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Biofuels Annual

EU Biofuels Annual 2015

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Report Highlights: On April 28, 2015, the European Parliament approved the reform of the Renewable Energy Directive (RED), which includes a 7 percent cap on food crop based biofuels for the transport sector. The current blending of food crop based ethanol and biodiesel is estimated at respectively 3.3 and 4.3 percent. Further growth in the use of conventional biofuels will mainly depend on the successful introduction of the higher blends such as E10 and E85. The blending of non-food based biofuels is estimated at about 0.6 percent. Since the past five years, production of biodiesel from waste has taken off, while the commercialization of cellulosic ethanol is lagging behind. The market for biomass for heating and power, in particular wood pellets is surging. The large scale industrial use of pellets is however dependent on the implementation of funding and sustainability requirements by the individual Member State Governments.

Post:
The Hague

Executive Summary

Policy and Programs

Regulations influencing the EU biofuels and biomass market are the EU Energy and Climate Change Package (CCP) and the Fuel Quality Directive (FQD). The Package includes the "20/20/20" mandatory goals for 2020, one of which is a 20 percent share for renewable energy in the EU total energy mix. The European Commission (EC) expects heat and power production from solid biomass to account for about 45 percent of the renewable energy use in 2020. The share of liquid biofuels is projected to be about twelve percent.

In the 'Renewable Energy Directive' (RED), Directive 2009/28/EC, which is part of the CCP, specific sustainability requirements are laid out for liquid biofuels. These include minimum greenhouse gas emissions (GHG) reductions, land use and environmental criteria, as well as economic and social criteria. The implementation of harmonized sustainability requirements for solid biomass is postponed to after 2020.

On April 28, 2015, the European Parliament's (EP) Plenary approved the compromise agreement on the reform of the RED, which includes a 7 percent calculation cap on crop based biofuels, also known as conventional biofuels, in the EU' s renewable energy target for its transport sector for 2020, and only included indirect land use change (ILUC) factors for reporting purposes. The Council has to confirm the Parliament's vote, which is expected by the end of 2015. If approved, Member States will have to enact the new legislation by 2017.

Conventional and Advanced Biofuels

The EU nearly reached self-sufficiency.
The supply and demand charts of bioethanol and biodiesel show a similar picture. After a reduction in 2012 and 2013, use stabilized in 2014 and is expected to remain at about the current level in 2015 and 2016. The main reasons for the stagnation are the lower fossil fuel use, adjustment of Member State mandates, and the double counting of biofuels made from non-food inputs. While consumption fell, production took advantage of the low feedstock prices and protective trade measures by the European Commission. In 2014, the EU reached a self-sufficiency of respectively 99 and 97 percent for bioethanol and biodiesel. With the antidumping duties the EU has effectively separated itself from the international market.

The 7 percent cap provides growth potential for food based biofuels.
In 2014, blending of bioethanol and biodiesel is estimated at respectively 3.5 and 5.3 percent (energy basis). The blending of food based ethanol and biodiesel is estimated at respectively 3.3 and 4.3 percent. With the proposal to cap the use of food based biofuels at 7 percent, use of these first generation biofuels has still the possibility to further increase by a maximum of 65 percent between 2014 and 2020. This estimate is based on an annual reduction of gasoline use of 5 percent and stagnation of diesel use. Under the current market conditions it is, however, unlikely that this cap will be reached within the next five years.

Further market expansion is hampered by the stop on imports.
Further growth in the use of biofuels will mainly depend on the successful introduction of the higher blends such as E10 and E85. But widespread use of these blends is hampered by the low fossil fuel prices and insufficient government incentives. Availability of competitive imports would

likely support a further market penetration of the higher bioethanol and biodiesel blends for transport use.

Use of waste oils has taken off, cellulosic ethanol is lagging.
The blending of non-food based ethanol and biodiesel is estimated at respectively 0.2 and 0.7 percent, combined about 0.6 percent, and thus already surpassing the non-binding target of 0.5 percent for second generation biofuels by 2020. Since the past five years, production of biodiesel from waste and animal fats has taken off, while the commercialization of cellulosic ethanol is lagging behind compared to this development. Currently the policy and financial structure is insufficient to support the switch from food based to the production of cellulosic bioethanol.

Biomass for heat and power

Wood Pellets

The EU is the world's largest wood pellets market, with a consumption of about 18.7 MMT of pellets in 2014. Based on the EC mandates and Member State incentives, the demand is expected to expand further to nearly 21.0 MMT in 2016. About an equal share is estimated to be used for industrial use and household use. The residential use for heating is relatively stable growth market compared to the use for power generation as the latter is highly dependent on government funding. In the United Kingdom, Denmark and Belgium, industrial use of pellets is ongoing and currently estimated at respectively 6, 2 and 1 MMT. In the Netherlands, pellet use for co-firing is expected to resume in 2016. In the residential market, Italy and France are notable growth markets of currently about 3 and 1 MMT. With the market expansion, EU imports from North America are likely to grow further. If trade flows remain consistent with current patterns, the United States has the potential to supply at least half of the import demand, which would represent a trade value of potentially over $1 billion in 2020. These third country imports could, however, be affected by the implementation of sustainability requirements by the individual Member State governments. Harmonization of the standards would benefit the commoditization and thus international trade of the biomass.

Biogas

The biogas sector is very diverse across Europe. Depending on national priorities, countries have structured their financial incentives to favor different feedstocks. Germany and the United Kingdom are the two largest biogas producers in the EU. Germany generates 90 percent of its biogas from agricultural crops, predominantly corn silage, while the United Kingdom relies almost entirely on landfill and sewage sludge gas.

Introduction

Disclaimer: This report presents the situation and outlook for biofuels in the EU. This report presents the views of the authors and does not reflect the official views of the U.S. Department of Agriculture (USDA). The data are not official USDA data. Official government statistics on biofuels are not available in many instances. This report is based on analytical assessments, not official data.

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Policy and Programs

The Renewable Energy Directive

The EU Energy and Climate Change Package (CCP) was adopted by the European Council on April 6, 2009. The Renewable Energy Directive (RED), which is part of this package, entered into force on June 25, 2009, and had to be transposed into national legislation in all Member States (MS) by December 5, 2010. The EU wants at least 10 percent of energy used in transport to come from biofuels by 2020, since this is where greenhouse gas emissions are increasing the fastest. The wider target is for clean energy to make up 20 percent of fuel used in transport, power stations, heating stations, and cooling stations combined. National targets will be set for each country's contribution to the overall goals.

The CCP includes the "20/20/20" goals for 2020:

• A 20 percent reduction in greenhouse 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 by the transport sector, to be achieved by all MS. An overview on the adopted mandates is listed in the GAIN report GM15015 "Biofuel Mandates in the EU by Member State".

The goal for 20 percent renewable energy use in the total energy mix is an overall EU target, but the RED sets a different target for each MS depending on the MS' capacity. In June 2014, Connie Hedegaard, former Commissioner for Climate Action, reported that the EU was on track to reduce its GHG emissions by 24 percent by 2020, 4 percent over the target.

