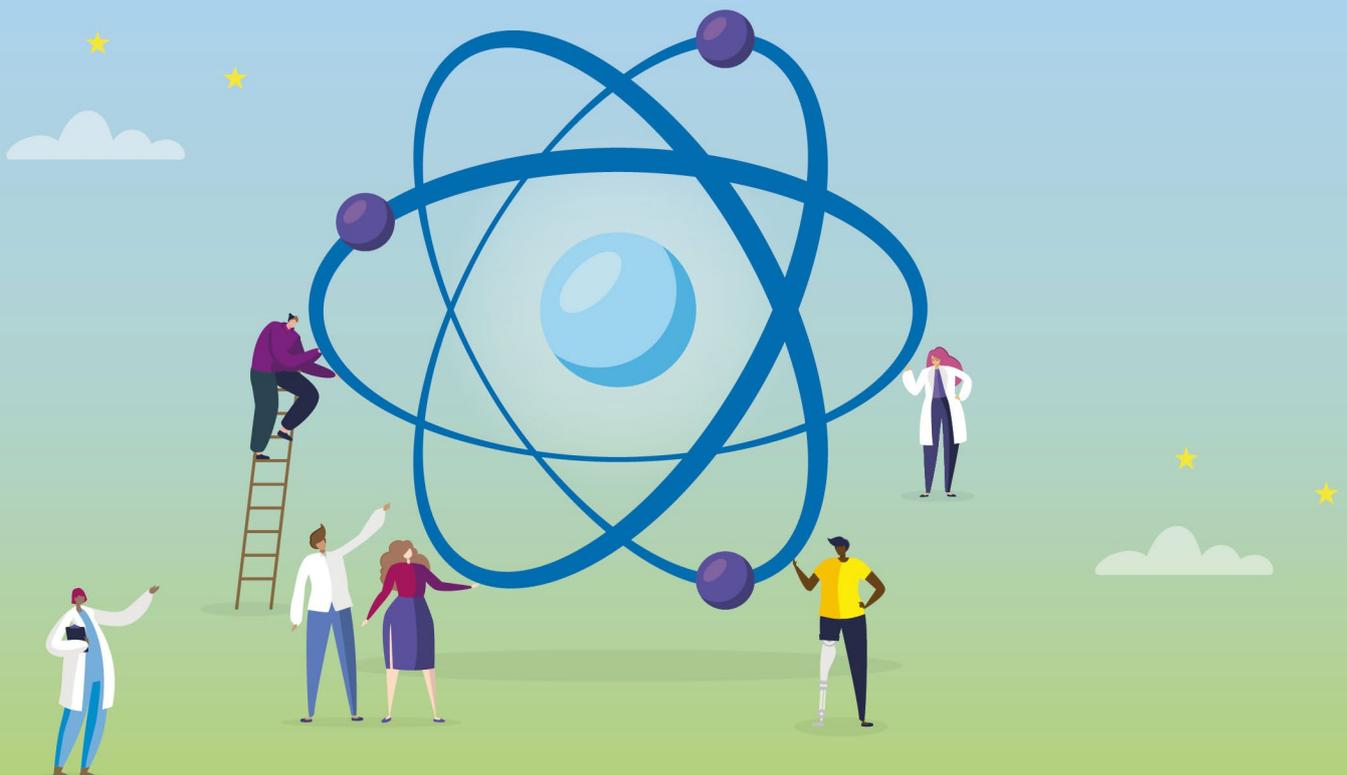




Euratom Research in Action and Opportunities for Europe

EU Strategic Autonomy and the Future Energy Systems

EU Small Modular Reactors (SMRs) Declaration



Research and
Innovation

Euratom Research in Action and Opportunities for Europe

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Euratom Research in Action and Opportunities for Europe

EU Strategic Autonomy and the Future Energy Systems

edited by Domenico Rossetti di Valdalbero and Karolina Janatkova

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INTRODUCTION



The European Union is responding to the negative impact of the war in Ukraine with broad geopolitical consequences. The energy crisis has shown that in addition to sustainability, security of supply and affordability are crucial for the EU's energy policy and for European citizens.

It is important to make us less dependent from fossil fuels and from exposure to global gatekeepers of energy sources and critical materials, including nuclear fuels. It is a key objective for our security.

Europe's Green deal ambition is to be the first carbon neutral continent in the world by 2050, which requires accelerating our strategic agendas to reduce by 55% the greenhouse gas emissions by 2030. This requires that we have world-leading technologies to use a variety of decarbonization options for the resilience and the strategic autonomy of our energy systems.

In the [Net Zero Industry Act](#)¹, the Commission proposes measures for strengthening several technology areas and manufacturing ecosystem, including Small Modular Reactors (SMRs), advanced nuclear technologies and fusion.

Several EU Member States, including some without nuclear power, are developing SMRs and are working on advanced reactors that allow the operation of the nuclear fuel in a circular economy perspective. We need to develop an EU SMR design to face the fierce international industrial competition. That is today's pressing challenge for our research and innovation, for our high-tech companies, including small and medium enterprises. That is the challenge for our universities and our research laboratories.

The EU must be at the forefront of the new developments, ensuring a strong European industrial value chain while being at the top of safety and radiation protection standards for SMRs. That is also the reason why we are gathering in the Commission hundreds of participants at our 4 April 2023 event *Euratom Research in Action and Opportunities for Europe: EU Strategic Autonomy and the Future Energy Systems* conference.

I am pleased to announce that we are signing with four nuclear stakeholders: [Nucleareurope](#), [SNETP](#), [ENS](#) and [ENEN](#) the Declaration on 'EU Small Modular Reactors (SMRs) 2030: Research & Innovation, Education & Training'.

This Declaration focus on my portfolio of research and innovation, education and training. We need to optimise Member States coordination on SMRs, to attract the best talents in the field and to develop the most advanced and safe nuclear technologies.

As 2023 is the European Year of Skills, we need to appeal the young generation and leverage investments from the public and private sector in education and upskilling that focus on key nuclear sciences and technologies dealing with energy (fission and fusion) but also for example medicine and space exploration. All nuclear-related activities require well-educated, trained and qualified staff for their safe and secure implementation.

From 4 April 2023, academics, industrialist and researchers can submit their proposals to the Euratom Work Programme 2023-2025 to support the demonstration of safety of European Light Water SMRs. We have budgeted EUR 15 million for such Innovation Action. In addition, we have earmarked EUR 12 million to work on the safety of Advanced Modular Reactors with interested Member States.

It is important keep in mind that research on SMRs encourages new actors including SMEs and spin-offs to enter the civil nuclear sector, attracting additional investment for demonstration and earlier deployment. Today, we are committing to continue to lead research, innovation, education and training for the safety of European SMRs in support to the EU industrial pre-partnership on SMRs.

We have prepared a rich agenda and I am pleased to see so many competent actors joining. I would like to invite you to visit the 3D models and posters of the European SMRs [Nuward](#), [Newcleo](#) and [Teplator](#) linked to Euratom R&T Projects [ELSMOR](#), [PASCAL](#) and [FREDMANS](#) in the Charlemagne building.

Mariya Gabriel
Commissioner for Innovation, Research, Culture, Education and Youth

¹ European Commission, Proposal for a Regulation on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act), COM(2023)161.

PRESENT AND FUTURE NUCLEAR ENERGY CHALLENGES

Signe Ratso, Deputy Director-General, European Commission, DG RTD



Signe Ratso is Deputy Director-General and a member of the Management Board of the Directorate-General for Research and Innovation of the European Commission. She is Chief negotiator, responsible for negotiations of association agreements with third countries associated and future potential associated countries to the EU R&I programmes Horizon Europe and Euratom, association policy and its interlinkages with EU R&I international cooperation strategy.

She is also responsible for Open Innovation and for citizens' engagement and social innovation in research and innovation policy. As a member of the Management Board she oversees some of the priority areas of the Commission in DG R&I. Before joining DG R&I she worked in different senior management positions in DG TRADE since 2006.

Signe Ratso has always been involved in international affairs. Before joining the Commission she worked as Deputy Secretary General (from 1994 to 2005) at the Ministry of Economic Affairs and Communications of the Republic of Estonia.

She has two University degrees from Tartu University in Estonia.

Key messages:

1. The European Commission (DG RTD) adopted the Euratom Work Programme 2023-2025, implementing the Euratom Research and Training Programme and supporting nuclear researchers with EUR 132 million in funding.
2. Most of the research and innovation – fusion energy, nuclear materials, radioactive waste management and radiation protection – will be carried out through co-funded European Partnerships. This new generation of Partnerships, involving a wide range of public and private partners, should achieve a greater impact.
3. This call for proposals will focus on the safety of Small Modular Reactors, development of nuclear materials and the secure management and disposal of radioactive waste.
4. European Commission (DG RTD) has been supporting research on Small Modular Reactors-Light Water (LW-SMRs) and on Advanced Modular Reactors (AMR) via the Euratom Research and Training Programme. Currently Euratom Programme funds 4 projects on LW-SMRs with a total budget of EUR 18 million and 5 projects on advanced nuclear technologies that could be implemented via AMRs concepts with a total budget of EUR 27 million.
5. European Commission (DG RTD) will be working on the implementation of the Declaration on 'EU Small Modular Reactors (SMRs) 2030: Research & Innovation, Education & Training' signed by Commissioner Gabriel and EU nuclear stakeholders: nucleareurope, SNETP, ENS and ENEN today. This is an important and very ambitious milestone.
6. Following this Declaration, the EU will continue to lead research, innovation, education and training for the safety of SMRs in Europe thus supporting the EU pre-partnership on SMRs.
7. The European Union requires nuclear expertise to make sure that there is and will be a well-qualified workforce for present and future nuclear science and technology applications. Know-how and competences have to be transferred to the next generation of scientists, engineers and technicians. This is also in line with the 2023 [European Year of Skills](#) initiative.

8. European Commission (DG RTD) supported the Inter Service Working Group (ISWG) on the “European Small Modular Reactors (SMRs) pre-Partnership” established by DG ENER. Under the related Steering Committee Euratom Research contributed to Work Stream-2 (WS) on Licensing and Work Stream -5 on Research on SMRs.
9. European Commission (DG RTD) supported SMR Research and Development cooperating with international organizations. Euratom Research participates in Technical Working Group (TWG) on SMRs of the International Atomic Energy Agency (IAEA) and in the Experts Group on SMRs of the Nuclear Energy Agency-Organisation for Economic Co-operation and Development (NEA-OECD).
10. Furthermore, the Euratom Programme is also seeking synergies in medical application of ionising radiation, including improvements in the quality and safety of such applications as outlined in the [SAMIRA action plan](#) in line with other Horizon Europe activities and Commission initiatives ([Europe's Beating Cancer Plan](#) and the [Cancer Mission](#)). DG RTD is supporting research on Radiation Protection via the partnership PIANOFORTE.

Desirée Comstedt, Vice-President, Vattenfall



Desirée Comstedt currently works as Vice President of Fleet Development at Business Area Generation in Vattenfall AB, Sweden. Fleet Development is responsible for developing the right prerequisites for optimizing the nuclear and hydro fleet within Vattenfall. She has several years of experience of working with strategic development for the generation part of Vattenfall including nuclear back end. Within Fleet Development lies the responsibility for Business Area Generation's business development portfolio including among several project a feasibility study for building Small Modular Reactors at the Swedish nuclear site Ringhals as well as a joint project with Shell aiming to produce sustainable aviation fuel.

Trained with a Master in science of Economics, D. Comstedt is Vice President Fleet Development at Business Area Generation, Vattenfall. Before, she was Head of Strategy and Performance at Fleet Development, Business Area Generation, Vattenfall after being Head of management support at Swedish Nuclear fuel and Waste management company (SKB). She has also been responsible for strategy and business development for Business Area Generation; Sponsor to several projects in connection to the development of brownfield and greenfield; and Sponsor to projects in the area of energy storage. D. Comstedt has been also Project portfolio owner of Vattenfall BA Generation Business Development portfolio.

Key messages:

1. We see a huge increase in electricity demand both in Sweden and in our other core countries.
2. We need to make sure that we enable the build out of all fossil free power sources available.
3. The policy overlap that exist is at the moment a big challenge when it comes to both expanding the grid and build out of additional capacity.
4. In the shift when facing out fossil fuels both from electricity production and industrial processes we see an increased need for baseload power.
5. Nuclear has a natural place in the future energy system.
6. We need to move nuclear in to the front room again after years of not being prioritized.
7. Getting enough competence for the large scale projects in the plan will be a big challenge and we need to acknowledge and work together in order to manage this.
8. The European Union needs to set the framework needed in order to get the new build projects going.
9. We need stability in the same framework to be able to get both the project risks and the financial risks down for new nuclear

Rafael Grossi, Director General, IAEA



IAEA Director General Rafael Mariano Grossi assumed office on 3 December 2019.

Mr Grossi is a diplomat with more than 35 years of experience in the fields of non-proliferation and disarmament. In 2013, he was appointed Ambassador of Argentina to Austria and Argentine Representative to the IAEA and other Vienna-based International Organizations. Mr Grossi was president-designate of the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and from 2014 to 2016 served as president of the Nuclear Suppliers Group (NSG). He was the NSG's first president to serve two successive terms. In 2015, Mr Grossi presided over the Diplomatic Conference of the Convention of Nuclear Safety, securing unanimous approval for the Vienna Declaration on Nuclear Safety, an important milestone in international efforts following the 2011 Fukushima-Daiichi nuclear accident.

From 2010 to 2013, he served as Assistant Director General for Policy and Chief of Cabinet at the IAEA, having previously held senior positions in the Argentinian Foreign Service, including as Political Affairs Director General from 2007 to 2009. Mr Grossi was Chief of Cabinet at the Organization for the Prohibition of Chemical Weapons (OPCW) in The Hague from 2002 to 2007. Prior to this, he served in the Argentinian Foreign Ministry, including as Head of Embassy in Belgium and Luxemburg from 1998 to 2002, and as Argentine Representative to NATO from 1998 to 2001. Mr Grossi joined the Argentinian Foreign Ministry in 1985.

Mr Grossi is an International Gender Champion, promoting gender balance in the nuclear field. He holds a PhD in International Relations, international History and Politics from University of Geneva, Graduate Institute of International and Development Studies, from which he also received his Master's degree. He began his academic journey at the Pontifical Catholic University of Argentina and at the Diplomatic Academy of Argentina.

