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# GAIN Report

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## **EU-27**

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### **Brief Analysis of the EU National Plans**

**Report Categories:**

Bio-Fuels

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**Report Highlights:**

This report provides a brief analysis of EU Member State (MS) national renewable energy action plans, which are part of a broad EU effort to increase the use of biofuels in transportation and electricity production. The report also considers the implications for domestic crop production and trade. For example, to meet the EU's stated goals, it is estimated that an additional 10 MMT of grains and 12 MMT of oils and fats may be required annually.

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### **Introduction; the EU Renewable Energy Directive and National Action Plans**

The EU Renewable Energy Directive (2009/28/EC) or RED entered into force on June 25, 2009, and is required to be implemented into national law by December 2010. The RED requires the EU to have:

- A 20 percent reduction in green house gas (GHG) emissions compared to 1990.
- A 20 percent improvement in energy efficiency compared to forecasts for 2020.
- A 20 percent share for renewable energy in the EU total energy mix. Part of this 20 percent share is a 10 percent minimum target for renewable energy consumed in transport, to be achieved by all Member States (MS).

The goal for 20 percent renewable energy in total energy consumption is an overall EU goal. The RED sets different targets for different MS within this overall target. This means that some MS will have to reach much higher targets than the 20 percent renewable energy by 2020, whereas other MS will have much lower targets.

The RED requires MS to submit national renewable energy action plans by June 30, 2010. These plans provide detailed roadmaps of how each MS expects to reach its legally binding 2020 target. In November 2010, twenty-three EU MS submitted their plans. The following countries have not yet submitted plans: Belgium, Estonia, Hungary and Poland. The national plans can be downloaded from the following website of the European Commission (EC):

[http://ec.europa.eu/energy/renewables/transparency\\_platform/action\\_plan\\_en.htm](http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm)

The Energy Research Centre (ECN) of the Netherlands was contracted by the European Environment Agency to create an external database and quantitative report of the national plans (<http://www.ecn.nl/docs/library/report/2010/e10069.pdf>). This GAIN report is based on the ECN report, in specific: tables 79, 93, 101 and 106.

### **Biofuels use for road transportation**

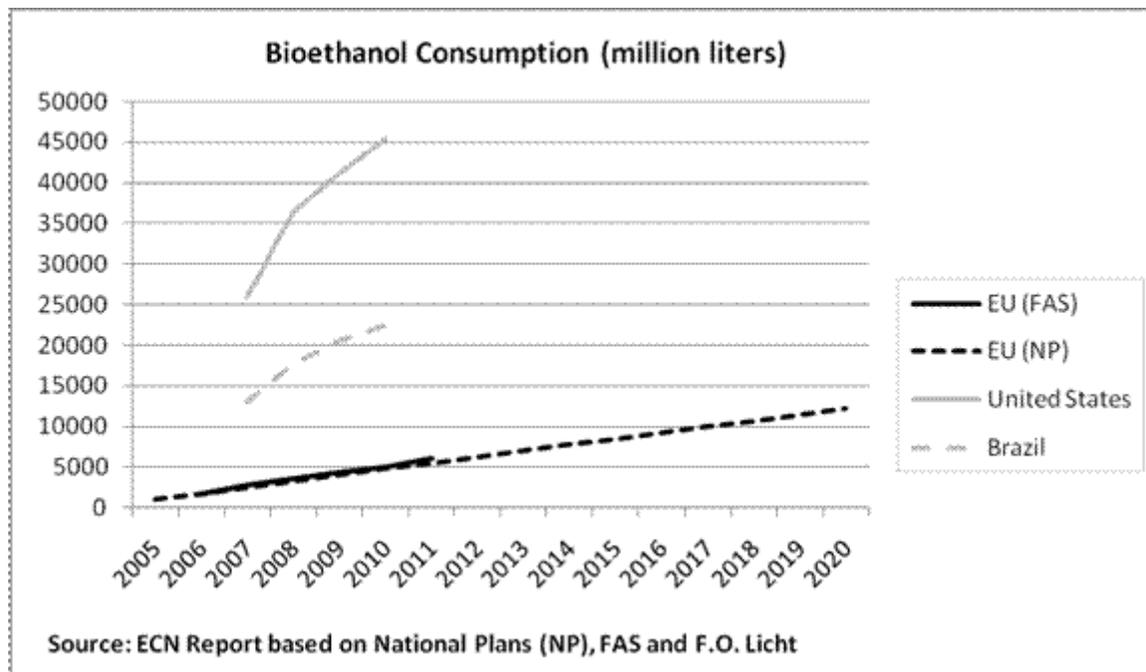
<b>EU Biofuels Use for Road Transportation</b>				
<b>Calendar Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Bioethanol (ktoe)	495	2,415	4,290	6,144
Biodiesel (ktoe)	2,360	9,621	12,525	18,710
Bioethanol (million liters)	979	4,777	8,485	12,152
Biodiesel (million liters)	3,118	12,713	16,550	24,723

Source: ECN based on National Plans

Production figures of conventional biofuels are not included in the ECN report and, as a result, EU import figures are absent.