In contrast to the 20 percent overall EU total energy mix target, the 10 percent target for renewable energy in transport is obligatory for all MS. The latest official number for the EU use of renewable energy is 5.4 percent (volume basis) in 2013.

Transposition of the RED
All MS were required to transpose the RED into national legislation by December 5, 2010. Currently, there is one infringement case open against the Netherlands for its failure to transpose the Directive, and infringement cases are open against Estonia, Poland, and Portugal concerning incorrect transposition of the RED. Additionally, Spanish law has been treating biofuels from individual geographical areas differently, which is unjustified according to the RED. In March 2015, the EC formally asked Spain to ensure the correct implementation of the RED, particularly in regards to biofuels. In order to ensure more effective and timely transposition of EU Directives, the EC will complete a review of its infringement policy procedures by the end of summer 2015.

National Renewable Energy Action Plans (NREAPs)
The RED required MS to submit National Renewable Energy Action Plans (NREAPs) by June 30, 2010. The NREAPs provide detailed roadmaps of how each MS expects to reach its legally binding 2020 targets.

The EC presented its first Renewable Energy Progress Report on March 27, 2013. The EC assessed MS' progress toward the achievement of the 2020 renewable energy targets set out in the RED, as well as on the biofuel sustainability scheme, also focusing on the economic, social, and environmental impacts of biofuel consumption. Based on 2013 data, half of the MS (Sweden, Finland, Slovakia, Poland, Austria, the Netherlands, Hungary, Italy, France, Ireland, Germany, Denmark, Czech Republic and Bulgaria) had achieved at least 5 percent or higher share of renewable energy in transport. These MS were on track towards attaining the 10 percent renewable energy target for transport, although significant progress has yet to be achieved in the remaining MS.

The report outlined the following key findings:

1) The EU as a whole was on track to meet its 2020 renewable energy targets, but some MS need to take additional efforts;
2) Transposition of the RED had been slower than desirable, and MS needed to go beyond current policies in order to stay on track for the achievement of the target;
3) MS' implementation of the biofuels sustainability regime was too slow, but GHG savings as reported by MS (not including ILUC effects) appeared to be positive.

On June 15, 2015, the EC published its second Renewable Energy Progress Report. This report concluded that the prospects for achieving the 20 percent renewable energy target by 2020 are good. The majority of the MS are on track to meeting their renewable energy targets. However, some MS have had difficulties in achieving their targets due to the steep slope of the trajectory and persistent market barriers. The report also found that achieving the 10 percent target for renewable energy in transport is challenging, but feasible with the development of advanced biofuels. From the regulatory point of view, all articles of the RED are relevant and have contributed to meeting the RED's objectives. However, the effectiveness and efficiency of the measures vary as a result of implementation at national level. The EC is expecting to publish a dedicated regulatory fitness and performance (REFIT) evaluation of the RED by the end of 2015.

The report outlined the following key findings:

- Renewable energy accounted for a share of 15 percent of the EU gross final energy consumption in 2013 and is estimated at 15.3 percent in 2014;
- 26 MS met their first 2011-2012 interim target and 25 MS are expected to meet their 2013-2014 target. Some have already met their 2020 targets;
- Some MS may need to intensify their efforts in the coming years to keep on track with their targets;
- There is increasing interest from MS to use cooperation mechanisms;
- The share of renewable energy in transport was 5.4 percent in 2013 with a projection of 5.7 percent for 2014. The reason for the slow progress was mainly attributed to the uncertainty over the ILUC proposal.

Review of the RED

On April 2015, DG Energy published a mid-term evaluation of RED. The evaluation assessed relevance, effectiveness, efficiency and value added of the RED as a whole, and various provisions laid down in the Directive, and aims to provide the EC with conclusions and recommendations to improve the RED. The study concluded that a number of provisions are found to be effective and efficient, whereas, the remaining provisions cannot be thoroughly assessed due to lack of data, delays in MS implementation, or limited use of the provisions so far. The administrative burden related to the RED seems reasonable, and meeting the mandatory transport target has been hampered by *inter alia,* the delay in the ILUC decision-making process. Nonetheless, most stakeholders see the RED as a key contributor to the EU-wide renewable energy deployment.

The study recommends that, although all the articles of the RED have the potential for further improvements, the current provisions should not be modified because stable policies are key to investor security and achievement of the 2020 targets. However, as an exemption to the rule, Article 19.6 provides that the EC shall review the impact of ILUC on GHG emissions and address ways to minimize the impact. To facilitate meeting the 10 percent transport target, the study recommends that Article 19.6 should be decided on as quickly as possible.

Furthermore, the study suggests that the longer-term framework for renewable energy resources (RES) regulation in the EU should be decided on before 2020, to provide clarity on market outlook and continuation of the current RED provisions beyond 2020. This would ensure a seamless transition from the 2020 to the 2030 policy package, which will strengthen the current regulation and measures, and encourage investments in RES throughout the EU.

The study also analyzed six MS (Bulgaria, Estonia, Germany, Poland, Spain, and Sweden) on their handling of and attitudes towards the RED. It found that some MS lack ambition to exceed the 2020 RES target and reporting duties under the RED are complicated for several MS. MS suggested that there is a need for binding targets for RES at MS level, rather than an overall EU target.

Commission Communication on 2030 Climate and Energy Goals

In January 2014, The EC published its Communication along with a Proposal revising the EU Emission Trading System (ETS). The Communication, which sets out the 2030 framework, includes a reduction in greenhouse gas (GHG) emissions by 40 percent compared to the 1990 level, an EU-wide binding target for renewable energy of at least 27 percent, and renewed ambitions for energy efficiency. The Communication also states that biofuels produced from food based feedstocks will not receive 'public support' after 2020.

There are no specific targets set for the use of biofuels in this Communication. The explanation for this, according to the EC, is that the future of EU transport development should be based on alternative, sustainable fuels as an integrated part of a more holistic approach to the transport sector. First generation biofuels will have a limited role in decarbonizing the transport sector.

On October 24, 2014, European Heads of State and Government confirmed the EC's Proposal by reaching a deal on the 2030 Framework for Climate and Energy, in an effort to maintain what the EU sees as its global leadership on the climate change issue. According to the Conclusions, the 2030 framework will be based on three targets:

- Reducing greenhouse gas emissions by 40 percent;
- Increasing the share of renewable energy to 27 percent of consumption;
- Improving energy efficiency by 27 percent. All targets to be compared to 1990 levels.

The Energy Council Agreement

In 2012, the EC proposed amending the RED 10 percent target for transport renewable energy, by limiting the contribution of crop-based biofuels to 5 percent. The EU executive justified the reform proposal with ILUC, a concept that is highly contentious. ILUC states that natural lands should not be cleared for expansion of biodiesel crops since the land use changes deplete carbon stocks and lead to additional GHG emissions. Another ILUC concern is that countries may expand their biofuel production into prime agricultural areas.