Mr Grossi has received numerous national awards, including Brazil's Order of Naval Merit; the National Medal on the occasion of 30th Anniversary of Independence of Kazakhstan; the Grand Decoration of Honour in Gold with Sash for Services to the Republic of Austria, and the Order of Merit of the Italian Republic. His honorary degrees and academic distinctions include, the Pontifical Catholic University of Argentina's International Chair for Sustainable Development, Common Good and Peace; an honorary doctorate in law from the University of Buenos Aires; an honorary degree in Nuclear Engineering from Polytechnic University of Milan; and an honorary doctorate in Global Studies from Busan University of Foreign Studies.

Key messages:

1. Nuclear energy plays a critical role in mitigating climate change and ensuring energy security. Representing more than a third of the EU's low carbon generation, nuclear is in fact the largest source of low carbon generation in the EU.
2. Today, all energy stakeholders across the globe face a variety of challenges and opportunities. The nuclear sector in Europe is no exception to this. One of course is Ukraine, where threats to nuclear safety and security continue. The Agency is doing all it can to stem these threats, but should they materialize, the consequences could be dire, for the affected populations in the first place obviously, but also for the future of nuclear energy in Europe.
3. Electricity grids also need a stabilizing source of reliable, 24/7 power to partner with variable renewables. And as the energy crisis has underscored, nuclear power continues to play an indispensable role as the backbone of reliable low-carbon electricity generation across the region.
4. Despite increasing support for nuclear power in Europe, I still see differences among EU Member States. The debate for the inclusion of nuclear energy in the EU Taxonomy has been long and controversial. Currently, there are heated discussions on hydrogen and how to differentiate between low carbon hydrogen produced from nuclear and renewables. If we truly want to build a net zero world

where eliminating carbon emissions is the aim, then all low-carbon hydrogen should be considered "green" to encourage the production of hydrogen from nuclear sources.

5. Financing is a critical issue, both for long-term operation and also for new build projects. Financing can come from the private sector, multilateral development banks, or the European investment bank, often called the EU's Climate Bank. Finding a way to unlock these various sources of financing will be important for the nuclear sector in the coming years. The inclusion of nuclear energy in key EU policy decisions is one.
6. The nuclear supply chain also presents challenges. From previously planned nuclear phase outs and suppliers leaving the marketplace, because of those announcements the trend now seems to be moving towards potential future bottlenecks, if large reactors and SMRs are to be built in large quantities.
7. Innovation is crucial for improving operational performance, enhancing safety and resilience, and making nuclear more flexible. SMRs as we know them, advanced fuels and reactors are promising in this respect. Non-power applications such as heat and hydrogen production can also help to decarbonize hard-to-abate sectors such as industry or transport. Additionally, nuclear fusion is making a rapid progress and heading towards a phase where its application for energy production might be on the horizon.
8. While nuclear waste has been safely and successfully managed for decades, permanent solutions to high level waste are within reach thanks to technological innovation and careful planning. Decommissioning nuclear facilities is also a key challenge for Europe to face in the coming years. But again, technological innovation - robots, drones, digitalization - are already helping many countries to make decommissioning more efficient and more economical.
9. Political and industry leaders will need to think beyond their own briefs and their own borders. To meet demand, we will need to facilitate the safe and secure deployment of advanced nuclear technologies, including SMRs and nuclear reactors used for more than producing power. That's why I launched the IAEA's Nuclear Harmonization and Standardization Initiative (NHSI). Together with industry and regulators, we are forging new common approaches that will also support Member States as they seek to address challenges and reap the rewards of expanding nuclear energy to ensure energy security and meet climate change goals.
10. IAEA applauds initiatives such as the EU SMR Pre-Partnership, which targets the same goals at the European level and fosters international cooperation. Addressing these challenges and seizing these opportunities will require all of us to work together.

François Jacq, General Administrator, CEA



Born in 1965, François Jacq is a graduate from Ecole Polytechnique and holds a PhD of Ecole des Mines de Paris – MINES ParisTech. He began his career as a researcher at the Center for Sociology of Innovation (Mines-Paris Tech) from 1993 to 1996. He then joined the Ministry of Higher Education and Research as a project officer at the Directorate General for Research and Technology from 1996 to 1997; he was then appointed Head of the "Energy, Transport, Environment, Natural Resources" Department.

In 2000, François Jacq became Director General of the French National Radioactive Waste Management Agency (ANDRA). As of 2005, he was appointed Director of Demand and Energy Markets at the Directorate-General for Energy and Raw Materials within the Ministry of Industry. In May 2007, he was appointed Advisor for Industry, Research and Energy to the French Prime Minister François Fillon, then in August 2008, Advisor for Sustainable Development, Research and Industry.

In April 2009, he became Chairman and Chief Executive Officer of Météo-France, the French national meteorological and climatological service. He served as Chairman of the Council of the European Forecast Center (ECMWF) from 2010 to 2013. Since 2013, François Jacq's previous position was Chairman and CEO of Ifremer, the French research institute for the exploitation of the sea. In 2016, he was also elected President of AllEnvi, the national alliance for environmental research. He was appointed Chairman of CEA by the Council of Ministers on April 20, 2018.

Key messages:

After being one of the historical pillars of the European project with Euratom treaty, nuclear energy has now been for many years a sensitive issue because of diverging view of Member States. It is taking a new momentum now because:

1. Europe's transition towards net-zero will be a major challenge for our society and economy.
2. In our time of crisis, first the COVID pandemic, and now the war in Ukraine, the European Union is rediscovering the risks of relying too heavily on foreign supply for our basic goods and service. Energy is maybe the most critical of all, as it is essential for most activities.
3. In that context, and as the growing use of electricity will be an enabler of the transition, Nuclear energy, as a low-carbon source of energy, with a strong domestic industry, will be a necessary part of the solution, together with renewables, hydrogen, batteries... It is our strong belief that all low carbon source of energy should be employed and the system considered as a whole.

In that context the challenges for nuclear energy:

1. In the short to medium term: prepare life-time extension of existing reactors with the highest safety standards, ensure the supply of fuel, and set up programmes for new build based on mature technologies, in order both to replace fossil based capacities and increase electricity production capacities.
2. Small Modular Reactors are also considered in many Member States and worldwide not only for electricity but also for hydrogen and heat production. Energy intensive industries are also looking at SMRs as a possible response to ensure critical electricity supply. The EU should aim to have a domestic technology available for SMR market uptake by the 2030s.
3. In the longer term, Advanced Modular Reactors, Gen IV fission reactors, can provide breakthrough innovations in terms a.o. of fuel cycle, safety, and waste management.
4. In parallel, fusion nuclear energy raises major expectations and work has to go on, with ITER project for instance, in order to master technical challenges.

5. Both short- and long-term objectives will require strong R&D support programmes. In particular:
- A European coordinated approach for nuclear infrastructures is necessary to organise complementarity in terms of access and investment;
 - Synergies between Euratom and Horizon Europe will also be key to promote innovation in nuclear (digitalisation, industrial processes, materials,...).
 - The nuclear sector will also need to attract a very large number of new skilled workers in many Member States.

What should be done in Europe to support these perspectives:

1. Nuclear energy should be acknowledged by the EU for its contribution to Net-Zero by 2050 and to its strategic autonomy.
2. The nuclear sector should therefore be identified within the 'Green Deal Industrial Plan', for reactors design and development but also for the whole of the fuel cycle supply chain, in particular conversion and enrichment capacities, building on European expertise and capabilities to avoid dependency from Russian supply.
3. An EU partnership or alliance has to be promoted in order to develop a domestic SMR technology.

SAFETY AND NUCLEAR FUEL DIVERSIFICATION

Jean-Christophe Niel, Director General, IRSN, ETSO member and CSNI Chair



For 30 years, Dr Jean-Christophe NIEL has gained a long experience in the control of nuclear safety and in radioprotection through various positions, at the French technical safety organization “Institut de Radioprotection et de Sûreté Nucléaire” (IRSN) and at the French nuclear safety authority “Autorité de sûreté nucléaire” (ASN).

He was Director General of ASN for almost 10 years.

The President of the French Republic appointed Jean-Christophe Niel at the head of IRSN in April 2016. He has been reappointed in April 2021 for five years. Dr Niel currently chairs the Committee on the Safety of Nuclear Installations (CSNI) of the Nuclear Energy Agency (NEA).

He has recently been appointed member of the International Nuclear Safety Group (INSAG) by the Director General of IAEA, Rafael Grossi

Key messages:

On safety and nuclear fuel diversification:

1. In a time of Russian war in Ukraine, when the European energy supply is highly challenged, how can the EU organise and maintain a high level of nuclear safety for the benefit of European citizens?
2. Innovation and adaptability are among solutions to answer the challenges we are facing.
3. This answer has to be properly organised at EU level, among the different stakeholders involved.
4. The industry can contribute by proposing innovative solutions, i.e. new types of reactors like SMRs, new fuels for operating reactors, especially in Eastern European countries.

On SMRs:

1. Favourable safety characteristics due to low power + simplification of the design and a shorter duration of the construction phase may allow for faster deployment.
2. This must go together with keeping high level safety requirements.
3. Therefore the expectations of Safety Authorities in terms of safety demonstration will require science based technical expertise and the use of experimental platforms (passive safety systems / PASTIS) = importance of Horizon Europe / EURATOM.
4. Safety challenges and solutions for nuclear fuel diversification
5. Never give up on science and research, including dedicated Safety and Radiation Protection research, which, in the end, allows for future innovative and efficient energy solutions, a stronger development of competences and human resources as well as more quality interactions with the public.
6. Science must remain at the core of the EU nuclear safety control organisation.

Johan Hallen, Director, Westinghouse



Johan Hallén has an extensive background in the nuclear industry and is currently Director for Engineering & Component services for Westinghouse Electric company in the EMEA market and is based in Brussels, Belgium.

Over the course of more than 30 years in the nuclear industry Mr. Hallén has held a number of leadership roles in Westinghouse Electric company in USA and EMEA in the areas of nuclear automation and nuclear engineering working with multinational teams based in a number of countries in Europe, USA, the Middle East, and Africa.

From 2007 to 2015 Mr. Hallén worked as account executive for the northern and eastern European markets and as managing director for Westinghouse Electric Sweden, based in Västerås, Sweden. Mr. Hallén started in the nuclear business in in ABB Atom working in the areas of nuclear engineering, as well as in inspection services. Mr. Hallén holds a Master of Science in Mechanical Engineering from the Royal Institute of Technology, Stockholm, Sweden, he is a certified Six Sigma Black Belt.

Key messages:

1. The objective of the APIS-programme is to create security of supply of nuclear fuel for Russian designed pressurized water reactors (VVER) operating in the EU and Ukraine.
2. APIS is the acronym for *Accelerated Programme for Implementation of secure VVER fuel Supply*, indicating that the European countries operating VVER reactors have an urgent need to qualify an alternative fuel supplier to secure the future power generation.
3. The programme is co-funded by the European Union through the Euratom Horizon programme. It started in January 2023 and will have a duration of 36 months.
4. Westinghouse is leading the programme, which is supported by eleven different partners including the affected utilities, another fuel manufacturer, fuel engineering and research organizations.
5. The APIS project is structured into eleven work-packages with different focuses, including:
 - completion of the VVER-440 fuel design for short term delivery;
 - development of improved and advanced VVER-440 and VVER-1000 fuel designs;
 - standardization of the fuel licensing;
 - complete the re-instatement of fuel manufacturing capabilities;
 - improved modelling and methods;
 - analysis of fuel related plant lifetime extension;
 - communication and project management.

FROM HARD TECH TO ARTS

Mariya Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth



European Commissioner for Innovation, Research, Culture, Education and Youth (2019 – present).

First Vice-President of the European People's Party (EPP) since 2019.

European Commissioner for Digital Economy and Society (2017-2019).

Member of the European Parliament (2009-2017).

Vice-President of the EPP Group in the European Parliament (2014-2017).

Vice-President of the EPP Women from 2012.

Parliamentary secretary to MEPs from GERB political party within the EPP Group (2008-2009).

Research Assistant, Institute of Political Sciences, Bordeaux (France) from 2004 to 2008.

ATER (Attaché Temporaire d'enseignement et de Recherche), Institute of Political Science, Bordeaux 2004-2007.

Master in Comparative Politics and International Relations Academy for Political Science, Bordeaux 2002-2003.

Certificate in Political Science, IEP Institute for Political Studies, Bordeaux 2001-2002.

BA in Bulgarian and French Languages, Paisii Hilendarski Plovdiv University, Bulgaria.

Key messages:

1. The Russian aggression in Ukraine has been a wake-up call for the European Union. Europeans have to strengthen unity and solidarity. Especially concerning energy, research and innovation, Europeans need all technologies able to ensure the resilience, the security of supply and the strategic autonomy of the future energy systems.
2. The Euratom Research and Training Programme (EUR 1.4 billion for 2021-2025) is complementing the achievement of Horizon Europe's objectives in the context of the energy transition. Member States efforts in all net-zero technologies should be increased in order to achieve the EU carbon neutrality by 2050.
3. Half of the EU Member States are currently using or are expecting to use safe nuclear carbon-free technologies for power production, heating and industrial processes. Nuclear-based hydrogen is also an option recognised in the REPowerEU, while nuclear sciences and technologies are very important in sectors like health (cf. nuclear medicine) and space (cf. deep space missions).
4. Small Modular Reactors (SMRs) offer an opportunity to further improve nuclear safety (cf. inherent safety features), to increase the stability of the grid complementing the higher penetration of renewables, and to help decarbonising hard-to-abate energy-intensive sectors.
5. Europe is faced by a strong international innovation and industrial competition in the nuclear sector (cf. USA, UK, Japan and Korea without speaking about Russia and China. Several Member States and the private sector are committing significant funds to Research, Development and Innovation on SMRs. The revamped SET-Plan (action 10) should optimise EU coordination on SMRs.
6. In line with the three high-level nuclear roundtables that I have convened over the last two years and 2023 being the European Year of Skills, we need to seize the opportunities offered by all European

programmes beyond Euratom, e.g. Marie Skłodowska-Curie actions and Erasmus+, to attract talents in the nuclear sector.

7. Synergies must also take place between the Euratom Programme and the Horizon Europe Health cluster (cf. radioisotope supply for medical applications) and the HE Cluster on Digital, Industry and Space (cf. new materials, robotics and artificial intelligence largely used in the nuclear sector).
8. More in-depth concerted efforts between Member States should take place in the nuclear sector. The European Partnerships – on fusion energy, nuclear materials, radioactive waste management and radiation protection – are welcome and have to be pursued to engage Europeans on a collectively long-term path of technological progress.
9. Our today's Declaration on 'EU Small Modular Reactors 2030: Research & Innovation, Education & Training' to be signed with nucleareurope, SNETP, ENS and ENEN is a key step towards our commitment to maintain and develop further the necessary skill needed to maintain our leadership in a strategic industrial sector.
10. Beyond 2030, we need to accelerate the development of Fusion energy research and innovation for the production of electricity. In the next few weeks, I will convey relevant players from both research and industry for such purpose.

