive waste, waste oil and packaging waste, absorbants etc. have a reduction below 50 %.

D6.3 Waste sorting

Table D14: Percentage of waste sorted at JRC-Geel

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percentage of waste sorted (%)	83.6	84.8	84.6	71.0	67.8	67.7	69.8	71.4	75.1	66.07
Percentage of waste not sorted (%)	16.4	15.2	15.4	29.0	32.2	32.3	30.2	28.6	24.9	33.93
Unsorted waste (Tonnes/p)	0.056	0.050	0.031	0.162	0.143	0.143	0.120	0.103	0.082	0.058

In 2020, the percentage of waste sorted decreased compared to 2019 due to the high reduction of total waste (both non-hazardous and hazardous) due to the significant reduction of the activities on sites or their temporary discontinuance.

Table D15 provides an overview of the actions to improve waste sorting.

Table D15: Actions relevant to waste

JIRA #	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-399	R.6	All buildings	2018	Replacement of plastic cups by bio-degradable ones at the water fountains.	Pilot	2020 – Completed
EMAS GAAP-461	R.6	All buildings	2019	Improvement of waste segregation with the set-up of "Waste Segregation Islands" in various JRC-Geel buildings and to remove the individual trash bins.	Multi stage	2021 – Analysis of various solutions (leasing, buying) to be done. 2020 – Deployment in other buildings to be analysed. 2019 – Hardware ordered and installed in B100, B200 & B210.
EMAS GAAP-462	R.6	2 buildings	2019	Study the feasibility of installing water meters on the 2 main industrial waste water tanks. (B170 and B200).	Single	2021 – To be completed spring 2021. 2020 – Meter to be installed on B200 tank. 2019 – Kick of meeting completed. Technical specifications done. Meter on new B171 installed.
EMAS GAAP-554	R.6	Site	2020	Eco-workshops.	Multi stage	2020 - On hold due to the COVID-19 Pandemic.
EMAS GAAP-582	R.6	1 building JRC-Geel	2021	Procurement and installation of a new dedicated chemical and biohazardous waste storage walk-in container for temporary hazardous waste storage	Single	To start in 2021.

D7 Protecting biodiversity

According to the redefined biodiversity indicators arising of Annex IV of the EMAS Regulation, the total sealed area (corresponding to the built surface on ground) slightly increased in 2019 compared to 2018 (70 336 m² vs 70 309 m²) due to the installation of new high voltage cabins in buildings B020 and B060 and new B02 filling stations in buildings B40, B050 and B090 as seen in **Table D16**. It also increased in 2020 as a result of the construction of a new high voltage cabin in building B040 and the new building B225 dedicated to the reception of the goods (the area going from 70 336 m² in 2019 to 70 512 m² in 2020). The building area represents 18.5 % of the total surface. As a consequence of slight staff increase, the built surface per person decreased by 1.26 %.

Table D16: Biodiversity oriented surface area

	2014	2015	2016	2017	2018	2019	2020
Total use of land* (m²)	380 316	380 316	380 316	380 316	380 316	380 316	380 316
Total sealed area** (m²)	70 623	71 286	71 286	70 203	70 309	70 336	70 512
Built surface area (%) as part of the site	18.6	18.7	18.7	18.5	18.5	18.49	18.54
Total nature-oriented area on site (m²)* **	**309 693**	**309 030**	**309 030**	**310 113**	**310 007**	**309 980**	**309 804**
Sealed area / person (m²/person)	204.1	217.3	240.8	264.9	271.5	268.5	265.1
Total nature-oriented area on site/person (m²/person)	**895.1**	**942.2**	**1044**	**1170.2**	**1196.9**	**1183.1**	**1164.7**

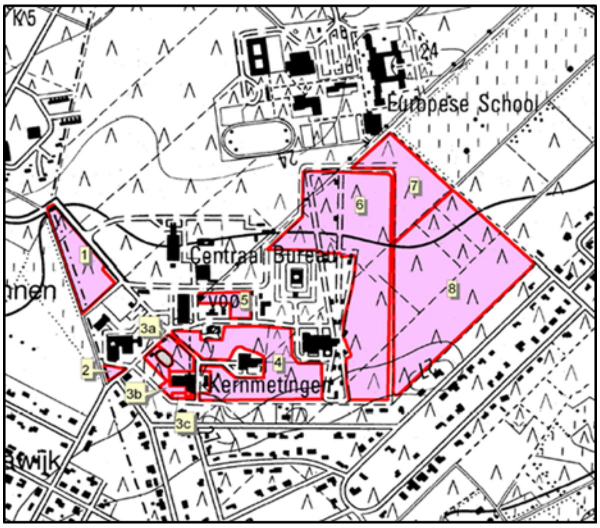
* Total surface area of the site (m²) until 2018
** Built surface area (m²) on ground (including roads, parking, pathways)
*** Difference between Total use of land and Total sealed area

In 2009, the "Natuur en Bos" authorities approved the JRC-Geel Forest Management Plan which describes the different actions to be performed to preserve the forest such as the gradual replacement of exotic tree species (e.g. pine trees) present on the forest parcel (**Figure D23**) by native species. This 2010-2029 plan includes also the eradication and the prevention of the regrowth of other foreign tree species or vegetation such as "Amerikaanse vogelkers" (American black cherry) to plant new native trees (e.g. oaks) or plants to restore the gradually the original forest.

The forest management plan was appraised by an external company contracted to also develop a biodiversity plan. The analysis of the forest management plan has highlighted that JRC-Geel manages appropriately its plan with the respect of the actions set up such as the elimination of exotic trees for endogenous species.

A forest fire prevention plan was also requested to complete the forest management plan and improve the protection and preservation of the forest and its biodiversity. Several actions to reduce any fire "propagation" were proposed and will be programmed to be executed.

Figure D23: Location of the forest lots (forest management plan)



JRC-Geel is eager to maintain and develop its biodiversity. Several actions are yearly performed to preserve biodiversity. JRC-Geel takes care that toads migrate safely during their pairing season by placing screens to prevent them from crossing the streets and transferring them into buckets from one side of the street to the other to reach the pond. JRC-Geel installed additional ecological insect hotels close to buildings B60, B20 and B051 in 2019 as shown in Figure 24.

Figure D24: Biodiversity actions: transfer of the toads and installation of insect hotels close to B050

To further enhance its biodiversity on its premises, JRC-Geel has hired an external company specialised in biodiversity to develop a biodiversity plan. This study, completed in 2020, assessed the existing status of the biodiversity and proposed complementary actions to increase it further. A prioritisation of the actions will be made and implemented in 2021.

Table D17 describes the main ongoing or foreseen actions for the biodiversity expansion.

Table D17: Actions relevant to biodiversity

JIRA #	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-463	R.6	All site – JRC-Geel	2019	Identification of strategic spots for installation of new insect hotels.	Single	Completed 2019 – 4 new insect hotels installed.
EMAS GAAP-555	DIR	All site – JRC-Geel	2020	Biodiversity assessment and action plan for the forested areas of JRC-Geel.	Multi-stage	To be completed 1st trimester 2021 2020 – Contract started spring 2020.
EMAS GAAP-577	DIR	All site – JRC-Geel	2021	To set-up priorities and start implementing actions based on the 2020 biodiversity study performed at JRC-Geel	Multi stage	To start in 2021.

D8. Green Public Procurement (GPP)

D8.1 Incorporating GPP into procurement contracts

The JRC procurement tool includes an automatic control step embedded in the PPMT (Public Procurement Management Tool), based on the CPV codes[11] (Common Procurement Vocabulary), flagging the request as soon as GPP criteria are involved.

In 2020, 7 out of 51 high value contracts (13.7 %) were flagged as falling under GPP. However, if we take into account the estimated contract value this is equal to 20 %. Of the 7 contracts signed in 2020, 6 were classified as light green and green, and 1 green by nature[10].

Table D18: GPP categories and contracts

Category (environmental clauses in GPP)	**Compliance criteria** Core (a)/ Comprehensive (b)	**Award criteria** (environmental specifications)	**2018**	**2019**	**2020**
Not green (No)	-	-	22	24	44
Light green (+)	partly (a)	< 10 %	4	3	3
Green (++)	Fully (a)/ Partly (b)	≥ 10 %	4	3	3
Very green (+++)	Fully (b); Best practices	≥ 25 %	3	3	0
Green by nature (++++)	Primary function	“100 %”	1	1	1
Total signed			**34**	**34**	**51**

- (a) Core / (b) comprehensive criteria: criteria suitable for use: (a) by any contracting authority and address the key environmental impacts / (b) for those who wish to purchase the best environmental products available on the market.
- The percentage is expressed as the weighting of environmental criteria as a share of the total weighting (for price and quality).
- Primary function: goods, services and works to be procured is green (e.g: green roof; consultancy services to improve environmental performance).

Table D19 gives an overview of the main actions related to the green public procurement.

Table D19: Actions relevant to procurement

JIRA #	**Service**	**Perimeter of action**	**Date in AAP**	**Action description**	**Action type**	**Description of latest progress**
EMAS GAAP-190	R.6	All site – JRC-Geel	2016	New electricity contract.	Single	Completed 2018 – New electricity contract operational.
EMAS GAAP-465	R.6	One building	2019	New cafeteria contract to include stronger GPP criteria’s to reduce water consumption and CO_2 footprint.	Single	Completed 2019 – New contract granted.

D9 Demonstrating legal compliance and emergency preparedness

The legal compliance of JRC-Geel’s activities is divided into nuclear and non-nuclear areas and was followed up by different external entities accordingly:

- The nuclear environmental protection issues are regulated by the Federal Authorities and monitored by the Federal Agency for Nuclear Control (FANC) and its technical subsidiary BelV. The last update of the nuclear operational license was approved in the Royal Decree on the 08 February 2010. The SAR (safety analysis report) reflecting the license basis of the plant has been revised in June 2020.
- The non-nuclear environmental protection is regulated by the Flanders Region. The main agencies involved are Departement Omgeving, OVAM (Openbare Afvalstoffen Maatschappij) and VMM (Vlaamse Milieu Maatschappij). The JRC-Geel environmental legal license (13 July 2012) was updated on the 8 February 2018 and 16 July 2020 respectively. The follow-up of the appropriate legislation is performed by an environmental coordinator. At JRC-Geel this task is outsourced. From 2019, a new contract for the external environmental coordinator entered into force with a new company.

11 CPV codes are internationally recognised. They establish a single classification system for public procurement aimed at standardising the references used by contracting authorities and entities to describe procurement contracts.

10 “according to scale adopted by European Court of Auditors Special Report 14 (2014)”.

Different units managed legal compliance at JRC-Geel in 2020:

- Health Physics Service (HPS), administratively belonging to Unit G2, followed the Nuclear legislation;
- Unit R.6 in close collaboration with the JRC-Geel EMAS Site Coordinator followed up the Non-Nuclear Environmental Legislation with the environmental legal register set up for JRC-Geel in 2018 as well as with the strong support of the external environmental coordinator, conducting regular inspections during site visits and audits.
- The Biosafety Coordinator, a staff member of Unit F.6, intervened in the framework of contained use of GMOs and pathogens in biosafety laboratories.

JRC-Geel established a procedure for the management of its environmental legal compliance. Environmental control measures are implemented to assess and ensure that JRC-Geel complies with the legislation (inspections, audits: internal and external…).

Table D20 lists the main on-going actions set up for the legal compliance of JRC-Geel.

Table D20: Major actions relevant to legal compliance

JIRA #	Service	Perimeter of action	Date in AAP	Action description	Action type	Description of latest progress
EMAS GAAP-466	DIR/ HPS	All buildings-JRC-Geel	2019	Integration of environmental emergency scenarios in JRC-Geel emergency exercises.	Multi-stage	2020 – Completed autumn 2020. New procedure includes detailed environmental scenarios. 2019 – Set-up on going.
EMAS GAAP-468	R.6	All buildings-JRC-Geel	2019	Characterisation of wastewater and correlation with legal requirements.	Multi-stage	2020 – Intensive measurement campaign performed. Complementary analysis to be done on hold due to Covid-19. 2019 – Analysis of waste water network on going.
EMAS GAAP-553	R.6	JRC-Geel Site	2020	Retrofit/renewal of cooling installations following ban of gas with GWP > 2500.	Multi-stage	2020 – Technical analysis completed; works on going. B100 and B190 completed.
EMAS GAAP-556	Dir/ R.6	JRC-Geel Site	2020	Environmental license update.	Single	2020 – Completed spring 2020.
EMAS GAAP-578	Dir	JRC-Geel Site	2021	To set-up a full process, including procedures, as well as communication for the regular update of the dangerous products inventory. Study of the possible implementation of an electronic inventory tool.	Multi stage	To start in 2021.
EMAS GAAP-579	R.6	4 buildings-JRC Geel	2021	Replacement of the main electric boards in buildings 010, 050, 060 and replacement study in B040.	Multi stage	To start in 2021.
EMAS GAAP-580	R.6	1 buildings-JRC Geel	2021	Study of renewal high voltage distribution in B090.	Multi stage	To start in 2021.

D10 Communication≈

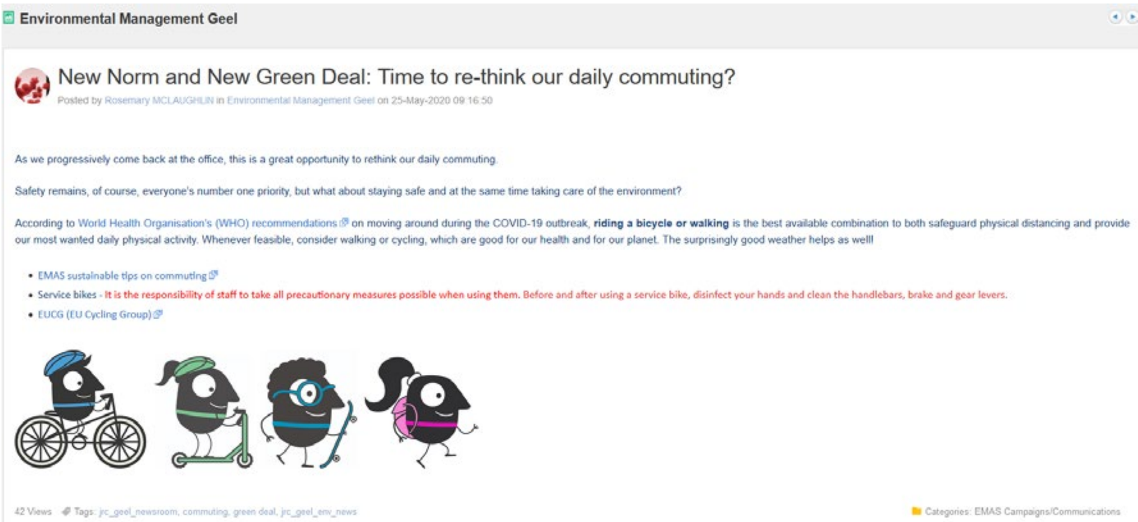
D10.1 Internal communication

To inform the staff and promote the different EMAS actions, JRC-Geel uses two main means of communication, namely the flat screens installed in the different buildings and the JRC intranet (Connected). In 2020, the EMAS team did not advertised any campaigns via the Overhead Screens as few staff was present on site due to the COVID-19 pandemic, but broadcast 53 campaigns via Connected with complementary links and documents.

The different promoted campaigns were either a communication from JRC-Geel's own initiative or in support of and with the material of DG HR.

An example of EMAS communication made at JRC-Geel via Connected for the Commuting is illustrated in **Figure 25.**

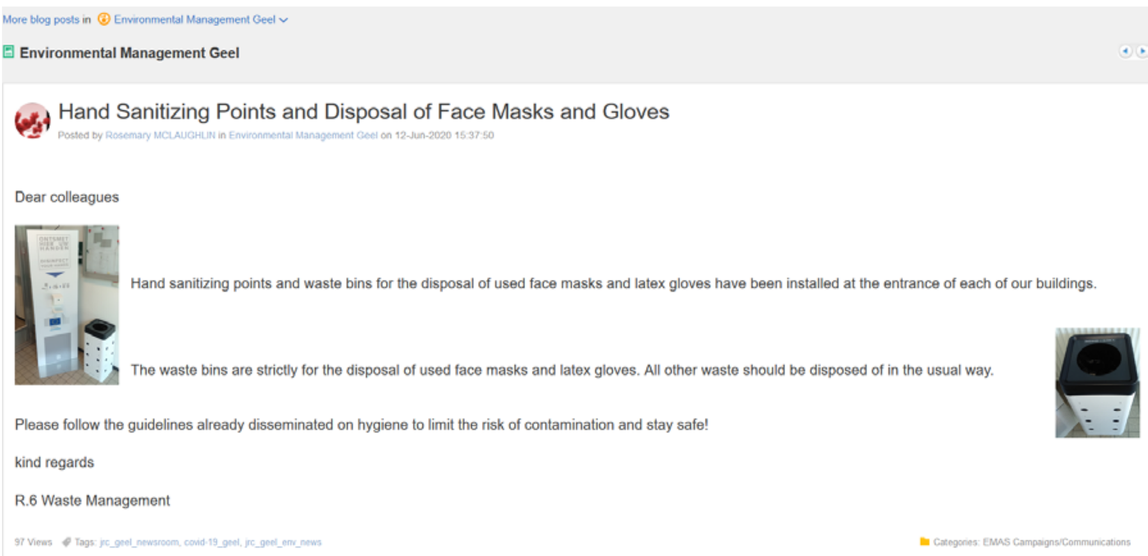
Figure D25: Commuting



The 2020 Environmental Statement showing the environmental performance made in 2019 was communicated on the JRC-Geel environment Connected page. New waste segregation rules and waste procedure(s) and JRC-Geel Environment Management review were also advertised via Connected. Other activities were promoted such as the Velomai, Nat Geo challenge, etc.

Another important Connected blog communication on one of the initiatives organised by JRC-Geel to strengthen the commitment of the staff and its awareness regarding hand sanitizing points and disposal of face masks and gloves during the COVID-19 pandemics is illustrated in **Figure 26**.

Figure D26: Communication on the hand sanitizing points and disposal of face masks and gloves at JRC-Geel



D10.2 External communication and stakeholder management

The mandatory annual reports to Departement Omgeving and VMM (Vlaamse Milieu Maatschappij) were prepared and dispatched on schedule (March 2020).

To efficiently manage its environmental aspects, JRC-Geel maintained continuous communication with its subcontractors (i.e. maintenance, cleaning, building management system etc.) either via reports or meetings.

The yearly meeting with the local community took place in January 2020 to update the "neighbours" on the different actions JRC-Geel implement or perform to fulfil its obligation vis à vis the environmental, safety of the facility and its surrounding to limit the risks and disturbances.

The nuclear legal obligations require even more regular communication with FANC (Federaal Agentschap voor Nucleaire Controle) and BelV (subsidiary of the FANC taking care of the regulatory controls in nuclear installations).

D11 Training

D11.1 Internal training

Despite the pandemic, the following training sessions related to environmental protection took place in 2020, mainly via video conferencing:

- Induction course for newcomers (including environment);
- Biosafety;
- Procurements:
  - GPP Public Buildings Design, Construction and Maintenance
- EMAS specific trainings:
  - EMAS – Overview of the environmental review;
  - Introductory training for new ECORs (environmental coordinator)/Site Coordinators;
  - EMAS – Significant Environmental Aspects
  - EMAS – Context and Stakeholders Analysis
  - EMAS - OTRS management of findings
  - Overview of the EMAS process – Tasks and responsibilities; OTRS as a tool for legal compliance management
- Arcalex database

The induction course was specifically prepared for Commission Staff. The Biosafety course is delivered to both Commission Staff and staff members from external companies; the statistics displayed in **figure D27** however only consider Commission staff members.

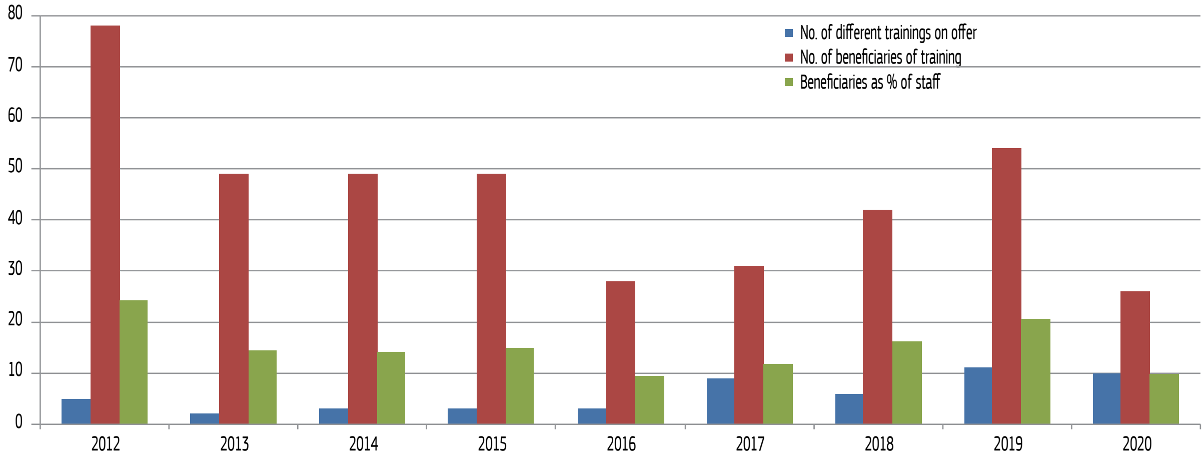
Any nuclear training courses directly linked to Health and Safety, such as for radiation protection, are excluded from the statistics discussed in this report.

D11.2 External training

In 2020, no specific external training relevant to environmental protection was followed by any JRC-Geel staff member.

Figure D27 gives the evolution of training given to JRC-Geel staff:

Figure D27: Evolution training



The decrease over the years (until 2016) in beneficiaries is largely due to the staff reduction and subsequent very limited number of newcomers. From 2016, the trend reverses, the percentage of staff benefiting from training increasing. The increase observed in 2017 and 2018 relates to the release of the new ISO 14001 (2015) standard and the revision to the EMAS regulation (2017) for which JRC-Geel staff had to be trained for an efficient implementation. The higher number of people trained in 2019 is likely due to a slight increase in the number of new staff; and an increase in the number of training courses offered to the staff. Lower number of trainings and trainees can be observed for 2020. These numbers result from the lock-down of the site during the COVID-19 pandemic, most of the training being organised physically being cancelled.

D12 EMAS Costs and saving

Table D21: EMAS administration and energy costs for buildings in the EMAS area

	Costs										Change in
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	last year
Total Direct EMAS Cost (EUR)			66 000	66 000	67 000	67 000	69 000	74 000	75 000	76 000	1000
Total Direct Cost per employee			194	191	204	226	260	286	286	286	-1
Total buildings energy cost (Eur)	1 714 963	1 687 504	1 362 337	1 337 755	1 200 048	1 192 636	1 085 126	1 043 440	1 260 420	1 017 637	-242783
Total buildings energy cost (Eur/person)	5 181	5 241	3 995	3 866	3 659	4 029	4 095	4 029	4 811	3 826	-985
Total water costs (Eur)	27 807	25 607	19 005	13 491	11 706	9 905	12 399	22 614	23 527	19 187	-4339
Water (Eur/person)	84	80	56	39	36	33	47	87	90	72	-18
Total paper cost (Eur)				7 419	3 793	6 462	3 518	3 896	4 295	1 227	-3068
Total paper cost (Eur/person)				21	11	19	10	11	12	4	-9
Waste disposal (general) - unit cost/tonne*					210	290	340	533	585	780	195
Waste disposal (general) - Eur/person*					73	105	122	156	145	118	-27

NA Not applicable

In 2020, all the cost generated by the resources consumption per capita have ben decreased due the lock down. The expenses for the waste on the contrary have raised by 33 %.

D13 Conversion factors used for JRC-Geel

Table D22: Conversion factors

Parameter and units	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
kWh of energy provided by one litre diesel (1)	11	10.89	10.89	10.89	10.89	10.89	10.89	10.89	10.89	10.62	10.58
kWh of energy provided by one litre petrol (1)	9	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.46
kWh of energy provided by one kg propane (2)		12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78
Paper Density (g/m^2)		80	80	80	80	80	80	80	80	80	75
Kgs CO_2 from 1 kWh of electricity (3)		0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285
Kgs CO_2 from 1 kWh natural gas (4)		0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21
Kgs CO_2 from 1 kWh diesel (4)		0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.266	0.266
GWP of R22	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760
GWP of R410A (5)	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920
GWP of R134A (5)	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
GWP of R404A (5)	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940
GWP of R407C (5)	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620
GWP of R507A (5)			2 240	2 240	2 240	2 240	2 240	2 240	2 240	2 240	2 240
GWP of R23 (5)						12 400	12 400	12 400	12 400	12 400	12 400
GWP of R508B (8)						13 396	13 396	13 396	13 396	13 396	13 396
GWP of R227A (5)							2 640	2 640	2 640	2 640	2 640
GWP of SF6 (5)						23 500	23 500	23 500	23 500	23 500	23 500
GWP of ISCEON89							3 805	3 805	3 805	3 805	3 805
GWP of R407D (5)							1 627	1 627	1 627	1 627	1 627
GWP of R32										675	675
Kgs CO_2 from one litre of diesel (7)	0	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.158
Kgs CO_2 from one litre of petrol (7)	0	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.81	2.808
Annual cost of one FTE (6)				132 000	132 000	134 000	134 000	138 000	148 000	150 000	152 000

Notes:

(1) www.carbontrust.com, (Conversion factors 2013)

(2) From site use, (PCI value)

(3) Value based on EU Covenant of Mayors

(4) Base Carbone 2017, ADEME (PCI for natural gas; Europe averages considering upstream and combustion emissions)

(5) IPCC 5th Assessment report 2014, referenced by Base Carbone 2017, ADEME

(6) Data from DG BUDG financial units network (RUF) for average cost of Administrator staff at beginning of year of reporting

(7) Base Carbone 2017, ADEME (vehicle fleet (France), including upstream and combustion emissions)

(8) http://climalife.dehon.fr/uploads/media/3/276/276_1496_r508b-fd-fr-13.pdf and http://www.linde-gas.com/en/products_and_supply/refrigerants/hfc_refrigerants/r508a/index.html (and as calculated by Ispra) (ARCADIS report May 2018

D14 Site breakdown performance of selected parameters

Table D23: Site breakdown

Building	Address	Occupant	Useful surface area (m²)	Staff	Office	Café	Self service restaurant	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	IT Server centre	Power generation	Water treatment plant	Lab/experimental (non nuclear)	Nuclear lab/experimental	Electricity	Mains gas	Other gas	Diesel	District heating	District cooling	Site renewable solar	Site heating from heat pumps	Site renewable biomass	**Total energy**	Water (m3)	Non hazardous waste (tonnes)	Hazardous waste (tonnes)	Wastewater discharge (industrial)
1) Building essential details 2019:					**2) Building use 2019**														**3) Energy sources and amount (MWh for 2019)**										**4) Water and waste consumption**			
10	Main building	F.4, G.2	8 327		X												X	X	645				352					**997**	255			
20	Monnet building	G.2	3 364		X													X	727				159					**886**	34			
40	Mass spectrometry building	G.2	6 818		X												X	X	1 319				540					**1 859**	1 989			
50 (and FP51)	Linac building	G.2	8 303		X							X		X				X	1 823	481								**2 304**	919			
60	Technical Services	R.6	2 776		X				X		X	X							93				66					**159**	88			
70-71-72&170	Dangerous products, chemical products and chemical waste storage building & pumping station		181								X																					
81	Cafetaria		665			X	X												54				96					**150**	214			
90	Generators building		756												X				47			7.75						**55**				
100	Conference building		779																53				54					**107**	8			
110	Chemistry building	F.5	2 030		X												X		528	797								**1 325**	126			
120	Garages	R.6			X						X								17				45					**62**	60			
130	BCR building	E.5; F.4, F.5	2 599		X												X		687			0.85	383					**1 071**	364			
190	Reference Materials Storage building	F.6	3 276		X						X								663									**663**	599			
200	Reference Material Processing building	F.6	5 880		X									X			X		1 032	534								**1 566**	457			
210	Administration building	F, R.6, R.10	3 074		X														119							101		**220**	119			
222	Entrance building	G.2	1 723		X					X				X					166				84					**250**	227			
225	Incoming goods building	Guards	100								X								1									**1**				
JRC-GEEL Total			**50 651**																**7 974**	**1 812**		**8.6**	**1 779**					**11 675**	**5 459**	**40.28**	**5.11**	

Notes Surface B060 includes B120
B110 includes B114 (as annex since 2018)

JRC Geel water/building: numbers given take into account rain water consumed in B200, 210 and 222
District heating measured in each building using heat meters
B120 water and electricity included in B060 for year 2016; 2017 only water in common for B060&120
- The difference observed between the sum of the electricity invoices and the electricity consumption of every single power meter of the JRC-Geel buildings (<0.35%) is mainly due to the power meters measurement uncertainty (at least +/- 0.5% according to the manufacturer's specifications) as well as to the losses on the high voltage lines and in the various transformers.

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Annex E: JRC-Seville

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Cover illustration: Photo of the EXPO building the location of JRC-Seville, provided by the EMAS Site coordination Team at JRC-Seville.

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Annex E: JRC-Seville

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ANNEX E: JRC-Seville – Administrative activities

The European Commission's Joint Research Centre (JRC) site in Seville is one of the JRC's seven scientific institutes across Europe. It was established in 1994 under the name Institute for Prospective and Technological studies, and after the re-organisation of the JRC in 2016 it became JRC-Seville Site

JRC-Seville's mission is to provide scientific and technical support for community policy-making by the European Commission (EC) involving a socio-economic and scientific/technological dimension. Its main activity involves carrying out studies in the above context, and it therefore assumes an administrative nature. Contrary to other JRC sites, JRC-Seville does not operate laboratories nor facilities other than the offices of the researchers with well-equipped computers and data processing resources suitable for performing the simulations and analyses required.

E1 Overview

E1.1 Reporting and the COVID pandemic

Reporting for 2020 retains the same approach as in previous years, for continuity purposes; therefore, it relates to site activity and total staff numbers. Thus, the data collected reflect the impact that the pandemic has had regarding staff presence on site, but to a certain extent only. In particular, since the JRC-Seville is located in a multi-tenant building, the Commission cannot decide upon its closure or shutting down of certain facilities. This has its reflection on the behaviour of some indicators. Moreover, the fact that some facilities had to run under specific conditions (e.g. no recirculation of air) introduced negative distortions to what would be normal operations.

The EMAS corporate coordination team has made rough estimates of home consumption due to telework under COVID, as described separately in the Corporate summary. The actual impact of teleworking on the reported indicators will be analysed as more site-specific information becomes available.

E1.2 Core indicators at JRC-Seville since 2010.

Table E.1 below summarises the evolution of main environmental indicators of the JRC-Seville site since 2010. The general EMAS targets for improvement were established for the period 2014 to 2020 allowing for some degree of flexibility from year to year. The 2020 Targets are indicated in the right hand column, while the annual change is presented in the performance trend column.

Table E1: Historical data, performance and targets for core indicators proposed for Commission level reporting

Physical indicators:	Historic data values					Performance trend (%) since:		Target		Future targets	
(Number, desciption and unit)	2010 (1)	**2014**	2018	2019	2020	2010	2014	2014-20		2014-23	2014-30
								Δ % (2)	value (2)	Δ % (3)	Δ % (3)
1a) Energy bldgs (MWh/p)	11.17	**9.13**	6.87	6.29	5.91	**-47.1**	**-35.2**	-8.0	8.402	-35.0	-40.0
1a) Energy bldgs (KWh/m²)	425	**376**	310	301	291	**-31.4**	**-22.6**	-8.0	346	-35.0	-40.0
1c) Non ren. energy use (bldgs) %	100	**77.4**	79.3	86.5	20.4	**-79.6**	**-73.6**	Q	Q	-8.0	-10.0
1d) Water (m³/p)	42.81	**21.73**	14.66	13.18	13.04	**-69.5**	**-40.0**	-5.0	20.65	-45.0	-50.0
1d) Water (L/m²)	1 627	**895**	661	630	642	**-60.5**	**-28.3**	-5.0	850	-45.0	-50.0
1e) Office paper (Tonnes/p)	0.03	**0.012**	0.013	0.010	0.003	**-90.2**	**-74.4**	-5.0	0.012	-25.0	-30.0
1e) Office paper (Sheets/p/day)	31	**12.6**	12.8	9.7	3.2	**-89.5**	**-74.4**	-5.0	11.9	-25.0	-30.0
2a) CO_2 buildings (Tonnes/p)	4.54	**3.09**	2.31	1.79	1.30	**-71.4**	**-58.0**	-5.0	2.93	-45.0	-50.0
2a) CO_2 buildings (kg/m²)	172	**127**	104	86	64	**-63.0**	**-49.8**	-5.0	121	-45.0	-50.0
2c) CO_2 vehicles (g/km, manu.)	136	**136**	136	136	136	0.0	0.0	-5.0	129	-100.0	-100.0
2c) CO_2 vehicles (g/km, actual)		**260**	210	149	237		**-8.9**	-5.0	247		
3a) Non haz. waste (Tonnes/p)		**0.022**	0.031	0.044	0.014		**-38.3**	-5.0	0.021	-20.0	-25.0
3b) Hazardous waste (Tonnes/p)		**0.012**	0.004	0.007	0.003		-75.0				
3c) Unseparated waste (7) (%)		23	41	36	23		**2.1**	-5.0	21	-25.0	-50.0
3c) Unseparated waste (7) (T/p)		**0**	0	0	0		**-49.8**	0.0	-5	-20.0	-50.0
Economic indicators (Eur/p)											
Energy consumption (bldgs)		**1 142**	779	769	677		**-40.7**				
Water consumption		**38.3**	29.9	27.3	22.6		**-41.0**				
Non haz. waste disposal			12.0	11.2	1.4						

Notes: (1) Earliest reported data;
(2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018)
(3) Draft figures from the Global Anual Action Plan 2021
(4) 2014-20 indicator discontinued
(6) Target value; Q Qualitative target, (7) minimum values
*Indicators are based on actual surface area occupied in the Expo Building

The table E1 shows a decreasing trend for most indicators for the period 2010 – 2020. This trend is very positive, particularly taking into account the significant increase of staff (increase by 80%) and occupied surface area (by 39%), as illustrated in Figure E1.

Based on a history of effective collaboration, JRC-Seville and the property owner, EPGASA, continue to work towards reducing the environmental impact of their activity in all related to the building and parts thereof, under responsibility of EPGASA. In 2015 and 2019, both entities signed environmental commitment letters stating the aspects under responsibility of EPGASA to monitor systematically. In 2016, the environmental commitment letter was included as annex in the rental contract and they are verified through regular coordination meetings.

Because of the commitments made through the rental contract, the property owner continues to upgrade building facilities and services. These actions have been determinant to achieve a considerable improvement of the building´s environmental performance in the last years, as can be seen in the evolution of energy consumption.

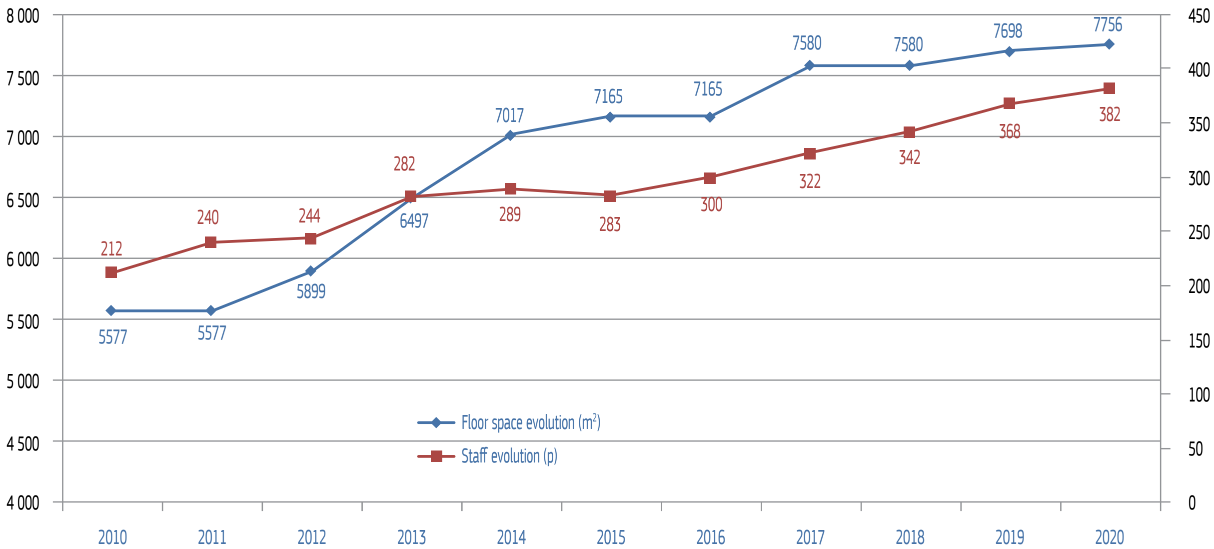
For what concerns other indicators with very positive outcome, the decreasing trend since 2014 by 74% (Tons/p) in office paper and 28% in water consumption (l/m^2) would suggest higher degree of awareness by staff and by the facility management services, who have deployed new policies in those areas in the last years.

As far as the energy (-3% Kwh/m^2) and water (-1 % m^3/p) consumptions are concerned, the decrease has not been so significant in 2020 due to the COVID-19 pandemic effect in comparison to 2019. These data are analysed in the chapter E4.

Finally, the economic indicators show also a descending trend since 2014. In 2020, Seville carried out different waste removals in close collaboration with the cleaning company which lead to a saving by 9.8 €/person in the Waste disposal indicator.

The evolution of the EMAS system in JRC-Seville since 2010 is as shown below:

Figure E1. JRC-Seville EMAS Basic Parameters evolution from 2010 to 2020

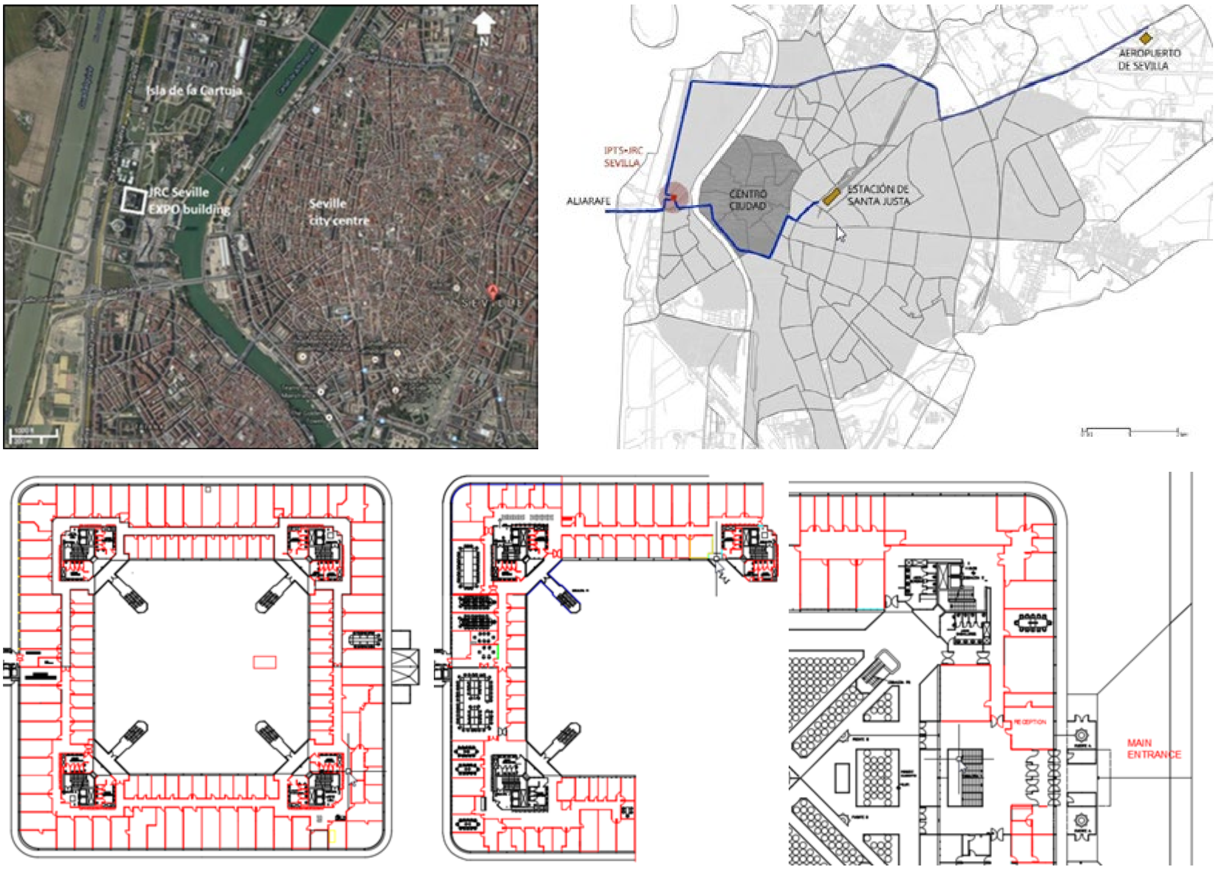


Notes : Staff no. centrally collected figures from DG HR;

The staff in JRC-Seville steadily and significantly increases over the years, from 212 in 2010 to 382 registered in 2020, representing an overall increase of 80% for that period. The work program 2021 foresees that this figure peaks at 425 persons, with an estimated yearly average of 410 staffs.

The increasing EMAS perimeter of useful surface area in the JRC-Seville Site logically follows the demographic pressure. The space rented to the property owner has reached 7 756 m^2 in 2020, representing an increase rate of 39% as of 2010, which, compared to the evolution of the staff count, indicates an efficient use of the space (from 26m^2/person to 20m^2/person, including shared spaces, meeting rooms, etc.)

Figure E2 Site location & layout



SECOND FLOOR FIRST FLOOR GROUND FLOOR

E2 Description of Seville activities and key stakeholders:

JRC-Seville is located in the building known as the "Expo building" since 1994, which is located in the Science and Technology Park (Isla de la Cartuja) to the west of the Seville city centre. EPGASA, a public company owned by the regional government of Andalusia, manages the building, along with other facilities originating from the Expo 1992.

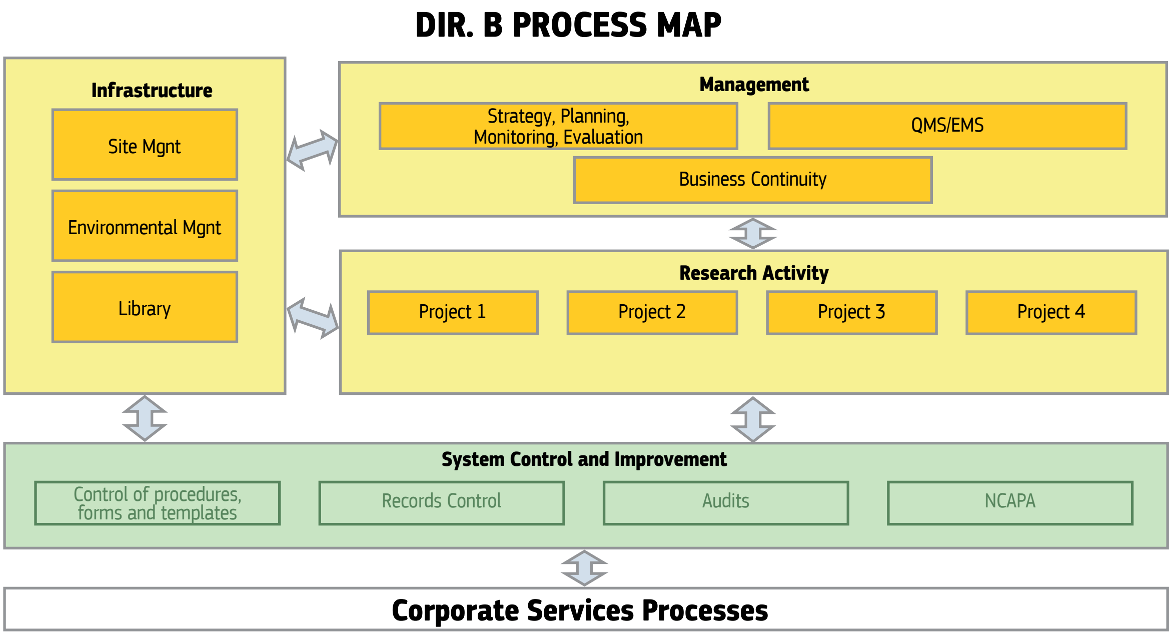
The Expo Building is a three-storey multi-tenant offices building with a total office space of 12 584 m^2, of which JRC-Seville occupies 7 756 m^2, equivalent to 61.65% of the total and distributed across the ground, first and second floors. The building has two basements used as parking, including bicycles, and hosting core infrastructures. The total site area is 11 669 m^2. The building itself occupies 8 168 m^2 at ground level.

E2.1 JRC-Seville's organisational structure

The Seville site accommodates several services of the JRC, (in 2019 JRC Units B.2, B.3, B.4, B.5, B.6, B.7, C.6, D.4, R.1, parts of the units I.2, I.5, DG.HR´s Human Resources and the Medical Service). The JRC-Seville Site Manager, who is Director of JRC´s Directorate Growth and Innovation (JRC.B) reports to the Director General of the JRC and is responsible by sub delegation of all site development, environmental, security and health and safety aspects of the Seville site, besides his obligations as Director of JRC.B, which is a multi-site entity based in Seville (Spain), Ispra (Italy) and Brussels (Belgium).

The so-called Scientific Units execute the policy and research work undertaken by the JRC in its yearly and multi-annual work programs. The Units structure their work in projects, under specific work-packages. The Programme Office of JRC.B coordinates the Scientific production of the directorate, manages internal communications, publications services, audits and quality management.

Figure E3:JRC-Seville Process Map



The JRC Directorate B Management System consists of the main processes shown in the Process Map above. JRC.B structures its processes in five groups: Management, Research, Infrastructure, Stakeholders & Customers, and System Control & Improvement. This process map is based on the JRC's IMS[1] process map, which currently is being mapped to the corresponding processes.

The table below shows the main core business activities carried out at JRC-Seville.

Table E2: Description of main activities in JRC-Seville

DIR or UNIT	Activities
JRC B - Growth & Innovation	JRC Directorate B - Growth & Innovation conducts research that provides science-based, customer-driven socio-economic and techno-economic support for the conception, development, implementation and monitoring of EU policies.
JRC B1 Finance and Economy	To provide scientific support to improve European economic and financial governance and to contribute to the reform of the European financial system.
JRC B2 Fiscal Policy Analysis	To model and analyse tax policies, and to support the action plan for a fair and efficient corporate taxation in the EU.
JRC B.3 for Territorial Development	To perform research and analysis and to provide policy support at the crossroads of EU regional, cohesion, R&I and industrial policies, including the assessment of economic and territorial impacts, in order to enhance the formulation and implementation of policy and more effective and efficient use of EU funds.
JRC B.4 Human Capital & Employment	To provide scientific support related to Human Capital and Employment, to contribute to Innovation, Growth and Social Cohesion in the EU.
JRC B5 Circular Economy & Industrial Leadership	To provide the techno-economic support in the fields of industrial emissions, product policy, waste and environmental management.
JRC B6 Digital Economy	To study the current and emerging facets of digital transformation, and its impacts on the European economy, society and environment.
JRC B7 Knowledge for Finance, Innovation & Growth	To support EU policies by focusing on topics that cut across several Dir B and other JRC Units, integrating scattered knowledge within JRC and outside, and doing essential complementary research to fill the gaps.
JRC C6, Economics of Climate Change, Energy & Transport	To Support the European Commission by performing economics based research in support of energy, transport and climate-related policies.

[1] Integrated Management System of the Directorate General JRC

DIR or UNIT	Activities
JRC D4 Economics of agriculture	To provide scientific support to the EU policy-makers in assessing through macro and micro socio-economic analyses the development of the Agro Food sector and related sectors including rural development, food security, trade and technological innovation in the EU and globally but also with special emphasis on Africa.
JRC R.1	To support and coordinate the implementation of resource management functions on the JRC Seville Site in a client responsive manner and in compliance with all applicable rules and regulations, acting as focus of resource management support to the Directorate JRC Seville. To provide technical support for the scientific programmes of the site and to develop and maintain the infrastructure of JRC Seville.
HR.AMC.8	To provide support to human resources dossiers.
I.5	To provide informatics support to the JRC-Seville site

E2.2 Interested parties and Stakeholders

In terms of a management system, JRC-Seville's main 'customers' are the policy Directorate-Generals (DG) of the EC, although in practice the JRC and other DGs work as partners, to ensure the formulation of policies based on research–based evidence. The JRC-Seville occasionally provides services for other European institutions, notably the European Parliament.

JRC-Seville, according to the EMAS EC Environmental Policy, commits to minimise the environmental impact of its everyday work and continuously improve its environmental performance by:

- Complying with the EMAS Regulation;
- Fulfilling the applicable legal and other requirements related to the environmental aspects;
- Taking measures to prevent pollution and to achieve more efficient use of natural resources (mainly energy, water and paper);
- Taking measures to reduce overall CO_2 emissions;
- Encouraging waste prevention, maximising waste recycling and reuse, and optimising waste disposal;
- Integrating environmental criteria into public procurement procedures and into the rules regarding the organisation of events; and
- Stimulating the sustainable behaviour of all staff and subcontractors through training, information and awareness-raising actions.

As mentioned before, the environmental responsibility is shared with the public company EPGASA, owner of the Expo Building. EPGASA is responsible for the general building management, maintenance and several accessory services. JRC-Seville's infrastructure-related processes seek to guarantee that staff enjoy a properly functioning and clean working environment while taking into account environmental issues and ensuring the premises' safety, security and business continuity.

The government of Andalusia and the city council of Seville are the competent bodies regulating the applicable local environmental legislative framework at regional and local level.

In 2020 (retrospectively for 2019), JRC-Seville prepared a comprehensive stakeholder and context analysis clearly defining the various stakeholder groups, their main representatives as well as their interests or expectations. This has been adapted up to 2021 (retrospectively for the year before). The results are shown in the tables E3, E4 and E5. The various groups are distributed according to their level of interest/influence and involvement on environmental matters using a semi-quantitative approach.

Table E3.Stakeholders Analysis

Stakeholder group	Main representatives	Interest, needs and expectations	Communication	Priority
European Institutions (Budget €)	◆ DG JRC, ◆ EC ◆ Council & parliament ◆ Member states ◆ Commission panels ◆ EC citizens	◆ Timely response to DG's demands ◆ Cost effective Environmental Management ◆ Policy making ◆ Effective implementation of policies at national level ◆ Multi-annual investment plans: investments : refurbishment, upgrading buildings, new construction ◆ Building site management	On regular basis	Manage closely
Policy makers	◆ European Commission ◆ Spanish Government ◆ Andalucía authority ◆ Local authorities	◆ Contribution to environmental policy and COP 2030 targets on energy ◆ COVID-19 pandemic crisis recuperation	On regular basis	Keep satisfied
Suppliers / contractors	◆ Property owner including building management and maintenance ◆ Services: cleaning company, catering company, authorised waste managers, architects and consultants, contractors, ◆ stationary supplies, printing services, training	◆ Business continuity ◆ Timely delivery of services, supplies ◆ Timely response in case of incidents ◆ Adequate resources ◆ Competence ◆ Efficient procurement and financial management ◆ Sound contract performance-Legal compliance ◆ COVID 19 framework collaboration	On regular basis	Manage closely
Employees	◆ Staff representatives ◆ Employees	◆ Safe and sound working environment ◆ Transparency ◆ Trust and respect ◆ Be informed on environmental policy, targets and performance ◆ Perceive the commitment from top management towards a sound environmental management.	On regular basis	Manage closely
Customers	◆ Research centre/companies and EC DGs	◆ Timely delivery of reference materials and policy support	On regular basis	Keep satisfied
Local communities	◆ Municipality ◆ Tenants of the Expo building ◆ Local Authorities	◆ Transparency ◆ Legal compliance ◆ Sound Environmental Management	On regular basis	Keep informed
Regulatory government	◆ Regulatory bodies Environmental inspection authorities	◆ Legal Compliance	On regular basis	Keep satisfied
Media and society	◆ Press/TV/radio ◆ Society in general / public opinion	◆ News value indirect influence on impact through image effects. ◆ Environmental awareness-Sound environmental Policy	On regular basis	Keep satisfied
Partners	◆ policy advisors ◆ other JRC sites ◆ OECD	◆ Knowing our competences (to partner or compete) ◆ Knowledge sharing, cooperation	On regular basis	Minimum effort
NGOs	◆ NGO	◆ Nature protection	On regular basis	Minimum effort
Insurances	◆ Fire insurances	◆ Minimize risk on incidents or calamities	On regular basis	Minimum effort
General Public	◆ Citizens	◆ Transparency -Sound environmental Policy	On regular basis	Minimum effort

Figure E4.Stakeholders Analysis

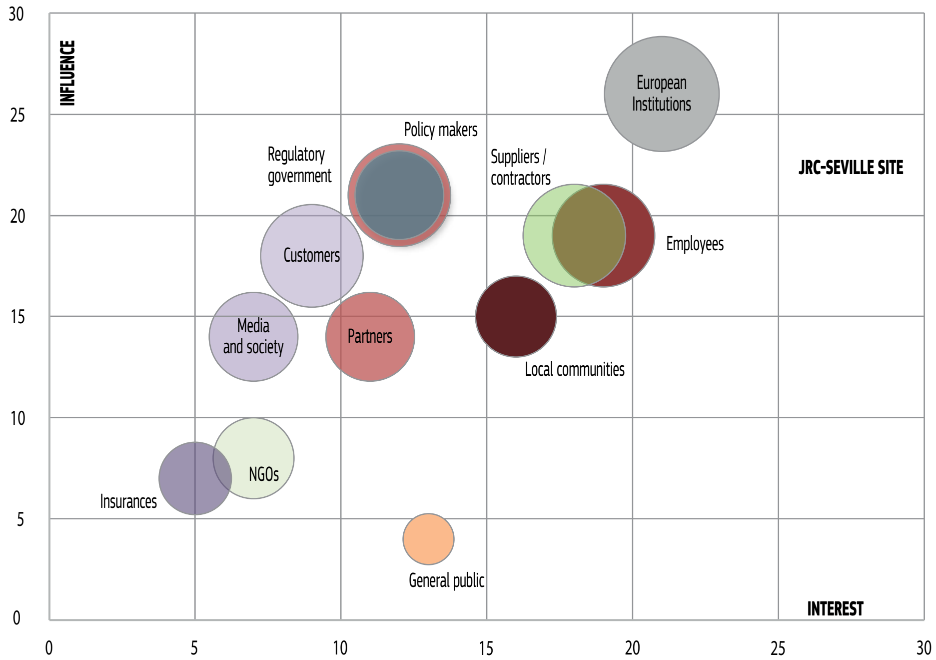


Table E4 Context Analysis External Issues

PESTLE criteria	External issues & circumstances that influence JRC- Seville's environmental targets (4.1)	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Political	Energy transition and COP (Conference of Parties) 2030 energy targets	Lack of direct control on the management of the building. Financial constraints faced by the property owner Time planning regulation constraints Uncertainty about the future seat of JRC-Seville	Potential to use renewable energy sources	Work out with the property owner potential proposals for energy saving measures to reach COP 2030 targets. Participation in regular meetings with the property owner
	European Green Deal	Difficulty of implementation. Need to allocate more resources and budget. Lack of direct control over the management of the building	Climate-neutrality by 2050 (net zero greenhouse gas emissions by 2050)	Assess requirements, risks and opportunities at local level to consider in the new building project
	Changing policies would imply a revision of the work program (e.g. Brexit, pandemics, Green Deal)	Yet unforeseeable impact on financial and human resources required to sustain the activity of the JRC, with impact on horizontal services and environmental activity	The Green Deal may open a door to increased awareness and environmental efficiency actions.	If necessary, liaise with Program Manager to anticipate potential actions.
	Requirements of national environmental and energy legislation as well as health and safety legislation	Risk of missing requirements and implications	Improve legal compliance monitoring. Improve environmental performance (better impact monitoring)	Support of an external data base for identifying and updating of the legal requirements

PESTLE criteria	External issues & circumstances that influence JRC- Seville's environmental targets (4.1)	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Political	Demands/ wishes of the surrounding communities	Reputational risk, complaints	Promote external communication	Support the Site Manager to develop an external communication plan as required
	Policy about Banning of use single plastics	Lack of control on the restaurant-cafeteria contractor, including catering service. Financial and other constraints faced by the cafeteria contractor.	Room for improvement to promote environmental actions with the new catering-restaurant services.	Develop and implement a strategy to influence contractors´ policies and actions to reduce waste and use of plastics. Better environmental actions. (Environmental Action Plan 2021)
	Buildings' infrastructure. The Expo Building is Energy Class D certified.	Lack of direct control on the management of the building. Financial constraints faced by the property owner Time planning regulation constraints Uncertainty about the future seat of JRC-Seville	New building project	Explore jointly with the property owner potential actions to improve the energy efficiency of the current site while the new building project progresses.
Economic	The uncertain economic situation (related also to Brexit) influences the investments, staffing and contractors	Potential for budgetary constraints to invest in reduction of energy consumption measures by the landlord	Loss of opportunities	Prioritise lower cost options
	The steady growth of JRC´s activity in the site has an impact on energy consumption and cost of support resources	Higher share by JRC of total building energy consumption and costs	Justification for new investment in energy reduction (refurbishment, insulation, new buildings)	Explore jointly with the property owner potential actions to improve the energy efficiency of the current site Participation in regular meetings with the property owner
	Captive market in relation with certain building maintenance tasks and services	Lack of market competition	There are external catering, parking and other offers available.	Explore jointly with JRC.R.1´s Procurement Sector potential actions leading to open the market that could have a positive impact on JRC´s environmental performance.
	COVID19 crisis	Revision of budget priorities might affect safety and environment project Shirking offer by providers due to closure of businesses	Reduction of mobility, best environmental performance in the site	Prioritise most relevant actions within the environmental and safety work plans

PESTLE criteria	External issues & circumstances that influence JRC- Seville's environmental targets (4.1)	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Economic	Increasing awareness of society on environmental impact and demand for transparency and reporting.	Lack of credibility while negotiating future seat with local and national authorities	Opportunity for developing good external communication	Support the Site Manager to include relevant environmental aspects in JRC-Seville´s external communication plan as required
Social	Cultural and demographic changes in a post-COVID19 Europe	Difficulties to fill vacant posts. Lower availability of specialised companies with interest to serve JRC-Seville. Evolution of the market with creation of de-facto monopoly positions, with impact on business continuity	Other EU bodies in Spain in similar situation: sharing of experiences and joining forces	Keep and develop contacts with other EU bodies in Spain and beyond.
	Energy transition and COP (Conference of Parties) 2030 energy targets	Lack of direct control on the management of the building. Financial constraints faced by the property owner Time planning regulation constraints Uncertainty about the future seat of JRC-Seville	Potential to use renewable energy sources	The property owner has signed a new green contract with Endesa Energia until 2022.
	Incorporation of massive teleworking to "new normal" working conditions	Reputational risk, questioning of current staff regulations	Reduction of transport emissions, less waste generation. Better environmental indicators.	Support the Site Manager to set JRC-Seville´s position with regard to telework, providing accurate estimates and data as required to define a balanced approach to it.
Technological	Development of green energy technologies	Lack of direct control on the management of the building. Financial constraints faced by the property owner Time planning regulation constraints Uncertainty about the future seat of JRC-Seville	Potential to use renewable energy sources and technologies.	Propose potential energy saving measures that could be agreed with the property owner. Participation in regular meetings with the property owner
	Increasing digitalization of processes, computer based management systems, videoconference systems	Budgetary constraints Uncertainty about the future seat of JRC-Seville	Potential to digitalise facility management	Green Public Procurement; ensure adequate video-conferencing systems, e-procurement process.

PESTLE criteria	External issues & circumstances that influence JRC- Seville's environmental targets (4.1)	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Legal	Increasing complexity of environmental regulations	Risk of missing requirements or insufficient monitoring No control in some legal requirements implementation Lack of adequate resources Budgetary constraints	Improve legal compliance monitoring. Improve environmental performance (better impact monitoring)	Maintain External Database service on key subject matters External Legal Compliance.
Environmental	Climate change effects: heat and cold periods- temperature peaks and average are increasing.	The Expo Building is Energy Class D certified Risk for higher heating and cooling costs demand compromising a sound environmental performance. Lack of direct control over the management of the building. Financial and other constraints faced by the property owner. Time planning regulation constraints Uncertainty about the future seat of JRC-Seville	Improve the energy efficiency, integration of renewable energy sources	Propose potential energy saving measures that could be agreed with the property owner

Table E5. Context Analysis Internal Issues

Criteria	Internal issues that influence JRC-Seville environmental targets	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Activities	Seville's core activity involves carrying out studies; therefore, it is of an administrative nature. The only specialist facilities required are well-equipped computers and data processing capabilities.	Degradation or interruption of power supply or connectivity.		Operational control procedures, regular meetings with the property owner

Criteria	Internal issues that influence JRC-Seville environmental targets	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Strategic direction	JRC positioning as reference centre increases travelling needs. JRC complex structure. New site manager.	Higher travel emissions (CO_2) Complex reporting lines and decision making	Streamlining of environmental activities in agreement with new site manager.	Promote video conferencing, Ensure Green/sustainable event organizations
	Steady growth of JRC-Seville´s activity due to success.	Direct negative influence on environmental performance. Fulfilment of the environmental objectives set compromised. Environment management resources put at strain.	Streamlining of environmental processes in agreement with new site manager.	Externalisation of low value-added activities to focus on core environmental actions.
	Biodiversity	Lack of awareness by staff of potential for enrichment of the biodiversity in the site.	Potential to improve the biodiversity in a site with sufficient green areas.	To explore initiatives and collaboration with the property owner on this respect
Culture & employees	Multi-culturalism at JRC-Seville has to be also considered from the point of view of impact on the environmental behaviour.	Negative" behaviour can have negative influence on the environmental performance. Lack of interest	"Positive" behaviour can have positive influences on the environmental performance as well as positively impact the general behaviour	Regular communication campaigns on environmental issues (Connected, info screens), awareness campaigns, specific trainings provided to key sectors of the organization all staff..
	Staff issues (seniority, temporary contracts, retirement)	Lack of interest by certain staff	Experienced staff may be attracted to give their experience back to staff, to promote positive behaviour. Temporary or junior staff may be attracted by facilitating them to expose and promote their ideas.	Improve the participation in EC EMAS basic trainings.
Processes & systems	Increased demand for remote/ flexible working	Organisational issues and priorities	Reduction of commuting emissions and decreased resources (use of office space, energy, etc.)	Promotion of telework as environmentally friendly work mode where feasible
	Complex procurement procedures and documentation management. Migration to Integrated management System	Risk of inefficiency. Devote more time to bureaucratic/ administrative tasks rather than to the area of expertise. Risk of delay in set deadlines	Room for improvement to structure and harmonise documentation	Corporate guidance and support.
Financial	Contract management sometimes unsatisfying	Non fulfilment of contractual requirements on environmental issues, such as proper waste segregation	Adequate contract performance	Define and communicate adequate Roles and responsibilities

In 2019, an additional expectation was to take into account recommendations out of the EMAS Sectoral Reference Document for Public Administrations. This was analysed, presented and discussed at successive EMAS site coordinator workshops in 2020. We consider that the existing reporting at site level largely takes into account feasible recommendations, and further analysis is presented in the Corporate Summary.