In the table above and the graphs below, the projected EU consumption of bioethanol and biodiesel by road transportation are shown.

**Consumption of bioethanol by road transportation**



The consolidated statistics of the national plans are comparable with the figures of the [FAS EU Biofuels Annual Report](#), taking into the account the missing numbers of the four MS. Also the numbers per individual MS are generally similar to the numbers in the FAS Annual (see table below). The ECN study reports a steady growth of bioethanol consumption, but the EU is expected to remain a minor consumer compared to the United States and Brazil.

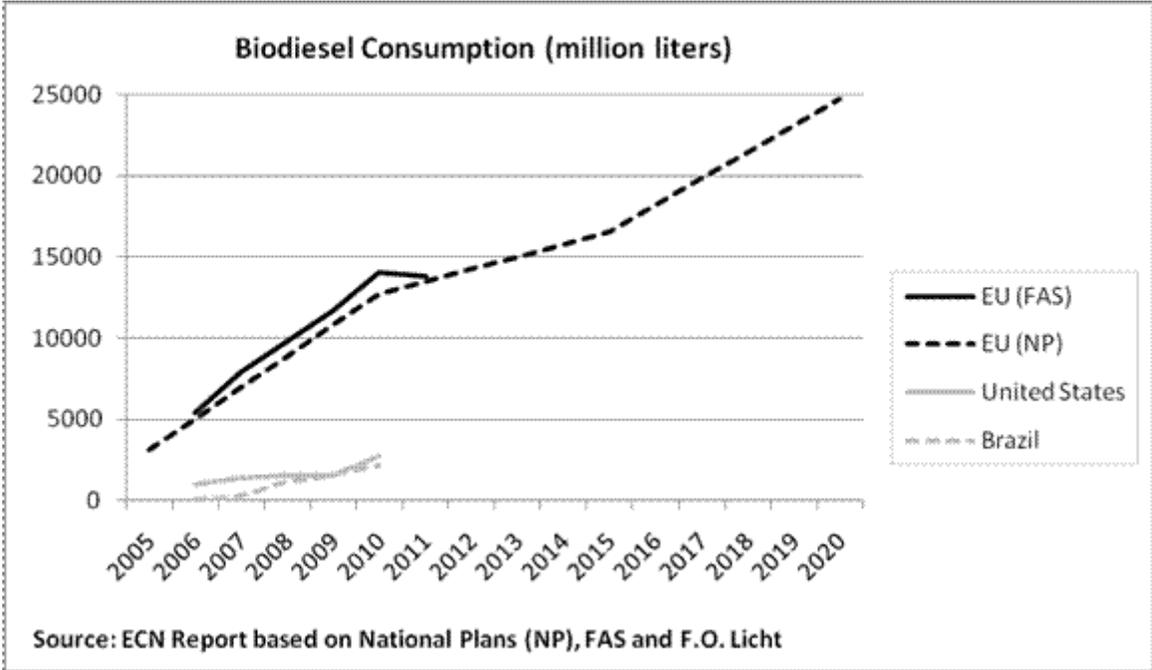
<b>EU Bioethanol Use for Road Transportation (million liters)</b>				
<b>Calendar Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
United Kingdom	36	267	1,369	3,447
Germany	285	1,264	1,970	1,695
France	148	1,088	1,088	1,286
Italy	0	293	740	1,187
Sweden	285	496	708	920
Greece	0	85	506	819
Spain	223	459	595	791
The Netherlands	0	332	429	558
Ireland	0	79	178	275
Finland	0	138	237	257
<b>Total</b>	<b>979</b>	<b>4,777</b>	<b>8,485</b>	<b>12,152</b>

Source: ECN based on National Plans

The most pronounced increase in consumption is projected in the UK. UK consumption is likely to be driven by domestic production. UK bioethanol production is boosted with two new plants expected to produce 400 million liters each once they

reach full capacity. A relatively high consumption is anticipated in Southern Europe: namely Italy, Greece and Spain. This region is generally a grain deficit area. Therefore imports of either bioethanol or feedstocks will be necessary to support this growth. Currently, the EU has a production capacity of about 7.3 billion liters (source: ePURE).

*Consumption of biodiesel by road transportation*



Also the biodiesel figures reported in the national plans are comparable with the figures reported in the FAS EU Biofuels Annual. According the ECN Report, after a relatively slow growth during 2010 – 2015, EU biodiesel consumption is projected to regain its growth rate during 2015 – 2020.