Cécile Massart, Artist



Since 1994 Belgian artist Cécile Massart's focus has become the modes of transmission of the memory of radioactive repositories. 7 concepts of Laboratories have been put forth to management agencies since 2014.

They would convey the memory of highly radioactive waste sites in the countryside. For each one, a landscape structure is proposed to be incorporated from the start of the landfill works just next to the industrial zone. In this way, the landscape would be disrupted, transfigured, and would demand a graphic vocabulary to read its singularity.

High-level radioactive waste produced in the last decades and stored underground will take hundreds of thousands of years to decompose. With that in mind, how can we communicate the necessary information about this new landscape in a lasting manner? The artist's proposal is to create an alive and active nuclear culture which is reactivated with every new generation in order to maintain the memory and allow it to survive the development of human civilisations.

Key messages:

1. Modes of transmission of the memory of the nuclear sites of highly radioactive waste in the landscape using artistic practices.
2. Four Markers:
 - Multi-layered artistic devices built aboveground;
 - Based on specific architectural vocabulary with codes, symbols and signs that evolve with time;
 - Create a visible framework for the archives of the future;
 - Become a transmission medium to preserve memory.
3. Those Markers create a link among generations. The memory is activated and passed it on with the goal to keep safety as a priority for humankind.
4. Overall, this communication and education method allows to nurture a nuclear culture that ensures the security and safety of the living world.

Leon Cizelj, President, European Nuclear Society



President of the ENS (European Nuclear Society) in 2022-2023.

Head of Reactor Engineering Division at the Jožef Stefan Institute, Ljubljana, Slovenia. Responsible for the strategic and operational leadership of the division active in the field of nuclear engineering and safety of nuclear installations (ageing of safety related structures, nuclear thermal-hydraulics, severe accidents). Activities include research, postgraduate education, technical and scientific support to the Slovenian nuclear regulatory body and to other end users, and communication of science.

Professor of nuclear engineering at the University of Ljubljana, Slovenia, Faculty of mathematics and physics.

Author or coauthor of more than 900 publications and more than 200 interventions in the Slovenian mainstream media (energy, nuclear energy, COVID-19 epidemics).

Key messages:

1. The nuclear knowledge is among the major achievements of the mankind. It enabled many significant contributions to science and technologies beyond the reliable, affordable and clean nuclear power.
2. Examples include diagnostics through imaging and variety of therapies in medicine, sterilization in food processing, and diagnostics in industry, forensics, archaeology and geology, among others.
3. With 12.000 members, the European Nuclear Society (ENS) is the largest society for nuclear science, research and industry in Europe. As a learned society we understand that the best ways into the sustainable and energy efficient future always start when the new generations of talents are introduced into research. The best ideas, born in academia, are then transferred into the society through the new talents.
4. Small and Modular Reactors (SMRs) offer many much needed and great opportunities for the future success of nuclear power and non-power technologies. They help to attract new talents to nuclear professions, to advance the research into the nuclear power technologies and provide new business opportunities. Last but not least, they will help EU to maintain and reinforce its leadership into the green transition.
5. Thank you very much, Commissioner Gabriel, for uniting the nuclear stakeholders into the SMR partnership, which follows a common strategic goal of industry, academia, and decision makers: to preserve, maintain and further develop the valuable nuclear knowledge and clean/green technologies for the present and future generations.

Csilla Pesznyák, President, European Nuclear Education Network



Medical Physics and Radiation Protection Expert. President of the European Nuclear Education Network Assembly. Associate professor at Budapest University of Technology and Economics. Head of Radiation Protection Service at National Institute of Oncology, Hungary. President of Health Physics Section, Roland Eötvös Physical Society. She has been a board member of the Hungarian Society of Medical Physics, the Vice President of the Hungarian Society for Radiation Oncology and a member of the European Federation of Organisations for Medical Physics Professional Matters Committee and Education & Training Committee for more than 10 years.

Since 2022 she has been the member of the International Organisation for Medical Physics Science Committee. Csilla Pesznyak was involved in several EC funded projects: ENETRAPII, ENETRAPIII, CORONAI, ENEN+ and ENEN2plus. She was the chair of the organizing committee of the Nuclear Competition for

Secondary School Pupils (2019, 2021) and the ENEN Nuclear BSc Summer Schools.

Key messages:

1. ENEN has been supporting the safe, competitive and sustainable use of nuclear technologies for 20 years through its members' activities (universities, institutions, and international organisations).
2. One of the most important objectives of ENEN is to attract new nuclear talents and bring up the young generation of nuclear professionals. So far hundreds of young professionals have been reached through different EU funded education and Training (E&T) projects.
3. EU funded projects coordinated by ENEN aim at ensuring the appropriate professional and financial background through grant programmes for secondary school students, BSc, MSc and PhD students; furthermore, for nuclear professionals' lifelong learning.
4. The long-term success and efficiency of the EU funded projects can be enhanced by ensuring their continuity; therefore, the necessary high-quality nuclear workforce can be provided. ENEN aims at facilitating the policy-making of European legislators and increasing the EU commitment to nuclear education and research involving nuclear stakeholders.
5. ENEN, through its R&D and E&T activities of its members focus on clean energy production, the safe exploitation of Nuclear Power Plants and Small Modular Reactors, radiation protection, non-power and especially medical applications.
6. Strategic proposals, goals and activities are necessary that provide the resources for the maintenance and further development of a stable and predictable system for R&D and the E&T in the EU, related to the different nuclear power and non-power applications.
7. SMRs are not intended to replace large scale NPPs - as they have their own role in the electricity system - but to support them in achieving a flexible, low-carbon energy system.
8. By the standardization of the production and the development of a global / international / common authorization system, at least at EU level, more countries would be encouraged to start SMR projects which would globally contribute to cleaner energy production.
9. Public acceptance has to be facilitated by prepared and responsible communication, promoting SMRs as a new technology and emphasizing their clean, reliable and available energy solutions.
10. SMR technology has safety advantages because of its limited core inventory, while safety and security challenges can rise because of the decentralization of nuclear facilities which calls for new requirements and regulations and further E&T improvements.

ATTRACTING YOUNG TALENTS IN NUCLEAR

Adéla Chalupová, NPP Turbine Operator Trainee



Adéla Chalupová graduated from nuclear engineering at Czech Technical University in Prague. She was involved in scientific research on nuclear fuel cladding materials for several years.

Fascinated by the technology, she decided to promote the benefits of nuclear energy, educate the public on the topic and especially encourage young men and women to join the nuclear field.

She creates social media content to highlight the importance of nuclear energy and its role in solving climate change. In addition,

Adéla communicates her own experience in the industry as she is currently training to land a position as nuclear power reactor operator at NPP Temelin.

Key messages:

- Nuclear has the potential to change the world for the better.
- Young people aim for their careers to be meaningful and to help others.
- Nuclear: A privilege to work with the most modern technologies.
- Demystifying nuclear energy: Once people have more information about nuclear, they gain trust in it. That's why it is necessary to raise awareness.
- Breaking the stereotype of the male profession: My ultimate challenge is being a girl.
- Nuclear Operator Training: Demanding task and a constant challenge, but it is worth it.
- A need for role models.

Umberto Giuliani, PhD student at University of Padova



Umberto Giuliani, MSc, attended scientific high school in Venice. He graduated in Electrical engineering at University of Padua, where he is currently a PhD student in Fusion science and Engineering. He first oriented towards this path moved by personal interest about the energy sector and the desire to actively help addressing climate change.

As undergraduate he finds out and became interested in Nuclear Fusion research. In his master thesis he combined these interests by working on future decarbonized energy scenarios and the role for Fusion energy.

During his PhD, at Consorzio RFX in Padua, he carried out research activity in this field. He plans to keep working on this subject as well as contributing to science communication in such a crucial topic.

Key messages:

- Coming to know about Fusion: the sooner, the better.
- Being part of something big, yet not feeling small.
- Even through difficulties, the big picture keeps us motivated
- Both for personal opportunity and for Fusion research, networking is crucial.
- Let's be honest about Fusion. It's already cool enough!

EUROPEAN SMR PRE-PARTNERSHIP

Jan Pánek, Director, European Commission, DG ENER



Jan Panek is Director for Nuclear Energy, Safety and ITER in the European Commission's Directorate-General for Energy since February 2021. He previously served since 2005 as Head of Unit in Directorates-General for Energy and for Justice and Consumers of the European Commission, dealing consecutively with oil and coal policies, energy market monitoring, retail energy markets, project ITER, and consumer protection policies.

Jan Panek joined the European Commission in 2005 following an earlier career in the diplomatic service of the Czech Ministry of Foreign Affairs during which he occupied positions in the Ministry's headquarters as well as in Czech diplomatic missions in Tokyo and Brussels. He also spent several years in the 1990s with the Boston Consulting Group in its London and

Central European offices.

Jan Panek holds a B.Sc. in Applied Geophysics from Charles University in Prague and an M.A. in International Economics/A.F.P. from The Johns Hopkins University – S.A.I.S. in Washington, D.C. He is also a Chartered Financial Analyst (CFA) charterholder.

Key messages:

1. To reach our climate goals, all sectors of the EU economy and society will need to substantially decarbonise. A key part of the solution is the electrification of the EU energy demand (and related supply), where possible.
2. In this context, there is a renewed interest in nuclear energy as several Member States announced plans for use of nuclear power plants, and in particular Small Modular Reactors (SMRs), both as part of their decarbonisation strategies but also for security of supply considerations.
3. In a decarbonized-energy system based primarily on renewables, SMRs could be used for complementary electricity production, but also for non-electrical uses, such as industrial or district heating, and to produce low-carbon hydrogen. Their successful deployment, by 2030, would be an important and timely milestone on the EU's path to climate neutrality by 2050.
4. In the field of nuclear, the Commission's priority is to ensure that nuclear energy is only used with the highest nuclear safety standards and the most advanced and safest technology, by those MS who decide to rely on nuclear sources as part of their energy mix.
5. The EU has assets, as a historic leader in nuclear energy that it can benefit from, such as the highest standards of nuclear safety, its innovation capacity, the considerable experience with the operation of nuclear power plants, as well as with management of high-level nuclear waste, and with NPP decommissioning. The EU should take advantage of these assets and of an EU coordinated approach to extend this leadership to Small Modular Reactors.
6. In that context, the Commission supports efforts by the European industry, research organisations and nuclear safety regulators, which is ongoing in the framework of the European SMR pre-Partnership, to create the necessary enabling conditions for the first EU SMR to start operation in Europe in the next decade and to ensure the safest possible development of SMRs in the next decade and beyond.

Johan Yves Desbazeille, Director General of nucleareurope



Yves Desbazeille is French and graduated in electrical engineering from the Ecole Supérieure d'Electricité ("SUPELEC") in France in 1991.

He studied on an MBA programme in the early 2000s.

During his successful career, he has been involved in different businesses and responsibilities at EDF: nuclear engineering, hydro and thermal power projects management in France, USA as well as in Asia, where he was for 5 years.

His previous position as EDF representative for energy in Brussels has provided him with an in-depth knowledge of the EU institutions and Brussels' stakeholders and of the energy and climate stakes for Europe.

Key messages:

1. It has become increasingly clear and widely documented that achieving the 2°C target and meeting net-zero by 2050 cannot be achieved without nuclear power. All policies at EU level should therefore enable all forms of low-carbon technologies to respond to the challenges. It is crucial that the existing nuclear fleet in the EU continues to operate for as long as possible, while new capacities are deployed using the latest technologies such as SMRs and AMRs. These objectives have been confirmed by the declaration signed by 11 Member States in February 2023.
2. In the declaration, Energy Ministers reassert jointly their willingness to strengthen European cooperation in the field of nuclear energy. As defined in the provisions and objectives of the Euratom Treaty, this shall be done through promoting research and disseminating technical information, setting uniform safety standards in line with the best international practices, and reinforcing industrial cooperation in the development of European nuclear power capacities. The Ministers agreed to foster closer cooperation between their national nuclear sectors to ensure the best cooperation across supply chains and explore joint training programmes and industrial projects, in order to support new projects, including based on innovative technology, as well as exploitation of existing power plants.
3. The recent European Commission proposal for a Net Zero Industry Act partially includes nuclear by referencing SMRs and advanced reactors. We welcome this as it is a step in the right direction; however, we believe that much more could still be achieved by including the nuclear sector as a whole and treating nuclear in the same way as other strategic technologies.
4. Demand for electric and non-electric forms of energy is growing and will be decisive for the successful decarbonisation of EU industry and ensuring security of energy supplies.
5. Nuclear and renewable energy sources complement each other as they reduce dependence from fossil fuel energy imports and produce a large quantity of decarbonised electricity at affordable and stable prices. Nuclear can play a positive role in the global stability and resiliency of the electrical grid system with a high content of variable generation.
6. The European nuclear industry sustains more than 1.1 million jobs throughout the European Union, out of which more than half a million are highly skilled professionals, including 15000 researchers. Education and training are at the heart of nuclear sector development and deployment. Preparing for nuclear revival requires upfront investment in human resources, skills and workforce, as well as investment in the whole fuel cycle supply chain and support development of new designs and new technologies.

7. We are eager to continue working jointly with the European Commission and SNETP and all other partners involved in the context of the European SMR pre-Partnership initiative that was already presented at the High-level European Nuclear Roundtable dedicated to SMRs and Medical Applications organised by Commissioner Gabriel and DG RTD in March 2022.

Bernard Salha, President, SNETP and CTO, EDF



Bernard Salha, president of SNETP (Sustainable Energy Technology Platform) since June 2019, was appointed Chief Technical Officer of EDF Group in June, 2018.

He's also Senior Executive Vice President of EDF Group, President of EDF Research and Development (EDF R&D) since spring, 2010. With more than 2000 researchers, EDF R&D covers all the Group's activities, upstream in the field of generation (nuclear, thermal, hydro and renewable), and downstream in the fields of transport and distribution grids, energy management and customer relationship and management. At present, the R&D Division is organised on a multi-site basis. Three are located in France in the greater Paris area and six worldwide: Germany, United Kingdom, China, United States, Singapore and Italy.

He was previously, since early 2005, Director of the Nuclear Engineering Division (DIN), after having held various senior positions in engineering units at EDF. He participated to the China's Nuclear Power Programme (LingAo I) for 3 years in China. He started his career at the French Ministry of Defence.

Bernard Salha is a graduate of the French Ecole Polytechnique, the foremost engineering school in France, and a Chief Engineer of Ponts et Chaussées. Bernard Salha received the insignia of Chevalier of the "Légion d'honneur".