E3 Environmental impact of Seville activities

JRC-Seville undertook a full update of the environmental aspects in 2020[2] in accordance with the corporate methodology included in the procedure EMS-PRO-001. The Aspects Register is reviewed annually and updated when necessary. Significant impacts associated with three main aspect groups were identified, as described in Table E6.

The analysis of environmental aspects is strongly influenced by the COVID-19 pandemic situation. For example, to keep up with safety standards, the ventilation system has required a greater level of energy consumption, independently of the office activity. For this reason, the environmental impact associated to the gas consumption in the building has resulted significant. The other aspects described in the Environmental Aspects Register can be considered of minor significance.

Table E6 – Summary of significant environmental aspects for JRC-Seville

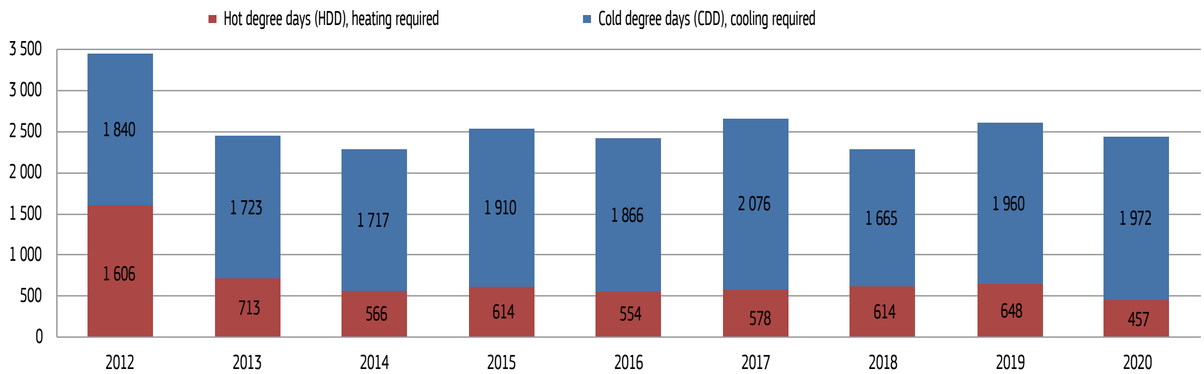
Aspect Group	Type Aspect	Environmental Aspect	Environmental Impact	Activity product or service	Indicator / action plan
Use of natural resources, including energy	Indirect	Gas consumption	Resources depletion, air emissions, global warming	Heating system	Indicator 1a
Air emissions	Indirect	Electricity and heating emissions	Global warming	Ventilation system, Lights, Heating system	Indicator 2a
Office work	Direct	Urban Waste Generation	Water pollution, damage to the ecosystem, contamination of land, depletion of resources	Office Activities	Indicator 3a

E4 More efficient use of natural resources

E4.1 Energy consumption

The building's energy consumption is influenced by the climatic conditions. Official meteorological data[3] suggest that the climatic conditions have been quite stable since 2013 with remarkably hot summers and mild winters (see Figure E5). In 2020, the number of Hot Degree Days decreased by 29%, whereas the number of Cold Degree Days were higher by 0.61%.

Figure E5: Total annual degree-days at JRC-Seville, 2012-2020



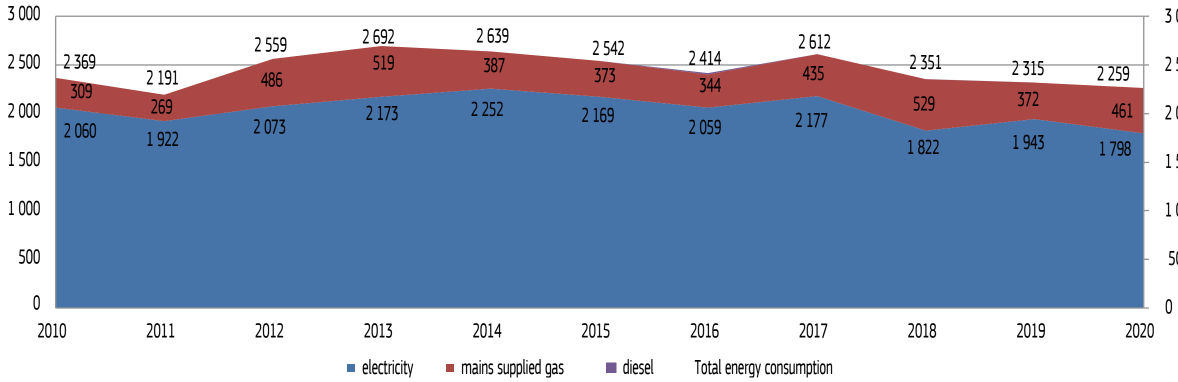
[2] Environmental Aspects Register (IMS-SVQ-S.6.6-REG-0001v3 Environmental Aspects JRC-Seville).

[3] Station LEZL, base 15.5 C, monthly degreedays.net. Note that temperature is just one factor influencing heating and cooling requirements

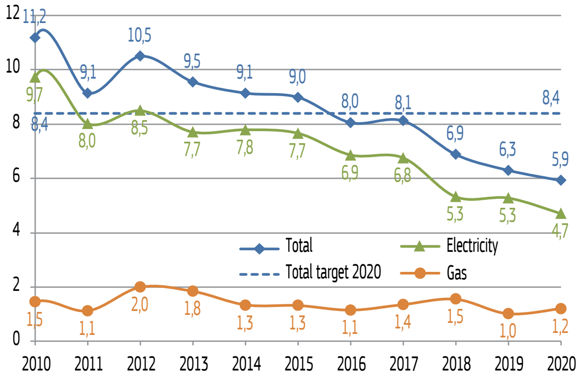
E4.1.1 Buildings

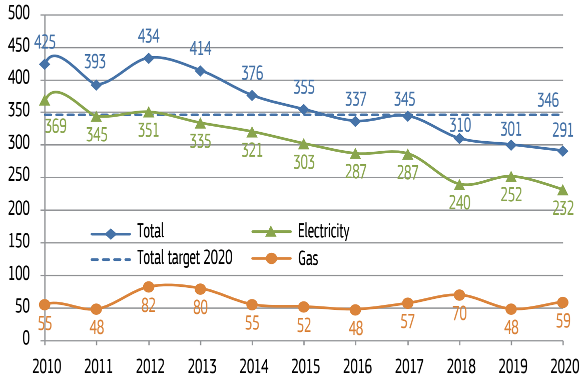
The evolution of total annual energy consumption is presented in the figure E6, while data per capita and per square metre are presented in Figures E7 and E8. In view that JRC-Seville's energy consumption is not measured individually, but there is one single meter for the whole building, the values are based on the prorata building occupation (2020: 61.65% share ot the total building consumption). In 2020, there was not any refill of diesel reported by the property owner.

Figure E6: Annual buildings energy consumption (MWh)perimeter (indicator 1a)



Figures E7 and E8: Evolution of total annual energy consumption for JRC-Seville EMAS building in MWh/person and in kW/m²





Figures E7 and E8 show that between 2010 and 2020 there has been a continuous reduction in energy consumption whether measured per capita (47%) or per square meter (31%).

The reduction from 2015 to 2020 is the result of the replacement of two chillers and two boilers (one boiler started operation in 2019) and through better performing equipment including refurbished restrooms, with energy and water saving features. In 2020, the property owner launched the project of replacing the fluorescents lamps in corridors by LED lightings.

In 2020, total energy consumption shows a decrease of 2.4 % MWh in relation to 2019. This reduction has not been very significant despite of the start-up of the new boiler in 2019. As mentioned before, due to COVID 19 pandemic, the ventilation system has been taking the outside air at all times, which for the city of Seville implies extreme conditions.

In 2019, a new environmental letter was signed and attached to the previous one, including all new regulation that applies in Seville and acknowledging EPGASA's efforts to improve the environmental performance of the Expo building.

It should be noted that the regional Government signed a framework contract with their electricity supplier to acquire "green energy" with guarantee of renewable origin, to all public buildings included in the "REDEJA Net[4]". This contract is valid until 2022 and the EXPO Building belongs to this net.

JRC-Seville committed to a reduction of 5% in building's energy consumption over the period 2014 to 2020; equivalent to reducing consumption by 0.85% annually. As can be seen JRC-Seville achieved many of the 2020

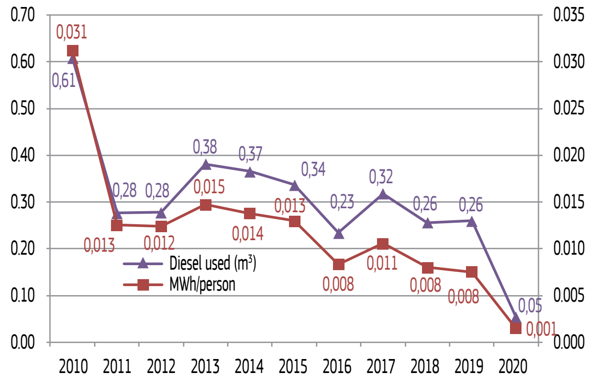
[4] Red de Energía de la Administración de la Junta de Andalucía (REDEJA)

targets and strives to continue to improve and collaborate with the property owner in their periodically coordination meetings. However, because JRC-Seville does not posses direct control over the environmental aspects relating to the building's infrastructure, the actions included in the Commission's 2021 EMAS Global Annual Action Plan (GAAP) focus mainly on Green Public Procurement, staff behaviour, promoting sound environmental practices at the office space and the actions related to energy consumption were modified or closed.

Table E7 Further actions to reduce buildings energy consumption (indicator 1a)

Action plan no	Year Planned	Description	Progress	Status / Date
422	2018	Keep promoting EMAS training for newcomers aimed to spread a sound environmental behaviour within the office space, thus minimizing the environmental impact.	EMAS training for newcomers done at regular intervals. More accurate feedback from attendees to be collected aimed to streamline the evaluation of the environmental training provided.	These awareness sessions were complemented with indications about good environmental behaviour campaigns. On going

Figure E9 Summary vehicle energy consumption (indicator 1b)



JRC Seville's service car fleet is composed of one diesel car only, which will be most likely discontinued in 2021. Meanwhile, the chauffeur commits to reduce emissions through more efficient driving habits.

Distances travelled are usually short as the car is used mostly for airport transfers, only 53.6 l of diesel were consumed. In 2020, due to COVID 19 pandemic situations, this service was negligible (only 714 km/year), with a significant reduction of trips to Malaga airport. The vehicle's fuel consumption figures are 136 gCO_2/km (manufacturer) and 237 gCO_2/km (actual).

The future of the service implies tendering a transport service, which will take into consideration environmental clauses.

E4.1.2 Renewable energy use in buildings and vehicles

The Expo building does not have installations producing renewable energy. However, as mentioned before, in 2020, all the electricity consumption at Expo Building, was consumed from renewable sources thanks to a contract between the electricity supplier and the Andalusia authority, owner the Expo Building.

The Order ITC/1522/2007 regulates the certificate of origin of the energy but does not foresee how the breakdown of the energy is communicated. Therefore, JRC Seville can verify that the electricity provided is "green", but cannot identify its sources. On other part, the Spanish competent body Comisión Nacional de los Mercados y la Competencia (CNMC), reports in 2020 that the share of energy generation from renewable sources in Spain consisted of 49% wind. Other sources were solar-photovoltaic, hydro, solar-thermal and other minor contributors.

Table E8 shows the increasing proportion of renewable energy used in the building, culminating in 2020 with the new contract.

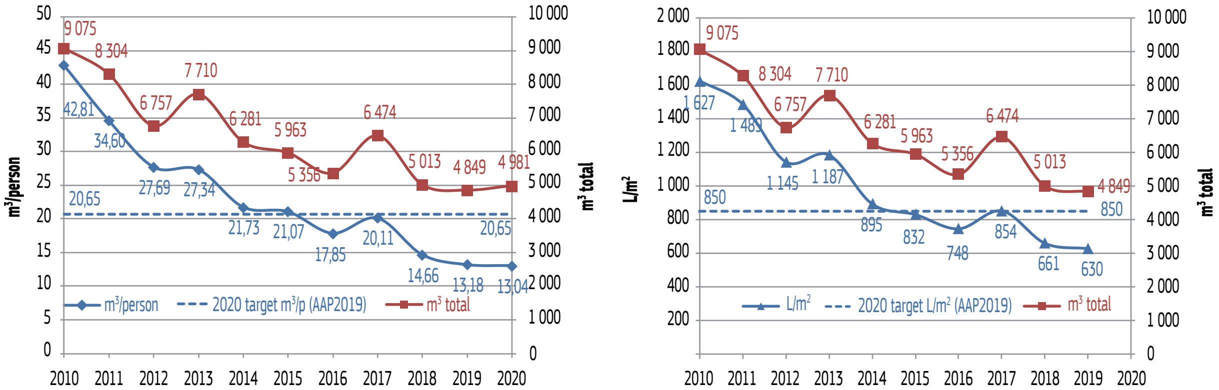
Table E8: Non-renewable energy use in the buildings (indicator 1c)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Electricty from renewables (MWh)	0	267	296	328	597	427	381	429	486	313	1798
(Electricity from renewables (%))	0	13.9	14.3	15.1	26.5	19.7	18.5	19.7	26.7	16.1	100.0
Electricty from non-renewables (MWh)	2 060	1 655	1 777	1 845	1 656	1 742	1 678	1 748	1 335	1 630	
(electricity from non-renewables (%))	100	86.1	85.7	84.9	73.5	80.3	81.5	80.3	73.3	83.9	0.0
mains supplied gas (MWh non-renewable)	309	269	486	519	387	373	344	435	529	372	461
(mains supplied gas (from non-renewables (%))	100	100	100	100	100	100	100	100	100	100	100
Total renewables (MWh)	**267.2**	**267.2**	**296.4**	**328.2**	**596.9**	**427.3**	**381.0**	**428.8**	**486.4**	**312.8**	**1798.4**
Total renewables (%)	**12.2**	**12.2**	**11.6**	**12.2**	**22.6**	**16.8**	**15.8**	**16.4**	**20.7**	**13.5**	**79.6**
Total non-renewables (MWhr/yr)	2 369	1 924	2 263	2 364	2 042	2 114	2 033	2 183	1 865	2 002	461
Total non-renewables (%)	100	87.8	88.4	87.8	77.4	83.2	84.2	83.6	79.3	86.5	20.4

In 2021, we will continue to hold the coordination meetings with the property owner to improve the EXPO building's energy efficiency and will continue to suggest alternative, feasible energy saving measures such as replacement of fluorescent lamps in offices or other options like the installation of photovoltaic panels on the roof that could be considered[5].

E4.2 Water consumption

Figure E10 & E11: Evolution of total annual water consumption for Seville EMAS building



Figures E10 and E11 show the total water consumption relative to staff count and surface. The figures confirm a global descending trend since 2010, with an overall reduction of 45%, equivalent to savings of 30 m³ per capita. The pandemic has contributed in 2020 to reduce direct water consumption by staff, however, the intensive use of air conditioning required to counter the extreme summer temperatures without recirculation of the air accounts for the net increase detected.

The target for 2021 is not to exceed the 2014 values and to try to reduce at least 3% of water use at the building regarding to 2020. To achieve this objective, we will continue cooperating with the property owner to better monitor aspects under their control and we will focus awareness camapaingns on fostering employee involvement using own and corporate resources.

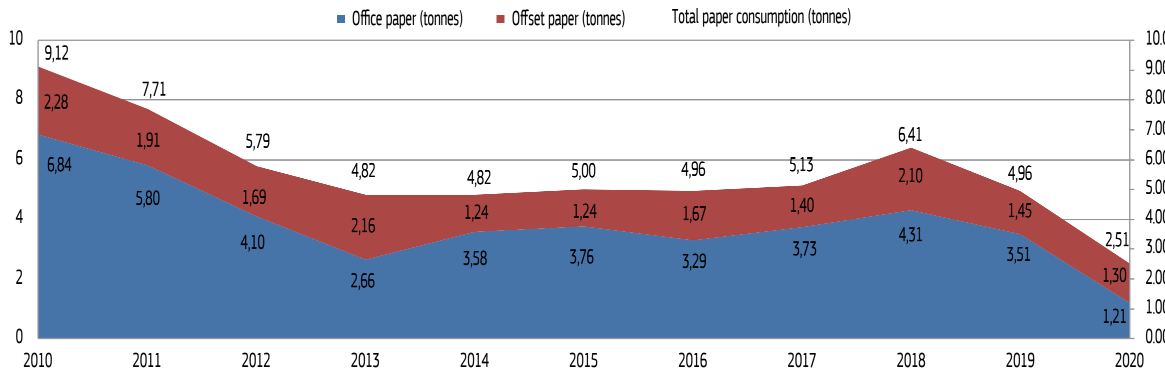
Table E9 Further actions to reduce buildings water consumption (indicator 1d)

Action plan no	Planned	Description	Progress	Status / Date
432	2018	Reduce the water consumption of those sources directly managed by JRC-Seville. Launch a specific guide for good environmental practices at the office space aimed to reducing the water consumption	Seville is developing a specific guide for good environmental practices at the office space aimed to reduce water consumption, considering the lunchroom.	Delayed due to COVID-19 situation, and teleworking Dec 2021

E4.3 Office and printshop paper

The evolution of office and printshop or offset paper at JRC-Seville and per capita breakdown presented below:

Figure E12: Evolution of paper consumption at JRC-Seville (totals)



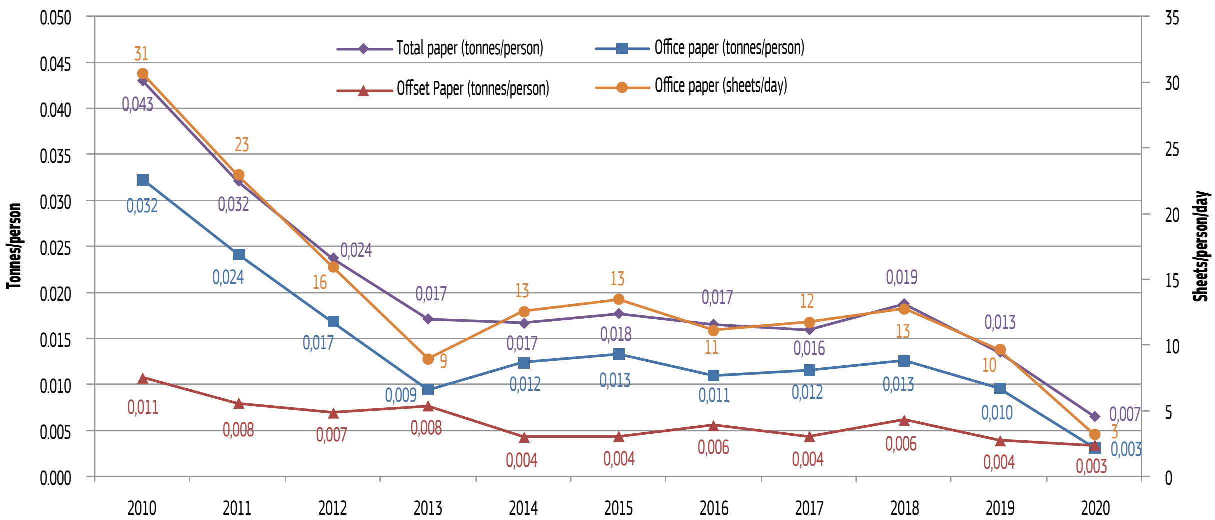
[5] Nevertheless, the roof of the Expo building is not prepared to support loads, so this options will have to be analysed with care.

Paper consumption is under direct control by JRC-Seville. Figure E12 shows a significant reduction of both office and offset paper consumption over the years. Due to the pandemic, most of the staff was working at home since March 2020. As consequence, paper consumption saw a drastic reduction on that year. Nevertheless, a new policy for distribution of paper[6], changed in September 2019, demonstrated to be very effective until the outbreak of the pandemic, with a notable 24% average reduction between the first three quarters of 2019 and the period October 2019 – March 2020.

Additionally, the introduction of the teleworking mode brought along the full implementation of electronic procurement prodecures at JRC Level, contributing to the consumption decrease by 67% (t/p) in 2020 with respect to the previous year. Thus, paper consumption remains considerably lower than in 2010 and below the target values for 2020.

Regarding offset paper consumption, and considering that the pandemic did not affect this activity, yet a negative trend may be verified due to the policies implemented by JRC Seville's Program Office. In 2020, offset paper consumption decreased by 14% (t/p), referred to 2019.

Figure E13: Evolution of paper consumption[7] at JRC-Seville (totals, and per person)



The target in 2020 was to continue monitoring the results of the new paper distribution policy and to try to address the heaviest consumers by location through targeted awareness campaigns. Naturally, this action had to be extended to 2021 or beyond, until resumption of the onsite working mode. Therefore, the objective for 2021 will be to launch targeted campaigns to raise staff awareness on the need to continue reducing paper consumption.

The status of actions related to reducing paper consumption is presented below, most of them were established in 2018.

6 The logistics team refills printer based on automatic alerts sent by the printer servers to them by email, so they do not distribute paper to staff members anymore. Formerly, the logistics team would distribute paper packs in reprography areas for free use by staff members.

7 The counted method for this indicator included the comparison of printed copy total provided by JRC Helpdesk and the total paper boxes bought in the year.

Table E10 Further actions to reduce paper consumption (indicator 1e)

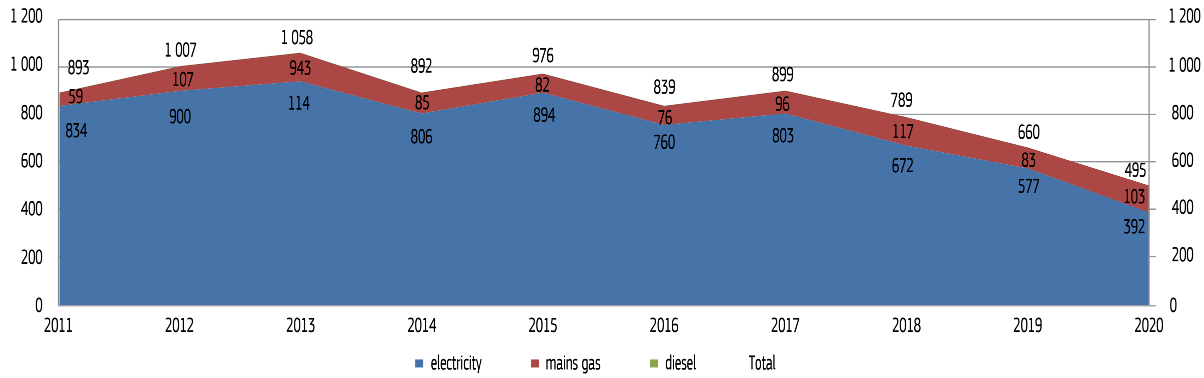
Action plan no	Introduced	Description	Progress	Status / Date
290	2018	Launch of targeted campaigns to raise staff awareness on the need to reduce printed-paper consumption. Analysis of data by individual printer and publication of results.	JRC-Seville needs to collect more printed-paper data (e.g. in an onsite working mode) to analyse these correctly and to identify consumption patterns and trends, including the identification of heaviest consumers by location. Regular and targeted campaigns will be launched to reduce further this indicator.	On going Dec 2021
430	2018	Reduction of office paper consumption.	Keep on raising awareness of staff aimed to reducing the office paper consumption. New methodology to paper distribution at JRC-Seville site	On going Dec 2021

E5 Reducing air emissions and carbon footprint

E5.1 CO_2 emissions from buildings

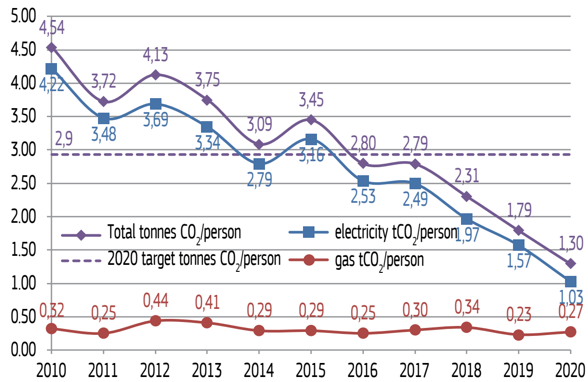
E5.1.1 Buildings (energy consumption)[8]

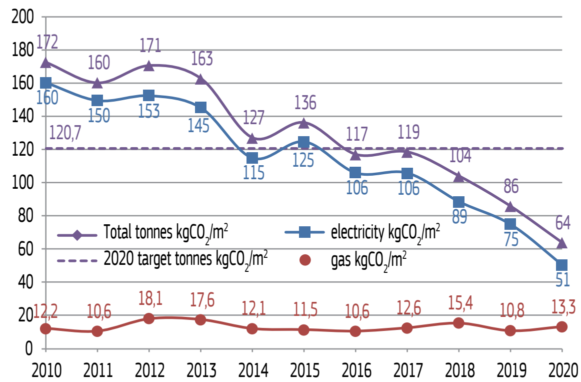
Figure E14: CO_2 emissions from buildings heating in the EMAS perimeter, tonnes (indicator 2a)



The main sources of CO_2 emissions considered under EMAS are from energy used for the buildings, (including equivalent emissions from release of refrigerants), vehicle fleet, missions and commuting. JRC-Seville has evaluated the annual CO_2 emissions for buildings in 2020 at 1.3 Tonnes/person.

Figures E15 & E16: CO_2 emissions from buildings heating (t/p & kg/m²) in the EMAS perimeter





8 Diesel is only consumed by test runs of the emergency generators. These follow a regular schedule, hence, no consumption is reported by the property owner.

Figures E14, E15 and E16 show an overall CO_2 emissions decrease in 2020 of 4 % relative to 2019, with a reduction by 8 % in the emissions linked to electricity consumption. However, emissions from combustion of gas to which contribute the operating of the boilers, have increased by 24% due to the pandemic, as mentioned before (need to constantly heat up external air).

Because the vast majority of CO_2 emissions are due to energy and that JRC-Seville does not manage these facilities, no additional specific CO_2 emissions actions have been planned. The 2021 target is the management of JRC-Seville's direct environmental aspects and careful monitoring of related indicators, besides supporting actions by the property owner such as installation of HEPA filters, which would allow safe recirculation of the air and therefore a noticeable reduction of energy consumption.

E5.2 CO_2 emissions from vehicles (indicator 2c)

E5.2.1 Commission vehicle fleet

JRC-Seville only operates one vehicle, mostly used to bring mission holders to Seville's airport. After March 2020, this service was halted, so most of the trips were done during the first quarter of the year. The total distance travelled was only 714 km. For this reason, the car only consumed 53.6 litres of diesel (about 79% less than in 2019), producing 237 gCO_2/km, based on the manufacturer's technical specification of 136 gCO_2/km. Car use has been constantly diminishing since 2012, but due to the pandemic and organisational decisions this service probably will be externalised.

The target for 2021 is to contract an external service considering environmental clauses and promoting efficient means of transport.

E5.2.2 Missions and local work based travel (excl. Commission vehicle fleet)

JRC-Seville did not have any specific target in 2020 associated with missions' emissions. JRC-Seville promotes the use of available videoconferencing infrastructure as an alternative for missions. Videoconference equipment and dedicated videoconference rooms are key assets for JRC-Seville and therefore they follow a continual maintenance and upgrade cycle over the years.

Due to COVID-19 pandemic situation, the business travels were cancelled to almost 100% in 2020.

Figure E17: Evolution of videoconferences organised in JRC-Seville, relative to staff count

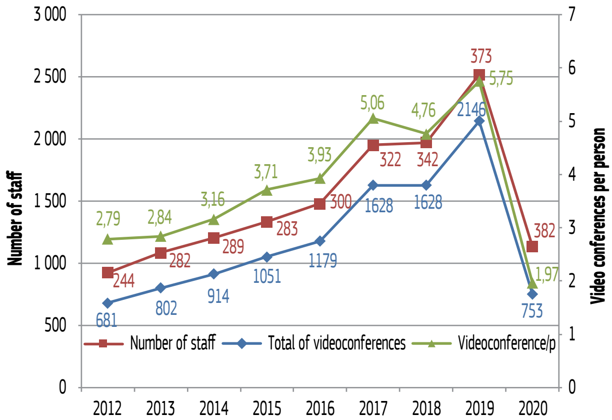


Figure E17 shows the steady increase in the use of videoconferencing over the years, per staff member.

In 2020, only 753 videoconferences took place at JRC-Seville premises. As we mentioned before, most of the staff was teleworking and the meetings were organised using corporate videoconferencing from home.

E5.2.3 Buildings -other greenhouse gases (refrigerants)

The property owner manages maintenance of the cooling system and is therefore responsible for the refrigerant life cycle in the building. However, JRC-Seville owns individual equipments, for which a comprehensive, detailed register was elaborated and its maintenance contracted with the landlord. The register thoroughly describes the preventive maintenance actions required by type of device, and their periodicity. This preventive program is run by the building owner every month, trimester, semester and year.

In 2015, the property owner reported a leakage of R-134 refrigerant gas on its own installations, amounting to 36 kg, equivalent to 51.5 tonnes equivalent of CO_2. In 2019, no leakage or refill of any refrigerant was reported by the property owner. The target in 2020 is to continue monitoring the preventive and corrective maintenance activities carried out by the property owner.

E5.2.4 Commuting

The CO_2 footprint of staff commuting was first-estimated in May 2019. JRC-Seville launched a survey to determine the transport modes used for commuting between home and the workplace. The CO_2 footprint resulted in approximately 84.7 t CO_2/day or (0.23 t CO_2/p). Unfortunately, the follow up survey planned for 2020 as part of the Sustainable Mobility Campaign could not be performed due to the lack of staff with presence at the site. The project was postponed to 2021 or when normal activity is resumed. As most of the staff was teleworking, the CO_2 footprint of staff commuting is considered non-significant in 2020.

The 2021 target is to continue to the Greening Commuting and minimizing the related CO_2 emissions by

- Monitoring commuting Carbon footprint of staff.
- Promoting staff awareness campaigns to use more sustainable means of transport.
- Testing different incentives for staff to shift towards sustainable mobility.

The status of actions related to reducing CO_2 emissions is presented below.

Table E11 Further actions to reduce commuting carbon footprint (indicator 1e)

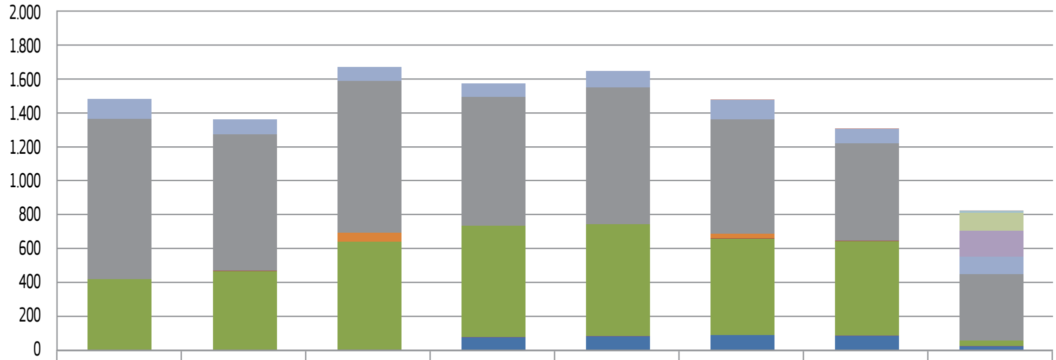
Action plan no	Planned	Description	Progress	Status / Date
425	2018	Greening daily Commuting of JRC-Seville staff, thus minimizing the related CO_2 emissions.	JRC-Seville participated in the Urban Mobilty organised by Ciclogreen. Due to reduction quote of staff with presence at the site, this project was posponed until 2021	On going Dec 2021
588	2021	To install vehicle charging poles in parking areas	Communication with the property owner for the installation of vehicle charging poles in parking areas	In progress Dec 2022

E5.3 Carbon footprint

The carbon emissions due to different sources are shown in Figures E18 and E19[9].

[9] Carbon emission figures obtained using the conversions factors. See the detailed values in the corporate chapter Appendix 2 Carbon footprint: factors and technical elements

Figure E18. JRC-Seville, carbon footprint (CO_2 equivalent emissions 2014-2020 (tonnes))



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	1 479	1 361	1 669	1 573	1 646	1 477	1 307	824
Own waste	0	0	0	0	0	0	0	1
Catering	0	0	0	0	0	0	0	0
Service contracts	0	0	0	0	0	0	0	9
Paper supply	0	0	0	0	0	0	0	2
Fixed assets - Commission vehicles	0	0	0	0	0	0	0	0
Fixed assets - IT	0	0	0	0	0	0	0	106
Fixed assets - buildings	0	0	0	0	0	0	0	152
Buildings - fuels for heating	114	85	82	79	96	117	83	103
Buildings - electricity	943	806	894	760	803	672	577	392
Buildings - district heating/cooling	0	0	0	0	0	0	0	0
Buildings - coolant losses	0	0	51	0	0	27	0	0
Vehicle fleet - fuel consumption	1	1	1	1	1	1	1	0
Missions (air, RFI 2)	418	465	636	654	662	570	558	33
Missions (excluding air)	2	2	4	3	3	2	2	1
Staff commuting	0	0	0	76	82	89	85	24

Due to the pandemic, the total emission decreased by 32% compared to 2019. Main contributors to the carbon footprint in 2020 are linked to electricity and gas supply and business travelling by air[10].

[10] Emissions from business are travel evaluated using Radiative Forcing Index (RFI=2). Fixed assets IT and buildings, service contract and paper emissions reported for first time in 2020.

Table E12 Per capita CO_2 equivalent (CO_2e) emissions 2013 to 2020 by scope (tonnes)

	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Fuel consumption and fugitive emissions								
Fuel for bldgs: mains gas	0.33	0.24	0.24	0.21	0.24	0.28	0.18	0.22
Fuel for bldgs: tanked gas (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refrigerants	0.00	0.00	0.18	0.00	0.00	0.08	0.00	0.00
Scope 2: Purchased energy								
External electricity supply (grey),	3.08	2.57	2.91	2.33	2.30	1.81	1.43	0.94
External electricity supply contract (renewables), combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (combustion) (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scope 3: Other indirect sources								
Fuel for bldgs: mains gas (upstream)	0.07	0.05	0.05	0.05	0.05	0.06	0.04	0.05
Fuel for bldgs: tanked gas (upstream) (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site generated renewables (upstream) (3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
External grey electricity supply, line losses	0.26	0.22	0.25	0.20	0.20	0.15	0.14	0.08
External 'renewables' electricity contract (upstream with line loss)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (upstream) (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business travel: air (combustion) + (including air taxi)	1.48	1.61	2.25	2.18	2.05	1.67	1.52	0.26
Business travel: rail (combustion)	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Business travel: hire car (combustion)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business travel: private car (combustion)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commuting (combustion) (4)	0.00	0.00	0.00	0.25	0.25	0.26	0.23	0.06
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28
Fixed assests - Commission vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service contracts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Catering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Own waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	**5.2**	**4.7**	**5.9**	**5.2**	**5.1**	**4.3**	**3.6**	**2.3**

E5.4 Total air emissions of other air pollutants (SO_2, NO_2, PM)

JRC-Seville's non-CO_2 air emissions are mainly result from the building's energy consumption due to the gas feeding the boilers. The property owner does not report on these parameters and we did not have the values required to measure concentrations of air pollutants in the boilers emissions.

However, in 2019 and 2018 the property owner installed two condensing gas boilers whose NO_2 emissions are shown in Table E13. Calculation takes as maximum concentration of NO_2 emissions, the value indicated in the manual of the manufacturer (Class 6 NO_x <56 mg/Kwh.)

There are no data for the parameters on SO_2 and particle emission to the atmosphere.

No relevant specific targets for 2020 and 2021.

Table E13 NO_2 emissions 2019 to 2020 by scope (tonnes)

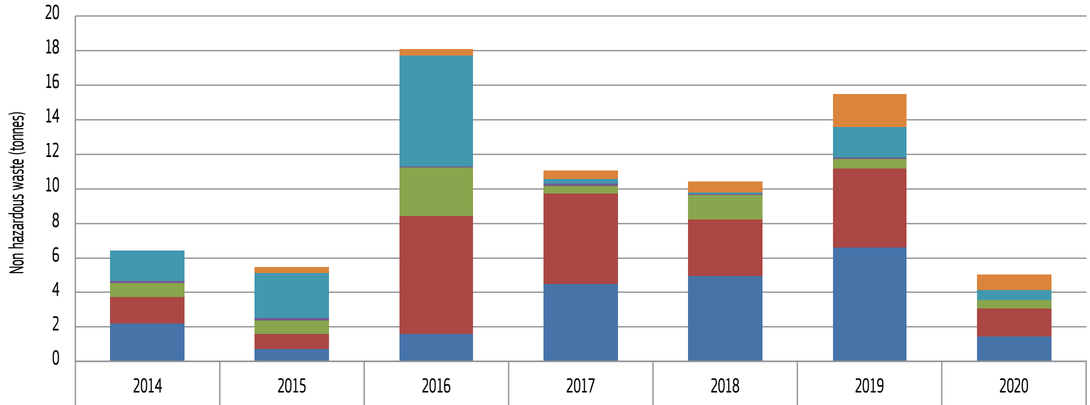
	2014	2015	2016	2017	2018	2019	2020
Total NO_x emission (tonnes)	NR	NR	NR	NR	NR	0.021	0.025
Change %	NR	NR	NR	NR	NR	NR	19

(1) NR-No reported

E6 Improving waste management and sorting

E6.1 Non hazardous waste

Figure E19: Evolution of total non-hazardous waste in JRC-Seville (tonnes)

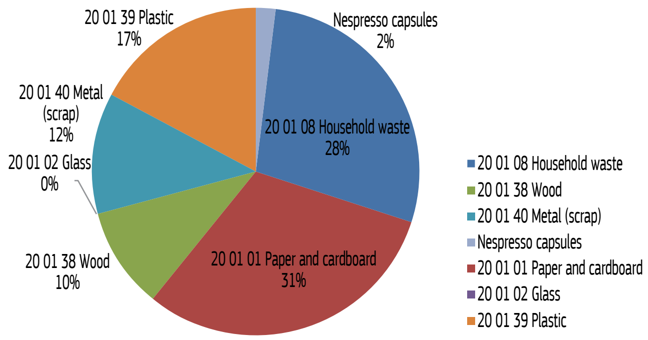


	2014	2015	2016	2017	2018	2019	2020
Total	6.4	5.5	18.1	11.3	10.7	16.1	5.2
Total (tonnes/person)	0.02	0.02	0.06	0.03	0.03	0.04	0.01
20 01 39 Plastic	0.0	0.3	0.4	0.5	0.6	1.9	0.9
20 01 40 Metal (scrap)	1.7	2.6	6.4	0.2	0.1	1.8	0.6
20 01 02 Glass	0.1	0.1	0.1	0.2	0.0	0.1	0.0
20 01 38 Wood	0.8	0.8	2.8	0.4	1.4	0.5	0.5
20 01 01 Paper and cardboard	1.5	0.9	6.8	5.2	3.3	4.6	1.6
20 01 08 Household waste	2.2	0.7	1.6	4.5	5.0	6.6	1.5

Non-hazardous waste values in 2020 were exceptionally low due to pandemic and the lack of staff on site. For to safety reasons, Seville's staff has the possibility to work on site in half-day shifts, so many go home for lunch. In this scenario, JRC-Seville disposed a total of 5.2t of non-hazardous waste, including household waste, paper and cardboard, wood, glass and metal.

This total amount of waste includes coffee capsules (100 kg) and the textile (LER 20 01 11) generated out of furniture sent for recycling (80 Kg)

Figure E20: Breakdown of non-hazardous waste in 2020 (tonnes)



The cleaning contractor reports most of the waste generated on site. Metal, wood and textile waste disposal are managed by an accredited contractor who provides the corresponding certificates indicating the type of treatment given to and the quantities of waste according to the national waste legislation.

In 2020, Seville continued developing improvement actions to manage urban waste that started at the end of 2019:

- Waste collection and disposal by authorised waste managers, thus improving monitoring of legal compliance;
- Reorganisation of waste collection areas and improved signage, for full waste segregation;
- Withdrawal of individual bins in offices, to enforce waste segregation;
- Co-operation and coordination with the cleaning company and the authorised waste managers;
- Improved measuring of waste.

Impacted by the pandemic, the building's canteen[11] closed in the course of 2020, reducing the production of waste. The target in 2021 will be to sign an environmental agreement with the future catering provider, in collaboration with the property owner.

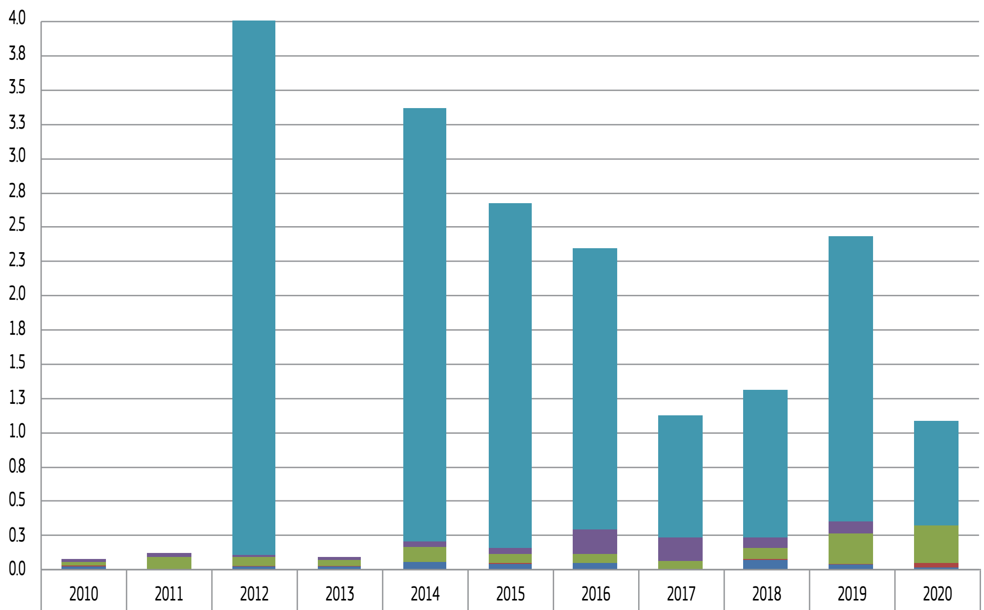
The status of actions related to optimising and reducing waste is presented below:

Table E14 Further actions to improve the waste management and to reduce non-hazardous waste (indicator 3a)

Action plan no	Planned	Description	Progress	Status
550	2020	Progressively reduce plastics for single use items dispose in the vending machines and replacing them by others environmentally friendly options	Proposal of actions to the vending machine distributor. Due to COVID-19 crisis, this action has been delayed. The most of the JRC Staff is in teleworking. We will retake this action when the situation improves.	To start in 2021
587	2021	Eliminate single use plastics for events organised by JRC-Seville.	Eliminate single use plastics for the events organised by JRC-Seville in collaboration with the new catering contractor replacing them by environmentally friendly options (porcelain cups, glasses and plates)	To start in 2021
589	2021	To manage the paper waste through an authorised waste manager	Entrust management of paper waste to a particular operator to ensure full control of the waste treatment	December 2021
590	2021	New environmental commitment letter with the future contractor of the catering services of the Expo Building	Sign an Environmental Commitment Letter with the contractor of the catering services of the Expo Building containing the guidelines of sustainable events guide (specially checklist)	To start in 2021

E6.2 Controled Waste

Figure E21: Evolution of total controlled waste in Seville (tonnes)



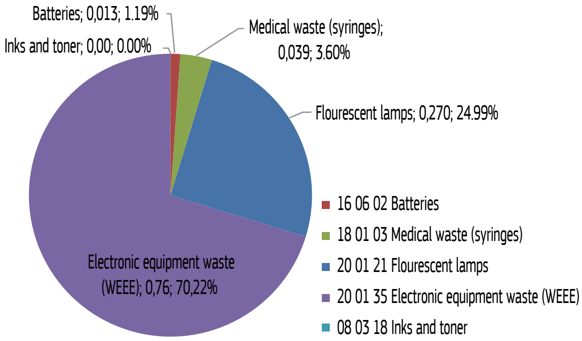
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	0.06	0.10	4.09	0.07	3.33	2.64	2.41	1.13	1.31	2.43	1.10
Total (tonnes/person)	0.000	0.000	0.017	0.000	0.012	0.009	0.008	0.004	0.004	0.007	0.003
20 01 35 Electronic equipment waste (WEEE)	0.00	0.00	4.00	0.00	3.16	2.52	2.05	0.89	1.07	2.08	0.76
08 03 18 Inks and toner	0.02	0.03	0.02	0.02	0.04	0.04	0.18	0.17	0.08	0.09	0.00
20 01 21 Flourescent lamps	0.03	0.09	0.06	0.04	0.11	0.07	0.06	0.06	0.08	0.22	0.27
18 01 03 Medical waste (syringes)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.006	0.006	0.039
16 06 02 Batteries	0.03	0.00	0.03	0.03	0.06	0.05	0.05	0.00	0.07	0.04	0.013

[11] EPGASA's contractor.

Figure E21 illustrates that the hazardous waste at JRC-Seville has fluctuated over the last few years. WEEE has been largest component of waste since 2012, having achieved a 76 % reduction in 2019 compared to 2014. Once more, the pandemic has contributed to drastically drop the consumption of inks and toners.

The remainder of controlled waste generated by JRC-Seville comprises batteries, medical waste, and fluorescents lamps. For all of them JRC-Seville has a specific contract with an authorised waste manager.

Figure E22: Breakdown of hazardous waste in 2020 (tonnes and %)



The procedures established in previous year are working properly and awareness campaigns will continue. Therefore, there are no specific management approved actions for continual improvement, except the action described in E.6.1 that also applies to controlled waste. Hazardous waste can be considered as a non-significant environmental aspect according to the environmental aspects' analysis and in relation to the activities of the site.

E6.3 Waste sorting

Table E15: Percentage of waste sorted at the JRC-Seville

	2014	2015	2016	2017	2018	2019	2020
Percentage of waste sorted	77.4	90.8	92.2	63.8	58.6	64.4	76.9
Precentage of waste not sorted	22.6	9.2	7.8	36.2	41.4	35.6	23.1

JRC-Seville is separating waste since 2014. Bins for each type of waste are distributed throughout the premises to facilitate separation. The cleaning contractor collects waste daily, providing the monthly measurement of quantities disposed.

While waste is separated as much as possible, the common household waste cannot be separated further in our premises. This is due to the municipal waste collection company's separation policy of non-recovery of organic matter comprising cellulose type waste from toilet paper, wipes, napkins, compresses. Nevertheless, for safety reasons, additional containers have been distributed in key locations for disposal of used facemasks and other potentially contaminated COVID-19 waste.

Probably related to the fewer total amounts generated, the percentage of unsorted waste raises in 2020 by 19%.

Since 2021, a specialised contractor manages paper waste, replacing the cleaning contractor.

E7 Protecting biodiversity

The total area of the site occupied by the Expo building, including the surrounding garden strips and the pavement, is 12 094 m^2, equivalent to 31.7 m^2 per capita.

The total sealed area is 23 487 m^2 equivalent to 61.5 m^2 per person.

A courtyard at the centre of the site has various tree species that provide a cooling effect by shading. It occupies 2 227 m^2, representing 19% of the total site area. This area is included in the total nature-oriented area on site which value is the same than the total area of the site occupied, above mentioned.

In 2020, JRC-Seville started to work with a local consultant to improve the habitat and biodiversity of the EXPO Building and of its surroundings. The target in 2021 will be to start deploying the recommendations of the consultant, seeking the improvement of biodiversity in the site.

Table E16 Action relevant to biodiversity (indicator 4a)

Action plan no	Planned	Description	Progress	Status / Date
557	2020	Identification of a biodiversity action for JRC-Seville	The biodiversity study is done. Proposal actions will be presented to the Senior Management and one action plan 2021-2024 will be defined.	In progress December 2024

E8 Green Public Procurement (GPP)

E8.1 Incorporating GPP into procurement contracts

JRC-Seville aims to incorporate GPP into its contracts where appropriate, irrespective of their value.

Regretfully in 2020, we observed that only the contracts and purchases committed by the Administration considered GPP criteria. For this reason, we started a campaign to help research staff including GPP criteria in their contracts.

The following actions were carried out:

- Cooperation with the corporate Environmental Procurement Team (JRC-Ispra) to look for solutions to improve GPP.
- Sharing this issue with the network of corporate Operational Staff, in charge of procurement.
- Creation of a local environmental group in charge of validating the GPP criteria.
- Promotion of the inter-institutional GPP helpdesk to ensure support to those contracts that must have Green Criteria.
- Meetings with the Secretariats to inform about the status of GPP in the Scientific units.

In 2020, relevant examples of JRC-Seville's Green Public Procurement are the contracts signed with the cleaning service company, the maintenance of the security systems and external prevention service, besides small purchases and acquisition of office stationary from Commission's framework contracts (see next section).

The status of GPP related actions included in the EMAS annual plan is presented below.

Table E17: Further actions to enhance GPP culture (indicators 5a & 5b)

Action	Year started	Description	Progress	Status/date
423	2018	Ensuring accurate and traceable GPP reporting data.	In Public Procurement Management Tool (PPMT), when it is necessary, in the workflow for approving a purchase in the system, the EMAS Coordinator is included to ensure that the purchase is compliant with the Green Public Procurement. We have included a group of environmental actors for the quick validation of these green criteria.	On going Dec 2021

E8.2 Office supply contracts

Most office supplies are provided through framework contracts arising from the Commission's call for tenders managed by the Office for Infrastructure (Brussels). The Commission applies "green" criteria to select suitable contractors and products. Examples of the Commission's current framework contracts used by JRC-Seville are those for office supplies and furniture or the supply of PCs and peripherals and for printing devices (through DG-DIGIT's contracts). There is no specific management approved action to support further improvement.

E9 Demonstrating legal compliance and emergency preparedness

E9.1 Management of the legal register

JRC-Seville site is compliant with all relevant legislation. JRC-Seville conducts an annual assessment of its legal compliance by monitoring applicable Spanish legal requirements regarding safety and environment for technical installations. The applicable regulations are listed and assessed in the legal register[12] , which was fully reviewed and updated in 2020.

For this evaluation, JRC-Seville holds periodic meetings with the property owner to verify legal compliance in situ and therefore, checks all regulatory documentation (e.g. permits, certificates, contractors' authorisations, laboratory tests), that is shared with JRC-Seville through a file exchange platform.

E9.2 Prevention and risk management

Since 2010, JRC-Seville has not recorded incidents on health, safety and environment. Every year, emergency preparedness and response procedures are tested and updated if necessary in collaboration with the property owner. Particular attention is paid to identifying potential accidents and reacting quickly to emergencies to minimise their negative impact. In addition, the external prevention service is elaborating a specific Emergency Plan for the Seville Site, which will include environmental emergencies identified in the Environmental Aspect register.

Furthermore, the Joint Research Centre annually conducts a risk assessment exercise at corporate level, covering those risks associated with its Environmental Management and Occupational and Health & Safety process.

E9.3 Emergency preparedness

JRC-Seville has a dedicated Emergency procedure describing the methodology used at local level to identify and react to potential accidents and emergencies that may affect staff, facilities as well as the environment. Most of the environmental emergencies should be managed by the property owner in accordance with their Emergency preparedness and response procedure. JRC-Seville has in place a dedicated emergency Initial Response and Evacuation Team and conducts a fire drill annually in dovetails collaboration with the property owner, responsible for the procedure. The safety and security equipment and installations are regularly verified and maintained in accordance with the applicable legislation.

Due to the pandemic, most of the actions carried out in 2020 were related to the prevention measures against COVID-19 risks. Some practical examples carried out for a safety reincorporation at the workplace:

- Elaborating of a Contingency Plan against COVID 19 and protocols for returning to work.
- Establishing measures and protocols to prevent the risk of COVID-19 spreading
- New site occupational risks assessment exercise due to the COVID 19 risks
- Updating legal requirements register
- Ensure effective cooperation with the property owner
- Certification of the COVID 19 Contingency Plan by an external certified organisation

E10 Communication

E10.1 Internal communication

Internal communication may typically involve Commission staff and contractors. Due to lack of staff, internal communication on site level had to be reduced since March 2020.

Mainly, JRC-Seville carried out the communications action defined in the Action Plan 2020 at corporate level. A summary of some of them is included below:

[12] IMS-SVQ-S.6.6-REG-0002-Legal Requirements JRC-Seville

Table E18: Internal communication actions promoted at JRC-Seville in 2020

Action description	Organisation	Dates in 2019	Replication at JRC-Seville site level
Environmental Management System	EMAS Site Coordinator	January 2020	Published on Connected
First corporate competition on Sustainable conferences and events	Centrally organised (Commission wide)	February 2020	Published on Connected
JRC-Seville participates in first purely digital Earth Hour 2020	Centrally organised (Commission wide)	March 2020	Published on Connected
World Environment Day 2020: It's time for Nature	Centrally organised (Commission wide)	June 2020	Published on Connected
Virtual lunchtime event on the draft results of the DG CLIMA's climate neutrality study	Centrally organised (Commission wide)	September 2020	Published on Connected
Urban Mobility Challenge	EMAS Site Coordinator	September 2020	Published on Connected
European Week for Waste Reduction: less waste, more action 2020	EMAS Site Coordinator	November 2020	Published on Connected
Green Public Procurement: Public building's Design, construction and maintenance	Centrally organised (Commission wide)	December 2020	Published on Connected
Environmental Statement 2019	EMAS Site Coordinator	September 2020	Published on Connected

E10.2 External communication and stakeholder management

JRC-Seville constantly seeks to influence its external suppliers, particularly through the signature of environmental commitments, and encourages them to contribute to sustainable development. For example, the environmental commitment letter signed with the property owner in 2015 was renewed in 2020. Because of the pandemic collaboration with the property owner has increased on the basis of common interest.

In 2021, JRC-Seville will start contacts with the new contractor of the catering services in the Expo building to discuss best practices for a sound waste management and pursuing the use of environmentally friendlier single-use items, particularly those made of plastic, in events organised by JRC-Seville.

Additionally, contacts with the city council were established at top level with the objective to improve the collaboration between both organisations.

E11 Training

E11.1 Internal training

In 2020, the following training sessions related to environmental protection took place as it is indicated in the table E 18 below.

Due to COVID-19 situation, the training was on-line.

Table E19: Internal training provided at JRC-Seville in 2020

Description	Organisation	Dates in 2019	Participation at JRC-Seville site level	Participants (estimated)
First things you need to know about Security, Environment, Health and Safety and use of the infrastructure	JRC-Seville	Fortnightly	75 min/session for newcomers	87
EMAS basics for all	HR EMAS Coordination Team	November and December 2020	All staff	20

Until last year, Seville's environmental training focused on new staff. However, in 2020, following collaboration with DG HR's Corporate EMAS team, the JRC-Seville Site Manager took responsibility to promote the EMAS Basic info sessions for all staff, in order to raise awareness on EMAS and how staff may contribute to minimise the environmental impact of their daily activity.

The target for 2021 will be to continue requesting the participation of Seville's staff in the corporate training, with at least 80% of staff participation in this training.

The status of environmental related training actions included in the EMAS annual plan is indicated in the Table E19.

Table E20: Further actions related to environmental training in 2020

Action	Year started	Description	Progress	Status/date
422	2018	Keep promoting EMAS training for newcomers. More accurate feedback from attendees to be collected.	All the newcomers at JRC-Seville receive fortnightly a basic introductory session about the EMS. New evaluation process for this awareness session	On going Dec-2021

E11.2 External training

In 2020, JRC-Seville did not offer any external environmental training.

E12 EMAS Costs and saving

Table E 21: EMAS administration and energy costs (Euros) for buildings in the EMAS area

Parameter	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Change in last year
Total Direct EMAS Cost (EUR)			132 000	151 840	132 000	134 000	134 000	138 000	148 000	150 000	152 000	2000
Total Direct Cost per employee			541	538	457	473	447	429	433	408	398	- 10
Total buildings energy cost (Eur)			295 470	331 838	329 966	300 602	304 217	307 918	266 329	282 984	258 525	- 24458
Total buildings energy cost (Eur/person)			1 211	1 177	1 142	1 062	1 014	956	779	769	677	- 92
Total fuel costs (vehicles) (Eur)		356	384	530	502	412	260	325	325	325	325	0
Total energy costs (Eur/person)		1	2	2	2	1	1	1	1	1	2	0
Total water costs (Eur)			11 892	13 415	11 068	11 091	11 623	13 208	10 227	9 905	8 631	- 1407
Water (Eur/person)			49	48	38	39	39	41	30	27	23	- 5
Total paper cost (Eur)	9 457	8 481	6 601	5 495	4 338	3 337	33 220	24 297	35 251	29 548	25 425	- 4123
Total paper cost (Eur/person)	45	35	27	19	15	12	111	75	103	80	67	- 14
Waste disposal (general) - unit cost/tonne							226	365	385	256	100	- 156
Waste disposal (general) - Eur/person							14	13	12	11	1	- 10

Total direct per capita costs of implementing EMAS increased in 2020 decreased by 10% in relation to 2019, from 408€ in 2019 to 398€ in 2020. As the table E21 shows, savings have been achieved in relation to per capita costs in the majority of the indicators.

Because the property owner manages the building, JRC-Seville has direct control over relatively few parameters, but these include paper consumption, waste disposal and fuel costs (vehicles). Anyhow, JRC-Seville since 2014 has encouraged the property owner to behave in a more environmentally responsible manner, which have also been successful in reducing operational costs.

Total paper costs include both office paper and printshop paper (publications). In 2020, due to COVID-19 situation, the paper cost was reduced by 14 €/person. On the same way, the inclusion of the waste management into the cleaning services contract allowed a general waste disposal reduction of 10€ per person over the previous year.

E13 Conversion factors

Table E 22 Conversion factors considered in JRC-Seville

Parameter	Unit	Factor 2020	Source
Electricity conversion factor (supplier)	Kg CO_2/kwh	0.2	Informes de Garantía y Etiquetado Electricidad para suministradora Endesa Energía S.A- Comisión Nacional Mercados de la Competencia (CNMC)
Kgs CO_2 from 1 kWh natural gas (combustion)	Kg CO_2/kwh	0.205	Bilan Carbon, V8.4, Natural gas, LHV, Europe
Kgs CO_2 from 1 kWh natural gas (upstream)	Kg CO_2/kwh	0.039	ADEME, Bilan Carbon, V8.4, Natural gas, LHV, Europe
Service car Kgs CO_2 from one litre of diesel (combustion	KgCO_2/litre	2.61	Updated version Carbontrust study (Conversion factors 2016). (www.carbontrust.com)
Service car Kwh from one litre of diesel (combustion)	Kwh/litre	10.58	Updated version Carbontrust study (Conversion factors 2016). (www.carbontrust.com)
Paper density	g/m^2	75	N/A

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2020 results

Annex F: JRC-Karlsruhe

EMAS
Verified environmental management

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Cover illustration: Entrance of JRC-Karlsruhe site

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ANNEX F: JRC-Karlsruhe

JRC-Karlsruhe (hereafter referred to as Karlsruhe) is one of the seven sites of the European Commission's Joint Research Centre and is a part of the JRC Directorate G for Nuclear Safety and Security. The mission of Directorate G is the implementation of the JRC Euratom Research and Training Programme, the maintenance and dissemination of nuclear competences in Europe to serve both ''nuclear'' and ''non-nuclear'' Member States. A strong cooperation and complementarity with their national organisations are of key relevance.

JRC Directorate G supports the relevant policy DGs with independent, technical and scientific evidence in the areas of nuclear safety, security and safeguards.

Directorate G is also an active key partner in international networks and collaborates with international organisations and prominent Academia and Research Institutes.

F1 Overview

F1.1 Reporting and the COVID pandemic

Reporting for 2020 retains the same approach for continuity, as previous years, and is therefore based on site activity and total staff numbers. The data will therefore reflect the impact of a very significant staff absence on facilities operation to a certain extent. Nevertheless, as JRC Karlsruhe is a nuclear site which cannot just be shut down reduction or cancelling of scientific work as well as the absence of staff do have some but no significant influence on several parameters because the installations which are necessary for the safe operations of the site (e.g. the ventilation system) were running under normal conditions most of the time.

The EMAS corporate coordination team has made 'high level' estimates of home consumption, due to telework under COVID, as described separately in the Corporate summary. The potential to systematically include the impact of teleworking in annual reporting will be explored as more site specific information becomes available..

F1.2 Core indicators since 2008

Karlsruhe has been collecting data on some core indicators since 2002 although not systematically. More recent data (from 2008) are presented in this report. Table F1a shows data and performance trends since 2014, and targets, where applicable, for 2020.

