EUROPEAN
COMMISSION

Brussels, 27.3.2013
SWD(2013) 102 final

COMMISSION STAFF WORKING DOCUMENT
Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Renewable energy progress report

{COM(2013) 175 final}

COMMISSION STAFF WORKING DOCUMENT
Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Renewable energy progress report

1. INTRODUCTION

This staff working document accompanies the Report of the renewable energy progress report and covers the legal obligation of the Commission to report on the progress in the promotion and use of renewable energy, and to monitor and report on measures taken to respect the EU biofuel sustainability criteria and impact of the EU biofuel consumption on sustainability in the EU and the main third countries of supply in accordance with Articles 17, 18 and 23 of Directive 2009/28/EC. The document draws on the Member States' official 2011 progress reports[1], external analysis undertaken for the Commission[2] and internal Commission analysis.

This document provides supplementary data and analysis for the progress report. It confirms the messages of the progress report that initial progress in developing renewable energy has been good or reasonable in nearly all Member States, but that the prognosis is less positive. Deviations from national plans increase the regulatory risk faced by investors and barriers that should, but have not yet been addressed through the implementation of the renewable energy Directive remain to be overcome. This is particularly the case for administrative barriers regarding planning and permitting regimes (2.1), and for infrastructure development and operation (2.2). The general economic conditions in the EU today together with disruptive changes to support schemes for renewable energy (again, raising regulatory risk), add to the conclusion that further measures will be needed in nearly all Member States in order to stay on the trajectory and for the targets to be achieved.

2. PROGRESS IN RENEWABLE ENERGY DEVELOPMENT

20 Member States in 2010 achieved or exceeded the 2010 renewable energy shares contained in the National Renewable Energy Action plans ("Plans"). Most of them also achieved their 2011/2012 interim targets[3] and unless their renewable energy shares decrease in 2011 and 2012 they are on track with their trajectory towards 2020. A few countries deviated from their planned 2010 target, though only Malta significantly. While this is of course encouraging, it is important to bear in mind that these findings are based on data from the period 2008-2010. Since then, as set out in the Report mentioned above, the economic climate has changed significantly and, as a result, the overall prospects of Member States meeting their targets for 2020 are less evident.

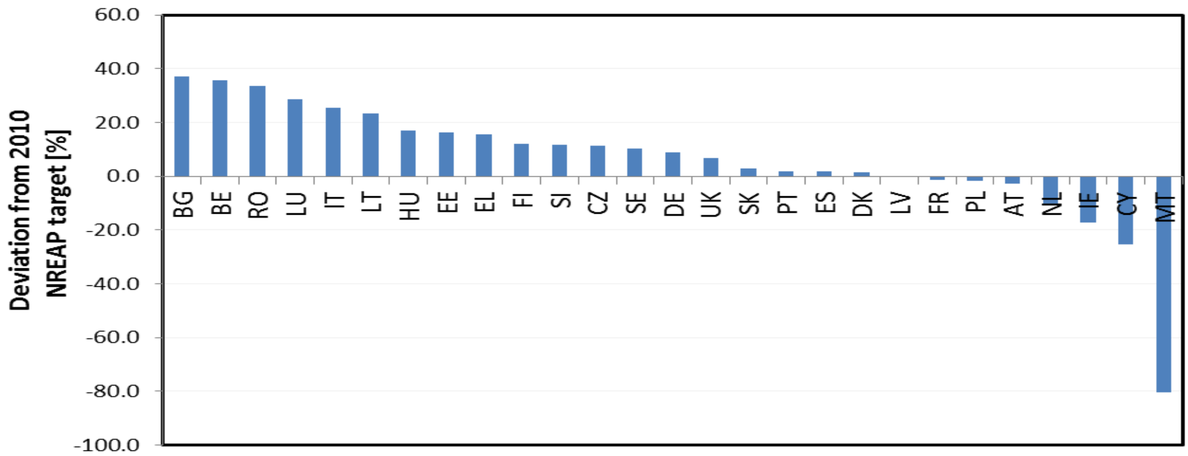
---

[1] The last of which was submitted in June 2012.

[2] Source: *Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012*

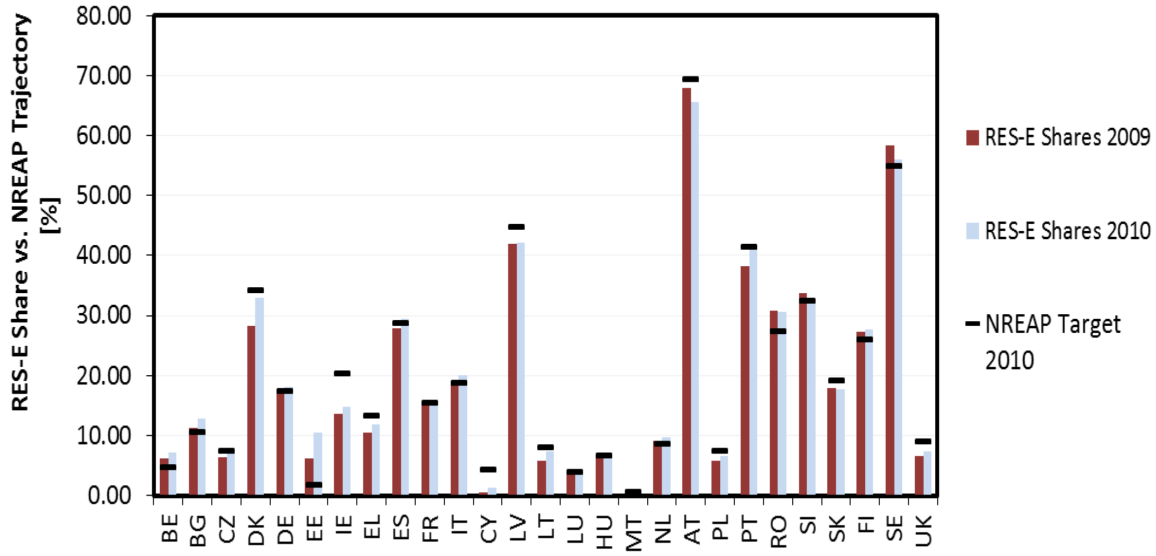
[3] Part B of Annex I of the Directive 2009/28/EC establishes binding interim trajectory towards 2020 targets. The interim targets consist in a percentage deployment towards the 2020 target starting from 2005 levels: 20% has to be reached by 2011/2012, 30% by 20113/2014; 45% by 2015/2016, and 65% by 2017/2018

Figure 1. *Deviations from 2010 planned renewables shares*



In the **electricity sector**, 12 Member States (Belgium, Bulgaria, the Czech Republic, Estonia, Finland, Germany, Hungary, Italy, the Netherlands, Romania, Spain and Sweden) exceeded their planned targets for renewable energy electricity in 2010, whilst the remaining 15 missed their targets (Figure 2). The "planned" targets for 2010 were also the indicative targets for the share of renewable energy in the electricity mix as submitted by Member States under Directive 2001/77/EC. Thus 15 Member States failed to meet their legally agreed indicative 2010 targets.

Figure 2. Renewable energy electricity shares compared to 2010 plans ("target")[4]

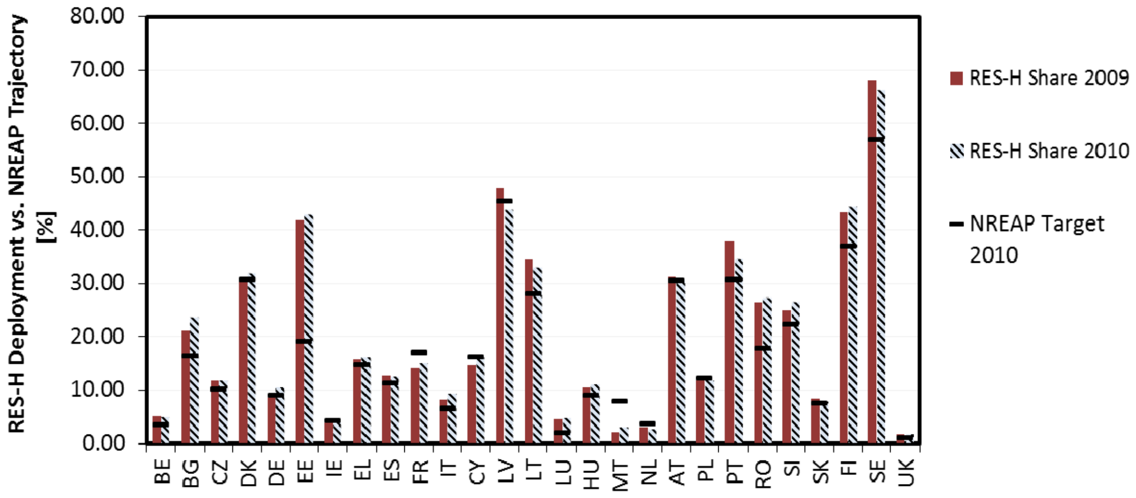


In the **heating and cooling sector**, 21 Member States exceeded their planned 2010 shares for renewable energy heating and cooling (Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Italy, Lithuania, Luxemburg, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and UK). 6 Member

[4] Source: Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012

States (France, Ireland, Latvia, Malta, the Netherlands and Poland) did not achieve their planned targets for renewable energy heating and cooling (Figure 3).

Figure 3. 2010 renewable energy heating & cooling shares against 2010 plans[5]

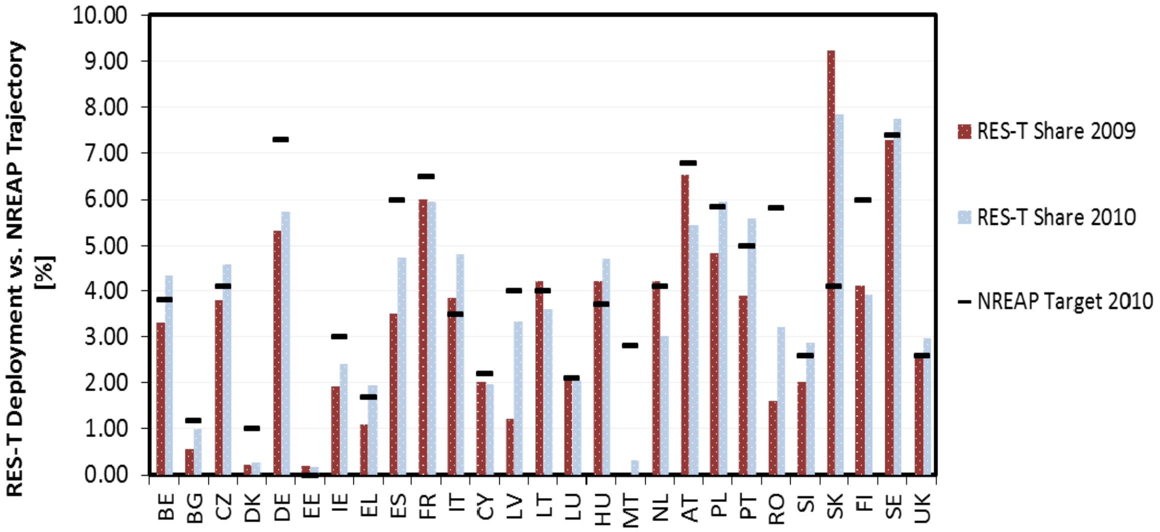


In the **transport sector**, 11 Member States (Belgium, the Czech Republic, Greece, Italy, Hungary, Poland, Portugal, Slovakia, Slovenia, Sweden, the UK) exceeded their planned 2010 shares using more renewable energy in transport than projected. Estonia just fulfilled its planned commitment and the majority - 15 Member States (Austria, Bulgaria, Cyprus, Denmark, Finland, France, Germany, Ireland, Latvia, Lithuania, Luxembourg, Spain, Malta, the Netherlands, and Romania) – were behind their planned targets (Figure 4). It is also worth noting that only five Member States[6] achieved their indicative 2010 target of 5.75% as established under Directive 2003/30/EC.