<b>EU Biodiesel Use for Road Transportation (million liters)</b>				
<b>Calendar Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Germany	2,112	3,687	2,740	5,871
Spain	192	1,944	2,866	4,096
France	433	2,861	3,138	3,766
United Kingdom	75	1,138	2,402	3,253
Italy	237	1,147	1,816	2,484
The Netherlands	0	184	462	729
Czech Republic	4	255	459	654
Portugal	0	371	535	595
Finland	0	198	396	568
Austria	46	365	408	542
<b>Total</b>	<b>3,118</b>	<b>12,713</b>	<b>16,550</b>	<b>24,723</b>

Source: ECN based on National Plans

Germany is anticipated to remain the main consumer of biodiesel for road transport in the EU. Spain plans to be the second largest consumer. Currently, the EU has a production capacity of about 22 billion liters (source: European Biodiesel Board),

and has thus the capacity to supply domestic demand. However, in which extent the projected consumption will be supplied by domestic or by non-EU producers depends on MS government production incentives and the implementation of import barriers, such as criteria for sustainability.

### *Share of advanced biofuels*

<b>Share of Advanced Biofuels on Conventional Biofuels</b>				
<b>Calendar Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Advanced Bioethanol	4.2%	2.1%	5.8%	7.0%
Advanced Biodiesel	1.8%	4.3%	6.4%	7.3%

Source: ECN based on National Plans

The contribution of advanced biofuels (biofuels conform Article 21.2 of the RED) is expected to grow between 2010 and 2020 but the share remains limited at about seven percent in 2020 (see table above).

### *Achieving 2020 RED goals*

<b>Share of Biofuels on Total Road Transport Fuel Use</b>				
<b>Calendar Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Use of Biofuels <sup>a</sup> (ktoe)	2,918	12,500	17,864	26,646
Total Fuel Use <sup>b</sup> (ktoe)	297,879	303,242	314,415	315,528
<i>Percentage</i>	<i>0.98%</i>	<i>4.12%</i>	<i>5.68%</i>	<i>8.44%</i>

Source: (a) ECN based on National Plans, (b) EU Energy Trends to 2030 (EC)

The share of biofuels on the total fuel use for road transport remains below the target of ten percent in 2020. In this calculation, advanced biofuels are counted double, as prescribed by the RED. Biofuels use in Belgium, Estonia, Hungary and Poland is not included since these countries have not yet submitted national plans.

### *Trade Implications*

In the national plans, with 2010 as a base year, the EU MS expect to produce an additional annual volume of 7.4 billion liters of bioethanol and 12.0 billion liters of biodiesel in 2020. If the EU produces this volume of biofuels domestically, an additional 10 MMT of grains and 12 MMT of oils and fats annually will be required, either from foreign or domestic sources (see the conversion factors on the last page of this report). This calculation takes into account an additional production volume of about 6 MMT of Distillers Dried Grains (DDG). The EU sugar balance will be negatively affected by about 2 MMT. The estimates above are based on 2010 feedstock use for the production of bioethanol, namely: 45% wheat, 25% corn, 10% rye and barley, and 20% sugar beets (source FAS Biofuels Annual).

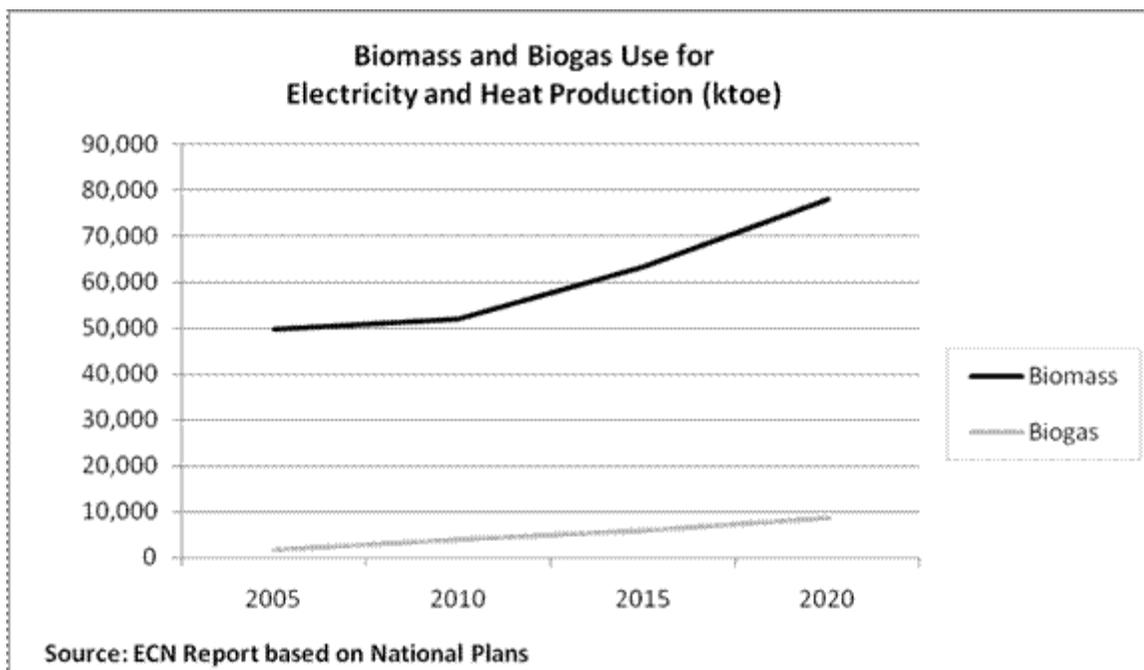
### **Biofuels for electricity and heat production**