Table F1a: Historical data, performance and targets for core indicators proposed for Commission level reporting

Physical indicators: (Number, desciption and unit)	Historic data values					Performance trend (%) since:		Target		Future targets	
	2008 (1)	**2014**	2018	2019	2020	2008	2014	2020		2014-23	2014-30
								Δ % (2)	value (2)	Δ % (3)	Δ % (3)
1a) Energy bldgs (MWh/p)**	78.64	**64.028**	73.06	76.90	66.30	**-15.7**	**3.5**	-	-	0.0	0.0
1a) Energy bldgs (KWh/m²)	610	**491**	536	561	475	**-22.2**	**-3.3**	+/-0	491	0.0	0.0
1c) Non ren. energy use (bldgs) %		**82.0**	75.8	74.1	72.2		**-11.9**	-5.0	77.9	-7.0	-10.0
1d) Water (m³/p)	16.51	**21.03**	19.11	15.22	12.29	**-25.6**	**-41.6**	-5.0	19.980	-29.0	-32.0
1d) Water (L/m²)	128	**161**	140	111	88	**-31.3**	**-45.5**	-10.0	145.1	-33.0	-35.0
1e) Office paper (Tonnes/p)		**0.019**	0.011	0.007	0.000		**-100.0**	-20.0	0.015	-22.0	-24.0
1e) Office paper (Sheets/p/day)		**17.8**	10.8	7.2	0.0		**-100.0**	-20.0	14.2	-22.0	-24.0
2a) CO_2 buildings (Tonnes/p)**	19.37	**18.34**	21.21	20.20	15.79	**-18.5**	**-13.9**	-	-	0.0	0.0
2a) CO_2 buildings (kg/m²)	150.2	**140.6**	155.8	147.4	113.0	**-24.8**	**-19.6**	+/-0	140.6	0.0	0.0
2c) CO_2 vehicles (g/km, manu.)		**202**	157	146	151		**-25.2**	-15.0	171.7	-17.0	-19.0
2c) CO_2 vehicles (g/km, actual)***		**277.7**	NR	NR	NR			-	-		
3a) Non haz. waste (Tonnes/p)		**0.33**	0.27	0.25	0.19		**-41.7**	-20.0	0.266	-22.0	-24.0
3b) Hazardous waste (Tonnes/p) (4)		**0.033**	0.019	0.008	0.023		-31.1				
3c) Unseparated waste (%) ****		**30.8**	28.7	39.2	32.5		**5.5**	n.a.	n.a.	n.a.	n.a.
3c) Unseparated waste (Tonnes/p)		**0.113**	0.083	0.100	0.071		**-37.5**	0.0	n.a.	-32.0	-34.0
Economic indicators (Eur/p) (4)											
Energy consumption (bldgs)		**5 210**	5 885	6 161	5 328		2.3				
Water consumption		**46.27**	42.04	33.49	27.03		-41.6				
Non haz. waste disposal		**NA**	NA	NA	NA						

Notes: (1) Earliest reported data; (2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018); (3) Draft figures from the Global Anual Action Plan 2021; (4) 2014-20 indicator discontinued

* Target for improvement for the period 2014 – 2020

**Following mid term review, original 2020 target no longer applies; owing to the site characteristics and the highly regulated nuclear activity, JRC-Karlsruhe does not consider them useful in its particular context.

***Following mid term review JRC-Karlsruhe no longer applies the targets for actual vehicle emissions owing to unreliability of manufacturer data

**** The new revision of the German Gewerbeabfallverordnung (German ordinance on industrial waste; taking effect from August 2017) defines different criteria regarding the waste separation than those used by the Commission for this Environmental Statement and consequently leads to different values. As there is a minimum value of 90%, separation required according to this Ordinance it is not possible for JRC Karlsruhe Site to use other criteria because these would lead to values far below the legally required percentage.

NA. Prices for various waste fractions differ too much for a useful calculation. NR not reported

As a nuclear facility subject to German nuclear legislation, Karlsruhe must comply with extensive legal requirements which can limit the scope for some environmental improvements (cf. F9.1). More specifically, Karlsruhe must at all times respect strict legal requirements governing site safety and security, which gives little flexibility regarding choices in consumption. Extensive active ventilation systems, for example, must run virtually continuously. Additionally, as a research institution, Karlsruhe's consumption of energy, water and other resources may vary significantly from year to year depending on its programme of activities and experiments as well as infrastructure measures.

Table F1a shows positive performance trends in all core parameters except energy consumption. Per capita energy consumption has reduced slightly since 2008 and consumption per square metre has reduced more considerably, although both indicators recorded an increase since 2015. The decrease of the latter parameter is partially also due to an increase of the surface of approximately 22% since 2012. The increase in CO_2 emissions in 2017 is due to a change of electricity supplier, a decision outside Karlsruhe's influence. Water consumption has reduced in recent years. Waste generation remains fairly steady since 2012 and is rather unpredictable as it depends to a large extent on the research as well as renovation and construction activities. Nevertheless, without construction waste there is a significant decrease since 2014.

The evolution of the EMAS system in Karlsruhe is as shown below.

Table F1b: EMAS baseline parameters[1]

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population: staff in EMAS perimeter	273	294	305	299	305	320	322	324	322	317	315	309
No. buildings for EMAS registration	0	0	0	0	2	2	2	4	4	4	4	4
Total no. operational buildings	2	2	2	3	2	2	4	4	4	4	4	4
Useful surface area in EMAS perimeter, (m^2)	35 592	35 592	35 592	35 592	41 735	41 735	41 735	43 170	43 170	43 170	43 170	43 170
Useful surface area for all buildings, (m^2)	35 592	35 592	35 592	35 592	41 735	41 735	43 170	43 170	43 170	43 170	43 170	43 170

Karlsruhe did not set quantitative EMAS targets in 2019 for 2020 as it focussed on achieving the qualitative objectives and actions identified in its Environmental Program. A target was set for most parameters to not exceed the 2014 values. Moreover, since 2014 an environmental plan has been prepared yearly to better manage environmental aspects. In addition, Karlsruhe subscribes to the Commission's EMAS objectives for the period 2014-2020.

F2 Description of JRC-Karlsruhe:

F2.1 Site activities[2]

As shown in Figure F1a, the site is located in the north of Karlsruhe (Eggenstein-Leopoldshafen), Germany at the Karlsruhe Institute of Technology (KIT) Nord Campus. Karlsruhe has averaged about 300 staff over the last few years with a further 150 permanent contract workers on site.

1 Staff no. centrally collected figures from DG HR; surface area collected by Karlsruhe's technical services (adding up the surface areas of all rooms)

2 NACE codes associated with Karlsruhe activities are: 99 – Activities of extraterratorial organisations and bodies; 71.2 Testing and technical anaysis, and 72.1 Research and experimental development on social science and humanities

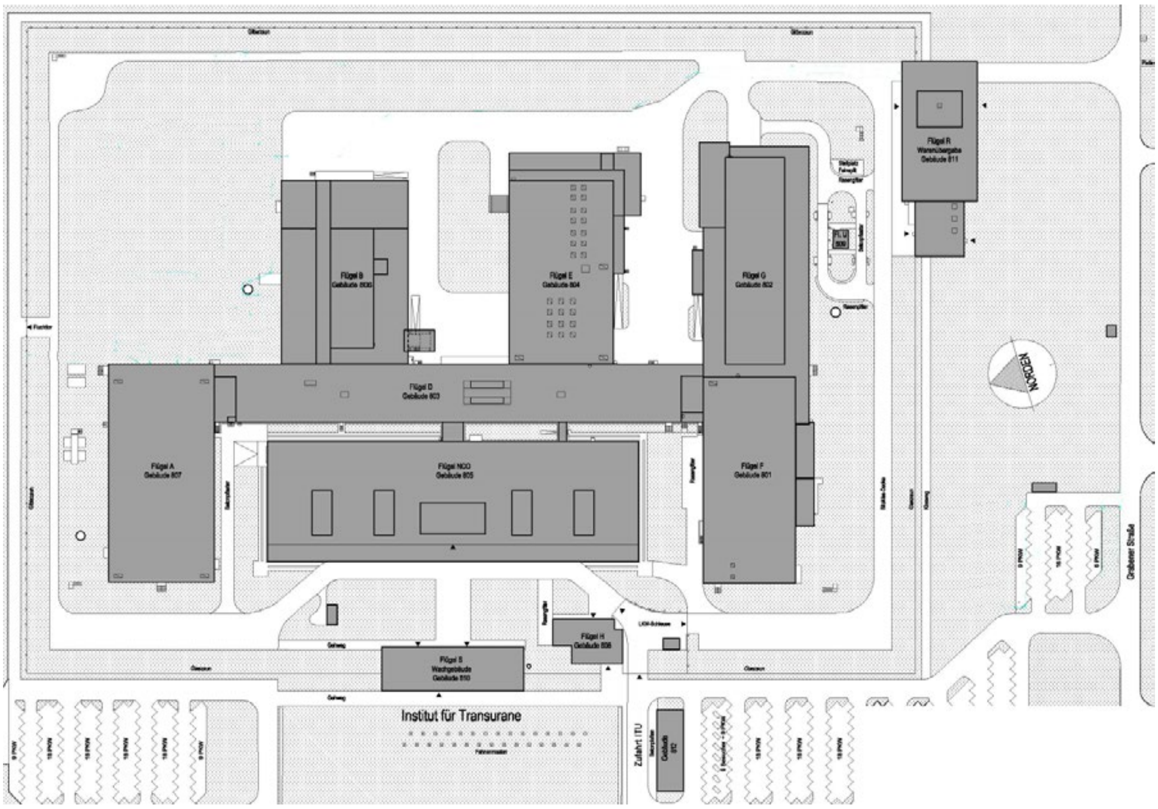
Figure F1a: Site location

In contrast to most other Commission premises which are dedicated mainly to administration, Karlsruhe is a nuclear facility conducting scientific and technical research. It requires large laboratories and other technical and experimental facilities resulting in a wide range of activities with varying environmental impacts.

Including all new buildings having become operational in the last years the total floor space now covers 43 170 m^2. The total site area is about 234 000 m^2 of which about 72 000 m^2 are sealed surfaces (paved or built-up). The site consists of the used area as shown in figure F1b and of, approximately, an additional 120 000 m^2 of unused forested area east of the built-up part (cf. figure F18).

As shown below in Figure F1b, other than the guards' house and the goods' transfer building, the site is dominated by one building with nine interconnected wings.

Figure F1b: Site layout



Karlsruhe's scientific activities are conducted in the nuclear area, within the frame of the EURATOM Treaty, and are summarised in Table F2:

Table F2: Description of main activities in JRC-Karlsruhe's nuclear area

Activity	Description
Fundamental properties & applications	◆ Basic understanding of actinides, nuclear materials and fuel processes ◆ Medical applications of alpha-emitter therapy of cancer and infectious diseases
Safety of nuclear fuels and fuel cycle	◆ Nuclear fuel behaviour in normal, transient and accidental conditions, codes and modelling ◆ Safety assessment of conventional and advanced nuclear fuel cycle and advanced technologies
Nuclear waste management & decommissioning	◆ Assessment and modelling of key alteration processes, long-term behaviour of spent fuels under disposal and storage conditions ◆ Development of innovative technologies and techniques for radiation surveillance, mapping and reconstruction technologies
Monitoring of radioactivity in the environment	◆ Procedures for data collection, evaluation and harmonisation, dispersion models ◆ Radioactivity environmental monitoring with management of information systems
Nuclear safeguards	◆ Nuclear material measurements, containment & surveillance, process monitoring, analytical methodologies and measurements ◆ Support to EURATOM safeguards regime and IAEA, operation of DG ENER onsite Laboratories
Nuclear non-proliferation	◆ Techniques and methodologies for the verification of absence of undeclared activities, trace and particle analysis, reference materials ◆ Export control, trade analysis, non-proliferation studies
Nuclear security	◆ Prevention, detection, response, national response plan, CBRN ◆ Combating illicit trafficking & nuclear forensics
Training and education	◆ European Nuclear Safety and Security School (EN3S), user facilities, higher education ◆ Vocational training, European Nuclear Security Training Centre (EUSECTRA) ◆ Knowledge management and dissemination

Since 2008 Karlsruhe has operated an Integrated Management System (IMS) and is certified according to ISO 9001 and 14001 as well as ISO 45001 (since 2018, previously BS OHSAS 18 001). Since 2015 the local IMS has been partially replaced by a JRC wide system.

F2.2 Stakeholder analysis

Important stakeholders for JRC-Karlsruhe include, in addition to the German nuclear regulatory authorities, peer nuclear scientists, journalists and influence makers, several Commission Directorates General such as DG ENER, EURATOM, co-operators on nuclear safety, young academics, local and regional politicians and the local Chamber of Commerce (see also chapter F10).

In 2018 (retrospectively for 2017) Karlsruhe prepared the first comprehensive stakeholder analysis clearly defining the various stakeholder groups, their main representatives as well as their interests or expectations. This was adapted and continued up to 2021 (retrospectively for the year before). The result is shown in table F3. The various groups are distributed according to their level of interest/influence and involvement on environmental matters using a semi-quantitative approach.

Table F3: Stakeholders' description - JRC-Karlsruhe

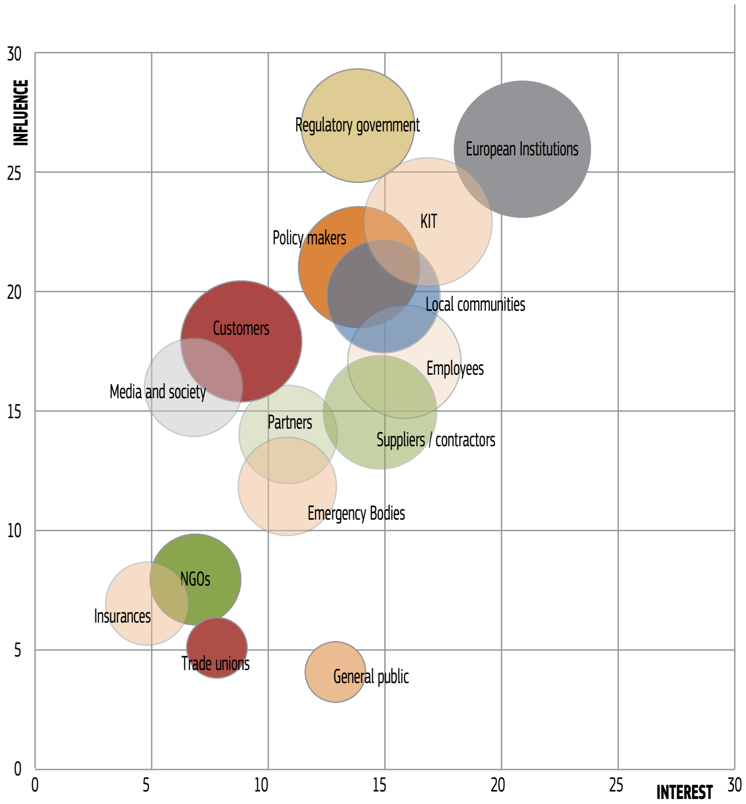
Stakeholder group	Main representatives	Interest, needs and expectations Obligations*	Necessary communication	Prio.
European Institutions (€)	◆ DG JRC, ◆ EC, ◆ Council & Parliament ◆ Member States ◆ Commission panels ◆ EU citizens	◆ Services responding well to DG's demands ◆ Minimal costs on energy/waste/soil ◆ They define the policy ◆ Multi-annual investment plans: that decide on investments: refurbishment, construction,... ◆ Site development plan		1
KIT	KIT	**Compliance with nuclear regulations**, operational control, active involvement Gründungsvertrag	Defined by respective legislation	1
Policy makers	◆ Baden-Württemberg ◆ Germany ◆ European Commission	Contribution to environmental policy and COP (Conference of Parties) 2030 targets on energy		1
Suppliers / contractors	◆ Products: e.g. lab chemicals, lab instruments, ◆ Services: e.g. maintenance companies, cleaning, catering, gardening, waste company, architects and consultants, construction companies	Maintaining their contracts, continue their delivery		1
Employees	◆ Employees ◆ Staff representation	Safe and modern working environment, trust and respect, be kept informed on environmental policy, targets and performance, employer that is caring about environment and sustainability		1
Customers	DGs: ENER, RTD, INTPA, TRADE, TAXUD, HOME, GROW, SANTE	Timely and correct delivery of reference materials and policy support, no specific requirements on environmental criteria.		1
Local communities	◆ Neighbourhoods and municipalities ◆ KIT ◆ Landkreis Karlsruhe	No radiation, no calamities, minimized transports and waste. Local communities want to be timely informed about incidents / calamities. They want to be informed about the installations and their risks.		1
Regulatory institutions	◆ Regulatory bodies / Environmental inspection authorities: UM Baden-Württemberg, Landkreis Karlsruhe ◆ EMAS verifiers ◆ IAEA ◆ EURATOM	**Compliance with regulations**	Defined by respective legislation	1
Emergency Bodies	◆ KIT Fire brigade ◆ Fire brigades of the surrounding communities ◆ KHG ◆ Civil protection institutions (Regierungspräsidium Karlsruhe, UM Baden Württemberg)	**Notification in case of incidents**	Defined by respective legislation	2
Media and society	◆ Press/TV/radio ◆ Society in general / public opinion	News value (when something goes wrong or ongoing projects). Indirect influence on impact through the image it conveys.		2

Stakeholder group	Main representatives	Interest, needs and expectations **Obligations***	Necessary communication	Prio.
Partners	◆ national laboratories ◆ policy advisors ◆ other JRC sites ◆ OECD ◆ other collaborators	Knowing our competences (to partner or compete)		2
NGOs	◆ NGO: e.g. BUND Naturschutz	Nature protection, no pollution		3
Insurances	◆ Fire insurances ◆ Nuclear liability insurance	Minimized risk on incidents or calamities		3
Trade Unions	◆ Members	**Working conditions**, contract fulfilment	Defined by respective legislation	3
General Public	◆ Citizens	Transparency		3

*Obligations printed in bold letters

A clearer picture of the significance of the various stakeholder groups as well as the necessary means to deal with them can also be found in a bubble chart below (Figure F2).

Figure F2: JRC-Karlsruhe Stakeholder analysis



F2.3 Context analysis

The EMAS regulation as well as ISO 14001 (2015)[3] require that an organisation determines which external and internal issues can affect its ability to achieve the intended outcomes of its environmental management system, whether positively or negatively.

For external issues this has been done in a PESTLE[4] analysis and is shown below (Table F4a).

[3] ISO 14001 (2015) Chapter 4.1, 6.1, 6.4 and EMAS Regulation Annex 1 §1, §7

[4] https://en.wikipedia.org/wiki/PEST_analysis

Table F4a: Context analysis JRC-Karlsruhe – external issues

PESTLE criterion	External issues & circumstances that influence JRC- Karlsruhe's environmental targets (4.1)[5] *(current conditions or future developments)*	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Political	Energy transition and COP (Conference of Parties) 2030 energy targets German climate targets		Energy reduction measures, energy efficiency, renewable energy.	Set up site development plan including measures to reach COP 2030 targets.
	Changing policies can effect scientific activities on the site and use of resources.	Budgetary constraints		
	Requirements of national environmental and energy as well as health and safety legislation	Risk of missing requirements	Improve environmental performance (better control of impact)	Contract and keep expertise on key functions (incl. using an external service provider) External Legal Compliance audits
	Demands / wishes of the surrounding communities	Reputational risk, complains	Promote external communication	
	Requirements of the Regulations: EMAS / ISO	Significant changes		Contract and keep expertise on key functions (incl. using an external service provider)
	Buildings' infrastructure	Budgetary constraints	Improvement in energy efficiency	Site development plan; Environmental Program 2020, No. A2a-A2g
	Covid-19 pandemic situation	Legal and general restrictions lead to reduced operations and consequently to reduced scientific output	Possible energy savings due to reduced operations	
Economic	The uncertain economic situation (related also to Brexit) influences the investments, staffing and contractors	Budgetary constraints, so investments in energy reduction/shift cannot be realized		
	Increasing energy and resources costs have an influence on overhead costs of the site	Higher budgets needed for electricity and gas as well as other resources; can also lead to reduction in other budgets	Justification for new investments in energy reduction (refurbishment, insulation, new buildings)	Environmental Program 2020, No. A2a-A2g
	Largely captive market (for several suppliers/providers of staff and material)	High cost, reduced availabilities		
	Covid-19 pandemic situation		Possible energy savings due to reduced operations	

5 Numbering taken from ISO 14001 (2015) Chapter 4.1, 6.1, 6.4 and EMAS Regulation Annex 1 §1, §7

PESTLE criterion	**External issues & circumstances that influence JRC- Karlsruhe's environmental targets (4.1)** [6] ***(current conditions or future developments)***	**Risks (6.1.1)**	**Opportunities (6.1.1)**	**Actions (6.1.4)**
Social	Increasing awareness of society on environmental impact and demand for transparency and reporting.		Opportunity for developing good communication and commit to EMAS compliance	Publish environmental statement
	Skills shortage - demographic change	Positions cannot be re-staffed, number of specialised companies decrease (can lead to monopolistic position in the market), also problematic for business continuity		
	Phase out of nuclear technologies for energy production. Higher demand for specialists in radiation protection and decommissioning	Decrease in specialized manpower available on the market; increasing prices for contracts		
	Covid-19 pandemic situation	Reduced operations,shift work and partial closure of the site lead to reduced social interactions of staff	"Real-life test" of teleworking/home office	Regular unit video-meetings
Technological	Development of green energy technologies		Improvement in energy efficiency	Environmental Program 2020, No. A2a
	Availability of electric cars can influence the emissions of the employees' cars			
	Phase out of nuclear technologies for energy production. This can influence the research work.	At the moment there are no clear risks identifiable but these cannot be excluded. In any case, there will be problems with the availability of specialized staff on the market (cf. above)		
	Increasing digitalization of processes, computers become more important, techniques available for videoconferencing		Less paper use, less missions	Green Public Procurement, video conferencing (Environmental Program 2020, No. C1h)
Legal	More complex environmental regulations	Risk of missing requirements	Improve environmental performance (better control of impact)	By contract, and maintaining expertise on key functions (incl. using an external service provider) External Legal Compliance audits
	Covid-19 pandemic situation	Legal restrictions lead to reduced operations and consequently to reduced scientific output		

6 Numbering taken from ISO 14001 (2015) Chapter 4.1, 6.1, 6.4 and EMAS Regulation Annex 1 §1, §7

PESTLE criterion	External issues & circumstances that influence JRC- Karlsruhe's environmental targets (4.1)[6] *(current conditions or future developments)*	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Environmental	Climate change effects: hot and cold periods- temperature peaks and average are increasing.	Risk for higher heating and cooling costs as well as worsened environmental performance		Infrastructure development plan; Environmental Program 2020, No. A2a-A2g
	Covid-19 pandemic situation	Large parts of staff working full or part time in homeoffice -> increased energy consumption in the private sector	Large parts of staff working full or part time in homeoffice è reduced emissions by commuting	
		General restrictions lead to reduced operations but important installations have to be kept running due to the nuclear character of the site; additional energy consumption due to teleworking	Reduction in some environmental parameters due to reduced operations	

For the classification of the internal issues the following subjects were used: Activities, Strategic direction, Culture and staff, Processes and systems, and Financial issues.

The result is presented below (Table F4b):

Table F4b: Context analysis JRC-Karlsruhe – internal issues

Criterion	Internal issues & circumstances that influence JRC-Karlsruhe's environmental targets (4.1) *(current conditions or future developments)*	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Activities	Nuclear activities require excellent operational control and safety measures	Risk of radiation releases with very high impact on neighbourhoods		Operational control procedures, regular meetings with inspection bodies such as UM
	The ventilation consumes a lot of energy (electricity)	Risk of high costs related to core activity as well as worsened environmental performance		Environmental Program 2020, No. A2a; Improvement of monitoring to allow optimal regulation.
	Limited activities due to COVID 19 pandemic situation	Legal and general restrictions lead to reduced operations and consequently to reduced scientific output		

Criterion	Internal issues & circumstances that influence JRC-Karlsruhe's environmental targets (4.1) ***(current conditions or future developments)***	Risks (6.1.1)	Opportunities (6.1.1)	Actions (6.1.4)
Strategic direction	JRC's restructuring towards the international level is affecting travelling needs	Higher travel emissions (CO_2), more complex reporting lines and decision making		Promote video conferencing (Environmental Program 2020, No. C1h); Green/ sustainable events' organization
	Resource limitation increases every year	Direct negative influence on the environmental performance ➔ fulfilment of the environmental targets endangered		Constant demand for adequate resources to higher management
Culture & staff	Multi-culturalism at JRC-Karlsruhe has to be also considered from the point of view of impact on the environmental behaviour.	"Negative" behaviour can have negative influences on the environmental performance as well as negatively impact the general behaviour	"Positive" behaviour can have positive influences on the environmental performance as well as positively impact the general behaviour	Regular communication on environmental issues (Connected, info screens), awareness campaigns, specific training events (Environmental Program 2020, No.C4)
	Increased demand for remote / flexible working		Reduction of commuting emissions and decreased resources (use of office space, energy, etc.)	Installation of telework where feasible
	COVID 19 pandemic situation	Reduced operations,shift work and partial closure of the site lead to reduced social interactions of staff	"Real-life test" of teleworking/home office	
Processes & systems	Complex procurement-procedures and document system	Risk of time loss, more time spent on administration than on actual action. Risk of escalating deadlines		Training and guidance documents
	Contract management sometimes unsatisfying	Non fulfilment of contractual requirements on environmental issues, such as proper waste segregation		
Financial issues	Restrictions/reductions of the budget for infrastructure measures	Direct negative influence on the environmental performance ➔ fulfilment of the environmental targets endangered		Constant demand for adequate resources to higher management
	Financial procedures are complex	It is sometimes difficult to obtain what is needed (missing points, deadlines, quality issues)		Training and guidance documents

F3 Environmental impact of JRC-Karlsruhe activities

Karlsruhe undertook the first full update of the environmental aspects in 2007. These are described in the Environmental Aspects Register (IMS-KRU-S6.6-RGS-0001-V12). It is reviewed at least annually and updated when necessary, most recently on the 14th of April 2020. Significant impacts associated with four main aspect groups were identified, as described in Table F5. Due to the mostly static character of the site, these have remained unchanged for several years. The other aspects described in the Environmental Aspects Register can be considered of minor significance or insignificant. There were two more aspects which were significant due to the methodology of the aspect register (missions and lights) but which were not considered as such because the actual data do not support this classification. In addition, the impact of Karlsruhe on the local environment can be considered as rather insignificant (cf. F7) because there are no potentially significant direct emissions to the environment except the ventilation system exhaust which is extensively filtered and strictly controlled. The premises were constructed to prevent any release of radioactivity. As a consequence, any release of other materials (e.g. hazardous substances) inside the building will not reach the outside, e.g. endangering the groundwater.

Table F5: Summary of significant environmental aspects at JRC-Karlsruhe

Aspect group	Environmental Aspect	Environmental Impact	Location/ Activity	Related Indicator
Use of natural resources, including energy	Electricity consumption	Resource depletion	Ventilation system,	1a
	Heating consumption	Resource depletion and air emissions	District heating	1a
Air emissions	Electricity and heating emissions	Global warming	Ventilation system, Lights, Heating system	2a
	Nuclear air emissions	Possible contamination of air	Nuclear research	Dose values
Waste generation	Radioactive waste	Potential contamination due to the existence of radioactive waste	Nuclear research	Chemie-III-Abwasser, nuclear waste volume and activity

F4 More efficient use of natural resources

F4.1 Energy consumption

F4.1.1 Buildings

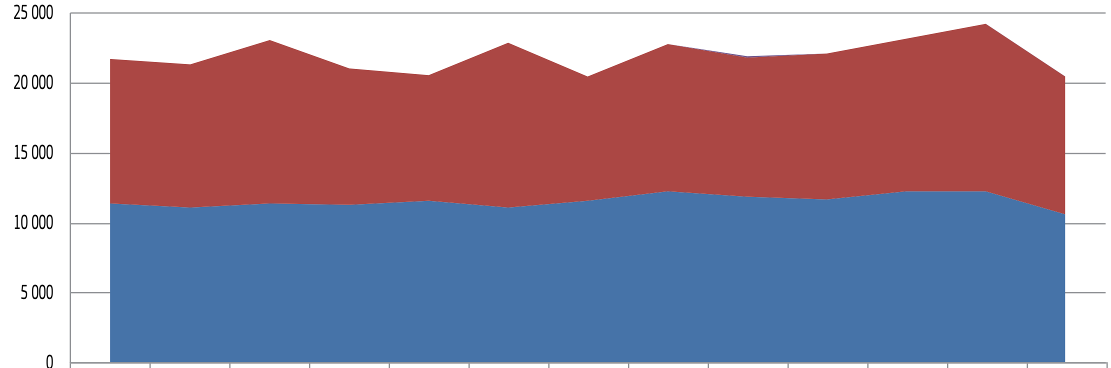
Buildings' energy consumption is one of the significant aspects. Figures F4 and F5 below show that most energy consumption parameters have been fairly steady during the last few years.

The site must comply with legal requirements, which is the dominant influence on energy consumption. For example, Karlsruhe is obliged to maintain an air flow of around 300 000 m^3 per hour, 24 hours per day throughout the year.

It should be noted that the 2020 values cannot be considered as "normal" due to the reduced operations because of the Covid-19 pandemic situation. On the other hand, as the installations cannot just be shut down, there were some but no significant reductions regarding the non-person dependent parameters (energy, CO_2 emissions). This is not unexpected, because the technical installations necessary for a safe operation of the site (e.g. ventilation) create a more or less constant basic level of energy consumption which is independent from the actual activities.

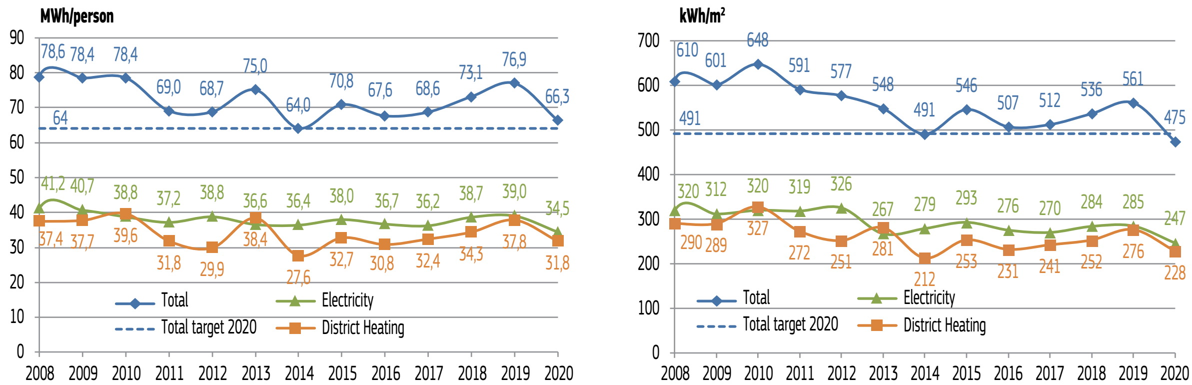
Total energy consumption shows an increase from 2016 to 2019 and a significant reduction in 2020, the latter presumably due to the reduced activities. The target for 2020 not to exceed the 2014 values could almost be reached for the total consumption. There was even a slight reduction for the value per m^2. Hence, also the revised target taken from the Global Action Plan (+/-0 % energy per m^2 from 2014 to 2020) could be reached. But as this is mostly due to the pandemic situation, this should not be overrated. Nonetheless, the 2020 figures both in total and also per m^2, as well as per capita, are still within the range of the values recorded since 2008.

Figure F3: Annual buildings energy consumption (MWh) in the EMAS perimeter (indicator 1a)[7]



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	21 705	21 393	23 059	21 046	20 544	22 882	20 489	22 786	21 889	22 104	23 158	24 222	20 486
diesel			10	10	10	10	10	10	10	10	10	10	10
district heating and cooling	10 330	10 293	11 649	9 692	8 932	11 710	8 839	10 540	9 982	10 423	10 888	11 912	9 826
electricity	11 375	11 100	11 400	11 344	11 602	11 162	11 650	12 236	11 897	11 670	12 260	12 300	10 650

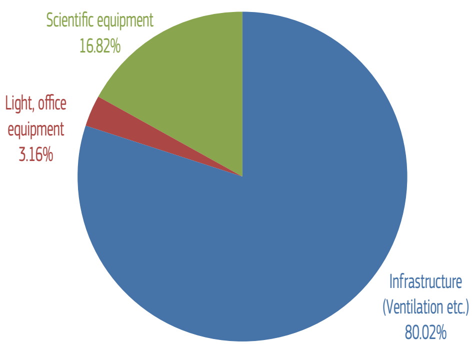
Figures F4 and F5: Evolution of total annual energy consumption for JRC-Karlsruhe



Electricity is provided by the KIT using a supplier contract with Stadtwerke Karlsruhe together with some electricity generated on site through combined heat and power generation, in a combined heat and power plant (15%) and photovoltaics (1%). Electricity consumption has remained fairly constant in the last few years despite an increase in floor area of 22% since 2013. There is some reduction in 2020 which presumably can be attributed to longer phases of reducing the ventilation system to 50 % (weekend mode) due to the almost total shutdown of the site.

The ventilation system is responsible for about 80% of Karlsruhe's electricity consumption. A breakdown by consumer group in 2020 is presented in Figure F6.

Figures F6: Distribution of electricity in 2020



7 Diesel is only consumed by test runs of the emergency generators. These follow a regular schedule; hence, the values are the same for each year (i.e. 10 MWh; calculated value based on the consumption of 40 l diesel per generator and test run adding up to a total diesel consumption of 960 l per year).

Any changes to the ventilation system are subject to strict regulatory control as it represents the site's main component of nuclear safety and as such is heavily integrated into the nuclear licensing that is supervised by the authorities.

Karlsruhe does not use a municipal gas supply. It receives heating energy from the KIT district heating system. Until 2012, and as expected, heating energy consumption was mostly influenced by climate fluctuations because there have been neither major changes to the heating system nor to the buildings' insulation. In 2013 a new "state of the art" office building became operational but the variations between 2014 and 2019 can still be largely attributed to weather conditions. The drop in 2020 is once again due to the reduced operations. But even with this extraordinary situation, the **2020 target** not to exceed the 2014 values could not be reached for both the total consumption and the value per m^2.

In addition Karlsruhe also subscribes to the commission wide proposal which was revised in 2018 to keep the 2014 value (i.e. +/-0%) of this parameter (for Karlsruhe). Karlsruhe opened several new buildings in the last years and will open another large laboratory building in the next years. These buildings require and will require additional energy therefore reducing total energy consumption will be difficult, at least when measured per capita. The development when measured per m^2 could look more positive due to the increase of the surface area and also due to the weather conditions but it remains doubtful whether this criterion can be met.

Looking over the development of the last ten years, the value for the last years are still close to the range of the long-time average both for the value per m^2 and also for the total consumption. In this context it should be pointed out, that the 2014 value was one of the lowest in the last years which is mostly due to a rather low heating consumption in that year.

Karlsruhe creates an Environmental Program for each year describing the various actions dealing with environmental aspects. The significant ones prioritising the reduction of energy consumption (indicator 1a) are summarised below.

Table F6: Important actions targeting indicator 1a (buildings' energy consumption)

Goal	Action	Action type	Status of target achievement	Date
Reduction of energy consumption	Installation of heat exchanger in the exhaust system in active areas.	Multi-stage	Decision about wing with continuing operation taken and included in Site Implementation Rolling Plan (under preparation), continuation earliest in 2020 (or after completion of wing M), only wing A will be considered as the other ones (F&G) will go into decommissioning;	started in 2014
Reduction of energy consumption	Thermal insulation of the "old" wings of JRC-Karlsruhe.	Multi-stage	Decision about wing with continuing operation taken and included in Site Implementation Rolling Plan (under preparation), continuation earliest in 2020 (or after completion of wing M), only wing A will be considered as the other ones (F&G) will go into decommissioning;	started in 2014
	Installation of a more effective heating control system in wing E (comparable to wing A).	Single	10%; further implementation included in Site Implementation Rolling Plan (under preparation), continuation earliest in 2020 (or after completion of wing M)	started in 2016
	Replacement of illuminated safety signs by LEDs; complete wings B, D, E, F, G (till mid of 2021)	Multi-stage	70%	Dec. 2020
	Replacement of current perimeter lights by LEDs (completion planned by end of 2020)	Single	100% (i.e. perimeter lights completely switched to LEDs).	Dec. 2020
	Substitution of fluorescent tubes by LEDs during maintenance when replacement is necessary	regularly repeated	ongoing	started in 2016

In any case, it should be pointed out that due to the site characteristics only infrastructure measures requiring heavy financial investements will lead to significant improvements regarding the energy consumption.

F4.1.2 Vehicles

Table F7: Summary vehicle energy consumption (indicator 1b)

	2014	2015	2016	2017	2018	2019	2020
Total (MWh/yr)	172.44	140.13	150.68	166.09	140.24	73.25	42.86
MWh/person	0.539	0.435	0.465	0.516	0.442	0.233	0.139
Diesel used (m^3)	5.71	7.79	12.47	14.30	11.71	4.59	2.50
Petrol used (m^3)	11.71	5.87	1.58	1.10	1.35	2.60	1.74

JRC-Karlsruhe operates a very small fleet of 12 vehicles of which five are mostly or only used on the premises. Two of the latter are all-electric cars. Their combined fuel consumption of 43 MWh per year can be considered as insignificant compared to the total energy consumption (0.2% of the total energy consumption in 2020 and 0.4% in 2019) but nevertheless decreased by 41.4%. But as this decrease can be attributed to a large extend to the reduced operations, it should not be overrated..

The Environmental Program 2020 describes the following action regarding the vehicles' consumption:

Table F8: Important actions targeting indicator 1b (vehicles' energy consumption)

Action	Action type	Status of target achievement	Date
When replacing service cars, take environmental aspects into consideration (i.e. low consumption, low emissions, etc.)	Multi-stage	ongoing (purchase criteria: 50% CO_2 for new service cars); manufacturer values for CO_2	started in 2015

F4.1.3 Renewable energy use in buildings

Table F9 shows that the trend of increasing the proportion of renewable energy in the electricity supply continued in 2020, and this is reflected by the reduction in the total percentage of energy from non-renewable sources.

Table F9: Non-renewable energy use in the buildings (indicator 1c)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Electricity from renewables (MWh)	2 220	2 280	2 269	2 320	2 232	3 681	4 833	4 640	4 855	5 603	6 273	5 687
Renewables (%)	20	20	20	20	20	31.6	39.5	39	41.6	45.7	51.0	53.4
Electricity from non renewables (MWh)	8 880	9 120	9 075	9 282	8 930	7 969	7 403	7 257	6 816	6 657	6 027	4 963
Non renewables (%)	80	80	80	80	80	68.4	60.5	61	58.4	54.3	49.0	46.6
supplied diesel (MWh non renewable)	0	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Non renewables (%)		100	100	100	100	100	100	100	100	100	100	100
Dist. heating/cooling (MWh non - ren)	10 293	11 649	9 692	8 932	11 710	8 839	10 540	9 982	10 423	10 888	11 912	9 826
Non renewables (%)	100	100	100	100	100	100	100	100	100	100	100	100
Total renewables (MWh)	**2 220**	**2 280**	**2 269**	**2 320**	**2 232**	**3 681**	**4 833**	**4 640**	**4 855**	**5 603**	**6 273**	**5 687**
Total renewables (%)	**10.4**	**9.9**	**10.8**	**11.3**	**9.8**	**18.0**	**21.2**	**21.2**	**22.0**	**24.2**	**25.9**	**27.8**
Total renewables (MWh/p)	**8.1**	**7.8**	**7.4**	**7.8**	**7.3**	**11.5**	**15.0**	**14.3**	**15.1**	**17.7**	**19.9**	**18.4**
Total renewables (kWh/m^2)	**62.4**	**64.1**	**63.7**	**65.2**	**53.5**	**88.2**	**115.8**	**107.5**	**112.5**	**129.8**	**145.3**	**131.7**
Total non. Ren energy use, (MWhr/yr)		20 779	18 778	18 224	20 650	16 808	17 953	17 250	17 249	17 556	17 949	14 799
Total non renewables, (%)		90.1	89.2	88.7	90.2	82.0	78.8	78.8	78.0	75.8	74.1	72.2

According to the supplier (responsible for 84% of the electricity), approximately 60% of the supplied electricity mix is supplied by renewable sources. There are no renewable energy sources directly on site. There is however a photovoltaic installation operated by the KIT which contributes to 1% of the supplied electricity adding up to a total percentage of 51% of energy by renewable sources. District heating is generated from natural gas in a combined heat and power plant which supplies the remaining 15% of electricity. There were no specific targets in 2020 because Karlsruhe does not directly influence the electricity mix. JRC-Karlsruhe is committed to a 5% reduction in non-renewable energy use from 2014-2020 and is on track to meet this target at least when considering the values per m^2.

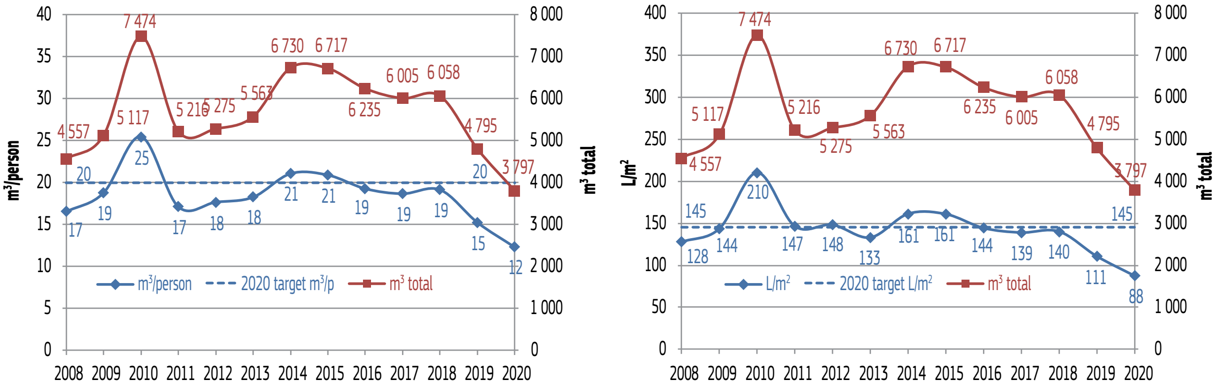
F4.1.4 Emergency generators

JRC-Karlsruhe operates two diesel emergency generators for the production of electricity for the operation of essential systems in case of an electrical power outage. These are tested monthly. Each test run consumes about 40 l diesel per generator adding up to a total diesel consumption of 960 l per year. This consumption produces approximately 10.5 MWh which is less than the consumption of the service cars and represents 0.04% of the total energy consumption in 2020.

F4.2 Water consumption

The evolution of total water consumption per capita and per square metre, are presented below.

Figures F7 and F8: Evolution of per capita (left) and per square metre (right) water consumption for Karlsruhe (indicator 1d)



These figures indicate a continuing decreasing trend since 2014. The higher value recorded in 2010 was due to a malfunction in the hydrogen generating plant.

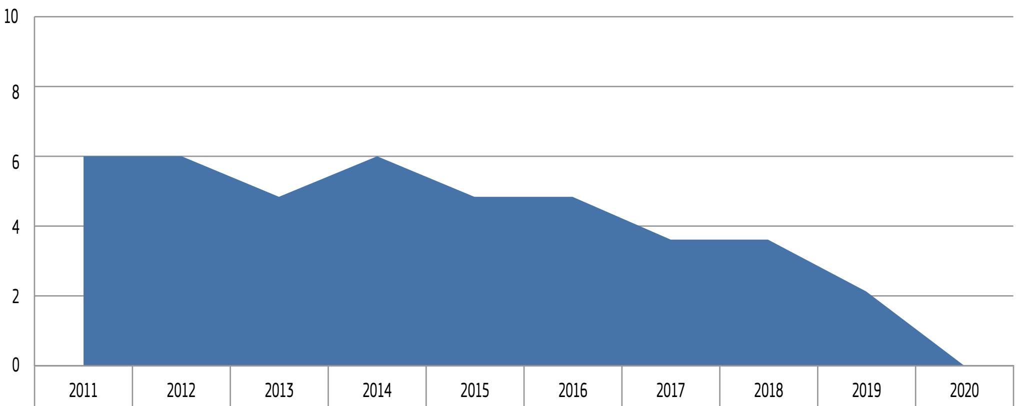
Not unexpectedly, water consumption also “benefited” from the pandemic situation. It decreased once again considerably after the significant drop in 2019 for which the reason is still not clear. The 2020 target for this parameter not to exceed the 2014 values could be reached (even exceeded). This also applies to the target of the Global Action Plan, which was met (-5% water consumption per m² from 2014 to 2020). Once again, the 2020 values are due to the Covid-19 situation, and should not be overrated.

The **2020 target** not to exceed the 2014 levels was met for both total consumption as well as consumption per m² (in fact, it was even exceeded). The **target for 2021** is once again not to exceed the 2014 values. The global target for 2014-2020 is a 5% reduction in water consumption on a per square metre basis, which was also met.

F4.3 Office and print shop paper

The evolution of office paper at Karlsruhe and per capita breakdown is presented below. No offset paper was used.

Figure F9: Evolution of paper consumption at Karlsruhe (totals)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Office (A4 sheet equivalent) x1 000 000	1.20	1.20	0.96	1.20	0.96	0.96	0.72	0.72	0.48	0.48
Total paper consumption (tonnes)	6.00	6.00	4.80	6.00	4.80	4.80	3.60	3.60	2.10	0.00
Offset paper (tonnes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Office paper (tonnes)	6.00	6.00	4.80	6.00	4.80	4.80	3.60	3.60	2.10	0.00

Figure F10: Evolution of paper consumption per capita at Karlsruhe

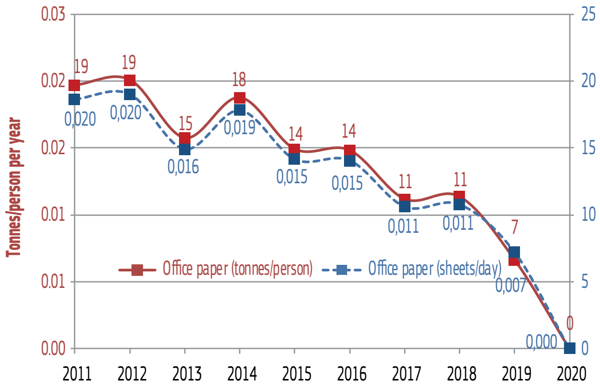


Figure F10 shows that office paper consumption decreased over the years. Since 2013 office paper has the Nordic Swan and EU Ecolabel (EU Flower) designations. In 2019, the paper density was changed from 80g/m² to 70 g/m². Due to the pandemic situation most of the staff was working most of the time in the home office. As a consequence, no paper was purchased in 2020. With no paper purchased at all, an evaluation of the 2020 value against the targets of the Global Action Plan (-20% (kg per person and number of sheets per person per day) from 2014 to 2020) does not really make sense. Using the 2019 values (-33%) instead, the targets of the Global Action Plan were met.

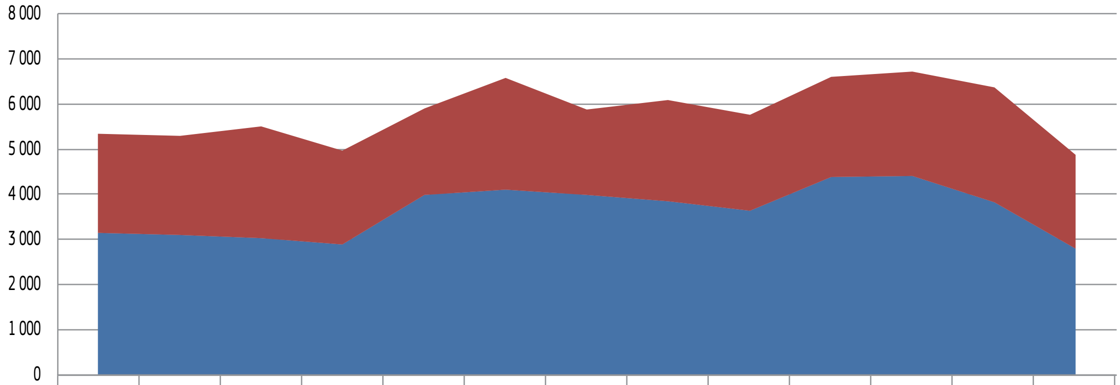
F5 Reducing air emissions and carbon footprint

F5.1 CO_2 emissions from buildings

F5.1.1 Buildings (energy consumption)

Buildings emissions currently account for a large majority of CO_2 emissions recorded at Karlsruhe and are therefore one of the significant environmental aspects.

Figure F11: CO_2 emissions from buildings energy consumption, tonnes (indicator 2a)[8]



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total (tonnes)	5 347	5 300	5 515	4 960	5 896	6 591	5 868	6 085	5 757	6 605	6 724	6 364	4 880
district heating/cooling	2 200	2 192	2 481	2 064	1 903	2 494	1 883	2 245	2 126	2 220	2 319	2 537	2 093
diesel			3	3	3	3	3	3	3	3	3	3	3
electricity	3 147	3 107	3 030	2 892	3 990	4 093	3 982	3 837	3 627	4 381	4 402	3 823	2 783

8 Diesel is only consumed by test runs of the emergency generators. These follow a regular schedule, hence, the values are the same for each year.

Figure F12: CO_2 emissions from buildings energy consumption, per capita and square metre (indicator 2a)

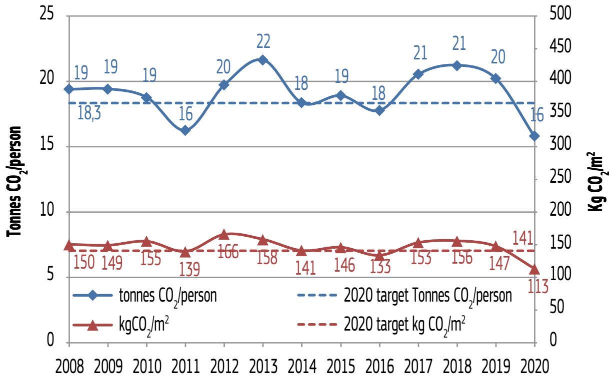


Figure F12 shows that the evolution of CO_2 emissions from buildings is, as expected; strongly linked to energy consumption and with the same trends described in section F4.1. But also the CO_2 conversion factor for electricity plays an important role (see below). In 2017 an increase could be recorded due to a change of the electricity supplier of the KIT which also included an increase of the CO_2 conversion factor. From 2018 to 2020 the CO_2 conversion factor decreased significantly (about 30%). Due to the reduced CO_2 conversion factor for electricity in combination with the reduced activities due to the pandemic situation in 2020, there is a significant decrease of the CO_2 generation in 2020. The **2020 target** for this parameter not to exceed the 2014 values was reached (even exceeded) for both, the total emissions and the value per m². The target taken from the Global Action Plan (CO_2 per m²: +/- 0% from 2014 to 2020) was also reached (resp. exceeded). But, also for this parameter, this is due to the pandemic situation to a large extend, so it should not be overrated.

Due to the fact that the vast majority of CO_2 emissions are due to energy in buildings, no additional specific CO_2 emissions actions were planned. However, measures introduced to reduce energy consumption, as described in section F4.1 will inevitably also reduce emissions.

F5.1.2 Buildings -other greenhouse gases (refrigerants)

Karlsruhe operates approx. 60 (mostly small) air conditioning systems with a combined inventory of 325 kg of different HFCs (mostly R407c and R410a). Emissions of refrigerants can only occur through leakage from these air conditioning systems which, owing to a rigorous maintenance programme, has so far been prevented. Up until 2020 there were no losses during normal operations, and there were no “abnormal” operations. The same applies to four electric cabinets which contain small amounts of SF_6 as an insulating agent (approx. 6 kg). These cabinets are completely closed systems; thus, there is no possible loss during normal operation. Other greenhouse gases (like CH_4, N_2O, HFCs, PFCs and NF_3) are not used on site and are therefore not reported. Hence, at JRC-Karlsruhe the potential for global warming due to emissions from refrigerants or comparable substances is considered insignificant. As a consequence, there were no specific targets in 2020. The **2021 objective** is to repeat 2020’s performance of no leakage during normal operation.

F5.2 CO_2 emissions from vehicles (indicator 2c)

F5.2.1 Commission vehicle fleet

JRC-Karlsruhe operates a very small fleet of 12 vehicles of which five are mostly or only used on the premises. Two of the latter are all-electric cars. All cars had a combined CO_2 output of 12.8 t in 2020. This is once again a significant decrease of 41.5 % compared to 2019. But as this decrease can be attributed to a large extend to the reduced operations, it should not be overrated. There is a slight increase in manufacturer’s data which is due to the fact that in 2020 two new service cars with gasoline instead of diesel engines (as in previous years) were purchased for the director’s office and the motor pool. In any case, it should be pointed out that the CO_2 emissions of all cars can be considered as negligible compared to the total CO_2 emissions (e.g. 0.3 % in 2020 or 0.4 % in 2019).

F5.2.2 Missions and local work-based travel (excluding Commission vehicle fleet)

Missions’ emissions were not among the significant aspects identified in Table F5, and there were no specific targets in 2019 or 2020 associated with them. Nonetheless, due to an increase in video conferencing facilities from two to nine since 2013 and also numerous Jabber installations, it could be assumed that there was some reduction of travel in favour of video conferences.

Business travels were cancelled to a large extent in 2020 due to the Covid-19 pandemic situation.

F5.2.3 Commuting

The CO_2 footprint of staff commuting was estimated in 2016 from survey data using a simple approach considering the main and potentially second modes of transport along with the distance to the workplace. The CO_2 footprint for commuting resulted in approx. 1.24 t per day or approx. 273 t per year respectively (cf. also F5.3). Unfortunately the follow up survey planned for September 2018 as a part of the actions of the EU mobility week could not be performed and was then put on hold due to the lack of staff.

As most of the staff was teleworking the CO_2 footprint of staff commuting presumably can be considered as insignificant in 2020.

The Environmental Program 2020 describes the following action regarding vehicles' consumption which were continued despite of the pandemic situation:

Table F10: Important actions promoting more sustainable commuting behaviour

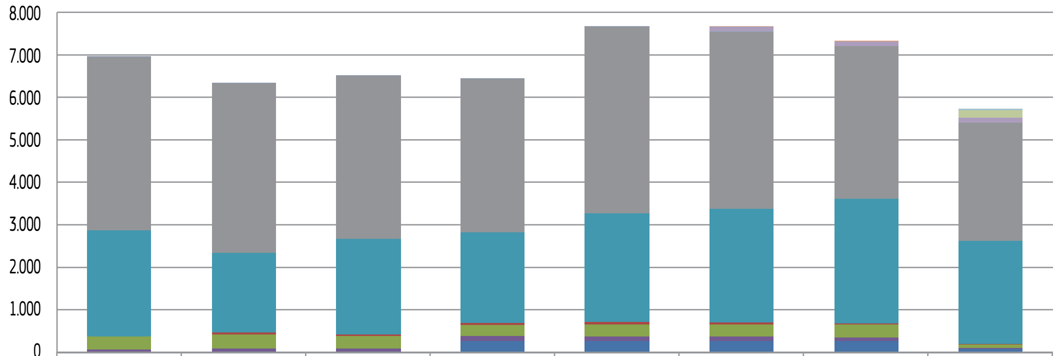
Action	Action type	Status of target achievement
Free tickets for public transport	continuous	Implemented
Car-pooling: intranet site for staff	continuous	Car-sharing inter-institutional portal
Equip, maintain and manage service bicycles	Continuous/ single	Regular service (includes also monthly servicing)

F5.2.4 Emergency generators

The two diesel generators (cf. chapter F4.1 - d)) generate approximately 3.4 t CO_2, even less than the CO_2 emissions of the service cars (0.05% of the total CO_2 emissions).

F5.3 Carbon footprint

Figure F13: JRC-Karlsruhe, carbon footprint (CO_2 or equivalent emissions 2013-2020 (in tonnes)



	2013	2014	2015	2016	2017	2018	2019	2020
Sum	6 962	6 339	6 517	6 451	7 667	7 674	7 327	5 733
Own waste	0	0	0	0	0	0	0	0
Catering	0	0	0	0	0	0	0	0
Service contracts	0	0	0	0	0	0	0	27
Paper supply	0	0	0	0	0	4	2	0
Fixed assets - Commission vehicles	0	0	0	0	0	5	4	5
Fixed assets - IT	0	0	0	0	0	0	0	182
Fixed assets - buildings	0	0	0	0	0	111	111	111
Buildings - fuels for heating	3	3	3	3	3	3	3	3
Buildings - electricity	4 093	3 982	3 837	3 627	4 381	4 164	3 585	2 783
Buildings - district heating/cooling	2 494	1 883	2 245	2 126	2 571	2 686	2 938	2 424
Buildings - coolant losses	0	0	0	0	0	0	0	0
Vehicle fleet - fuel consumption	0	51	41	44	48	41	22	13
Missions (air, RFI 2)	300	322	293	263	290	291	311	75
Missions (excluding air)	72	98	98	115	101	97	78	32
Staff commuting	0	0	0	273	273	273	273	78

Figures F13 shows that buildings' energy consumption, whether through electricity or district heating, are the most important components of the carbon footprint. The next significant components are fixed assets (IT and buildings). Due to the Covid 19 pandemic situation commuting and business air travel are significantly lower than in the last years. Nevertheless, all these next components are far below the buildings' energy consumption.

Table F11 (below) ives a more detailed overview.

Table F11: Carbon footprint

	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Fuel consumption and fugitive emissions								
Fuel for bldgs: mains gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: tanked gas (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet	0.00	0.13	0.10	0.11	0.12	0.10	0.06	0.03
Refrigerants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scope 2: Purchased energy								
External electricity supply (grey),	12.37	11.47	10.98	10.32	12.54	12.11	10.35	8.27
External electricity supply contract (renewables), combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (combustion) (2)	8.18	5.88	6.97	6.56	6.89	7.32	8.05	6.77
Scope 3: Other indirect sources								
Fuel for bldgs: mains gas (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: tanked gas (upstream) (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet (upstream)	0.00	0.03	0.03	0.03	0.03	0.03	0.01	0.01
Site generated renewables (upstream) (3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
External grey electricity supply, line losses	1.05	0.97	0.93	0.88	1.07	1.03	1.03	0.74
External 'renewables' electricity contract (upstream with line loss)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (upstream) (2)	0.00	0.00	0.00	0.00	1.09	1.16	1.27	1.07
Business travel: air (combustion) + (including air taxi)	0.98	1.01	0.91	0.81	0.90	0.92	0.99	0.24
Business travel: rail (combustion)	0.03	0.01	0.02	0.02	0.01	0.01	0.01	0.00
Business travel: hire car (combustion)	0.20	0.17	0.19	0.23	0.18	0.19	0.18	0.07
Business travel: private car (combustion)	0.00	0.12	0.10	0.10	0.12	0.10	0.05	0.03
Commuting (combustion) (4)	0.00	0.00	0.00	0.84	0.85	0.86	0.87	0.25
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.36
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Fixed assests - Commission vehicles	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.02
Paper supply	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Service contracts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Catering	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Own waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Other category) - Ispra								
Sum	**22.8**	**19.8**	**20.2**	**19.9**	**23.8**	**24.2**	**23.3**	**18.6**

F5.4 Total air emissions of other air pollutants (SO_x, NO_x, PM)

Karlsruhe's non CO_2 air emissions are not significant for the environmental aspect. It does not operate heating installations, hence, there are no processes generating either NO_x or SO_x. VOC emissions are not measured as air flow from the chemical laboratories passes through activated-carbon filters and thus can also be considered negligible. Consequently, there were no relevant specific targets for 2020 and also no **2021 targets.** The emergency generator is tested monthly for a very short period and would be responsible for a very small quantity of particulate matter emissions.

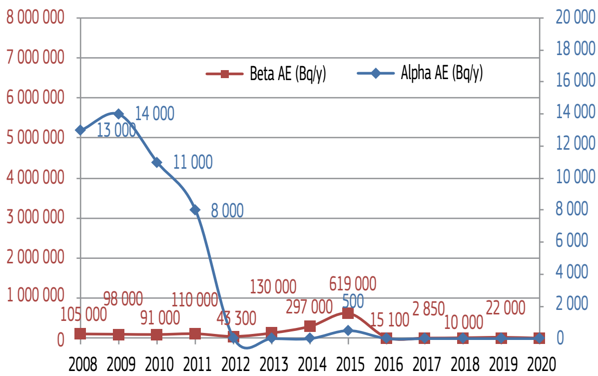
F5.5 Nuclear emissions

For official values relating to potential radioactive emissions to the surrounding environment JRC-Karlsruhe participates in the KIT Campus Nord's surveillance program in addition to constant measurements made by JRC-Karlsruhe itself. The latter are mostly used for operative purposes and not for official surveillance.

KIT has an extensive surveillance program measuring air, soil, water and vegetation for radioactivity and is obliged to give regular reports about these measurements to the Umweltministerium Baden-Württemberg, the supervising authority for nuclear installations in Baden-Württemberg.

Due to extensive filtering systems, emissions of radioactive substances are far below the legal limits as shown in Figure F14. The fluctuations in the values can be largely attributed to the measuring method. In 2020 both values were 0 resp. below the detection limit.

Figure F14: Exhaust air: declaration to authority on aerosol emissions



Note: maximum values on the y axes are only 20% of the permitted maxima for beta and alpha emissions (40 000 000 Bq/y, and 100 000 Bq/y respectively)

Owing to the already low values, a further reduction in nuclear emission is practically unachievable. Karlsruhe's **2021 target** is, nonetheless, to maintain this very good level of performance, given that site policy is to keep emissions as low as reasonably possible, regardless of the authorised limits.

In 2011, as a consequence of the mediation process regarding the construction of the new laboratory wing, Karlsruhe's management declared a voluntary reduction of the authorised limit of "nuclear" emissions by 10%.

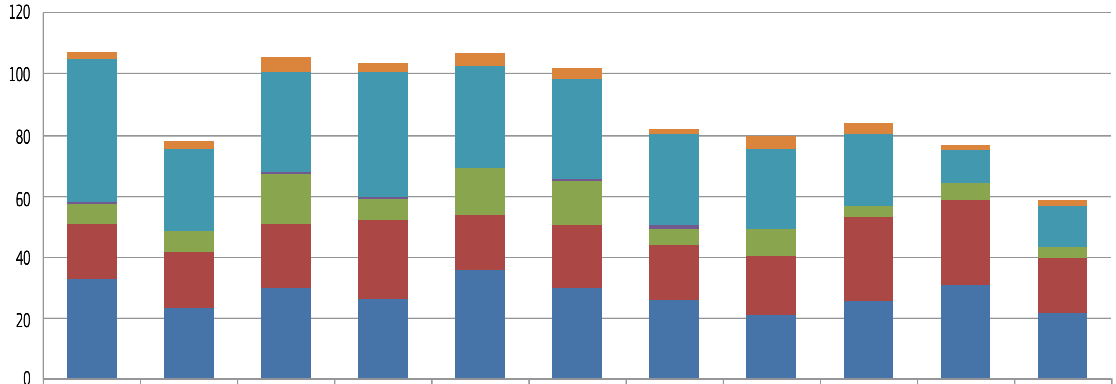
F6 Improving waste management and sorting

F6.1 Non-hazardous waste

Figure F15 shows a decreasing trend in waste generation since 2012. Most waste data are provided by the waste contractor. Some household and paper waste disposal is managed by a different company (due to specific requirements of the German waste legislation) and quantities were calculated using the average number of containers counted over four weeks and bulk density values for the waste types given in the literature[9]. It should be noted, that these latter values are probably too high in 2020 but there was no possibility to re-evaluate them. The site has developed a policy of waste partitioning and recycling through which it constantly seeks to reduce overall waste production. Without construction and dismantling waste there is a significant reduction since 2014 as shown in figure F15. It should be pointed out that some kind of dismantling waste might be included in municipal waste (e.g. drywall waste because there is no other waste fraction to dispose of this kind of material).