[5] Ibid.

[6] France, Germany, Poland Slovakia, Sweden.

Figure 4. *Overview of 2010 transport shares against 2010 plans*[7]



Such statistical comparisons are simple and indisputable, however the collection and assessment of national statistical data is time consuming so there is quite some time lag in processing statistics – such that today, the 2010 data is the latest official data. For this reason the Commission has also undertaken a qualitative assessment[8] of Member States' policies and measures described in their progress reports of 2011 and made a comparison with the commitments contained in the national renewable energy action plans ("Plans"). This assessment indicates that few Member States have vigorously implemented their planned short term measures and many have not honoured their commitments.

In addition, modelling-based analysis was undertaken for the Commission, considering the current and planned policy initiatives of Member States, their current implementation rates and the various barriers to renewable energy development[9]. This conservative analysis points to the possibility of an even less optimistic outlook for 2020.

In the majority of countries, currently implemented renewable energy policies appear insufficient to trigger the required renewable energy deployment, at least under such conservative assumption. Generally this reflects the inadequacy of both the *current, existing* measures necessary to mitigate the non-economic barriers that hinder renewable energy growth and support. The financial crisis also affects these developments more than was anticipated by Member States in their national renewable energy action plans; EU countries face a different financial risk rating today and that has had a further negative impact on investments in renewable energy.

[7] Source: Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012

[8] The assessment is based on comparison of the policies and measures Member States reported in the national renewable energy action plans and in the progress report to identify measure by measure if the planned measures have been adopted or if existing measures planned to be revised have been revised. It was also assessed whether existing measures have been cancelled or put on hold without notice. The source of information for this assessment is the national plans (table 5) and the progress reports (table 2), complemented with expert interviews and other background data. The qualitative assessment leads to the answer 'yes', 'no' or 'partially' for electricity, heating and cooling and transport policies.

[9] The Green-X model was applied to perform a detailed quantitative assessment of the future deployment of RES on country, sector and technology level.

On the other hand, the success in improving energy efficiency and consequently reducing overall energy demand growth represents a more positive pillar contributing to the achievement of renewable energy targets, since they are defined as renewable energy shares, i.e. in relation to final energy consumption. Thus, Member States may end up with higher renewable energy shares by virtue of lowering total energy consumption. Such efforts will be easier for those with lower existing shares of renewable energy. (Countries with high renewable energy shares experiencing strong energy growth would reduce the future renewable energy share and negatively affect renewable energy target achievement).

The quantitative analysis indicates that 2012 renewable energy deployment will exceed planned deployment (the EU will continue to be above its trajectory). However thereafter growth slows. In the heating and cooling sector in particular, it seems significant improvements in the policy framework are needed[10]. Specifically according to technology deployment expectations within the heat sector, heat pumps, solar thermal collectors as well as mid- to large-scale geothermal heating systems may all require additional initiatives in order to let them play their role in meeting the 2020 targets. Geothermal energy is expected to have the greatest shortfall in 2012 (-32.1%) and heat pumps by 2020 (-70.9%). The electricity sector also shows shortfall by 2020. The technologies expecting to deviate most from planned deployment paths include concentrated solar power (-92.9%) and ocean technologies (including tidal stream and wave power; -64.7%). However in absolute terms, the most important measures for achieving the renewable energy targets are better framework conditions for wind energy. In the transport sector additional initiatives are also required for biofuels where deviations appear highest compared to the other sectors. In practice, this may require an increase of the blending obligations in several countries (Table 1).

Table 1. *Expected deviation from planned EU technology deployment 2012 and 2020*[11].

	2010	Expected 2012 ("CPI")	planned 2012 target	2012 deviation	Expected 2020 (CPI)		Expected 2020 (CPI+PPI)		target 2020	2020 deviation	
					Min.	Max.	Min.	Max.		Min.	Min.
Technology	Mtoe	Mtoe	Mtoe	%	Mtoe	Mtoe	Mtoe	Mtoe		%	%
electricity	56.2	62.5	64.3	-2.8%	77.3	77.9	87.1	87.9	104.5	-26.1%	-26.1%
Biomass (solid & liquid)	8.5	9.6	8.7	9.9%	12.0	12.1	14.2	14.5	14.4	-16.7%	-16.7%
Biogas	2.1	2.5	2.9	-13.3%	4.7	4.7	5.2	5.2	5.5	-15.0%	-15.0%
Geothermal	0.5	0.5	0.5	-6.9%	0.8	0.8	0.9	1.0	0.9	-15.5%	-15.5%
Hydro large-scale	26.9	26.1	25.9	1.1%	26.8	26.9	26.8	27	27.1	-1.2%	-1.2%
Hydro small-scale	3.8	3.9	4.1	-5.5%	4.6	4.6	4.6	4.7	4.7	-1.9%	-1.9%
Photovoltaic	1.9	3.0	3.0	0.2%	6.8	6.8	7	7	7.1	-4.9%	-4.9%
Concentrated solar	1	0.1	0.4	-79.8%	0.1	0.1	0.7	0.7	1.7	-92.9%	-92.9%
Wind onshore	12.8	15.9	17.0	-6.8%	17.5	17.9	18.3	18.5	30.4	-42.4%	-42.4%
Wind offshore	0.5	0.8	1.6	-49.8%	3.7	3.7	9.1	9.1	12.0	-69.5%	-69.5%
Tidal/Wave/Ocean	0.04	0.04	0.05	-14.2%	0.2	0.2	0.2	0.2	0.5	-64.7%	-64.7%
heating & cooling	80.6	81.0	70.6	14.7%	84.3	84.6	88.1	89	104.7	-19.5%	-19.5%
Biomass (solid & liquid)	72.2	72.2	60.9	18.6%	74.8	75.1	77.1	77.9	81.6	-8.3%	-8.3%
Biogas	2.0	2.3	1.9	24.0%	2.7	2.7	3.0	3.0	4.4	-38.1%	-38.1%
Geothermal	0.5	0.6	0.9	-32.1%	1.1	1.1	1.3	1.3	2.5	-55.5%	-55.5%
Heat pumps	4.3	4.2	5.1	-17.2%	2.9	2.9	3.1	3.1	9.9	-70.9%	-70.9%
Solar Thermal	1.5	1.7	1.9	-12.2%	2.7	2.7	3.5	3.5	6.3	-56.6%	-56.6%
_Transport-biofuels only	13.6	15.0	16.2	-7.8%	18.9	20.6	19.1	20.8	28.9	-34.8%	-34.8%
1st gen. biofuels	13.6	15.0	15.4	-2.6%	16.7	18.4	16.9	18.6	26.4	-36.8%	-36.8%

[10] A comparison of expected and planned deployment indicates a gap ranging from 15 to 19% for RES in heating and cooling.

[11] Source: *Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012*

2nd gen. biofuels	0.02	0.0	0.9	-100.0%	2.2	2.2	2.1	2.2	2.5	-13.7%	-13.7%
Total	150.4	158.5	151.2	4.8%	180.4	183.1	194.2	197.6	238.2	-24.3%	-24.3%

CPI=current policy initiatives; PPI=planned policy initiatives

2.1. Administrative barriers

The Renewable energy progress report also notes the limited progress in Member States in their efforts to remove the **administrative barriers** to renewable energy development. According to article 13(1) of the Directive 2009/28/EC, Member States shall ensure that the procedures for authorisation, certification and licensing procedures for renewables are necessary and proportionate. The Directive also promotes coordination between different administrative levels and agencies and asks for concrete time limits for decisions. Further, comprehensive information on renewable energy must be made available. Administrative procedures shall be streamlined at the adequate administrative levels and requirements shall be objective, transparent and proportionate. The article also requires transparency as regards the costs of the proceedings and potentially also for special facilitations for smaller projects or decentralized projects. Article 22(3) then specifies a general reporting obligation and requires Member States to report on their plans to have a so-called “one stop shop”, thus one single agency for all authorisation, certification and licensing procedures (art. 22(3) a)), automatic permission in case of no response from the respective authority within a certain time frame (art. 22(3) b)) and measures to clearly identify geographical sites for the use of renewables and district heating and cooling.

The Articles clearly address a large number of well-known barriers, but progress made by the Member States in improving their administrative procedures (as can be seen from Table 2) appears to be limited.

Administrative procedures are not always national, often subject to local and regional decisions. Important differences occur in the way how local authorities work, even within the same country (e.g. Sweden, Spain). Many Member States needing improved administrative measures announced such measures in their plans but have not put them into practice. Many Member States have been working on plans for the deployment of some technologies as suggested in article 22(3)c) of the Directive, either designating areas or making clear where building certain plants is not possible. Few Member States combine an automatic procedure for financial support with the administrative application procedure.

Generally, the concreteness and completeness of the administrative simplification measures intended and reported is very low in all Member State reports: the quantity of permits required is often not mentioned, neither the number of authorities involved in procedures. These shortcomings were also apparent in Member States plans. This shows a lack of coordination and poor implementation of Article 13 of the Directive 2009/28/EC which explicitly asks for improved coordination of the administrative procedures. No Member State can be regarded as “advanced” in carrying out the administrate procedure reforms and few have received a “fair” rating.

Table 2. *Assessment of the administrative procedures in the Member States.*[12]