Key messages:

1. Nuclear power, as a low-carbon energy source, is a key part of the global energy mix, together with renewables sources to address the EU sovereignty, independence and security of supply while tackling climate change and affordability challenges.
2. In this sector, the EU has developed over decades, a consistent and well qualified EU supply chain starting from the beginning of the process cycle, these are raw material suppliers, fabricators, sub-component suppliers, original equipment manufacturers, system integrators and technology vendors.
3. The EU owns worldwide-recognized expertise in nuclear science, industrial research and engineering. While other parts of the world are investing a lot in supporting the development of new innovative nuclear products and systems, the EU must accelerate and substantiate its engagement to maintain and enhance its nuclear global knowledge and know-how.
4. This global knowledge and these industrial capabilities are key to continue operating safely and for long term the existing fleet of more than 100 nuclear power reactors and to build new reactors for the future while tackling nuclear wastes management and fresh uranium needs.
5. The deployment of Small Modular Reactors (LWR and others), as complement to large nuclear power plants, could support the baseload electricity production, and follow the electricity production demand from the grid, complementing the intermittency of renewables. They could bring significant leverage to reduce the generation of high-level long lifetime wastes and the needs of fresh uranium. They could contribute to the decarbonization of a variety of industrial sectors such as heavy transport and aviation, heavy industry, and many others through hydrogen and heat generation
6. R&D&I are needed to support the development of SMRs, to prepare the necessary skills and competences and research facilities with a global strategy to make them safe, competitive, and suitable to climate change with other production means starting next decades. R&D&I as well as education and training require continuous and substantial support well beyond the Euratom R&T Programme.

7. SNETP members believe that the EU SMR partnership in preparation is a key element to build enabling conditions allowing the design, construction, and operation of series of SMRs shared in various countries in Europe working together.
8. Promoting nuclear R&D&I, SNETP has taken a leading role on the co-creation of the EU SMR partnership preparation, together with other institutions (nucleareurope, the EC and ENSREG) and stakeholders, gathering our best efforts and people to play its part in the development of this very promising technology for power generation and non-electric applications.

EURATOM R&I PRIORITIES – NEW WORK PROGRAMMES

Jean Bergevin, Senior Expert, European Commission, DG GROW



Jean Bergevin is a dual national (British/French), PhD Industrial Economist and European policy officer and manager. He joined the European Commission in 1989. Most of his career in the European Commission has focussed on the realisation of the Internal market.

He has held various Head of unit positions covering: (i) The integration of the European Internal Market for services; (ii) The development and enforcement of the European Industrial intellectual property policy framework and (iii) The enforcement of European antitrust principles in the field of financial services (capital, banking, insurance and re-insurance).

More recently, he opted out of management in order to take a position as a Senior Expert in the Unit of DG GROW (I1) responsible for Raw Materials, Energy Intensive Industries and Hydrogen policies. He is currently involved in files related to the development of the Hydrogen economy within the EU and the electrification/decarbonisation of European Energy Intensive Industries.

Key messages:

1. Nuclear power features in the EU net-zero electrification requirements for 2050 and will also play a key role in ensuring security of supply goals.
2. In the recent reform of the Electricity Market Design, the Commission has explicitly encouraged Member States to rely on Contracts for Difference and direct support measures to stimulate investment in low carbon /non-fossil nuclear power.
3. A number of the first to launch Hydrogen Important Projects of Common European Interest (IPCEIs) are dependent on the provision of nuclear generated power. Nuclear power therefore plays an important role already in helping to launch the European clean hydrogen ecosystem.
4. The Proposal for a regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act) that was adopted by the Commission on the 16 March 2023 recognises as a net zero technology *nuclear processes with minimal waste from the fuel cycle, small modular reactors, and related best-in-class fuels*.
5. There is a need to monitor closely the development of European SMR initiatives with a view to determining at what stage one or a number of these technologies will be ready for commercialisation within the EU. In that manner, the required policy tools to facilitate the eventual roll out of SMRs can be refined and prepared for in a timely fashion.

Elena Righi-Steele, Head of Unit, Euratom Research, DG RTD



Elena RIGHI STEELE is currently Head of Unit 'Euratom Research' in the Directorate 'Clean Planet' of DG Research and Innovation of the European Commission, overseeing all aspects of nuclear research and innovation policy and research related to Euratom, including fusion and fission research, as well as inter-institutional and international cooperation policy.

Born in Milano in 1965, Elena trained as a plasma physicist at the Università di Milano and Imperial College London, specialising in propagation and absorption of radio waves in plasmas and working 10+ years in the field of nuclear fusion.

A theoretician at first, she subsequently became expert Session Leader in experiments and operations of the JET tokamak in Culham (UK), including the DTE1 campaign, and as RF physicist responsible for the plasma engineering of the heating systems for ITER at the NET Team (subsequently the EFDA Close Support Unit) in Garching (DE). Professionally she therefore became a communicating link between the theoretical and experimental/engineering communities in fusion plasma physics, understanding the requirements, language and limitations of both.

In 2001 she moved to the Research Infrastructures Unit of DG RTD in the European Commission, where she managed contracts in the fields of radio astronomy, astrophysics, astroparticle physics, space and inertial fusion. Her main policy portfolio during this period include: coordination of the research infrastructures policy for International Cooperation, creation the G7 Group of Senior Officials for Global Research Infrastructures and work in the Secretariat of the European Strategy Forum for Research Infrastructures, where she became Executive Secretary.

In 2014 she moved to the ITER Unit of the European Commission as Deputy Head of Unit, going back to her professional roots, supporting the management of the EU budget for the construction of ITER. In 2017 she became Head of Fusion Energy Research in DG RTD, coordinating all aspects of broader fusion research and policy for the realisation of the European fusion roadmap. From 1 June 2019 she took over responsibility for the newly created Euratom Research Unit, regrouping together all activities related to fusion and fission research and policy within DG Research & Innovation.

Key messages:

1. Within the current geopolitical context and to overcome the energy crisis, Europeans have to strengthen unity and solidarity.
2. Nuclear is included in the Delegated act on EU Taxonomy implemented since 1/1/2023. REPowerEU includes nuclear Hydrogen.
3. The EU carbon-neutral economy by 2050 and the net-zero industry plan require all low carbon energy sources and technologies.
4. The Euratom Research and Training Programme is coordinating the EU efforts in terms of Fusion research, nuclear safety (and security and safeguards with our direct actions), waste management, radiation protection, nuclear non power applications, education and training.
5. The Programme is increasing Member States' and the EU's energy security, according to and respecting the technology neutrality principle. The Programme promotes excellence in nuclear research and innovation, in particular to ensure the highest standards of nuclear safety, and is therefore a crucial part of the Union's efforts to contribute to the further development of the EU technological leadership.
6. The Programme strengthens the European Research Area in the nuclear and cross-cutting fields of science and engineering.

7. The Euratom R&T work-programme 2021-2022 amendment has put on the table EUR 10 Million for the security of supply and diversification of nuclear fuels for the VVER reactors.
8. The Euratom R&T programme ensures continuity between short- and long-term research and competences in the context of the energy transition and decarbonisation of the EU economy by 2050.
9. The Euratom Programme is maintaining strong competences in nuclear research and innovation in both fission and fusion.
10. The Euratom Work Programme 2023-25 adopted on 16 of March has an European Union available funding of EUR 132 million. It covers 12 Topics mostly dealing with Fission (safety, nuclear waste management, radiation protection) and Fusion (IFMIF-DONES).

Domenico Rossetti di V., Deputy Head of Unit, Euratom Research, DG RTD



Domenico Rossetti di Valdalbero is the Deputy Head of Unit for Euratom Research at the European Commission, DG Research and Innovation, Directorate Clean Planet. Before, he was renewing the Research Fund for Coal and Steel in the Industrial Technologies Directorate. In the Commission, he has been working 7 years in Foresight and 'Inclusive Societies' after 10 years in the field of Energy.

Holding a PhD in Economics from Paris Dauphine University, Domenico is the author of more than 100 articles and 3 books entitled 'The Power of Science', 'Mapping European integration through its Cities' and 'La réussite de l'Europe – Union, énergie et technologie'. Domenico has

given 10 Lectures at the Belgian Royal Academy of Sciences and he is Secretary General of the Union of European Federalists (UEF.be).

Key messages:

1. For the first time, the Euratom Research and Training has a 3 years programming approach (2023, 2024 and 2025).
2. Most of the EU Fusion and Fission research activities are managed through co-funded European Partnerships (EP) allowing the best possible coordination among EU and Member States. In addition to EP on radiation protection (PIANOFORTE) launched in 2022, two new EP will be launched with the next work programme: the EP for research in Nuclear Materials and the EP on Radioactive Waste Management (EURAD).
3. The Euratom Work Programme 2023-25 also covers four Innovation Actions on: Safety of Light Water Small Modular Reactors (LW-SMRs); Innovative technologies for safety and excellence in decommissioning; Safety of low enriched fuel for research reactors – securing the supply of medical radioisotopes; Harnessing innovation in nuclear science, technology and radiation protection.
4. This WP plans five Research and Innovation Actions on: Safety of operating nuclear power plants and research reactors; Safety of advanced and innovative nuclear designs; Partitioning and Transmutation of minor actinides towards industrial applications; Improved nuclear data for the safety of energy and non-energy applications of ionising radiation; Nuclear and radiation techniques for EU strategic autonomy, circular economy and climate change policies.
5. The preparatory phase for a European production capability to secure a supply of High-Assay Low-Enriched Uranium (HALEU) is planned as a Coordination and Support Action (CSA) of the 2023-25 WP.
6. In the Other Actions, this new Euratom Work Programme will: Promote education and training, and networking actions to strengthen Ukrainian and EU nuclear research; Support the consolidation phase of the International Fusion Materials Irradiation Facility – DEMO Oriented Early Neutron Source (IFMIF-DONES); Fund Marie Skłodowska Curie Actions (MSCA) in nuclear research and training; Sponsor the FISA-EURADWASTE 2025 conference on Euratom fission research and training in close collaboration with the Polish Presidency of the Council (June 2025); Deliver Nuclear Innovation Prizes 2025; Contribute to the GIF Secretariat for the Generation-IV International Forum.

Manuel Martin Ramos, Deputy Head of Unit, Euratom coordination, DG JRC



Manuel Martín Ramos (Madrid, 1970) is the Deputy Head of the Euratom Coordination Unit of the JRC. He has more than 25 years of experience in the nuclear field (industry and research). He holds a MSc in Energy Engineering from the Polytechnic University of Madrid.

After being a researcher in the Chair of Nuclear Technology of the School of Engineering, he joined the industry as Project Engineer and Project Manager of nuclear safety and spent fuel management of the José Cabrera Nuclear Power Plant. In 2008 he became an official of the European Commission's Joint Research Centre. First in JRC-Petten dealing with research and support to EU policies in nuclear safety, radioactive waste and spent fuel management; and decommissioning files.

In 2012, Martín Ramos moved to the Euratom Coordination Unit in the JRC Headquarters in Brussels, and in January 2022 he was appointed Deputy Head of Unit.

Key messages:

1. The Euratom Treaty establishes that the Commission is responsible for promoting and facilitating nuclear research in the Member States, and for complementing it by carrying out a Community Research and Training Programme.
2. This programme is implemented by Indirect Actions carried out by research institutions of the Member States through projects funded by the EU research budget, and by the Direct Actions of the Joint Research Centre.
3. Direct actions aim at improving and supporting nuclear safety, security, safeguards, radiation protection, safe spent fuel and radioactive waste management; and decommissioning, including the safe and secure use of nuclear power and of non-power applications of ionising radiation; maintain and further develop expertise and competence in the nuclear field within the community; and support the policy of the EU and its members on continuous improvement of nuclear safety, safeguards and security
4. The recently adopted JRC work programme is now structured in portfolios that bring together several projects in broad topical areas, fostering cooperation and interactions amongst different disciplines and areas of expertise, experimental work, knowledge management and policy support, and which are aligned with Commission priorities.
5. Overall, the JRC work programme include 33 portfolios, encompassing 234 projects. Three of them are 100 % focused on nuclear topics:
 - Small modular reactors
 - Safety of nuclear technology in support to the transition towards climate neutrality
 - Support to nuclear compliance assuranceFive of them are mixed nuclear and non-nuclear:
 - Hydrogen and other decarbonised gases
 - Science for the global gateway and the international Green Deal
 - Enhanced situational awareness for crisis management
 - Tackling cancer and non-communicable diseases
 - Science for security
6. The JRC portfolio on SMR aims at providing scientific evidence to Member States and policy DGs within the JRC domain of expertise in view of the potential deployment of SMR in the EU.

7. Examples of JRC activities in SMR include:

- Assess design objectives.
- Research needs for licensing
- Check technology readiness level
- Progress in harmonisation (e.g. through codes and standards)
- Research on 3S (safety, security and safeguards), European supply chain, new fuel types, new waste forms, and innovative materials

8. Why JRC?

- Growing interest at all levels (Member States, industry, investors, Commission)
- Since 2 decades, JRC is a strong contributor to EU research in SMR and advanced systems, and cooperates with international organisations with interests in the field.
- JRC operates nuclear experimental infrastructure adequate for testing, characterisation, qualification of fuel, materials and waste.
- JRC hosts scientific and technical competencies and expertise for example in multi-physics nuclear safety analysis and modelling tools, 3S, codes and standards, supply chain, materials and fuels, licensing, etc that can be applicable to SMR and innovative designs.

INTERNATIONAL FUSION MATERIALS IRRADIATION FACILITY – DONES

Carlos Alejandre, Emeritus Scientist CIEMAT



First Director of the Spanish National Laboratory for Magnetic Confinement Fusion (1992-2004)

Director General Technology. Ministry of Science. Spain (2004-2006)

ITER Deputy Director-General (2006-2015)

Chairman of the European Fusion Science and Technology Advisory Committee (1999-2004). Member of the Scientific Advisory Board of the Max-Planck Institute for Plasma Physics (2002-2008) and of the United Kingdom Engineering and Research

Council Fusion Advisory Board (2004-2012) among other international advisory groups.

Executive Director of the Commission for the Implementation of IFMIF-DONES in Spain (2016-2021)

Director General of CIEMAT (Centro de Investigaciones Energéticas, MedioAmbientales y Tecnológicas) (2018-2022)

CIEMAT Emeritus Scientist (2022-)

Since 2022, Chairman of the Governing Board of the European Joint Undertaking “Fusion for Energy”

Decorated with the Encomienda of the Order of Isabel la Católica (2003) and the Encomienda con Placa de la Orden Civil de Alfonso X el Sabio. Research award “Carlos Sanchez del Río” of the Spanish Nuclear Society.