9 Görner, Hübner - Abfallwirtschaft und Bodenschutz; Springer; 2002

Figure F15: Evolution of total non-hazardous waste in Karlsruhe (in tonnes)

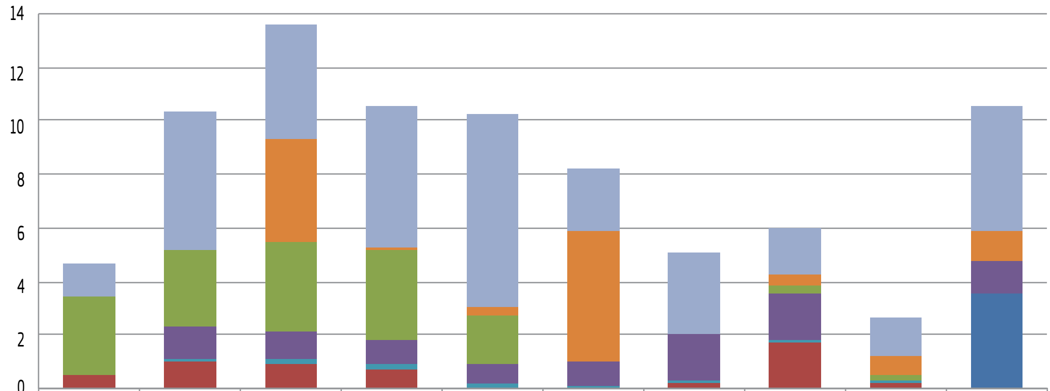


	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	107	78	106	104	107	102	82	80	85	78	60
Total (tonnes/person)	0.37	0.26	0.35	0.34	0.33	0.32	0.25	0.25	0.27	0.25	0.19
Plastic	2.4	2.4	4.9	3.0	4.1	3.3	1.6	3.9	3.9	1.8	2.0
Metal (scrap)	47.0	26.6	32.7	40.8	32.9	32.8	29.9	26.7	23.1	10.7	13.7
Glass	0.2	0.0	0.6	0.6	0.0	0.8	0.8	0.0	0.0	0.0	0.0
Wood	6.7	7.1	16.6	6.9	15.4	14.4	5.6	8.3	3.8	5.9	3.5
Paper and cardboard	18.0	18.0	20.8	25.7	18.0	20.6	18.0	19.3	27.0	27.3	18.0
Municipal waste	33.2	23.8	30.3	26.7	36.1	30.1	26.0	21.6	26.2	31.5	21.8

The 2014-2020 target (2018 revision) of 20% non-hazardous waste reduction (tonnes /person) has been achieved and will continue to be so through strengthening awareness of the established procedures and through staff awareness campaigns. Non-hazardous waste is an insignificant environmental aspect, and depends to a large extent on the research as well as renovation and construction activities which are not predictable. The significant drop in 2020 can be attributed to the reduced operations due to the pandemic situation. Nonetheless, the target to keep the 2014 values was reached (and even significantly exceeded). The target of the Global Action Plan for non-hazardous waste (- 20%, kg per person from 2014 to 2020) was reached. In addition there was a share of about 5 tons of construction waste in 2020 which was not included in the graph for better comparibility with the other sides. This is only 10 % of the 2019 value for construction waste which is, of course, also due to the reduced operations.

F6.2 Hazardous Waste

Figure F16: Evolution of total hazardous waste in Karlsruhe (in tonnes)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	4.65	10.32	13.58	10.51	10.26	8.23	5.07	6.02	2.59	6.99
Total (tonnes/person)	0.015	0.035	0.045	0.033	0.032	0.025	0.016	0.019	0.008	0.023
Electrical equipment (WEEE)	1.18	5.20	4.27	5.20	7.25	2.32	3.03	1.72	1.38	4.64
Insulating glass fibre	0.00	0.00	3.86	0.18	0.30	4.88	0.00	0.46	0.76	1.21
Asbestos from dismantling works	3.00	2.82	3.38	3.32	1.84	0.00	0.00	0.25	0.14	0.00
Lead-acid battery	0.00	1.19	1.02	0.90	0.70	0.91	1.79	1.79	0.00	1.14
Flourescent lamps	0.00	0.13	0.13	0.21	0.17	0.12	0.11	0.09	0.11	0.00
Mixed chemical waste	0.47	0.98	0.92	0.70	0.00	0.00	0.14	1.71	0.20	0.00
Other hazardous waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.58

Figure F16 shows the evolution in the generation of total hazardous waste. Some categories of hazardous waste are disposed according to specific laboratory waste procedures and therefore accounted together as “mixed chemical waste”. This approach has delivered the highest safety standards while reducing the administrative burden.

Excluding 2016, WEEE has been the largest component of hazardous waste since 2011 but under German law it must all be recycled. The next largest component of hazardous waste for several years was asbestos generated through renovation works. This is a historic liability as large parts of Karlsruhe were built in the 1960s. Although most of the renovation works removing asbestos elements are completed, some small amounts might appear from time to time. This also applies to insulating glass fibres which also have, and might, come up during renovation works in smaller or larger quantities. The significant rise of the total amount in 2020 compared to 2019 is due to the fact that in 2020 large amounts of waste lubricants and waste oils which were collected over years were disposed at once (as “other hazardous waste”) in addition to a rather high percentage of WEE.

Established procedures are working well and awareness campaigns will be continued. Therefore there are no specific management approved actions for continued improvement. Hazardous waste can be considered as an insignificant environmental aspect according to the environmental aspects’ analysis and in relation to the activities of the site.

F6.3 Waste sorting

This parameter as it is listed in table F12 can only be used for informational purposes because the new revision of the German Gewerbeabfallverordnung (German ordinance on industrial waste; taking effect from August 2017) defines different criteria regarding the waste separation than those used by the Commission for this Environmental Statement and consequently leads to different values. This ordinance requires a minimum separation of 90%. The criteria used by the Commission would lead to values far below the required percentage. According to the criteria given in this ordinance the percentage sorted in 2020 is 99.45%. It is obvious that the **target for 2021** is to fulfil the requirements of this regulation.

The values according to the criteria used by the Commission since 2010 are shown in table F12 to allow a comparison with the other EMAS sites.

Table F12: Percentage of waste sorted at the JRC-Karlsruhe

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percentage of waste sorted	0.0	28.8	26.1	22.8	30.8	26.8	28.8	25.4	28.7	39.2	32.5
Percentage of waste not sorted	100.0	71.2	73.9	77.2	69.2	73.2	71.2	74.6	71.3	60.8	67.5

F6.4 Radioactive waste and waste water

Nuclear waste management includes the disposal of radioactive waste as well as the unrestricted disposal of non-contaminated waste from the controlled area. Disposal of radioactive waste can be separated in three processes:

1. Handling and disposal of radioactive waste, decontamination and dismantling
2. Dismantling of disused glove-boxes, waste characterisation
3. Glove-box waste packages measurements, gamma-spectrometry and neutron coincidence

The amounts of nuclear waste since 2011 are shown in table F13a. A trend cannot be determined as the amount of disposed nuclear waste is caused by changing parameters, e.g. the research activities, glove box disassembling and also the capacity of KTE (the official collecting facility for low and middle radioactive waste in Baden-Württemberg).

Table F13a: Nuclear waste

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Waste volume (m^3)	168	112	179	152	108	127	127	74	44	31,9
evolution %	**0**	-33	60	-15	-29	18	0	-42	-41	-28
Activity (TBq)	5	2	13	2	10	9	5	7	2	0
evolution %	0	-60	550	-85	400	-10	-44	40	-71	-88

In addition to the usual handling of nuclear waste, non-contaminated waste from the controlled area can be cleared acc. to §33 and §35 StrlSchV (new version since 2019) respectively acc. to § 29 StrlSchV (old version until 2019) by respective measuring for unrestricted disposal. This waste is registered under "normal waste" (chapter F6.1).

Waste water coming from the Hot Cells and the decontamination processes in wing B (so called Chemie-III-Abwasser) is collected separately and disposed by KTE as radioactive waste. The amounts of nuclear waste water since 2011 are shown in table F13b. Due to construction works at the collection facility in wing B, no Chemie-III-Abwasser was disposed in 2020.

Table F13b: Nuclear waste water

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Chemie-III-Abwasser (m^3)	3	6	9	10	6	3	3	3	3	0
evolution %		100	50	11	-40	-50	0	0	0	n.a.

F7 Protecting biodiversity

The total area of the site is about 234 000 m^2. The part occupied by impermeable surfaces including buildings, parking lots, paved roads and paths, etc. is approximately 72 000 m^2; equivalent to 233 m^2 for each staff member in 2020. The built surface area between 2012 and 2015 was about 68 000 m^2. In 2015 it increased by around 3 500 m^2 due to the new buildings already mentioned as well as new walkways, driveways, parking lots and container positions in the vicinity of these buildings. In 2018 it increased again by about 500 m^2 due to the construction of the new laboratory wing which was necessary because of regulatory requirements. The "natural" proportion of the site decreased accordingly and covers now approximately 162 000 m^2 or 69% of the total surface area. A large part of this area is natural forested area like the surrounding forests providing a natural habitat for different species (cf. figure F18). The respective development is shown in table F14.

Figure F18: Aerial view of the site including "natural" parts

Table F14: Biodiversity

	2015	2016	2017	2018	2019	2020
Total area (m^2)	234 000	234 000	234 000	234 000	234 000	234 000
Sealed area (m^2)	68 000	71 500	71 500	72 000	72 000	72 000
Nature-oriented area on site (m^2)	166 000	162 500	162 500	162 000	162 000	162 000
Sealed area per person (m^2)	211	221	222	227	229	233

There is no total nature-oriented area off site. There was no related target for 2020 and there is also no related target for 2021.

Imminent effects of the site on the local environment can be considered as mostly insignificant, restricted to the effect of impermeable surfaces represented by the buildings and paved areas. Karlsruhe has no significant air emissions apart from the air from the ventilation systems which is constantly monitored for radioactive contamination.

Although the site is situated close to an aquifer there is also no significant influence because the installation is a completely closed system with no possible discharge to groundwater (other than rainwater draining from the roofs). The impact on the surrounding biota is also negligible as the site occupies a small area in comparison to the surrounding landscape (comprising mostly forests) and there are virtually no impacts on the neighbourhood (neither air, water or noise). JRC-Karlsruhe ensures that during site developments, environmental considerations are taken into account. Consequently there were no specific targets in 2020 and there are also no specific **targets for 2021**.

F8 Green Public Procurement

F8.1 Incorporating GPP into procurement contracts

Karlsruhe aims to incorporate GPP into contracts exceeding 60 000 EUR and has increased the number of contracts incorporating "green" criteria in the last few years. During the procurement process the applicability of GPP criteria is defined by the procurement software "PPMT" (see below). In 2020, 27% of contracts exceeding 60 000 EUR included such criteria. Out of these, 27% could be classified as "green", the remaining 73% as "light green" (using the classification recommended by the Court of Auditors). Hence, the 2020 target of incorporating GPP criteria in more than 3% of contracts, was reached. The 2021 target is to again exceed 3%.

The JRC uses a tool integrated into the procurement management software (PPMT), which makes the units preparing contracts aware of the potential (and obligation) of applying GPP standards, including links to DG Environment and EU Green Public Procurement criteria and also requiring the approval of the Environmental Coordinator for certain types of orders/contracts (included in the system).

F8.2 Office supply contracts

Most office supplies are provided through framework contracts arising from the Commission's (OIB) call for tenders. The Commission applies "green" criteria to select suitable contractors and products. Examples of the Commission's current framework contracts used by ITU are those for office supplies, office furniture or the supply of PCs and peripherals (through DG-DIGIT's contracts). There is no specific management approved action to support further improvement.

F9 Demonstrating legal compliance and emergency preparedness

F9.1 Management of the legal register

Karlsruhe is a nuclear installation under German legislation and as such is bound by a tight regulatory framework under the Atomic Energy Act (Atomgesetz, last updated in July 2018), the Radiation Protection Act (Strahlenschutzgesetz, last updated in December 2019) and the respective Radiation Protection Ordinance (Strahlenschutzverordnung, complete new version since December 2018). The former Ordinance for X-Ray Devices (Röntgenverordnung) was integrated in the new Radiation Protection Act. The nuclear licences and amendments governing Karlsruhe's operation include:

1. Genehmigung/licence Nr. K/30/65 [07/65]

2. Genehmigung/licence K/46/66 - LU/101/66 [10/66]
3. Nachtrag 1 zur Genehmigung/amendment 1 to licence Nr. K/30/65 [09/66]
4. Nachtrag 1 zur Genehmigung/amendment 1 to licence Nr. K/46/66 - LU/101/66 [10/66]
5. Nachtrag 2 zur Genehmigung/amendment 2 to licence Nr. K/30/65 - LU/95/66 [10/67]
6. Nachtrag 3 zur Genehmigung//amendment 3 to licence Nr. K/30/65 - LU/95/66 [11/71]
7. Nachtrag 4 zur Genehmigung/amendment 4 to licence Nr. K/30/65 - LU/95/66 [07/74]
8. Nachtrag 5 zur Genehmigung/amendment 5 to licence Nr. K/30/65 - LU/95/66 [08/77]
9. Nachtrag 6 zur Genehmigung/amendment 6 to licence Nr. K/30/65- LU/95/66 [06/81]
10. Nachtrag 7 zur Genehmigung//amendment 7 to licence Nr. K/30/65 - LU/95/66 [04/82]
11. Nachtrag 8 zur Genehmigung/amendment 8 to licence Nr. K/30/65 - LU/95/66 [07/82]
12. Änderungsgenehmigung zum Nachtrag 8/licence for modification to amendment 8 [09/84]
13. Genehmigung/licence S1/97 [10/97]
14. Änderungsgenehmigung nach § 9 AtG (Flügel M)/ licence for modification acc. to § 9 AtG (wing M) Nr. K/132/2012 [03/12]

Another aspect of Karlsruhe's status as nuclear installation according to German legislation is the fact, that for safety or security relevant technical installation only reliable and time-tested components may be used (§9, para 2, nr. 3 AtG). More detailed subordinated regulations also require a time period of ten years for "new" equipment.

Other applicable regulations are listed and assessed in the Legal Register IMS-KRU-S6.5-RGS-0007-DE which was created in cooperation with an external company, which also provide an update twice a year, most recently in January 2021.

Karlsruhe operates under the close scrutiny and constant surveillance of the Competent Supervisory Authority which is the Ministry of Environment of Baden-Württemberg (cf. also F9.2). There have been no legal proceedings against Karlsruhe and consequently neither penalties nor fines since operations started. In order to assess legal compliance, Karlsruhe commissioned an external company to undertake legal compliance audits annually. The latest took place in December 2020. As usual there were no deviations. Due to this and also due to the constant surveillance by the authorities, JRC-Karlsruhe is compliant to all relevant legislations.

F9.2 Prevention, risk management and emergency preparedness

As an installation subject to German nuclear legislation the whole site and its activities are conceived and operated with a focus on prevention, risk management and emergency preparedness. The applicable legislation requires these topics explicitly. Procedures are based on and tailored to this legislation. Significant procedures have to be approved by the supervising authority (Ministry of Environment of Baden-Württemberg) before becoming effective. The supervisor undertakes inspection visits regularly at least monthly which could be mostly kept even under the pandemic restrictions.

Some practical examples demonstrating the rigour with which legal compliance and emergency preparedness are addressed include:

- all safety and security relevant equipment and installations are subject to stringent recurring check programs which are also under the supervision of the commissioned experts of the supervising authority;
- the site operates its own semi-professional firefighting team and cooperates with the professional fire brigade of the surrounding research site (KIT);
- there are regular firefighting and evacuation exercises partially in cooperation with the fire brigade of the KIT. Unfortunately, most of these had to be cancelled due to the Covid-19 pandemic situation in 2020;
- most technical works are subject to a working permit procedure;
- the admission to the site is strictly limited.

F10 Communication

F10.1 Internal communication

Internal communication may involve Commission staff and contractors. Details of the site level actions are described in the individual (action) Fact Sheets. Due to lack of staff, internal communication on site level had to be reduced to almost zero since January 2019.

A summary of the actions is included below:

Table F15: Internal communication actions at the JRC-Karlsruhe

Action description	**Organisation**	**Dates in 2020**	**Participants** (numbers when applicable)
Corporate Actions performed at site level			
The award ceremony of the first corporate competition on sustainable conferences and events	HR.D.02 & DG SCIC	8/10	200 (EC)
The Volunteer for a Green Change initiative	HR.D.02 & CSR team	20-22/10	300 (EC)
The Less Waste, More Action - Waste Reduction campaign	HR.D.02	November-December	-
Inter-institutional GPP Helpdesk's event on Public Buildings' Design, Construction and Maintenance	EP	8/12	100 (EC)

Action description	**Organisation**	**Dates in 2020**	**Participation at Karlsruhe site level**	**Participants** (numbers when applicable)
Local Actions at Karlsruhe site				
Continuous awareness via slides on info-screens on the EMAS ("EMAS internal communication -info screens")	Karlsruhe site (partially based on centrally provided slides)	2020	Awareness	Internal and external staff
Dialogue with internal stakeholders	Karlsruhe site	2020	Possibility for staff to pose questions received to be answered via the JRC-Karlsruhe Connected page	Internal staff (0 questions)

F10.2 External communication

Karlsruhe holds licences under German Atomic Law and the Radiation Protection Ordinance as described in Section F9.1. These cover all operations and plant components and therefore all modifications must be approved by the competent supervisory authority, the Ministry of Environment of Baden-Württemberg.

Karlsruhe and the supervisory authority are responsible for compliance with the licences and the latter therefore regularly monitors Karlsruhe's nuclear area. Karlsruhe and the Ministry of Environment share objectives for the safety and security of Karlsruhe's nuclear area. In this context Karlsruhe and the competent authority enjoy a close collaboration based on regular meetings, solving problems and verification exercises. This could be continued despite the boundary conditions due to the Covid-19 pandemic situation. Most of the regular meetings could take place as planned.

External dialogue usually also involves, in addition to local communities and stakeholders, international stakeholders through activities such as site visits and information campaigns. Due to the Covid-19 pandemic situation there were no respective actions at all in 2020.

Also the European Nuclear Security Training Centre (EUSECTRA) at Karlsruhe site had to cancel almost all planned training courses in 2020 except a few (cf. table F16).

Table F16: EUSECTRA training courses at JRC-Karlsruhe

Event Title: Description	Date	Participants' profile	Country(ies)/Region	Possible Collaboration/ Coordination
Radiological Crime Scene Management (RCSM) training for EU law enforcement	Jan. 2020	Experts	EU	
Radiological Crime Scene Management (RCSM) training for EU law enforcement	Mar. 2020	Experts	EU	
Reachback training for German Radiation Protection Office (BfS); online training	Nov. 2020	Experts	EU	

F11 Training

F11.1 Internal training

Internal training partially includes also includes external staff working on the premises. Most trainings were cancelled due to the Covid-19 pandemic situation; only the legally absolutely necessary ones were given (cf. table F17).

Table F17: Internal trainings at the JRC-Karlsruhe

Description	Organisation	Dates in 2019	Participation at Karlsruhe site level	Participants (estimated)
Local Actions at Karlsruhe site				
Newcomer training for hazardous substances and lab work	Karlsruhe site	Whole year	Newcomers working in the laboratories	2 (internal staff)
Annual radiation protection and safety instructions	Karlsruhe site	Nov-Dec	Health, Safety, Environment	all internal and external staff

F11.2 External training

N.a.

F12 EMAS Costs and saving

Table F18: EMAS administration and energy costs for buildings in the EMAS area

	Costs:									Change in last year
	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Total Direct EMAS Cost (EUR)	0	81 000	71 000	72 000	72 000	74 000	79 000	80 000	81 000	1000
Total Direct Cost per employee	0	266	222	322	324	322	317	315	309	- 6
Total buildings energy cost (Eur)	1 669 420	1 824 280	1 667 240	1 839 040	1 769 470	1 779 927	1 865 560	1 940 840	1 646 320	- 294 520
Total buildings energy cost (Eur/person)	5 583	5 981	5 210	5 711	5 461	5 528	5 885	6 161	5 328	- 834
Total water costs (Eur)	10 550	12 239	14 806	14 777	13 717	13 211	13 328	10 549	8 353	- 2196
Water (Eur/person)	35	40	46	46	42	41	42	33	27	- 6
Total paper cost (Eur)	7 080	5 664	7 080	5 664	5 664	4 248	4 248	2 473		- 2 473
Total paper cost (Eur/person)	24	19	22	18	17	13	13	8	0	- 8

The direct EMAS costs were calculated using the average costs for an official as determined by DG BUDG in relation to the estimated time used for EMAS (full time equivalent – FTE) in combination with external costs (e.g. consultants). The consumption costs were calculated using the consumption values and the prices for the relevant units (e.g. MWh for energy).

F13 Conversion factors:

Parameter and unit	2012	2013	2014	2015	2016	2017	2018	2019	2020
kWh of energy provided by one litre diesel (1)	10.89	10.89	10.89	10.89	10.89	10.89	10.89	10.62	10.58
kWh of energy provided by one litre petrol (2)	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.46
Paper Density (g/m^2)	80	80	80	80	80	80	80	70	70
Kgs CO_2 from 1 kWh of electricity (3)	0.317	0.338	0.315	0.289	0.281	0.346	0.313	0.265	0.24
Kgs CO_2 from 1 kWh district heating (5)	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.266	0.266
Kgs CO_2 from 1 kWh diesel (4)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.205	0.205
Kgs CO_2 from one litre of diesel (6)			2.5	2.5	2.5	2.5	2.5	2.5	2.5
Kgs CO_2 from one litre of petrol (7)			2.28	2.28	2.28	2.28	2.28	2.28	2.28
Annual cost of one FTE (EUR) (8)	132 000	132 000	132 000	134 000	134 000	138 000	148 000	150 000	152 000

Data sources

(1) www.carbontrust.com

(2) www.carbontrust.com

(3) EN BW (2010 – 2016); KIT/Stadtwerke Karlsruhe (since 2017)

(4) www.carbontrust.com (2011-2013); Base Carbone, ADEME, 2017, including upstream emissions (2014-2017)

(5) Umweltbundesamt

(6) Base Carbone, ADEME, 2017, including upstream emissions (2014-2017)

(7) Base Carbone, ADEME, 2017, including upstream emissions (2014-2017)

(8) DG BUDG circular of the financial unit network (RUF) with average administrator staff cost for the upcoming year

European Commission

Environmental Statement 2021

2020 results

Annex G: JRC-ISPRA

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Cover illustration: New building 102 during covid-19 period

European Commission

EMAS
Verified environmental management
REG.NO. BE-BXL-000003

Environmental Statement 2021

2020 results

Annex G: JRC-ISPRA

FOREWORD

The European Commission (EC) site in Ispra is the host of many research activities conducted by the Joint Research Centre (JRC) in the fields of Sustainable Resources and Transport, Space, Security, Migration, Health and Consumer Protection, Energy Efficiency and Climate Change, Nuclear Security as well as selected aspects of Growth & Innovation.

The 160 ha site is located on the Eastern shore of Lago Maggiore and has a relevant woodland coverage. We have a long-standing commitment to reducing our environmental footprint, which is vital for our staff, the neighbouring communities and the wider region.

EMAS is the most rigorous environmental management system available. It is regarded as the premium standard for environmental excellence. Since early 2012, we committed to the EMAS scheme, building on and extending the ISO 14001 certified management system. Our environmental policy aims to make sure that sites operate in such a way that all activities, which have an environmental impact, are planned and executed in order to minimise damage to the environment, prevent pollution and improve environmental performance.

EMAS has helped us focus on the environmental aspects of our processes and services, and this guiding principle has been fully integrated into the task of site management services, be they construction, refurbishments or decommissioning and demolition of our building stock, purchase of supplies, energy and waste management, mobility and transport. They integrate eco-friendly work processes, methods and materials whenever possible.

Using the “Ispra Site Development Plan” we are applying a new strategy for the development of the site from now until 2030. Our vision is to develop into the European reference point for a modern and open research facility that is managed in the most sustainable and efficient way, whilst being a stimulating, pleasant, safe and secure working environment for over 2000 people, daily. This caring approach goes in the same direction as the great new challenge ahead, namely implementing the Commission’s commitment to sustainable growth and fighting climate change, at the Ispra site.

We are therefore planning to cut drastically our carbon footprint by maximising the use of renewable energy, enhancing the energy efficiency of our buildings and commuting more sustainably and seeing how this can be done in the covid-19 era. In 2020, for instance, the spread of the pandemic impacted strongly on our energy consumption, e.g. by ventilating buildings 24h / 7 days.

This said, the EMAS results for the Ispra site during 2020 went generally beyond the targets set in 2014, particularly due to the excellent work done to reduce our impact on the environment done in recent years.

In 2020, activities began for the definition of the “Greening the Commission” strategy with the aim of achieving carbon neutrality by 2030. This will be the way that the Commission intends to implement the European Green Deal internally and thereby lead by example. In 2021, we will be defining the actions to achieve this goal. Our ambitious targets will be supported by our environmental core indicators, which facilitate multi-annual comparability within and between organisations. In all this, transparent communication of our performance to authorities and the general public is key.

Rien Stroosnijder
Site Manager

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ANNEX G: JRC-Ispra site

In 1957 the Euratom Treaty, signed in Rome by six European founding Members (Belgium, France, Germany, Italy, Luxembourg and the Netherlands), created the European Atomic Energy Community (EURATOM). Since its creation EURATOM has supported the establishment and growth of safe nuclear power related industries contributing to the peace, health and prosperity of European citizens. To support this mission, Article 8 of the Treaty established a Joint Research Centre (JRC) with sites located (initially) in four Member States to perform top level research and disseminate findings for policymaking and to set uniform safe standards. Ispra was selected as the Italian site.

The activities of what has become the JRC-Ispra site began in 1958 with the construction of the Ispra 1 nuclear reactor by the Italian "Comitato Nazionale per l'Energia Nucleare" (CNEN). Subsequently, under the agreement between the Italian government and the European Atomic Energy Community (Euratom), the Ispra site came under the jurisdiction of the European Community, with an act ratified on 1st August 1960 (Italian Law 906). Initially the site was dedicated to nuclear research. At the beginning of 1990s, however, it was decided to focus on new areas of research, mainly related to environment and sustainability, health and consumer protection and protection and security of the citizen. Currently most of the nuclear facilities located within the site are in the process of pre-decommissioning (see Chapter G2.1b).

The Ispra site hosts a large variety of scientific, technical and support services, with all the Directorates of the JRC being at least represented physically on the site. Please consult the JRC's organigramme for more details, at: https://ec.europa.eu/jrc/en/about/organisation.

The site's portfolio of activities breaks down as follows:

- Focal points of non-nuclear research: Sustainable Resources and Transport, Space, Security, Migration, Health and Consumer Protection, Energy Efficiency and Climate Change, as well as selected aspects of Growth & Innovation.
- Nuclear activities including Nuclear Security and the Decommissioning of the existing historical nuclear facilities.
- Horizontal research activities in support of Knowledge Management and Competence Building.
- Site management support services covering Site Development, Maintenance, Logistics as well as Safety at Work, Security and Environmental Protection.
- Resources Management including finance, procurement, HR, IT, etc.
- Non-JRC Commission services such as the Medical Service (DG HR), the Paymaster's Office (PMO) and the management of the Social Infrastructure through the Office for infrastructure Brussels (OIB).

The average daily presence of staff and intramuros contractors at the JRC-Ispra site on regular years is about 2 400 people. Under normal conditions, the site hosts over 40 000 visitors yearly.

G1 Overview of core indicators at Ispra

Reporting and the covid-19 pandemic:

Reporting for 2020 retains the same approach for continuity, as previous years, and is therefore based on site activity and total staff numbers. The data will therefore reflect the impact of a very significant staff absence on facilities operation.

The EMAS corporate coordination team has made 'high level' estimates of home consumption, due to telework under covid-19, as described separately in the corporate summary. The potential to systematically include the impact of teleworking in annual reporting will be explored as more site-specific information becomes available.

JRC-Ispra has been reporting on EMAS parameters since 2014 with data mostly stretching back at least to 2011. The variation of the core Key Performance Indicators (KPIs), including performance trends and targets, is shown below.

Table G. 1 – Historical data, performance and targets for core indicators proposed for Commission level reporting

Physical indicators:	**Historic data values**					**Performance trend (%) since:**		**Target**		**Future targets**	
(Number, desciption and unit)	2011 (1)	**2014**	2018	2019	2020	2011	2014	2014-20		2014-23	2014-30
								Δ % (2)	value (2)	Δ % (3)	Δ % (3)
1a) Energy bldgs (MWh/p)	53,22	**44,32**	43,39	41,92	36,73	**– 31,0**	**– 17,1**	– 5,6	41,84	– 10,0	– 16,0
1a) Energy bldgs (KWh/m²)	502	**404**	379	378	342	**– 31,7**	**– 15,3**	– 5,6	381,7	– 10,0	– 16,0
1c) Non ren. energy use (bldgs) %	93,1	**95,5**	89,4	91,4	87,7	**– 5,8**	**– 8,2**	– 5,0	90,7	– 14,0	– 30,0
1d) Water (m^3/p)	234	**125**	163	112	95	**– 59,3**	**– 23,9**	– 5,0	119	– 11,0	– 13,0
1d) Water (L/m²)	2 209	**1 144**	1 426	1 011	889	**– 59,7**	**– 22,3**	– 5,0	1 086	– 11,0	– 13,0
1e) Office paper (Tonnes/p)	0,02	**0,017**	0,012	0,010	0,004	**– 82,8**	**– 76,8**	– 20,0	0,016	– 55,0	– 65,0
1e) Office paper (Sheets/p/day)	22	**16,5**	12,2	11,0	4,4	**– 80,4**	**– 73,5**	– 20,0	15,1	– 55,0	– 65,0
2a) CO_2 buildings (Tonnes/p)	12,39	**10,27**	9,68	9,40	7,86	**– 36,5**	**– 23,4**	– 5,6	9,695	– 23,0	– 41,0
2a) CO_2 buildings (kg/m²)	117	**93,7**	84,5	84,8	73,3	**– 37,2**	**– 21,7**	– 5,6	88,5	– 23,0	– 41,0
2c) CO_2 vehicles (g/km, manu.)		**185,5**	111,2	109,1	104,2		**– 43,9**	– 5,1	176,1	– 50,0	– 97,0
2c) CO_2 vehicles (g/km, actual)	346	**343,4**	280,7	270,8	181,2	**– 48**	**– 47,2**	– 5,1	325,9		
3a) Non haz. waste (Tonnes/p)	0,474	**0,491**	0,546	0,508	0,218	**– 54,1**	**– 55,7**	NA	NA	– 2,0	– 5,0
3b) Hazardous waste (Tonnes/p) (4)	0,057	**0,021**	0,021	0,019	0,010	– 82,5	– 53,3				
3c) Unseparated waste (%)	28,7	**18,5**	14,2	13,3	17,7	**– 38,2**	**– 4,1**	– 2,0	18,1	– 2,0	– 5,0
3c) Unseparated waste (T/p)	0,0	**0,1**	0,1	0,1	0,04		**– 57,4**	0,0	– 2,0	– 2,0	– 5,0
Economic indicators (Eur/p) (4)											
Energy consumption (bldgs)			1 499	1 089	861		– 51,5				
Water consumption		**28**	20	13	14		– 48,1				
Non haz. waste disposal	120	**115**	119	113	86	– 28	– 24,6				

Note: (1) Earliest reported data; (2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018); (3) Draft figures from the Global Anual Action Plan 2021; (4) 2014-20 indicator discontinued
NA: Not applicable

All 2020 targets for JRC-Ispra's core KPIs, having 2014 as baseline reference were met. A detailed analysis of the relative causes of these indicators is described in the dedicated chapters.

The 2018 midterm review led to the raising of several core indicators, particularly where the 2020 objective had already been reached. For instance, the paper consumption target was further raised (-9% to -20%). However, the actions put in place achieved considerable results for the KPIs, exceeding even the new target and reaching as much as -76,8% in 2020.

Another achievement that shall continue in time is, as of October 2018, the energy supplied from the grid is 100% renewable.

To be noted that the JRC-Ispra EMAS baseline parameters, such as population or useful surface area for buildings, may vary on a yearly basis and may therefore indirectly affect some EMAS core indicators.

Table G.2 - EMAS baseline parameters

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population: total staff (internal and external)	2 087	2 110	2 223	2 337	2 296	2 258	2 277	2 285	2 332	2 411
Total no. operational buildings	422	423	421	419	409	410	402	402	384	376
Useful surface area for all buildings, (m^2)	221 444	222 148	223 077	256 077	253 428	254 356	259 828	261 713	258 539	258 546

The JRC-Ispra population has a fluctuating trend which is not always predictable. In 2017, to standardise data with the rest of the EC EMAS family, the actual staff calculation method was changed, accounting only for the site's internal staff and external staff having a desk-office position. Clearly, this new calculation methodology has been applied to all previous years, as well. It has influenced negatively the core indicators as they have staff numbers as the denominator.

The site's usable surface area in 2020 is almost the same as in 2019.

G2 Description of JRC-Ispra activities[1], context and key stakeholders

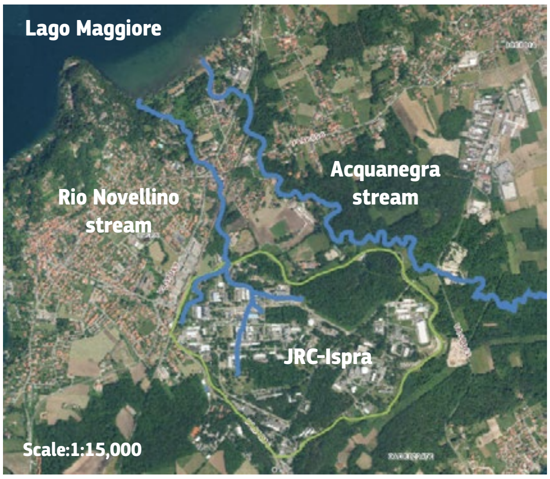
G2.1 Site setting and activities

Figure G. 1 - Geographical overview of JRC-Ispra site (source Google Maps)

The Ispra site occupies about 160 hectares, and is located about 70 km Northwest of Milan, in Italy, as shown in Figure G1. The site is in a hilly area between Lakes Maggiore and Varese, at an altitude of approximately 230 m above sea level. The site contains several ponds and many hectares of groves comprising mainly pines, birches, oaks, acacias and chestnut trees.

[1] Corporate NACE codes associated with the JRC-Ispra site activities are: 99.00 - Activities of extraterratorial organisations and bodies; 71.2 – Technical testing and analysis; 72.1 - Research and experimental development in natural sciences and engineering; 35.11 - Production of electricity; 35.30 - Steam and air conditioning supply; 36.00 - Water collection, treatment and supply; 37.00 – Sewerage.

Figure G.2 - Location of Rio Novellino and Acquanegra Stream (source Regione Lombardia – Geographic Viewer)

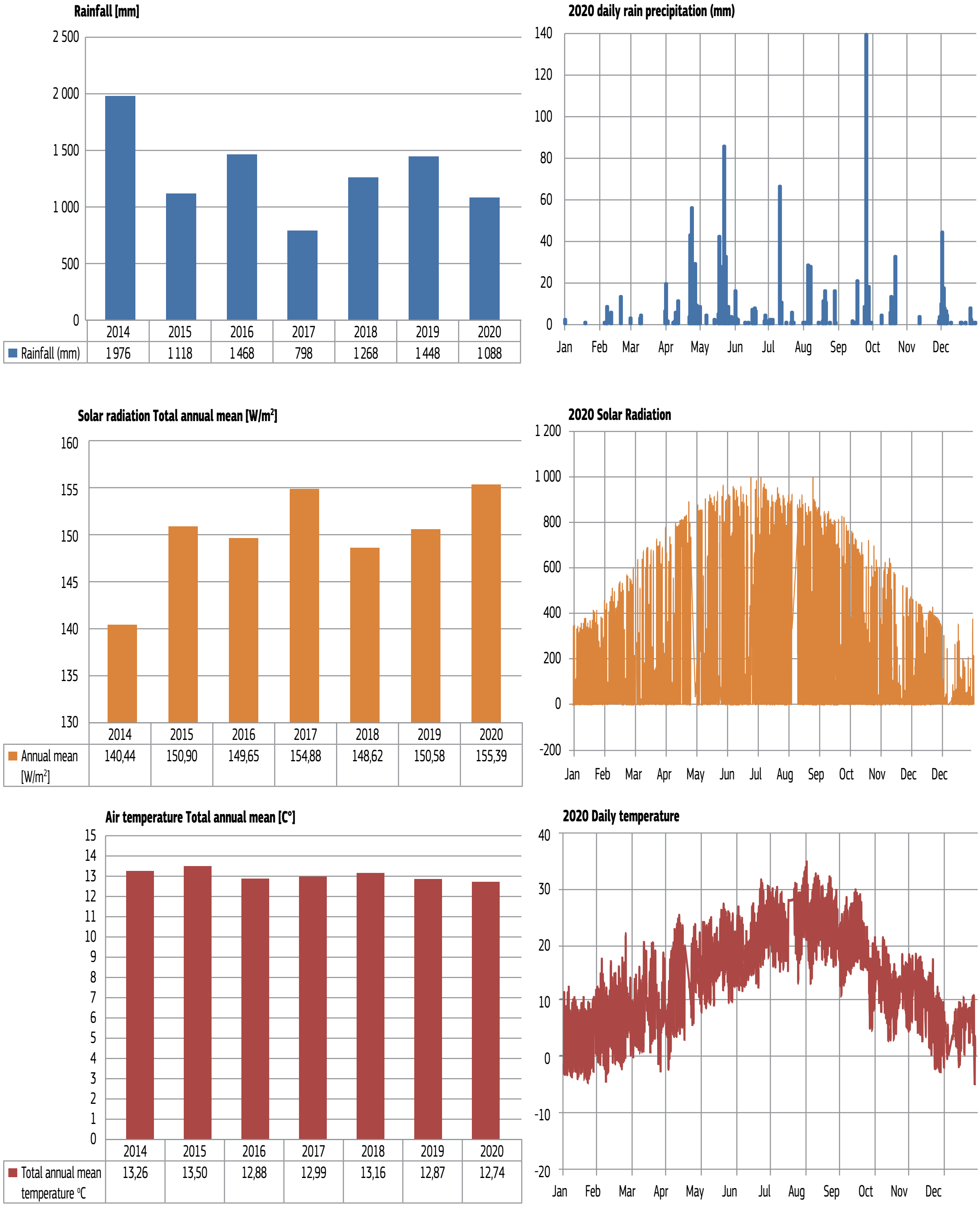


The main surface watercourses that flow close to the site are the Rio Novellino, a stream originated within the site and flows mainly NW bound, and the Acquanegra stream which flows alongside the North-Eastern boundary. Both streams discharge into "Lake Maggiore".

The meteorological conditions of the site are extremely variable and the weather can change rapidly. The coldest months are typically December and January, while during summer average temperatures exceed 20°C. The average rainfall in the area is about 1 300 mm over the reference period. Figure G.3 shows the annual trend of the main meteorological data[2].

[2] Source: Atmosphere – Biosphere – Climate Integrated monitoring Station : http://abc-is.jrc.ec.europa.eu/

Figure G.3 - Main meteorological data at JRC-Ispra (rainfall, solar radiation and air temperature)



	2014	2015	2016	2017	2018	2019	2020
Rainfall (mm)	1 976	1 118	1 468	798	1 268	1 448	1 088

	2014	2015	2016	2017	2018	2019	2020
Annual mean [W/m²]	140,44	150,90	149,65	154,88	148,62	150,58	155,39

	2014	2015	2016	2017	2018	2019	2020
Total annual mean temperature °C	13,26	13,50	12,88	12,99	13,16	12,87	12,74

The humidity registered in the JRC site is generally high due to the presence of two large lakes nearby. The site is generally well protected from the winds; analysis of the multi-year wind rose indicates that the dominant wind direction is southbound, and it is in this direction that higher speeds can be registered.

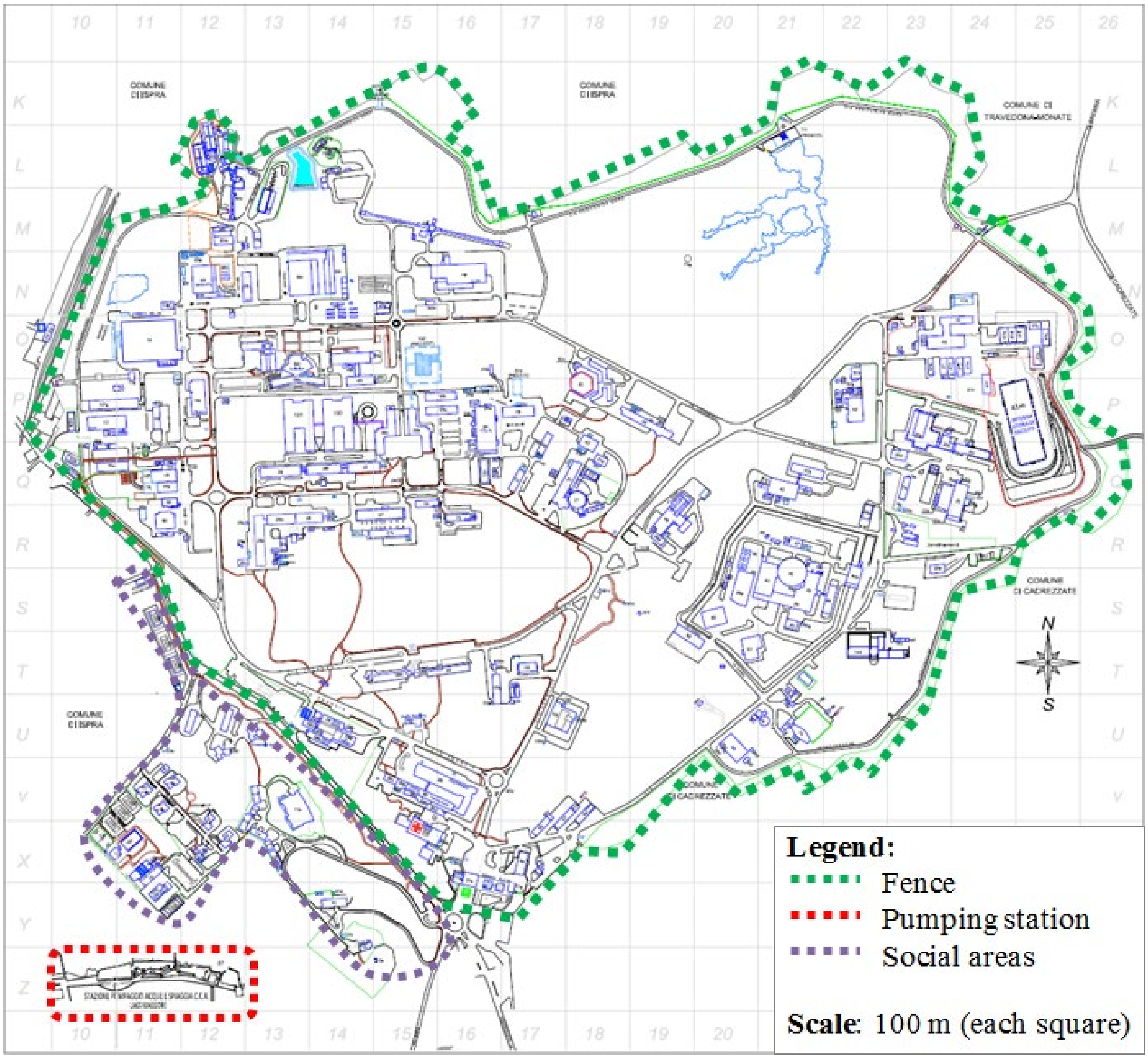
Core based activities and utility plants of the Ispra site are located inside the fence, as shown in Figure G.4. Some facilities are outside the fence, such as the water pumping station located on the Lake Maggiore shore, about 3 km from the Ispra site, and the social areas (the JRC apartments and guest quarters; about sixty flats and twenty lodgings; the Club House; childcare and sports facilities; building 51 that currently is subject to relocation of activities). All these premises are within the EMAS scope.

The following activities, even if hosted on the Ispra site, are excluded from the EMAS scope:

- the nuclear reactor named 'Ispra-1';
- the Italian Fire Brigade station;
- the Carabinieri offices;
- the Italian Post office;
- the travel agency;
- the bank office;
- the ENEA building (a subsidiary site of the Italian National agency for new technologies, Energy and sustainable economic development).

Within the boundaries of the site there are 376 so-called buildings, out of which approximately 140 are technical buildings (gas cylinder cabinets, transformer cabinets, etc.) and only 80 are permanently occupied by staff. There are some new buildings, but most of the structures are more than twenty years old. About 60% of the buildings are from the 1960s, 15% from the 1980s and about 20% from the 1990s. Only a few buildings have been built more recently creating a high density zone, in which scientific activities are concentrated. In particular, two new energy efficient buildings (buildings 100 and 101), hosting about 250 staff each, and the related heat recovery pumps have notably improved the overall energy efficiency of Ispra infrastructure. This shall further improve when building 102, a Nearly Zero Energy Building (NZEB), shall be occupied (foreseen in 2021) and subsequent building demolition shall be accomplished. The JRC-Ispra site map can be seen in Figure G.4.

Figure G. 4 – The JRC-Ispra site map



G2.1.1 JRC-Ispra utility plants and infrastructure

The Site Management Ispra, Department R.I, is responsible for providing an appropriate site service level by means of the following utility plants:

Table G.3 - JRC-Ispra utility plants

Utility plant	Function	Operation period
Tri-generation plant supplied with methane	Electricity, hot water and cold water production	From 2004
Wastewater treatment plant	Wastewater treatment before discharge in the Lake Maggiore	From 1978
Pumping station	Water supply from the Lake Maggiore	From 1960s
Filtering station	Water disinfection and distribution through the site network	From 1960s
Sewage network	Collection of wastewater from buildings to wastewater treatment plant	From 1960s
Electrical energy transformer station (Bld. 14)	Reduction of the electric voltage and distribution through the site network	From 1960s
Electrical energy transformer cabins	Reduction of the electric voltage and distribution through the buildings	From 1960s
Petrol station	Supply of fuel for internal fleet and other utilities	From 1960s and totally refurbished in 2012
Technical tunnels	Distribution of all utilities needed for the ordinary operation of the JRC-Ispra site (e.g. electric cables, hot and cold water pipes, drinking and cooling water pipeline, optical cables).	From 1960s
Heat recovery pump station	To produce heat and cold energy for the new buildings (100-101).	From 2015
Renewable energy plants	To produce electricity and heat from renewable sources (solar photovoltaic and thermal plants)	From 2015
Lamination basin	To reduce the flow of meteoric water to the Novellino stream and increase the sedimentation process.	From 2016

G2.1.2 Nuclear installations

Activities for the development of a nuclear research centre in Ispra started in 1958. In 1959 the first reactor (Ispra-1) became operational. Over the years, further research installations and labs were built including the second nuclear reactor ESSOR ("ESSais ORgel[3]"), and ECO ("Esperienza Critica Orgel") the third research reactor which has already been dismantled. The nuclear installations occupy about 18 ha which are double fenced and have restricted access within the JRC-Ispra site. This area is largely covered by woods and only the chimneys of ESSOR (80 m height) and Ispra-1 (40 m height) are visible from the site borders. A small part of the buildings of SGRR is visible only in winter, when trees are stripped bare. On September 26th 2019, the nuclear plant Ispra-1 was signed over to Sogin, the Italian state company appointed to dismantle this facility.

The facilities still operating are:

- ADECO – "Atelier Démantèlement Eléments COmbustibles", Laboratory for the dismantling of nuclear fuel elements. ADECO includes TSA[4] (Transit Safe Area), a hot cell specifically modified for the containment of irradiated nuclear fuel.
- PERLA – PERformance LAboratory.
- PUNITA - PUlsed Neutron Interrogation Test Assembly.
- SGRR – "Stazione di Gestione dei Rifiuti Radioattivi", Radioactive Waste Management Plant. This facility includes the Dry well area, the storage of historic nuclear waste.

Currently the long term shutdown[5] nuclear installations are:

3 ORGanique-Eau Lourde

4 License obtained from the Italian Government (D.M. MiSE 20.11.2020).

5 Shutdown: an interruption of nuclear activity. Therefore, this does not necessarily imply that nuclear facilities have been decommissioned.

- Cyclotron: a type of particles accelerator in which charged particles are accelerated by an alternating electric field between two large electrodes in a constant magnetic field created by two large magnets. Shutdown was carried out in 2014.
- ECO-FARO: the research reactor in the past was converted in FARO (Fuel Assemblies melting and Release Oven). The dismantling of FARO facility was completed in May 2014.
- LCSR – "Laboratorio Caldo Studi e Ricerche", Hot cells facility: a laboratory progressively shutdown in the 90's.
- STRRL – "Stazione di Trattamento dei Rifiuti Radioattivi Liquidi", Radioactive liquid effluent treatment facility: shut down after 40 years of operation and replaced by the new "Stazione di Trattamento degli Effluenti Liquidi", Liquid effluent treatment plant facility (STEL).

An example of complete decommissioning is the RadioCHemistry Laboratory –RCHL. This lab has been progressively shutdown in 1990s. The RCHL decommissioning programme was completed in 2010 (green field status) and the building is currently being used as the JRC Visitors' Centre.

The nuclear activities at the JRC-Ispra impact the environment in essentially three ways:

1. Radioactive emissions during the operating and the future decommissioning activities phase (see Chapter G5.4 on Radioactive emissions);
2. The management of old radioactive waste and the generation of radioactive decommissioning waste (see Chapter G6.5 on Radioactive Waste Management System);
3. Indirect use of conventional industrial resources (i.e. not due to the nuclear nature of the operations).

G2.1.3 The Decommissioning programme

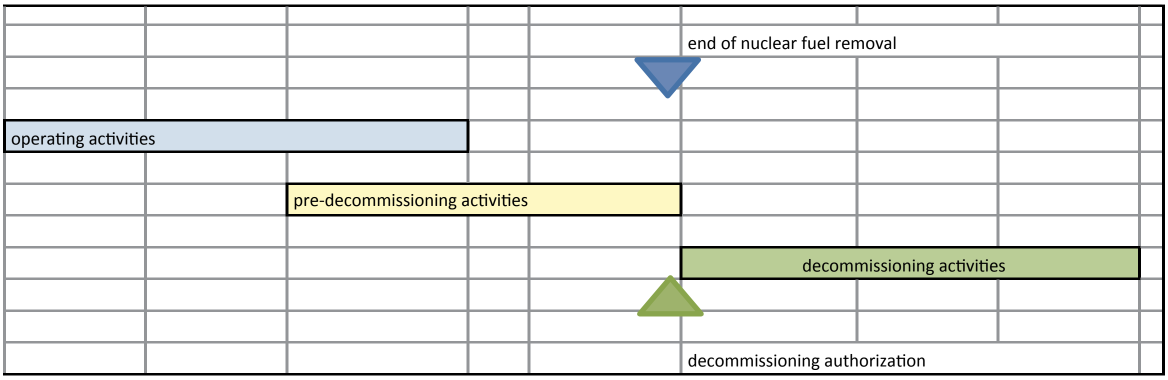
The site's nuclear plants and most of nuclear research installations are currently either undergoing or in preparation for decommissioning[6] which has the ambitious goal of restoring the site to its original condition (also called "green field" status) by 2038. The programme includes the following steps:

1. removal of nuclear materials;
2. dismantling installations and removal of the radioactive waste;
3. reduction of any residual radioactivity and a final radiological survey;
4. re-establishing "green field" status having no radiological constraints.

The decommissioning programme, as well as all the nuclear activities performed on the JRC-Ispra site, are developed and implemented under Italian legislation and inspected by the Italian "Ispettorato nazionale per la Sicurezza Nucleare" (ISIN). The decommissioning programme, to be completed by 2038, has a budget of approximately 750 million Euro. The evaluation of the environmental impacts associated with decommissioning of nuclear plants (both power or research reactors) is subject to **EIA** (Environmental Impact Assessment) process. In September 2015 JRC-Ispra sent a request to the Italian Environmental Ministry (**MATTM**, "Ministero dell'Ambiente, della Tutela del Territorio e del Mare") to start the EIA process. The preliminary and voluntary EIA phase, also called Scoping, defines the steps for the evaluation methodologies and the procedures for the environmental analysis involved in the EIA study. Moreover the scoping process aims at involving local communities and all relevant stakeholders. The stakeholder information is facultative in the scoping phase but strongly suggested in order to give transparency and information of planned project activities, according to EMAS requirements applied at JRC. During 2016 JRC received from MATTM[7] and Regione Lombardia a positive evaluation on the Scoping report and the guidelines for the preparation of the EIA document also called EIS (Environmental Impact Study). The finalisation of the writing of the EIS and its submission to MATTM took place in the first semester of 2020. Later on during 2020, JRC-Ispra received positive feedback by Provincia di Varese (September 2020) and Ministero dei Beni e delle Attività Culturali e del Turismo (November 2020).

[6] Decommissioning: the last major licensed phase of a nuclear installation. It involves taking the installation out of operation while ensuring the health and safety of personnel and the general public and the protection of the environment, and culminates in the termination of the installation license.

[7] http://www.va.minambiente.it/it-IT/Oggetti/Info/1571



Pre-decommissioning is an intermediate stage between the operating and decommissioning phases (see figure on the left).

The main objective of the Ispra site Decommissioning and Waste Management Programme[8] is to decommission the shutdown nuclear facilities and to manage the resulting waste together with the old waste.

SGRR, the Radioactive waste management facility, is the supporting facility for the characterization, treatment, conditioning and storage of radioactive waste coming from decommissioning activities. This facility is located in the designated zone known as “Area 40”. SGRR plant includes:

- STEL (“Stazione Trattamento Effluenti Liquidi”), plant for low and intermediate activity lightly contaminated liquid (aqueous) effluents, 300 m^3/y can be treated by precipitation and ultra-filtration to acceptable levels prior to their authorised discharge off-site. STEL is operative since 2007;
- ISF (“Interim Storage Facility”) has been built in 2013, the 5 500 m^2 building is designed as prescribed by law and to endure threats such as natural calamities and all man-made failures. ISF is surrounded by special green embankment to minimise the visual and environmental impact. This building is designed to safely store low and intermediate level conditioned radioactive waste. The ISF will temporarily host only the JRC-Ispra radioactive waste. The destination of the JRC-Ispra radioactive waste will be the future Italian national repository.

A settlement agreement between European Commission and Italian Government has established that, since 1st January 2018, the decommissioning of Ispra-1 reactor nuclear plant will be carried out under the responsibility of the Italian Government. The radioactive waste produced by the dismantling Ispra-1 will be managed by JRC and will be temporarily stored within the ISF.

Unit JRC-G.III.9 – Nuclear Decommissioning (since January 2021 called Unit J.1-Ispra Operational Nuclear Decommissioning and Waste Management) has signed a Material Transfer Agreement with Radiopharmaceutical Chemistry Unit of Czech Technical University of Prague about the donation, and indeed the re-use, of the Cyclotron lab, an amazing example of circular economy. The first shipment (87 big boxes, 1 600kg total weight) was sent on 21st November 2019; the next shipment (accessories with no radiological constrain), was planned during the 2020 spring. However, due to the covid-19 pandemic, this was re-scheduled to May 2021.

G2.1.4 Research activities

The non-nuclear research activities of the JRC in Ispra are a combination of desktop research and experimental research. The latter encompasses chemical, biological and physical testing and analysis in dedicated laboratories onsite, and includes the following major facilities (non-exhaustive list[9]):

- European Union Reference Laboratory for alternatives to animal testing (EURL ECVAM);
- European Crisis Management Laboratory (ECML);
- European Interoperability Centre for Electric Vehicles and Smart Grids;
- European Laboratory for Structural Assessment (ELSA);
- European Microwave Signature Laboratory (EMSL);

8 For further information please refer to: http://dwm.jrc.ec.europa.eu
9 Further details can be found on the JRC internet, currently on: https://ec.europa.eu/jrc/en/research-facilities

- European Nuclear Security Training Centre (EUSECTRA);
- European Reference Laboratory for Air Pollution (ERLAP);
- European Solar Test Installation (ESTI)
- Greenhouse gas monitoring facilities;
- JRC air pollution observatory;
- Marine Optical Laboratory;
- Nanobiotechnology Laboratory;
- NGS-Bioinformatics infrastructure;
- Vehicle Emissions LAboratory (VELA);
- JRC Makerspace.

G2.1.5 Site Development Plan 2030 (SDP2030)

The SDP2030 is a holistic vision document that comprises all ideas and plans for a modern site, that will continue leading the European Union's research by being smart, sustainable, open, and efficient, as is described hereafter:

- **Smart** – enhance the site appearance as a place to do cutting-edge research ("Smart Site"), by turning it into a Living Lab featuring hands-on advanced technology demonstrators and by innovating the way we live, work and move on the site;
- **Sustainable** – cutting down drastically our carbon footprint by maximising the use of renewable energy, enhancing the energy efficiency of our buildings and commuting more sustainably, thus aiming at lowering the site's global energy demand by at least one quarter by 2030;
- **Open** – turn the site into a more open, welcoming and collaborative space for many, adapting our infrastructure to foster inspiration and sharing, while keeping the site safe and secure;
- **Efficient** – lean and modernise the site's support services.

Throughout the SDP2030, one can read our vision for modern near-zero energy buildings that will host our research facilities and staff, a modern energy tri-generation plant, a fully modern grid and renewable energy forms that will reduce to the minimum our need for non-renewable energy.

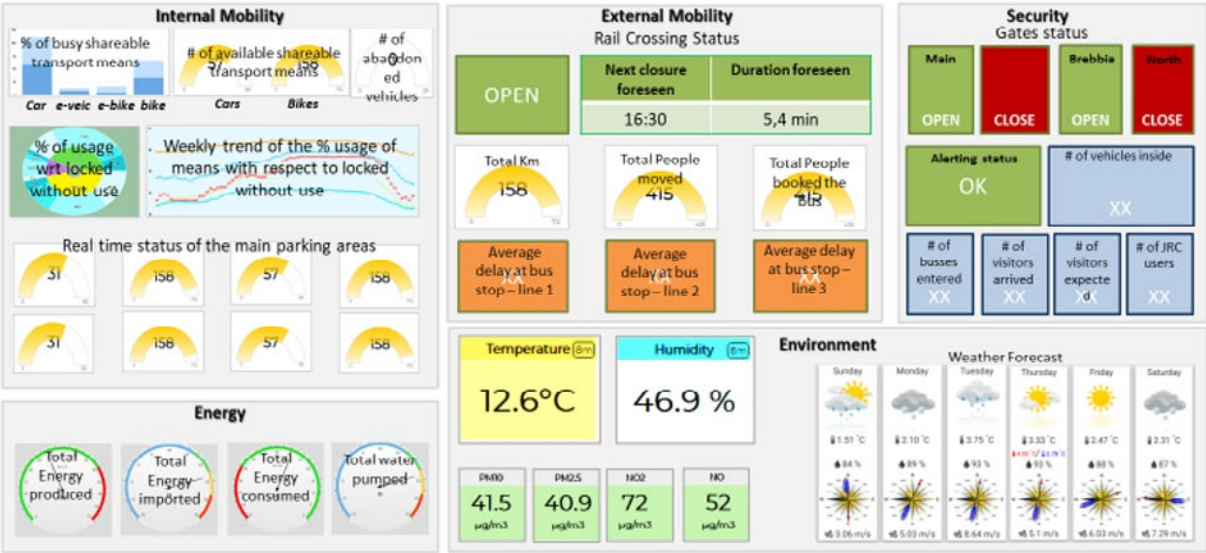
The SDP2030 describes our vision for efficient and sustainable forms of transportation inside the site, connecting efficiently with the transportation offered by local authorities outside the site. The SDP2030 is currently under revision to implement the European Green Deal.

In particular, recent work concern the site mobility plan, Ispra Site Management is currently studying all possibilities for enhancing the use of sustainable means of movement and transportation, encouraging in particular walking, cycling, use of electrical vehicles, and introducing a shuttle bus that will go around the site, offering lifts to visitors and colleagues at appropriate times and places. The use of sustainable means of transportation will be greatly supported by the modification of the external/public bus service. Our negotiations with the public busses agency have now successfully materialised. In total three bus lines will be modified, creating a major terminal bus stop in front of the Ispra Site. Two of these lines will start their new itineraries as of 9 June 2021.