The European Parliament and Council have been divided over how to reform the EU's biofuels policy. In November 2013, the Parliament stressed the importance of a speedy switchover to advanced biofuels and proposed a 6 percent cap on crop-based biofuels. The Parliament also wanted emissions from ILUC to be included in carbon accounting to identify the most polluting biofuels.

On June 13, 2014, the Energy Council finally reached a political agreement on the ILUC proposal. The main features are:

- A 7 percent cap on conventional biofuels (made from feed and food raw materials);
- Encouragement of the transition to second and third generation biofuels (advanced biofuels). MS should have an indicative target of 0.5 percent. MS will be allowed to set a lower target, based on objective reasons;
- New Annex IX of the RED contains feedstock for advanced biofuel that count double towards the targets. In addition, advanced biofuels not listed in Annex IX and used in existing installations prior to the adoption of this Directive can be counted towards the national target;
- A multiplication factor of 5 for electricity from renewable sources in electric road vehicles and of 2.5 for electrified rail transport was introduced;
- ILUC reporting on GHG savings from the use of biofuels will be carried out by the EC. For that purpose, provisional estimated ILUC factors are included in new Annexes to the RED and FQD.

The Council did not include binding sub-targets for advanced biofuels and fuel ethanol, which were supported by the Parliament.

EU Parliament Plenary Approves Compromise Agreement on ILUC Proposal

On April 28, 2015, the European Parliament approved the compromise agreement on the proposal for a Directive on ILUC from biofuels. The measure would amend the RED and FQD, and aim at facilitating the transition from first generation biofuels (biofuels generated from feed crops) to advanced biofuels (biofuels generated from algae, straw and waste). The Council will need to formally adopt the draft Directive, which is expected to take place by the end of 2015, before being published in the EU's Official Journal and entering into force.

The EP compromise agreement, which was also approved by the EC ENVI Committee on April 14, 2015, includes the following elements:

- Fuel suppliers must report to the EC and MS the estimated level of GHG emissions caused by ILUC, i.e. freeing up more land to grow food crops, in order to offset the switch to biofuel production;
- Seven percent cap contribution of first generation biofuels to the 10 percent target for renewable energy in transport by 2020. MS are free to set lower caps;
- Multiplication factor of 5 for electricity from renewable so**u**rces used for electric road vehicles and of 2.5 for renewable electricity used in rail transport;
- MS were given a target value of 0.5 percent for the share of advanced biofuels consumed in transport in 2020. Lower targets may be set based on certain grounds: a) limited potential for production, b) technical or climatic features of the national market for transport fuels, c) national policies putting particular emphasis on incentivizing energy efficiency and renewable electricity in transport. Advanced biofuel MS national targets are required to be set no later than 18 months after the EU Directive enters into force;
- Double counting of the contribution of advanced biofuels towards the 10 percent target;
- MS would be required to respect the waste hierarchy principle when incentivizing waste biofuels;
- The EC must report and publish data on ILUC-related emissions, and;
- The EC must report back to the European Parliament and the Council of Ministers on the scope for including ILUC emission figures in the existing sustainability criteria.

Double Counting

The majority of double counted biofuels in the EU are produced from used cooking oil or animal fat. In 2013, the highest consumption of "other biofuels" (mainly vegetable oils used pure), was reported in Hungary (15 percent) and Finland (13 percent). The EU biofuel industry argues that double-counting provisions have so far only assisted the deployment of inexpensive conversion of used oils and fats, whereas an advanced ethanol development would require respective mandatory sub-targets.

The European Parliament's newly adopted draft legislation on RED states that biofuels produced from feedstocks listed in the Annex IX should be considered twice their energy content for the purpose of complying with the target. This means that biofuels made out of ligno-cellulosic, non-food cellulosic, waste, and residue materials will count double towards the 10 percent target of RED. It also allows for the multiple counting of advanced biofuels towards the 20 percent general renewable energy target, and not only towards the 10 percent renewable energy in transport target.

The key issue with double counting is that Article 21 (2), stating that " *the contribution made by biofuels produced from wastes, residues, non-food cellulosic material, and ligno-cellulosic material shall be considered to be twice that made by other biofuels"*, is still not implemented in several MS and the definition of waste differs between MS despite the EC's efforts to harmonize.

Sustainability Criteria

The EU has defined a set of sustainability criteria to ensure that the use of biofuels (used in transport) and bioliquids (used for electricity and heating) is done in a way that guarantees carbon savings and protects diversity.

To qualify for both the RED and FQD targets, biofuels consumed in the EU must comply with strict sustainability criteria provided in Article 17 of the RED, in order to be eligible for financial support and to count towards the EU renewable energy target. Rigorous requirements are set in the RED on the minimum level of GHG savings, appropriate land use, as well as monitoring requirements for any potentially adverse effects.

In order to demonstrate compliance with the EU sustainability criteria, biofuels need to be validated by either national verification systems or by one of 19 voluntary schemes approved by the EC and valid in the EU. Sustainability criteria must be met by all biofuels, whether produced within the EU or imported, and must meet a 35 percent GHG emission savings requirement compared to fossil fuels. As of 2017, the threshold is set to rise to 50 percent and by 2018, to 60 percent for new installations.

Environmental sustainability criteria covering bio-diverse and high-carbon-stock lands are also laid out in the RED. The biodiversity criteria apply to land that would have been classified as highly biodiverse in January 2008. The criteria state that biofuels may not be made from raw material obtained from land with high biodiversity value, such as primary forest and other wooded land, biodiverse grasslands, or areas designated for nature protection purposes. Biofuels also cannot be made from raw materials produced on land with high carbon stock such as wetlands, peatlands, or continuously forested areas.

Agricultural raw materials produced within the EU, including biofuels, must be produced in accordance with the minimum requirements for good agricultural and environmental conditions that are established in the common rules for direct support schemes under the common agricultural policy (Cross compliance Article 17 § 6 of the RED). Other sustainability requirements cover environmental criteria for soil, water, and air quality, as well as social criteria, which focus on food price impact and adherence to International Labor Organization conventions.

MS competent authorities are responsible for ensuring that biofuel counted towards targets, mandates, and tax credits fulfill sustainability criteria. MS are not allowed to have higher or lower sustainability criteria than those set by the EC, and must accept all certification systems recognized by the EC. However, with each MS having different checklists, there could be 28 different national certification schemes that must be registered and recognized by the EC.

The Fuel Quality Directive (FQD) complements the RED and mirrors some of the RED's content such as the sustainability criteria. A key requirement of the FQD is that all fuel suppliers must meet a 6 percent cut in GHG emissions by 2020 across all fuel categories supplied to the market. This is designed to be consistent with the 10 percent use of biofuels and move demand towards biofuels with higher GHG savings. In addition, the FQD limits ethanol blends to 10 percent or less when ethanol is used as an oxygenate, and places limits on palm oil and soy oil content of biodiesel.