Member State	"One Stop Shop"?	One permit? (Nr. of permits?)	Online application for permit?	Max time limit for procedures?	Automatic permission?	Facilitated procedure for small-scale?	Identification of geographic sites?	Automatic entry into financial support scheme?	Overall assessment
Austria	Yes	No (?)	No	No	No	Yes	No	No	☹
Belgium	No	No (4)	n.a.	Partly (6 mths – 1 yr)	No	No	n.a.	n.a.	☹
Flanders	No	Partly (2)	n.a.	Yes (15 days - 4 mths)	No	Yes	Yes	No	😐
Wallonia	No	Partly (2)	n.a.	Yes (90-140 days)	No	Yes	Yes	No	😐
Brussels	Yes	Partly (2)	n.a.	Yes (20-450 days)	No	Yes	n.a.	n.a.	😐
Bulgaria	No	No (?)	No	No	No	Yes	Yes	Yes	☹
Czech Republic	No	No (3)	n.a.	Yes (60 days – 72 mths)	No	Yes	No	n.a.	☹
Cyprus	Yes	No (5)	No	Yes (2-3 months)	n.a.	Yes	Yes	n.a.	😐
Denmark	Yes	Yes	n.a.	No	n.a.	Yes	n.a.	Yes	😐
Estonia	No	No (2)	No	No	No	No	Yes	No	☹
Finland	No	No (3)	n.a.	n.a.	n.a.	Yes	Yes	n.a.	☹
France	No	No (3)	Partly	Partly (?-1 yr)	No	Yes	n.a.	No	☹
Germany	Partly	Partly (2)	Partly	Partly (?-10 months)	n.a.	Yes	Yes	Yes	😐
Greece	Yes	No (3)	No	Yes (n.a.)	n.a.	Yes	n.a.	n.a.	☹
Hungary	Yes	Partly	Partly	Yes (n.a.)	n.a.	Yes	n.a.	No	😐
Ireland	No	No (2)	No	Partly (6 – 8 weeks)	n.a.	Yes	Yes	No	☹
Italy	Yes	Yes	No	Yes (30-90/180 days)	Partly	Yes	n.a.	No	😐
Latvia	No	No (8)	No	Partly (30 - 180 days)	n.a.	n.a.	n.a.	No	☹
Lithuania	Partly	No (2)	n.a.	Partly (10-30 days)	Partly	Yes	n.a.	No	☹
Luxembourg	No	No (2)	n.a.	Partly (3-5,5 months)	n.a.	Yes	n.a.	n.a.	☹
Malta	No	Partly	No	Partly (4 weeks)	n.a.	Yes	n.a.	No	☹
The Netherlands	Yes	Yes	Yes	Partly (6 months)	n.a.	Yes	Yes	No	😐
Poland	No	No (4)	No	Partly (30-65 days)	Partly	Yes	n.a.	n.a.	☹
Portugal	Yes	Partly (2)	Partly	Yes (120-250 days + 30 days for connection)	n.a.	Yes	Yes	n.a.	😐
Romania	No	No (7)	n.a.	Partly (30 days)	n.a.	No	n.a.	No	☹
Slovakia	No	No (3)	No	Partly (n.a.)	n.a.	Yes	Yes	n.a.	☹
Slovenia	No	No (>5)	n.a.	No	No	Yes	n.a.	n.a.	☹
Spain	No	No (>5)	n.a.	Yes (3 mths)	Yes	Partly	n.a.	No	☹
Sweden	Partly	Partly (2)	Partly	Partly (n.a.)	n.a.	Yes	Yes	No	😐
UK	No	No (3)	n.a.	Partly (1 yr)	n.a.	Yes	Partly	No	☹

n.a.= no information, ☹= needs improvement, 😐= fair, ☺= advanced

2.2. Electricity grid barriers

The Renewable energy progress report also notes limited Member State progress in addressing the **electricity grid barriers**. A comparative analysis[13] of the most common electricity grid barriers and remedial measures planned and reported by Member States has

[12] Source: *Renewable energy progress and biofuel sustainability*, *ECOFYS et al*, *2012*

[13] Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012

been undertaken. This has provided an overview of the effectiveness of electricity grid measures and planned progress.

Most countries are affected by a “lack of grid capacity” and “long lead times / delays”. This indicates an urgent need for grid extensions and shorter approval procedures. To improve the grid capacity, most Member States reported better, more structured approaches to increasing grid capacity, with network development plans and large investment programmes. To address the barrier of long lead times, most of the countries opted for measures facilitating and unifying the connection requirements but they also have chosen to grant specific rights for the producer to construct a connection in case of inertia of the TSO. One barrier “No compensation provided in case of curtailment” seems to be less present in Member States. It might signal that there is already a vivid promotion of renewable energy-integration in the majority of countries or at least rules concerning the compensation for curtailment / renewable energy dispatching priority are in place.

Comparing the barriers and measures taken to address grid barriers, it appears more has been done regarding grid development than on issues relating to grid costs. A first conclusion could be that adopting effective cost regulation measures aiming at a clear distribution and level of costs as well as setting incentives for investments seems to be less of a priority for Member States than accelerating and facilitating grid development.

On average, Member States took 3 measures to deal with electricity grid barriers. Romania has taken a record number of 8 measures. Since Romania was also affected by quite a number of barriers it can be concluded that major improvements are under way in the Romanian treatment and absorption of electricity from renewable energy. Such efforts will be closely monitored. Germany and Lithuania have also recently been quite active in addressing electricity grid barriers. The analysis also shows that many countries had not addressed or even acknowledged certain barriers in their National Renewable Energy Action plans but have nevertheless adopted quite effective measures to reduce such barriers recently (e.g. "lack of grid capacity": Belgium, Bulgaria, Finland, France, Greece, Ireland, Spain). This shows that the development of renewable energy integration is evolving quickly and that policies are dynamic.

The implementation of the EU energy infrastructure package and the 3rd energy market liberalisation package (in particular the creation of harmonised EU network codes and grid framework guidelines) should greatly facilitate the treatment and resolution of the grid barriers identified, but further efforts by Member States to fully implement Article 16 of the renewable energy Directive are required.

3. EU BIOFUEL MARKET

In 2010, 13.3 mega tonnes of oil equivalent (Mtoe) of biofuels were consumed in the EU, representing 4.5% of all fuels consumed in road transport and the bulk of the total renewable energy share (4.7%) in transport. This share however fell below the original indicative target of 5.75% for 2010 stipulated in the previous Directive on the use of biofuels and other renewable fuels in transport (2003/30/EC) (repealed with the adoption of the Renewable Energy Directive 2009/28/EC).

Table 3. EU biofuel and all fuel consumption in transport, 2007 – 2010 (Mtoe) (Eurostat)

	2007	**2008**	**2009**	**2010**
Biodiesel	4.3	6.8	9.1	9.9
Biogasoline	1.2	1.8	2.3	2.8
Other liquid biofuels	1.3	0.9	0.5	0.5
Total biofuels in road transport	**6.7**	**9.6**	**11.9**	**13.3**
- Of which biofuels from waste (Article 21.2)	0.05	0.07	0.15	0.18
- Other	7.33	9.88	11.42	12.83
Non-road renewable electricity in transport	1.14	1.17	1.24	1.30
Road renewable electricity in transport	0.005	0.004	0.005	0.006
Total fossil fuels consumed in road transport	301.5	295.2	287.6	285.1
Share of renewable energy in transport (Transport)	**2.7%**	**3.5%**	**4.2%**	**4.7%**
planned 2010 EU share of renewable energy in transport				4.9%

The share of biofuels (for indication only) is calculated by dividing the volume of biofuels in all transport, by the volume of all fuels in road transport (i.e. the sum of petroleum fuels and biofuels in road transport).

Germany remained the largest consumer market in the EU for biofuels. In 2010 22% of all EU biofuels were consumed in Germany; other large consumers were France, United Kingdom, Italy and Spain. In Germany, the consumption of biofuel decreased in 2008, recovered in 2009 and increased again in 2010. The French market halted in 2010. Over the 2008-2010 period, the Latvian market experienced the strongest percentage growth (more than tenfold), though its total market is still very small. Significant growth also occurred in Poland. The already low growth of Danish biofuels consumption seems to have stopped completely in 2010 and Malta and Estonia still have no significant consumption. (Table 4).

Table 4. *EU biofuel consumption 2009-2010 (ktoe) (Eurostat).*

	2009	2010
EU	11,908	13,307
Germany	2,697	2,960
France	2,454	2,420
Spain	1,073	1,436
Italy	1,180	1,466
UK	970	1,127
Poland	663	886
Austria	485	478
Sweden	361	380
Belgium	286	362
Netherlands	373	229
Portugal	220	300
Czech Republic	195	231
Finland	145	142
Romania	163	115
Slovakia	168	164
Hungary	169	175
Denmark	9	27
Greece	78	128
Ireland	75	93
Lithuania	52	45
Luxembourg	41	41
Latvia	4	27

Slovenia	30	45
Bulgaria	4	13
Cyprus	15	15
Estonia	0	0
Malta	0	0

Biodiesel is the most common form of biofuels consumed in the EU, with 75% of consumption, mostly consumed as a low blend of up to 10% by volume in conventional diesel. Pure biodiesel (B100) is used in several countries, most notably in Germany, but the market is declining as the tax advantages for B100 are gradually phased out. Also, on a small and declining scale, pure plant oils are still used in Germany, Austria and Ireland. In earlier years (2005-2008), the markets for B100 and other higher blends of biodiesel (B20, B30) and for pure plant oil used to be much more attractive, but vehicle manufacturers and governments have lost interest in this market and focused on biofuels in the mainstream diesel market.

Biogas is used as a transport fuel in Sweden and Denmark at a considerable scale. In Sweden, about 100 gas stations sell biogas, in the form of compressed natural gas.

Sweden also has a consistent market for bioethanol, E85. This fuel is sold at 1,500 out of 3,000 of its filling stations. Supportive legislative framework ensures that E85 is 25% cheaper than conventional petrol; flex-fuel cars get free parking in many Swedish towns and cities, and are exempt from the congestion charge in Stockholm. France is the second largest market for E85 in the EU. So whilst vehicles and the markets for higher biodiesel blends are disappearing, more car makers are producing flexifuel vehicles adapted for use with high blend bioethanol. Furthermore, Sweden is the only Member State with considerable significant E100 applications in public transport, in Stockholm and Örnsköldsvik.

3.1. Double counting of biofuels

In 2010, Eurostat reported that 1.4% (177 ktoe) of all EU consumed biofuels was produced from wastes, residues, non-food cellulosic material, and lignocellulosic material. These fuels count double towards the 10% transport according to Article 21.2 of Directive 2009/28/EC. (So whereas the actual share is only 0.06% of energy use in transport, these fuels count as 0.11% points (double-counting rule) of the 4.70% 2010 transport share. Whilst these official values are valid for target accounting purposes, they may well be an underestimation resulting from different national definitions of waste and reporting methods. Non Eurostat data sources[14] suggest that EU biodiesel consumption actually included 1276ktoe of recycled vegetable oil, which is generally considered waste oil, but has not been included in Member State submissions to Eurostat. This would imply that EU consumption of such biofuels in 2010 was nearer 9%.

Few countries (Italy, Netherlands, Portugal and Sweden) have reported the production or consumption of double-counted biofuels for the period 2009-2010. In Sweden the double counted biofuels are largely based on biogas, in the other countries on used cooking oil, with smaller amounts derived from animal fats. Several countries have facilities for producing residue-based biofuels, and the UK reported biofuels production from ‘by-products’.

Table 5. ***Double counting biofuels reported by Member States.***[15]

[14] See *Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012*

[15] Source: *2011 Member State renewable energy progress reports/Eurostat*

Member State	Biodiesel (ktoe)		Bioethanol (ktoe)		Comments
	2009	2010	2009	2010	
Denmark	0	0	0	0	The progress report mentions that "Inbicon produces around 5 million litres of bioethanol based on hay. Much of this fuel was exported between 2009 and 2010.
France	0	63	0	0	
Germany	43	86	0	0	Progress report mentions consumption of double counting biofuels 17ktoe in 2009 and 0 in 2010. Eurostat does not report any consumption.
Ireland	16.36	22.6		2.5	Biofuels that are produced and consumed in Ireland under Article 21(2) include those derived from used cooking oil (UCO) and category 1 tallow (to produce biodiesel) and whey (residue from dairy products production used for bio-ethanol production).
Malta	0.76	0.63	0	0	
Netherlands	242	338	(138 *)	(134 *)	* The production figures for double counting ethanol are confidential. Therefore, the consumption numbers are shown.
UK	0	0	0	0	Consumption of biofuels from 'by-products': 2009: 165 ktoe 2010: 298 ktoe

The largest contribution of double counted biofuels was seen in the Netherlands. In practice, this mainly concerned biodiesel made from used deep-frying oil and animal fats from slaughterhouses. The feedstock came from throughout the EU[16]. The production of double counted "bioethanol" in the Netherlands mainly concerned biomethanol from glycerine at the facility of BioMCN. The production capacity is 200 kt/year, but the actual production is confidential. This biomethanol is accepted on several Member States' markets, sometimes in the form of its derivative bio-mtbe.