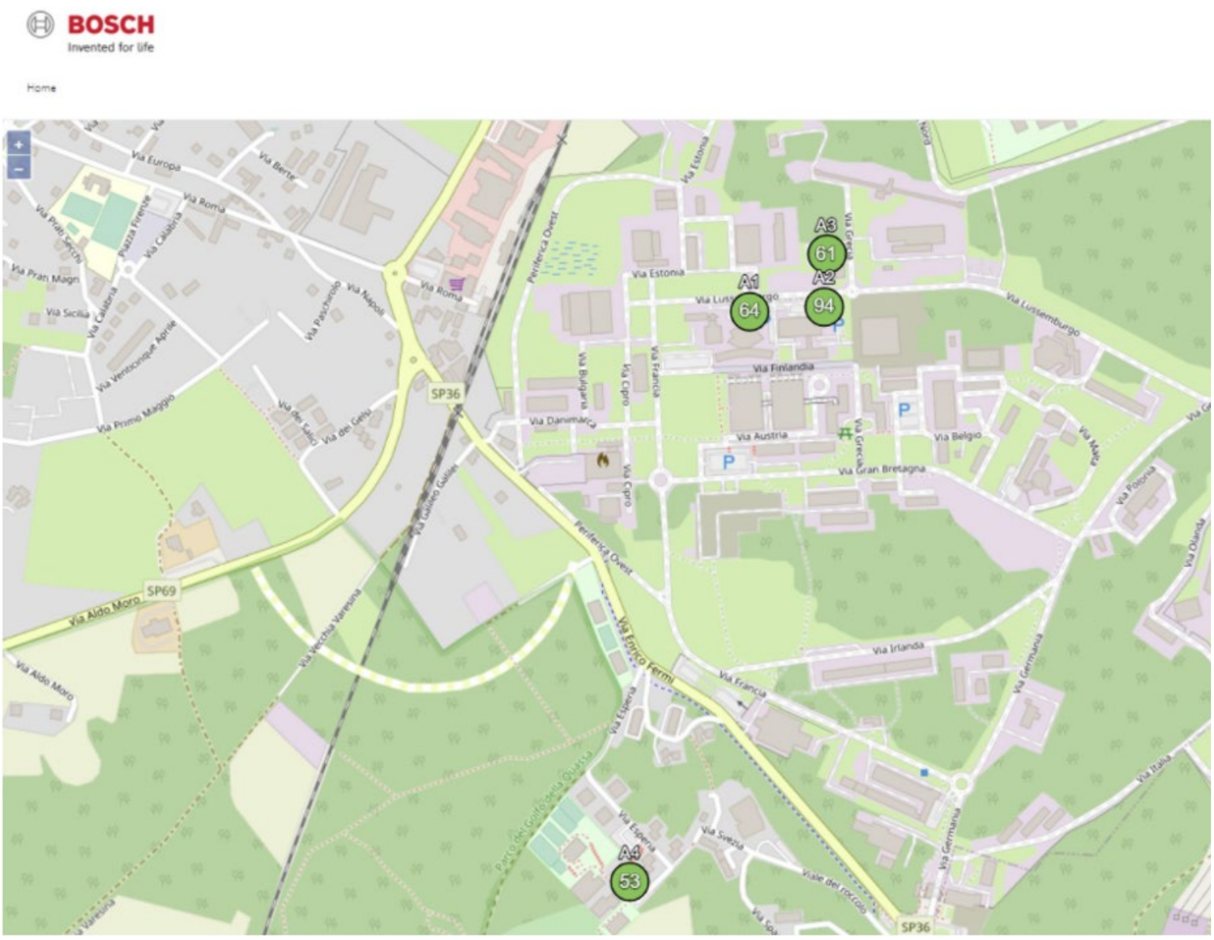
The site management has offered service bicycles and a dedicated maintenance service. Plan are on-going for further development of the bicycles using technology to better exploit their use. For example, the bicycles will be equipped with trackers that will allow calculation of kilometers ridden and the preferred routes. This will allow the site management to understand if and where more infrastructure is needed in order to maximise safety for bicycles.

The Site Management has also embarked on a new project for smart management of all its operations, by creating a new operations platform, where the energy and mobility aspects will be among the mostly addressed fields (demonstration figures follows).

Figure G. 5 operations platform



With the assistance of this platform, the site would be significantly modernised, thanks to various modern features, like for example the smart parking management:



In addition, the SDP2030 mentions specifically a one-way system inside the Ispra site and the subsequent allocation of one road lane to cyclists and other environmentally-friendly commuters. This is now studied as part of an overall mobility plan which will connect buildings and areas for pedestrians and cyclists.

LINEA N18: orario NON SCOLASTICO in vigore dal 09/06/2021 al 11/09/2021.
Percorso ANDATA: Ispra - Monvalle - Leggiuno - Laveno

Fermata	Fer 6	Fer 6	Fer 6	Fer 6	Fer 6	Fer 6	Fer 6					
Ispra - JRC	5,45	7,45	9,45	11,45	13,45	15,45	17,45	-	-	-	-	-
Ispra - via Fermi (passaggio a livello)	5,47	7,47	9,47	11,47	13,47	15,47	17,47	-	-	-	-	-
Ispra - via Mazzini (Banca Pop. Bergamo)	5,49	7,49	9,49	11,49	13,49	15,49	17,49	-	-	-	-	-
Ispra - Carera	5,51	7,51	9,51	11,51	13,51	15,51	17,51	-	-	-	-	-
Ispra - San Giacomo (Cascine)	5,52	7,52	9,52	11,52	13,52	15,52	17,52	-	-	-	-	-
Brebbia - via Roma (distributore benzina)	5,53	7,53	9,53	11,53	13,53	15,53	17,53	-	-	-	-	-
Brebbia - via Mazzini 13	5,54	7,54	9,54	11,54	13,54	15,54	17,54	-	-	-	-	-
Brebbia - località Bozza (distributore Agip)	5,56	7,56	9,56	11,56	13,56	15,56	17,56	-	-	-	-	-
Turro - via Monte Nero/via Roma (Trento)	5,57	7,57	9,57	11,57	13,57	15,57	17,57					
Turro - lido Monvalle	5,58	7,58	9,58	11,58	13,58	15,58	17,58	-	-	-	-	-
Monvalle - via Delle Piane (rondò)	5,59	7,59	9,59	11,59	13,59	15,59	17,59	-	-	-	-	-
Monvalle - via XXV Aprile 49	6,00	8,00	10,00	12,00	14,00	16,00	18,00	-	-	-	-	-
Monvalle - via Mendozza (Municipio)	6,01	8,01	10,01	12,01	14,01	16,01	18,01	-	-	-	-	-
Monvalle - località Cantone (via Roma 22)	6,03	8,03	10,03	12,03	14,03	16,03	18,03	-	-	-	-	-
Arolo - via Europa/Sasso Moro	6,04	8,04	10,04	12,04	14,04	16,04	18,04	-	-	-	-	-
Arolo - via Europa 32	6,05	8,05	10,05	12,05	14,05	16,05	18,05	-	-	-	-	-
Cellina - via Europa 29 (chiesa)	6,06	8,06	10,06	12,06	14,06	16,06	18,06	-	-	-	-	-
Leggiuno - piazza Marconi 2 (Municipio)	6,09	8,09	10,09	12,09	14,09	16,09	18,09	-	-	-	-	-
Leggiuno - via Piave 20	6,10	8,10	10,10	12,10	14,10	16,10	18,10	-	-	-	-	-
Leggiuno - via Piave 10	6,11	8,11	10,11	12,11	14,11	16,11	18,11	-	-	-	-	-
Reno - via Verbano 34	6,13	8,13	10,13	12,13	14,13	16,13	18,13	-	-	-	-	-
Reno - via Verbano (Sgambarotto)	6,14	8,14	10,14	12,14	14,14	16,14	18,14	-	-	-	-	-
Ceresolo - via Reno/Sempione	6,15	8,15	10,15	12,15	14,15	16,15	18,15	-	-	-	-	-
Cerro - via Reno/Russolo	6,16	8,16	10,16	12,16	14,16	16,16	18,16	-	-	-	-	-
Laveno Mombello - via Fortino 18	6,21	8,21	10,21	12,21	14,21	16,21	18,21	-	-	-	-	-
Laveno Mombello - via Martiri della Libertà (Tigros)	6,23	8,23	10,23	12,23	14,23	16,23	18,23	-	-	-	-	-
Laveno Mombello - stazione FNM	6,25	8,25	10,25	12,25	14,25	16,25	18,25	-	-	-	-	-
Laveno Mombello Lago FN	*6,38*	*8,38*	*10,38*	*12,38*	*14,38*	*16,38*	*18,38*					
Varese FN	*7,15*	*9,15*	*11,15*	*13,15*	*15,15*	*17,15*	*19,15*					
Laveno imbarcadero	-	*8,30*	*10,30*	*12,30*	*14,30*	*16,30*	*18,30*					
Intra	-	*8,50*	*10,50*	*12,50*	*14,50*	*16,50*	*18,50*					

I passeggeri in coincidenza con servizi ferroviari e di navigazione sono pregati di verificare variazioni di orario presso i rispettivi operatori del servizio/
Please always verify the train and ferry timetable with the operators of these services

Legenda: Fer 6 = giorni feriali dal lunedì al sabato/working days Mon-Sat; Nei giorni festivi servizio sospeso/no service on Sunday and holidays

G2.1.6 Context – risks, and opportunities

Fully understanding the context in which an organisation operates provides a high-level understanding of the important issues and circumstances that may influence its environmental commitment and responsibilities. Furthermore it helps to avoid risks and to seize opportunities. JRC-Ispra defined the external and internal circumstances that influence its targets by using the PESTLE (Political, Economic, Social, Technological, Legal, Environmental) and the ASCPF (Activities, Strategic direction, Culture & employees, Processes & systems, Financial) criteria, respectively.

The main risks identified in the context analysis are related to change management, which may have an impact on economic aspects (e.g. higher budget needs for energy provision), social aspects (alarmism due to possibly incorrect communications, such as fake news) and control over the processes managed by the contractors. Also severe crisis such as the covid-19 pandemic or Brexit trigger the same risks even if at a greater scale.

JRC-Ispra is trying to seize the opportunities that are present by implementing actions finalised to improve its environmental sustainability. This is currently done by implementing the Ispra Site Development Plan, which addresses the improvement of the energy management of the site, including increasing efficiency of buildings and facilities and the promotion of sustainable mobility. At the same time, progress is being made in terms of using the site itself as a test bed for research purposes in the format of a “Living Lab”, targeting particularly mobility (Future Mobility Solutions) and energy (Testing Digital Energy Solutions).

In 2020, a horizontal study was finalized to assess the ways in which the Commission could reach climate neutrality by 2030, with a decision on the way forward currently being taken. This action, which falls under the “Greening the Commission” campaign is actually the way that the Commission intends to apply internally the European Green Deal, already reaching carbon neutrality by 2030 and thereby implementing the ambition to lead by example. JRC-Ispra site is looking forward in understanding how to collaborate on this ambitious goal.

From 2020 JRC-Ispra will also contribute to the achievement of the Sustainable Development Goals set by the United Nations Agenda 2030. This shall be done particularly by collaborating with the Lombardy region’s Open Innovation Community, following the subscription of the relative Sustainable Development Protocol on 17.01.2020. A collaboration programme was presented including attaching the above-mentioned study to illustrate ways forward to meet the European Green Deal targets. Relative progresses will be presented and implemented annually with the Sustainable Development Forum.

Given that the JRC-Ispra site falls under the Standard Reference Documents (SRD) recently reviewed for NACE code E36.0.0 – "Water collection, treatment and supply" and E37.0.0 – "Sewerage", an analysis was performed to understand if and how the relative suggestions should be implemented. Currently two of the suggested indicators[10] are already reported within the Environmental Statement. No further action is foreseen.

The analysis of the internal context highlighted good involvement and participation of staff in promoting environmental actions and identified the opportunity to further improve staff competence and awareness through targeted training courses.

G2.1.7 Stakeholders (interested parties), compliance obligations risks and opportunities

JRC-Ispra has identified its internal and external stakeholders and is committed to relate to them in a transparent and timely way, in accordance with the EMAS regulation. In particular, JRC-Ispra has identified their main needs and expectations classifying these as "political role", "legal requirements", "collaboration" and "communication". When JRC-Ispra decides to adopt a "need" or an "expectation" of a stakeholder that is not legally mandatory, it becomes part of its compliance obligations. The main risks highlighted in the analysis are image loss or loss of trust.

The actions deriving from these risks are focused on communication activities. In particular JRC-Ispra is committed to communicate its environmental performance in a yearly EMAS Round Table meeting with external stakeholders, whereas internal stakeholders are constantly involved by means of awareness-raising actions and related communication campaigns. For instance, the aforementioned implementation by JRC-Ispra of the European Green Deal responds to the stakeholder's expectation to have the European Commission being an example for others.

In 2020, apart from the first three months of the year, it was not possible to organise face-to-face meetings. When possible, meetings were held by videoconference. This also impacted on the organisation of a 2020 November EMAS Round Table.

JRC-Ispra's internal stakeholders include staff, mostly management as well as the Unions, whereas JRC-Ispra's external stakeholders are:

- neighbouring Municipalities (Ispra, Brebbia, Cadrezzate, Travedona Monate);
- other Municipalities;
- other Public Administration (e.g. Region Lombardy, Province of Varese, Italian fire brigade);
- the Italian EMAS Competent Body (Comitato Ecolabel Ecoaudit) and the environmental control bodies (I.S.P.R.A., A.R.P.A. Lombardia);
- suppliers and subcontractors;
- environmental Associations (e.g. Legambiente);
- other Associations (e.g. Unione degli industriali, Confindustria, Camera di commercio);
- neighbouring citizens and EU citizens at large.

G3 Environmental impact of JRC-Ispra activities

This section considers the site's significant environmental aspects. An analysis of environmental aspects has been made using a specific procedure[11] under which significant environmental aspects have been identified and these are summarised in Table G.4. JRC-Ispra takes measures to reduce pollution (airborne emissions, waste production, wastewater discharge) and to achieve more efficient use of natural resources (mainly energy and water).

Table G.4 also shows the indicators that are most pertinent to the significant environmental aspects, along with actions that have been defined and validated by the European Commission EMAS Steering Committee, and which are referenced in the following sections.

The Commission services in Ispra undertook a full update of the environmental aspects in 2020, the results of which are summarised in the table below.

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[10] Indicator i102 concentration of BOD, COD, total nitrogen and phosphorus and indicator i76 artificial surfaces reported as [m^{2}] instead of [%]

[11] P01, "Identification and evaluation of environmental aspects", Environmental Management system

Table G.4 – Summary of significant environmental aspects at JRC-Ispra

Aspect group	Environmental aspect	Environmental impact	Activity, product or service	Indicator
1) Resources	Energy production	Energy sources consumption; Electric, thermal and cooling energy consumption	Heating, cooling, ventilation, electrical equipment and transport, tri-generation plant; non-nuclear scientific laboratories; site maintenance and infrastructures development; nuclear controlled areas	(1a) Total energy buildings (1a i) supplied (1a ii) mains supplied gas 1a vii) site generated renewable - PV, (1b) Total energy used by service vehicles (1c) Total non-renewable energy use
	Site activities		Electricity for lighting, IT devices, air conditioning units Electricity for yards	
	Buildings heating and cooling		Natural gas consumption for tri-generation, local heating and cooling	
2) Air	Air emissions (e.g. CO_2, NO_x, CO)	Air pollution, climate change	Buildings: HVAC and equipment maintenance Transport: work-related travel and commuting to work Site activity: tri-generation plant; non-nuclear laboratories; site maintenance and infrastructure development; nuclear controlled areas	(2a) Total office building emissions from energy (2c) Site vehicle CO_2 emissions (2d) Total air emissions for buildings (CO, NOx)
	HCFC and GHG gas emissions	Green House effect	Used in refrigerators and cooling systems	(2b) Refrigerant gases
3) Waste	Hazardous and non-hazardous waste production	Environmental impacts on soil, water, air, and use of naturale resources connected to waste final management	Medical laboratories, sanitary installations, cleaning, maintenance, office activities, IT and catering,	(3a) Total non-hazardous waste (3b) Total hazardous waste (3c) Percentage of waste sorted
	Spills of hazardous substances from underground storage tanks, waste production	Soil and groundwater pollution, environmental impact related to final waste management	Presence of diesel tanks, generator sets in some buildings (above ground, or double-walled underground), spillage of chemicals / hydrocarbons during transport on the roads / yards of the site	Not applicable
	Spills of hazardous substances from waste storages	Soil and groundwater pollution		Not applicable
4) Water	Wastewater collection, treatment and discharge in Rio Novellino Soil and groundwater contamination	Water pollution, floods	Sanitary and technical installations, wastewater treatment plant, scientific laboratories, site management and infrastructure, nuclear controlled areas	3d) Wastewater discharge
	Radioactive release in wastewater [12]	Water and soil pollution	Generated by nuclear controlled areas	Liquid radioactive effluents

[12] See previous note.

Aspect group	Environmental aspect	Environmental impact	Activity, product or service	Indicator
5) Bio-diversity	Protection of flora, fauna e site natural environment	Impact on flora, fauna e site natural environment	In the context of the Commission's buildings policy (Life cycle approach) Variation of permeable/ impermeable surfaces, felling of trees, damage to green areas	4a) Total use of land Total sealed area Total nature-oriented area on site Total nature-oriented area off site
6) Local aspects	Noise	Noise pollution	Generated by building renovation/repairs, staff travel and Commission car fleet, tri-generation engines	Indicator 2c / mobility plan
7) Other acrtivities on site	Construction and maintenance activities (external operators))	Legal and internal environmental requirements	Construction and mainteinance activities on site	Not applicable

The analysis of significant environmental aspects identified risks, opportunities and actions to be implemented. The main risks identified were:

- increasing cost of energy purchase;
- not complying with JRC-Ispra's Environmental Policy;
- increasing cost of waste management;
- possible JRC-Ispra reputation loss.

The main opportunities are:

- renovation of buildings with high energy consumption installations;
- reduction of costs for waste management;
- reduction of costs for procurement of goods, by implementing full circular economy principles.

The main actions considered to manage risks and opportunities are:

- implementation of the Ispra Site Development Plan;
- increase communication to staff of energy saving behaviours;
- promote waste reduction activities;
- improve waste separation on site.

G4 More efficient use of natural resources

G4.1 Energy consumption

During 2020 the cumulated reduction of total primary energy from natural gas consumption was 13,20% compared with 2019[13]. The decrease is basically linked to the low presence of staff on site and to a different management approach that promotes the integration of the tri-generation plant production with the renewable energies (e.g., more "green" electric energy purchased).

Despite this notable result, at least three factors have had a negative impact on the general consumption during 2020:

1. covid-19 internal safety requirement measures that obliged keeping air treatment units always on and the use of most of offices as single ones, with a significant spread of staff throughout buildings. To be noted that Ispra site registered higher amounts of presence on site than other European Commission premises due to the particular kind of activities;

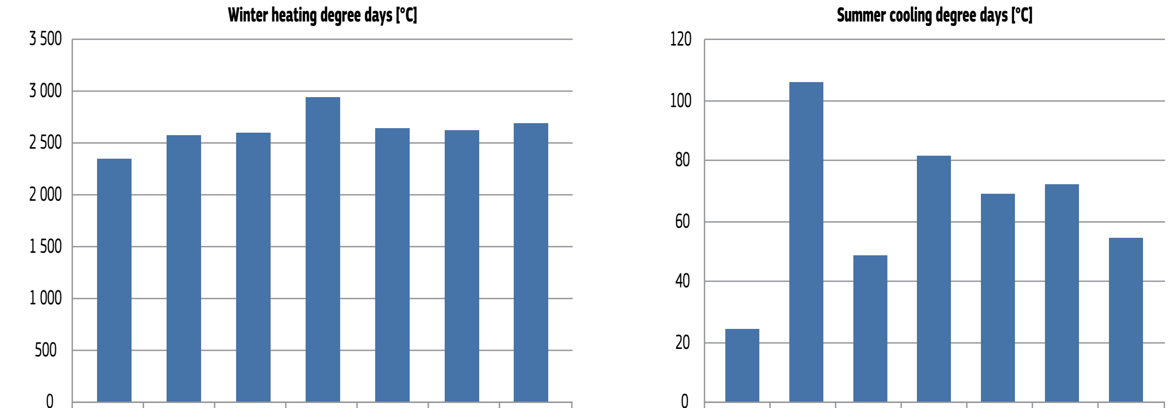
[13] Referring to the total annual consumption of natural gas measured in m^3 under Standard conditions (1 atm and 288,15 Kelvin degrees).

2. technical obsolescence of the actual tri-generation plants with low values of efficiency production with several stoppages throughout the year;
3. increased activities of laboratories (e.g. within the Vehicle Emissions Laboratories - VELA) with a significant demand in terms of energy. As an example, in December 2020 the total electrical consumption was 45% higher than in December 2019.

Building energy consumption data should be considered in the context of climatic conditions too. Analysis of degree days data[14] presented below suggests that:

- despite the climatic conditions during the 2020 winter period, which were slightly colder than those in 2019, less heating was needed to satisfy the site's winter heat demand (-6% winter thermal energy produced by tri-generation plant with respect to 2019). This was surely affected by the covid-19 pandemic emergency due to which the presence of staff on site was very low. For this reason, in order to reduce energy waste and in line with regional norms, the office temperature was reduced to 19 degrees instead of the usual 20 degrees;
- during the 2020 summer period, the climatic conditions were just a little milder with respect to 2019. The small increase (+1%) of the total cooling energy produced for the site district cooling system compared with the previous year is mostly due to the covid-19 internal requirements that provide to keep air treatment units on in the offices even at nights and during the weekend and the parallel request to staff to keep the windows open during presence in office.

Figure G.6 - Annual winter heating degree days and summer cooling degree days at Ispra, 2014-2020



	2014	2015	2016	2017	2018	2019	2020
Winter heating degree days [°C]	2346	2568	2611	2934	2655	2617	2681

	2014	2015	2016	2017	2018	2019	2020
Summer cooling degree days [°C]	24	106	48	81	64	72	55

G4.1.1 Buildings [15]

Electrical energy consumed by the JRC-Ispra site is mostly provided by the internal tri-generation natural gas plant and complemented by:

- electric energy purchased from the grid (this is an important backup power supply for the Ispra site, in case the site tri-generation plant reduces production);
- on site photovoltaic (PV) plants producing a relatively small amount of renewable electric energy which, in terms of peak value, is increasing continually.

[14] Hourly data is collected from the "JRC - Ispra Atmosphere – Biosphere – Climate Integrated monitoring Station" located at the 77r building of JRC-Ispra:
- winter heating degree days: 20°C is the reference temperature during month from January to April and from October to December, It is a measurement designed to quantify the demand for energy needed to heat a building.
- summer cooling degree days: 26°C is the reference temperature during month from May to September. It reflects the amount of energy used to cool a building.

[15] For energy consumption of JRC-Ispra building we consider the total energy consumption of plants, installations, buildings, facilities, laboratories and, generally speaking, all energy consumption devices excluding only the JRC-Ispra vehicle's fleet.

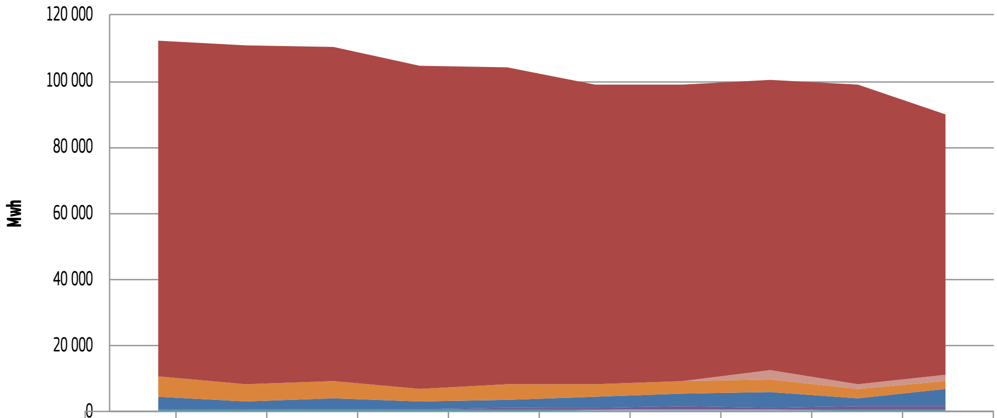
The tri-generation plant has been in permanent operation since September 2004. It is connected to a thermal and cooling pumping station and related networks for heating and air conditioning for most of the buildings. Currently only a small number of buildings, including INE (which stands for “Impianto Nucleare ESSOR”) remain unconnected to the site’s refrigeration system which is either provided by independent coolers or by pumping water from Lake Maggiore, which passes through the site’s filtering station, and is then distributed as cooling water.

The canteens and the Club House of the site are supplied with methane gas directly from the distribution network for cooking purposes, as are the sports centres and the residencial areas located outside the fence.

An energy recovery heat pump exchanges hot and cold energy from the wastewater discharged from the site’s wastewater treatment plant and the water used in the site’s district cooling network.

Diesel liquid fuel is used to run emergency power plants. Both diesel and petrol liquid fuel are used for VELA laboratories and small portable devices such as chainsaws and lawn mowers.

Figure G.7 – Annual buildings energy consumption (MWh) (core indicator 1a)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total energy consumption (Mwh) purchased or produced on site	111 076	109 507	108 983	103 555	103 038	97 716	97 591	99 152	97 749	88 549
mains supplied gas	101 028	101 954	100 544	97 609	95 413	90 333	89 141	87 542	90 361	78 389
cooling energy form heat exhange with wastewater								2 834	1 448	1 535
cooling energy form heat exhange with lake water	6 480	5 140	5 140	3 610	4 800	3 900	3 717	3 636	2 932	2 385
electricity puchased from the grid	3 502	2 328	3 236	2 232	2 389	2 940	4 052	4 504	2 175	5 420
electricity generated on site from PV	13,2	14,7	17,0	52,2	391	431	594	544	717	731
diesel and petrol for laboratories and facilities	52,8	70,1	45,3	51,8	44,3	102,1	78,4	91,3	115,7	88,8
heat energy from thermal solar panels	0,0	0,0	0,0	0,0	0,0	10,9	8,1	0,0	0,0	0,0

Figure G.7 shows the decrease of global site energy consumption since 2011 thanks to several energy efficiency improvement actions concluded in the last years; these effects will also be seen in the years to come. To be noted that the energy consumption was recalculated for 2018, 2019 and 2020 in order to consider the contribution given by the cooling energy produced by the heat pump located in building 59x as it exchanges heat with the wastewater from the wastewater treatment plant.

The main improvement actions which are on-going are listed hereunder including relative references in the EC EMAS Global Annual Action Plan, GAAP:

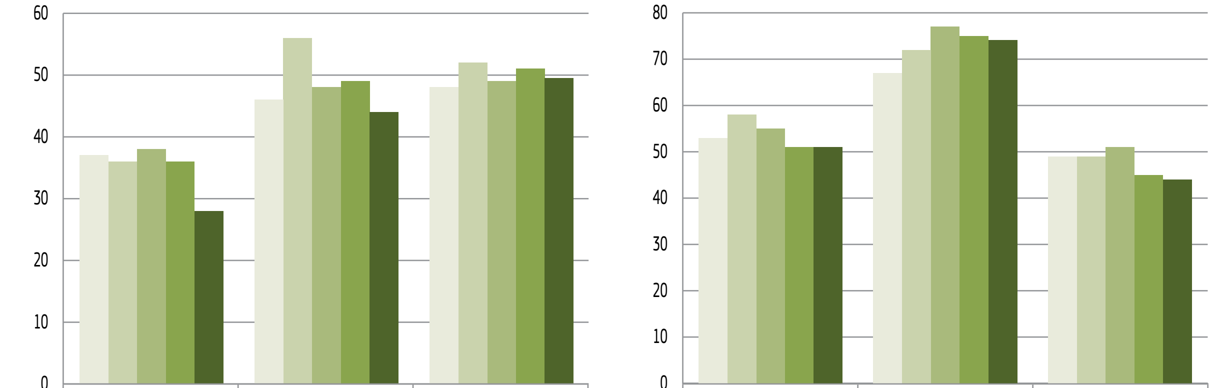
1. A remote monitoring system for the site renewable electricity produced from photovoltaic panels was installed during 2020. It will be fully operational by the first half of 2021 (ref. 2016/210).
2. Following the successful application of the BREEAM environmental standard to building 27b with unprecedented results[16], to extend the application of the BREEAM standard to JRC buildings having budget above 3 Million €, as indicated hereafter (ref. 2015/100):
    - Building 102 final certification is on-going (rated excellent in the mid-term evaluation);
    - New garderie: design certification on-going;
    - New canteen: design certification on-going.

[16] Building 27b has obtained “Excellent” certification for its refurbishment. This has been the first time that such an achievement was obtained in Italy.

These certifications, planned for the year 2020, were delayed due to the covid-19 emergency and are going to be completed by 2021.

3. To implement the buildings' demolition plan which foresees the progressive removal of the old non performing buildings; 4 buildings were fully demolished in 2020 (ref. 2017/200).
4. To continue the substitution of old lamps in buildings, in the sports area and in technical tunnels (about 32 old lamps substituted with LED and further 11 new installations in 2020, all the old lamps have been replaced in the streets). Where possible, LED lighting systems were coupled with presence sensors for automatic light switch on (ref. 2017/104).
5. To continue the installation of automation devices regulating building's heating, cooling and electric energy on the basis of the effective needs (ref. 2015/103 and 2015/105).
6. To continue the implementation of an automatic energy management system to monitor energy consumption of single buildings (ref. 2015/102). This currently allows monitoring end-user buildings/facilities energy consumption (see Figure G.8):
    a. 28% of global site heat consumption (corresponding to 51 monitoring points[17]);
    b. 44% of global site electric energy consumption (corresponding to 75 monitoring points);
    c. 49% of site global cooling energy consumption (corresponding to 44 monitoring points).

Figure G.8 – Monitoring of energy consumption progress



	Heating	Electricity	Cooling
2016	37%	46%	48%
2017	36%	56%	52%
2018	38%	48%	49%
2019	36%	49%	51%
2020	28%	44%	49%

	Heating	Electricity	Cooling
2016	53	67	49
2017	58	72	49
2018	55	77	51
2019	51	75	45
2020	51	76	44

To be noted that the energy consumption value measured at the monitored buildings is lower than the theoretical one due to the grid losses.

Furthermore, the reduction of the monitored energy consumption in 2020 with respect to the previous years is accounted by:

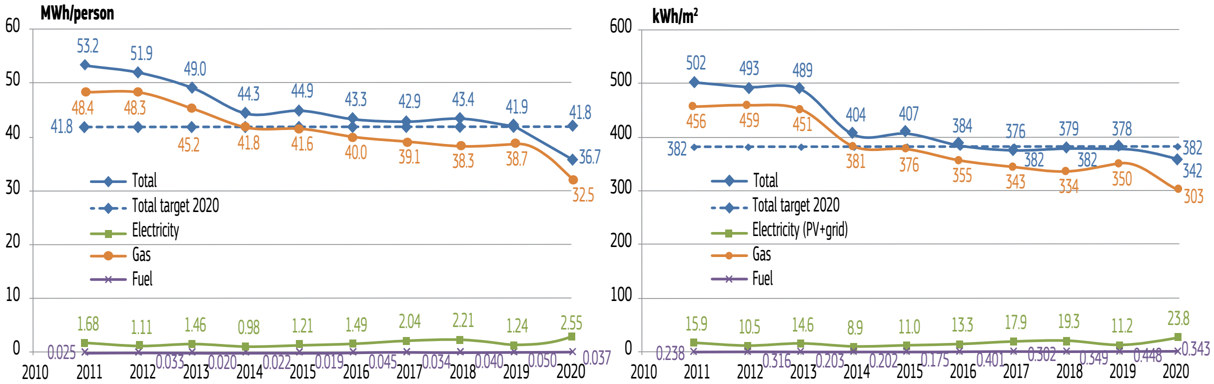
- some metering devices temporarily not working (mostly heat meters);
- different consumption trends with respect to the total site energy consumption.

On top of the above-mentioned actions, in 2020 care was also dedicated to the nuclear area where several actions have been carried out to improve the efficiency of the most significant HVAC plants and to reduce electrical energy consumption.

As can be seen in Figure **G.9**, this proactive approach to energy management permitted JRC-Ispra to achieve, and go beyond, its 2020 energy efficiency targets both in terms of per square metre and in terms of per person total annual energy consumption (respectively -15,3% and -17,1% compared to 2014).

[17] For technical reasons, monitoring points at end user do not always correspond to readings of single buildings.

Figure G.9 – Evolution of total annual energy consumption for buildings[18]



As said, the consumption of natural gas decreased by 13,2% in 2020 compared to 2019 on account of the lower presence of staff on site and the different approach to the management on the electricity production.

Table G.5 – Evolution of electric energy consumption breakdown for buildings

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total electric energy consumption [MWh]	32 886	32 131	32 576	31 394	30 909	30 223	29 935	30 549	29 440	27 803
Share of electricity from tri-generation plant[MWh]	29 371	29 788	29 323	29 110	28 128	26 852	25 288	25 501	26 548	21 652
Share of electricity purchased from the grid [MWh]	3 502	2 328	3 236	2 232	2 389	2 940	4 052	4 504	2 175	5 420
Share of electricity generated from PV [MWh]	13	15	17	52	391	431	594	544	717	731

Table G.5 shows that the overall reduction in energy consumption of 2020 is confirmed by the reduction of the total electricity consumption (-5,6% respect to 2019). The share of electricity purchased from the grid considerably increased in 2020, especially in the last months of the year, due to the above mentioned choice to prefer other energy sources to natural gas consumption, the increase of energy demand by some premises like VELA 2, 7 and 9 and the temporary unavailability of some of the engines of the tri-generation plant.

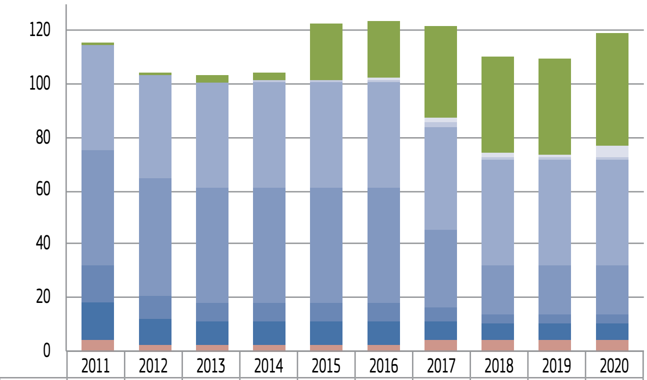
In 2020 the production of electricity from photovoltaic plants installed on the site slightly increased by 2% thanks to the increased solar radiation and the installation of 3 new PV modules on the ESTI solar field. Other PV plants have been installed on buildings 102 and 23b during 2020 but they are not fully operational yet. Furthermore, during 2020, a very accurate cleaning and maintenance campaign was carried out on the site's photovoltaic park.

G4.1.2 Vehicles

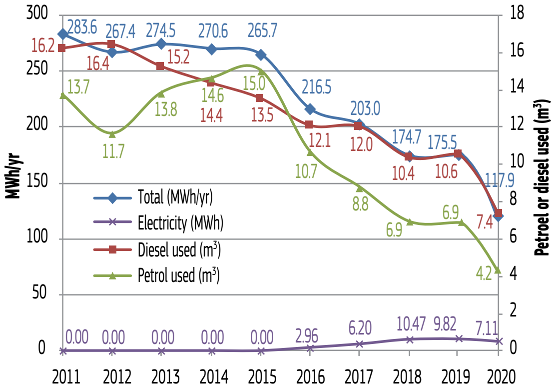
JRC-Ispra service vehicles has a fleet of 119 vehicles which support site staff in their research and other technical and operational activities, providing mostly internal mobility. The fleet includes mobile laboratories, internal postal service, firefighting, ambulance and other work vehicles. In addition to the related vehicle emissions, JRC-Ispra has further vehicle emissions from the VELA laboratories, which are accounted for in the dedicated chapter addressing buildings and facilities (see the above section a)). 9 vehicles were put in service in 2020 (4 Euro 6 and 5 Electric Vehicles (EV)). They replace 9 vehicles (Euro 1-2-3 and 4) that were removed from service and are awaiting to be scrapped in 2021.

18 To be noted that cold energy from heat exchange with lake water has not been accounted for within figures G.8 and G.9 as it is included in the total annual energy consumption (continuous blue line).

Figure G.10 – Internal fleet engine types (number of vehicles) and total energy used by service vehicles



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Electric	1	1	3	3	21	21	34	36	36	41
Euro 6	0	0	0	0	0	1	2	2	1	5
Euro 5	0	0	0	1	1	1	1	1	1	1
Euro 4	39	39	39	39	39	39	39	39	39	39
Euro 3	43	43	43	43	43	43	29	18	18	18
Euro 2	14	9	7	7	7	7	5	4	4	4
Euro 1	14	10	9	9	9	9	7	6	6	6
Euro 0	4	2	2	2	2	2	4	4	4	4



The left-hand-side graph Figure G.10 shows the breakdown of the vehicle fleet by Euro standard. The standard is imposed on manufacturers of engines of vehicles sold in the EU, with each successive standard being more stringent than the previous one, particularly with respect to emissions.

Older, less efficient and more polluting vehicles with Euro 0[19] and Euro 1 engines are still required for some special purposes such as towing mobile laboratories and firefighting. However, they are seldom used and their impact is therefore limited. As the number of electric vehicles (EVs) in the JRC-Ispra vehicle fleet gradually increases, the number of petrol or diesel-powered vehicles decreases. Overall, the fleet has increased its efficiency for the following reasons:

- the vehicles with engines classified at least as Euro 4 (including EVs) increased from 62,8% of the total in 2017 to 73,1% in 2020 owing to the disposal of 11 Euro 3 or lower vehicles last year and the purchase of 7 futher EV, giving a total of 41 EVs (25 cars and 16 vans). In 2020, a call for tender was made for the purchase of 8 EVs and 9 EVs wich were delivered.
- the overall fleet size increased by 9 units following the acquisition of 4 euro 6 diesel and 5 EVs.

The right-hand-side graph also shows the volumes of petrol and diesel used for the internal fleet and the corresponding total energy[20]. The total energy has decreased by 33% since 2019. However, there is a total reduction of about 58,4% from 2011 to 2020.

To put the above figures in context, it should be noted that the total annual vehicle energy consumption represents only 0,13 % of that for buildings.

12 recharging points for internal EVs have been installed since April 2016, two of which were installed in 2018. The relative monitoring systems allow us to monitor the EV's electrical consumption (7,1 MWh in 2020 with a 27,6% decrease respect 2019) and their indirect upstream CO_2 emissions. The monitoring also helped us understand that some recharges were unaccounted for due to the fact that ordinary schuko-sockets were being used. A corrective action to address this involved providing appropriate communication to concerned staff and applying stickers to remind staff about the internal recharge policy. This action has yielded positive results and is ongoing to make sure that all EVs abide to this policy.

In an effort to promote sustainable mobility, JRC-Ispra has put in place a fully operational service bicycle policy which is now fully operational and comprises of a dedicated service which manages 140 service bicycles (of which 27 are electric), a service bicycle repair shop and many dedicated bicycle fostering events (see Chapter

19 We refer to Euro 0 standard for conventional purposes, referring to vehicles either of standard prior to Euro 1 or non classified vehicles, such as escavators or operating machinery. The latter have been acquired in 2017.

20 More precisely, it includes external refueling for service cars during missions, but not fuel consumption for VELA laboratories' activities, "operating machinery", lifter, generator and other little machinery.

Internal communication). In order to encourage staff further to use service bicycles and therefore reduce emissions of polluting vehicles, a pilot initiative to improve ease-of-access to bicycles is on-going: bicycle locks have been removed from all non-electric service bicycles.

The actions contained in the Commission's 2021 Global Annual Action Plan for vehicles addressing the energy saving targets are summarised below.

Initial year / ref.#	**Action Description**	**Action Type**	**2020 objective** **2019 results**
2015 / 132	Multi annual renovation of the fleet with additional electric and hybrid vehicles	Multi-stage	2021 objectives: launch a call for tender for the purchase of indicatively 10 electric vehicles. To reach a number of electric/hybrid service vehicles higher than the number of conventional ones. 2020 results: 9 electric vehicles were delivered, 6 small vans and 3 large ones. A call for tender for the purchase of 8 electric vehicles was finalised.
2014 / 129	Install charging stations for electrical vehicles	Multi-stage	2021 objectives: 1 charging station to be installed in building 14. Living lab project to be launched with public charging station inside JRC as a scientific project. 2020 results: 1 public charging station installed outside the JRC.
2017 / 302	Implementing a site plan for sustainable mobility	Multi-stage	2021 objectives: Finalisation and implementation of the flegma software for the management of the fleet; modernisation of the bicycles and tracking of them and improvements in the internal mobility; smart parkings implementation aiming to reduce the unnecessary traffic of vehicles looking for an empty space. Improvements in the autonomous shuttle mobility solutions 2020 results: 1. Progress in the development of the site operation platform; 2. Private buses: modernization of the fleet, optimization of the service; 3. Arrangement with the Public transport company to implement three bus lines that will stop at the site's entrance; 4. Bicycles: tracking system of the internal fleet, improvement of the bicycle paths inside and outside the site; 5. Improvement of the internal car fleet (continuous action)

G4.1.3 Renewable energy use in buildings and vehicles

The JRC-Ispra tri-generation plant is fueled with fossil natural gas, which cannot be classified as a renewable energy source, even though it provides greater efficiency than traditional means of energy generation. JRC-Ispra has analysed the possibility to acquire biomethane but there are important legal, technical and market capability obstacles.

The installations which can produce energy (heat, cold or electric) from renewable sources within the site are:

- the cooling systems which use lake water. This historical heritage concerns specifically INE buildings. For specific and limited technical needs other JRC buildings also use this;
- water – water heat pump in building 46i that produces both hot and cold energy to cover the 60% of thermal needs (installed in 2018 but data available only since the second semester of 2019);
- the energy recovery heat pump located in building 59x that produces cooling energy from the wastewater discharged from the site's wastewater treatment plant and produces heat recovering waste energy from water used in the site's district cooling network (installed in 2016 but data available since 2018);
- PV panel systems installed, with a global PV peak capacity of 749,54 kWp, at the end of 2020;
- a small geothermal heat pump for the heating and cooling of 4 residences;

- a geothermal heat pump with groundwater withdrawal was constructed to meet the significant energy needs required by building 102 particularly due to a relevant project of collaboration between JRC and EUROPOL (the internal authorisation for the excavation of wells was already released, and the internal authorisation for withdrawal of groundwater and discharge in surface water basin has been completed in 2021).

Table G.6- Renewable and non-renewable energy use in the buildings

Energy source	2014	2015	2016	2017	2018	2019	2020
i) Total electricty from renewables - purchased from the grid (MWh)	976	993	737	1 199	1 965	2 175	5 420
ii) Total electricity from renewables (%)	43,7	39,8	24,3	29,6	43,6	100,0	100,0
iii) Total electricty from non renewables (MWh)	1 257	1 500	2 296	2 854	2 539		
iv) Total electricity from non renewables (%)	56,3	60,2	75,7	70,4	56,4	0,0	0,0
v) mains supplied gas (% non renewable)	100,0	100,0	100,0	100,0	100,0	100,0	100,0
vi) mains supplied gas (MWh non- renewable)	97 609	95 413	90 333	89 141	87 542	90 361	78 389
vii) site generated renewables (PV) (% renewable)	100,0	100,0	100,0	100,0	100,0	100,0	100,0
viii) site generated renewables (PV, MWH renewable)	52,2	391,4	430,9	594,1	543,9	716,9	731,1
ix) site generated renewables - lake water heat exchange, (MWh)	3610	4800	3 900	3717	3636	2 932	2 385
x) site generated renewables - Solar panel, (MWh)	0,0	0,0	10,9	8,1	0,0	0,0	0,0
xi) site generated renewables - heat pumps (MWh)	0,0	0,0	0,0	0,0	4327	2618	2 383
Total renewables (MWh)	**4638**	**6 184**	**5 079**	**5 518**	**10 473**	**8 443**	**10 919**
Total renewables (%)	**4,5**	**6,0**	**5,2**	**5,7**	**10,6**	**8,6**	**12,3**
Total non renewables, (MWhr)	**98 917**	**96 853**	**92 638**	**92 073**	**88 679**	**89 306**	**77 630**
Total non renewbles (%)	**95,5**	**94,0**	**94,8**	**94,3**	**89,4**	**91,4**	**87,7**

The 2020 increase in the electric energy purchased from the grid, 100% coming from renewable sources only - since 2019 - , and the simultaneous reduction in the mains supplied gas, have largely contributed to the noteworthy increase of the renewable energy as part of total (+42,8% compared to 2019).

The slight reduction in the use of lake water to produce cooling energy (see Chapter G4.2) and in the production of thermal energy by the heat pumps located in building. 59x and 46i have not affected the result, allowing the Ispra site to obtain a remarkable reduction in non renewable energy use in 2020 compared to 2014 (-8,2%) and so exceeding the 2020 target (-5% compared to 2014).

To be noted that the energy production of the above-mentioned heat pumps has been introduced in the calculation method starting from 2018.

There is no longer any production of solar thermal energy as the panels of both buildings 100 and 101 are out of service. They were replaced with PV panels.

JRC-Ispra will further increase its renewable site energy consumption in the next few years by:

- installing other PV systems (2MW by the end of 2023);
- installing other heat pumps (geothermal, lake water, ground water sources).

There are 41 EVs using 12 charging stations on site. Charging stations are powered by an internal grid and the energy is supplied by an external contractor, PV panels and tri-generation plant. A Living Lab project that involves the installation of charging stations powered exclusively by photovoltaic panels shall be developed in 2021.

G4.2 Water use

When the Ispra site was built, the lake was an obvious source of water and is still used today. The JRC-Ispra water is provided by the pumping station, which is located on the shore of Lake Maggiore about two kilometres from the Ispra site, but still part of the JRC-Ispra EMAS scope. It delivers water through three steel pipes to a treatment station within the Ispra site boundary. The water is initially treated with chlorine dioxide to eliminate microorganisms and then passes through a series of sand filters. The pre-treated water intended for human consumption then undergoes a second disinfectant phase with chlorine dioxide in order to ensure treated water can reach the distribution network. From the filtering station, the water distribution network branches into three different lines, which run for about 74 km underground and comprises of:

1. a low pressure drinking water circuit: mostly for staff use (canteen, toilets, etc.);

2. a high pressure drinking water circuit (fire extinguishing network, the social and sport areas, toilets, garderie, ALER apartments, etc.);
3. a cooling water circuit for technical purposes: this supplies many utilities, such as building's cooling plants, most of the fire extinguishing circuits, the evaporative towers serving the tri-generation plant. Two different networks are used for:
   a. a closed circuit supplied by the tri-generation plant;
   b. an open circuit supplied directly by the water pumped from the lake. This is then discharged into the sewage system and received mainly in the site wastewater treatment plant and, in a very small part, in the sewerage system that collects rain water and discharges it outside the site into the Acquanegra Stream.

During the last few years, most of the site's buildings have been connected to the closed cooling circuit, reducing the need for lake water uptake. Currently, the main buildings that are still cooled with lake water in an open circuit are those in INE (with a peak flow during the summertime approaching 100 m^3/h), further reductions in water consumption will be challenging.

Lombardy Regional Decree n. 9082 was signed on 15th October 2012, regulating the abstraction of water from Lake Maggiore. In 2006, JRC-Ispra had signed an agreement to supply water to the Brebbia Municipality, especially during summer months and for emergency purposes (fire extinguishing). The total amount of water distributed to the Municipality is insignificant in relation to the site's hydrological balance: 1 858 m^3 in 2020.

As said above, total water withdrawn from the lake is used basically for two purposes: drinkable and, mainly, cooling. However, it should be noted that on account of technical reasons, "Drinking water" data also includes:

- the fire extinguishing network;
- the Italian fire team car engine washing;
- the watering of a limited number of green areas within the nuclear area;
- water provided to the external social area, including the sports area.

"Cooling water" is used, instead, for buildings cooling purposes and it's considered a renewable energy source.

This said, to be coherent with the other Sites of the European Commission, only the volume of water for drinkable purpose is used as core EMAS indicator (indicator 1d). This approach allows us to distinguish between the part of water that is desirable to reduce ("drinking water") from the water used as a renewable energy source, which is expected to increase in time. The reason is twofold: other than wanting to maximize the use of a renewable energy source, it should also be noted that, the lake temperature is increasing with time, thus implying that more water will have to be used for the same cooling result.

In Figure G.11, the evolution of "drinking" water use from 2014 to 2020 is displayed. In 2020, there was a reduction of drinking water per person and per square meter of, respectively, 24% and 22.2% compared to 2014. This is a remarkable result as both values exceed by far the 2020 EMAS target set at 5% for both indicators.

Figure G.11 – Evolution of total annual water consumption (indicator 1d)

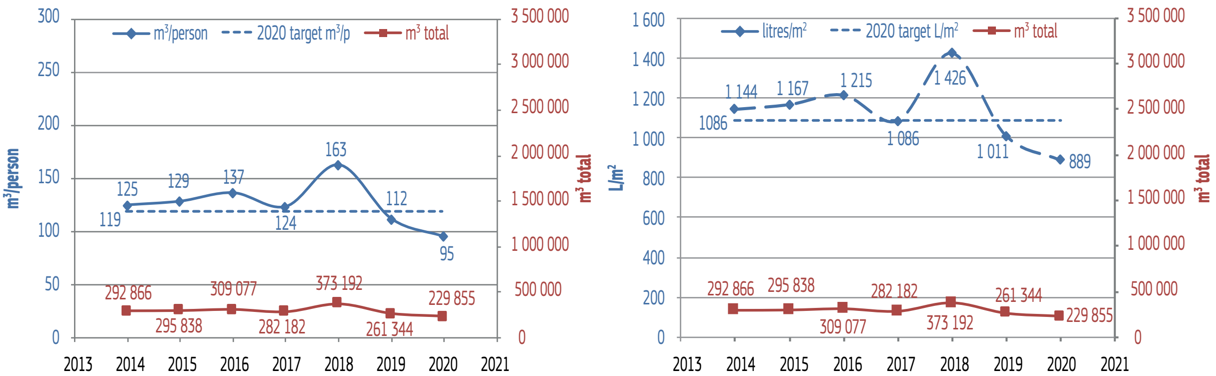
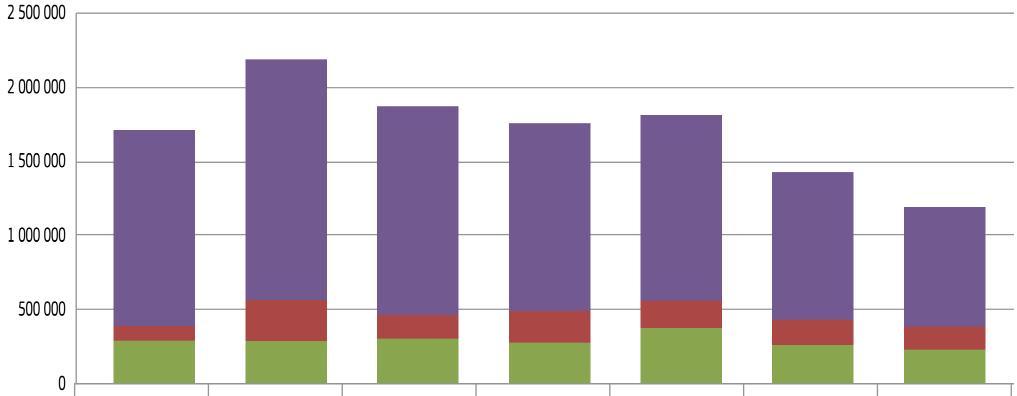


Figure G.12 – Water consumption (m^3) breakdown for different uses in 2014 – 2020



	2014	2015	2016	2017	2018	2019	2020
Total site water use (m^3)	1 717 056	2 201 344	1 875 214	1 768 919	1 827 458	1 434 107	1 183 936
Share of cooling water used by JRC (m^3)	1 326 586	1 641 749	1 407 017	1 280 615	1 255 665	996 967	797 520
Share of cooling water used by INE (m^3)	97 604	263 757	159 120	206 122	198 601	175 796	156 561
Total site drinking water use (m^3)	292 866	295 838	309 077	282 182	373 192	261 344	229 855

Figure G.12 shows how water uses have evolved from 2011 to 2020, with an overall reduction of about 62,6% in this time frame. Even if the lower presence of staff on site due to the covid-19 pandemic situation has surely contributed to the reduction in water use in 2020 compared to previous years (e.g., -50% of drinking water at the canteens), many activities (laboratories, facilities, etc.) continued to operate at their usual pace. Lower summer temperatures compared to 2019 and the awareness campaign carried out on the JRC-Ispra site on keeping a temperature of 26°C inside offices and large rooms (workshop, halls, warehouse) throughout the summer and lesser use by the canteens, cafeteria (closed to the public for covid-19 restrictions) and the Medical service (closed for refurbishment) further contributed to the reduction of the water used for cooling purposes (-18,65% compared to 2019). Furthermore, low temperatures were kept in the district cooling circuit during the night in order to have less consumption during the day.

The noteworthy results obtained in 2020 in total water use reduction were also accomplished thanks to the implementation of several actions in the last years, including:

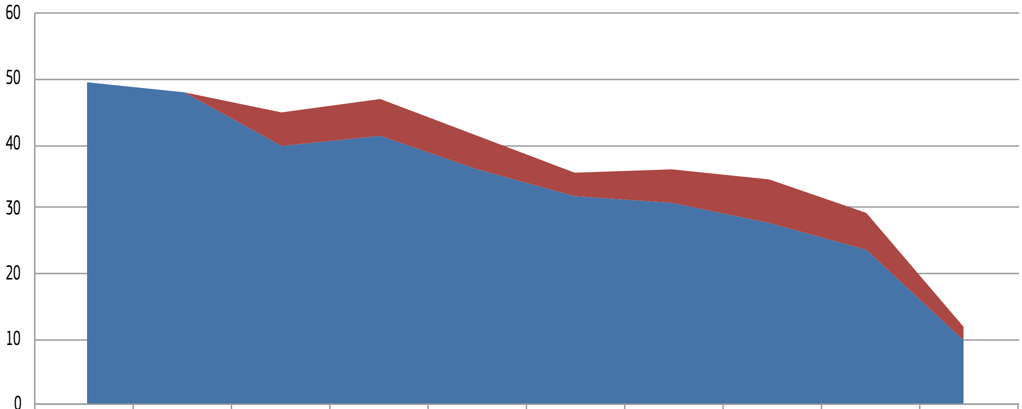
- In 2018 some broken pipes have been identified, accounting for a 32,3% increase in drinking water with respect to 2017. These were duly repaired in November 2018 and further important extraordinary maintenance works were also carried out during 2019 leading to a 30% reduction in water withdrawn for drinking purposes, compared to 2018. During 2020 there was a further reduction of 12% compared to the previous year;
- a regulation system was installed at the pumping station in 2013, allowing for an automatic regulation of the withdraw water for cooling purposes, thus avoiding water overflows from the cooling water reservoirs. The benefits of this regulation system were seen in 2014, 2019 and 2020, i.e. the only years when this was running most of the time as there were no extraordinary events hindering its correct use;
- the withdrawal of lake water used as drinking water occurs without automatic regulation. The excess quantity is allowed to flow into the cooling water basins and then used as such;
- the connection of buildings to the closed cooling circuit continued and is in progress;
- at the end of 2015 an INE water cooling battery was replaced resulting in a reduction of water consumption amounting to approximately 40% between June and September, see Figure G.12. Increase of water consumption in 2017 and 2018 is due to the use of water for a longer period of time, respectively 109 and 112 days (whereas in 2014, 2015 and 2016 the cooling water was used for 77, 96 and 87 days, respectively). The 2020 values show a reduction (-11%) compared to 2019 due to a water leak repair in building 99 and to the lower presence of staff because of the covid-19 restrictions.
- the installations of new water consumption metering devices dedicated to the canteens and to the social areas (monitoring started in October 2017). In 2020 there was a reduction of 10,5% in drinking water supplied to external areas compared to the previous year.

G4.3 Office and printshop paper

While Office paper accounts for paper used for everyday printing in offices, JRC-Ispra's offset paper[21] accounts for what is printed at the internal printshop for the production of reports, leaflets, etc. for the European School in Varese, as well as other JRC sites. An environmentally friendly printing policy limits single orders to the internal print shop to a maximum of 200 copies: possible further limitations are under study for 2020.

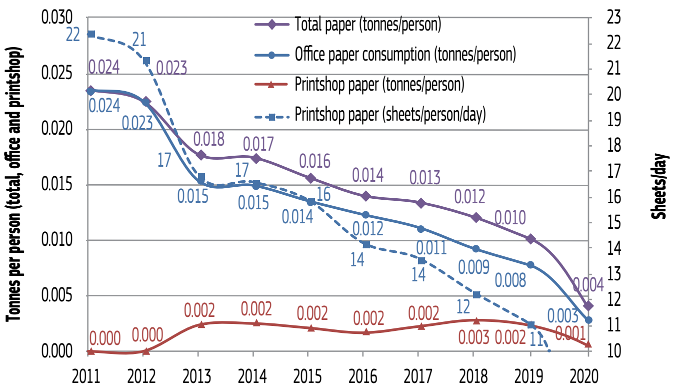
The evolution of office and offset paper at JRC-Ispra and per capita breakdown is presented below:

Figure G. 13 – Evolution of paper consumption at JRC-Ispra (totals)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Office (A4 sheet equivalent)x1 000 000	9,85	9,52	7,89	8,16	7,67	6,74	6,51	5,89	5,42	2,23
Total paper consumption (tonnes)	49,16	47,49	44,59	46,53	40,72	35,30	35,52	33,92	29,17	11,52
Printshop paper (tonnes)	0,00	0,00	5,21	5,82	4,82	3,76	5,06	6,37	5,50	1,76
Office paper (tonnes)	49,16	47,49	39,37	40,71	35,90	31,54	30,46	27,55	23,67	9,76

Figure G.14 – Evolution of paper consumption at JRC-Ispra (tonnes/person and sheets/person/day) (core indicator 1e)



Total paper consumption has decreased by 77% since 2011, mainly due to increasing use of e-signature work-flows, including for procurement purposes. New printers allowing secure print via enabled badges were installed on site in 2018. In 2019, the use of 70 g/m^2 paper has been introduced, to reduce the weight of consumed paper (this was equal to 75 g/m^2 in 2018). In terms of number of sheets per person per day, there has also been a considerable reduction between 2011 and 2020 as there has been a drop from 22 to 4, respectively. The latter accounts for an overall reduction above 82% given that back in 2011 the paper was mostly at 80 g/m^2. To be noted that the decrease in paper consumption in 2020 is strongly influenced by the spread of the covid-19 pandemic and the reduced number of staff present on site.

[21] To be noted that JRC-Ispra's offset paper consumption has been measured separately from office paper consumption since 2013.

G5 Reducing carbon footprint and air emissions

G5.1 Carbon footprint

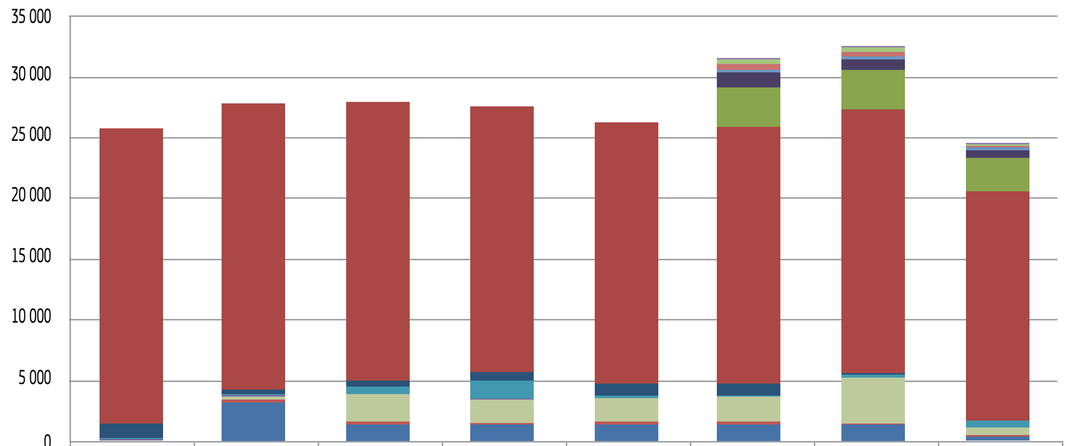
The figures below show the relative importance of emissions under Scopes 1, 2 and 3.

Scope 1 emissions: CO_2 equivalent (CO_2 eq) emissions directly made from the JRC-Ispra site including those produced by the tri-generation plant (from natural gas combustion), by the JRC-Ispra vehicle fleet (from diesel and petrol combustion) and by refrigerants machinery (from cooling gases leaks). These are overall the most impacting carbon footprint contributions covering over 50% of total site CO_2 eq emissions.

Scope 2 emissions: CO_2 eq emissions that are generated indirectly, particularly by consuming electricity on-site.

Scope 3 emissions: CO_2 eq emissions that are a consequence of the activities of the organisation but occur from sources not controlled by JRC-Ispra itself, including emissions associated with business travel and commuting to work (private car, motorcycle, public transport). The emissions of all the supply chains are also calculated: e.g. fixed assets such as buildings, IT, Commission vehicles, service and supply contracts, own waste (calculated for the first time in 2018) and "other upstream emissions" including i.a. water supply, wastewater treatment and furniture.

Figure G. 15 - Carbon footprint emissions (Tonnes CO_2 eq)



	2013	2014	2015	2016	2017	2018	2019	2020
TOTAL	25 773	27 864	28 035	27 574	26 300	31 654	32 583	24 620
Other upstream emission (JCR Ispra)						168	143	143
Own waste	0	0	0	0	0	405	385	163
Catering	0	0	0	0	0	490	379	131
Service contracts	0	0	0	0	0	134	134	133
Paper supply	0	0	0	0	0	34	29	12
Fixed assets - Commission vehicles	0	0	0	0	0	10	10	7
Fixed assets - IT	0	0	0	0	0	1 264	845	586
Fixed assets - buildings	0	0	0	0	0	3 260	3 247	2 786
Buildings - fuels for heating	24 267	23 536	23 012	21 805	21 529	21 159	21 757	18 863
Buildings - electricity	1 217	461	534	818	1 016	957	164	99
Buildings - district heating/cooling	0	0	0	0	0	0	0	0
Buildings - coolant losses	162	92	513	1 410	161	37	208	540
Vehicle fleet - fuel consumption	90	89	87	70	65	54	54	36
Missions (air, RFI=2) and JRC Navette	37	274	2 282	1 916	1 961	2 091	3 687	533
Missions excluding air	0	177	176	145	148	158	149	132
Staff commuting	0	3 236	1 431	1 409	1 420	1 425	1 392	454

Figure G.15 shows the evolution of the site's total CO_2 equivalent emissions subdivided into the different goods and processes. 76,6% of the emissions (18863 tonnes CO_2 eq) are accountable for the use of natural gas to produce electrical energy, as well as heating and cooling by the tri-generation plant. Emissions from "fixed asset building " (11,31%, 2786 tonnes CO_2 eq) and "building coolant losses" (2,19%, 540 tonnes CO_2 eq) also provide high percentage inputs. The covid-19 pandemic affected particularly air travel, i.e. main contributor to travelling for work purposes.