GHG Emissions

GHG emissions for biofuels and bioliquids are calculated using 'default' values outlined in the FDQ and listed in the RED Annex V. The EC Joint Research Center (JRC) defines the GHG emissions savings for various raw materials, and production and supply pathways associated with the cultivation of the biomass, processing, transport, and distribution. Emissions savings and carbon

emissions resulting from land-use change, adoption of improved agricultural practices, carbon capture and storage, or generation of excess electricity through cogeneration are also included. For fuel production pathways that are not included in Annex V, life cycle analyses (LCAs) must be developed to calculate carbon intensities.

Table A: Typical and default values for biofuels if produced with no net carbon emissions from land-use change

	Typical GHG[1] savings	**Default GHG[2] savings**
Rape seed biodiesel	45%	38%
Soy bean biodiesel	40%	31%
Sun flower biodiesel	58%	51%
Palm oil biodiesel (Process not specified)	36%	19%
Palm oil biodiesel (process with methane capture at oil mill)	62%	56%
Corn ethanol, Community produced (natural gas as process fuel in CHP plant)	56%	49%
Sugar beet ethanol	61%	52%
Sugar cane ethanol	71%	71%
Waste vegetable or animal oil biodiesel	88%	83%

Source: EU Official Journal L140/52

(1) 'Typical' implies an estimate of the representative GHG emission savings for a particular biofuel production pathway.
(2) 'Default' implies a value derived from a typical value by the application of pre-determined factors and that may, in circumstances specified in RED, be used in place of an actual value.

When the default values are calculated, the Commission applies a "discount factor" from the typical value to ensure that the biofuel pathway is not inflated. For example, the RED's GHG savings default value for soy diesel is 31 percent, which is below the minimum 35 percent GHG threshold defined in the RED sustainability criteria. The default GHG value for soybeans was calculated using a pathway where soybeans were first shipped from Brazil, and then transformed into soy oil and biodiesel in the EU. If the GHG value was calculated for soy-based biodiesel produced in the United States and shipped from the United States then it would have a GHG savings value of 40 percent and be above the 35 percent threshold. However, EC officials have stated they do not wish to have GHG saving numbers for different geographical areas, but prefer to base GHG numbers on specific pathways, such as no-till farming, to allow for easier updates. With no international standard in place for the calculation of GHG savings, there are concerns that protectionists could use GHG thresholds to hamper trade.

On May 29, 2015, the EC indicated that the work on the draft Commission Decision on the calculation of the GHG impacts of biofuels, bioliquids, and their fossil fuel comparators is ongoing. The EC is aiming to present the draft measure, that would amend Annex V of the RED (rules for calculating the greenhouse gas impacts of biofuels and bioliquids) and Annex IV of the FQD (environmental specifications for market fuels to be used for vehicles equipped with compression ignition engines) by August 2015. Reportedly, in the upcoming update of the Annex V, there will be two different numbers for soybeans, depending on the tilling practices used, and corn will have a separate number from other cereals. It is unclear why corn will have a separate number, but the GHG savings are anticipated to be lower than those for other cereals.

Certification Systems

One way to ensure that biofuel used meets the sustainability and GHG savings requirements of the RED is to have the biofuel certified by one of the voluntary certification systems. Some of the MS have developed national voluntary systems, while others rely on voluntary schemes adopted by the EC. The EC considers voluntary certification schemes its preferred mean of obtaining certification, but there are no negotiations for bilateral agreements on biofuels certification even though this was an option mentioned in the RED.

As of April 2015, the EC has approved 19 voluntary schemes that can certify biofuels for all MS. MS must accept these certification schemes and cannot demand anything more than what they cover. The approved voluntary certification schemes are:

1. ISCC (International Sustainability and Carbon Certification)
2. Bonsucro EU
3. RTRS EU RED (Round Table on Responsible Soy EU RED)
4. RSB EU RED (Round Table of Sustainable Biofuels EU RED)
5. 2BSvs (Biomass & biofuels voluntary scheme)
6. RBSA (Abengoa RED Bioenergy Sustainability Assurance)
7. Greenergy (Brazilian bioethanol verification program)
8. Ensus (Voluntary scheme under RED for Ensus bioethanol production)
9. Red Tractor (Farm Assurance Combinable Crops & Sugar Beet Scheme)
10. SQC (Scottish Quality Farm Assured Combinable Crops scheme)
11. Red Cert
12. NTA 8080
13. RSPO RED (Roundtable on Sustainable Palm Oil RED)
14. Biograce (GHG calculation tool)
15. HVO Renewable Diesel Scheme
16. Gafta Trade Assurance Scheme
17. KZR INIG
18. Trade Assurance Scheme for Combinable Crops
19. Universal Feed Assurance Scheme

In April 2015, the U.S. Soybean Export Council submitted an application to DG Energy to recognize the U.S. Soybean Sustainability Assurance Protocol (SSAP) as a voluntary certification scheme. The SSAP recently met the Dutch Feed Industry Association's (NEVEDI) requirements for sustainable feedstuffs, which is seen by the U.S. Soybean Export Council as a significant step forward towards meeting the RED sustainable criteria.

Biomass Sustainability

The RED required the EC to assess whether or not sustainability criteria for solid and gaseous biomass were needed. In February 2010, the EC adopted a sustainability report for biomass other than biofuels and bioliquids. However, in May 2014 the EC reported that there will be no EU-wide sustainability criteria for biomass before 2020. For 2020 through 2030, the EC will develop a biomass policy aimed at maximizing the overall climate and environment benefits of biomass and contributing to significant GHG emission savings. The EC decision was based on the assumption that current national, EU, and international legislation is enough to ensure sustainable practices are being used. However, some MS, the largest importers, are moving forward on developing their own sustainability criteria (see for more information the RED Biomass Chapter). These MS include the Netherlands, United Kingdom, Denmark, and Belgium. All MS sustainability schemes on biomass have to be checked by the EC even though there are no EU criteria.

Reactions to Revision of the RED and FQD

Industry:
The EU biofuels industry believes the emphasis on the production of advanced biofuels from waste feedstocks will increase uncertainties and further constrain biofuels production in Europe. According to the European Biofuels Technology Platform (EBTP), the ILUC debate has caused many uncertainties and blocked many investment decisions for the past three years. Furthermore, EBTP states that the non-binding and double counted advanced biofuels target of 0.5 percent is not ambitious enough to foster the deployment of advanced biofuels. MS have options to go below 0.5 percent and experience in the EU demonstrates that indicative targets are usually not achieved. EBTP is in favor of the decision to maintain dedicated crops or so called "grassy energy crops with a low starch content" among the advanced biofuels feedstocks list. Dedicated energy crops provide best land-use-efficiency, can be grown also on marginal or degraded land, and are able to create additional income to farmers.

According to EBTP, the 7 percent cap on the contribution of biofuels from food crops is a political compromise that affects the healthy sustainable conventional biofuels industry in Europe. Capping all conventional biofuels without distinction has led the biofuels sector to question whether policy makers can define objective and evidence-based biofuels policy in the future.

ePURE, the EU ethanol industry group, emphasized that the decision paved the way for a long-term decarbonization policy for the transport sector, but added that the lack of a binding advanced biofuels mandate and sub-target for fuel ethanol are missed opportunities. Nonetheless, ePURE believes that while the deal lacks ambition, it is a much needed first step in establishing market stability and defining a long term decarbonization policy for the transport sector, in which European ethanol has a crucial role to play.