Key messages:

1. Need to accelerate the development of nuclear Fusion for the production of electricity.
2. The development and qualification of the new materials needed for DEMO and fusion power plants in general must start immediately if Europe wants to remain credible and leading the development of Fusion as energy source.
3. This will only be possible with the construction of suitable facilities, such as the planned IFMIF-DONES to irradiate and test materials needed for DEMO.
4. IFMIF-DONES is ready to be implemented:
 - Site selected in Granada.
 - Strong commitment from Governments of Spain and Croatia.
 - Engineering design ready.
 - Solid cost estimate based on industrial quotations.
 - Technical validation done through Europe-Japan collaboration on key prototypes including the construction of the accelerator LIPAC in Rokkasho.
 - Included in ESFRI roadmap and successfully finished its preparatory phase.
 - First Steering Committee for the Project was held on March 2023.
5. IFMIF-DONES is indispensable to prove that nuclear Fusion is possible as energy source.

Tonči Tadić, Senior research associate, Ruđer Bošković Institute



Born in Split, Croatia, on 31 March 1962.

Senior Research Associate of Ruđer Bošković Institute, Zagreb, Croatia.

In 1995, he got PhD in Nuclear Physics at Ruđer Bošković Institute and University of Zagreb and in 1997-98 Japanese STA postdoctoral fellow at NIAIST-Kansai, Ikeda, Osaka, Japan.

From 2000 to 2008, Member of Parliament of the Republic of Croatia.

Since 2013, Member of Euratom Scientific and Technical Committee; Coordinator of Croatian Fusion Research Unit; Member of Fusion for Energy Governing Board; Member of EUROfusion Consortium's General Assembly

Since 2022, Head of Project Team of Croatian DONES.HR Consortium after being the Chairman of Council of the DONES Preparatory Phase Project from 2019 and leading the Croatian candidacy for hosting of IFMIF-DONES facility from 2015.

2019 - 2022 Chairman of SOFT Conference's International Organizing Committee.

In 2014 received Japanese Order of the Rising Sun, with gold rays and neck ribbon and in 2022 received Spanish Order for Civil Merits – Cross.

Vice-president of Japan-Croatia Cultural & Economic Society (2007) and Head of Parliamentary Friendship Group Croatia-Japan (2000 – 2008).

Key messages:

1. Fusion energy is one of solutions for energy future of Europe, most probably the best possible solution among carbon-free energy sources;
2. There is no European DEMO fusion power plant without IFMIF-DONES; It is impossible to select and prepare radiation hard fusion materials and related components for European DEMO fusion power plant without IFMIF-DONES; IFMIF-DONES is therefore indispensable in the European Roadmap to the fusion electricity;
3. Research and development of radiation hard fusion materials are still on very low Technology Readiness Level (TRL); Irradiation of fusion materials by fast neutron reactors and emulation of fusion neutron impact by ion irradiation at dual-beam facilities (such as DiFU dual-beam facility in Zagreb) are stop-gap measures until commissioning of IFMIF-DONES;
4. The IFMIF-DONES is a technology hub! The development of IFMIF-DONES requires technology breakthrough in several demanding fields, like high-power ion accelerators (required for intensive deuteron beam), liquid metal “waterfall” of molten lithium as target for deuteron beam, myriad of remote-handling equipment for remote maintenance of IFMIF-DONES components, as well as sophisticated control systems;
5. The IFMIF-DONES facility is not a stand-alone facility; The DONES Facility is an ESFRI Single-Site Research Infrastructure, to be built and operated under EURATOM regulations, within a wider IFMIF-DONES Programme that includes research being conducted by institutions and their Support Facilities in Partner countries;
6. The core mission of IFMIF-DONES Programme and IFMIF-DONES Facility is to generate the needed data for the design, licensing, construction and safe operation of DEMO; The IFMIF-DONES Programme therefore aims at setting up a database to benchmark the radiation responses of fusion material for the DEMO;

7. Other fusion-related experiments required for testing of DEMO fusion power plant systems could also be developed at the IFMIF-DONES Facility in parallel to its core mission;
8. In addition the IFMIF-DONES Facility enables development of Complementary Research experiments relevant to other scientific and technological areas, utilizing unique intensive flux of high energy neutrons, as well as intensive 125 mA deuteron beam of 40 MeV, for the benefit of wider scientific and technological communities in EU;
9. Industrial application of IFMIF-DONES facility would be enabled, too; Besides, creation of IFMIF-DONES, a unique, first-of-a-kind facility brings jobs and references for European industry and business sector, confirming the role European industry in development of cutting-edge technologies; European industry already participate in designing of IFMIF-DONES components;
10. Governance and management model for IFMIF-DONES Programme is also challenging; This Spanish-Croatian Initiative, with strong support and guidance of European Commission, now assembles a wide circle of EU member states and Japan willing to joint their efforts in enabling of the fusion electricity.

CONCLUDING REMARKS AND NEXT STEPS

Cyril Piquemal, Deputy Permanent Representative of France to the EU



2022 - Deputy Permanent Representative of France to the European Union, Brussels.

2020-2022 - Deputy Director of the European Union Directorate - Ministry of Europe and Foreign Affairs.

2017-2020 - Consul General of France in Barcelona.

2014-2017 - Adviser to the French President for Europe and global issues (G7, G20).

2014 - Ministry of Ecology, Sustainable Development and Energy (Adviser for Relations with Parliament, European and International Affairs).

2012-2014 - Permanent representation of France to the European Union, Brussels (Antici counsellor).

2010-2012 - Permanent representation of France to the European Union, Brussels (Western Balkan counsellor).

2010 - European Union Directorate - Ministry of Europe and Foreign Affairs.

2008-2010 - Leave of absence.

2006-2008 - Special assistant to the Director-General for International Cooperation and Development - Ministry of Europe and Foreign Affairs.

2004-2006 - National School of Administration (ENA « Simone Veil » Class).

Key messages:

1. Nuclear science, technology and research represent the underlying foundation of all nuclear applications, not only in the field of electricity generation, but also for a broad range of economic activities. Every year, thanks to some of those numerous applications, thousands of lives are saved and millions of European patients have access to specific treatments and diagnostic procedures.
2. But this unique European capacity has been the consequence of a clear political will. Taking full advantage of nuclear applications requires a resolute commitment to an ambitious policy of training as well as continuous research and innovation efforts, for instance through the EURATOM Research and Training programme.
3. The EU is also at the forefront of the most ambitious programme of decarbonisation in the world, owing to the 'Green Deal', to the 'Fit For 55' package and to 'RepowerEU'. The EU, along with its Member States, is now engaged in a steadfast support to the development of clean technologies necessary to the transition.
4. With a view to succeeding in this effort, while strengthening, in the context of the war of aggression in Ukraine, our common strategic sovereignty, technological neutrality will be key. Whereas the pace of the transition is challenged by technological competitors, we believe it is our collective duty and our essential interest not to exclude any asset, thus avoiding unnecessary technological restrictions. In this regard, one cannot forget nuclear power is as a safe, proven and sustainable option, alongside renewable energy.
5. There is no doubt that well-educated, trained and qualified staff is a priority for the safe and secure implementation of all nuclear-related activities. It is therefore of strategic importance to maintain and further develop a high level of nuclear expertise and skills in the European Union. To this end, we also need to attract young talents to prepare the next generation of the nuclear workforce, and make sure that all engaged stakeholders work in a coordinated manner.
6. The development of European SMR initiatives will be a unique opportunity to develop skills across the entire ecosystem and a genuine European value chain, based on the expertise of companies and institutions from many Member States. Decisions related to both front-end and back-end challenges should also be taken in early the development phase to guarantee the competitiveness of the EU SMR supply chain. This will create valuable synergies and ensure our technological and economic sovereignty and competitiveness in the nuclear sector.

7. The EU has also major assets in the nuclear fuel cycle and is mastering all technologies in the value chain. This technological leadership will be important for Europe to reach nuclear fuel diversification and avoid dependency from Russian supply. To this end, the European Union must also strengthen its strategic sovereignty with European technologies.
8. To reach all these challenges, we need to develop synergies between: research and innovation European stakeholders to propose new solutions; the private sector to promote innovation and associated investments; and the European Commission, together with the Member States, to define long-term action and support innovation. But this future-oriented policy is not for tomorrow: it needs to be addressed now, and to that end, the next Euratom programme will have a great role to play.

Jan Prášil, Director, Nuclear Department, Czech Republic



Jan Prasil is currently leading the work on a roadmap for the possible development and deployment of Small Modular Reactors in the Czech Republic.

Since July 2021, he has been the Director of Strategy and Research in Nuclear Energy at the Ministry of Industry and Trade of the Czech Republic.

He also worked as a Senior EU Regulatory Affairs Specialist at CEZ, Energy Policy Officer at the Government Office of the Czech Republic, and adviser to Czech members of the European Parliament in Brussels.

Key messages:

1. Fuel diversification has to be delivered on time, building up of alternative supplier's capacities is crucial now, financial support for human resources will be needed. Diversity in fuel diversification is also important.
2. Investments in the front and end fuel cycle to enhance capacities (conversion and enrichment) needed.
3. SMRs in 2030s for electricity, heat and hydrogen production. We need a first project in the EU.
4. Cooperation of national nuclear regulators with regulators of the country of origin or with the country of first deployment on licencing will be crucial as there is no progress on any approach which could accelerate regional cooperation or harmonization. The European SMR pre-Partnership should identify possible approaches.
5. Long permitting procedures, EU needs to speed up permitting process also for nuclear energy, not just for renewable energy.
6. How to prepare conditions for SMRs should be part of the Nuclear Illustrative Programme (PINIC).
7. Including nuclear as sustainable activity in taxonomy will not deliver new investments in nuclear new build on its own. We need a debate on nuclear financing in the EU.

Marc Lemaître, Director General, European Commission, DG RTD



Marc Lemaître studied at Université Libre de Bruxelles (ULB) and Bruges (College of Europe) and holds a Master in European Economics. He brings 25 years of profound experience in European Affairs, both in the European Commission and in the diplomatic service of Luxembourg.

Between 1996 and 2006, he worked in the Permanent Representation of Luxembourg to the European Union, dealing with budgetary, trade and general affairs issues. He joined the Commission in 2007 as Head of the private office of Regional Policy Commissioner, Danuta Hübner, and then her successor, Pawel Samecki.

Between 2010 and 2013, he led the private office of Budget Commissioner Janusz Lewandowski. Between 2013 and 2016, he managed, as Director, the Office for Administration and Payment of individual entitlements (PMO). Between 2016 and January 2023, he was Director-General for Regional and Urban Policy (REGIO). Since February 2023 he is Director-General for Research and Innovation (RTD).

Key messages:

1. The Russian war against Ukraine has pushed us to shift Europe's energy system radically. We have reduced our dependency on Russian gas, while at the same time making a leap after in the deployment of renewables.
2. Now, we stand at a moment where we must consolidate these achievements with longer-term structural solutions.
3. As recognised in the taxonomy of sustainable investments, nuclear can temporarily contribute to the energy transition.
4. Several EU Member States have extended the lifetime of their existing nuclear power plants (cf. long-term operation) or are planning to build new plants. Many Member States are also interested in Small Modular Reactors (SMRs) thanks to the intrinsic safety features, potentially reduced costs, and flexibility of these new reactors.
5. New private players, startups, spin-offs, and private investors are emerging in both fusion and fission in traditionally EU nuclear countries and non-nuclear countries.
6. The Euratom Programme 2021-2025 is pursuing nuclear research and training activities with an emphasis on research on fusion and the continuous improvement of nuclear safety, security and radiation protection. The Programme complements the objectives of Horizon Europe's in the energy transition context.
7. The Euratom Work Programme 2023-2025 (EUR 132 million) has just been adopted, and applicants can start submitting their proposals on 4 April 2023 including on nuclear safety, on SMRs, on nuclear waste management, on materials and radiation protection.

DECLARATION EU SMR 2030

The role of Research, Innovation, Education and Training for the safety of Small Modular Reactors (SMRs) in the European Union

1. The EU needs the effort of all sectors and all possible solutions to enable a transformational change to its economy and make Europe the first climate-neutral continent while ensuring energy security of supply, EU strategic autonomy and resilience. The Commission welcomes the collaborative efforts of the European nuclear industry and scientific community to achieve the common goal of a modern, resource-efficient and competitive economy.
2. The Commission is committed to continue to support research and innovation in nuclear safety through the Euratom Research and Training Programme, in this way complementing the achievement of Horizon Europe's general and specific objectives in the context of the energy transition. In order to achieve carbon neutrality by 2050, Member States' are putting efforts to increase all net-zero technologies.
3. For those Member States that choose to include nuclear in their energy mix, we see the deployment of SMRs as complementing existing assets. It is also an opportunity to further improve nuclear safety (through SMRs' inherent safety features) and increase the stability of the grid, complementing the higher penetration of renewables. SMRs could further guarantee baseload electricity production and meeting demand from the grid to better to make up for the intermittency of renewables. The EU SMR development would allow to face a strong international industrial competition in the sector (cf. USA, UK, Russia, Japan and Korea).
4. We recognise that nuclear, and particularly SMRs, can play an important role beyond electricity production in, for example, decarbonising hard-to-abate sectors. The Euratom community has committed research funding to these fields where different design solutions could offer wider application beyond electricity. This includes applications such as cogeneration for energyintensive industries, district heating and desalination and in support of hydrogen production to decarbonise the industrial, residential and transport sectors. Several Member States and the private sector (cf. BE, DK, EE, FI, FR, IT, PL, NL, RO, SE) are committing significant funds to research, development and innovation on SMRs. The revamped SET-Plan (action 10) should optimise EU coordination on SMRs.
5. We underline that nuclear and radiation protection expertise is necessary across EU Member States to ensure safety, security and safeguards of existing and future nuclear power plants, including SMRs, industrial and medical applications and space exploration initiatives. With 2023 being the European Year of Skills, we need to seize the opportunities offered by all European programmes beyond Euratom, e.g. Marie Skłodowska-Curie actions and Erasmus+, to attract talents and leverage investments in education and upskilling that focus on key technology areas.
6. Building on past Euratom research programmes, the Commission is launching the first Innovation Action of EUR 15 million through the Euratom Work Programme 2023-2025 to support the demonstration of safety of European Light Water SMRs. In addition, this Work Programme will earmark EUR 12 million of co-funding to researchers and industry to work together on the safety of Advanced Modular Reactors (AMRs) with interested Member States. In collaboration with the Joint Research Centre (JRC), the Euratom community is opening-up EU research infrastructures and supporting access to unique nuclear research infrastructures in Europe.
7. To maintain the highest safety and radiation protection standards, we stress the need for experimenting, testing and qualifying novel fuels, materials and technologies for the whole lifecycle of advanced SMRs, training and human capacity-building, disseminating knowledge and bridging the gap between research and industry.