Measures for double counting biofuels were not implemented in the UK in 2009 or 2010, therefore neither the UK progress report, nor Eurostat reported any consumption of double counted fuels. Nevertheless, the UK Renewable Fuels Agency reported that in the 2009/2010 obligation year, 12% (by volume) of biofuels originated from tallow and 3% from used cooking oil.

In Sweden, only biofuels that are produced in Sweden from waste, residues, non-food cellulosic material and lignocellulosic material have been reported as being double-counted biofuels, such as biogas and ethanol from residues from sulphite pulp production. Sweden also considers HVO (hydrogenated vegetable oil) from crude tall oil part of this category.

3.2. Origin of EU biofuels

83% of biodiesel and 80% of bioethanol *consumed* in the EU in 2010 were *produced* within the EU. Germany, France, Italy and Spain remained the largest biofuel producers supplying over 70% of the biofuels in the EU (Table 6).

Table 6. ***EU biofuel production 2009-2010 (ktoe) (Eurostat).***

Member State	2009	2010
Germany	3,936	4,589
France	2,324	2,259
Italy	1,119	1,419
Spain	887	1,023

[16] Member State Renewable Energy Progress Reports 2011

Sweden	557	622
Netherlands	290	363
Poland	429	457
Belgium	353	378
Portugal	228	285
Austria	303	299
Czech Republic	195	236
Finland	230	314
United Kingdom	211	277
Slovakia	150	161
Hungary	154	142
Romania	75	46
Greece	71	112
Lithuania	108	102
Denmark	78	69
Latvia	49	48
Ireland	57	63
Bulgaria	11	11
Cyprus	6	5
Malta	:	1
Estonia	0	0
Luxembourg	0	0
Slovenia	6	16
European Union	11,826	13,298

Current EU production capacity is not fully utilized. The years of rapid expansion of biodiesel industry seem to be over: from 2005 to 2009 production capacity increased by 360%, while the increase from 2009 to 2010 was just 7%. Already in 2007 and 2008, the first cases of companies closing their operation or declaring insolvency occurred in the UK, Austria, and Germany. This development continued and spread to the Benelux in 2009 and to Italy in 2010. In addition, a number of plants all over the EU temporarily stopped production. Even with the projected increase in EU biodiesel consumption through mandates, a number of plants can be expected to close their operations[17].

There are several reasons for the apparent underutilisation of production capacity. Market (and subsidised) returns on investment seemed very attractive when decisions for construction were taken, and may have resulted in overcapacity. Changing legislation, however, meant a decrease in demand, especially for biodiesel. Increasing imports to the EU also led to lower use of the EU produced biofuels, in particular, low-cost imports of biodiesel from the U.S. and Argentina that were driven by favourable blending subsidies (U.S.) and export policies (Argentina) in those countries. Biofuel production costs were also influenced by increasing oil and feedstock prices and the gap between biofuel production cost and sales value at the pump became too big to be bridged by the incentive schemes in place.

[17] U.S. Dept of Agriculture (Foreign Agricultural Service (FAS) 201.1

As noted in the Report[18], Argentina (10% of biodiesel imports), Brazil and the US (8% and 4% of bioethanol imports) were the top three third countries supplying the EU biofuels market. In 2010 Argentina replaced the U.S. as the largest biodiesel exporter to the EU compared to 2008 when about the same fraction of biodiesel imports came from the U.S. and Argentina. In 2010, however, imports of biodiesel from the U.S. were limited by EU anti-dumping regulations imposed in 2009. In 2010 Brazil remained the largest exporter of bioethanol to the EU, although bioethanol imports halved from 15.9% of bioethanol on the EU market in 2008 to just 8.4% in 2010. The high sugar prices, combined with adverse weather conditions in a major producing region, resulted in production and export decreases.

The following tables (Table 7 and Table 8) present an overview for biodiesel and bioethanol feedstock of the EU consumed biofuels.

Table 7. ***Origin of feedstock for biodiesel consumed in the EU in 2010. Expressed in volume of biodiesel (ktoe)***[19]

	Rapeseed	Soybean	Palm oil	Sunflower seed	Tallow	RVO	Other	Total	
EU	4,098	87	5	444	159	1,182	3	5,977	60%
Argentina	0	1,191	0	0	0	0	0	1,191	12%
Indonesia	0	0	814	0	0	0	0	814	8%
Brazil	0	417	0	0	1	0	0	419	4%
Canada	212	44	0	0	13	22	0	292	3%
Ukraine	252	14	0	0	0	0	0	266	3%
U.S.	7	221	0	0	12	5	0	245	2%
Malaysia	0	0	212	0	0	0	0	212	2%
Paraguay	3	185	0	0	0	0	0	188	2%
Russia	80	45	0	0	0	0	0	124	1%
China	0	1	0	0	0	67	0	67	1%
Other	99	14	13	0	0	1	0	126	1%
Total	**4,751**	**2,220**	**1,043**	**444**	**184**	**1,276**	**3**	**9,922**	

Table 8. ***Origin of feedstock for bioethanol consumed in the EU in 2010. Expressed in volume of bioethanol (ktoe)***[20]**.**

	Wheat	Maize	Barley	Rye	Triticale	Sugar beet	Wine	Sugar cane	Other	Total	
EU	581	344	58	81	20	733	101	0	33	1,951	79%
Brazil	0	8	0	0	0	0	0	234	0	242	10%
U.S.	2	122	0	0	0	0	0	0	0	124	5%
Peru	0	0	0	0	0	0	0	26	0	26	1%
Switzerland	25	0	0	0	0	0	0	0	0	25	1%
Bolivia	0	0	0	0	0	0	0	20	0	20	1%
Ukraine	6	7	0	0	0	2	0	0	0	15	1%
Egypt	0	0	0	0	0	0	0	15	0	15	1%
Guatemala	0	0	0	0	0	0	0	14	0	14	1%

[18] Renewable energy: 2012 progress report.
[19] Source: *Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012*
[20] Ibid.

Argentina	0	2	0	0	0	0	0	5	0	7	0%
Cuba	0	0	0	0	0	0	0	6	0	6	0%
Other	10	7	0	0	0	0	0	16	2	34	1%
Total	**623**	**490**	**58**	**81**	**20**	**735**	**101**	**336**	**35**	**2,480**	

The most important feedstock for biodiesel was rapeseed originating from the EU, followed by Argentinean soy - both in the biodiesel imported from Argentina as well as in EU produced biodiesel. Indonesian and Malaysian palm oil were feedstock to the biodiesel exported by those countries to the EU, but also played a role in the EU biodiesel production. Similarly, soybean from Brazil, US and Paraguay were converted in the EU to biodiesel. Significant rapeseed imports from Canada and Ukraine also showed up in EU produced biodiesel.

The origin of feedstock of EU consumed ethanol in 2010 stemmed from a broader range of countries, compared with biodiesel feedstock, although about 80% originated from the EU. EU produced ethanol was mainly produced from EU produced feedstock, only small shares of wheat and maize originate from Switzerland, Ukraine and a few other countries.

Table 8a. Origin of total biofuel feedstock, 2010.

EU	Argentina	Indonesia	Brazil	U.S.	Canada	Ukraine	Malaysia	Paraguay	Other
63.9%	9.7%	6.6%	5.3%	3.0%	2.4%	2.3%	1.7%	1.5%	1.3%

Russia	China	Switzerland	Peru	Bolivia	Peru	Egypt	Guatemala
1.0%	0.5%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%

4. THE EU BIOFUELS SUSTAINABILITY SCHEME

Since the end of 2010[21], all biofuels and bioliquids, either produced in the EU or imported, that are counted towards the renewable energy targets for transport and national renewable energy obligations and that receive financial support, must comply with the sustainability criteria for biofuels and bioliquids included in the Renewable Energy Directive[22]. Compliance can be demonstrated following the provisions of national law in the EU Member States, through the use of EU approved certification schemes or by following the provisions laid down in bi- or multilateral agreements covering the sustainability scheme for biofuels, albeit no such agreement was concluded so far. The Commission is required in its biennial renewable energy progress and biofuel sustainability reports to assess national measures in respect of the EU sustainability criteria, and measures taken for soil, water and air protection. The Commission is also required to **assess[23] the operation of the verification system for measuring the compliance with the sustainability criteria** (mass balance verification method) and the feasibility and appropriateness of introducing mandatory requirements in relation to air, soil or water protection.

[21] The Renewable Energy Directive had to be transposed in the national law of all Member States by 5th December 2010.

[22] Article 17 of Directive 2009/28/EC define the sustainability criteria that have to be fulfilled by all biofuels and bioliquids, whether or EU or other origin, that are counted towards the national targets, renewable energy obligations and eligibility for financial support. Article 18 (1) establishes rules for verification of compliance with the sustainability criteria.

[23] The Commission is required by Article 18.2 and 18.9 of the RES Directive to assess "the operation of the mass balance verification method […] and the potential for allowing for other verification methods" as well as "the effectiveness of the system in place for the provision of information on sustainability criteria and whether […] to introduce mandatory requirements in relation to air, soil or water protection".

4.1. Implementation of the sustainability scheme

By the end of 2010 only six Member States (Austria, Denmark, Estonia, Germany, Hungary and Malta) had declared even partial transposition of the EU sustainability criteria in their national law, as the Directive only came in force on 5th December 2010. In 2012 all Member States had declared partial or complete transposition of the Renewable Energy Directive, including biofuel sustainability criteria. However, the Commission's analysis reveals that the transposition and implementation of the biofuel sustainability criteria in many Member States is still not complete or correct. The Commission continues to assess Member State progress in implementation of the renewable energy Directive and legal measures are being taken in those cases where the transposition is incomplete.

An increasing amount of the feedstock used to supply the EU biofuels market (i.e. from Argentina, Brazil, the US, Indonesia and Malaysia) have demonstrated compliance with the sustainability criteria through the use of a voluntary scheme (and so may count towards the target). The three main voluntary schemes, that increased their coverage in these countries in 2010 were RTRS (Round Table on Responsible Soy), ISCC International Sustainability and Carbon Certification) and RSPO (Round Table for Sustainable Palm Oil). However, during the period covered by this report, none of these schemes had been recognised by the Commission. The first schemes were recognised in 2011. Currently, a total of thirteen voluntary schemes have been recognised by the Commission and the share of biofuels to be certified by these schemes is expected to increase. Argentina, Brazil, Indonesia and Malaysia also adopted new regulatory measures in 2009 and 2010 aiming at improved environmental practices in forestry, nature protection or feedstock cultivation, including for biofuels.

4.2. Effectiveness of the sustainability scheme

By nature the implementation of Directives in the Member States differs with respect to various technical details. A study conducted for the Commission shows that such differences may have implications on the effectiveness of the system and the administrative burden for economic operators.

Overall, the report[24] shows that particularly in the larger Member States representing the bulk of biofuel consumption the sustainability scheme for biofuels works effectively, however, it also shows that in some Member States there is still scope to improve the effectiveness of the sustainability scheme.

The implementation of the sustainability scheme differs among Member States also with respect to the administrative burden placed on economic operators.

In some Member States economic operators have to report to several governmental bodies and have only a limed choice of options on how to demonstrate compliance with the sustainability criteria. Some Member States rely for instance solely on voluntary schemes without setting up an ex post verification system. Overall, it can be concluded that the Member States did not put an excessive administrative burden on the economic operators.