A group representing the EU's biodiesel chain, comprised of the European Biodiesel Board (EBB), the European Oilseed Alliance (EOA), and the European Vegetable Oil and Protein Meal Industry Federation (FEDIOL), expressed relief that the MEPs closed the ILUC file after four years of intense debate, but the group found the compromise far from perfect.

NGOs:
Oxfam Europe welcomed the ILUC agreement, but lamented the fact that it did not go further in limiting food crops for biofuel and called for Europe to ban fuels competing with food production completely. The European Environmental Bureau (EBB) said that the vote sends an important signal: first generation biofuels are not needed in the future of our transport policy.

Trade Policy

In 2012, the EC published a customs regulation which changed the HS code for ethanol used for fuel to HS/CN code 2207. Ethanol and gasoline blends with an ethanol content of 70 percent or more are classified as denatured ethanol under code 22.07.20.00, and charged with an import tariff of €10.20 per hectoliter. Previously, ethanol was imported under code 38.24, at an import duty of 6.5 percent. There seems to be still some uncertainties where blends between E30 and E70 would be classified.

For biodiesel, a code that covers fatty-acid mono-alkyl esters (FAMAE) was introduced in January 2008, and changed in January 2012. However, other forms of biodiesel could still enter under other codes depending on the chemical composition. Diesel with a biodiesel component of less than 30 percent can enter the EU under chapter 27.10.20 at a tariff rate of 3.5 percent.

Table B: Duty Rates for Fuels

HS Code	Description	Duty Rate

3826001	FAMAE 96.5-100%	6.5% (plus AD and CV duties for U.S. and most Canadian companies)
38260090	FAMAE below 96.5%	6.5% (plus AD and CV duties for U.S. and most Canadian companies)
271020	B30 and below	3,5%
220710	Undenatured ethanol	€19.2/hl
220720	Denatured ethanol	€10.2/hl

Biodiesel
In March 2009, the EC published Regulation 193/2009 and Regulation 194/2009, containing provisional anti-dumping (AD) and countervailing (CV) duty measures on imports of biodiesel from the United States containing 20 percent or more of biofuels. Both regulations were imposed by the EC on July 7, 2009 (see Council Regulation 598/2009 and 599/2009) and were due to expire in July 2014. However, the European Biodiesel Board (EBB) lodged a request for a review of the duties on April 9, 2014, based on the grounds that an expiry of the measures would result in recurrence of subsidized imports offered at dumping prices. On July 10, 2014, the EC decided to undertake the investigation, which could lead to the extension of heavy duties for the next five years. The current duties will remain during the period the EC is conducting the investigation. The determination should be available between the end of June or September 2015.

In May 2011, the EC published a Council Decision, which extended the definitive AD and CV on biodiesel blends of 20 percent or less originating from the United States. The measures adopted by the EC were retroactive and extended to August 13, 2012. For U.S. companies that were investigated in 2009, the combined duties will apply €213.8 – €409.2 per metric ton (MT). Other U.S. companies will be subject to the highest combined duty of €409.2 per MT, based on the biodiesel content in the blend. The different duties have drastically reduced the imports of biodiesel from the United States.

In May 2013, the EC published regulation 490/2013 imposing a provisional anti-dumping duty on imports of biodiesel originating in Argentina and Indonesia. The provisional tariffs were effective from May 29, and range between 6.8-10.6 percent on imports from Argentina, and between 0-9.6 percent on biodiesel originating in Indonesia. During the investigation period (July 1, 2011- June 30, 2012) all imports from Argentina were found to be dumped, while a low level (2-6 percent) of the Indonesian biodiesel was found not to be dumped. The Argentine and Indonesian biodiesel sectors filed a complaint with the WTO on the EU biofuels quota and tax systems. In November 2013, the anti-dumping duties were made permanent, see Regulation 1194/2013.

On October 2014, U.S. industry group, National Biodiesel Board (NBB) filed comments with the EC, challenging import duties that were introduced in 2009. The NBB urged the EC to allow duties to expire that year, citing evidence that global trade for biodiesel had changed since the duties were imposed and that continuing the duties was protectionist and unnecessary.

Bioethanol
On February 23, 2013, the EC adopted Council Regulation (157/2013) imposing a definitive anti-dumping duty on import of bioethanol originating in the United States. The rate of the anti-dumping duty is set at €62.3 ($84.87) a metric ton (MT), and is applicable in proportion by weight of the total content of pure ethyl alcohol produced from agricultural products. Ethanol for other uses than for fuel is exempted from the anti-dumping duty.

On January 29, 2014, the EU ethanol industry (ePURE) filed a complaint with the EC asking it to take action against a circumvention of EU anti-dumping duties on ethanol originating in the United

States. According to ePURE, ethanol was being imported through Norway as an E48 blend. On June 4, 2014, ePURE decided to withdraw its request for an anti-circumvention investigation following an EC decision to apply AD duties on U.S. ethanol. ePUre representatives said that the EC's "clarification" that U.S. bioethanol blended in Norway is of U.S. origin amounts to a fast-track finding of circumvention." Moreover, the EC and Member States reportedly agreed with ePURE's view that the sole objective of this operation in Norway was to circumvent anti-dumping duties on U.S. originating renewable fuel ethanol originating in the United States.

Conventional Bioethanol

EU Production, Supply and Demand Tables

Fuel Use Projections (Ktoe)								
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014[e]**	**2015[e]**	**2016[e]**
Gasoline Total	99,246	94,118	90,578	84,769	81,706	77,732	73,944	70,380
Diesel Total	256,026	260,305	255,185	250,647	249,906	250,200	250,750	251,300
On-road	190,695	194,864	195,502	191,390	191,680	192,000	192,400	192,800
Agriculture	12,640	12,387	12,074	11,491	11,669	11,800	11,900	12,000
Constr./mining	3,036	3,222	3,191	3,146	3,350	3,400	3,450	3,500
Shipping/rail	6,435	6,472	6,138	6,114	5,530	5,500	5,500	5,500
Industry	11,723	12,184	10,631	10,802	9,545	9,500	9,500	9,500
Heating	31,497	31,177	27,648	27,704	28,132	28,000	28,000	28,000
Jet Fuel Total	49,192	49,217	50,570	49,060	48,926	49,000	49,000	49,000
Total Fuel	404,464	403,640	396,333	384,475	380,539	376,932	373,694	370,680