8. We highlight that research on SMRs encourages new actors including SMEs and spin-offs to enter the civil nuclear sector, attracting additional investment for demonstration and earlier deployment.
9. We welcome Horizon Europe and Digital Europe Programmes' initiatives that can bring new benefits in additive manufacturing, digital technologies, robotics and artificial intelligence. Synergies between the Euratom Programme and other Programmes should be implemented, in particular but not only with the Horizon Europe cluster 1 'Health' on the radioisotope supply for medical applications and with cluster 4 'Digital, Industry and Space' (e.g. SMRs for space applications).
10. We acknowledge the possible socio-economic impact arising from the deployment of SMRs in terms of EU highly qualified jobs and high added-value companies created. We are committed to exploring new ways to address them through meaningful actions, including a series of stakeholder workshops as part of Euratom's socio-economic actions and in line with the expected stakeholders' views on the European SMR pre-Partnership activities.

Overall, we commit to continue to lead research, innovation, education and training for the safety of European SMRs in support to the EU pre-partnership on SMRs.

European Commissioner

Mariya Gabriel

Director General	President	President	President
nucleareurope	SNETP	ENS	ENEN
<i>European association of nuclear industry</i>	<i>Sustainable Nuclear Energy Technology Platform</i>	<i>European Nuclear Society</i>	<i>European Nuclear Education Network</i>
Yves Desbazeille	Bernard Salha	Leon Cizelj	Csilla Pesznyák

Annex - Explanatory memorandum of the Declaration

The European Council has acknowledged the need to ensure energy security while respecting Member States' right to choose their energy mix and to choose the most appropriate technologies. Some Member States use or will use nuclear energy as part of their national energy mix.

Nuclear technologies for both power and non-power applications are part of the EU's leadership in these fields. EU technological sovereignty will require joint efforts in education, training, research and innovation efforts. This is crucial for ensuring high-level safety and radiation protection in Europe, to properly manage radioactive waste and spent fuel and to develop the technologies of tomorrow including intrinsically safe reactors and closing the nuclear fuel cycle.

Research and Innovation for SMRs safety for power generation and beyond: Heat and Hydrogen

Small Modular Reactors (SMRs; reactors with a maximum output of 300 MWe) are expected to be cheaper and easier to build and operate while integrating inherent and passive safety features. SMRs are expected to offer a simpler, more standardised and safer modular design with enhanced, built-in by design safeguards (i.e. increased proliferation resistance).

SMRs is one promising option among others to replace fossil fuel-fired power plants, especially old coal power plants, and to complement the penetration of renewable energies. They should offer the flexibility of use for district heating, desalination, process heat for energy-intensive industries and production of hydrogen. SMRs should also offer flexibility with increasing penetration of renewables.

The EU must be at the forefront of new developments, ensuring a European industrial value chain while being at the top of safety and radiation protection standards for SMRs. To ensure EU leadership and strategic independence for SMRs, there is a need to support the best regulatory and institutional standards (cf. licensing, controls, inspection), to improve human resource management, to make nuclear careers more attractive, to optimise the use of nuclear research infrastructures and to stimulate the emergence of EU SMR design

Education and Training (E&T) and access to nuclear research infrastructures

The European Union requires nuclear expertise. Considering that 2023 will be the European Year of Skills, the timing is right to take action and to make sure that there is and will be a well-qualified workforce for present and future nuclear applications, including for SMRs.

Half of the EU's workforce involved in the lifecycle of nuclear energy (e.g. mining, design, regulation, construction, operation, decommissioning and waste management of nuclear facilities) will soon reach retirement age.² It is therefore a matter of urgency that the know-how and competences are transferred to the next generation of scientists, engineers and technicians. To address this situation and the risk of knowledge loss, the EU is taking action to improve E&T in nuclear³ by:

- giving access to students and researchers to large and sometimes unique nuclear research infrastructures⁴;

² Report from the French Presidency of the Council, 'For a European dynamic in nuclear skills', Doc. 9799/22 RECH 326 ATO 38, June 2022 - <https://data.consilium.europa.eu/doc/document/ST-9799-2022-INIT/fr/pdf>

³ Euratom ENEN2Plus - European Nuclear Competence Area from 2022 to 2025 (EUR 7 million) for ensuring the availability of sufficient and skilled staff in the EU:

- Build a comprehensive pan-European E&T programme in the areas related to the use of nuclear and ionising radiation technologies.
- Detailed analysis of national strategies, E&T and knowledge management programmes in terms of supply (academia) and demand (end-users).
- Focus on attracting new talents and tackling fragmentation of training opportunities.
- Include a mobility scheme within the EU and encourage mobility beyond Euratom with international organisations and institutions from third countries with the most advanced nuclear research programmes.
- Build a long-term career perspectives involving Human Resources specialists.
- Bring together teachers, academia, operators, regulators, teaching and training organisations, industrial and non-industrial suppliers, end users of nuclear and ionising radiation technology.

⁴ Euratom OFFERR project - European Facility in Nuclear Research (EUR 9 million):

- attracting the young generation to nuclear careers through Euratom funded actions dedicated to E&T and schemes such as Marie Skłodowska-Curie Actions (MSCA);
- recognising the best talents in nuclear research, for e.g. through the SOFT Prize & Nuclear innovation Prizes for safety, radioactive waste management and radiation protection⁵.

List of SMR Euratom Research and Training projects - https://research-and-innovation.ec.europa.eu/system/files/2023-02/ec_rtd_smr-project.pdf

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- Transnational access for researchers from MS and AS to European and international state-of-the-art nuclear research infrastructures in other countries in order to advance research in all areas (except fusion).
 - Common rules for the future sustainable operation of a network of 'Euratom user facilities'.
 - Participation of major infrastructure operators.
 - Support scheme operated by open calls.
 - International cooperation is encouraged, i.e. support of international researchers when reciprocity in access to their infrastructures.

⁵ European Commission, Euratom R&T Work Programme 2023-25, March 2023 - [wp_euratom-2023-2025_en.PDF \(europa.eu\)](#).

DÉCLARATION SUR LES PETITS RÉACTEURS MODULAIRES DANS L'UE À L'HORIZON 2030

Rôle de la recherche, de l'innovation, de l'éducation et de la formation dans la sûreté des petits réacteurs modulaires dans l'Union européenne

1. L'UE a besoin d'un effort de tous les secteurs et de toutes les solutions possibles pour transformer son économie et faire de l'Europe le premier continent neutre pour le climat, tout en garantissant la sécurité de son approvisionnement énergétique, son autonomie stratégique et sa résilience. La Commission salue les efforts de collaboration consentis par l'industrie nucléaire et la communauté scientifique européennes en vue d'atteindre l'objectif commun d'une économie moderne, efficace dans l'utilisation des ressources et compétitive.
2. Elle est déterminée à continuer de soutenir la recherche et l'innovation dans le domaine de la sûreté nucléaire par le programme Euratom de recherche et de formation, et à parachever ainsi la réalisation des objectifs généraux et spécifiques du programme «Horizon Europe» dans le contexte de la transition énergétique. Afin de parvenir à la neutralité carbone d'ici à 2050, les États membres s'efforcent de développer toutes les technologies «zéro net».
3. Dans le cas des États membres qui ont choisi d'inclure le nucléaire dans leur bouquet énergétique, nous considérons le déploiement de petits réacteurs modulaires comme complémentaire des actifs existants. C'est également l'occasion d'accroître encore la sûreté nucléaire (grâce aux dispositifs de sûreté inhérents aux petits réacteurs modulaires) et de renforcer la stabilité du réseau, en complétant la pénétration accrue des énergies renouvelables. Les petits réacteurs modulaires pourraient garantir davantage la production d'électricité en base et répondre à la demande du réseau pour mieux compenser l'intermittence des énergies renouvelables. Le développement de petits réacteurs modulaires dans l'UE permettrait de faire face à la forte concurrence industrielle internationale dans ce secteur (États-Unis, Royaume-Uni, Russie, Japon et Corée).
4. Nous reconnaissons que le nucléaire, en particulier avec les petits réacteurs modulaires, peut jouer un rôle important au-delà de la production d'électricité, par exemple dans la décarbonation des secteurs dont il est difficile de réduire les émissions. La communauté Euratom a engagé des fonds en faveur de la recherche dans les domaines susceptibles d'offrir un champ d'application plus large que la simple production d'électricité pour les différentes solutions de conception, et notamment la cogénération pour les industries à forte intensité énergétique, le chauffage urbain, le dessalement et le soutien à la production d'hydrogène afin de décarboner le secteur de l'industrie, celui du logement et celui des transports. Le secteur privé et plusieurs États membres (BE, DK, EE, FI, FR, IT, PL, NL, RO, SE) consacrent des fonds importants à la recherche, au développement et à l'innovation dans le domaine des petits réacteurs modulaires. Le plan SET révisé (action 10) devrait optimiser la coordination des travaux sur les petits réacteurs modulaires au niveau de l'UE.
5. Nous soulignons qu'il est nécessaire que tous les États membres de l'UE disposent d'une expertise en matière de sûreté nucléaire et de radioprotection pour assurer la sûreté, la sécurité et les garanties en ce qui concerne les centrales nucléaires existantes et futures, y compris les petits réacteurs modulaires, les applications industrielles et médicales et les initiatives d'exploration spatiale. L'année 2023 étant l'Année européenne des compétences, nous devons saisir les opportunités offertes par tous les programmes européens au-delà du programme Euratom, par exemple les actions Marie Skłodowska-Curie et le programme Erasmus+, pour attirer des talents et des investissements dans l'éducation et le renforcement des compétences dans les domaines technologiques clés.
6. S'appuyant sur les programmes de recherche Euratom précédents, la Commission lance la première action pour l'innovation, d'un montant de 15 millions d'EUR, dans le cadre du programme de travail Euratom 2023-2025, afin de soutenir la démonstration de la sûreté des petits réacteurs modulaires

européens à eau légère. En outre, ce programme de travail allouera 12 millions d'EUR de cofinancement aux chercheurs et à l'industrie, aux fins d'une collaboration sur la sûreté des réacteurs modulaires avancés avec les États membres intéressés. En collaboration avec le Centre commun de recherche (JRC), la communauté Euratom ouvre les infrastructures de recherche de l'UE et soutient l'accès à des infrastructures de recherche nucléaire uniques en Europe.

7. Afin de maintenir les normes les plus élevées en matière de sûreté et de radioprotection, nous insistons sur la nécessité d'expérimenter, de tester et de qualifier de nouveaux combustibles, matériaux et technologies pour l'ensemble du cycle de vie des petits réacteurs modulaires avancés, de former et de renforcer les capacités humaines, de diffuser les connaissances et de combler le fossé entre la recherche et l'industrie.
8. Nous soulignons que la recherche sur les petits réacteurs modulaires encourage de nouveaux acteurs, y compris des PME et des entreprises issues de l'essaiage, à pénétrer le secteur nucléaire civil, attirant ainsi de nouveaux investissements à des fins de démonstration et de déploiement plus rapide.
9. Nous saluons les initiatives du programme Horizon Europe et du programme pour une Europe numérique qui sont de nature à procurer de nouveaux avantages en matière de fabrication additive, de technologies numériques, de robotique et d'intelligence artificielle. Il convient de mettre en œuvre des synergies entre le programme Euratom et d'autres programmes, en particulier, mais pas uniquement, avec le pôle 1 «Santé» d'Horizon Europe sur l'approvisionnement en radio-isotopes pour applications médicales et avec son pôle 4 «Numérique, industrie et espace» (petits réacteurs modulaires pour les applications spatiales, par exemple).
10. Nous reconnaissons l'incidence socio-économique que peut avoir le déploiement de petits réacteurs modulaires pour la création d'emplois hautement qualifiés et d'entreprises à forte valeur ajoutée dans l'UE. Nous sommes déterminés à explorer de nouveaux moyens de relever ce défi au moyen d'actions concrètes, notamment une série d'ateliers avec les parties prenantes dans le cadre des actions socio-économiques d'Euratom, et selon les attentes des parties prenantes concernant les activités relevant du pré-partenariat européen dans le domaine des petits réacteurs modulaires.

D'une manière générale, nous nous engageons à conserver notre rôle de chef de file dans la recherche, l'innovation, l'éducation et la formation en matière de la sûreté des petits réacteurs modulaires européens, à l'appui du pré-partenariat de l'UE dans ce domaine.

Commissaire européenne

Mariya Gabriel

Directeur général	Président	Président	Présidente
nucleareurope	SNETP	ENS	ENEN
Association européenne de l'industrie nucléaire	Plateforme technologique pour l'énergie nucléaire durable	Société européenne de l'énergie nucléaire	Réseau européen pour l'enseignement des sciences nucléaires
Yves Desbazeille	Bernard Salha	Leon Cizelj	Csilla Pesznyák

Annexe – Exposé des motifs de la déclaration

Le Conseil européen a reconnu la nécessité de garantir la sécurité énergétique tout en respectant le droit des États membres de choisir leur bouquet énergétique et les technologies les plus appropriées. Certains États membres utilisent ou utiliseront l'énergie nucléaire dans leur bouquet énergétique national.

Les technologies nucléaires utilisées pour la production d'électricité et pour d'autres applications jouent un rôle dans le leadership exercé par l'UE dans ces domaines. La souveraineté technologique de l'UE réclamera des efforts conjoints dans les domaines de l'éducation, de la formation, de la recherche et de l'innovation. C'est essentiel pour garantir un niveau élevé de sûreté et de radioprotection en Europe, pour gérer correctement les déchets radioactifs et le combustible usé et pour développer les technologies de demain, notamment des réacteurs intrinsèquement sûrs et la clôture du cycle du combustible nucléaire.

Recherche et innovation pour garantir la sûreté des petits réacteurs modulaires utilisés pour la production d'électricité et au-delà: chaleur et hydrogène

Les petits réacteurs modulaires (d'une puissance maximale de 300 MWe) devraient être moins chers et plus faciles à construire et à exploiter, tout en intégrant des dispositifs de sûreté intrinsèques et passifs. Ils devraient offrir l'avantage d'une conception modulaire plus simple, davantage normalisée et plus sûre, assortie de garanties renforcées et intégrées dès la conception (à savoir une meilleure résistance à la prolifération).

Ils représentent une option prometteuse, parmi d'autres, pour remplacer les centrales électriques à combustibles fossiles, en particulier les anciennes centrales au charbon, et pour compléter la pénétration des énergies renouvelables. Ils devraient permettre une souplesse d'utilisation pour le chauffage urbain, le dessalement, la production de chaleur industrielle pour les industries à forte intensité énergétique et la production d'hydrogène. Ils devraient aussi offrir une certaine souplesse tenant compte de la pénétration croissante des énergies renouvelables.