The administrative burden, however, does not depend only on procedures applied in each Member State individually. The administrative burden may also increase if the administrative procedures and requirements differ significantly between Member States. Varying reporting obligations for instance make it more difficult or costly for producers to operate in several Member States simultaneously. It is therefore recommended that Member States, like

[24] *Study on the operation of the system for the biofuels and bioliquids sustainability scheme – analysis of Member State implementation, 2013 Task 2* http://ec.europa.eu/energy/renewables/studies/renewables_en.htm

voluntary schemes, harmonise procedures wherever this would facilitate the operation of the internal market for biofuels or extend mutual recognition to national schemes.

Measures to improve the effectiveness could for example include the application of are for instance to apply appropriate penalties for non-compliance with procedures laid down in the sustainability scheme or the sustainability criteria themselves. Such penalties should go further than the excluding biofuels from counting towards the renewable energy targets and from support mechanisms. Furthermore, not all Member States have yet defined the verification bodies needed to be able to conduct the audits foreseen in the framework of the sustainability scheme.

4.3. Measures in relation to air, soil or water protection

Currently, the main feedstock used for the production of biofuels are agricultural corps. Potential risks for soil, air and water from feedstock cultivation for biofuel are therefore similar to the risks related to other agricultural activity.

Regarding measures for soil, water and air protection, most Member States deemed the impact of the production of feedstock for biofuels on water and air quality in 2010 to be low, either because the share of crops dedicated to biofuels is small compared to other uses or because feedstock for biofuel production were imported from other Member States or third countries and therefore no domestic land was used. However, 19 Member States had also not yet performed such impact assessments for biofuel production in 2010. Belgium, Bulgaria and Germany reported on completed or on-going studies to assess the impacts of their biofuels policies; five Member States (Austria, the UK, the Czech Republic, Italy and Poland) estimated that negative impacts from the production of biofuels on biodiversity, water resources and quality would be prevented by existing legislation or protection measures, including national codes of practice and the EU cross compliance requirements for farmers[25].

A report[26] produced for the Commission shows that production of agricultural feedstock for biofuel production might have an impact on air quality, might lead to increased water consumption. The best way to reduce such risks is to promote good agricultural practices. However, such good agricultural practices depend on the crop, the region, the prevailing conditions etc. Therefore, defining, applying and enforcing mandatory criteria for protection of soil, air and water does not appear feasible specifically for biofuels as the risks are not specifically related to production of feedstock for biofuels but to agricultural production in general. Therefore, such risks could be approached in a much more efficient way by agricultural policy. Nonetheless, the sustainability scheme for biofuels contributes to promotion of good agricultural practice as many of the voluntary certification schemes which have been recognised by the Commission for demonstrating compliance with the sustainability criteria require farmers to apply good agricultural practises. This provides further incentives to improve production methods because voluntary schemes will be able to use their membership of such schemes for marketing purposes.

---

[25] Member State biennial national renewable energy progress reports (2011) in accordance with Article 22 (1) of the Directive 2009/28/EC. Available on Commission's Transparency platform: http://ec.europa.eu/energy/renewables/reports/2011_en.htm

[26] *Study on the operation of the system for the biofuels and bioliquids sustainability scheme - mandatory requirements in relation to air, soil, or water protection: analysis of need and feasibility, 2013 Tasks 3&4* *http://ec.europa.eu/energy/renewables/studies/renewables_en.htm*

4.4. Mass balance system

Typically, biofuels have a production chain with many links, from field to distribution of the fuel. The feedstock is often transformed into an intermediate product and then into a final product. Compliance with the sustainability criteria needs to be shown for the final product. The method by which a connection is made between information or claims concerning raw materials or intermediate products and claims concerning final products is known as the chain of custody. The method laid down in the Renewable Energy Directive for the chain of custody is the mass balance method. Other options are 'book and claim' systems and physical segregation systems, also called 'track and trace' or 'identity preservation'.

In a mass balance system physical mixing of certified and non-certified products is permitted but products are kept administratively segregated. The system ensures that for the volume of biofuels for which claims are made at the end of the supply chain, sufficient certified material has been added to the supply chain, taking into account relevant conversion factors. Physical product and sustainability information are coupled when they are traded between parties. There cannot be trade in sustainability information between parties without trading physical products between the same two parties (as is possible in a book and claim system). Each actor in the supply chain keeps track of the amount of product with certain sustainability characteristics it sources and sells, in which each company can never sell more certified products than it sourced, taking into account relevant conversion factors.

Under the book and claim method, fuel suppliers must be able to show that a quantity of raw material or biofuel equal to the quantity in the consignment in question, and having the sustainability characteristics described in associated documentation, has been produced somewhere in the world; and that this documentation has not been and will not be associated with any other consignment of biofuel for the purposes of sustainability verification.

In physical segregation systems certified products are physically segregated from non-certified products throughout the supply chain. 'Track and trace' or identity preservation systems also provide traceability back to the origin of the product. All such systems ensure that consignments physically contain 100% certified material.

Three years after the adoption of the Renewable Energy Directive and the Fuel Quality Directive the operation of mass balance systems is an established practice. However, the detailed implementation of the system differs between Member States and also between voluntary schemes but as long as the principle of the mass balance system is not violated this is not problematic with respect to the integrity of the system. Still, further harmonisation would facilitate the operation of the biofuels market. This is why the Commission has included recommendations for the implementation of the mass balance system in the Report on the practical implementation of the EU biofuels and bioliquids sustainability scheme[27].

The Commission assessed alternative forms of the chain of custody in 2008. It concluded that the book and claim method has the disadvantage of lower effectiveness than the mass balance method. This is because only a small share of feedstock is used for the production of biofuels. It would not be difficult to find sufficient amounts of sustainably produced product to meet the demand for biofuels. Therefore, the certification scheme would not require changing production practises and thus, would be ineffective. Segregation systems on the other hand would cause a disproportional administrative burden as traders would be required to separate the product streams completely. An analysis of the operation of the mass balance

[27] 2010/C 160/02

system which was conducted for the Commission[28] has shown that that most market participants dealing with the chain of custody would prefer to maintain the mass balance system. The main reasons for this assessment are to prevent confusion in the market, a lack of complaints about the mass balance system, to avoid high costs of switching and the low effectiveness of the book and claim system. Therefore, the mass balance system should be maintained. The Commission services will continue the close dialog with Member States and stakeholders in order to apply best practises.

4.5. Definitions of areas of high conservation value and high biodiversity value

Article 17(3) defines areas with high biodiversity value and exempts such areas from use for the production of biofuels and bioliquids. The Commission is also required by Article 23 (5c) to assess whether current definitions of areas of high conservation value and **high biodiversity value** defined in Article 17 (3) and 17 (4) of the renewable energy Directive are sufficient for biodiversity protection.

Biodiversity is complex in nature and has multiple dimensions (i.e. ecosystem-level, species-level, and genetic-level biodiversity), and because of issues of ecological scale and connectivity, and the mobility and migration of some species, it is difficult to define terms such as "high conservation value" precisely and scientifically[29] with an agreed approach that would be valid for all scales, habitats and species. At the global scale, conservation scientists have used several different approaches to identify areas of importance for biodiversity conservation, such as Conservation International's biodiversity hotspots, or WWF's global 200 ecoregions, but these are generally not considered appropriate for public policy decision making e.g. on the biofuel production. There is little scientific discussion on the relationship between the various standards and their varying levels of protection for "high biodiversity" lands and there is little consensus on how they should be defined and identified. However Webb and Coates also note the availability of the UN-Energy Bioenergy Decision Support Tool that can aid the identification of high biodiversity value areas.

All of the ecosystems listed in Articles 17 (3) (biodiversity) and 17 (4) (high carbon stocks) are prohibited for conversion for biofuel feedstock production are high conservation value areas. Since their direct conversion for biofuel feedstock production is already prohibited by the renewable energy Directive, the Directive's current definitions can be considered as sufficient to prevent direct conversion of a large part of these areas to arable crops, and, on the basis of current scientific evidence their improvement is not considered appropriate or feasible. However, existing tools can still be useful and when further developed provide the basis for improved assessment. that might already guide decision making and that might be considered in the next report when further developed. Further, the studies on indirect land use change carried out by the Commission show that indirect impacts on these ecosystems could be significant. The Commission's proposal to address indirect land use change aims to address these risks.

Impacts of EU biofuel consumption

The EU sustainability scheme, as well as monitoring and reporting requirements included in the Renewable Energy Directive, aims at preventing the conversion of areas of high carbon

[28] *Study on the operation of the system for the biofuels and bioliquids sustainability scheme – mass balance report, 2013 Task 1 http://ec.europa.eu/energy/renewables/studies/renewables_en.htm*

[29] Campbell and Doswald 2009; Grantham, et al. 2010; Lourival, et al. 2009; Technical Series of the Secretariat of the Convention on Biological Diversity on Biofuels and Biodiversity, Webb and Coates 2012.

stock and high biodiversity for the production of raw materials for biofuels. These requirements also require that biofuels must achieve minimum greenhouse gas emission saving thresholds. Moreover, the Commission is required to monitor and report on the impacts of the EU biofuel consumption in the EU and in the third countries supplying the EU market.

4.6. Economic and social impacts

4.6.1. Land use

It is estimated that the total land planted to produce the feedstock for 13.3 Mtoe of biofuels consumed in the EU in 2010 was about 5.7 Mha. of which 3.2 Mha, (57%) within the EU and 2.4 Mha. (43%) outside the EU. Full incorporation of the value of co-products would yield a lower figure[30] (less than 3 Mha in total). Within the EU, several countries used slightly higher percentage of the land used for the total crop for the EU biofuel feedstock, like France (6%), Germany (5%) and Poland (2%). The IFPRI estimate is of 2.4% for the EU.

Member State progress reports provide little conclusive evidence about the impact of increased biofuel production on the national land use patterns. Some Member States did not allocate any of the land use changes to biofuels (Austria, Denmark), concluded that these changes were insignificant (Bulgaria, Netherlands), or even reported decreasing land use for biofuel crops (Estonia, Lithuania). France, Slovakia, Slovenia reported that the area occupied by feedstock that can be used for biofuel production increased. Romania reported significant expansion in land use for rapeseed between 2004 to 2009 on to previously unused agricultural land. The UK claimed a small increase in the land used for oilseed rape and sugar beet as biofuel feedstock between 2009 and 2010; also the start of domestic ethanol production from wheat in UK resulted in expansion of the land used for wheat as a biofuel feedstock (2% of the total UK wheat crop was used for ethanol production).

The Commission, in its proposal[31] on minimising indirect land-use change (ILUC) emissions adopted 17 October 2012, limits the contribution that 1st generation biofuels can offer towards the Renewable Energy Directive transport targets to 5%, which represents today's consumption levels. This limits the risk of any further ILUC impacts, and provides for strong incentives for advanced 2nd and 3rd generation biofuels, and in particular for those advanced biofuels that are not using land, which will count more towards the above-mentioned target. The proposal also increases the minimum greenhouse gas emissions savings threshold for new installations and suggests that reporting of ILUC should be required by Member States, by using the ILUC-factors set out in Annex to the proposal. The proposal is now with the co-legislators in the Parliament and the Council.

4.6.2. Land use rights

Concerns have been expressed regarding the increase in global biofuel production and its possible negative impacts on the land use rights[32]. The comprehensive 2012 ILC global study

---

[30] Estimations for total land area used for the biofuel production, including their destination for the domestic and/or EU market is based on production and trade data and feedstock analysis. All data from *Renewable energy progress and biofuel sustainability*, ECOFYS et al, 2012. IFPRI results suggest additional cropland for biofuels constitutes 1.7Mha.