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)								
Calendar Year	**2009**	**2010**	**2011**	**2012[r]**	**2013[e]**	**2014[e]**	**2015[f]**	**2016[f]**
Beginning Stocks	872	621	440	315	88	161	230	170
Fuel Begin Stocks	839	588	407	282	55	128	197	137
Production	4,203	4,918	5,042	5,308	5,561	5,900	5,900	5,900
Fuel Production	3,553	4,268	4,392	4,658	4,911	5,250	5,250	5,250
-of which cellulosic (a)	0	0	0	0	0	75	75	75
Imports	1,136	1,284	1,663	1,245	676	447	270	270
Fuel Imports	899	880	1,285	886	595	367	190	190
-of which ETBE (b)	158	270	261	188	197	109	100	100
Exports	150	126	149	145	113	278	300	280
Fuel Exports	100	76	99	95	63	228	250	230
Consumption	5,440	6,257	6,681	6,635	6,051	6,000	5,930	5,930
Fuel Consumption	4,603	5,253	5,703	5,676	5,370	5,320	5,250	5,250
Ending Stocks	621	440	315	88	161	230	170	130
Fuel Ending Stocks	588	407	282	55	128	197	137	97
Production Capacity								
Number of Refineries	66	68	68	70	71	71	71	71
Capacity	6,234	7,570	7,759	8,468	8,480	8,480	8,480	8,480
Capacity Use (%)	57	56	57	55	58	62	62	62
Co-product Production (1,000 MT)								
DDG	2,119	2,594	2,664	2,752	2,953	3,229	3,172	3,187
Corn Oil	70	71	67	111	151	155	157	159
Feedstock Use (1,000 MT)								

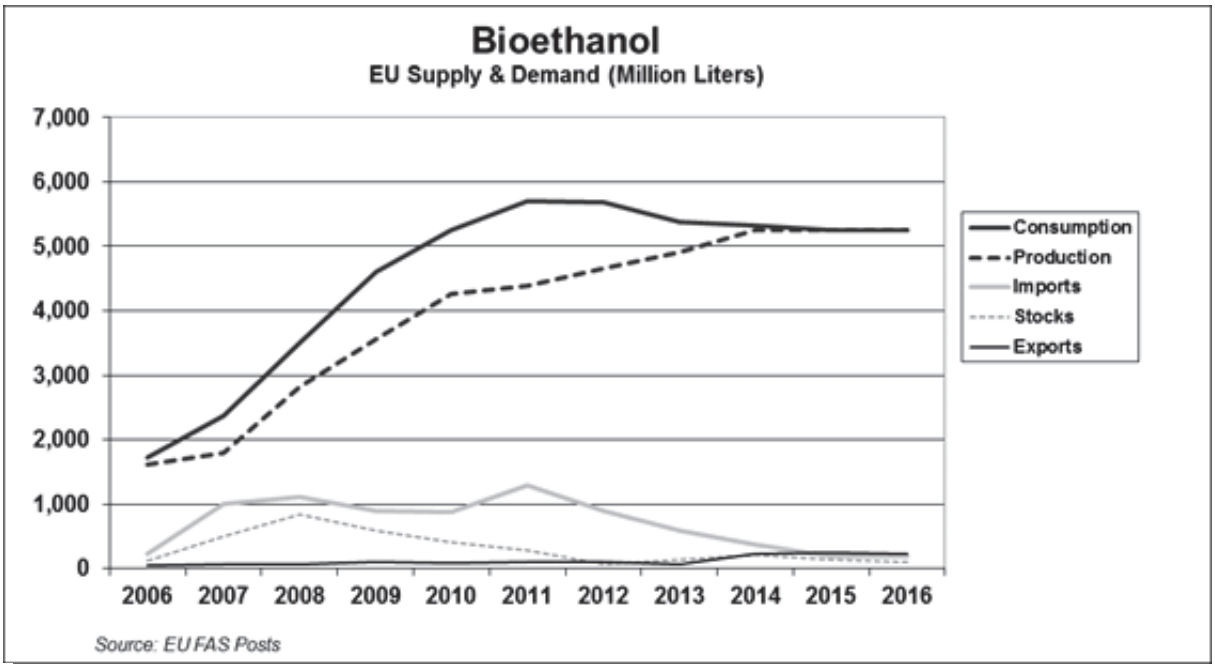
Wheat	2,736	4,173	4,813	4,209	2,850	3,535	3,306	3,260
Corn	2,414	2,455	2,327	3,840	5,213	5,360	5,398	5,478
Barley	661	608	707	389	618	651	602	598
Rye	959	1,051	666	355	753	769	829	846
Sugar Beet	9,209	10,680	10,882	11,040	11,683	11,509	12,209	12,019
Market Penetration (1,000 TOE)								
Fuel Ethanol	2,327	2,656	2,883	2,870	2,715	2,690	2,654	2,654
Gasoline	99,246	94,118	90,578	84,769	81,706	77,732	73,944	70,380
Blend Rate (%)	2.3	2.8	3.2	3.4	3.3	3.5	3.6	3.8

The ethanol production and exports for industrial chemicals is estimated at respectively 650 and 50 million liters per year. r = revised / e = estimate / f = forecast EU FAS Posts. (a) For more information see section Advanced Biofuels. (b) ETBE in million liters of ethanol. HS code 29091910, ETBE contains 45 percent ethanol. Source: European Commission, Eurostat, Global Trade Atlas, ePURE and EU FAS Posts.

Production & Capacity

Fuel Ethanol Production – Main Producers (million liters)								
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013[r]**	**2014[e]**	**2015[f]**	**2016[f]**
France	906	1,208	1,208	1,241	1,152	1,180	1,180	1,180
Germany	752	765	730	776	851	920	975	1,010
Benelux	220	415	675	900	984	1,000	1,000	1,000
Hungary	203	190	190	291	392	460	635	640
United Kingdom	70	352	89	215	278	760	540	510
Spain	465	471	462	381	442	455	455	455
Austria	175	199	215	215	223	220	220	220
Poland	165	194	167	213	235	180	190	190
Total	**3,553**	**4,268**	**4,392**	**4,658**	**4,911**	**5,250**	**5,250**	**5,250**