The overall CO_2 eq emissions decreased by 24,4% compared to 2019 due to the spread of the covid-19 pandemic which had a particular impact on some categories such as commuting and business travel.

Commuting staff emissions are mostly related to the use of private car (368 tonnes of CO_2 eq considering only 2,5 months of 2020), this is because the site is not connected by a widespread public transport system. The emissions deriving from the use of other means don't particularly affect the overall value (e.g. 86 tonnes of CO_2 eq for the use of JRC buses,hired cars contribute with 6 tonnes CO_2 eq).

Table G.7- Carbon footprint elements (Tonnes CO_2/person)

	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Fuel consumption and fugitive emissions								
Fuel for bldgs: mains gas	9,10	8,39	8,36	8,04	7,88	7,71	7,80	6,55
Fuel for bldgs: tanked gas (1)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fuel for bldgs: diesel	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Biomass	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Commission vehicle fleet	0,03	0,03	0,03	0,03	0,02	0,02	0,02	0,01
Refrigerants	0,07	0,04	0,22	0,62	0,07	0,02	0,09	0,22
Scope 2: Purchased energy								
External electricity supply (grey),	0,53	0,19	0,23	0,35	0,44	0,39	0,00	0,00
External electricity supply contract (renewables), combustion	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
District heating (combustion) (2)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Scope 3: Other indirect sources								
Fuel for bldgs: mains gas (upstream)	1,81	1,67	1,66	1,60	1,57	1,53	1,51	1,26
Fuel for bldgs: tanked gas (upstream) (1)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Fuel for bldgs: diesel (upstream)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Commission vehicle fleet (upstream)	0,01	0,01	0,01	0,01	0,01	0,00	0,00	0,00
Site generated renewables (upstream) (3)	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,03
External grey electricity supply, line losses	0,01	0,00	0,01	0,01	0,01	0,01	0,00	0,00
External 'renewables' electricity contract (upstream with line loss)	0,00	0,00	0,00	0,00	0,00	0,01	0,05	0,01
District heating (upstream) (2)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Business travel: air (combustion) and JRC Navette	0,02	0,12	0,99	0,85	0,86	0,92	1,58	0,22
Business travel: air (WTT)								
Business travel: rail (combustion)	0,00	0,01	0,01	0,01	0,01	0,01	0,00	0,00
Business travel: rail (WTT)								
Business travel: hire car (combustion)	0,00	0,02	0,01	0,00	0,00	0,01	0,01	0,00
Business travel: hire car (WTT)								
Business travel: private car (combustion)	0,00	0,05	0,06	0,05	0,05	0,05	0,05	0,05
Business travel: private car (WTT)								
Commuting (combustion) (4)	0,00	1,38	0,62	0,62	0,62	0,62	0,60	0,19
Commuting (WTT) (4)								
Fixed assets - buildings	0,00	0,00	0,00	0,00	0,00	1,43	1,39	1,16
Fixed assets - IT	0,00	0,00	0,00	0,00	0,00	0,55	0,36	0,24
Fixed assests - Commission vehicles	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Paper supply	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00
Service contracts	0,00	0,00	0,00	0,00	0,00	0,06	0,06	0,05
Catering	0,00	0,00	0,00	0,00	0,00	0,21	0,16	0,05
Own waste	0,00	0,00	0,00	0,00	0,00	0,18	0,17	0,07
Other upstream emissions (JRC-Ispra)						0,07	0,06	0,06
Sum	**11,6**	**11,9**	**12,2**	**12,2**	**11,6**	**13,8**	**14,0**	**10,2**

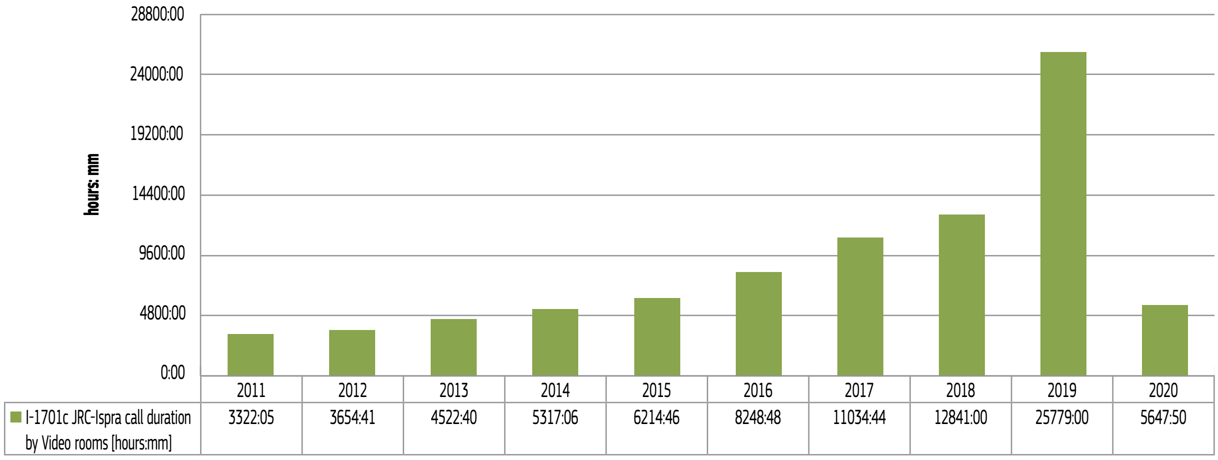
(1) - Grange is the only site with tanked gas rather than mains gas.
(2) - Not all Commission sites.
(3) - Can include Commission bus service when appropriate.
(4) - Geothermal, biomass, PVs.

As can be seen both in Figure G.15 and in Table G.7, the other upstream emissions include information on emissions deriving from activities such as wastewater treatment or goods (e.g. furniture). The impact of these emissions is calculated on the basis of the Ispra OEF methodology.

The 2020 Scope 3 JRC-Ispra commuting mode split has been calculated from the 2016 JRC-Ispra Transport Survey. The results of this and the JRC-Ispra commitment to sustainable mobility can be further seen in Chapter G5.3.

JRC-Ispra provides facilities such as videoconferences (VCs) or Personal Video Systems (PVS) to contain the number of business travels. Accordingly, new KPIs have been introduced based on use of VCs, as PVSs cannot be monitored as they are subject to a privacy policy. The figure G.16 below shows a sharp decline in the use of videoconferencing systems on site due to the reduced number of staff present and the covid-19 pandemic limitations. To be noted that only 22 out of 44 theatres were active from April to December 2020. Data via other videoconferencing sources (computers, mobile phones etc.) is not available for privacy reasons.

Figure G. 16 – Videoconference call duration per year per person



G5.2 CO_2 emissions from buildings

Buildings account for about 83% of JRC-Ispra's calculated CO_2 emissions in 2020, and include those from energy consumption, from refrigerant losses and fixed assets (buildings) as described below.

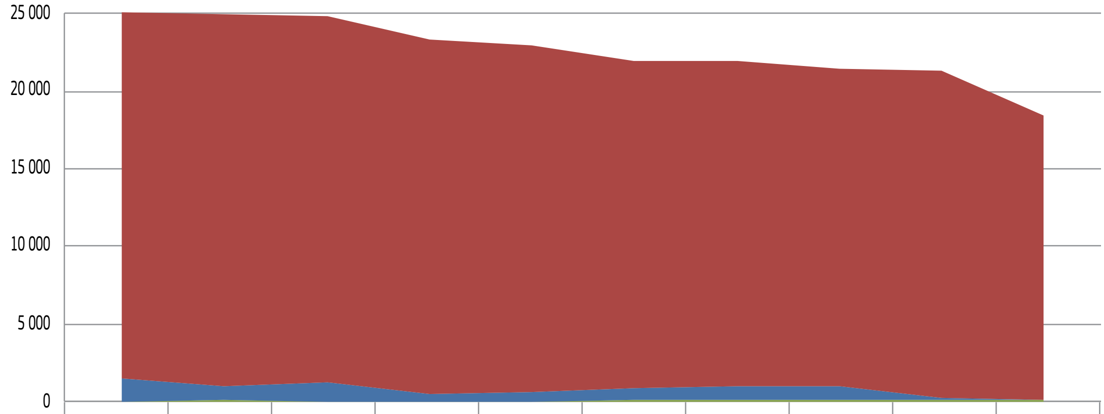
G5.2.1 Buildings (energy consumption)

CO_2 emissions are generated through combustion of the main energy sources:

1. operation of tri-generation plant, i.e. production of electricity and hot water for heating the residences and sports centres;
2. upstream combustion produced by the external supplier to produce electricity supplied to the grid;
3. petrol and diesel used for laboratory activities and specific facilities, including fuel consumption of VELA activities, operating machinery, lifter, generator and other small machinery. This contribution was monitored starting from 2016;
4. cooking in the canteen and Club House.

Total CO_2 emissions from buildings' energy consumption are shown below (Figure G.17 and Figure G.18) together with per capita and per square metre (Figure G.18). Total CO_2 emissions have been decreasing steadily since 2011, due largely to a reduction in emissions associated with gas consumption.

Figure G.17 – CO_2 emissions from buildings heating in the EMAS perimeter, tonnes / year (indicator 2a)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total (tonnes/year)	25 851	25 615	25 483	23 997	23 545	22 623	22 545	22 116	21 921	18 962
mains gas	24 408	24 632	24 252	23 519	22 997	21 771	21 503	21 129	21 719	18 834
electricity	1 425	960	1 217	461	534	818	1 016	927	124	35
diesel and petrol (laboratories and facilities)	17	23	15	17	14	33	25	30	37	29

Figure G.18 – CO_2 emissions from buildings energy consumption in the EMAS perimeter, tonnes / person / m² (indicator 2a)

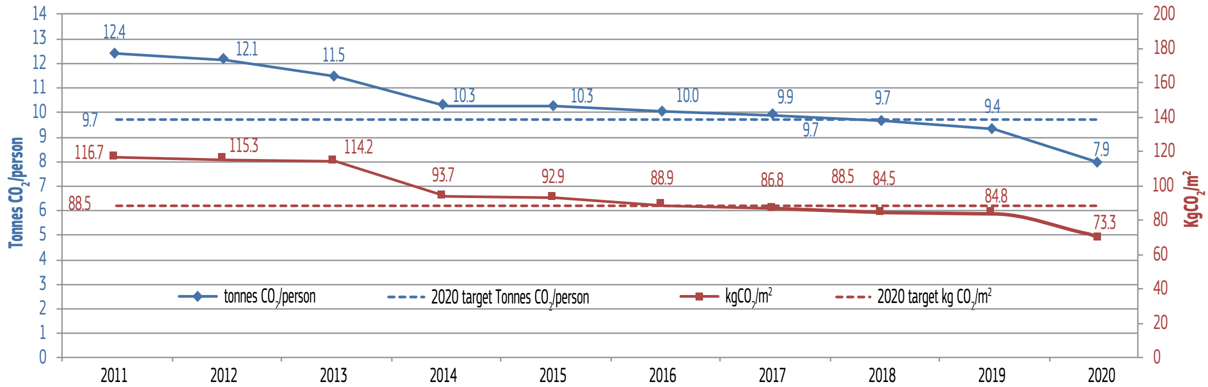


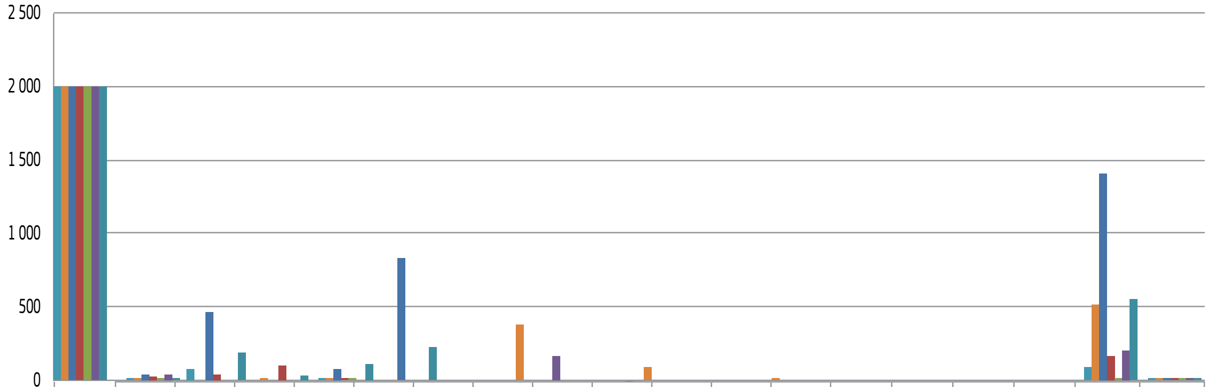
Figure G.18 shows that, as with energy consumption, per capita CO_2 emissions have slowly decreased in the last few years and, overall, have decreased by 25% with respect to 2011. The 2020 CO_2 emissions targets, per square metre and per capita, have been reached, respectively in 2017 and 2018.

To be noted that, in the calculation method for CO_2 emissions, data of 2018, 2019 and 2020 has changed to consider, for the first time, the contribution of upstream emissions generated from the renewable energy produced for the electricity contract.

G5.2.2 Buildings – other refrigerants e.g. greenhouse gases (GHG)

Figure G.19 shows JRC-Ispra's recorded losses of greenhouse gases (GHG) in 2020.

Figure G. 19 – Losses of refrigerants in JRC-Ispra EMAS perimeter (indicator 2b)



	Losses of refrigerants (t CO_2 e)	R22	R410A	R134A	R404A	R407C	R507A	R422D	R23	R427A	R508B	NAF S III	R227A	SF6	R12	R600A	R290A	Total (t CO_2 e)	Total Tonnes CO_2e / person
Series11	2014	0,00	8,26	78	0,00	5,82	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	92,07	0,039
Series12	2015	0,00	12,38	0,00	16,15	6,48	0,00	0,00	384,4	0,00	91,09	0,00	2,64	0,00	0,00	0,00	0,00	513,15	0,224
Series1	2016	0,00	36,21	468	0,00	77,08	828,8	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1 410,1	0,624
Series2	2017	0,00	21,29	39,46	98,5	2,11	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	161,35	0,071
Series3	2018	0,00	7,01	0,00	0,00	3,32	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	37,49	0,016
Series4	2019	0,00	41,38	0,00	0,00	0,00	0,00	0,00	166,16	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	207,54	0,089
Series5	2020	0,00	13,25	179,40	21,67	104,33	221,76	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	540,41	0,224

The 540 tonnes of CO_2eq losses recorded in 2020 originated from 14 out of the 493 machines that were monitored. Here are further details concerning the GHG losses:

- three occurred in laboratories using R407C, R410A and R507A gas;
- five in buildings using R410a;
- four at the cogeneration plant using R134A;
- two in restoration services using R404A.

41% equivalent value of GHG losses are accountable by the leakage occurred to a cooling system serving one of the VELA laboratories. Following the incident, it was decided that gas retrofitting will be anticipated to 2023. JRC-Ispra investigates the causes and makes an in-depth analysis for each leakage. Leakages are generally detected during periodic checks and are linked to the breakage of a component of the system, pipes or its connecting parts.

JRC-Ispra monitors all GHG used on-site for air conditioning, fire prevention systems, cold room and fridges. A general census is updated yearly accounting for new installations and dismantled equipment, last leak checks and leakages, in case of occurrence. The census takes into consideration also equipment containing other refrigerant gases categories, such as Ozone-Depleting Substances (ODS) and Hydro Carbons (HCs). The 7 equipment using ODS are taken under regular monitoring considering the gases are not available for refilling anymore. HCs are suggested to be used for new equipment, when possible, since they have a lower Global Warning Potential (GWP) value and, in case of leakage, the relative impact on the environment would be limited.

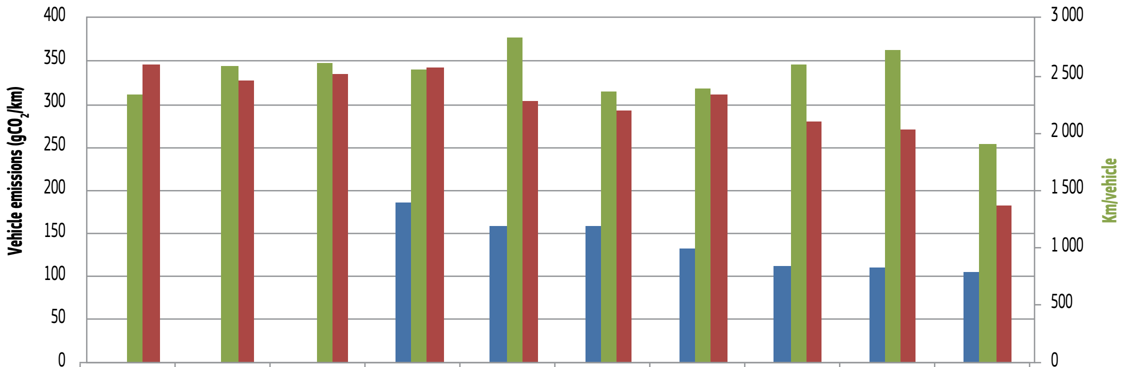
Starting from 2019, JRC communicates leakage data to Italian Authorities through the "Banca Dati F-Gas", following a regulation change. In 2020 the relative Work Instruction has been reviewed and in conjunction with this training has been organised for all parties managing GHG, providing case-by-case support concerning the implementation of the new legal standard.

G5.3 CO_2 emissions from vehicles

G5.3.1 Commission vehicle fleet

Fuel consumption was used to calculate JRC-Ispra's internal vehicle fleet emissions. A theoretical value was calculated using data from the vehicle manufacturer's data taken from the vehicles' log book and is increased by a nominal 3%, to take into account older vehicles for which manufacturer's information on CO_2 emissions was not available. Results are shown in Figure G.20.

Figure G.20 – Emissions per km and distance travelled per vehicle (core indicator 2c)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
gCO_2/km (manufacturer)	0	0	0	186	158	157	132	111	109	104
gCO_2/km (actual)	346	327	334	343	304	292	311	281	271	181
kms/vehicle	2 334	2 578	2 606	2 561	2 837	2 355	2 391	2 598	2 715	1 910

In 2020, the theoretical (manufacturer) vehicle emissions decreased by 4,6% with respect to 2019 and by 44,1% with respect to 2014, thus already going well beyond the 2020 target of -5,1%. This was a consequence of EVs replacing old conventional service vehicles (see section G4.1).

Actual vehicle fleet emissions[22] were reduced by 33,2% with respect to 2019 which can be understood by the fact that the number of electric vehicles and also the km traveled by them has increased.

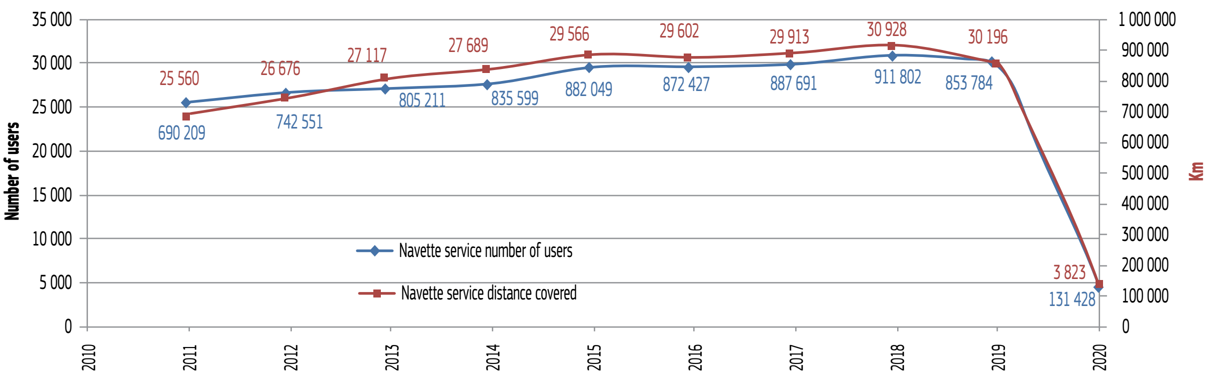
The target for 2020 of 5,1% reduction of the site's vehicle fleet's CO_2 emissions (tonnes) with respect to 2014 was met. The EVs, considering tailpipe emissions, contributed to the achievement of the target thanks to the multi annual plan substitution of conventional vehicles with the electric ones.

As an internal target for 2019, JRC-Ispra foresees a further 5% reduction of the site's vehicle fleet's CO_2 emissions (tonnes) with respect to 2018, with the exception of EVs (these are calculated seperately as scope 1 "Commission vehicle fleet"). In 2020, an additional 5% reduction of the vehicle fleet's CO_2 emissions with respect to 2019 shall be targeted following the successful completion of an on-going call for tender to purchase 6 light vans and 3 large vans, which will replace the same number and type of conventional vehicles. These nine new electric vehicles have been delivered at the end of 2020 and will be put in service during the first months of 2021.

G5.3.2 Missions(business travel) and local work based travel (excluding Commission vehicle fleet)

The Logistics Unit manages a contractor taxi service ("navette") for transporting staff from the site to the most important transport interchanges (chiefly Malpensa and Linate airports and Milan railway station). Usage is shown below in Figure G. 21.

Figure G. 21 – Navette service users and covered distance (km)



Data shows a sharp decrease of about 85% in the number of people using the Navette service in 2020 compared to 2011. This data is affected by the spread of the covid-19 pandemic and travel limitation in 2020.

[22] This indicator excludes EVs given that their CO_2 upstream contribution is already accounted for within the total site CO_2 direct emissions indicator. The resulting upstream EV charging is 2,7 equivalent tonnes of CO_2 and corresponds to ca. 6% of the total site vehicles' CO_2 direct emissions. This indicator shall be refined in the future by fully monitoring all EVs.

There was also a sharp decrease in km traveled compared to 2019 (-84,6%). Requests to use the navette service depend on JRC core activities and, consequently, there are currently no specific actions planned relating to reducing the navette service use. On average, in 2020 the coefficient of use of the shuttles is 2,2 persons / trip (this includes both 8-seater vans and 3-seater cars). Until mid-March, the service was "business as usual" and that is why the KPI does not seem so different compared to 2019 (2,69 persons/trip). However, if we were to take the months following the resumption of the service in mid-June, the data is around 1.00 - 1.11

G5.3.3 Commuting

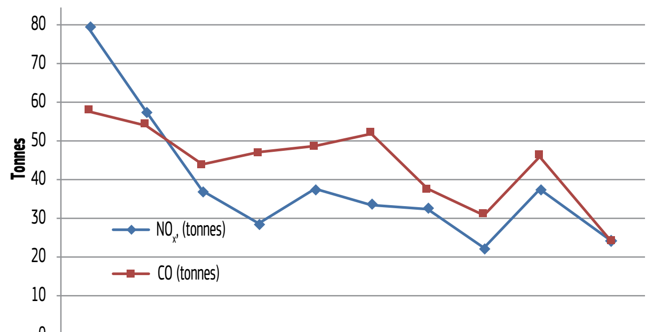
Public transport is currently not available and not practical for commuting to the Ispra site. The Ispra Site Manager is fostering actions with relevant stakeholders both to improve safe commuting to work by bicycle and also to enhance the access of public transport towards the Ispra site. For more information on the "Bicycle to work" project, see Chapter External communication and stakeholder management".

Currently, the most commonly used mode of transportation is the car (used by 76% of staff), followed by the bicycle (8%) and the JRC Bus (6%). Ispra site management is committed to foster a more sustainable commuting transport, in particular looking into creating sinergies with public transport.

The site has provided a free bus service since the 1980s covering most of the Varese Province, and also reaching out as far as Milan. Staff predominantly drive to work; "Small ads", a dedicated tool within the internal intranet site, helps staff promote carpooling amongst colleagues. An internal survey carried out in 2020 in the framework of the Living labs reveals interesting information noted in the following infographic.

G5.4 Total air emissions of other air pollutants (CO, NO_x)

Figure G.22 - Evolution of annual air emissions from the tri-generation plant (data 2011-2020)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NO_x (tonnes)	79	57	37	28	37	34	32	22	37	24
CO (tonnes)	58	54	44	47	48	52	37	31	46	25

JRC-Ispra estimates the quantity of air pollutants emitted by the cogeneration engines by means of instrumentation providing continuous analysis of NO_x and CO concentrations provided by an analysis device installed on the engine stacks and by the emission flow rates, estimated on the basis of the engine's technical data sheets. As the tri generation plant consumes natural gas, other air pollutants, such as SO_2 or PM, were not emitted. Other air emission sources (i.e. natural gas boilers at the JRC-Ispra residences, laboratories and facilities using diesel and gasoline) are considered as negligible compared to the tri-generation emissions and are therefore not monitored.

Following a more in-depth analysis of the technical data sheets of the engines of the tri-generation plant, the calculating method of the annual emissions for 2019 was optimized. This new method was also used to recalculate the values from the 2011 to 2018.

Despite the aging of the tri-generation plant, Figure G.22 shows that there has been a reduction in the quantities of NO_x and CO emitted by the plant in 2020 compared to 2019. This is accountable thanks to the installation of a new kind of filtration system on all the engines of the tri-generation plant and also to a minor number of engine operating hours compared to 2019.

Although there was an overall reduction in the values with respect to 2019, the concentration of NO_x and CO emitted from the tri-generation plant during 2020 exceeded, in several moments, the new, stricter, threshold limits set by Regione Lombardia for 2020. However, it is to be noted that given its specific legal framework, JRC-Ispra is not subject to local and national legislation, but applies it as a best practice and on a voluntary basis. Furthermore, more stringent limits have already been established starting from January 2021.

Some corrective actions have been identified and shared in a fully transparent way with Italian authorities (Regione Lombardia, both the national and regional environmental protection agency as well as the Province of Varese):

- a call for tender for construction works for a new plant tri-generation (replacing the existing one) was launched. It is expected to start operating in late 2023;
- new filtering systems have been installed on every engine;
- the installation of the instrumentation for continuous monitoring of the emissions on all engines is on-going.

In the meantime, JRC-Ispra committed to manage the operation of the engines so as to ensure that the overall emission (mass flow) for NO_x and CO doesn't exceed the equivalent emission that would be obtained assuming the continuous operation of the engines for the whole year, on the basis of the concentration limits defined in the regional legislation. For the year 2020, this disposition was completely satisfied.

G5.5 Radioactive emissions

JRC-Ispra, as established in the operational provisions for nuclear installations and under Italian law, has set up a program of environmental monitoring in order to detect and record potential radioactive releases and monitor the level of radioactivity in the environment in its surroundings. This uses a network of fixed instrumentation for sampling and/or direct measurement complemented by environmental sampling made within the site and in the surrounding areas. Main sampling characteristics are shown in following table:

Environment compartment	Type of Samples	Sampling place
Air	Air effluents	JRC nuclear plant chimneys
	Aqueous vapour, Air particulate, Fall out	JRC environmental monitoring stations,
Liquid	Liquid effluents	JRC Liquid Effluent Treatment Station (STEL)
	Surface Water, Groundwater, Drinking water, Sewage sludge	JRC water treatment plant , Rio Novellino, Acquanegra stream, JRC pond, Lake Maggiore (Ispra, Ranco, Cerro) Ticino river
Soil	Soil and sediments	Soils in Ispra, Brebbia and Capronno, Rio Novellino
Feed	Fodder, Vegetables, Fruit	Ispra, Brebbia, Capronno, Angera farms
	Fish	Lake Maggiore
	Honey	Brebbia
	Meat	Cadrezzate
	Milk	Ispra, Brebbia, Capronno farms
Ambient dose	Dosimeter	JRC perimeter stations, City Hall of: Angera, Besozzo, Brebbia, Cadrezzate, Taino, Travedona

Within the framework of operation and pre-decommissioning of its nuclear and radioactive facilities and installations, the site is authorized to discharge low quantities of gaseous and liquid radioactive effluents (**FdS**), through authorized release points, in accordance with the limits set out in operational provisions issued by the Italian Regulatory Authority.

Gaseous radioactive effluents can only be released from the nuclear installations after filtration and continuous radiometric control. The amount of gaseous radioactive releases is shown in the following table. The amount of the JRC-Ispra radioactive releases, together with a summary of the results of the environmental surveillance, are reported on the website[23] of I.S.I.N., the National Competent Body.

Table G.8 Gaseous radioactive effluents

Year	Gaseous radioactive effluents		Percentage of authorized limit
	type	[Bq]	[%]
2020	Tritium	$7{,}91 \cdot 10^{10}$	0,11
2019	Tritium	$9{,}03 \cdot 10^{10}$	0,13
	Cs-137	$5{,}74 \cdot 10^{2}$	
2018	Tritium	$2{,}08 \times 10^{11}$	5,7
2017	Tritium	$1{,}87 \times 10^{11}$	0,25
2016	Tritium	$3{,}36 \cdot 10^{11}$	0,45
2015	Tritium	$1{,}40 \cdot 10^{11}$	0,19
	Cs-137	$7{,}03 \cdot 10^{3}$	
2014	Tritium	$1{,}34 \cdot 10^{11}$	0,18

Similarly, the release of radioactive liquid effluents is permitted only after treatment and prior radiometric control. Amount of liquid releases are shown in the following table.

Table G.9 Liquid radioactive effluents

Year	Liquid radioactive effluents		Percentage of authorized limit
	type	[Bq]	[%]
2020	α-emitters	$4{,}63 \cdot 10^{4}$	0,615
	β-γ emitters	$7{,}71 \cdot 10^{5}$	
	Sr-90	$3{,}85 \cdot 10^{5}$	
	Tritium	$6{,}24 \cdot 10^{6}$	
2019	α-emitters	$3{,}89 \cdot 10^{4}$	0,024
	β-γ emitters	$9{,}03 \cdot 10^{5}$	
	Sr-90	$8{,}11 \cdot 10^{5}$	
	Tritium	$7{,}70 \cdot 10^{7}$	
2018	α-emitters	$3{,}80 \cdot 10^{4}$	0,012
	β-γ emitters	$5{,}81 \cdot 10^{5}$	
	Sr-90	$3{,}72 \cdot 10^{5}$	
	Tritium	$1{,}63 \cdot 10^{7}$	
2017	α-emitters	$7{,}75 \cdot 10^{4}$	0,019
	β-γ emitters	$1{,}09 \cdot 10^{6}$	
	Sr-90	$5{,}61 \cdot 10^{5}$	
	Tritium	$1{,}22 \cdot 10^{8}$	
2016	α-emitters	$7{,}16 \cdot 10^{3}$	0,011
	β-γ emitters	$4{,}52 \cdot 10^{5}$	
	Sr-90	$3{,}56 \cdot 10^{5}$	
	Tritium	$1{,}45 \cdot 10^{8}$	
2015	Tritium	$2{,}85 \cdot 10^{7}$	0,0017
	β-γ emitters	$1{,}21 \cdot 10^{6}$	
2014	α-emitters	$7 \cdot 10^{4}$	0,05
	β-γ emitters	$5{,}33 \cdot 10^{6}$	
	Sr-90	$1{,}37 \cdot 10^{6}$	
	Tritium	$1{,}67 \cdot 10^{8}$	

23 https://www.isinucleare.it/

It should be noted that since November 2020 the authorized discharge limits have been reduced in accordance with the requirements of the Italian Regulatory Authority. A further reduction will derive from the approval of the new discharge formula, the authorisation process for which is currently underway.

Even though the authorised discharge limits have been reduced, the total activity released in 2020, both liquid and air, remains well below the authorised limits and the overall releases resulted in negligible doses for the population, quantified well under 1 microSv/year[24], even under conservative assumptions.

In 2021 a further reduction of the authorised discharge limits is expected as well as the start of important projects for the treatment and release of the water in the decay pools of the Ispra1 and SGRR plants. Despite this, the 2021 target is to keep discharges well under the authorised limits, in line with the values of the last years and to keep, in any case, the dose values to the population well below the threshold of non-radiological relevance of 10 microSv/year, as defined by Italian legislation and European directives.

JRC-Ispra is committed to keep the effluent treatment systems, the measurement instrumentation and the whole environmental monitoring network updated and efficient both in order to keep emissions as low as reasonably achievable and to be ready for the most challenging decommissioning activities.

In this context, in 2007 JRC-Ispra replaced the old liquid effluents treatment plant (called STRRL, Radioactive liquid effluent treatment facility) with a modern treatment plant for liquid effluents (called STEL, Liquid effluent treatment plant facility) based on more environmentally friendly physical phenomena such as precipitation and flocculation whose operational provisions foresee more restrictive limits for authorised releases. Furthermore, during the last few years, most of the fixed instrumentation for the environmental monitoring network has been replaced with more modern and efficient instruments.

G6 Improving waste management and sorting

JRC-Ispra produces many different types of waste which vary according to the site's activities of which are sorted as much as possible. The Logistics Unit manages all the activities of conventional waste collection, handling and disposal by means of external suppliers specialised in waste management.

The 2018 and 2019 kill plastic campaigns were of particular relevance as they addressed a topic of notable concern nowadays and on which the Commission is actively committed. In an effort to do as you preach, and possibly go beyond, JRC-Ispra kicked-off as many as 33 site level actions going beyond regular waste management: the suppression of Single Use Plastic (SUP) used both by our catering services and staff was targeted either directly or indirectly, e.g. by promoting the use of water bottles for collecting water coming from water dispensers.

All these actions were formally communicated and shared with the EC EMAS registration governing body. Of these:

- nine were completed in 2018;
- five were started in 2019, of which three were completed;
- one is a continuous action, and
- one is ongoing (relating to monitoring activities (water dispensed on site, invitation to visitors to bring their own bottle to use the water dispensers on site).

Where reusable materials could not be used and SUP could not be substituted, JRC-Ispra invested in biodegradable and compostable SUP. For example, single-use PI sachets of oil and vinegar, plastic tableware and cutlery, coffee milk pods, plastic straws, plastic tableware and cutlery are no longer available as they have either been substituted by compostable or reusable items.

JRC-Ispra's waste management contractor was asked whether biodegradable and compostable SUP could be digested within its anaerobic organic waste treatment plant. Following a negative reply, he was asked to provide confirmation through testing. The test result showed that indeed the SUP was fully biodegradable and compostable. Hopefully these test results will also have a positive repercussion on all town halls served by this contractor and also their SUP may be sorted with organic waste. More information on this can be found in Chapter Internal communication.

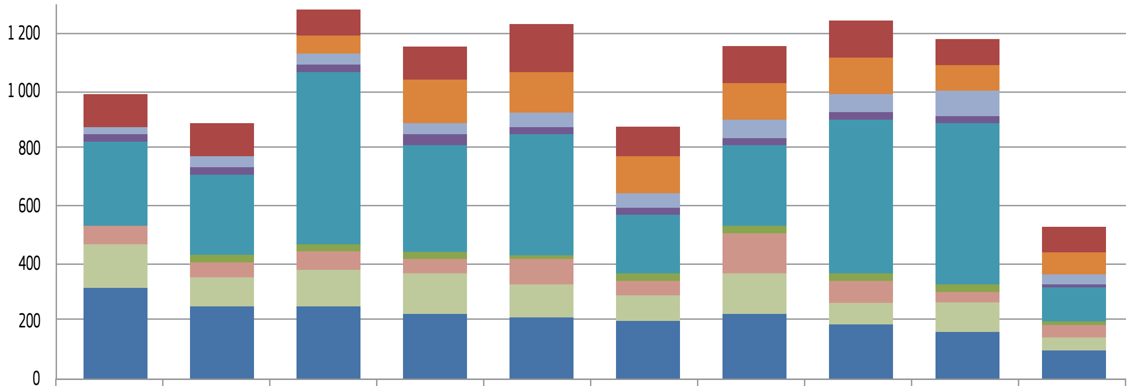
Due to the covid-19 pandemic in 2020 no further action could be taken.

[24] The Sievert (Sv) is the unit of measure of dose (technically, effective dose) deposited in body tissue, averaged over the body. Such a dose would be caused by an exposure imparted by ionizing x-ray or gamma radiation undergoing an energy deposition of 1 joule per kilogram of body tissue.

G6.1 Non-hazardous waste

The evolution of non-hazardous waste production is shown below in Figure G.23.

Figure G.23 - Evolution of total non-hazardous waste production in JRC-Ispra (tonnes)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	989,8	883,1	1 285,7	1 147,8	1 235,4	877,8	1 155,4	1 247,3	1 185,	524,8
Total (tonnes/person)	0,47	0,42	0,58	0,49	0,54	0,39	0,51	0,55	0,51	0,22
Other	120,7	116,1	95,4	108,1	172,9	101,9	132,9	133,6	96,7	86,9
Street cleaning	0,0	0,0	57,8	151,3	137,2	135,2	127,8	124,4	87,6	76,0
Organic waste	19,5	34,2	37,7	44,1	48,1	51,7	59,0	69,0	87,0	33,4
Plastic	31,3	27,6	33,0	33,1	27,4	25,8	29,4	26,7	25,7	12,6
Metal (scrap)	283,3	274,9	601,4	370,8	416,1	196,2	271,2	527,3	567,4	114,1
Glass	4,9	24,5	24,9	31,1	21,1	23,6	30,7	23,2	21,9	17,2
Wood	58,7	51,1	62,0	50,3	84,5	57,1	138,0	76,6	39,5	36,8
Paper and cardboard	153,3	109,0	130,1	137,6	113,6	90,4	138,3	83,0	95,8	50,3
Mixed urban waste	318,2	245,7	243,4	221,5	214,4	195,8	228,1	183,5	163,4	97,4

The data shown in Figure G.23 underlines the difficulty of defining trends and setting targets over the years for total non-hazardous waste and individual categories. In fact, this strongly depends both on the number of staff present on site and on certain activities, such as maintenance, construction or demolition of buildings. 2020 data are affected by spread of covid-19 pandemic and the reduced number of personnel working on site. For this reason, there was 55,7% decrease in total non-hazardous waste with respect to 2019 on account of the decrease in production of mixed urban waste (-40,4%), metal scrap (-79,9%), organic waste (-61,6%) and plastic (-51,1%).

In order to reduce the use of single use plastic bottles, in 2016 an in depth analysis over the use of water dispensers, was performed. This led to the installation and monitoring of 26 water dispensers (5 of them added during 2020), on lease. The importance of this proactive initiative was also confirmed by the Commission itself by means of the "European Strategy for Plastics in a Circular Economy". In 2020, 73 689 litres of drinking water were distributed from water dispensers installed in buildings, canteens and Club House. This corresponds to 147 378 PET bottles being saved or, equivalently, avoiding using 3 684 kg of plastic waste.[25] In 2020 there was a significant reduction of water consumption (-66,4% compared to 2019), due to a limited presence of staff in the buildings, the reduction of opening of the Club House and canteens and the introduction of a take-away service since March 2020, i.e. since the beginning of the pandemic restrictions to staff. Due to these differences, the results of 2020 are not comparable to the results of the previous years.

Despite the very specific boundary conditions, an analysis was made over the frequency and quantity of water to be used to rinse the water dispenser, to see if rinsing water use could be reduced, thereby always granting quality water. The assessment showed that amounts of water used for rinsing could be halved, thus granting virtual savings for 56 412 litres.

JRC-Ispra is also trying to maximise the sustainability of its waste streams by adopting circular economy management criteria. Despite the covid-19 limitations the following good practises have been established:

- Recycling and reusing furniture or scientific equipment (mainly chemical hoods and safety cabinets) inside the JRC-Ispra site. Approximately 91% of the furniture was reused in 2020and about 82% in the last 6 years as a result of the following removals. The trend is growing notably, in fact in 2015 only 70% of furniture were reused.

[25] Considering a weight of 25g per each 500ml bottle.

- Donating the scientific equipment and recyclable ICT assets (PCs are replaced every 5 years) to non-profit organisations having humanitarian, social, educational, training, charitable or environmental purposes. In 2020, 52 PCs and 37 monitors were donated (memories bleached) to non-profit organisations. This action has a high potential for further development. 2 scientific equipment instruments (safety cabinets) were reused internally.

In 2020 the JRC-Ispra sold 849,12 tons of mixed wood material (branches, tree trunks, stumps). In particular:

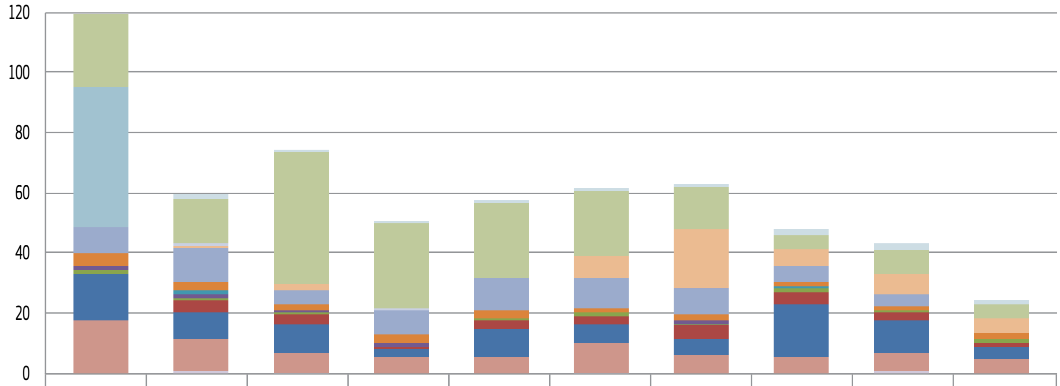
- 511,26 tons of branches and 232,96 tons of mixed wood/trunks were used to produce energy by means of cogeneration plant fuelled by biomass;
- 104,9 tons of stumps were sent to authorised waste treatment plants to produce soil conditioner by composting and waste recovery, thus granting a new use for material that would have otherwise become waste.

Major actions still not presented within the text are included in the Commission's EMAS Annual Action Plan for non-hazardous waste management are reported hereafter.

Initial year / ref.#	**Action description**	**Action type**	**2020 objective** **2019 results**
2015 / 161	Increase the percentage of recycled urban waste	Continuous	2021 objectives: To evaluate the possibility of new waste collection points and take actions if needed. 2020 results: No new collection points have been implemented, due to the pandemic.
2015 / 162	Increase awareness of waste management (reduction and separation)	Continuous	2021 objectives: To implement a new more in-depth training course with wider contents on the management of special / hazardous and urban waste at the JRC-Ispra (no longer only on laboratory chemical waste). The general course on municipal waste (MSW) will also be re-proposed. 2020 results: due to pandemic restrictions, no courses were done in 2020
2016 / 168	Clarification of the procedures for managing the waste management in classified areas from a documentary point of view as well as for refurbishment and reorganisation	Single	2021 objectives: apply the E-type procedure to dismiss 15 tons as conventional materials, delayed due to covid-19 pandemic 2020 results: over 7 tons dismissed as conventional waste, 10 tons ongoing procedures; 13 tons of Type E-materials re-classified into D-type materials.
2017 / 307	Installing water dispensers on site.	Multi-stage	2021 objectives: to continue monitoring and analysing water consumption in order to establish if further water dispensers are needed. 2020 results: 5 new distributors were installed (for a total of 17) during 2020 and water consumption monitoring and relative analysing has continued but, due to the coronavirus pandemic, the acquired results were affected by the lack of staff on the site. Anyway, to reduce water waste, water rinses have been reduced from 4 to 2 per day on all water dispensers, after having demonstrated the quality of water by means of specific analyses.
2018/ 483	Monitoring the volume of water distributed by new water dispenser	Continuous	2021 objectives: to continue monitoring and analysing water consumption in order to establish if further water dispensers are needed. 2020 results: 5 new distributors were installed (for a total of 17) during 2020 and water consumption monitoring and relative analysing has continued but, due to the coronavirus pandemic, the acquired results were affected by the lack of staff on the site. Anyway, to reduce water waste, water rinses have been reduced from 4 to 2 per day on all water dispensers, after having demonstrated the quality of water by means of specific analyses.

G6.2 Hazardous waste

Figure G. 24 - Evolution of total hazardous waste in JRC-Ispra (tonnes)



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	119,25	59,33	74,12	50,14	57,19	60,91	62,61	48,27	43,31	24,14
Total (tonnes/person)	0,06	0,03	0,03	0,02	0,02	0,03	0,03	0,02	0,02	0,01
Other	0,00	1,35	0,72	0,24	0,09	0,21	0,08	2,29	1,92	0,80
Electrical equipment WEEE	24,02	14,96	43,19	27,96	25,01	21,60	14,19	4,45	7,96	4,70
Waste containing PCB	0,00	0,08	0,00	0,87	0,00	0,00	0,00	0,00	0,00	0,00
Waste belonging from buildings and streets maintenance	0,00	0,89	2,04	0,17	0,11	7,39	19,92	5,36	7,24	4,75
Asbestos material	46,27	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Mercury containing objects	0,24	0,00	0,04	0,01	0,00	0,02	0,05	0,00	0,00	0,00
Lead-acid battery	8,99	11,62	4,71	7,63	11,10	9,58	8,83	5,34	3,78	0,50
Medical waste	3,64	2,72	2,58	3,02	2,60	1,55	1,97	1,87	1,51	1,50
Spray cans	0,00	1,49	0,00	0,04	0,00	0,08	0,06	0,26	0,00	0,05
Solvent	1,74	1,34	0,42	1,19	0,00	0,00	0,88	0,00	0,00	0,00
Paint	1,41	0,10	0,60	0,31	0,32	1,39	0,54	1,23	0,18	1,75
Filters	0,00	4,01	3,28	0,24	2,92	2,52	4,20	4,48	2,68	1,33
Waste oil	14,93	9,10	9,77	2,63	9,28	6,33	5,46	17,63	11,32	4,20
Laboratory mixed waste	18,01	10,92	6,59	5,83	5,36	10,02	6,00	5,17	5,93	4,47
Batteries	0,00	0,75	0,18	0,00	0,38	0,22	0,42	0,19	0,79	0,11

Hazardous waste production depends largely on site specific research activities carried out in the laboratories, specific maintenance requirements[26] and changes in site use such as removal of laboratories. In 2020 due to spread of the covid-19 pandemic there was a decrease in the total quantity of hazardous waste (-44,3%, compared to 2019).

Waste such as 08.01.11* waste paint and varnish containing organic solvents or other hazardous substances* significantly increased although the quantity is not very significant in general terms (from 0,18 tonnes to 1,75 tonnes). This was due to demolition of buildings 28, 59a e 59t where paint was stored.

The average cost of disposal decreased in 2020 by about 8% with respect to 2019, thanks to better sorting and classification of the waste produced.

The action addressing hazardous waste management is as follows:

Initial year / ref.#	**Action description**	**Action type**	**2020 objective** **2019 results**
2017 / 306	Optimise the operational control of the new storage of special waste in order to maintain low quantities of waste stored (especially hazardous or flammable waste).	Continuous	2021 objectives: To manage the electronic waste (PC etc.) through AMI and / or transposition of the WEEE directive Dir. 2012/19 / EU European Parliament and of the Council in such a way as to keep low quantities of sorted waste at all times. 2020 results: Due to the pandemic quantities of waste stored were low and well managed; total electronic waste disposed in 2020: 16.02.11* = 2,84 tons 16.02.13* = 1,6 tons 16.02.14 = 22,06 tons

[26] To be noted that from 2012 responsibility for asbestos disposal was transferred to the contractor.

G6.3 Waste sorting

Table G.10 – Percentage of waste sorted at the Commission in JRC-Ispra

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percentage of waste sorted	71,3	73,9	82,1	81,5	83,4	79,1	81,3	85,8	86,7	82,3
Percentage of waste not sorted	28,7	26,1	17,9	18,5	16,6	20,9	18,7	14,2	13,3	17,7

The table above demonstrates that in the last few years there has been a generally increasing trend in the amount of waste sorted into separate waste streams. In 2020 there was a decrease (-5,1%) in thi s trend possibly due to a less care during the pandemic. The percentage of waste not sorted decreased by 4,1% compared to 2014.

G6.4 Wastewater discharge

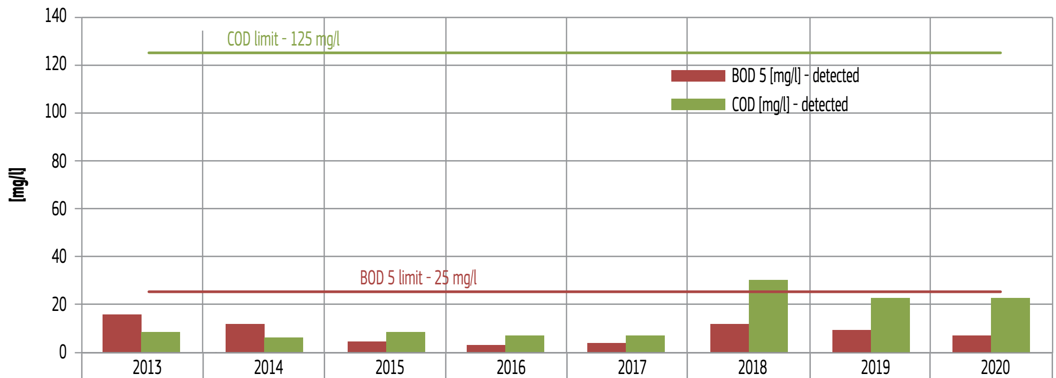
JRC-Ispra site's wastewaters include discharges produced by flush toilets (both from the internal JRC area and the area outside the fence, i.e. the social areas) and discharges produced by the canteens, laboratory sinks, etc. as well as part of the urban wastewater from the Municipality of Ispra[27]. These are conveyed by a 26 km sewerage system to the site's urban wastewater treatment plant which has been operational since 1978.

A secondary wastewater discharging system collects only "white" wastewaters (rain-water and soil drainage) and conveys them to the Acquanegra Stream via several discharge points around the site without need of any preventive treatment processes.

The treatment process used is biological biodisc followed by sedimentation and treatment by Ultra Violet (UV) rays. The maximum treatment capacity, which is limited by the UV treatment equipment, is 870 m^3/h. Excess flow is diverted into two different bypasses located upstream of the wastewater treatment plant.

Treated wastewater is finally discharged in the Novellino Stream and monitored to ensure compliance with the Italian threshold limits[28] for water quality, reported monthly to Italian authorities via the "Sistema Informativo Regionale Acque" database. Figure G.25 .and Figure G.26 show the annual average values of some main parameters of the wastewater discharge from JRC-Ispra. Although there is a slight physiological annual variation, all the parameters are always well below the Italian threshold limits.

Figure G. 25. Annual average concentration value of BOD$_5$ (daily average, detected monthly) and COD (daily average, detected monthly) at the wastewater treatment plant discharge point with respect to the Italian threshold limits (mg/L).

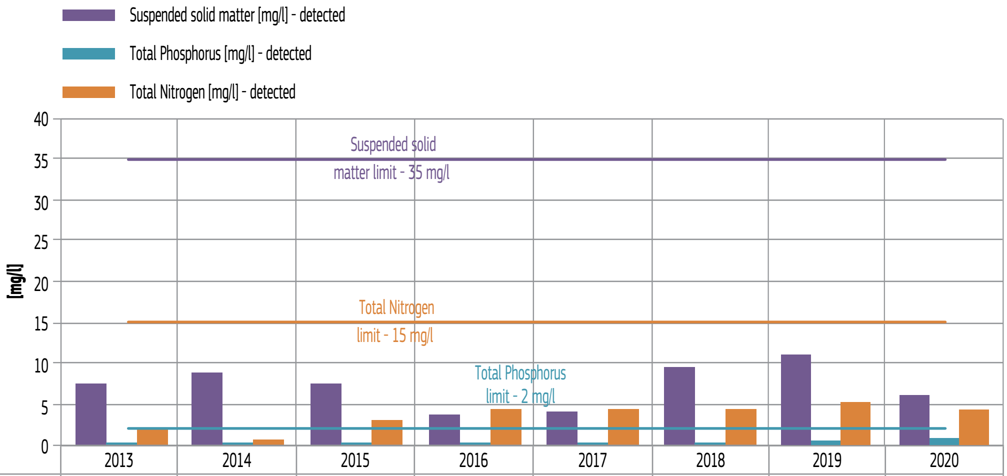


	2013	2014	2015	2016	2017	2018	2019	2020
BOD 5 [mg/l] - detected	15,83	11,82	4,48	3,18	3,53	11,38	9,33	6,75
COD [mg/l] - detected	8,75	6,16	8,44	7,28	7,11	30,08	22,58	22,17
BOD 5 [mg/l] - limit	25	25	25	25	25	25	25	25
COD [mg/l] - limit	125	125	125	125	125	125	125	125

27 Treatment of the wastewater from the Ispra Municipality is according to a specific Agreement between the two parties stipulated on 30.06.2011 (Ref. Ares(2011)750566) and renewed on 15.06.2016 (Ref. Ares(2016)2775778).

28 Legislative Decree 152/06, Part 3 of Annex 5, Tables 1 and 2 "Emission limits for urban wastewater disposal plants discharging in surface water bodies and sensitive areas"

Figure G.26. Annual average concentration value of Suspended solid matter (daily average, detected monthly), total Phosphorus (annual average, detected monthly) and total Nitrogen (annual average, detected monthly) at the wastewater treatment plant discharge point with respect to the Italian threshold limits (mg/L).



	2013	2014	2015	2016	2017	2018	2019	2020
Suspended solid matter [mg/l] - detected	7,68	8,77	7,63	3,91	4,01	9,48	10,92	5,92
Total Phosphorus [mg/l] - detected	0,48	0,32	0,34	0,49	0,42	0,38	0,57	1,04
Total Nitrogen [mg/l] - detected	1,98	0,77	3,14	4,43	4,61	4,29	5,37	4,41
Suspended solid matter [mg/l] - limit	35	35	35	35	35	35	35	35
Total Phosphorus [mg/l] - limit	2	2	2	2	2	2	2	2
Total Nitrogen [mg/l] - limit	15	15	15	15	15	15	15	15

In addition to these, further analytical checks are performed on a voluntary basis every two months to verify that the wastewater is also below more stringent threshold limits . In 2020 the threshold limit values have been respected at all times.

Table G.11 - Total water use and total water discharged (2015-2020)

	2015	2016	2017	2018	2019	2020
Total water withdrawn from Lake Maggiore [mc]	2 201 344	1 875 214	1 768 919	1 827 458	1 434 107	1 183 936
Total water discharged in Rio Novellino] [mc]	5 659 332	3 990 727	3 522 299	2 696 844	3 961 201	3 890 451

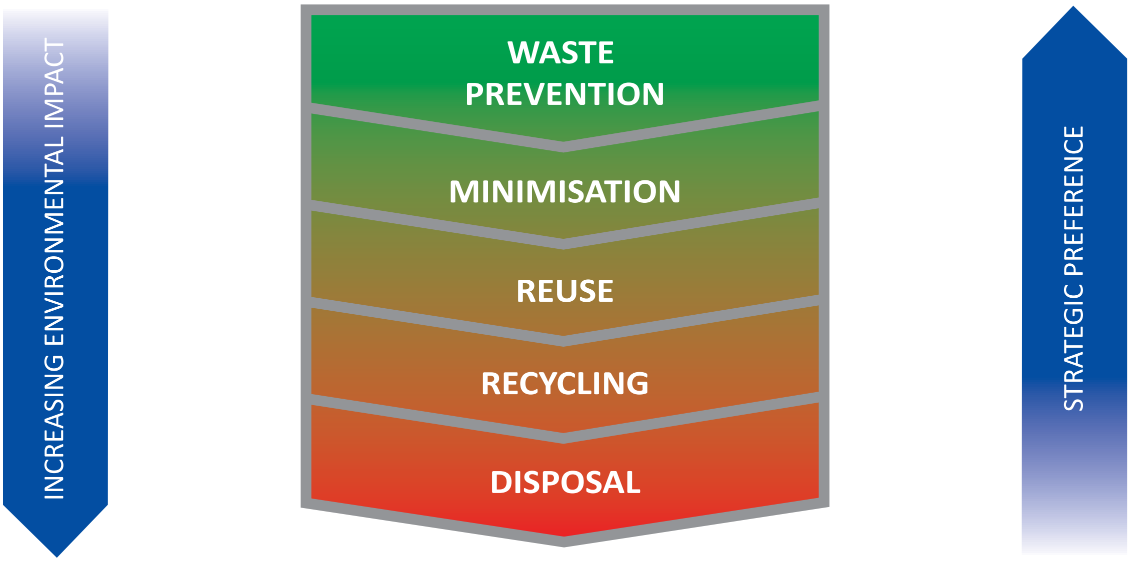
The table above shows that the volume of water withdrawn from the Lake Maggiore is far smaller compared to that treated in the wastewater treatment plant and then discharged in Rio Novellino, which then reaches Lake Maggiore. The overall JRC-Ispra water cycle balance is virtuous, thanks also to rainwater and groundwater contributions.

About 3,9 million cubic metres of wastewater were treated in 2020 of which about 9% comes from the Municipality of Ispra. Despite the lower presence of staff on site due to the covid-19 pandemic, the total volumes of water discharged in the Novellino stream has substantially confirmed the 2019 values (-1,8% compared to 2019). Furthermore, despite the reduction of the wastewater coming from the Municipality of Ispra compared to 2019 (-38,6%), the wastewater treated from the JRC-Ispra site further increased by 4,7% in the same period. The reasons could be:

- the increase in the amount of rainwater treated in the wastewater treatment plant (e.g. more constant rain events cause less activation of the plant's bypasses);
- not monitored water inputs from outside the site or coming from groundwater delivered through the old sewer lines;
- the reliability of the measurement of the quantity of wastewater coming from the municipality of Ispra (due to the presence of numerous debris);
- other.

A multi-stage project for further separating the "white" and the "black" wastewaters is on-going in order to improve the entire JRC-Ispra sewage network. A budget has been assigned for works to continue in 2020 and beyond.

G6.5 Radioactive Waste Management System



Significant quantities of radioactive waste from prior on-site activities have accumulated on site. Even greater quantities of waste are expected to be generated by the decommissioning activities in the next few decades. The Nuclear Decommissioning Unit is developing a management system for radioactive waste ensuring strong internal controls are in place both for historical waste and for new waste originating from operations and (pre)decommissioning activities.

Solid materials are released following a clearance process[29]. A detailed report of the releases by the site and an assessment report of the dose to the human population in the surrounding areas are sent annually to the Italian Control Authority.

Historical solid nuclear waste is stored in "Area 40", either unconditioned or conditioned in bituminised drums, or in concrete blocks or in buried concrete cylinders (the so-called "roman pits").

The radioactive waste management system set up at the site includes clearance materials and radioactive waste in accordance with Italian Law (mainly Legislative Decree 230/95). It includes elements related to planning, quality assurance and activity recording.

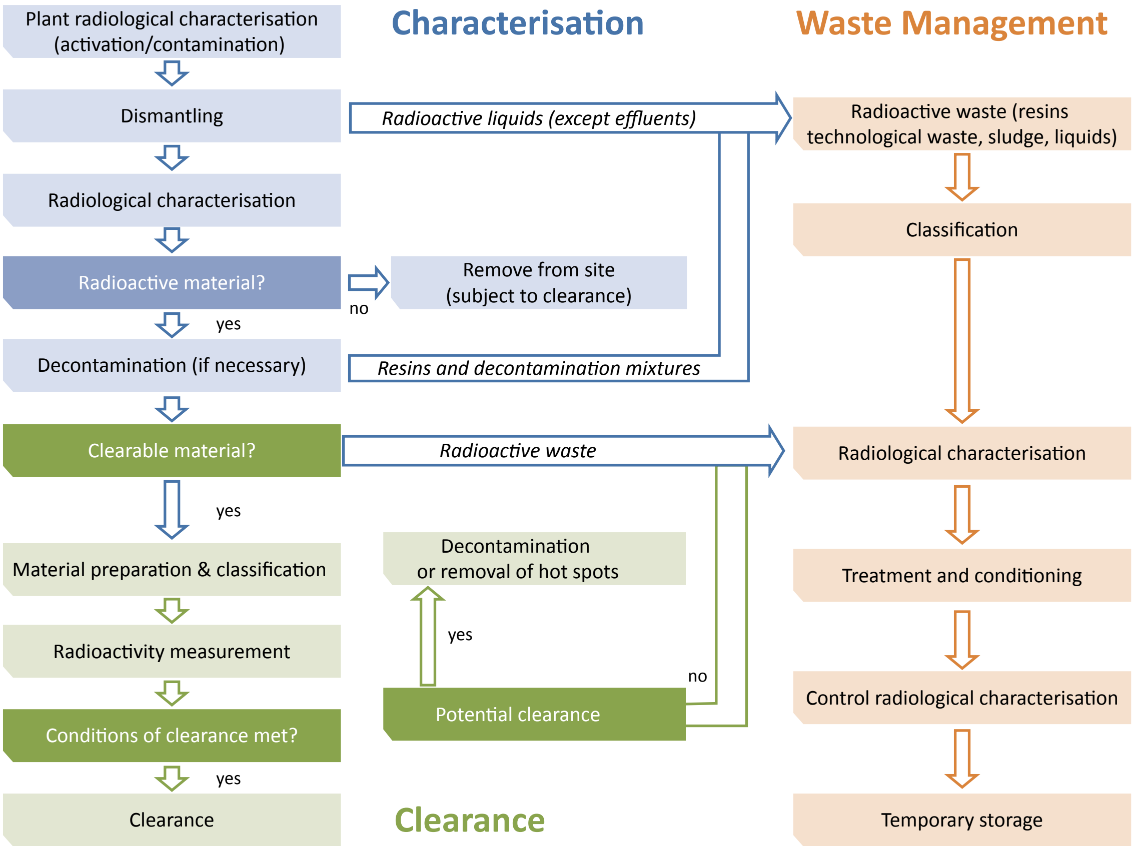
JRC-Ispra's waste management policy is based on three main rules according to Italian law and international guidelines:

1. Minimise the amount of unused nuclear materials by recycling them within industry.
2. Maximise the quantity of clearable waste that can be removed from regulatory control.
3. Reduce the volume of remaining radioactive waste for temporary storage on the Ispra site.

For radioactive waste, the route from bulk waste to an acceptable form for final disposal goes through multiple steps of characterization, pre-treatment, treatment and conditioning. The waste management system thus provides for the flexibility in the waste management strategy to respond to changing external constraints, such as the evolving regulatory framework and the design of the final disposal facility.

[29] Clearance: the removal of radioactive materials or radioactive objects within authorized practices from any further regulatory control following verification that the content of radioactivity is below the limits established the regulatory authority.