<b>Biofuels Use for Electricity and Heat Production (ktoe)</b>				
<b>Calendar Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Biomass Electricity	4,485	5,680	8,307	11,259
Biomass Heat	45,238	46,371	55,033	66,766
<b>Biomass Total</b>	<b>49,723</b>	<b>52,051</b>	<b>63,340</b>	<b>78,025</b>

Biogas Electricity	1,040	2,390	3,515	4,853
Biogas Heat	596	1,390	2,312	3,777
<b>Biogas Total</b>	<b>1,636</b>	<b>3,780</b>	<b>5,827</b>	<b>8,630</b>

Source: ECN based on National Plans

In the national plans, the EU MS project to significantly increase the use of biomass and biogas for electricity and heat production. In 2010, about seventy-five percent of the biomass consisted of wood and wood waste products (source: FAS Biofuels Annual). If the same share of wood and wood waste is used in 2020, implies a wood input of 163 MMT. In 2010, about fifty percent of biogas was produced from field crops, requiring about 800,000 hectares of crop land (source: FAS Biofuels Annual). Anticipated biogas production in 2020 will imply the use of 1.8 million hectares of land, utilizable for producing 7.5 MMT of wheat.



#### Conversion Factors

1 ktoe	=	1,000 MT of oil equivalent
1 toe	=	1 MT of oil equivalent
1 toe	=	41.868 GJ
1 toe	=	11.63 MWh
1,000 liter of bioethanol	=	790 MT
1,000 liter of biodiesel	=	880 MT
1 MT of bioethanol	=	0.64 toe
1 MT of biodiesel	=	0.86 toe
1 MT of wood fuel	=	15 GJ
1 MT of wheat		produces 0.310 MT of bioethanol and 0.370 MT of DDG
1 MT of corn		produces 0.320 MT of bioethanol and 0.370 MT of DDG
1 MT of rye or barley		produces 0.190 MT of bioethanol and 0.370 MT of DDG
1 MT of sugar beets		produces 0.075 MT of bioethanol and 0.370 MT of DDG

1 MT of sugar beets produces 0.130 MT of sugar  
 DDG = Distillers Dried Grains

Energy conversion based on data of Massachusetts Institute of Technology (MIT):  
[http://web.mit.edu/mit\\_energy/resources/factsheets/UnitsAndConversions.pdf](http://web.mit.edu/mit_energy/resources/factsheets/UnitsAndConversions.pdf)

Bioethanol / feedstock conversions based on data of the USDA:  
<http://www.usda.gov/oce/reports/energy/EthanolSugarFeasibilityReport3.pdf>

Bioethanol / DDG conversion factor is based on data of the European Bioethanol Fuel Association.

**Related reports from FAS Post in the European Union:**

<b>Country</b>	<b>Title</b>	<b>Date</b>
Germany	Introduction of E10 may curb biodiesel consumption in Germany	11/12/10
Hungary	Bill on Bio-fuels Approved by Parliament	11/08/10
Germany	Germany Extends Transition Period - POS Required for 2010 Harvest	07/15/10
EU-27	Commission Communications on Sustainability and Voluntary Schemes	07/15/10
EU-27	Biofuels Annual	06/11/10
France	First Generation Biofuels Gain Credibility- Next Generation Projects	05/31/10
EU-27	Grain and Feed Annual	05/01/10
EU-27	Sugar Annual	04/29/10
EU-27	Oilseeds and Products Annual	04/26/10
Germany	Status of Biomass Sustainability Certification in Germany	03/12/10
Denmark	Biorefinery and Biogas Tour	02/18/10
Denmark	Dane launches Low-Cost 2 <sup>nd</sup> Generation Ethanol Enzyme	02/18/10

The GAIN Reports can be downloaded from the following FAS website:  
<http://gain.fas.usda.gov/Pages/Default.aspx>