r = revised / e = estimate / f = forecast EU FAS Posts. Source: EU FAS Posts

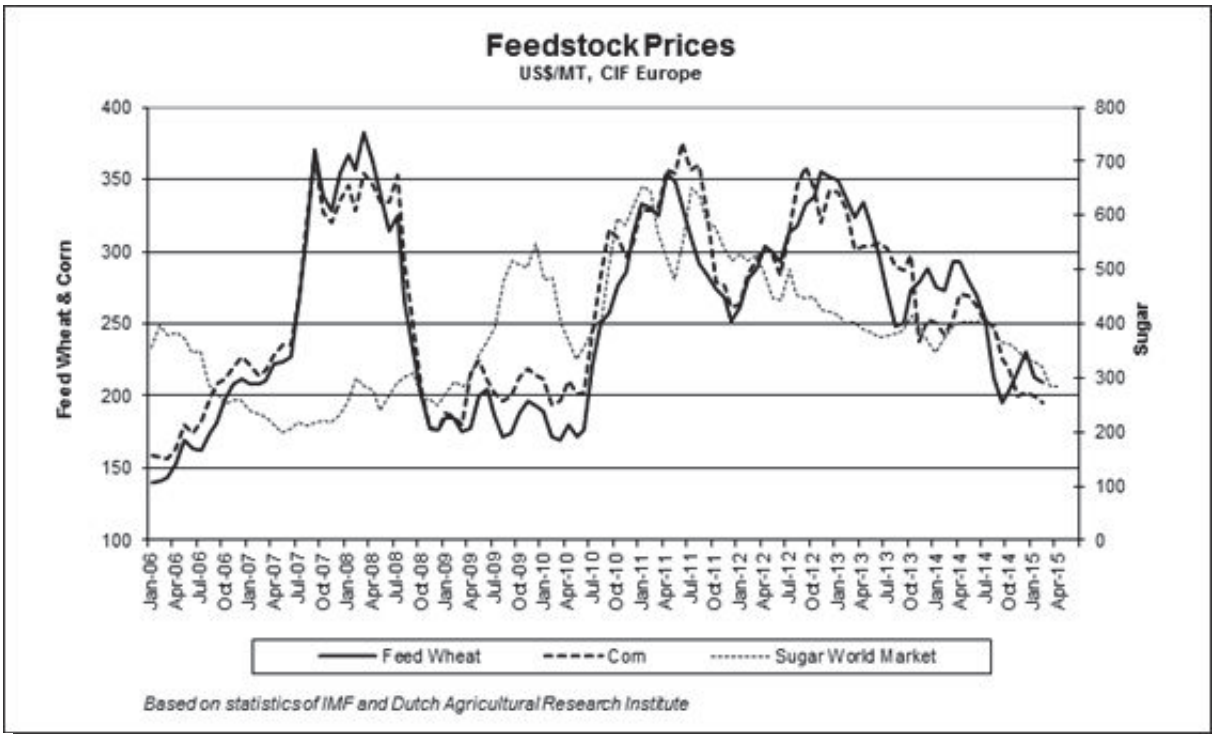


EU ethanol production capacity quadrupled from about 2.1 billion liters in 2006 to about 8.5 billion liters in 2013. The majority of the production capacity has been installed in France, the Benelux countries, Germany, the United Kingdom, Spain, Poland and Hungary. Since 2012, capacity has not significantly increased, and is not expected to be expanded in 2015 and 2016. Due to the proposed cap on food based bioethanol, expansion of first generation bioethanol is expected to be limited, while expansion of cellulosic bioethanol production is restrained due to the he lack of certainty in the EU policy making process (see Chapter Advanced Biofuels). Since 2012, capacity use for bioethanol production increased from 55 percent to 62 percent currently. Recent restrictive measures on bioethanol imports (see trade section) created an opportunity for domestic producers to expand their production and make use of their capacity.

EU bioethanol production in 2014 is estimated at 5.3 billion liters. On an energy basis, this is equivalent to 33 million barrels of crude oil. Since 2013, production benefitted from an abundance of feedstock, both imported and produced domestically. Furthermore, competitive imports from the United States have been cut significantly since February 2013. While production expanded, consumption fell, and as a result the EU almost reached self-sufficiency in 2014. In 2015 and 2016, the EU is expected to match production with consumption. The domestic bioethanol market has been affected by reduced gasoline consumption and adjusted blended mandates (see consumption section).

As the ethanol market reached its limits, bioethanol production is expected to stagnate in most EU Member States during 2015 and 2016. A cut-back of the production in the United Kingdom is balanced by increased production in Germany and Hungary. Production in Germany is forecast to expand based on increased blending of bioethanol on the domestic market (see consumption section). Hungarian production is projected to increase based on further investments in capacity. Based on these investments plans, capacity will increase with a maximum of 180 million liter. The new facilities are planned to be ready in 2015.

Feedstock Use



In the EU, bioethanol is mainly produced from wheat, corn and sugar beet derivatives. Wheat is mainly used in northwestern Europe, while corn is predominantly used in Central Europe and Spain. Due to the abundance on the world market, in particular corn prices fell (see graph above) and producers in northwestern Europe switched to imported corn in 2013 and 2014 (see FAS Grain and Feed Annual). While corn was also imported from the United States, the corn for ethanol production was mainly sourced from the Ukraine. This is partly because of its non-GM content. Producers in northwestern Europe prefer to market their distillers dried grains (DDG) as non-GM to the domestic feed market. An abundance of corn at the domestic market benefitted production in Central Europe, in particular in Hungary. Depending on the 2015 harvest, EU producers will switch to wheat or continue to produce from corn. In northwestern Europe and in the Czech Republic sugar beets are used for the production of bioethanol. Use of beets for ethanol production increased slightly during MY2014/2015 due to the record EU beet crop and low prices for sugar for industrial purposes (see FAS EU Sugar Annual).

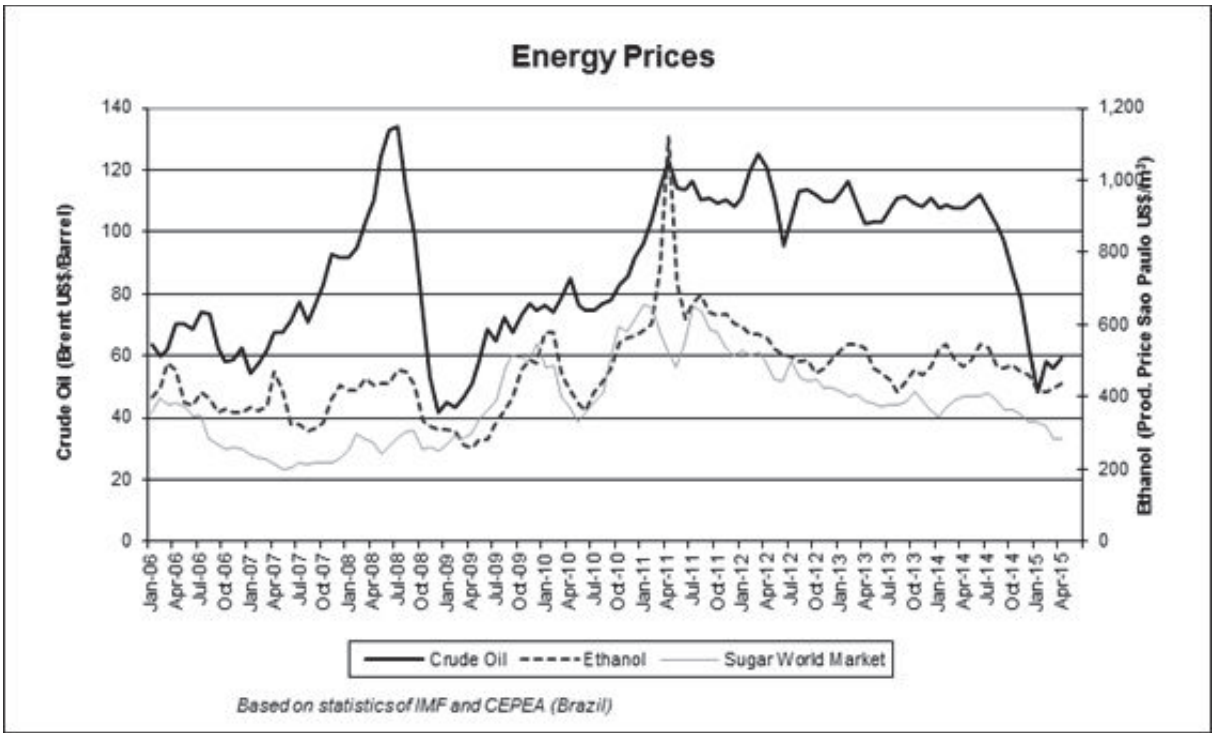
In the EU, the required feedstock for the 2015 production (5,250 million liters of bioethanol) is estimated at nearly 10.1 MMT of cereals and 11.2 MMT of sugar beets. This is about 3.0 percent of total EU cereal production and about 8.8 percent of total sugar beet production. Co-products of the bioethanol production are DDG, wheat gluten and yeast concentrates. In 2014, the maximum theoretical production of co-products is forecast to reach 3.2 MMT. This is about two percent of total EU feed grain consumption.