[31] The proposal and accompanying Impact Assessment is available here: http://ec.europa.eu/energy/renewables/biofuels/land_use_change_en.htm

[32] ILC 2012 - Land rights and the rush for land; Pisces 2011- Working brief: biofuels and sustainability: a case study from Tanzania, UK DIFD; Grain 2012- The great food robbery, Barcelona, Spain; ActionAid 2012 - Fuel for thought; UN Special rapporteur on the right to food Olivier De Schutter states that “biofuel crops often lead to land-grabbing”.

about land deals which is based on the 'Land Matrix' database[33] associated significant part of the global land deals with biofuels. ILC suggest that the rate of acquisitions remained low until 2005, where after it accelerated considerably, peaking in 2009 and slowing down somewhat in 2010. The surge of 2009 can be related to the food price crisis and a range of factors that triggered new investor interest in land, including biofuels.

Although comprehensive, the Land Matrix database nevertheless contains several serious flaws[34]. Many references given in the Land Matrix database do not correspond to specific deals. Often, the areas quoted are mere stated objectives or potentials, or large multi-stakeholder government programmes. Many sources are reports or articles that cover large, multi-deal projects, countries or regions, thus very likely leading to overlap between sources and deals mentioned in the Land Matrix database. In many cases the quantities or references given do not add up to the large areas claimed to be affected by the deals. Closer scrutiny of the top-5 deals in regions that have given rise to the most serious concerns about land-use rights reveals that only about 30% of the acreage reported in the Land Matrix concerns actual deals[35].

The lead time from the moment of land acquisition to the actual production of biofuels is at least 3-5 years, therefore assumptions about the link between the land acquisitions occurring in 2010 with the possible future EU biofuel demand can only be verified within the coming years if and when the biofuel production on newly acquired land would occur. At present, there is insufficient information available to link biofuels-oriented projects to the demand in the EU market, even if projects often use the EU Renewable Energy Directive as part of their argumentation. Furthermore, 70% of the EU consumed biofuels are produced in the EU, U.S. or Canada. However, it can be assumed that some of the projects in developing countries, where land deals have caused significant concerns, have been initiated because of expectations regarding the EU biofuels market. Monitoring of the EU biofuels consumption and associated impacts in the coming years is necessary and will reveal whether this assumption remains valid.

4.6.3. Food prices

Global commodity markets experienced two significant **food price** increases in 2008 and 2011, and the weather damaged harvests in the U.S. in 2012 raised concerns of further price increases for maize and soy prices. The Commission has been monitoring these developments closely.

As set out in Section 3.2, around 80% of the EU consumed bioethanol in 2010 were produced in the EU from domestic feedstock. Grain use for bioethanol amounted to 3% of the total cereal use in 2010/2011 marketing year and was expected to remain in the same range for 2012/2013[36]. Back casting scenario analysis clearly shows that EU expanding bioethanol use has contributed only little to the historical cereal price increases in 2008 to 2010. Due to the quite low use of bioethanol in EU, the price effect on global cereal market is only 1-2 % in

[33] The Land Matrix is a database of large-scale land-based investments, that include transactions entailing a transfer of rights to use, control, or own land through sale, lease, or concession, implying a conversion from land used by smallholders, or for important environmental functions, to large-scale commercial use. The database contains two sets of data: "reported" (from published research reports and media reports and government registers) and "cross-referenced" (deals that are referenced from multiple sources and triangulated for reliability with other information sources, and, in-country partners in some cases). The database and its details can be accessed online at http://landportal.info/landmatrix

[34] See "Global land rush", 2012, http://pubs.iied.org/17124IIED.html?k=land rush

[35] Source: *Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012*

[36] Directorate-General for Agriculture and Rural Development - Short Term Outlook – N°3 – June 2012 http://ec.europa.eu/agriculture/analysis/markets/index_en.htm

2000-2010. This suggests that EU bioethanol use played only a very modest role in the cereal price increases observed in 2008 and 2010. For other food crops, including oil crops, the price increases simulated in 2000-2010 due to EU biofuel production were 4 %, thus the role of EU *biodiesel* use has been slightly more significant, although still modest[37]. These figures are broadly confirmed by the indirect land-use change emissions modelling conducted by IFPRI, where a scenario with biofuels as set out in the National Renewable Energy Action Plans for 2020 is compared to a scenario where the consumption of biofuels stabilises at the level of 2008, the results thus show the long term effect. Cereals and sugars experience price increases of 1% or less due to the increased use of ethanol, while the use of biodiesel leads to higher prices, in particular for rapeseed, which is the dominant source of biodiesel in EU.

Table 8b. ***Estimated crop and commodity price increases***

Ethanol crops	**Price incr. 2020**	**Biodiesel crops**	**Price incr. 2020**	**Biodiesel oils**	**Price increasesincr. 2020**
Wheat	1.0%	Soybeans	2.5%	Palm oil	4.5%
Maize	0.74%	Sunflower	4.8%	Rapeseed oil	9.2%
Sugarcane and sugar beet	0.88%	Rapeseed	11%	Soybean oil	7.3%
		Palm Oil	2.1%	Sunflower oil	4.8%
Other crops	**Price incr. 2020**	**Other commodities**	**Price incr. 2020**	**Other commodities**	**Price incr. 2020**
Rice	0.012%	Cattle	0.047%	Other Food	0.16%
Other crops	0.27%	Other animals	0.22%	Sugar	1.0%
Other oilseeds	0.66%	Meat&Dairy	0.078%	Fishing	-0.044%
Vegetables and fruits	0.19%				

Source: Commission calculations based on IFPRI report.

It is important to keep in mind when drawing conclusions from the above data that despite the better understanding and recent improvements in the science, the estimates remains vulnerable to the modelling framework and the assumptions made. It is also important to note that the figures above are for global prices, and thus prices for smaller regions might be experiencing more significant changes.

With the recently adopted proposal to minimise ILUC, as referred to in chapter 5.1.1 above, it can be expected that less pressure will be exerted on global markets, as further EU incentives to increase consumption of 1st generation biofuels beyond today's consumption level are reduced.

The international markets have been influenced by many other factors such as weather, lower than average harvests, rising global demand for meat and other food and oil prices, to a much larger extent than biofuel production. The transmission of global food prices to domestic prices is not transparent and differs a lot between countries, crops and other circumstances.

[37] Backcasting scenario analysis with a world food system model has been used to quantify the impact of demand growth for biofuel feedstock in recent years on prices and conventional demand for food and feed uses of crops. The outcomes of scenarios with historical biofuel production levels were compared to a simulation for 2000 to 2010 where biofuel expansion was suppressed. The difference in results was interpreted as an estimate of the market impacts of historical biofuel development and policies. This approach was also used to quantify the impact of recent weather related factors by comparing simulation results for a model calculation with 'smooth' average weather (with and without biofuel expansion) to simulation results where historical production distortions due to specific historical weather events were included (FAO/IIASA Agro-ecological Zone - AEZ) model and the IIASA world food system (WFS) model, August 2012).

Finally, not all local populations are impacted in a similar manner by high local food prices. Overall these elements make it difficult to clearly and transparently state the impacts of biofuel production on local food prices and food security.

That said, the detailed overview of the main regional markets of importance to EU biofuel production, as provided by the report prepared for the Commission [38],does not suggest any direct link between the biofuel production and local food price increases. Biofuel production did add to demand, but in many cases harvests of 2010 were improving compared to 2009, in some cases even leading to surpluses of feedstock on the market (like soy in Argentina or sugar beet in the EU). In other cases, other uses/applications of the feedstock were the main drivers of the market and price movement (for example the sugar or palm oil market). In cases where production was low in 2010 (like rapeseed in EU) market reports state that the use of this feedstock for biofuel production was reduced, while other applications of this feedstock were less affected. Thus biofuel demand for a specific feedstock appears more elastic than other markets' demand.

4.6.4. Compliance with international conventions

The Commission is required by Article 17 (7) of the renewable energy Directive to monitor the impacts of the EU biofuel consumption in the EU and main third countries of supply. This includes for third countries and Member States that are a significant source of raw material for biofuel consumed within the Community, information on whether or not the country has ratified and implemented eight Conventions of the International Labour Organisation[39], and the Cartagena Protocol on Biosafety and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Tables 9 and 10 summarise the ratification and implementation record of EU Member States and main third countries.

[38] *Renewable energy progress and biofuel sustainability*, ECOFYS et al, 2012.

[39] Convention concerning Forced or Compulsory Labour (No 29); Convention concerning Freedom of Association and Protection of the Right to Organise (No 87); Convention concerning Application of the Principles of the Right to Organise and to Bargain Collectively (No 98); Convention concerning Equal Remuneration of Men and Women Workers for Work of Equal Value (No 100); Convention concerning Abolition of Forced Labour (No 105); Convention concerning Discrimination in Respect of Employment and Occupation (No 111); Convention concerning Minimum Age for Admission to Employment (No 138); Convention concerning Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (No 182).

Table 9. ***Ratifications of international conventions by the main exporting countries (as on 2010)***[40]**.**

	ILO 29	ILO 87	ILO 98	ILO 100	ILO 105	ILO 111	ILO 138	ILO 182	CPB[1]	CITES[2]
Argentina	√	√	√	√	√	√	√	√	-	R
Brazil	√		√	√	√	√	√	√	ACS	R
Guatemala	√	√	√	√	√	√	√	√	ACS	R
Paraguay	√	√	√	√	√	√	√	√	R	R
Peru	√	√	√	√	√	√	√	√	R	R
Indonesia	√	√	√	√	√	√	√	√	R	A
Malaysia	√		√	√	√		√	√	R	A
Canada	√	√		√	√	√		√	-	R
Russia	√	√	√	√	√	√	√	√	-	C
Ukraine	√	√	√	√	√	√	√	√	A	A
U.S.					√			√	-	R
EU 27	√	√	√	√	√	√	√	√	(see table below)	

Abbreviations: **√,** R= Ratified, A= Accepted, ACS = Accession, AP= Approval, S = Succession, C=Continuation.
[1] Cartagena Protocol on Biosafety
[2] Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Table 10. ***Ratification of biodiversity conventions by the 27 EU Member States (as on 2010)***[41].

Country	**CPB**	**CITES**		**Country**	**CPB**	**CITES**
Austria	R	A		Latvia	A	A
Belgium	R	R		Lithuania	R	A
Bulgaria	R	A		Luxemburg	R	R
Cyprus	ACS	R		Malta	ACS	A
Czech Republic	R	S		Netherlands	A	R
Denmark	R	R		Portugal	A	R
Estonia	R	A		Poland	R	R
Finland	R	A		Romania	R	A
France	AP	AP		Spain	R	A
Germany	R	R		Slovenia	R	A
Greece	R	A		Slovakia	R	S
Hungary	R	A		Sweden	R	R
Ireland	R	R		UK	R	R
Italy	R	R				

Abbreviations: R= Ratified, A= Accepted, ACS = Accession, AP= Approval, S = Succession, C=Continuation.

Of the 27 EU Member States, all have signed the eight ILO conventions. In terms of EU enforcements, the ILO Committee of Experts on the Application of Conventions and

[40] This overview is based on the review of official information from the convention websites, US department of Labour and ILO SIMPOC (Statistical Information and Monitoring Programme on Child Labour) indicators. ILO SIMPOC is a statistical body that collects information for the International Programme for the Elimination of Child Labour (see http://www.ilo.org/ipec/ChildlabourstatisticsSIMPOC/lang--en/index.htm).