L'UE doit être à l'avant-garde de ces évolutions, en garantissant l'existence d'une chaîne de valeur industrielle européenne tout en étant à la pointe des normes de sûreté et de radioprotection pour les petits réacteurs modulaires. Afin de garantir le leadership et l'indépendance stratégique de l'UE dans le domaine des petits réacteurs modulaires, il est nécessaire de promouvoir les meilleures normes réglementaires et institutionnelles (en matière d'octroi de licences, de contrôles, d'inspection), d'améliorer la gestion des ressources humaines, de rendre les carrières dans le nucléaire plus attrayantes, d'optimiser l'utilisation des infrastructures de recherche nucléaire et de favoriser l'émergence de petits réacteurs modulaires de conception européenne.

Éducation et formation et accès aux infrastructures de recherche nucléaire

L'Union européenne a besoin d'une expertise nucléaire. L'année 2023 étant l'Année européenne des compétences, le moment est parfaitement choisi pour agir et assurer l'existence, aujourd'hui et à l'avenir, d'une main-d'œuvre qualifiée pour les applications nucléaires présentes et futures, et notamment pour les petits réacteurs modulaires.

La moitié des travailleurs de l'UE intervenant dans le cycle de vie de l'énergie nucléaire (exploitation minière, conception, réglementation, construction, exploitation, déclassement et gestion des déchets des installations nucléaires) atteindra bientôt l'âge de la retraite⁶. Il est donc urgent de transférer leurs savoir-faire et leurs compétences à la génération suivante de scientifiques, d'ingénieurs et de techniciens.

Face à cette situation et pour prévenir le risque de perte de connaissances, l'UE prend des mesures visant à améliorer l'éducation et la formation dans le domaine du nucléaire⁷:

⁶ Rapport de la présidence française du Conseil, «Pour une dynamique européenne des compétences nucléaires», 9799/22 RECH 326 ATO 38, juin 2022 – <https://data.consilium.europa.eu/doc/document/ST-9799-2022-INIT/fr/pdf>

⁷ Projet ENEN2Plus dans le cadre du programme Euratom – Espace européen de compétences nucléaires (7 millions d'EUR pour la période 2022-2025), visant à garantir que l'UE dispose d'un personnel qualifié suffisant au moyen des mesures suivantes:

- mettre en place un programme paneuropéen complet d'éducation et de formation dans les domaines liés à l'utilisation des technologies nucléaires et des rayonnements ionisants;

- en offrant aux étudiants et aux chercheurs l'accès à des infrastructures de recherche nucléaire de grande taille et, dans certains cas, uniques⁸;
- en attirant la jeune génération vers les carrières du nucléaire, grâce à des actions d'éducation et de formation financées par Euratom et à des dispositifs tels que les actions Marie Skłodowska-Curie (AMSC);
- en distinguant les meilleurs talents dans le domaine de la recherche nucléaire, par exemple grâce au prix SOFT et aux prix de l'innovation nucléaire pour la sûreté, la gestion des déchets radioactifs et la radioprotection⁹.

Liste des projets de recherche et de formation d'Euratom dans le domaine des petits réacteurs modulaires - https://research-and-innovation.ec.europa.eu/system/files/2023-02/ec_rtd_smr-project.pdf

-
- réaliser une analyse détaillée des stratégies et programmes nationaux d'éducation, de formation et de gestion des connaissances en termes d'offre (universités) et de demande (utilisateurs finaux);
 - s'attacher en priorité à attirer de nouveaux talents et à remédier à la fragmentation des offres de formation;
 - prévoir un programme de mobilité au sein de l'UE et encourager la mobilité au-delà d'Euratom, en partenariat avec les organisations internationales et les établissements de pays tiers offrant les programmes de recherche nucléaire les plus avancés;
 - créer des perspectives de carrière à long terme avec l'aide de spécialistes des ressources humaines;
 - fédérer enseignants, universités, exploitants, régulateurs, organismes d'enseignement et de formation, fournisseurs industriels et non industriels et utilisateurs finaux des technologies nucléaires et des rayonnements ionisants.
- ⁸ Projet OFFERR dans le cadre du programme Euratom – Installation européenne pour la recherche nucléaire (9 millions d'EUR):
- accès transnational des chercheurs des États membres et des pays associés aux infrastructures de recherche nucléaire européennes et internationales de pointe, afin de faire progresser la recherche dans tous les domaines (à l'exception de la fusion);
 - règles communes pour l'exploitation durable future d'un réseau d'installations Euratom destinées aux utilisateurs;
 - participation des exploitants de grandes infrastructures;
 - régime d'aide fondé sur des appels ouverts;
 - encouragement de la coopération internationale, par un soutien aux chercheurs internationaux en cas de réciprocité dans l'accès aux infrastructures.

⁹ Commission européenne, Programme de travail Euratom en matière de recherche et de formation 2023-2025, 17/3/2023 – [wp_euratom-2023-2025_en.PDF \(europa.eu\)](https://euratom.europa.eu/2023-2025_en.PDF)

ERKLÄRUNG EU SMR 2030

Die Rolle von Forschung, Innovation und Aus- und Weiterbildung für die Sicherheit kleiner modularer Reaktoren (SMR) in der Europäischen Union

1. Die EU braucht die Anstrengung aller Sektoren und alle denkbaren Lösungen, damit ihre Wirtschaft einen tiefgreifenden Wandel durchlaufen und Europa zum ersten klimaneutralen Kontinent werden und zugleich die Energieversorgungssicherheit, die strategische Autonomie der EU und die Resilienz sichergestellt werden kann. Die Kommission begrüßt die gemeinsamen Anstrengungen der europäischen Kernindustrie und Wissenschaftsgemeinschaft, das Ziel einer modernen, ressourceneffizienten und wettbewerbsfähigen Wirtschaft zu erreichen.
2. Die Kommission hat zugesagt, mit dem Euratom-Programm für Forschung und Ausbildung weiterhin Forschung und Innovation im Bereich der Kernsicherheit zu unterstützen und somit im Zusammenhang mit der Energiewende einen Beitrag zur Verwirklichung der allgemeinen und spezifischen Ziele von Horizont Europa zu leisten. Um bis 2050 CO₂-Neutralität zu erreichen, unternehmen die Mitgliedstaaten Anstrengungen, die Nutzung aller klimaneutralen Technologien voranzutreiben.
3. In den Mitgliedstaaten, die sich für die Kernenergie als Bestandteil ihres Energiemixes entscheiden, betrachten wir den Einsatz von SMR als Ergänzung bestehender Energiequellen. SMR eröffnen auch die Gelegenheit, die Kernsicherheit zu erhöhen (durch ihre inhärenten Sicherheitsmerkmale) und in Ergänzung des stärkeren Einsatzes erneuerbarer Energie die Stabilität des Netzes zu steigern. Die Grundlaststromerzeugung und die Deckung der Netznachfrage könnten durch SMR zusätzlich gewährleistet und so die Schwankungen bei erneuerbarer Energie besser ausgeglichen werden. Die Entwicklung von SMR in der EU würde es ermöglichen, einem starken internationalen industriellen Wettbewerb in diesem Bereich standzuhalten (USA, Vereinigtes Königreich, Russland, Japan und Korea).
4. Wir erkennen an, dass die Kernenergie und insbesondere SMR über die Stromerzeugung hinaus eine wichtige Rolle spielen können, z. B. für die Dekarbonisierung von Sektoren, in denen eine Verringerung der Emissionen schwierig zu erreichen ist. Die Euratom-Gemeinschaft hat für diese Bereiche, in denen verschiedene Konstruktionslösungen eine breitere Anwendung über Elektrizität hinaus bieten könnten, Forschungsmittel bereitgestellt. Dies umfasst Anwendungen wie die Kraft-Wärme-Kopplung für energieintensive Wirtschaftszweige, Fernwärme und Entsalzung und die Unterstützung der Wasserstoffherzeugung zur Dekarbonisierung der Sektoren Industrie, Wohngebäude und Verkehr. Mehrere Mitgliedstaaten und der Privatsektor (vgl. BE, DK, EE, FI, FR, IT, PL, NL, RO, SE) stellen erhebliche Mittel für Forschung, Entwicklung und Innovation bei SMR bereit. Der neu gestaltete SET-Plan (Maßnahme 10) sollte die Koordinierung auf EU-Ebene im Bereich der SMR optimieren.
5. Wir betonen, dass in allen EU-Mitgliedstaaten Fachwissen im Atom- und Strahlenschutz erforderlich ist, um die Sicherheit, die Gefahrenabwehr und Sicherungsmaßnahmen in bestehenden und künftigen Kernkraftwerken einschließlich SMR, industrieller und medizinischer Anwendungen und Initiativen zur Weltraumerkundung zu gewährleisten. Im Europäischen Jahr der Kompetenzen 2023 müssen wir die Möglichkeiten nutzen, die alle europäischen Programme über Euratom hinaus – z. B. Marie-Sklódowska-Curie-Maßnahmen und Erasmus+ – bieten, um Talente anzuwerben und Investitionen in Bildung und Weiterbildung mit dem Fokus auf Schlüsseltechnologiebereichen zu mobilisieren.
6. Aufbauend auf früheren Euratom-Forschungsprogrammen startet die Kommission im Rahmen des Euratom-Arbeitsprogramms 2023-2025 die erste Innovationsmaßnahme mit einer Mittelausstattung von 15 Mio. EUR, um die Demonstration der Sicherheit europäischer Leichtwasser-SMR zu unterstützen. Darüber hinaus werden im Rahmen dieses Arbeitsprogramms 12 Mio. EUR an Kofinanzierungsmitteln für Forschende und die Industrie bereitgestellt, die für die gemeinsame Arbeit mit interessierten Mitgliedstaaten an der Sicherheit fortgeschrittener modularer Reaktoren vorgesehen

sind. In Zusammenarbeit mit der Gemeinsamen Forschungsstelle (JRC) macht die Euratom-Gemeinschaft EU-Forschungsinfrastrukturen zugänglich und unterstützt den Zugang zu einzigartigen Kernforschungsinfrastrukturen in Europa.

7. Wir betonen, dass es zur Aufrechterhaltung höchster Sicherheits- und Strahlenschutzstandards notwendig ist, neuartige Brennstoffe, Werkstoffe und Technologien für den gesamten Lebenszyklus fortgeschrittener SMR in Experimenten zu erproben, zu testen und geeignet zu machen, die Ausbildung zu intensivieren und Personalkapazitäten auszubauen, Wissen zu verbreiten und die Kluft zwischen Forschung und Industrie zu überbrücken.
8. Wir heben hervor, dass die Forschung im SMR-Bereich neue Akteure einschließlich KMU und Ausgründungen dazu anregt, in den zivilen Nuklearsektor einzutreten, wodurch zusätzliche Investitionen für Demonstrationszwecke und für einen früheren Einsatz angezogen werden.
9. Wir begrüßen die Initiativen im Rahmen der Programme „Horizont Europa“ und „Digitales Europa“, die neue Vorteile in der additiven Fertigung, bei digitalen Technologien, in der Robotik und bei der künstlichen Intelligenz bringen können. Synergien zwischen dem Euratom-Programm und anderen Programmen sollten genutzt werden, insbesondere – jedoch nicht ausschließlich – mit dem Horizont-Europa-Cluster 1 „Gesundheit“ bei der Versorgung mit Radioisotopen für medizinische Anwendungen und mit dem Cluster 4 „Digitalisierung, Industrie und Weltraum“ (z. B. SMR für Weltraumanwendungen).
10. Wir würdigen die möglichen sozioökonomischen Auswirkungen des Einsatzes von SMR im Hinblick auf Arbeitsplätze für hoch qualifizierte Tätigkeiten und die Entstehung von Unternehmen mit hohem Mehrwert in der EU. Wir sind entschlossen, neue Wege für sinnvolle Maßnahmen zu sondieren, um diese Herausforderung anzugehen; dies umfasst eine Reihe von Workshops mit Interessenträgern im Rahmen der sozioökonomischen Maßnahmen von Euratom und im Einklang mit den erwarteten Standpunkten der Interessenträger zu den Tätigkeiten im Rahmen der vorgeschalteten Phase der europäischen SMR-Partnerschaften.

Alles in allem sind wir entschlossen, in den Bereichen Forschung, Innovation und Aus- und Weiterbildung für die Sicherheit europäischer SMR weiterhin führend voranzugehen, um die vorgeschaltete Phase der europäischen SMR-Partnerschaften zu unterstützen.

Mitglied der Europäischen Kommission

Mariya Gabriel

Generaldirektor	Präsident	Präsident	Präsidentin
nucleareurope	SNETP	ENS	ENEN
<i>Europäischer Verband der Atomenergiewirtschaft</i>	<i>Technologieplattform für nachhaltige Kernenergie</i>	<i>Europäische Nukleargesellschaft</i>	<i>Europäisches Bildungsnetz im Bereich der Kernenergie</i>
Yves Desbazeille	Bernard Salha	Leon Cizelj	Csilla Pesznyák

Anhang – Begründung zur Erklärung

Der Europäische Rat hat die Notwendigkeit anerkannt, für Energieversorgungssicherheit zu sorgen, und achtet zugleich das Recht jedes Mitgliedstaates, über seinen eigenen Energiemix zu entscheiden und die jeweils am besten geeigneten Technologien zu wählen. Einige Mitgliedstaaten nutzen Kernenergie als Teil ihres nationalen Energiemixes oder werden sie nutzen.

Kerntechnologien sowohl für die Stromerzeugung als auch für andere Anwendungen gehören zur Führungsrolle der EU in diesen Bereichen. Die technologische Souveränität der EU erfordert gemeinsame Anstrengungen in den Bereichen Aus- und Weiterbildung, Forschung und Innovation. Dies ist von entscheidender Bedeutung, um ein hohes Maß an Sicherheit und Strahlenschutz in Europa zu gewährleisten, radioaktive Abfälle und abgebrannte Brennelemente ordnungsgemäß zu entsorgen und die Technologien von morgen zu entwickeln, darunter inhärent sichere Reaktoren und ein geschlossener Kernbrennstoffkreislauf.

Forschung und Innovation für die Sicherheit von SMR bei der Stromerzeugung und darüber hinaus: Wärme und Wasserstoff

Kleine modulare Reaktoren (SMR – Reaktoren mit einer maximalen Leistung von 300 MWe) dürften günstiger und leichter zu bauen und zu betreiben sein, wobei inhärente und passive Sicherheitsmerkmale integriert werden. SMR dürften eine einfachere, standardisiertere und sicherere modulare Konstruktion mit verbesserten, von vornherein bei der Konzeption berücksichtigten Schutzvorkehrungen (d. h. erhöhte Proliferationsresistenz) bieten.