The radioactive waste management process is summarised in the following schematic diagram:

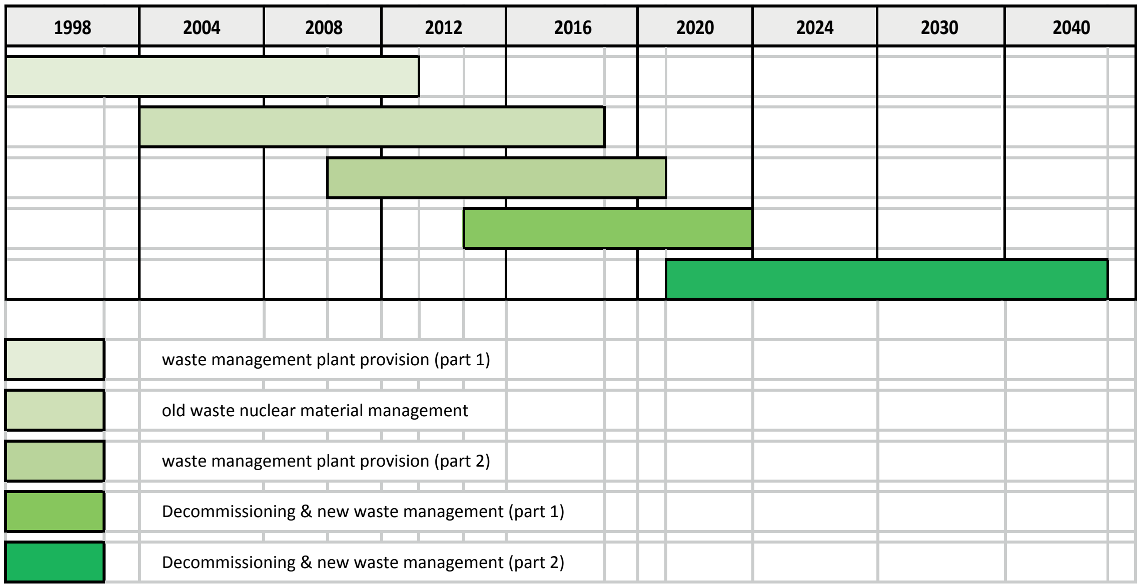


The Italian regulatory framework allows for the clearance of materials, i.e. its unrestricted use after removal from regulatory control. The procedure for clearance of materials is complex but well defined; the clearance guidelines and procedures are being updated according to the Italian Safety Authority requirements. Currently, limited quantities of material are removed from regulatory control following a strict procedure providing for substantial safety margins to minimise any risk of releasing uncontrolled quantities of radioactivity to the public.

Given the high value of clearance in the Waste Management Strategy Hierarchy and the absolute priority given to safety, the challenge is to increase the efficiency of the process to cope with the increasing flow of material produced by the rising decommissioning activity.

JRC-Ispra's nuclear waste is less than 1% in radiological content and 10% in volume of the radioactive waste produced in Italy. Whereas the implementation of the Decommissioning & Waste Management Programme is under the sole responsibility of the JRC, as stated by the Euratom Treaty and corresponding national legislation, most of the activities are today carried out by contractors with internationally recognised expertise in the nuclear field to ensure the application of the most exacting technological standards. Provision of complementary on-site/off-site waste management services will integrate and complete the full range of complete activities.

A summary schedule of Decommissioning & Waste Management is illustrated in the figure below:



During the radiometric checking process for the disposal of conventional waste (i.e. the conventional waste produced within classified areas under Legislative, Decree 101/2021), more than 31 tonnes were processed under 36 specific procedures, 13 of them are positively closed (over 13,5 t), 5 negatively closed (8,7 t) and 24 are ongoing (over 10,5 t).

Main types of conventional waste are (tons):

- Wood (44)
- Iron and other metallic waste (1,3)
- Rubble (1,2)
- Technological waste (2,5)
- Electrical material (0,5)
- Asbestos/Man made Vitreous Fibres (0,5)

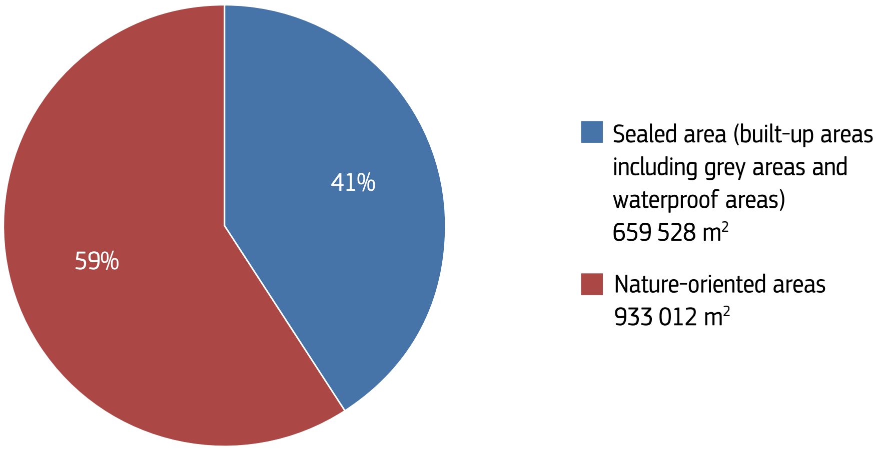
The 2020 results are higher (50 tons) than the 2019 target value (40 tons). The difference is due to the completion of procedures started in 2019 and concluded in 2020 and the large increase of wood waste from E-type clearance procedure. Furthermore there was an increase of the internal staff dedicated to manage the E-type materials. The overall target for 2021 is 50 tons.

The 2020 results are 77% of the 2019 target value (40 tons). The difference is due to 2 factors: covid-19 crisis generated, since March to October 2020, a very strong reduction of staff and consequently of maintenance activities and project; over 8 t have not achieved the authorization requirements (procedures with negative results having the same duration as well as positive procedures). Overall target for 2021 is 140 tons.

G7 Protecting biodiversity

The Ispra site hosts many interesting species of wildlife within its boundaries and aspires to enhance biodiversity and possibly be regarded as a hot spot of biodiversity in the regional area. This is due to the many semi-natural habitats (i.e., man-made and partially managed, but with an abundance of spontaneous plants) and natural habitats (i.e. unaltered communities affected by human intervention occasionally) some of which have remained intact for over 50 years.

Figure G.27 - JRC-ISPRA land use with regard to biodiversity, according to the definitions in EMAS Regulation

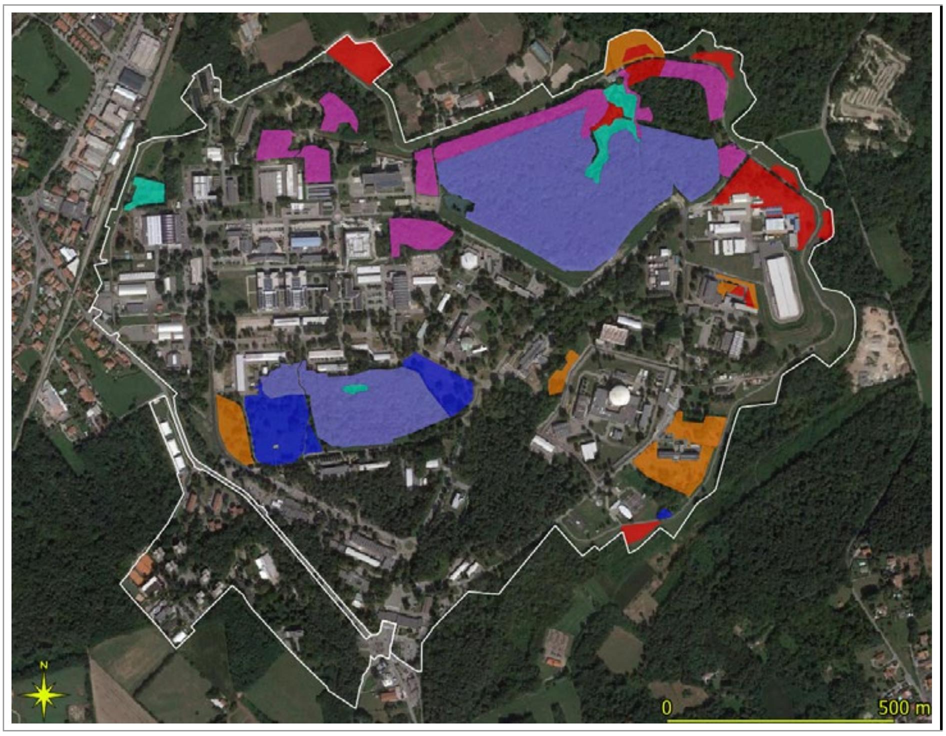


To protect and enhance biodiversity on site, activities are ongoing to follow the key commitments and the key actions established by the recently updated EU Biodiversity strategy 2030:

Protection of habitats and species

As is seen in the figure below, JRC-Ispra site features 33 hectares of natural habitats of conservation covered by the Habitats Directive, including:

Figure G.28 - Distribution of the naturalistic value in JRC-Ispra site



Habitat	EU Habitat Directive Code	2019
Grasslands: high-diversity plant communities Acidophilous meadows, Dry meadows, wet meadows	6230*: Species-rich Nardus grasslands	3,73 ha
	6150: Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	3,48 ha
	6510: Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	3,02 ha
	Total	10,23 ha
Wetlands Surface waters and swamp	3150: Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation	1,3 ha
Wet woodlands Alder woodland and mixed alder-oak woodland	91E0*: Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	17,11 ha
Wry woodlands Oak woodland	9190: Old acidophilous oak woods with Quercus robur on sandy plains	4,67 ha

JRC ISPRA SITE
MANAGEMENT OF GREEN AREAS

MONITORAGGIO DELLA POPOLAZIONE DI RANA LATASTEI
ALL'INTERNO DEL JRC DI ISPRA

Report Maggio 2018

Silvia Macchi* e Stefano Scali**

A standardised annual programme was established in 2016 for **monitoring the *Rana Latastei* population** (Italian agile frog), using a capture - mark - recapture methodology, to evaluate if any protective additional actions are needed. The population size was estimated in 2019 of being about 176 breeding frogs, which is a very positive result as it grants a stable Rana Latastei population, well above the critical level of 50 breeding frogs. The monitoring has currently been suspended due to covid-19 restrictions and will be resumed following the reopening of the Ispra site.

The flowering plant ***Eleocharis carniolica*** (spikerush) is regarded as an “endangered” species in Italy. Although extremely rare, it is currently not at risk from extinction. 14 plants were found in the wetlands of the JRC-Ispra site in 2020. Changes in the habitat conditions (e.g. drainage, water pollution, succession) are its main threats.

Conservation measures and monitoring

Enhancing biodiversity is part of the EMAS policy. A long-term project to manage Ispra site’s naturalistic heritage is ongoing. To allow biodiversity to flourish (greater variety of species and different flowering times), steps have been taken to create new biodiversity areas since 2019.

A full set of EMAS documentation has been developed in 2020 to cover the management of the green areas and new maps of ecological value, protected habitats and species are included in the documentation and has been updated on the Geographical Information System platform (JRC-GIS). To ensure no net loss to the Ispra site ecosystem, compensation schemes have been revised in the new work instruction “Compensation schemes for felling trees and shrubs”.

For further improvement, a multi-annual action plan in accordance with the commitments of the 2030 Biodiversity Strategy will be established and the JRC GIS mapping will be updated with tree census and new trees planted during JRC Tree day past editions.

Nature restoration: new trees plating on JRC Tree day (21ST November)

As a symbolic gesture to preserve the site’s green areas and to engage staff, a yearly JRC Tree day was established as a recurring event on 21st November. After planting about 100 native trees and shrubs during both the 2017 and 2018 events, 150 native trees and shrubs were planted in 2019 and 300 in 2020. Selection of species was made in accordance with the Native Trees Annex of the recently updated “Compensation schemes for trees and shrubs cutting” work instruction:

- 90 Acer Campestre (tree) – Field maple;
- 90 Fraxinus excelsior (tree) - Common Ash or European Ash;
- 90 Carpinus betulus (tree) - European or Common Hornbeam;
- 30 Quercus petraea (tree) Sessile oak, Cornish oak or Durmast Oak. To be noted that planting Quercus petrae is also considered a contribution to improve the habitat 9190 Quercion Robori-petraeae[30].

[30] Referring to “Technical-scientific support to the activities of the Regional Observatory for Biodiversity of Lombardy” - Resolution No. X / 5739 session of 24/10/2016

Figure G. 29 - Panorama of seedlings at JRC-Ispra, done by the contractors due to covid-19 restrictions, and engaged staff planting a tree in their home gardens during the 2020 Ispra tree day.

Habitat restoration: reforestation of Via Irlanda wood

An action to improve the perimeter of a wooded area of the site has been kicked-off in 2020 by reconciling the safety standards with those for nature conservation. During 2020-22, exotic forest species will be eliminated to prevent dead branches (or the trees) from falling. Native trees will be planted with the aim of recovering forest habitats of community interest “Alluvial forests of Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)” (EU habitat 91E0, see Figure G.28). An ecotonal band (hedge) will be added, both as a “buffer strip” and as a physiognomic diversification of the vegetation between the forest itself and the anthropized areas. The action will therefore also have positive effects on the local fauna.

Reduction of invasive alien species

The semi-natural or natural habitats, that in themselves are worthy of protection, are native lands for several wild species.The introduction of alien species may not only affect the aesthetics of an area, but also the natural ecosystems and possibly human health. Some of these species, including certain fauna are, unfortunately, existing on the JRC site and may be invasive and/or harmful. Effects of exotic/alien species include preying on native species, transporting of diseases, out-competing native species for resources, affecting aquatic and terrestrial habitats etc. Such threats can cause fatalities and imbalance an ecosystem by decreasing biodiversity, changing the food chain and altering ecosystem conditions. The Biodiversity Strategy 2030 states that the implementation of the EU Invasive Alien Species Regulation and other relevant legislation and international agreements will be stepped up. The effort to control and eradicate alien species, which threaten ecosystems and habitats, is implemented on the Ispra site by:

- removing phytolacca americana (american pokeweed) and cutting low the pleioblastus pygmaeus (pygmy bamboo): around 10 000 m^2 (done regularly);
- removing alien invasive species: 13 plants such as Pinus nigra (Black pine), Catalpa Bignonioides (Southern catalpa, cigars tree), Pinus strobus (White pine);
- girdling of Robinia pseudoacacia (Black locust) and Prunus serotina (Black cherry): 200 plants which will be removed in 2021.

G8 Green Public Procurement

Green Public Procurement (**GPP**) is the premium tool to reduce the environmental impacts of public authorities' activities and to develop sustainable, low-carbon and resource-efficient circular economy. It is defined as "the process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured"[31].

GPP is a voluntary instrument, which means that Member States and public authorities can determine the extent to which they implement it.

The basic concept of GPP is based on common environmental criteria, with the purpose of avoiding market distortions and reduced competition as a result of differing national GPP criteria. Common GPP criteria have been developed for products and service groups in 20 priority sectors. The latter have been selected considering the importance of the relevant sector in terms of the scope for environmental improvement, public expenditure, potential impact on the supply side, lead by example, political sensitivity, existence of relevant and easy-to-use criteria, market availability and economic efficiency.

The criteria, available at this link are based on existing Ecolabel criteria, where appropriate, as well as on information collected from stakeholders of industry and civil society.

G8.1 Incorporating GPP into procurement contracts

The following table resumes JRC-Ispra's targets to improve GPP in the context of the Commission's objective of carbon neutrality by 2030. The progress is monitored by means of numeric indicators.

[31] COM/2008/400 Public procurement for a better environment

Indicators for Objective V Promoting green procurement	2020	2023	2030	Actions – Communication – Awareness of staff
5a) % of overall number of contracts without a GPP criteria that appply environmental improvements ("special mention" contracts)				5a Increasing % of "green" contracts Add a report on waste as supporting the documents for the payment. Number of tenders with requested report will be monitored. No penalties foreseen but a report to be provided as supporting documents for the payment(s).
Target	5%	5%	5%	Provide support in identification of GPP in procurement. To test the validity of CPV list. In case of criteria updated with identified CPV or identified needs on the basis of experience, the list will be revised again.
Results	6,5%			Identify JRC-Ispra's planned tenders where GPP criteria can be included and implement GPP (in technical specifications, selection and award criteria). 100% of contracts qualifying for GPP (i.e. with a toolkit available) applying green criteria. At least 50% of this contracts shall be classified green or green by nature. For Contract with no criteria available at least 5% of all the contracts, not falling under GPP, shall apply green criteria.
5d) % of tenders using EU GPP criteria (where available)	100% of contracts qualifying for GPP criteria	100% of contracts qualifying for GPP criteria	100% of contracts qualifying for GPP criteria	
Results	100% Additional result: 50% green-green by nature			Provide advice and support on application of GPP in JRC procurement. Presentation of GPP during all the procurement training sessions on technical specifications
7 General awareness	-	-	-	To create a "pinboard" to share scientific instruments already available on site. To propose the initiative as a consultation on OPN (Operational Procurement Network) group.

Since the beginning of 2015, following the development of the Public Procurement Management Tool (**PPMT**) in 2014, calls for tender for goods, services and works that may be subject to the 20 EU GPP criteria for priority product groups, are flagged as potential procurement procedure entailing environmental aspects, on the basis of a standard reference to identify and describe the subject of the contract (CPV – Common Procurement Vocabulary). In this way, at the very early stage of the procurement process, PPMT selects which procurement is to be analysed for GPP criteria by experts in the GPP field. This is a Corporate business rule implemented at all the JRC Sites, and therefore any decision not to apply GPP must be justified.

In addition to the EU Criteria, JRC-Ispra has decided to improve the corporate approach by also checking the feasibility of applying the Italian GPP criteria ("Criteri Minimi Ambientali" – CAM), which are adopted by the Italian Ministry of Environment and reflects the adaptation of the EU GPP criteria to the national market situation.

To facilitate the inclusion of green requirements in public tender documents, in 2020 a presentation of GPP was made during all five procurement training sessions for staff involved in procurement and contract management (14 members of staff for Ispra). For 2021 it is foreseen to include GPP highlights during all the procurement training sessions on technical specifications.

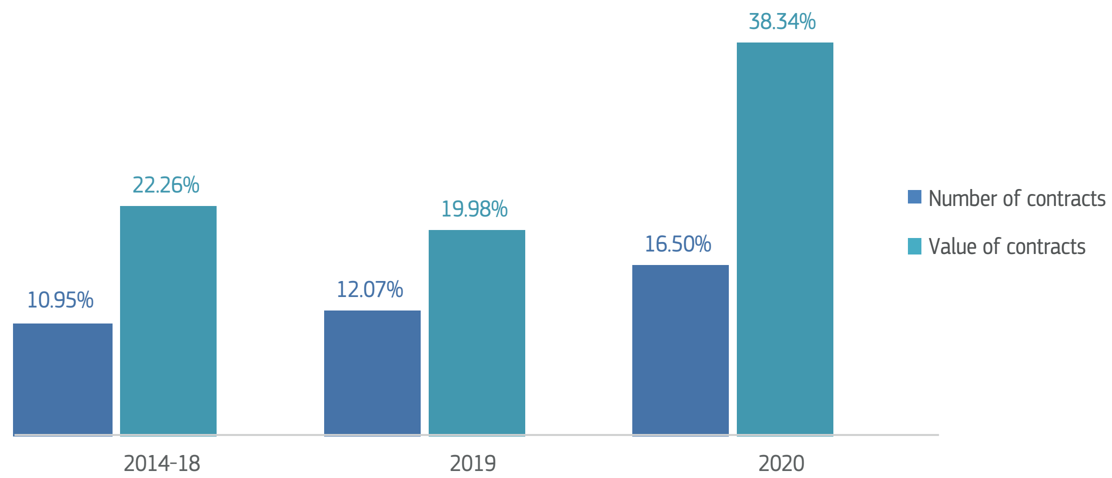
All the above is complemented by the use of the Interinstitutional framework contract of the European Parliament: 'GPP helpdesk for Buying Green'.

Finally all the contracts to be executed on the Ispra site include the Annex on Environmental Clauses which has been reviewed in 2018 with the new Environmental Policy.

During the first four years of GPP application through PPMT, the contracts considered were all types of contracts (both framework and direct contracts) over € 60k. Since 2019 the evaluation was extended to all types of contracts over 15k €.

Contracts where GPP criteria were available were automatically flagged as "GPP" by PPMT. In most procurement cases, a GPP criterion was available and was consequently applied. In addition green suggestions were proposed and applied for some supply/service/work purchases, which did not fall within one criterion (these procedures were classified as special mention and were calculated in the total of contracts with "eco" criteria). The following graph shows the last years' data relating to contracts applying "eco"-criteria (i.e. both GPP criteria and special mention).

Contracts with "eco" criteria



100% of the contracts qualifying for GPP (i.e. those where an EU or Italian criterion is available), plus 6 special mention contracts, applied "eco" criteria, representing 16,5% of the total amount of Ispra contracts. The adoption of EU GPP criteria in JRC-Ispra procurementcontracts is classified following four categories[32], as shown below.

Classification of GPP contracts	**Number of contracts in 2020**
Green by nature The primary function of goods, services and works to be procured is green	1
Green Fully or largely compliant with the core criteria and/or partly compliant with the comprehensive criteria /Award environmental criteria +10% of the total weighting	4
Light green Partly compliant with the core criteria/award environmental criteria for price and quality -10% of the total weighting.	6
Special mention Contracts with no toolkit available but where green criteria were considered	6

17 contracts
24,085,954 €

[32] "How do the EU institutions and bodies calculate, reduce and offset their greenhouse gas emissions?", European Courts of auditor, 2014.

G9 Demonstrating legal compliance and emergency preparedness

G9.1 Management of the legal register

According to the Site Agreement, Italian Law 906/1960, JRC-Ispra is fully implementing Italian legislation regarding nuclear activities, including prescriptions relating to requirements laid down in the 18 licences issued by the Italian Nuclear Authorities and adheres on a voluntary basis and under its own responsibility, to the environmental prescriptions set within Italian national laws and regulations and/or in laws and regulations of the Lombardy region. JRC-Ispra has developed a dedicated strategy to issue internal environmental authorisations which are technically equivalent to those issued by Italian Authorities. This strategy has been acknowledged by the relevant Italian EMAS Competent Body in 2013, as well as with all Authorities during each EMAS Round Table meeting.

Under the framework of the Environmental Management System, developed at the site since 2009, several tools are currently in place to ensure that appropriate legal compliance checks are performed continuously. These include:

- the register of legal requirements and obligations and voluntary requirements, such as the Protocol for Sustainable Development signed between JRC-Ispra and Lombardy region;
- the schedule for monitoring the legal or voluntary documents and the progress of ongoing implementation actions;
- a procedure for the management of the legal compliance and environmental requirements applicable to the JRC-Ispra site;
- a Consultation Procedure to authorise all new projects and activities performed on site;
- a Safety and Environmental Inspection service performed by the JRC-Ispra Inspectors;
- internal and external EMAS audits and also JRC-Ispra internal combined audits.

The process of verification of the legal compliance with respect to applicable environmental legislation has been improved. For each relevant environmental aspect and for each type of activity, a detailed analysis is carried out in order to check how all environmental requirements are applied on-site, including the relative implementation (who does what) and the progress of ongoing implementation actions.

The legal register is the main document where all applicable environmental legislation is listed and analysed. Compliance checks are performed by means of audits, inspections and the Consultation Procedure. Given the complexity of the JRC-Ispra organisation, where needed, specifically appointed environmental correspondents help to grant compliance directly and indirectly (i.e. helping to prepare for audits). When significant new legislation is issued, timely communication is sent to relevant internal environmental correspondents. The schedule for monitoring the legal or voluntary documents and the progress of ongoing implementation actions has been introduced to complement the monitoring. Both are updated twice a year.

In addition, in 2017 JRC-Ispra signed a Convention with ARPA Lombardia[33] for legal and technical support on environmental matters and, in particular, addressing the internal environmental authorisations. These have been subject to analysis by ARPA in 2018, leading to the writing of a technical report with some suggestions for improvement of the internal authorisations. JRC has started implementing most of these suggestions and has shared a formal action plan to ARPA in 2020, which has been evaluated in a positive way and additional comments were duly considered.

Collaboration with ARPA was extended in 2020 to receive an opinion over JRC-Ispra waste management, over JRC-Ispra's procedure to implement the management of excavated material, as well as looking at the internal authorisations in more detail. ARPA's technical report acknowledged the progress made and also suggested some improvement actions.

Following the positive experience of the first cycle of collaboration, the Convention with ARPA Lombardia has been renewed for another year: new activities will be planned soon.

The Ispra site complies with the applicable legislation with the exception of the emissions of the tri-generation plant. In fact JRC-Ispra is now facing the challenge to comply with the atmospheric emission threshold values for CO and NOx

[33] ARPA Lombardia is the competent Environmental Protection Agency (i.e. "Agenzia Regionale per la Protezione Ambientale").

of Region Lombardy in force since 1/1/2020 and those, even more stringent, in force since 1/1/2021. Even if, given its legal status, JRC-Ispra is not legally bound to apply such values, these are best practice targets. The call for tender for the design of the building of a new efficient tri-generation plant has been assigned in 2020 and the design phase is currently ongoing. The construction of the new tri-generation plant is currently foreseen in 2023. In the meantime, several actions were commenced to limit the emissions of the existing plant. For example, new catalysts have been installed in all engines, following the positive results monitored following the implementation of the first catalyst, granting a notable reduction in terms of the concentration of CO and NO_x emissions. In any case, JRC-Ispra is maintaining transparent communication with stakeholders, including Region Lombardy, ARPA Lombardy, the Province of Varese to mention just a few. Within this framework it was decided that the 2020 target shall be to ensure that the overall emission (mass flow) for CO and NO_x will not exceed the equivalent emission that would be obtained assuming the continuous operation of the plants for the whole year, based on the concentration limits defined in the regional legislation. This will also be implemented for the following years, until the new tri-generation plant is operational.

G9.2 EMAS registration and compliance with EMAS Regulation

JRC-Ispra has been ISO 14001 certified since 2010 and is part of the European Commission's EMAS registration since 2015. Excellent results have been obtained throughout the years of third-party EC corporate EMAS verification audits, underlining JRC-Ispra's great care for the environment and commitment toward environmental sustainability at large.

The 2020 EMAS external verification, performed by the EC's contractor AENOR INTERNACIONAL, was particularly challenging due to the covid-19 pandemic. The audit was split in two sessions, hoping to grant the auditors to have on-site access for the second session. However, despite good timing, due to administrative issues, even the second session of the audit was done via videoconferencing. Despite this very complicated setting with substantial communication issues mostly due to IT or networking problems, the overall audit was a success, also on account of the fact that no non-conformities were registered and that there were as many as 11 strong points. Findings also included 4 observations and 10 "scopes for improvement".

The 2020 EMAS internal verification, performed by the EC's contractor ARCADIS, was also quite successful. Even in this case, no non-conformities were found, and 11 strong points were noted. Other findings were 3 observations and 4 "scopes for improvement". JRC-Ispra monitors all EMAS audit findings and, in cooperation with the EC corporate EMAS team, ensures that these are all appropriately analysed and followed-up.

G9.3 Prevention, risk management and emergency preparedness

During 2018 the emergency procedures were reviewed and the Site's Emergency and Business Continuity Plan and associated procedures and instructions, providing the framework for both nuclear and conventional emergencies, including incidents that could have a negative impact on the environment (site and off site), were approved.

The procedure for the management of emergency exercises and the planning of emergency exercises and drills has been updated to account for all the applicable scenarios, including spillage and release of dangerous substances and finally issued in 2021.

In 2020, due to the covid-19 pandemic, only mandatory nuclear emergency exercises and building evacuation tests were carried out.

In order to test the preparedness of the JRC and the Italian authorities to respond to nuclear emergencies, the annual nuclear full scale emergency exercise was held in February 2020 in the presence of local and national authorities. In parallel, an emergency exercise was held to test the emergency preparedness in Area 40.

There was a positive outcome of both the exercises, with the request to organise an exercise dedicated specifically to Area40 which was held in February 2021.

Drills on environmental scenarios have been postponed to 2021 and included in the new template for emergency drills and exercises.

G10 Communication

G10.1 Internal communication

An Environmental Communication Action Plan was established in 2014 and revised annually in coordination with the EMAS Commission's corporate team. The corporate programme is adopted by JRC-Ispra according to feasibility of implementation and with the addition of specific site-level initiatives. The Ispra site EMAS team is supported in the execution of its environmental communication campaigns by the Ispra Green team.

In 2020, a special pandemic year, the focus for internal communication was on:

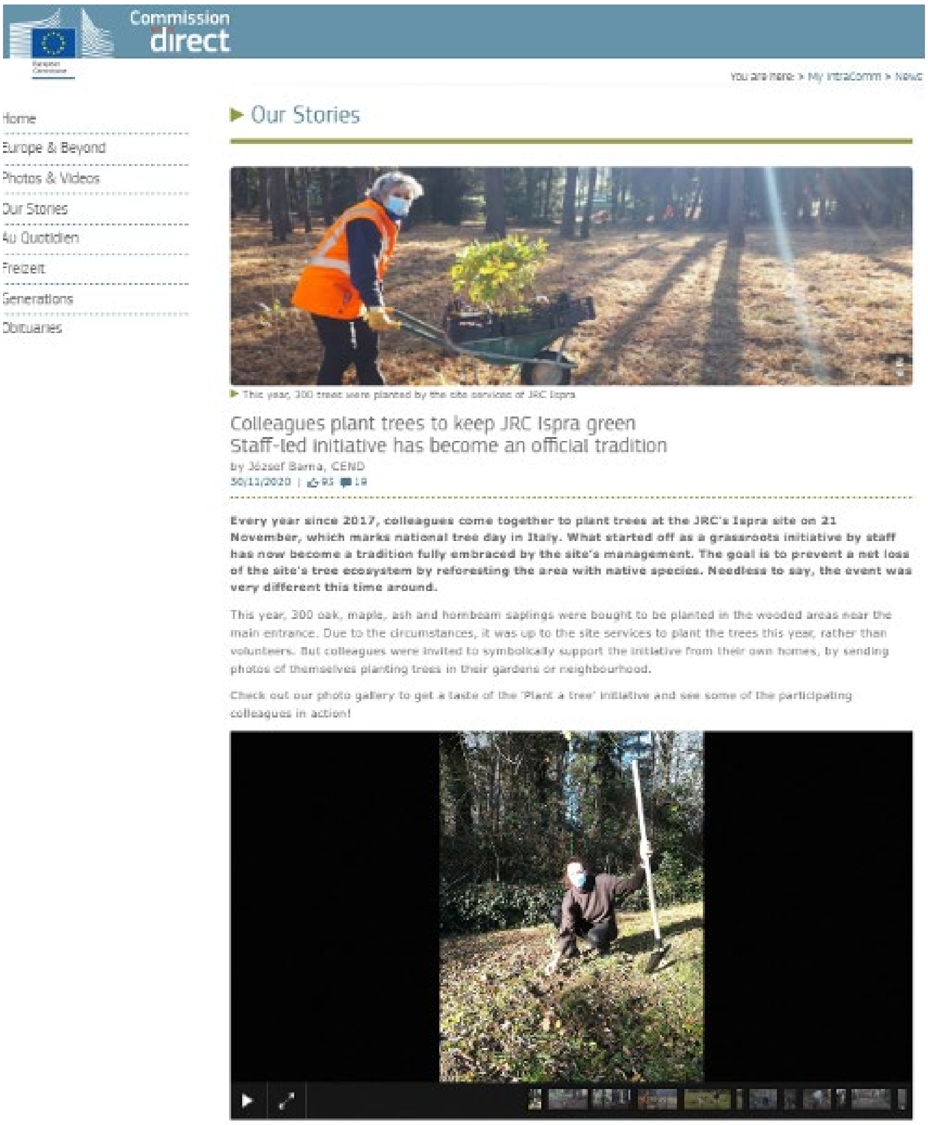
a) raising staff awareness by organising specific events to further improve the environmental performance of JRC-Ispra as an EC EMAS registered site;

b) engaging staff to participate in these events and to support them.

Our intranet 'Connected' was used as a main tool for internal communication campaigns, supplemented by ad hoc staff engagement events. Highlights detailed below:

Event	Description/Purpose
Sustainable meetings and events (competition) 21 February 2020	The competition addressed the sustainability of both internal events (e.g. team-building activities and away days) and external conferences; either in EC-premises or outside the Commission that took place during 01/01-31/12/2020. **Communication Action:** Connected Blog to promote the first corporate competition on Commission's sustainable conferences and events and the participation in it.
M'illumino di meno 27 March 2020	The annual day of energy-saving and sustainable lifestyles launched by Caterpillar and Radio 2 in 2005. In 2020 M'illumino di meno promoted a specific theme, namely increasing the amount of trees, plants and green around us. **Communication action**: Connected Blog to encourage the participation by switching off lights, heating, computer and monitor before leaving the office in the evening or when you leave the room, even while teleworking.
Earth Hour 28 March 2020	Worldwide movement organised by the World Wide Fund for Nature (WWF), encouraging individuals, communities and organisations to turn off non-essential lights for one hour **Communication Action:** Connected Blog referencing Ispra site environmental achievements
European Mobility Week 16-22 September 2020	Opportunity to get together and discuss the different aspects of mobility and air quality, find innovative solutions to reduce car-use and transport emissions Theme 2020 - "Zero-emission mobility for all" **Communication Action:** Blog on My IntraComm. LivingLabs blog on Connected on JRC-Ispra Mobility Survey.
VéloMai October 2019	EC-wide cycling competition to encourage the use of bicycles amongst staff **Communication Action:** Competition on the new VéloMai 2020 slogan linked to the EU Green Deal and the reduction in carbon emissions. The winning slogan in the VéloMai 2020 campaign – Zero pollution, bike solution was selected by the VéloMai Steering Committee on 18/02. The 6th interinstitutional fit@work cycling challenge took place in October. Connected blog invited to participate in a rich programme with training courses, conferences and presentations.
EU Green Week 19-22 October 2020	The year 2020 focused on nature and biodiversity. **Communication Action:** Blog on My IntraComm. Blog on Connected on 'Volunteer for a Green change' initiative. Plant a tree for a JRC-Ispra tree day and send a photo action (an article published also in CenD).

Event	Description/Purpose
European Week for Waste Reduction 21-29 November 2020	An EC initiative aiming to increase awareness about how we can change habits and "3Rs": Reduce waste, Reuse products, Recycle material. Focus on Invisible waste. **Communication Action:** Further awareness raising towards staff. Plastic is still a priority. EMAS team organised the 'Less waste, more action 2020' initiative aiming to inspire our colleagues to further reduce our daily waste with special focus on digital waste.
JRC-Ispra Tree Day 21 November 2020	The event is organised annually on 21 November (national tree day in Italy) using only native trees and shrubs provided by the site management services. In 2020, due to covid-19 restrictions, the tree-planting activity was carried out only by the site services. Nevertheless, JRC-Ispra colleagues were invited to symbolically support the initiative from their homes, by sending photos of themselves planting trees in their gardens or neighbourhood. **Communication Action:** Connected blog
Green Public Procurement: Info session by GPP Helpdesk 10/11/2020 and 02/12/2020	Arguments treated: a) Data centres, server rooms and cloud services; b) Public Buildings' Design, Construction and Maintenance **Communication Action:** Connected Blog to promote VC to Brussels
Ispra and EMAS-related environmental news and achievements Throughout 2020	Various EMAS-related Connected posts to keep environmental issues in the forefront e.g.: Annual Environmental Statement; Environmental organisation at JRC-Ispra; EMAS staff surveys and competitions. Promotion of various webinars, presentations, green tips. Online EMAS basic for all staff



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This year, 300 trees were planted by the site services of JRC Ispra

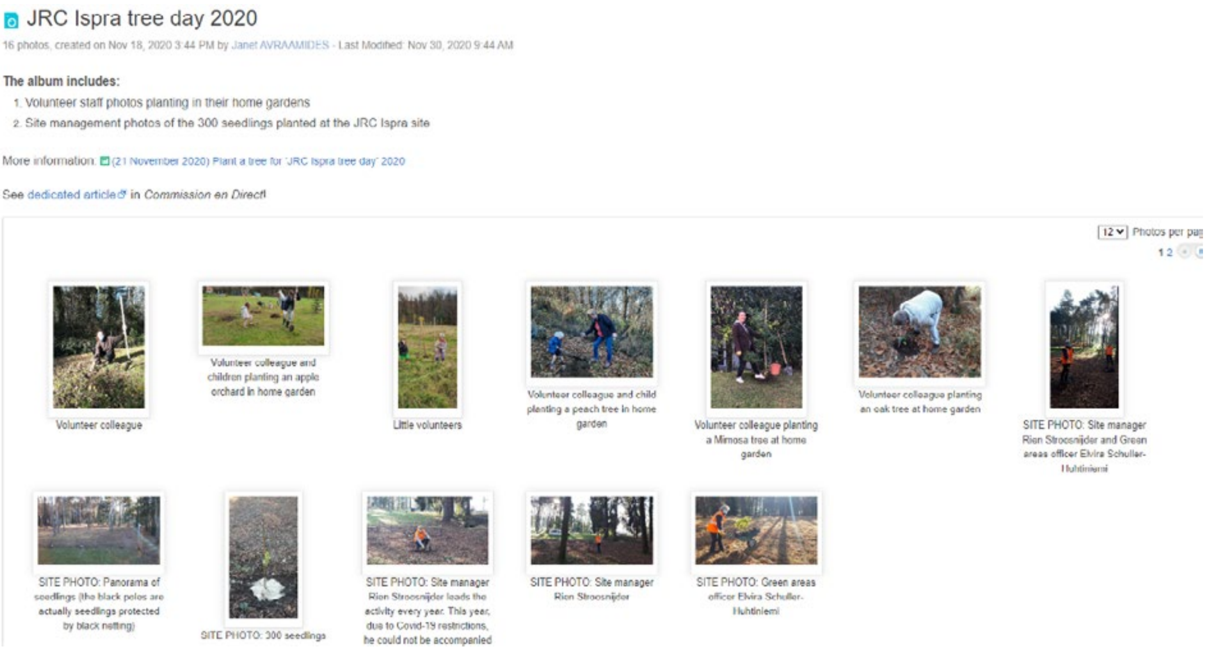
Colleagues plant trees to keep JRC Ispra green
Staff-led initiative has become an official tradition

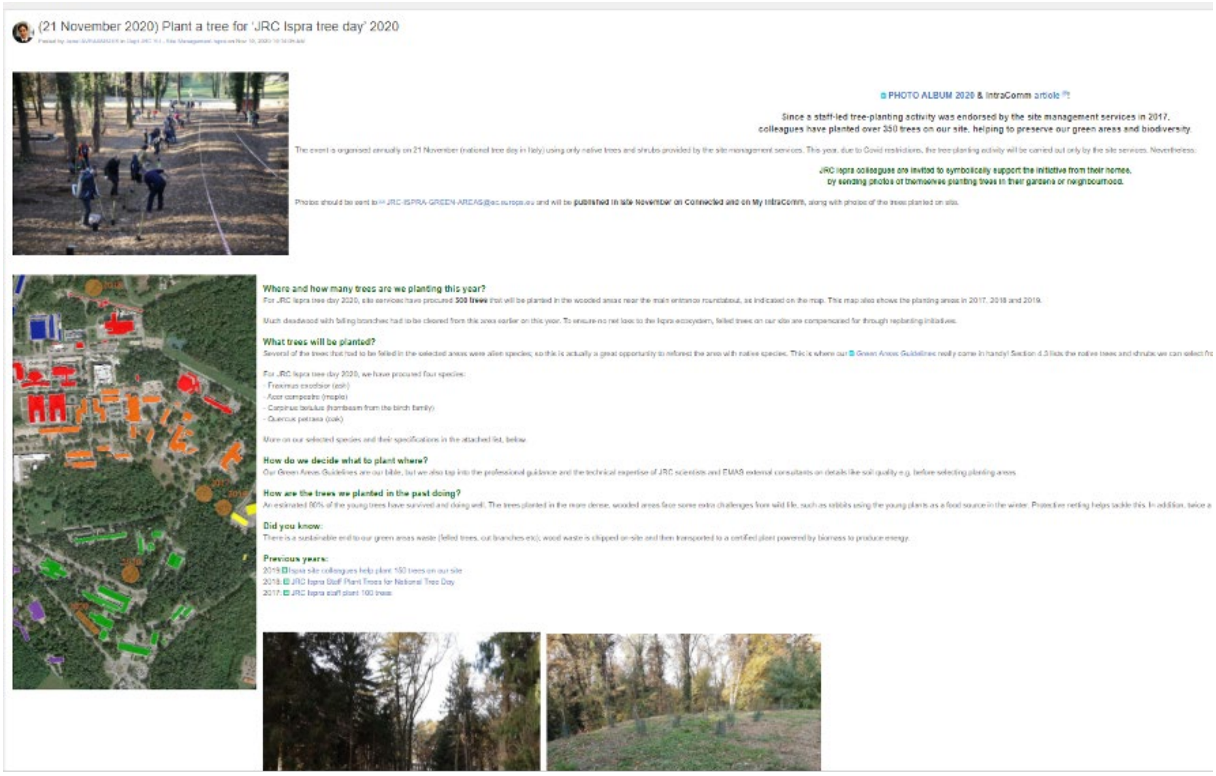
by József Barna, CEND
30/11/2020 | 95 19

Every year since 2017, colleagues come together to plant trees at the JRC's Ispra site on 21 November, which marks national tree day in Italy. What started off as a grassroots initiative by staff has now become a tradition fully embraced by the site's management. The goal is to prevent a net loss of the site's tree ecosystem by reforesting the area with native species. Needless to say, the event was very different this time around.

This year, 300 oak, maple, ash and hornbeam saplings were bought to be planted in the wooded areas near the main entrance. Due to the circumstances, it was up to the site services to plant the trees this year, rather than volunteers. But colleagues were invited to symbolically support the initiative from their own homes, by sending photos of themselves planting trees in their gardens or neighbourhood.

Check out our photo gallery to get a taste of the 'Plant a tree' initiative and see some of the participating colleagues in action!





G10.2 External communication and stakeholder management

JRC-Ispra organises an annual EMAS Round Table in order to:

- enhance the dialogue with key local, regional and national stakeholders over JRC-Ispra's environmental performance and to follow-up over stakeholder's expectations;
- promote JRC-Ispra's ambitions to promote a more sustainable environment and lead by example;
- demonstrate the transparency that is required under the EMAS umbrella;
- grant to all stakeholders that there are no impediments towards JRC-Ispra's EMAS registration.

The last EMAS Round Table was held on the 17th January 2020, when the Protocol for Sustainable Development of the Lombardy region was adopted by JRC-Ispra. This Protocol promotes the implementation, in particular, of the core of the United Nations' 2030 Agenda for Sustainable Development. Companies, associations and representatives of local authorities adhering to this Protocol are committed to establishing their own programme of measures or initiatives, centred on topics ranging from the conservation of biodiversity and the improvement of air quality to the circular economy, from the energy transition to the development of renewable sources to the development of sustainable mobility. The progress of the actions is discussed annually within the Forum for Sustainable Development organised by Lombardy Region.

JRC-Ispra shared this programme within the framework of the Protocol for Sustainable Development. The target of this contribution is to share how the European Commission and, in particular, JRC-Ispra shall achieve climate neutrality within its premises by 2030. The particular focus is on the following Sustainable Development Goals – SDGs:

- goal 13, climate action;
- goal 12, responsible consumption and production;
- goal 7, affordable and clean energy.

The European Commission, in order to implement within its own premises the European Green Deal, has written a report, "Feasibility and scoping study for a climate-neutral European Commission by 2030", and is currently evaluating how to proceed to implement this. This will ultimately allow us to lead by example towards climate neutrality.

Figure G.30 – Photo from the VI EMAS Round Table

Details of external participation in the recent EMAS Round Tables are summarised in the table below. To be noted that the 2019 edition was postponed to the beginning of 2020, for organisational purposes and that the 2020 edition was cancelled on account of the covid-19 pandemic.

	Invited	Participants	National	Regional	Provincial	Municipal
2014 EMAS Round Table	48	25	2	6	2	15 (12 VA[34]; 3 NO)
2015 EMAS Round Table	59	23	2	3	8	10 (7 VA; 3 NO)
2016 EMAS Round Table	75	28	2	2	9	15 (12 VA; 3 NO)
2017 EMAS Round Table	84	33	1	4	17	11 (8 VA; 3 NO)
2018 EMAS Round Table	89	35	5	6	11	13 (10 VA, 3 NO)
2020 EMAS Round Table	73	43	4	13	11	15 (12 VA, 3 NO)

[34] "VA" stands for the Varese Province, where JRC-Ispra is located and "NO" stands for the Novara Province, on the opposite side of Lake Maggiore.

JRC-Ispra is continually trying to increase participation of stakeholders to the yearly EMAS Round Table thus granting greater inclusion and transparency, which is consistent with the EMAS requirements.

The main highlight was the signing of the Protocol for Sustainable Development between JRC-Ispra and the Lombardy Region. This demonstrates concretely the commitment that JRC-Ispra has towards sustainable development, as well as the European Commission at large. Further goals were achieved during the EMAS Round Table:

- consolidating the effective collaboration of JRC-Ispra with ARPA Lombardia by the planning of further consultancy interventions regarding, in particular, the management of JRC-Ispra waste. This collaboration started with the signing of the relative agreement during the IV EMAS Round Table;
- illustrating of the key aspects of the European Covenant of Mayors, initiative through which local authorities undertake to strengthen energy efficiency and use of renewable sources in their territories;
- providing a specific guided visits to some JRC-Ispra laboratories to follow up on the expectations expressed during the 5th EMAS comparison table (60% of the respondents asked for greater sharing of the JRC projects, innovations and initiatives, to example, transmission of the results of research activities carried out on the site, sharing of good practices and virtuous activities).

Several very positive news press articles, both in newspapers and on the web were written and can currently be found here[35]. Pictures of the signature ceremony for the Protocol for Sustainable Development between JRC and Lombardy Region follow, including some news articles.

Figure G. 31 Signature ceremony for the Protocol for Sustainable Development of Region Lombardy

[35] https://www.openinnovation.regione.lombardia.it/it/lombardia-ricerca/strategia-sviluppo-sostenibile/protocollo-lombardo-per-lo-sviluppo-sostenibile
https://www.openinnovation.regione.lombardia.it/it/b/9565/protocollosviluppososteniblediregionesianchedaljrcispra
https://www.regione.lombardia.it/wps/portal/istituzionale/HP/lombardia-notizie/DettaglioNews/2020/13-19/sviluppo-sostenibile-jrc-di-ispra-ha-sottoscritto-il-protocollo-lombardo/sviluppo-sostenibile-jrc-di-ispra-ha-sottoscritto-il-protocollo-lombardo
https://www.varesenews.it/2020/01/patto-regione-jrc-lo-sviluppo-attento-allambiente/891327/

Figure G. 32 some positive news press articles about the signing of the Protocol for Sustainable Development between JRC and Lombardy Region

ISPRA

Patto tra Regione e JRC per lo sviluppo attento all'ambiente

Sottoscritto un accorso che recepisce i 17 obiettivi per lo sviluppo sostenibile definiti dall'ONU

jrc ispra regione lombardia ispra

Questa mattina, **nella sede del JRC, Rien Stroosnij** e l'assessore all'Ambiente e Clima di Regione Lombardia **Raffaele Cattaneo** in occasione dell'**annuale Tavolo di confronto EMAS**, hanno sottoscritto il nuovo protocollo.

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News

Sviluppo sostenibile, JRC di Ispra ha sottoscritto il protocollo lombardo

17 gennaio 2020

(LNews - Ispra/VA) Il Joint Research Centre (JRC) di Ispra, rappresentato da Rien Stroosnijder capo Dipartimento gestione, in occasione dell'annuale Tavolo di confronto EMAS, ha sottoscritto alla presenza dell'assessore all'Ambiente e Clima di Regione Lombardia Raffaele Cattaneo, il Protocollo lombardo per lo sviluppo sostenibile. Il Tavolo EMAS è da anni un'occasione per condivisione con le realtà locali l'operato e i progetti del JRC in materia ambientale sul sito di Ispra. Dimostrazione dell'impegno a migliorare la propria performance ambientale e rafforzamento del ruolo di promotore dello sviluppo sostenibile.

G11 Training

G11.1 Internal training

The environmental training programme was focused particularly on newcomers. Specific training sessions were included within the two-day JRC-Ispra training session for all newcomers. In 2020 only two sessions were held with 52 participants.

Four further environmental training courses (14 participants) were delivered to technical staff in 2020, all focussed on Green public procurement technical specification.

In addition safety training courses are progressively being extended in order to also include relevant environmental aspects, as appropriate.

G11.2 External training

JRC-Ispra does not provide environmental training for contractor staff as specific requirements for this are indicated in the technical specifications of the relevant contracts.

G12 EMAS costs and saving

The following table shows estimated resource costs associated with running EMAS and for expenditure on energy, water and waste disposal. Savings in resource expenditure, particularly in relation to energy and fuel costs, are substantial.

Table G.12 – EMAS costs and virtual savings in JRC-Ispra

	2013	2014	2015	2016	2017	2018	2019	2020	Change in last year
Total Direct EMAS Cost (Eur)	486 799	383 760	368 168	446 200	486 945	491 928	473 595	476 515	2920
Total Direct Cost per employee	219	164	160	198	214	215	203	198	-5
Total buildings energy cost (Eur)	4 652 111	4 148 033	3 366 004	2 421 569	2 947 212	3 424 664	2 539 842	2 076 905	- 462 937
Total buildings energy cost (Eur/person)	2 093	1 775	1 466	1 072	1 294	1 499	1 089	861	-228
Total fuel costs (vehicles) (Eur)	24 854	20 049	19 777	11 180	11 286	9 443	10 220	4 851	-5 369
Total energy costs (Eur/person)	11	9	9	5	5	4	4	2	-2
Total water costs (Eur)	58 993	64 431	65 084	67 997	47 971	44 783	31 361	34 478	3 117
Water (Eur/person)	26,5	28	28	30	21	20	13	14	1
Total paper cost (Eur)	n.a.	50 197	45 619	40 082	39 156	36 645	34 079	13 562	-20 517
Total paper cost (Eur/person)	n.a.	21	20	18	17	16	15	6	-9
Waste disposal (non hazardous) - unit cost/tonne	176	233	251	341	293	218	223	397	175
Waste disposal (non hazardous) - Eur/person	102	115	135	133	149	119	113	86	-27
Waste disposal (non hazardous) - net* unit cost/tonne	n.a.	n.a.	239	331	260	137	158	351	193
Waste disposal (non hazardous) - net* Eur/person	n.a.	n.a.	129	129	132	75	80	76	-4

*including revenue from scrap metal sold to a contractor

Building energy costs have fallen by 55% since 2013: a reduction of 1 232 EUR/person from 2013 to 2020, and equivalent for the same reference period to a virtual saving of 462 937 EUR per year.

The decrease in cost between 2019 and 2020 is related to the decrease in the cost of methane (from 23,31 EUR/MWh to 17,17 EUR/MWh).

Total fuel costs have decreased (-53%) due to a minor number of refuelling operations (-30% for diesel and -38% for petrol).

The total cost related to paper consumption decreased by 56% between 2019 and 2020 and also the cost of paper per kg has decreased (-5%), the overall decrease is linked to lower consumption of paper between 2019 and 2020 (-60,5%). A virtual saving of 36 685 EUR (or 73%) compared to 2014 was achieved.

Regarding the non-hazardous waste, the overall total cost of waste disposal increased on account of the change of supplier and relative more expensive costs. This is despite a notable decrease of the waste produced.

To be noted that in the calculation of the total quantities of waste produced, the waste sent for recovery and sold as recyclable material is also included. They are the so-called "ferrous materials"[36] which represent about 263 000 EUR in total revenue during the period 2015-2020 (24 000 EUR in 2020).

Finally, it should be noted that the direct EMAS costs account for internal staff and also for a consultancy contract which includes the application of Internal Control Standards, such as the respect of environmental legislation, GPP criteria assessment and also include specific projects. It therefore goes well beyond the scope of the EMAS registration itself.

[36] Aluminium; iron and steel; copper; cables, which are respectively accounted for by the following CER codes: 17.04.02, 17.04.05, 17.04.01 and 17.04.11.

G13 Conversion factors

Parameters and units	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
kWh from one litre diesel	10,06	10,06	10,06	10,12	10,12	10,12	10,12	10,12	10,12	10,12
kWh from one litre petrol	8,75	8,75	8,75	8,56	8,56	8,56	8,56	8,56	8,56	8,56
Paper Density (g/m^2)	80	80	80	80	75	75	75	75	70	70
Kgs CO_2 from 1 kWh of electricity (national average) - upstream	0,407	0,402	0,367	0,359	0,375	0,36	0,359	0,31	0,02	0,02
Kgs CO_2 from 1 kWh of electricity (supplier) - upstream losses, multiply by		0,0257	0,0246	0,0226	0,0233	0,0216	0,0209	0,0179	0,10	0,10
Kgs CO_2 from 1 kWh natural gas (combustion)- convert HHV (invoice value) to LHV multiply by	1	1	1	1	1	1	1	1	1	1
Kgs CO_2 from 1 kWh natural gas (combustion)- for LLV	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20	0,20
Kgs CO_2 from 1 kWh natural gas (upstream)	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
Kgs CO_2 from 1 kWh diesel (combustion)	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26
Kgs CO_2 from 1 kWh diesel (upstream)	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
GWP[37] of R22 (not Kyoto)	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760	1 760
GWP of R410A	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920	1 920
GWP of R134A	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300
GWP of R404A	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940	3 940
GWP of R407C	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620	1 620
GWP of R507A	2 240	2 240	2 240	2 240	2 240	2 240	2 240	2 240	2 240	2 240
GWP of R422D	2 470	2 470	2 470	2 470	2 470	2 470	2 470	2 470	2 470	2 470
GWP of R23	12 400	12 400	12 400	12 400	12 400	12 400	12 400	12 400	12 400	12 400
GWP of R427A	2 020	2 020	2 020	2 020	2 020	2 020	2 020	2 020	2 020	2 020
GWP of R508B	13 396	13 396	13 396	13 396	13 396	13 396	13 396	13 396	13 396	13 396
GWP[38] of NAF S III (not Kyoto)	1 497	1 497	1 497	1 497	1 497	1 497	1 497	1 497	1497	1497
GWP of R227A	2 640	2 640	2 640	2 640	2 640	2 640	2 640	2 640	2 640	2 640
GWP of SF6	23 500	23 500	23 500	23 500	23 500	23 500	23 500	23 500	23 500	23 500
Kgs CO_2 from one litre of diesel (combustion)	2,70	2,70	2,70	2,68	2,68	2,68	2,68	2,68	2,68	2,68
Kgs CO_2 from one litre of diesel (upstream)	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66
Kgs CO_2 from one litre of petrol (combustion)	2,26	2,26	2,26	2,26	2,26	2,26	2,26	2,26	2,26	2,26
Kgs CO_2 from one litre of petrol (upstream)	0,53	0,53	0,53	0,53	0,53	0,53	0,53	0,53	0,53	0,53
Annual cost of one FTE		132000	132000	132000	134000	134000	138000	148000	150000	150000

37 Unless otherwise stated, GWP data has been taken from the IPCC 5th Assessment Report (2014).

38 The NAF S III GWP has been calculated using the UE 517/2014 calculation methodology.

The conversion factors summarised in the table above are generally standard for the all sites except for:

- "kWh of energy provided by one litre diesel" and "kWh of energy provided by one litre petrol": the conversion factors are drawn from the UNFCCC[39] national register for the reference year;
- "Kgs CO_2 from 1 kWh of electricity (of grid average)": the emission factor is drawn from the report over the disclosure of energy mix of the electricity purchased in 2019 from the Italian electricity suppliers (Terna S.p.A.) in that year. To be noted that, as the report is not available at the time of writing it has been assumed equal to the mix of 2018, i.e. the last published data;
- "Kgs CO_2 from 1 kWh natural gas", "Kgs CO_2 from one litre of petrol" and "Kgs CO_2 from one litre of diesel": the conversion factors are drawn from the UNFCCC national register for the reference year;
- "Kgs CO_2 from 1 kWh fuels (diesel and petrol)": the conversion factor is calculated as an average value weighted on the specific conversion factors (petrol/diesel) and on the specific site consumptions;
- "Kgs CO_2 from 1KWh of electricity (of EV)": the conversion factor is calculated from the energy mix consumed by the site, considering both self-production of electricity from natural gas tri-generation and the purchase of electricity from the grid, and self-production on site by photovoltaic plant;
- Regarding the Scope 3 carbon footprint upstream emission factor, the Ecoinvent database v3.2 was used, according to the OEF Methodology.

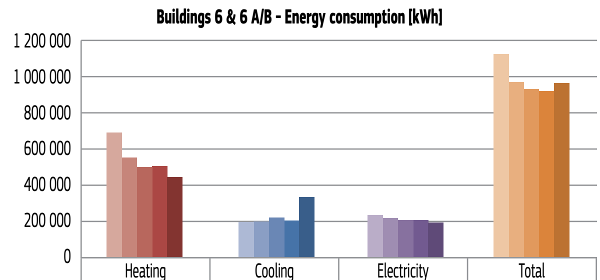
Finally, it is to be noted that where applicable in many graphs, due to excel automatic formatting criteria, numbers were rounded-up to the nearest whole figure.

G14 Site breakdown: characteristics of buildings and performance of selected parameters (indicative data)

JRC-Ispra is continuing the implementation of an automatic energy management system to monitor energy consumption of single buildings (see Chapter G.4.1a)). What follows are some examples of on-going monitoring for heating, cooling and electrical energy for sample buildings hosting mainly offices over the last five years. Data will be further analysed and actions will be decided in due course, considering the scope, the data reliability and the available man power.

Cooling energy consumed has increased in almost every case. This was due to the covid-19 dispositions, particularly the request to have air ventilation 24 hours a day and in the weekends too. As a consequence, in buildings devoid of an automated ventilation system, windows were left open to maximize air circulation, causing at the same time greater cooling energy consumption.

Buildings 6, 6a and 6b, administrative offices



	Heating	Cooling	Electricity	Total
2016	690 186	197 235	236 328	1 123 749
2017	553 260	199 683	217 301	970 224
2018	500 230	221 741	208 576	930 547
2019	506 716	205 195	207 314	919 225
2020	413 265	355 595	199 372	968 232

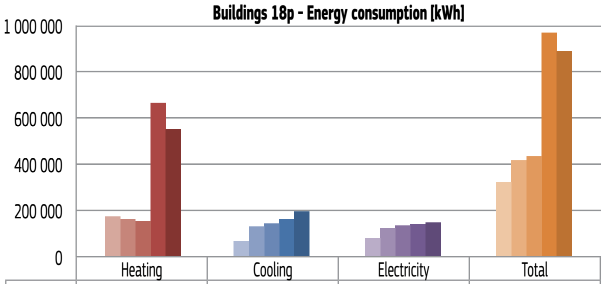
Type energy	2020 vs 2019
Heating	-18%
Cooling	73%
Electricity	-4%
Total	5%

[39] United Nations Framework Convention on Climate Change

This building hosts administrative staff including from the Site Management Ispra. There is a strong commitment to lead by example.

A relevant decrease has been registered to the heating consumption in 2020 mainly due to the lowering of the office temperature from 20 degrees to 19 degrees to avoid waste energy.

Buildings 18p, central library

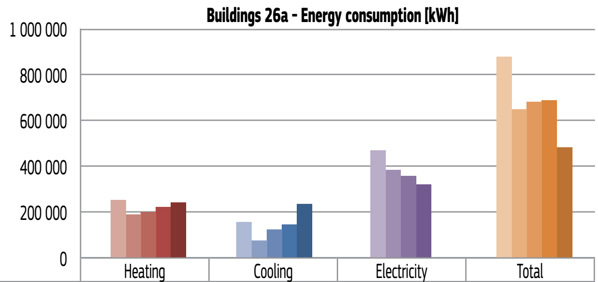


	Heating	Cooling	Electricity	Total
2016	174 233	68 055	81 078	323 366
2017	161 882	130 661	123 990	416 533
2018	155 089	144 242	134 257	433 588
2019	664 414	162 075	142 052	968 541
2020	549 279	196 674	142 426	888 379

Type energy	2020 vs 2019
Heating	-17%
Cooling	21%
Electricity	0%
Total	-8%

This building hosts the central library and staff from the Directorate E, Space, Security and Migration. Even in this case there was a relevant decrease in the heating energy and also with respect to the total energy consumption, compared to 2019.

Buildings 26a, offices

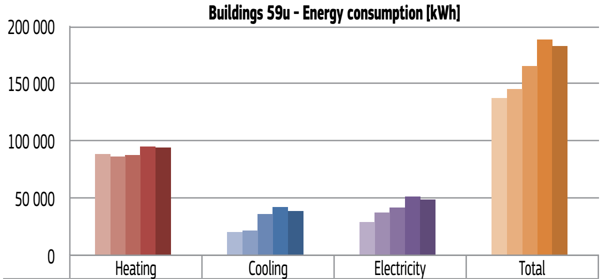


	Heating	Cooling	Electricity	Total
2016	252 739	156 029	469 540	878 308
2017	188 654	76 335	382 961	647 950
2018	200 662	124 994	356 371	681 327
2019	221 764	145 493	321 157	688 414
2020	252 141	241 176	-	493 857

Type energy	2020 vs 2019
Heating	14%
Cooling	66%
Electricity	-
Total	-28%

The building hosts offices belonging to the Directorate B, Growth & Innovation and D, Sustainable Resources. The electric energy consumption data are not reliable due to the malfunction of the metering device. This will be soon be replaced.

Buildings 59u, offices



	Heating	Cooling	Electricity	Total
2016	88 307	20 059	28 773	137 139
2017	86 126	21 566	37 403	145 095
2018	87 310	35 979	41 559	164 848
2019	94 925	41 918	51 162	188 005
2020	94 673	38 843	48 934	182 450

Type energy	2020 vs 2019
Heating	0%
Cooling	-7%
Electricity	-4%
Total	-3%

The building hosts JRC.R.I.4 Infrastructure Unit offices. Values show that there were small improvements with respect to 2019.