[41] Sources: CPB website : http://bch.cbd.int/protocol/parties/ and CITES website: http://www.cites.org/eng/disc/parties/alphabet.php

Recommendations (CEACR)[42] notes that enforcement of the Convention 111 Concerning equity should be improved in some of the new Member States (e.g. Poland).

While most of the non EU countries exporting biofuels to the EU market have ratified the fundamental conventions, the enforcement in these countries is lower. The US has declined to ratify many of the conventions, however, its enforcement of the same principles is stronger than in most other countries[43]. Ukraine's ratification and implementation is relatively strong with positive reports from ILO and a partnership with ILO in developing a strong so-called "Decent Work" approach. Weak implementation of the convention principles mostly occurs in lower income countries. US Department of Labour monitoring on forced labour notes potential risks related to sugarcane production in Brazil and Guatemala. Furthermore child labour and forced labour for Indonesia are mentioned, as well as forced labour in Malaysian oil palm sector [44]. However, progressive introduction of mechanized harvesting (e.g. Argentina and Brazil) is gradually reducing the incidence of child labour[45].

4.6.5. Employment

Biodiesel and bioethanol use in transport were estimated to provide more than 220,000 jobs in the EU, and global ethanol and biodiesel production supported nearly 1.4 million jobs in all sectors of the global economy in 2010[46]. These jobs include not only direct biofuels production, but also employment in agriculture, other supplying industries, and other sectors such as retail and wholesale trade that benefit from the economic activity generated by biofuels. The largest share of employment for ethanol occurs in the U.S. and Brazil. The subsidies provided to biofuel producers, through tax exemptions, constituted around €5bn in 2009[47]. This is one significant element of the whole bio-economy which promises to be a major source of future economic growth and employment.

A distinction can be made between the more traditional uses of biomass for material use as the oleo-chemical industry and the emerging bio-economy sectors like the bio-plastics sector. In 2010 the new bio-economy sectors were still developing and therefore the interaction with the biofuel sector not yet that apparent, while the impact on especially the oleo-chemical industry was significant. However as the emerging bio-economy sectors grow, the competition for raw materials for the different biomass uses is expected to increase. This calls for further development of bio-refinery concepts and 2nd generation biofuels.

---

42 Committee of Experts on the Application of Conventions and Recommendations, http://www.ilo.org/indigenous/Conventions/Supervision/lang--en/index.htm

43 Fair Labour Standards Act (FLSA) and ILO CEACR on US Reporting http://www.ilo.org/dyn/normlex/en/f?p=1000:13100:0::NO:13100:P13100_COMMENT_ID:2309420:NO

44 US Department of Labour. The Trafficking Victims Protection Reauthorization Act (TVPRA) provides information and monitors forced labour and trafficking of purpose for this purpose. http://www.dol.gov/ILAB/programs/ocft/tvpra.htm

45 The law 11,241 of the 19th of September 2002 in the Brazilian state of Sao Paulo aims for 100% mechanized harvesting by 2021. Higher wages, higher benefits and a regularization of the contracts are increasing the cost of workers. All contributes to make mechanized harvesting less costly than manual harvesting. It is expected that this legislation will be supported by the federal government and applied also to the other states. This is expected to decrease substantially or even end forced and child labour. (INMETRO; UNICA; Brazilian Ministry of Labour 2010)

46 Contribution of biofuels to the global economy. John M.Urbanchuk, Global Renewable Fuels Association, Environmental Economics, May3, 2012.

47 Figure 14 in section 2.2.2 of the report "Financing Renewable Energy in the European Energy Market", available here: http://ec.europa.eu/energy/renewables/studies/doc/renewables/2011_financing_renewable.pdf

Considering broader economic and social sustainability and its effect on consumers, the Commission is currently studying biofuels from a consumer perspective as a part of a broader study on the functioning of the fuels market[48].

4.7. Environmental impacts

4.7.1. GHG savings

Member States' total estimated **greenhouse gas emission savings** from the use of biofuels in the EU without land use change quantification in 2010 ranged between 22.6 Mt CO_2 eq, indicating a saving of 53%[49], and 25.5 Mt CO_2 eq or 60% savings[50], compared to the situation where only fossil fuel would be used. The latter figure from Member State reports indicates higher total greenhouse gas emission savings than calculated emission savings based on the types of feedstock and default emission values. One possible explanation for the difference could be rougher estimations by the Member States (e.g. using average value for biodiesel and bioethanol), more insight in the specific value chains (if reported by producers within the Member State this might give more details on variations compared to default values) or other uncertainties. Note that these values are not including estimates for indirect land-use change emissions, which can be done when the ILUC proposal is agreed by EU legislators and are estimated at 48 Mt to 2020.

4.7.2. Biodiversity

Based on the biodiversity sustainability indicators combining land cover change analysis between 2008 and 2010, protected area coverage information and the share of the biofuel feedstock production in the total EU biofuel consumption, it is estimated that the majority of EU countries were at low risk of biodiversity loss from the conversion of land for the production of biofuels. Spain and Poland were the only two Member States considered at moderate risk. Overall, EU countries, including Spain and Poland, are at much lower risk of biodiversity loss that non-EU countries. Among these, Brazil and the US, are estimated to be at higher risk, followed by Argentina, Canada, Russia, Paraguay and Ukraine (Table 11).

Table 11. ***EU biofuel consumption and biodiversity risk indicators for main non-EU countries***[51]

Country	Crop	Estimated crop area for EU biofuel market (x1000 ha) (*) (Source: Ecofys, 2012)	Source ecosystem	Estimated risk from conversion to cropland 2008-2010	Estimated risk from low coverage by Protected Areas in 2010
Argentina	Soy	868	Savannah/shrubland, Grassland	Medium	High
Brazil	Soy	300	Savannah/shrubland, Grassland	High	Medium
	Sugar	74			
Canada	Rapeseed	207	Grassland	Medium	Medium

[48] The study (to be published by the end of 2013) explores whether consumers are able to make informed choices, by looking into consumer understanding and the transparency of information. It is expected to generate recommendations on improving and harmonising fuel labelling at the pump across EU Member States. The study also tackles the issue of the availability of different fuels and retailers, and retail prices.

[49] Calculation based on disaggregated feedstock and production region data using 'typical' values of Annex V of the Renewable Energy Directive. The same calculation method was used in previous Commission's Renewable Energy progress reports.

[50] Calculation based on total reported greenhouse gas emission reductions for 2010 in 2011 Member State renewable energy progress reports.

[51] Source: *Renewable energy progress and biofuel sustainability, ECOFYS et al, 2012*

	Soy	32			
Indonesia	Palm	57	Forest, wetland	Low	Low
Malaysia	Palm	12	Forest, wetland	Low	Medium
Paraguay	Soy	140	Savannah/shrubland, Grassland	Low	High
Peru		N.A., less than 10			
Russia	Rapeseed	129	Savannah/shrubland, Grassland	High	Low
	Soy	80			
Ukraine	Rapeseed	263	Savannah/shrubland, Grassland	Low	High
	Soy	19			
U.S.	Soy	160	Savannah/shrubland, grassland	High	Medium
	Maize	33			

(*) Only biofuel feedstock crops where more than 10,000 hectares of production area can be attributed to EU biofuels imports are shown in this table.

These issues mainly occur because, although the ecosystems where biofuel feedstock could be grown were converted to cropland only at low rates between 2008 and 2010, those ecosystems are afforded relatively poor protection in national protected area systems. In Indonesia and Malaysia the main current threat to biodiversity is conversion of forest (492,000 hectares of forest and 162,000 hectares of wetlands were converted to cropland in Indonesia between 2008-2010, an unknown fraction of which could represent conversion to oil palm plantations), a small part of which may be used for biofuels production destined for the EU market. As demonstrated by the work carried out by the Commission, indirect land use change from biofuels can play a role in tropical deforestation. In terms of direct land use change, deforestation is a relatively modest level of conversion compared to much higher levels in savannah/shrubland and grassland ecosystems elsewhere in the world. Overall, the current threat to biodiversity from direct ecosystem conversions comes less from tropical deforestation than from the conversion of natural savannah/shrubland and grassland ecosystems to cropland and pasture, with regards to indirect ecosystem conversions both deforestation and grasslands conversion are problematic.. The most important drivers are considered to be meeting increased local and global demand for meat, animal feedstock and cereal production, but any additional demand would add to the situation.

4.7.3. Water, soil, air impacts

Water

Compared to the total water use for agricultural production globally, water use associated with EU biofuel consumption in 2010 was low - less than 0.01% of total agricultural water use. However, water consumption varies hugely between countries and regions. The highest risks for water availability impacts are located outside of the EU[52]. In terms of gross cubic meters, biofuel crops have higher impacts on reducing natural water availability (i.e. green water) than impacts related to irrigation (i.e. blue water). Thus, green water impacts outside of the EU are of particular concern[53].

[52] Mekonnen, M.M. and Hoekstra, A.Y. (2010) The green, blue and grey water footprint of crops and derived crop products, Value of Water Research Report Series No.47, UNESCO-IHE, Delft, the Netherlands

[53] In this analysis, "green water" refers to natural water availability from rain or soil moisture that is available in situ to cultivation. Green water impacts include the amount of naturally available water used by cultivated crops, which is not available for other purposes. "Blue water" refers to water used through human intervention, including irrigation. Blue water impacts include the amount of irrigated water used by cultivated crops, and not available for other purposes. Finally, "grey water" refers to polluted water resources. Grey water impacts therefore refer to water that is polluted in the process of cultivating crops, and is not available for other purposes. For the purposes of this report, water availability impacts are inferred from green and blue water impacts, and water quality impacts are inferred from grey water impacts

Brazilian sugarcane has the highest impacts in both the green and blue water categories, and has experienced a larger increase in impacts than other countries between 2008 and 2010. Two biofuel crops grown within the United States, soy and maize, also have significant green and blue water impacts, each of which increased between 2008 and 2010. Additional notable biofuel crop impacts include soybeans from Brazil and Argentina, and palm oil from Indonesia and Malaysia. Meanwhile, it must be noted that the EU consumption of biofuel feedstock from some of these countries has decreased. For example, although Brazilian sugarcane has the highest water impacts and may be considered high risk for water availability and water quality, EU biofuel imports from Brazil have decreased between 2008 and 2010. Similarly, biofuel imports from Malaysia and Indonesia have also decreased. Recent legislation and regulatory measures taken in these third countries also indicate their governments' willingness to address the issues related to water quality, although additional legal and voluntary measures will be necessary to significantly mitigate risks[54].

Green and blue water impacts are much lower within the EU. Wheat tends to have the highest green water impacts, especially in France, Poland, and Spain, although German and French rapeseed cultivation results in some impacts. Maize in France and Spain has the highest EU blue water impacts, although impacts decreased between 2008 and 2010. Spanish sunflower cultivation also had relatively modest blue water impacts.

Soil

The FAO statistics indicate a global trend towards expansion and/or intensification of biofuel crops. The concern that biofuel market may have negative impact on soil health is based on the premise that increased demand for biofuel feedstock will encourage expansion of cropping area, shift from diversity to monoculture, and increased use of inputs. The connection appears logical. There appear to be few studies to establish a direct link between biofuels and soil health as such[55], however the impact of agricultural cultivation in general is well documented.