SMR sind eine von mehreren vielversprechenden Optionen, die mit fossilen Brennstoffen betriebene Kraftwerke, insbesondere alte Kohlekraftwerke, ersetzen und die Verbreitung erneuerbarer Energien ergänzen können. Sie sollten flexibel genug sein, um für Fernwärme, Entsalzung, Prozesswärme für energieintensive Industrien und Wasserstoffherzeugung genutzt zu werden. Außerdem sollten sie bei zunehmender Verbreitung erneuerbarer Energie Flexibilität bieten.

Die EU muss bei neuen Entwicklungen an vorderster Front stehen, indem sie eine industrielle Wertschöpfungskette in Europa sicherstellt und gleichzeitig an der Spitze der Sicherheits- und Strahlenschutzstandards für SMR steht. Um die Führungsrolle und die strategische Unabhängigkeit der EU im SMR-Bereich zu gewährleisten, müssen die besten regulatorischen und institutionellen Standards (Genehmigungen, Kontrollen, Inspektionen) unterstützt, das Personalmanagement verbessert, Berufswege im Kernenergiebereich attraktiver gestaltet, die Nutzung der Kernforschungsinfrastrukturen optimiert und das Entstehen von Konzeptionskapazitäten für SMR in der EU gefördert werden.

Aus- und Weiterbildung und Zugang zu Kernforschungsinfrastrukturen

Die Europäische Union benötigt Fachwissen im Nuklearbereich. Vor dem Hintergrund, dass 2023 das Europäische Jahr der Kompetenzen ist, ist jetzt der Zeitpunkt zu handeln und dafür zu sorgen, dass gut qualifizierte Arbeitskräfte für derzeitige und künftige Anwendungen im Nuklearbereich einschließlich SMR zur Verfügung stehen.

Die Hälfte der Arbeitskräfte, die in der EU im Lebenszyklus der Kernenergie tätig sind (z. B. Rohstoffabbau, Konzeption, Regulierung, Bau, Betrieb, Stilllegung und Abfallentsorgung bei kerntechnischen Anlagen), wird bald das Renteneintrittsalter erreichen.¹⁰ Daher müssen das Know-how und die Kompetenzen dringend an die nächste Generation von Fachkräften in Wissenschaft, Ingenieurwesen und Technik weitergegeben werden.

Um dieser Situation und der Gefahr des Wissensverlusts entgegenzuwirken, ergreift die EU Maßnahmen zur Verbesserung der Aus- und Weiterbildung im Nuklearbereich¹¹, indem sie

¹⁰ Bericht des französischen Ratsvorsitzes „Pour une dynamique européenne des compétences dans le domaine nucléaire“, 9799/22 RECH 326 ATO 38, Juni 2022 – <https://data.consilium.europa.eu/doc/document/ST-9799-2022-INIT/fr/pdf>.

¹¹ Euratom ENEN2Plus – Europäischer Kompetenzraum im Nuklearbereich von 2022 bis 2025 (7 Mio. EUR) zur Gewährleistung der Verfügbarkeit von ausreichend Personal und von qualifiziertem Personal in der EU:

- Aufbau eines umfassenden gesamteuropäischen Programms für Aus- und Weiterbildung in den Bereichen, die mit dem Einsatz von Nukleartechnologie und Technologien, die ionisierende Strahlung nutzen, zusammenhängen.
- Detaillierte Analyse der nationalen Strategien und der Programme für Aus- und Weiterbildung und Wissensmanagement in Bezug auf Angebot (Hochschulen) und Nachfrage (Endnutzer).

- Studierenden und Forschenden Zugang zu großen und in einigen Fällen einzigartigen Kernforschungsinfrastrukturen ermöglicht¹²;
- Berufswege im Kernenergiebereich durch Euratom-finanzierte Maßnahmen im Bereich Aus- und Weiterbildung und Programme wie Marie-Sklodowska-Curie-Maßnahmen für die junge Generation attraktiver gestaltet;
- die besten Talente in der Kernforschung würdigt, z. B. durch den SOFT-Preis und die Preise für Innovationen in der Kernforschung in den Bereichen Sicherheit, Entsorgung radioaktiver Abfälle und Strahlenschutz.¹³

Liste der Forschungs- und Ausbildungsprojekte von Euratom im Bereich SMR – https://research-and-innovation.ec.europa.eu/system/files/2023-02/ec_rtd_smr-project.pdf

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- Konzentration auf die Anwerbung neuer begabter Kräfte und die Defragmentierung der Ausbildungsmöglichkeiten.
 - Aufnahme eines Mobilitätsprogramms innerhalb der EU und Förderung der Mobilität mit internationalen Organisationen und Einrichtungen aus Drittländern mit den fortschrittlichsten Nuklearforschungsprogrammen über Euratom hinaus.
 - Entwicklung langfristiger Karriereperspektiven unter Einbeziehung von Fachkräften für Personalangelegenheiten.
 - Zusammenführen von Lehrkräften, Hochschulen, Betreibern, Regulierungsbehörden, Lehr- und Ausbildungseinrichtungen, industriellen und nichtindustriellen Lieferanten sowie Endnutzern von Nukleartechnologie und Technologien, die ionisierende Strahlung nutzen.

¹² Euratom-Projekt OFFERR – Europäische Fazilität für Kernforschung (9 Mio. EUR):

- Grenzüberschreitender Zugang für Forschende aus den Mitgliedstaaten und assoziierten Staaten zu hochmodernen Kernforschungsinfrastrukturen in Europa und in anderen Ländern, um die Forschung in allen Bereichen (mit Ausnahme der Fusion) voranzubringen.
- Gemeinsame Regeln für den künftigen nachhaltigen Betrieb eines Netzes von „Euratom-Nutzereinrichtungen“.
- Beteiligung wichtiger Infrastrukturbetreiber.
- Förderregelungen auf der Grundlage offener Ausschreibungen.
- Förderung der internationalen Zusammenarbeit, d. h. Unterstützung internationaler Forschender, wenn im Gegenzug Zugang zu ihren Infrastrukturen gewährt wird.

¹³ Europäische Kommission, Euratom-Arbeitsprogramm im Bereich Forschung und Ausbildung 2023-25, 17/3/2023 – [wp_euratom-2023-2025_en.PDF \(europa.eu\)](#).

ONGOING SMR PROJECTS CO-FUNDED BY THE EURATOM RESEARCH AND TRAINING PROGRAMME

Tangible impacts expected by 2030-2035

- Light Water (LW): **ELSMOR**
Towards European Licencing of Small Modular Reactors
Duration 42 months, Start date 1 September 2019, End date 28 February 2023
EC contribution: EUR 3.5 million - Overall budget EUR 4.2 million
Coordinated by VTT - Teknologian Tutkimuskeskus Oy (Finland)
<https://cordis.europa.eu/project/id/847553>
- Light Water (LW): **McSAFER**
High-Performance Advanced Methods and Experimental Investigations for the Safety Evaluation of Generic Small Modular Reactors
Duration 36 months, Start date 1 September 2020 End date 31 August 2023
EC contribution: EUR 4 million - Overall budget EUR 4 million
Coordinated by KIT - Karlsruher Institut fuer Technologie (Germany)
<https://cordis.europa.eu/project/id/945063>
- Light Water (LW): **SASPAM-SA**
Safety Analysis of SMR with Passive Mitigation strategies – Severe Accident
Duration 48 months, Start date 1 October 2022, End date 30 September 2026.
EC contribution: EUR 2.9 million - Overall budget EUR 3.8 million
Coordinated by ENEA (Italy)
<https://cordis.europa.eu/project/id/101059853>

Tangible impacts expected after 2035

- High Temperature Gas cooled Reactor (HTGR): **GEMINI Plus**
Conceptual design for a HTGR for supply of process steam to industry, a framework for the licensing of such system and a business plan for a full-scale demonstration.
Duration 42 months, Start date 1 September 2017 End date 28 February 2021
EC contribution: EUR 4 million - Overall budget EUR 4.5 million
Coordinated by Narodwe Centrum Badan Jadrowych (Poland)
<https://cordis.europa.eu/project/id/755478>
- Super Critical Water Reactor (SCWR): **ECC-SMART**
Joint European-Canadian-Chinese Development of Small Modular Super-Critical Water-cooled Reactor Technology
Duration 48 months, Start date 1 September 2020 End date 31 August 2024
EC contribution: EUR 4 million - Overall budget EUR 8.9 million
Coordinated by Centrum Vyzkumu Rez Sro (Czech Republic)
<https://cordis.europa.eu/project/id/945234>
- High Temperature Gas cooled Reactor (HTGR): **GEMINI For Zero Emission**
Nuclear cogeneration, polygeneration, decarbonisation, high temperature reactor
Duration 36 months, Start date 1 June 2022, End date 31 May 2025
EC contribution: EUR 3.1 million – Overall budget EUR 3.1 million
Coordinator: FRAMATOME (France)
<https://cordis.europa.eu/project/id/101059603>
- Liquid Metal: **ANSELMUS**
Advanced Nuclear Safety Evaluation of Liquid Metal Using Systems
Duration 48 months, Start date 1 September 2022, End date 31 August 2026
EC contribution: EUR 3.4 million - Overall budget EUR 4.3 million
Coordinator: SCK-CEN (Belgium)
<https://cordis.europa.eu/project/id/101061185>
- Sodium Fast Reactor: **ESFR-SIMPLE**
European Sodium Fast Reactor - Safety by Innovative Monitoring, Power Level flexibility and Experimental research
Duration 48 months, Start date 1 October 2022, End date 30 September 2026
EC contribution: EUR 3.3 million - Overall budget: EUR 5.5 million
Coordinator: CEA (France)
<https://cordis.europa.eu/project/id/101059543>
- Molten Salt reactors: **MIMOSA**
Multi-recycling strategies of LWR SNF focusing on Molten Salt technology
Duration 48 months, Start date 1 June 2022, End date 31 May 2026
EC contribution: EUR 5.7 million - Overall budget: EUR 5.7 million
Coordinator: ORANO (France)
<https://cordis.europa.eu/project/id/101061142>

Hybrid projects

- Light Water SMRs and AMR: **TANDEM**
Small Modular Reactor for a European safe and Decarbonized Energy Mix
Duration 36 months, Start date 1 September 2022, End date 31 August 2025
EC contribution: EUR 3.3 million - Overall budget: EUR 3.6 million
Coordinator: CEA (France)
<https://cordis.europa.eu/project/id/101059479>
- Licensing of fusion and fission installations: **HARMONISE**
Towards harmonisation in licensing of future nuclear power technologies in Europe
Duration 36 months, Start date 1 June 2022, End date 31 May 2025
EC contribution: EUR 2.5 million - Overall budget: EUR 2.5 million
Coordinator: Lietuvos Energetikos Institutas (Lithuania)
<https://cordis.europa.eu/project/id/101061643>

AGENDA

8:30 – 9:00 Registration and coffee

Session 1 chaired by Signe Ratso, Deputy Director-General, European Commission, DG RTD

9:00 – 9:20 Welcome and introduction

- Signe Ratso, Deputy Director-General, European Commission, DG RTD
- Désirée Comstedt, Vice-President of Vattenfall

9:20 – 09:40 Present and future nuclear energy challenges

- Rafael Grossi, Director General, IAEA
- François Jacq, General Administrator, French Atomic Energy Commission (CEA)

9:40 – 10:00 Safety and nuclear fuel diversification

- Jean-Christophe Niel, ETSO member, Chair of CSNI (NEA) and DG of IRSN
- Johan Hallen, Director at Westinghouse Electric Sweden

Session 2 chaired by Marc Lemaître, Director-General, European Commission, DG RTD

10:00 – 10:40 From hard tech to arts and attracting young talents in nuclear

- Mariya Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth
- Cécile Massart, Artist – The Consciousness of the Landscape (Radioactive waste)
- Young talents in nuclear (3' pitch each):
 - o Adela Chalupova, NPP Turbine Operator Trainee
 - o Umberto Giuliani, PhD student at University of Padova
- Leon Cizelj, President, European Nuclear Society (ENS)
- Csilla Pesznyák, President of European Nuclear Education Network (ENEN)

10:40 – 11:10 European SMR Pre-Partnership

- Jan Panek, Director, European Commission, DG ENER, Nuclear energy, safety and ITER
- Yves Desbazeille, Director General of nucleareurope
- Bernard Salha, Vice-President and CTO of EDF and President of SNETP

**Commissioner Gabriel Declaration on
'EU SMR 2030: Research & Innovation, Education & Training'**
Co-signed by nucleareurope, SNETP, ENS and ENEN

11:15 – 11:40 Coffee and SMR models visit for the participants

Session 3 chaired by Jean Bergevin, Senior Expert, European Commission, DG GROW

11:40 – 12:10 Euratom R&I priorities – New Work Programmes

- Elena Righi-Steele, Head of Unit, Euratom Research, DG RTD
- Domenico Rossetti di V., Deputy Head of Unit, Euratom Research, DG RTD
- Manuel Martin Ramos, Deputy Head of Unit, Euratom coordination, DG JRC

12:10 – 12:30 International fusion materials irradiation facility – DONES

- Carlos Alejandre, Chair of the F4E Governing Board & emeritus scientist CIEMAT
- Tonči Tadić, Ruder Boskovic Institute

12:30 – 13:00 Concluding remarks and next steps

- Cyril Piquemal, French Deputy Permanent Representative
- Jan Prášil, Director of Strategy, Research and International Cooperation in Nuclear Energy at the Ministry of Industry and Trade of the Czech Republic
- Marc Lemaître, Director-General, European Commission, DG RTD

12:50 – 14:00 Sandwich lunch and visit of SMR models and posters

GETTING IN TOUCH WITH THE EU

In person

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EU open data

The portal data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

The [Euratom Research in Action and Opportunities for Europe: EU Strategic Autonomy and the Future Energy Systems](#) event is organized by the European Commission. During the conference, the European Commission will announce the ambitious Declaration on ‘EU Small Modular Reactors (SMRs) 2030: Research & Innovation, Education & Training’. The declaration will be signed by Commissioner Gabriel and EU nuclear stakeholders: [Nucleareurope](#), [SNETP](#), [ENS](#) and [ENEN](#). Following this Declaration, the EU will continue to lead research, innovation, education and training for the safety of European small modular reactors in support of the EU pre-partnership on SMRs. This publication includes the Declaration itself as well as key messages and bios of all the speakers participating to the event. Furthermore, it includes the List of Ongoing SMRs projects co-funded by the Euratom Programme. It also provides key information about the activities under the Euratom Research and Training Work Programme 2023-2025.

Studies and reports



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