G15 Acronyms

AENOR	Asociación Española de Normalización y Certificación
AIGIS	Analytic Ispra Geographic Information System
BLD	Building
BOD	Biochemical Oxygen Demand
BREEAM	Building Research Establishment Environmental Assessment Methodology
CER	Catalogo Europeo Rifiuti (European Waste Catalogue)
COD	Chemical Oxygen Demand
DG	Directorate-General
D.Lgs	Legislative Decree
EC	European Commission
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
ELO	Environmental Liaison Officer
EMAS	Eco-Management and Audit Scheme
ES	Environmental Statement
EV	Electric Vehicle
F-GAS	Fluorinated Gas
GPP	Green Public Procurement
GWP	Global Warming Potential
HR	Human Resources
HFC	Hydro-Fluoro-Carbons
HVAC	Heating, Ventilating and Air Conditioning
ICT	Information and Communication Technology
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Centre
KPI	Key Performance Indicator
LED	Light Emitting Diode
OEF	Organisational Environmental Footprint
PPMT	Public Procurement Management Tool
PC	Personal Computer
PV	Photovoltaic
UNFCCC	United Nations Framework Convention on Climate Change

European
Commission

Environmental Statement 2021

2020 results

Annex H: DG SANTE at Grange

EMAS
Verified
environmental
management
REG.NO. BE-BXL-000003

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Cover illustration: Aerial view of the site

European Commission

Verified environmental management

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Annex H: DG SANTE at Grange

Foreword

2020 was the six year in which the Grange site was part of the European Commission's Eco-management and audit system (EMAS). Each year of the project, we have put in place measures to deliver on the Commission's targets but also to exploit the unique location of the Grange site.

We are located in the lush, green farmland of County Meath, Ireland where cattle farming is the main activity although sheep are not an uncommon sight in the fields around us.

We are particularly conscious of the agricultural setting of our site and take steps to ensure that our activities do not have a negative impact on our neighbours and the local environment. We include EMAS compliance as a feature of all contracts and look at how services to the 173 or so staff can be delivered in an eco-friendly way.

The year 2020 has been, in all aspect, a very unusual year. The different lockdowns imposed by the Irish Government (due to the Covid-19 pandemic), with as direct consequence the closure of the site, have disrupted our plans and therefore we played more a role of caretaker (ensuring that the building was maintained and kept in good order, ready to re-open when necessary). We reacted to the measures imposed by the Irish government to combat Covid-19 and adapted the building.

Having said that, during the year 2020 we delivered a number of projects. In particular:

- We had new IR sensor taps installed that do not require physical contact to work and that contribute positively to our battle against waste of water, since the IR sensors are programmed to only deliver water if they detect an object (in this case a hand).
- The first phase of our Multi-annual Biodiversity program has been implemented. Big sections of our grassland (±3.75 ha) were left to grow into meadows, in order to allow plants and flowers to grow and provide nectar for insects such as bees, butterflies and hoverflies.

Not only have these initiatives had a positive impact for the Grange site but they have also raised the profile of the EMAS project with everyone in Grange, and contributed to spreading the EMAS message further afield. For the EMAS team that is the best of outcomes.

(e-signed)
Maria Pilar Aguar Fernandez
Director
DG SANTE - Dir. F – Health and food audits and analysis

Contents

ANNEX H: SANTE Grange

The European Commission's Health and Food Safety Directorate General (DG SANTE), has offices located at Grange (Dunsany) in County Meath in Ireland, some 45 kilometres north-west of Dublin, and approximately 10 kilometres south-east of Trim as shown in Figure H1.

Figure H1: DG SANTE at Grange, 45km NW of Dublin

There are approximately 173 staff, covering a range of administrative and technical activities. The working environment is typical of an administrative office.

The site is home of SANTE Directorate F – Health and food audits and analysis. A large proportion of staff conduct audits within Europe and beyond and therefore at any time many staff are on mission. The site is currently certified EMAS compliant and was included in the Commission's EMAS registration in 2015, 2016, 2017 and 2018. SANTE is responsible for overseeing facilities management and the implementation of EMAS on site.

In this document, the European Commission site will be referred to as SANTE Grange or simply Grange.

H1 Overview of core indicators at Grange

Grange has been collecting data on core indicators (mostly utilities) since it opened as a purpose built facility in April 2002. A summary of some of the main parameters from 2005 is presented below in Table H1, which focuses on data expressed per square metre, as staff numbers prior to 2014 are estimated.

Table H1: Historical data, performance and targets for core indicators proposed for Commission level reporting

Physical indicators (Number, desciption and unit)	**Historic data values**					**Performance trend (%) since:**		**Target**		**Future targets**	
	2005 [1]	**2014**	2018	2019	2020	2005	2014	2014-20		2014-23	2014-30
								Δ % [2]	value [2]	Δ % [3]	Δ % [3]
1a) Energy bldgs (MWh/p)	10.21	**12.69**	10.75	11.27	9.88	-3.3	**-22.2**	-5.0	12.06	-19.0	-34.0
1a) Energy bldgs (KWh/m²)	199	**227**	192	198	171	**-14.2**	**-24.8**	-5.0	215.6	-22.0	-39.0
1c) Non ren. energy use (bldgs) %		**92.5**	82.3	82.2	84.3		**-8.8**	-5.0	87.8	-25.0	-36.0
1d) Water (m³/p)	30.66	**27.69**	18.11	16.31	11.50	**-62.5**	**-58.5**	-5.0	26.30	-45.0	-50.0
1d) Water (L/m²)	597	**495**	324	287	199	**-66.7**	**-59.9**	-5.0	470.3	-45.0	-50.0
1e) Office paper (Tonnes/p)	0.00	**0.010**	0.018	0.016	0.007		**-34.7**	-5.0	0.010	-22.0	-25.0
1e) Office paper (Sheets/p/day)		**9.9**	18.7	16.5	6.8		**-31.6**	-5.0	9.4	-22.0	-25.0
2a) CO_2 buildings (Tonnes/p)	4.18	**4.91**	3.69	3.65	3.20	**-23.5**	**-34.9**	-5.0	4.66	-39.0	-70.0
2b) CO_2 buildings (kg/m²)	81	**87.8**	66.0	64.2	55.2	**-32.2**	**-37.1**	-5.0	83.4	-41.0	-74.0
2c) CO_2 vehicles (g/km, manu.)		**174**	174	0	0		**-100.0**	-5.0	165.3	0.0	0.0
2c) CO_2 vehicles (g/km, actual)		**174**	174	0	0		**-100.0**	-5.0	165.3		
3a) Non haz. waste (Tonnes/p)	0.000	**0.251**	0.253	0.230	0.088		**-65.2**	-5.0	0.239	-10.0	-12.0
3b) Hazardous waste (Tonnes/p) [4]	0.000	**0.000**	0.050	0.052	0.004						
3c) Unseparated waste (%)		**0.0**	5.2	7.4	4.1			-5.2	0.0	-46.0	-82.0
3c) Unseparated waste (T/p)		**0.0**	0.0	0.0	0.0		– 70.9	0.0	-5.2	0.0	0.0
Economic indicators (Eur/p) [4]											
Energy consumption (bldgs)		**931**	829	864	734		**– 21.1**				
Water consumption		**34.06**	22.27	20.06	14.14		**– 58.5**				
Non haz. waste disposal			0.00	0.00	0.00						

Note: (1) Earliest reported data; (2) Global annual action plan 2020, targets reviewed in 2018 (upwards for indicators already met, decision EMAS Steering Committee September 2018); (3) Draft figures from the Global Anual Action Plan 2021; (4) 2014-20 indicator discontinued.

The site decreased water consumption (per m^2 and per person) in 2020 compared with 2019 by an average 30%. Energy consumption for buildings and CO_2 emissions per square metre have decreased too. Energy and water consumption have fluctuated since the site opened. Poor roof insulation and window draughts were identified in an energy survey as primary causes contributing to our energy consumption. Major roof insulation works took place and were successfully finished at the end of 2017 and another large-scale joinery project of replacing all problematic windows started in 2018 and still is ongoing.

The evolution of basic parameters of the EMAS system at Grange is shown below:

Table H2: EMAS baseline parameters

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population: total staff	188	186	189	182	179	180	190	188	179	176	173
Total no. operational buildings					3	3	3	3	3	3	3
Useful surface area for all buildings, (m^2)	10 010	10 010	10 010	10 010	10 010	10 010	10 010	10 010	10 010	10 010	10 010

H2 Description of SANTE Grange's activities, setting and stakeholders

H2.1 Activities

SANTE Grange has about 173 employees, made up of professionals originating from virtually all 28 Member States of the European Union, trainees and IT contractors working on site.

SANTE Grange carries out audits in EU Member States and in countries exporting food, feed, animals or plants to the EU to verify that standards set out in EU legislation are met. It checks how the national authorities in each country ensure that products put on the EU market are safe. SANTE Grange audits also check that national authorities keep important animal and plant diseases under control and that animal welfare rules are respected. More recently, SANTE Grange's responsibility has been extended to controls in the domain of human health protection (medical devices, active pharmaceutical ingredients, eHealth).

H2.2 Context – risks, and opportunities

Opportunities for improvement of the Environmental Management System and its effectiveness are identified in the same way as the identification of hazard and risk. Many of the internal and external factors which have the potential to harm the EMS may also have the potential to improve the system. We consider the risks and opportunities related to aspects and impacts on the environment, potential emergency situations, impacts on the organization from the environmental conditions, and business issues such as reputation, competitiveness and cost, both positive and negative. We also consider the risk that the EMS is not effective in achieving intended outcomes. Because of the serious threat that Covid-19, it was felt important to add its risk assessment to the list.

Table H2.2: Assessment of Environmental Risks

Assessment of Environmental Risks to European Commission Grange **Scope of Risk Assessment: European Commission Grange Environmental Management System**								
Legend:	**P * I = RR P = Probability (1-5)**				**I = Impact (1-5)**	**RR = Risk Rating (1-25)**		
Risk Category	**Detail**	**P**	**I**	**RR**	**Actions to address Risk/ Opportunities**	**P**	**I**	**RR**
Pandemic of class 3 or 4 biological agent	Covid 19 is a viral disease with the potential to spread widely in the community, cause serious illness or fatality and has no vaccine or cure.	3	5	15	Work from home from initial phase to at least 10th August 2020. Covid management plan, full compliance with legal requirements and government and HSE guidance (including Health Preservation and Protection and other Emergency Measures in the Public Interest Act 2020, Emergency Measures in the Public Interest (Covid-19) Act 2020) risk assessment, social distancing, severe restriction on numbers coming to site (employees and others), PPE, cleaning and disinfection, minimising touch points, personal hygiene, signs and posters, contact logging.	2	5	10
Risk of legal restrictions and/or the	Legal requirements changes, impacting on compliance or ability to conduct business (Risk)	2	4	8	The Commission monitors legal requirements and ensures compliance. Pegasus legal register is used to identify	2	3	6

External issues and circumstances affecting Grange's environmental performance

These have been analysed using PESTLE[1] criteria. Both risks and opportunities identified, and to the corresponding actions are presented below:

PESTLE	
Issue	**Impact/Action/Opportunity**
Legislation	
◆ General Data Protection Regulations ◆ FOI ◆ EU EHS legislation and standards	◆ Challenges to stay current on legal and other requirements
Environmental	
◆ Irish targets of 40% electricity from renewables by 2020 ◆ EU target to reduce GHGs by a minumun of 80% by 2050 ◆ More onerous energy and efficiency targets following the publication of the Energy White Paper and the signing of the Paris agreement ◆ Public health protection from Covid-19 pandemic.	◆ Identify eco oportunities - Biogas. ◆ Continue drive to reduce impacts - e.g. biodegradable cups, energy reduction/conservation. ◆ Covid-19 plan, controls and compliance

[1] PESTLE criteria– Political, Economic, Social, Technological, Legal, Environmental.

Internal issues and circumstances affecting Grange's environmental performance

These have also been analysed using PESTLE criteria, with consideration of both risks and opportunities, the most important are as follows:

Social / Culture	
◆ Transport needs of employees ◆ Good relationships with neighbours – e.g. Teagasc, GAA club ◆ Health needs of employees	◆ Existing and future Corporate Social Responsibility programmes ◆ Possible co-operation from Teagasc regarding future biodiversity project ◆ Covid-19 plan, controls and compliance

H2.3 Stakeholders (interested parties), compliance obligations risks and opportunities

Grange is located in a rural setting in County Meath and is bounded by the local Gaelic Athletic Association (G.A.A.) grounds and club house, a research farm and centre which belongs to Teagasc (the National Agriculture and Food Development Authority) and other farm land. Teagasc is responsible for coordinating national research and development on cattle. According to its mandate, it seeks to ensure that production of Irish Beef is world class and therefore environmentally aware, safe for consumers while meeting best practice of animal health and welfare.

Additional local stakeholders include the Office of Public Works (OPW) which currently owns the site under a lease-purchase scheme, and is located in the nearby town of Trim; the operator of the local water supply scheme, Kiltale Water Scheme, which supplies water to the site; Irish Water, which removes waste water from the site; as well as the local authority, neighbours and local towns.

Contractors and employees are in continual communication with SANTE Grange. Employees also make suggestions through the suggestion scheme and other communication streams. On site contractors meet with the Commission regularly. The Facilities Management and Cleaning contractors have weekly meetings with the Commission. Other on-site contractors also meet regularly with the Commission.

In addition to local external stakeholders, SANTE Grange has a number of national and international stakeholders, including the Commission itself, the Member States of the EU, Irish national regulatory bodies such as the Environmental Protection Agency, the Health and Safety Authority and the Department of the Environment.

Figures H1a and H1b below show the main outcomes of the stakeholder analysis

Figures H1a: Relative importance of issues for the Commission and for Stakeholders

Stakeholder Analysis

Importance to External Stakeholders		Important	Very Important
	Very Important	• Comission image • Economic contribution • Diversity • Local employment • Economic climate	• Infrastructure developed to meet current and future needs • Directorate Image • Competence, engagement and focus on staff • Sustainability impact in the local area • Recruitment and retention of key staff • Healthy and Safe Environment for employee well-being • Service value and innovation • Reliability of service • Impact of our services on health and food safety in the EU • Compliance with legislation • Impact of our business to local community, suppliers and contractors • Business ethics and values
	Important	• Excellence in implementing audit function • Greenhouse gas emissions • Waste management • Use of natural resources • Climate change	• Safe and healthy work environment and processes • Reputation • Ecological footprint • Maintaining standards • Risk Management
		Important	**Very Important**
		Importance to the European Commission	

Figure H1b: Importance of different issues by stakeholder

	Sustainable develop.	Business Continuity	Reputation	CSR	Infra-structure	Staff competence & engagement	Recruitment & retention key staff	Safe and healthy environment for staff & contractors	Service Value & Reliability	Legal compliance	Impact of business to local community, suppliers and contractors	Business ethics and values
European Commission, Brussels	Important	Very important	Very important	Very important	Important	Important	Important	Very important	Very important	Legal requirement	Important	Very important
Regulatory authorities - Operations	Important	Not important	Not important	Very important	Very important	Very important	Not important	Legal requirement	Not important	Legal requirement	Not important	Very important
Local community neighbours	Very important	Very important	Not important	Very important	Important	Very important	Very important	Very important	Not important	Very important	Very important	Very important
EU member states	Important	Very important	Important	Not important	Very important	Very important	Very important	Very important	Very important	Legal requirement	Not important	Very important
Employees	Very important	Very important	Very important	Very important	Very important	Very important	Very important	Legal requirement	Very important	Legal requirement	Very important	Very important
Suppliers/Contractors/ Hauliers	Not important	Very important	Not important	Important	Not important	Not important	Not important	Legal requirement	Not important	Legal requirement	Very important	Very important
Insurers (EL/PL/ Property)	Important	Important	Not important	Not important	Important	Important	Important	Very important	Important	Important	Not important	Important
Utilities Suppliers	Not important	Important	Not important	Not important	Important	Important	Not important	Important	Not important	Legal requirement	Not important	Not important
Management System cert bodies	Important	Not important	Not important	Important	Important	Very important	Important	Very important	Important	Very important	Important	Very important

(red)	Legal requirement
(orange)	Very important
(green)	Important
(white)	Not important

Figure H2: Aerial view of SANTE Grange

As shown in Figure H2, the site consists of one main rectangular building and several outbuildings set in a rural location. It includes a restaurant, café and crèche. There is a large conference facility which can accommodate major events, and which is in use most weeks of the year.

Notable features in the vicinity include a surface watercourse along the Teagasc boundary, which discharges into the River Boyne.

The Commission site also includes an old wastewater treatment plant, disused since October 2010, that still awaits decommissioning. The Commission has a lease/purchase arrangement with the OPW ending in April 2022 by which time the Commission will own the premises outright. Since October 2010 site wastewater discharges into the new mains sewer, part of the Kiltale sewage scheme, following the construction of a link from the Grange site.

H3 Environmental impact of Grange activities

Examination and evaluation of Grange's environmental aspects and impacts, both direct and indirect under normal, abnormal and emergency conditions was developed in 2017. The identification of environmental impacts takes account of the organisation's current and past activities, products and/or services.

A summary of the preliminary analysis of aspects and impacts is presented below in Table H3, which also shows the related indicators and actions identified in the Commission's 2019 EMAS annual action plan that was adopted by the EMAS Steering Committee.

A study of the Grange environmental aspects was undertaken for the first time in 2014. This table is reviewed and updated every year, the results of which are summarised in the table H3.

Table H3 – Summary of significant environmental aspects for the Grange site

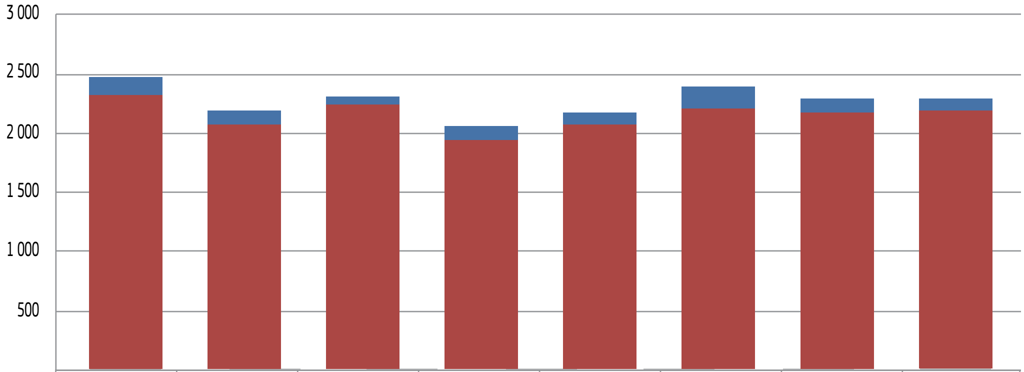
Environmental aspect	Environmental impact	Activity, product or services	Indicator/Action plan	Significance Rating
Resource consumption (Energy – Electricity)	Energy production and usage has impacts on air and water quality as well as depletion of natural resources.	For office activities; facilities and all parts of the site	Electricity kWh. The site is monitoring and comparing electricity use from month to month and year to year to identify possible issues and opportunities. Electricity use in 2020 was 20.03 lower than 2019. 2019 was 0.75% higher than in 2018. 2018 was 2.45% lower than 2017, continuing the improvement trend from previous years. Solar panels generate hot water, particularly in summer months when they combine with Biogas boiler to provide hot water for the site, and avoid using the diesel boilers when possible.	**54**
Resource consumption (Energy – Oil)	Energy production and usage has impacts on air and water quality as well as depletion of natural resources.	Diesel is used for heating and hot water outside of the summer months.	Commission has installed gas oil burners which generates GHG. The burners are well maintained and serviced as required. Bio-LPG is also used on site for catering and for heating water in the summer months. Gas oil use for 2020 was 9.31% lower than 2019. 2019 was 3% above 2018 due to a colder winter. 2018 was 19.87% below 2017. The overall pattern of use was similar with the expected dip in the summer months. Lifecycle considerations for fuels include sourcing of fuels and impacts on environment, depletion of resources, and transport of fuel. Burning of fossil fuels creating CO_2 emissions and other pollutants. Storage of fuel and risk of spillage or leak to ground water, soil or waterways. Reduction of fuel use will have an impact on the environment at each stage of the lifecycle and reduce the overall environmental load and risk.	**48**
Non-hazardous waste	Impacts are resource depletion in the re-use, recycling and recovery activities, and use of landfill. Impact on landfill is minimised by re-use, recycling and recovery.	Packaging materials, timber, metals, non-hazardous WEEE, food waste, paper	The site has worked to reduce the impact of non-hazardous waste by improving segregation and recycling. It has diverted 94% of non-hazardous waste from landfill (similar to the previous year). Total non-hazardous waste levels for 2020 were down against target by 45.40% compare to 2019. 2019 was down 7,41% compared to 2018. Indeed 2018 had two unusually high months (April and October). The increase in waste in April was due to the replacement of office chairs, many of which were donated, but 253 had to be scrapped. The October increase was due to the general clean up after contract work on windows.	**48**
Water use	Upstream impact on treatment and delivery to site, including energy, land use, materials and chemicals. Downstream impacts include requirements related to water treatment and potential effects on the receiving environment.	Water is used for sanitary and kitchen requirements. Water is also used in utilities such as the boilers.	Water consumption during 2020 was down 30.67% compare to 2019. 2019 decreased by 11,45% compared with 2018. Indeed, in 2018 there was a spike due to a leak from a burst pipe in the hydrant system, without which overall use for the year would have been down by 330 m^3, or 10%, from 2017.	**36**

H4 More efficient use of natural resources

H4.1 Energy consumption

Buildings energy consumption data should be considered in the context of climatic conditions. Analysis of degree data suggests that climatic conditions were slightly harsher in 2020 than in 2019.

Figure H3: Indicative climate conditions[2]

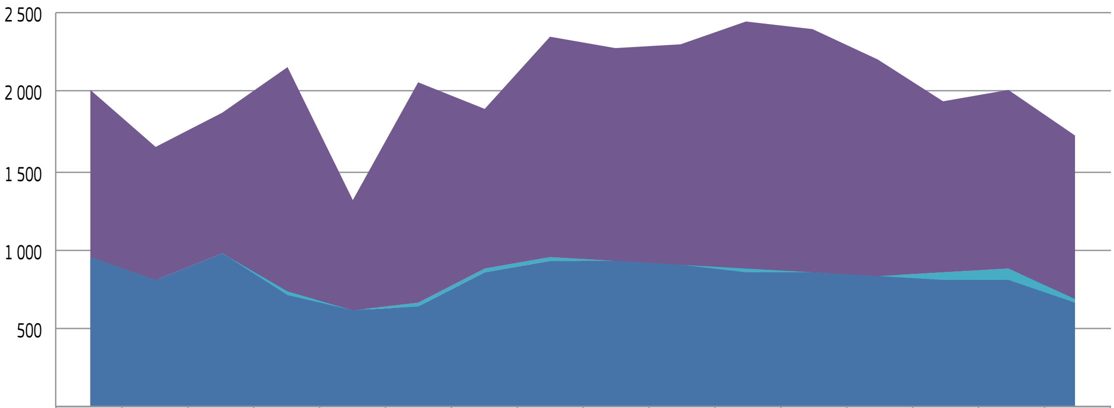


	2013	2014	2015	2016	2017	2018	2019	2020
Total degree days	2 458	2 179	2 297	2 056	2 173	2 376	2 276	2 278
Cold degree days (CDD), cooling required	147	110	63	128	105	185	115	102
Hot degree days (HDD), heating required	2 311	2 069	2 234	1 928	2 068	2 191	2 161	2 176
kWh/person/degree day	5.05	5.82	5.86	6.09	5.33	4.53	4.95	4.34

H4.1.1 Buildings

Most of the energy requirements for the buildings are met from the electricity grid and from heating oil supplied on average three times per year and stored in an 85 000 litres bunded storage tank. There is no mains connection for gas on site because there is no such facility in the area. Bio-LPG is provided by a propane storage tank and is used for cooking in the canteen and restaurant, and to heat the water on site during the period spanning from May to September when oil boilers are shut down. Heating oil has in recent years provided a larger share of the site's energy use than electricity.

Figure H4 Annual buildings energy consumption (MWh) in the EMAS perimeter[3] (indicator 1a)



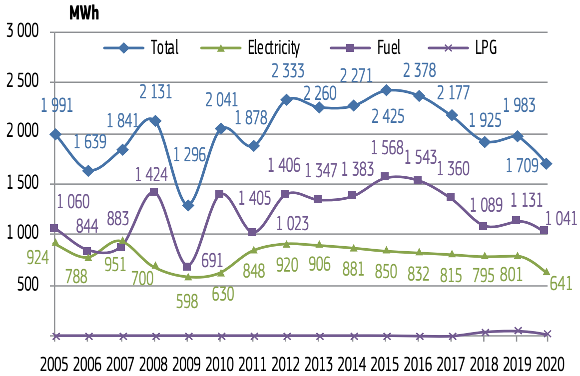
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	1 991	1 639	1 841	2 131	1 296	2 041	1 878	2 333	2 260	2 271	2 425	2 378	2 177	1 925	1 983	1 709
diesel	1 060	844	883	1 424	691	1 405	1 023	1 406	1 347	1 383	1 568	1 543	1 360	1 089	1 131	1 041
mains supplied gas																
tank supplied gas (LPG)	6.87	6.87	6.87	6.87	6.87	6.87	6.87	6.87	6.87	6.87	6.53	2.68	1.68	40.55	51.20	26.80
electricity	924	788	951	700	598	630	848	920	906	881	850	832	815	795	801	641

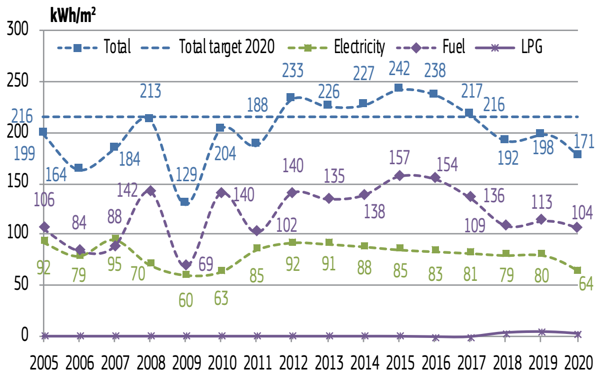
Per capita and consumption per square metre are presented in figures H5 and H6.

2 www.degreedays.net; monthly data for EBBR station (15.5 C reference temperature).

3 Which has expanded steadily since first registration in 2005.

Figures H5 and H6: Evolution of total annual energy consumption for Grange EMAS buildings





In 2020 due to the covid-19 pandemic and the different lockdowns, only some minor electrical project took place and all involved the replacement of old lamp fittings with new LED ones. An important project regarding the replacement/repair of some emergency lighting components was also undertaken.

The trends in energy consumption are largely related to external causes such as climate, seasons (natural light levels) and to office occupancy rates.

In 2020, COVID-19 significantly impacted the implementation of SANTE programme of audits. Planned controls had to be postponed to later in the year or cancelled. Of the 167 audits and similar controls initially planned in the food chain area, 97 were eventually carried out in 2020. Even though the COVID-19 situation did not allow most on-the-spot activities, controls continued remotely and 61 remote audits and similar controls were completed in 2020.

Staff conducted only 39 on-the-spot missions amounting to a total of 78 person-days of staff absence. Normally, that combined with other factors such as holidays, missions to Brussels and other absences has an impact on energy consumption, but in 2020, for reasons already explained, the daily average presence on side was around 8 to 10% of the normal population (±100/day).

Therefore, the main reason behind the ±14% decrease in energy consumption for 2020 compared with 2019 is due to the fact that, although a low presence of staff on site, the office did remain open and fully functioning in order to facilitate the work of the daily present staff.

Having said that, when one examines each single type of energy separately, one realises that the single performances are encouraging even in a Covid-19 context:

- Electricity ± 20% reduction
- Fuel ± 8% reduction
- Bio-LPG ± 48% reduction

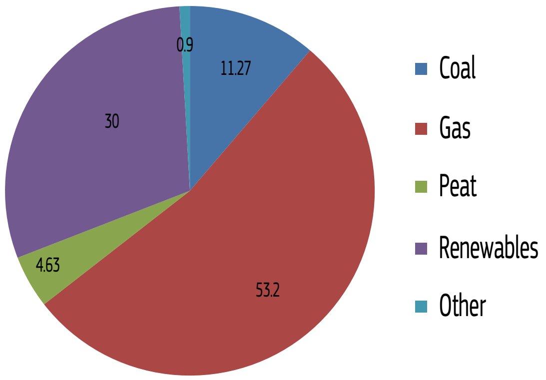
H4.1.2 Vehicles

The site vehicle was disposed off in 2019 in accordance with EMAS end-of-life rules and was not replaced.

H4.1.3 Renewable energy use in buildings and vehicles

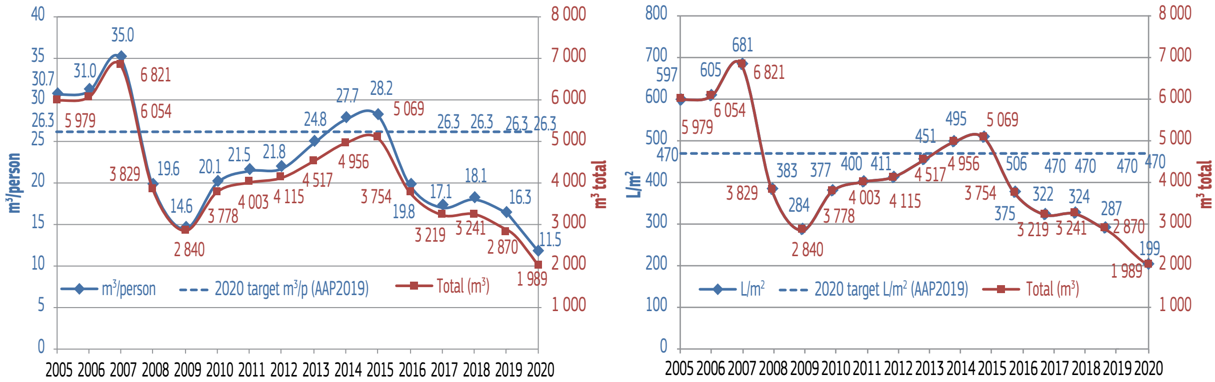
The composition of the grid electricity supply is shown in Table H7. Gas is still the most important component, but renewables account now for 42.90% compared with the 32.5% of 2019.

Figure H7: Renewable and non-renewable energy use in buildings (MWh and percentage of total)



H4.2 Water consumption

Figures H8 and H8a: Evolution of total annual water consumption for Grange EMAS buildings



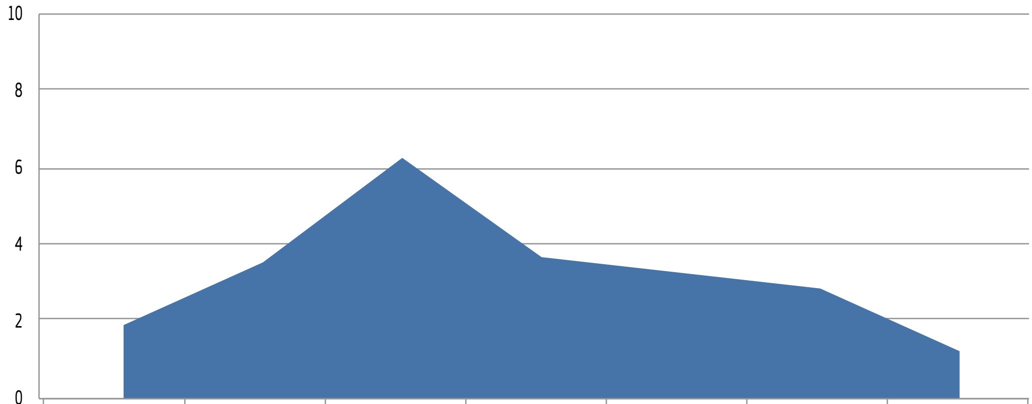
Figures H8 and H8a, show water consumption as a total and per square metre since 2005. 2020 has seen a decrease of around 30.67% when compared with the previous year. In 2020, due to the Covid-19 lockdowns, only few meetings took place (mainly during the period January to mid-March), compared with the 2019 33 meetings with an average duration of 2 days and 1229 external visitors attending.

H4.3 Office paper consumption

Paper usage in 2020 was 245 000 sheets, an average of 1 392.6 sheets/person, equivalent to 6.33 sheets per working day (± 220 working days/year), compared with the 2019 figures of 3 707 sheets/person = 16.85 sheets per working day. This is one of the positive effects of the Covid-19 situation. Indeed, as a direct consequence of staff not being on site, because the majority has been working from home, the printing of paper in 2020 has seen a decrease of ±59%.

Since 2015 all printers and photocopiers have the option to print double sided set as a default. Since 2015, Grange followed other Commission sites in using 75g/m² office paper instead of 80g/m². In 2019 Grange moved to "paperless" signataires, better exploiting the possibilities of Ares.

Figure H9: Evolution of total paper consumption at Grange



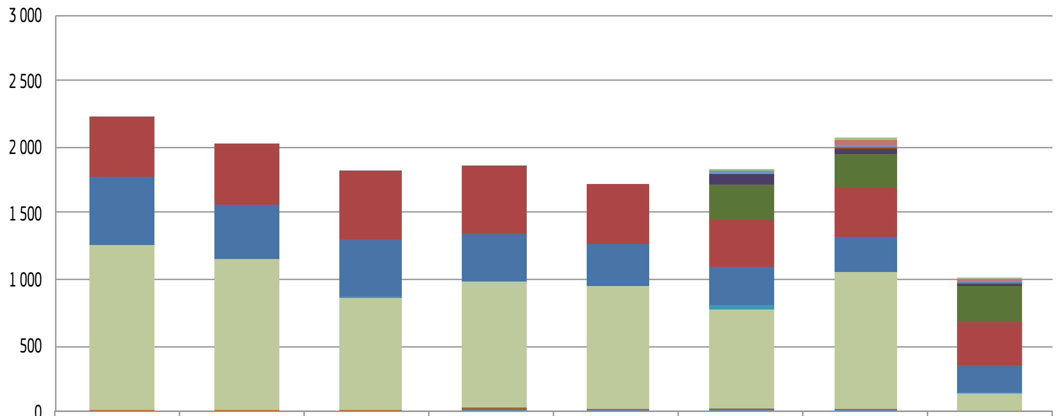
	2014	2015	2016	2017	2018	2019	2020
Office (A4 sheet equivalent)x1 000 000	0.38	0.76	1.34	0.80	0.71	0.61	0.25
Total paper consumption (tonnes)	1.839	3.54	6.254	3.74	3.3	2.87	1.16
Office paper (tonnes)	1.839	3.54	6.254	3.74	3.3	2.87	1.16

H5 Reducing carbon footprint and air emissions

H5.1 Carbon footprint

Emissions associated with energy supply for the buildings still account for virtually half of all the CO_2 emissions evaluated for the site. Business air travel emissions have substantially decreased when compared with previous year 2019, due to the fact that only a limited number of missions took place in 2020 due to the different travel bans, restrictions and lockdowns imposed by the Covid-19 situation.

Figure H10, DG SANTE at Grange, carbon footprint (CO_2 or equivalent emissions 2013-2020 (tonnes)



	2013	2014	2015	2016	2017	2018	2019	2019
Total	2 229	2 027	1 823	1 856	1 717	1 834	2 073	1 014
Other category (Ispra)								
Own waste	0	0	0	0	0	13	17	17
Catering	0	0	0	0	0	0	34	4
Service contracts	0	0	0	0	0	21	23	23
Paper supply	0	0	0	0	0	3	3	1
Fixed assets - Commission vehicles	0	0	0	0	0	0	0	0
Fixed assets - IT	0	0	0	0	0	83	50	24
Fixed assets - buildings	0	0	0	0	0	258	258	258
Buildings - fuels for heating	445	456	519	510	449	359	366	337
Buildings - electricity	526	421	439	367	319	293	264	209
Buildings - district heating/cooling	0	0	0	0	0	0	0	0
Buildings - coolant losses	0	0	5	0	0	34	0	8
Vehicle fleet - fuel consumption	0	0	0	0	0	0	0	0
Missions air (RFI=2)	1 248	1 142	853	953	927	747	1 035	128
Missions excluding air	10	7	7	12	7	7	7	0
Staff commuting	0	0	0	14	14	14	14	4

Table H4 Per capita CO_2 or equivalent (CO_2e) emissions 2013 to 2020 by scope (tonnes)

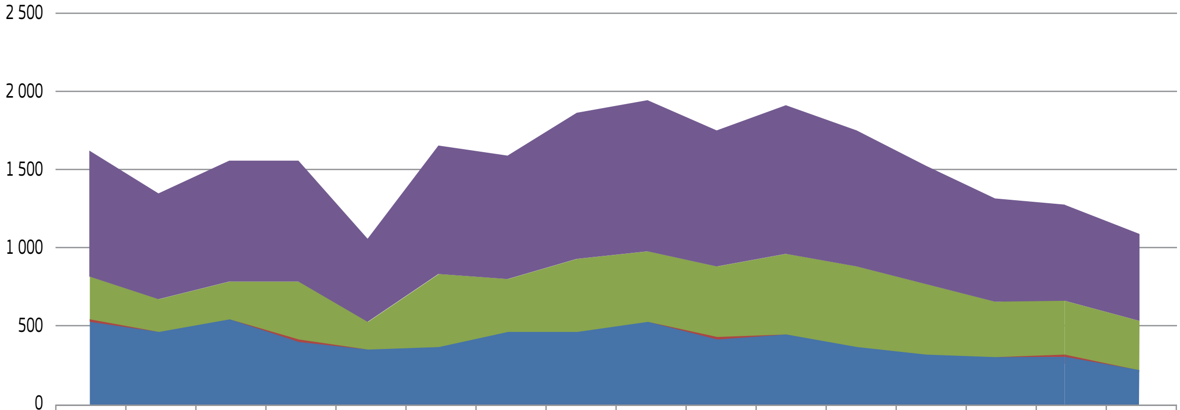
	2013	2014	2015	2016	2017	2018	2019	2020
Scope 1: Fuel comsumption and fugitive emissions								
Fuel for bldgs: mains gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: tanked gas (1)	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel	2.00	2.09	2.35	2.19	1.95	1.64	1.71	1.60
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commission vehicle fleet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refrigerants	0.00	0.00	0.03	0.00	0.00	0.19	0.00	0.05
Scope 2: Purchased energy								
External electricity supply (grey)	2.66	2.17	2.25	1.78	1.56	1.51	1.37	1.11
External electricity supply contract (renewables), combustion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (combustion) (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scope 3: Other indirect sources								
Fuel for bldgs: mains gas (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: tanked gas (upstream) (1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fuel for bldgs: diesel (upstream)	0.44	0.46	0.52	0.49	0.43	0.37	0.37	0.35
Commission vehicle fleet (upstream)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site generated renewables (upstream) (3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
External grey electricity supply, line losses	0.23	0.18	0.19	0.15	0.13	0.13	0.14	0.10
External 'renewables' electricity contract (upstream with line loss)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District heating (upstream) (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Business travel: air (combustion)	6.86	6.38	4.74	5.01	4.93	4.17	5.88	0.74
Business travel: rail (combustion)	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Business travel: hire car (combustion)	0.05	0.04	0.03	0.06	0.04	0.04	0.04	0.00
Business travel: private car (combustion)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commuting (combustion) (4)	0.00	0.00	0.00	0.07	0.08	0.08	0.08	0.02
Fixed assets - buildings	0.00	0.00	0.00	0.00	0.00	1.44	1.47	1.49
Fixed assets - IT	0.00	0.00	0.00	0.00	0.00	0.47	0.28	0.14
Fixed assests - Commission vehicles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper supply	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.01
Service contracts	0.00	0.00	0.00	0.00	0.00	0.12	0.13	0.13
Catering	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.02
Own waste	0.00	0.00	0.00	0.00	0.00	0.07	0.09	0.10
Sum	**12.2**	**11.3**	**10.1**	**9.8**	**9.1**	**10.2**	**11.8**	**5.9**

(1) - Grange is the only site with no mains gas supply
(2) - Can include Commission bus service where appropriate
(3) - Only applies to Brussels
(4) - Not all sites
(5) - Geothermal, biomass and PVs

H5.2 CO_2 emissions from buildings

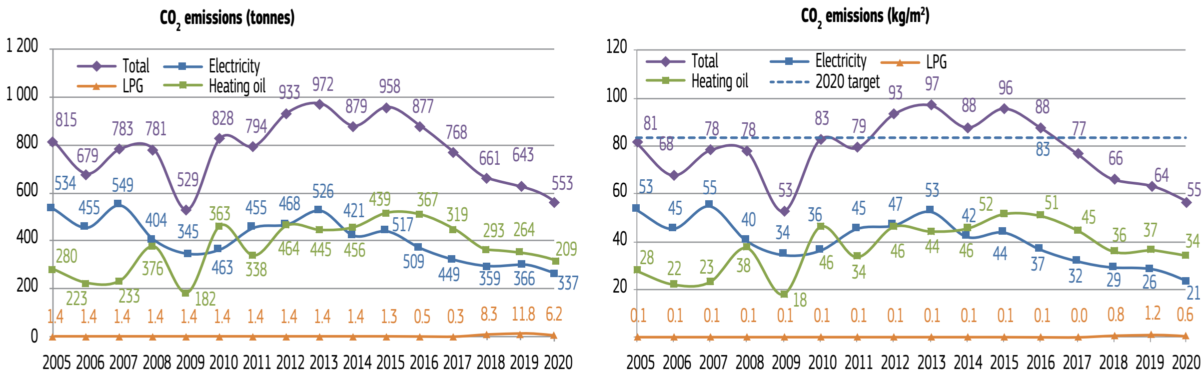
H5.2.1 Buildings (energy consumption)

Figure H13: CO_2 emissions from buildings energy consumption at Grange, (tonnes)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total	815	679	783	781	529	828	794	933	972	879	958	877	768	661	678	553
diesel	280	223	233	376	182	463	338	464	445	456	517	509	449	359	366	337
tanked gas	1	1	1	1	1	1	1	1	1	1	1	1	0.3	8.3	11.8	6.2
electricity	534	455	549	404	345	363	455	468	526	421	439	367	319	293	300	209

Figure H14 and H15: CO_2 emissions from buildings' energy consumption



2020 has seen a decrease of 14% in CO_2 emissions compare 2019. Heating oil and electricity still account for the majority of the CO_2 production of the site. CO_2 emissions Kg/M² in 2020 went down by 8 Kg mainly because of the electricity performances (5 Kg) and 3 Kg from oil.

H5.2.2 Buildings other greenhouse gases (cooling gases)

A loss of 7.88 tonnes CO_2 of refrigerant R404A was recorded in 2020 from the blast chiller in the main kitchen, following the F-gases maintenance schedule:

1. air conditioning units (quarterly/six-monthly and annually depending on capacity);
2. main kitchen freezers and fridges (six-monthly and annually); and
3. the two main Hitachi chillers for the air-conditioning system in the main conference rooms (monthly and annually) and, although they are rarely used, they are maintained in operational condition.

H5.3 CO_2 emissions from vehicles

H5.3.1 Commission vehicle

The site vehicle was disposed off in 2019 in accordance with EMAS end-of-life rules and not replaced

H5.3.2 Missions (excluding Commission vehicle)

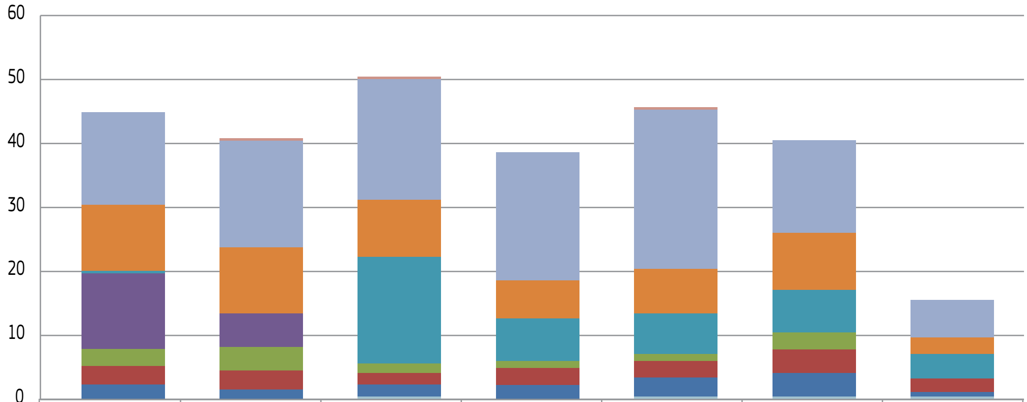
Missions within the EU and to third countries are part of SANTE Grange's core business. All missions carried out are part of an approved work programme of official controls and, in setting priorities, every effort is made to ensure that the missions carried out are essential. At the same time SANTE has invested in improvements to its video conference (VC) facilities to allow meeting take place without the need to travel, particularly between colleagues in SANTE's three locations (Brussels, Luxembourg and Grange). In 2020 this investment paid-off since part of the 61 remote audits and similar controls that took place, were conducted taking advantage of those VC facilities.

H6 Improving waste management and sorting

H6.1 Non hazardous waste

Waste generation is an environmental aspect with significant impact, and the evolution of waste generation since 2014 is shown below.

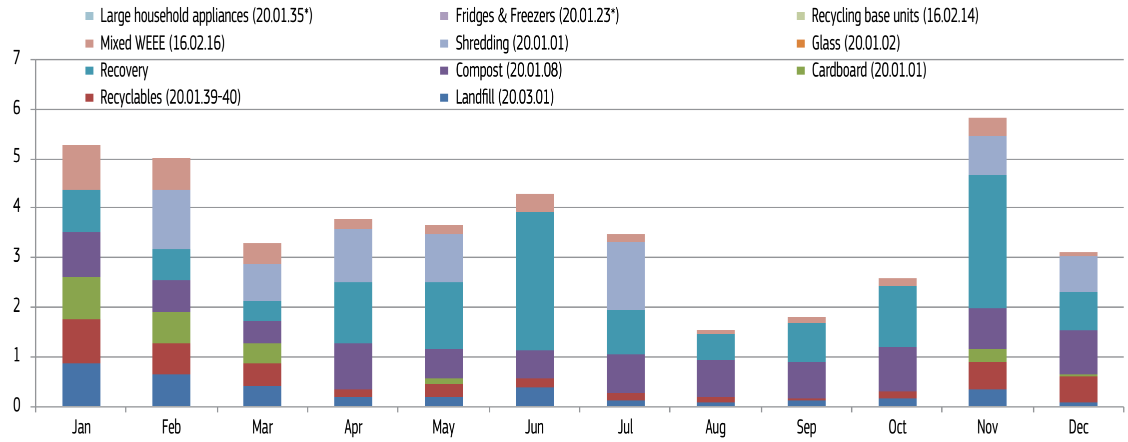
Figure H16: Evolution of total non-hazardous waste in Grange (tonnes)



	2014	2015	2016	2017	2018	2019	2020
Total	45.0	40.5	50.2	38.7	45.2	40.4	15.2
Total (tonnes/person)	0.25	0.23	0.26	0.21	0.25	0.23	0.09
Glass (20.01.02)	0.0	0.1	0.130	0.000	0.070	0.000	0.000
Recovery*	14.6	16.6	18.790	20.080	24.660	14.216	5.920
Compost (20.01.08)	10.3	10.3	8.960	5.960	7.080	8.909	2.870
Shredding (20.01.01)	0.3	0.0	16.660	6.470	6.370	6.786	3.540
Paper (20.01.01)	11.9	5.1	0.000	0.000	0.000	0.000	0.000
Cardboard (20.01.01)	2.4	3.8	1.290	1.360	1.030	2.357	0.000
Recyclables (20.01.39-40)	3.1	3.2	1.950	2.320	2.610	4.032	2.170
Household waste, landfill (20.03.01)	2.3	1.5	2.009	2.246	2.839	3.648	0.650
Mixed WEEE (16.02.16)			0.428	0.188	0.520	0.354	0.504
Recycling base units (16.02.14)			0.000	0.042	0.042	0.042	0.000

As direct consequence of the 2020 Covid-19 lockdowns, restrictions and very low numbers of people present on site, there has been a substantial decrease of non-hazardous waste generation (± 62% compared to 2019).

Figure H17: Monthly breakdown of waste in 2020 (tonnes)



Recovery is still the largest single component, compost (food waste from the kitchens) has been overtaken by shredding and the three of them account for ± 79% of the total waste.

H6.2 Hazardous waste

In 2020 0.729 tonnes of hazardous waste were collected. There was 84 kg of fluorescent tubes, 116 kg of batteries, 25 kg of toner and 504 kg of other IT/electric items (WEEE).

H7 Protecting biodiversity

The dimensions of the Grange site are shown in the plate to the left, from which the footprint is calculated at approximately 8.5 ha within which the constructed area is about 0, 55ha. Owing to its rural location, preserving and promoting biodiversity is very important. The site is sparsely populated, a staff member occupies on average 447 m^2 of the site or 52.7m^2 of the built up area.

The main action regarding the protection and enhancement of our bio-diversity, after the signature of a contract for submission of a multi-annual plan, was to let a big sections of our grassland (±3.75 ha) grow into a meadow, in order to allow plants and flowers to grow and provide nectar for insects such as bees, butterflies and hoverflies. Unfortunately, due to prolonged Covid-19 lockdowns it wasn't possible to put in place other parts of the plan (e.g. creation of a pond and construction of a woodland path).





H8 Green Public Procurement

Action 54 of the Commission's Global Annual Action Plan has, since 2012, sought to integrate systematically GPP or environmental criteria in calls for tender's terms of reference and technical specifications.

All tenders for the Grange site incorporate GPP. In 2020 a tender for Audit and Inspection services was launched and contains reference in the technical specification to EMAS. SANTE envisages using a three level classification of the tenders (green, not green and green by nature), which should give sufficient detail in the analysis of the environmental criteria

H9 Demonstrating legal compliance and emergency preparedness

H9.1 Management of the legal register

A procedure for maintaining the legal register has been in place since late 2014. The Register of Environmental Legislation is reviewed and updated continually by an external consultancy[4]. The responsible SANTE personnel receive automatic email updates relating to new or changing legislation and ensure that there is appropriate follow up.

For each piece of legislation, the Legal Register provides:

1. Full title of legislation;
2. Reference number;
3. Purpose of the Act/Regulation/Directive; and
4. Summary of the Act/Regulation/Directive.

The Register of Environmental Legislation is divided into the following sections:

1 - General Environmental Legislation	7 - Energy
2 - Water	8 - Dangerous Substances
3 - Waste	9 - Emergency Preparedness
4 - Air Pollution	10 - Habitats and Eco systems
5 - Physical Planning	11 - Existing Licences, Planning Permissions and EMS Policy
6 - Noise	

Unlike most other Commission EMAS sites, Grange does not require a permit to operate. It does require a fire safety certificate and a planning permit. Legal compliance is demonstrated through the responses the site provides to legislation specific questionnaires which generate scores. The Grange site is compliant with all relevant legislation. SANTE Grange monitors the findings of EMAS internal and verification audits and, in co-operation with DG HR's EMAS coordination unit, ensures that all non-conformities and scopes for improvement are monitored and that remedial actions are taken to close them.

H9.2 Prevention and risk management

The site implements a programme of environmental incident prevention based on its evaluation of environmental aspects and impacts, and on the identification of potential emergency conditions or abnormal incidents related to each aspect. The main aspects likely to give rise to an accident or incident are:

1. Waste management on site and off site: Waste management procedures have been implemented and authorised and approved waste management contractors identified and employed through the Facility Management contractor. Dedicated storage areas for specific wastes are maintained, including a fluorescent tubes "coffin", food waste containers, recyclable waste containers, general waste containers.
2. Hazardous materials: Diesel is stored in a bunded overground 85 000 litre tank. The bund is subject to three yearly hydrostatic testing, in accordance with Environmental Protection Agency guidelines, by a competent engineering contractor. Paints, water treatment and cleaning materials are stored in small quantities and provided with secondary containment. A liquid propane gas (Bio-LPG) tank on site is subject to maintenance and periodic testing by the supplier, who also own the tank.

[4] www.pegasuslegalregister.com

3. Air emissions: Regular maintenance and annual emissions testing of the boilers ensures that emissions remain as low as possible.
4. Discharges to water: Polluted discharge to ground and surface water is prevented by primary and secondary containment of all hazardous wastes and hazardous materials and substances on site. Discharges to sewer are from sanitary and cooking facilities. The kitchen sinks drain through a grease trap which is regularly serviced and emptied. Cleaning chemicals are low or non-hazardous and are diluted in use.
5. Use of resources: Utilities and waste consumption are monitored each month and variances from expected levels are investigated.
6. Contractors: All contractors used by the site are subject to approval based on competence and environmental probity. Contractors are also regularly audited and operational audits include environmental requirements and considerations. Key on site Facilities Management and security contractors are certified to ISO 14001.

The preventive measures outlined above protect the local ecosystems and habitats. Furthermore measures to encourage wild life and bees on site and to prevent damage to healthy trees and wildlife have been also implemented.

H9.3 Emergency Preparedness

The Emergency Plan was not updated in 2020. Last update was done on the 14/10/2019.

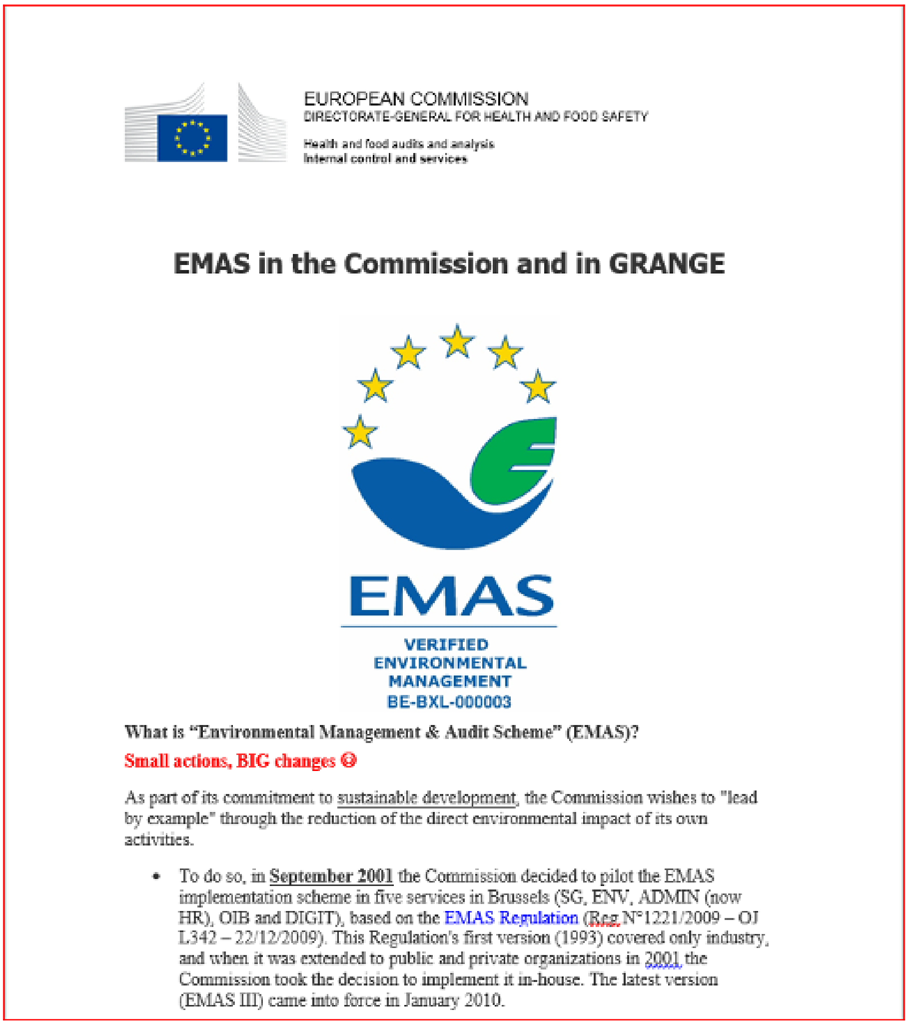
H10 Communication

H10.1 Internal communication

At the initiative of the Director, our unit was asked to give a presentation on EMAS to our staff. The presentation took place on the 13/02/2020 in the context of the Director's monthly meeting with staff. The attendance was good and feed-backs received from staff were positive. Lots of them were interested by the Biodiversity project.

H11 Training

An introductory EMAS training course is provided for newcomers. The objective is to raise awarness and knowledge of EMAS in Grange among our staff and to ensure that EMAS is taken into account in all aspects of our day to day life on site.



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR HEALTH AND FOOD SAFETY

Health and food audits and analysis
Internal control and services

EMAS in the Commission and in GRANGE

What is "Environmental Management & Audit Scheme" (EMAS)?

Small actions, BIG changes ☺

As part of its commitment to sustainable development, the Commission wishes to "lead by example" through the reduction of the direct environmental impact of its own activities.

- To do so, in **September 2001** the Commission decided to pilot the EMAS implementation scheme in five services in Brussels (SG, ENV, ADMIN (now HR), OIB and DIGIT), based on the EMAS Regulation (Reg N°1221/2009 – OJ L342 – 22/12/2009). This Regulation's first version (1993) covered only industry, and when it was extended to public and private organizations in 2001 the Commission took the decision to implement it in-house. The latest version (EMAS III) came into force in January 2010.

H12 EMAS Costs and saving

For several years we have monitored the costs associated with running EMAS in terms of staff time, and the cost of supporting contracts and savings. We have also estimated costs associated with parameters such as energy and water consumption. Costs and energy savings are presented below.

Table H6: EMAS costs and savings

Parameter	Costs											Change in last year
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Total Direct EMAS Cost (EUR)	0	0	0	0	47 400	47 900	48 356	49 356	51 856	56 100	56 600	500
Total Direct Cost per employee	0	0	0	0	265	266	255	263	290	319	327	8
Total buildings energy cost (Eur)	NA	0	0	0	166 604	174 867	171 230	160 324	148 396	152 066	126 979	-25 087
Total buildings energy cost (Eur/person)	NA	0	0	0	931	971	901	853	829	864	734	-130
Total water costs (Eur)	NA	0	0	0	6 096	6 235	4 617	3 959	3 986	3 530	2 446	-1 083
Water (Eur/person)	NA	0	0	0	34	35	24	21	22	20	14	-6

Energy is by far the largest single resource cost. We can see that in 2020 energy costs represented ± 89% of the total amount.

H13 Conversion factors

Table H7: Conversion factors used in producing data for the Grange site

Parameter and units	2005	2014	2015	2016	2017	2018	2019	2020
kWh of energy provided by one litre diesel (1)		10.89	10.89	10.89	10.89	10.89	10.62	10.58
Paper Density (g/m^2)		78.63	75	75	75	75	75	75
Kgs CO_2 from 1 kWh of electricity (2)	0.532	0.44	0.476	0.407	0.361	0.34	0.3	0.3
Kgs CO_2 from 1 kWh tanked gas (3)	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21
Kgs CO_2 from 1 kWh diesel (1)	0.27	0.27	0.27	0.27	0.27	0.27	0.266	0.266
Kgs CO_2 from one litre of diesel (3)		2.50	2.50	2.50	2.50	2.50	2.50	2.50
Kgs CO_2 from one litre of petrol (3)		2.28	2.28	2.28	2.28	2.28	2.28	2.28
Annual cost of one FTE (EUR) (4)		132 000	134 000	134 000	138 000	148 000	150 000	152 000
Conversion 1 Litre heating oil = x kwh	10.169	10.169	10.169	10.169	10.169	10.169	10.169	10.169

1) Neil Packer, Staffordshire University UK - 2011
2) Electricity bills (2013-2019)
3) Base ADEME 2017
4) Value from DG BUDG Finance Unit Network for beginning of year

H14 Site breakdown: characteristics of buildings and performance of selected parameters (indicative data)

Building	Address	Occupant	Construction Yr	EMAS registration	Useful surface area (m^2)	Staff	Office	Café	Self rest	Creche/ child care	Printing and mail sorting	Medical service	Depot, large storage	Workshop	Sports/ recreation centre	IT Server centre	Power generation	Water treatment plant	Lab/experimental (non nuclear)	Nuclear lab/experimental	Electricity	Mains gas	Other gas	Diesel	District heating	District cooling	Site renewable solar	Site renewable biomass	Water (m^3)	Non hazardous waste (tonnes)	Hazardous waste (tonnes)	Wastewater discharge (industrial)
1) Building essential details 2020:							**2) Building use 2020**														**3) Energy sources and amount (MWh for 2020)**								**4) Water and waste consumption**			
GRANGE																																
GRAN	Grange, Kiltale, Dunsany, Co Meath, Ireland	DG SANTE/ Dir F	2 002	BXL -000003	10 010	173	X	X	X	X	X			X	X	X	X				641		26.8	1 041					1 989	15.15	0.73	

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Environmental management : Leading by example

The European Commission long provided strong political leadership on environmental issues, including fighting global climate change. It leads by example becoming in 2005 **the first EU Institution to achieve an EMAS registration** reducing the environmental impact of its everyday activities. Initially limited to Brussels, the scheme now includes its eight largest sites in Europe: Brussels, Luxembourg, JRCs Geel (Belgium), Petten (Netherlands), Seville (Spain), Karlsruhe (Germany), and Ispra (Italy), along with DG SANTE at Grange (Ireland). For the coming years, the Commission aims to further extend the scope of its EMAS registration to include executive agencies under Commission facilities management control, as well as Commission Representations in the Member States. Through EMAS the European Commission identifies, minimizes, and mitigates the environmental impacts of its activities, delivering continuous improvement in environmental performance in line with the EU Policies and Regulations. Every year the European Commission publishes its results in an Environmental Statement. This brochure presents some highlights of the latest results.

Moreover, the European Commission recognises the importance of Europe continuing its leading role on the global stage in reducing environmental impacts. Its flagship European Green Deal emphasizes the importance of achieving tough emissions reductions in Member States while also signalling the importance of sustainable food supply chains (Farm to Fork strategy) and maintaining biodiversity. The Commission, through its policies, directives and regulations, ensures that Member States set an example by developing more sustainable economies, through initiatives such as the Clean Energy Package, successive Water Framework Directives, the Circular Economy Package and support for the Paris climate agreement. It is important that we practise what we preach. In that context, the President Ursula von der Leyen pledged that **the Commission would become climate-neutral by 2030** and would present an action plan on how to do so in practice.

This brochure includes European Commission's results up to 2020 aggregated from the eight sites. In 2020, the European Commission met, and in part due to the COVID pandemic, **largely exceeded its corporate 2014-2020 targets for core indicators**. Therefore, although we continue to face difficult economic conditions and uncertainty, we were able nonetheless to improve the Commission's environmental performance and deliver significant benefits thereby demonstrating our commitment to a more sustainable European Union.

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More information about EMAS in the Commission at:
http://ec.europa.eu/environment/emas/emas_registrations/emas_in_the_european_institutions_en.htm

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