Crops that currently serve the EU biofuel market include wheat, maize, rye, rapeseed, sunflower, sugar beet, soybean, sugarcane and oil palm. All of these crops also serve other market outlets with biofuels only being one of the possible end uses. Cultivation of these crops spans over variable agro-ecological zones across EU and non-EU countries. Accordingly, the risk to soil resources varies with local soil characteristics, landforms, climatic conditions, and management practices. Based on climatic conditions of the feedstock producing regions, inherent soil vulnerabilities, and known risk factors associated with agriculture practices, it is possible to estimate the different soil risks (high, medium or low) for various biofuel producing regions. However, considering that total land area dedicated to the production of feedstock for the EU biofuel market in most third countries is less than 1% of the cropland (and for the main EU biofuel producing countries between 2-6%), the following overview cannot be directly applied to assess the impacts of the EU biofuel consumption.

European soils exhibit a wide range of conditions, including low moisture and nutrient status, low organic matter, calcareous conditions, impeded drainage, and seasonally excess water. These conditions arise partly from natural factors (rainfall, soil types, landscape setting) and partly from management practices. Commission's report "Towards a Thematic Strategy for Soil Protection"[56] identified eight main threats to European soils: soil sealing,

[54] *Renewable energy progress and biofuel sustainability*, ECOFYS et al, 2012.
[55] *Renewable energy progress and biofuel sustainability*, ECOFYS et al, 2012, Appendix XIII.
[56] *Towards a Thematic Strategy for Soil Protection,* COM(2002) 179 final

erosion, loss of organic matter, decline in biodiversity, contamination, compaction, hydro-geological risk (floods and landslides), and salinisation. These threats apply to practically all soils and it is difficult to attribute any or all to biofuel feedstock. The 2012 report on the implementation of the Soil Thematic Strategy[57] noted that whilst the Soil Thematic Strategy has helped raise the profile of these issues, there is still no systematic monitoring and protection of soil quality across Europe and called for further integration of soil protection in different policies.

Argentina produces soybean as feedstock for biofuel consumed in the EU. The main soy producing areas are located in the humid Pampa region, where soils and climatic conditions are generally favourable. Close to 80% of growers in the Pampa region have adopted no-till farming, which has shown promising results in terms of reducing soil erosion, conserving soil moisture, and improving soil fertility. The system of no-till planting has been promoted by the Argentinean Association of Farmers (AAPRESID), which has joint research projects with research and technological centres, universities, and agricultural extension showing benefitial initial results. However there still appear to be emerging risks of soil compaction, chemical use and accumulation. The concerns regarding land degradation are related to intensification of agriculture (e.g., introduction of the double annual cropping wheat-soybean), the change from the rotation cattle-agriculture to continuous agriculture, and untimely tilling sometimes along the slopes.

Brazil's main exporting crops are sugarcane and soybean. Brazilian soils are characterized primarily by low nutrient holding capacity, seasonal moisture stresses and high temperatures. The impact of biofuel feedstock crops in Brazil relate to land clearing and agricultural management practices. Although there appears to be a shift from traditional to no-till cultivation, which reduces erosion and improves soil quality, there is a growing trend toward mono-cropping in crops grown for biofuels, especially sugarcane and soybean. This reduces soil fertility, increases crops' vulnerability to pests and diseases, as well as other environmental impacts. Erosion under sugarcane is low due to the semi-perennial nature of this crop. Soybean, on the other hand, may impact soils through the effects of mechanization and use of chemicals.

The United States produce corn and soybean as feedstock for biofuel consumed in the EU. Soil erosion is a major concern related to pre-planting soil preparation. In addition, there are areas of low organic matter, soils of low nutrient holding capacity, acidity in coastal areas, areas of seasonal moisture stresses, and areas of seasonally excess moisture, however, in most cases, these limitations are overcome by management and investment of inputs. No-till planting and conservation tillage are popular, and they have shown considerable improvements in terms of reducing soil erosion and conserving soil moisture. Major soil risks relate to use of machinery, soil compaction, excessive use of chemical inputs and emerging pest and weed resistance.

Malaysia: the major soil stress is due to drainage of peat-lands, deforestation and excessive leaching. There are areas of high P, N, and organic retention. There is also impeded drainage along parts of the coastline, high organic retention, and acid sulphate condition. Soil impacts related to palm oil arise primarily from land conversion and replanting. Burning is a common practice for preparing land for replanting. Recent trends indicate move toward zero-burning, which allows plant material to be recycled. Use of machinery in the oil palm industry is common due to labour shortages.

[57] *The implementation of the Soil Thematic Strategy and ongoing activities*, COM (2012) 046 final

Indonesia: The major soil stress in oil palm growing areas in Indonesia is draining of peat-lands, excessive leaching due to highly weathered soils, deforestation and high rainfall. Additional stresses are due to high temperatures, high aluminium, low nutrient holding capacity, and steepness of land. There is increased risk of erosion when forests are cleared to grow oil palm, especially during periods of planting, establishment, and replanting. Drainage of peat-lands results in loss of retention capacity, erosion and emission of greenhouse gases. Acid sulphate conditions exist along many parts of the coastline.

Air

The biofuel supply chain can emit air pollutants in every stage from growing feedstock (e.g., dust from clearing land, smoke from burnings, nitrogen from fertilizers), to transporting feedstock and refined product (e.g., vehicle emissions and dust generation), to processing (e.g., industrial systems emissions), to use (e.g., combustion). The types and impacts of the emitted pollutants depend on the local context, including activity causing the emissions, proximity to population centres, sensitivity of ecosystems, concentrations of the pollutant, topography, and meteorology. Preliminary results in key countries supplying the EU biofuel market indicate that generally the greatest threats to air quality are associated with burning (e.g. burning of crop residues, sugarcane pre-harvest, clearing vegetation from land). High threats are also associated with some applications of agrochemicals, areas highly vulnerable to wind erosion, and gaseous emissions from processing facilities. The results of the subjective threat assessment show that the highest overall potential threats due to the presence of burning as part of their production are associated with the feedstock that is mostly grown outside the EU (soybean, palm oil, maize, and sugarcane). In the cultivation stage, all of the crops have high or medium threats associated with the volatilization of nitrogen compounds from fertilizers, and in some countries air pollution from volatilization of other agrochemicals raise the threats. Air pollution from the processing stages presents a medium to high threat in all countries where processing occurs.

It is difficult to establish the extent to which existing legislative and voluntary provisions successfully lower the overall threat associated with a specific practice or activity, however, through consideration of the existing provisions and the potential to enforce legislation in each country, it was determined that in the EU[58], Canada, and Malaysia, and the United States, the high and medium threats are likely lowered by the existing regulatory provisions. Each of those countries has high potential enforcement, with the exception of Malaysia, which has medium. However, the greatest threat from Malaysia relates to burning, which was noted to have high enforcement of bans. In Indonesia and Brazil (two of the countries with the highest threats to air pollutions), some of the threats are lowered to the extent that legislation is enforced and some remain the same. Both countries are considered to have 'medium' potential enforcement and burnings in both countries are not sufficiently addressed; Brazil does have several measures to address burning but none is fully in effect or having sufficient coverage at this point.

[58] Within the EU, the environmental protection standards are ensured among other through the application of the system of cross-compliance requirements for. As part of these requirements there are Statutory Management Requirements (SMRs) and a set of standards of Good Agricultural and Environmental Condition (GAEC), which are additional requirements relating to soil erosion, soil structure, soil organic matter and the minimum maintenance of habitats but which are determined at the country level. Large scale EU biorefineries are covered by the requirements of the Industrial Pollution Prevention and Control Directive, to be replaced by the Industrial Emissions Directive as of January 2014. For smaller scale plants, there are no specific environmental regulatory requirements. However, air quality limit values established under the Air Quality Framework Directive have to be complied with by Member States. These regulations significantly lower the threat to air quality from all aspects of biofuel production.

Between 2008 and 2010, there has been limited change in threats to air quality from the EU biofuel demand. There have been changes in the biofuel trade (imports from Argentina increased, while imports decreased from Brazil, the U.S., Indonesia and Malaysia). New environmental legislation was introduced in that time period, but its impact cannot yet be determined (e.g., Indonesia in 2009 introduced a significant new environmental legislation). The coverage of voluntary sustainability certification in the third countries exporting to the EU market is continuing to increase, however in 2009 and 2010 only part of the feedstock produced in the third countries would be covered by these schemes and the first voluntary certification schemes were only approved by the European Commission in 2011[59].

5. CONCLUSION

This Staff Working Document reviews a range of data and analysis for the renewable energy progress report. The data show that the EU is clearly on its trajectory towards the 2020 targets, but certain Member State are not and will need to make further efforts. The Commission's analysis suggests there are reasons for concern about future progress. Member States' deviations from their own national renewable energy action plans, for instance, reflect policy changes which reduce clarity and certainty for investors, increasing their exposure to regulatory risk. The deviation from the plans' expectations regarding sectoral and technology trends also indicate where further efforts may be needed. Finally, the modelling undertaken of the impact of current and planned policy measures gives an indication of the degree to which further measures will be needed (in nearly all Member States) to ensure that growth continues and targets are met.

Reasons for the concern include the failure to address barriers to the uptake of renewable energy: administrative burdens and delays still cause problems and raise project risk for renewable energy projects; slow infrastructure development, delays in connection, and grid operational rules that disadvantage renewable energy producers all continue and all need to be addressed by Member States in the implementation of the renewable energy Directive. The changed economic climate has also clearly had an impact on the development of new renewable energy projects. One aspect is the increased cost of capital in general. Another aspect is the increase in risk resulting from Member Sates changes to support schemes. The Commission's planned guidance on support schemes and reform is intended to ensure that such support is cost effective and helps integrate renewable energy production into the energy market. Regarding the instrument of tax incentives for biofuels in particular, it should be noted that scope for such incentives beyond 2020 depend on the adoption by the Council of a new legal framework for taxation of energy products on the basis of the Commission proposal for revision the Energy Taxation Directive [60].

The document also reviews the EU biofuel market. The origins, markets, fuel composition and sources of biofuels consumed in the EU are important for assessing their impacts and sustainability. The renewable energy Directive required the assessment of certain impacts in particular, and these have been assessed, on the basis of external and internal analysis. In addition to requiring all biofuels in the EU to comply with strict sustainability standards, the EU has created clear incentives for using advance biofuels, with higher greenhouse gas savings and fewer potential negative impacts. The document also examines the need for further mandatory requirements to mitigate potential negative impacts, reviews the

[59] The list of voluntary schemes recognised by the European Commission is available at the following webpage: http://ec.europa.eu/energy/renewables/biofuels/sustainability_schemes_en.htm
[60] COM(2011) 169 final.

effectiveness of the mass balance system and several definitions and finds that, despite risks, no major impacts are readily apparent and current measures are sufficient. It is necessary to continuously assess and monitor the impacts with a view to implementing corrective measures when needed.

Together with the progress report, this document presents the Commission's thorough assessment of the state of renewable energy in the EU today. An impression is gained of a solid initial start, but with slower than expected removal of key barriers to renewable energy growth. Further efforts are needed in terms of administrative simplification and clarity of planning and permitting procedures. And further efforts are needed regarding the treatment and inclusion of renewable energy production within the electricity system. Addressing such barriers will contribute significantly to the cost effective deployment of renewable energy and the achievement of the EU's targets.