Consumption

Fuel Ethanol Consumption – Main Consumers (million liters)								
Calendar Year	2009[r]	2010	2011[r]	2012[r]	2013[e]	2014[f]	2015[f]	2016
Germany	1,142	1,475	1,568	1,581	1,532	1,480	1,480	1,520
United Kingdom	354	797	823	981	1,040	1,040	1,000	1,000

France	805	782	835	810	797	820	835	850
Italy	232	306	480	463	358	360	360	360
Spain	299	468	443	395	335	370	370	375
Benelux	357	363	390	342	342	355	355	355
Total	**4,603**	**5,253**	**5,703**	**5,676**	**5,370**	**5,320**	**5,250**	**5,250**

r = revised / e = estimate / f = forecast EU FAS Posts. Source: EU FAS Posts



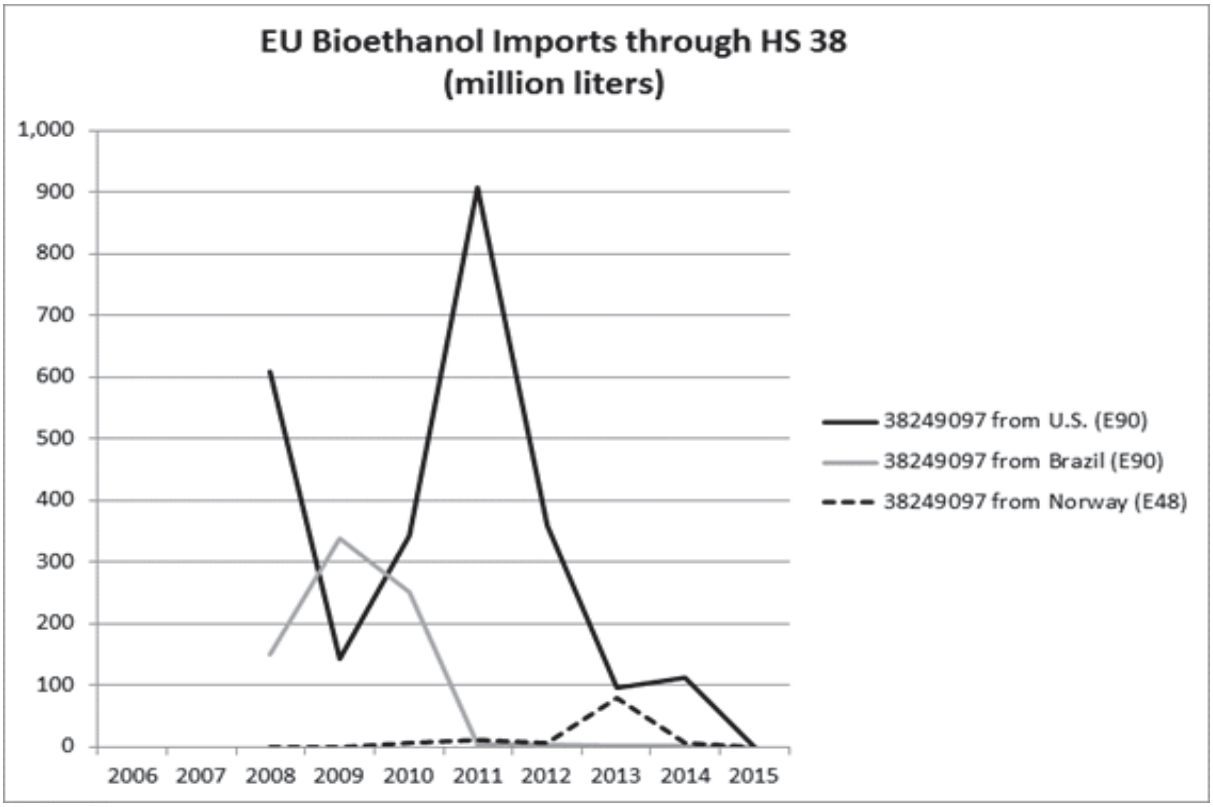
During 2006 – 2011, EU bioethanol consumption expanded by 0.5 to 1.2 billion liters per year. In 2011, consumption reached a peak level of 5.7 million liters. Since 2012, consumption fell and is anticipated to stagnate around 5.25 million liters during 2015 and 2016. EU production is expected to stagnate around the same level. A surplus will be available in the Benelux countries, France, and in some Central European countries, mainly Hungary. Germany, the United Kingdom and Italy are expected to remain the main deficit markets in 2015 and 2016. A deficit is also anticipated in the Nordic countries; Denmark, Finland and Sweden.

During 2015 and 2016, bioethanol use is anticipated to increase mainly in Germany, France, Hungary and the Czech Republic. In Germany consumption is expected to increase in 2016 partly as a result of the switch in biofuels mandates from being based on energy content to greenhouse gas (GHG) savings. Based on the GHG savings, this new system is anticipated to create a preference for ethanol above biodiesel. In 2015, this preference for bioethanol is offset with credits received in 2014. These credits were earned with the higher than mandated use of bioethanol last year. French consumption is increasing due to an increase in the share of gas stations that sell E10. In Hungary, the government is anticipated to increase the blending mandate for the year 2016 and later. In the Czech Republic, consumption of bioethanol has been gradually growing due to tax incentives for the high percentage biofuels such as E85.

The overall stagnation in consumption can mainly be explained by the lower gasoline use and the adjustment of blending mandates. Another factor is the blending of biofuels which are counted double towards the mandate. In the Benelux countries for instance, the lower consumption can partly be attributed to the blending with double counting biodiesel, bioethanol, bio-MTBE and biomethanol. The reduction of the fossil fuel prices did not have a significant effect on biofuel consumption in the markets which are regulated by mandates and thus consumption of biofuels is fixed. Also has the price increase been tempered by the weakening of the Euro against the US Dollar. Sales of the higher ethanol blends are however negatively affected by the low gasoline prices. German sales of E5 and E10 are slackening and in Sweden, E85 consumption declined by about 12 percent in 2014.

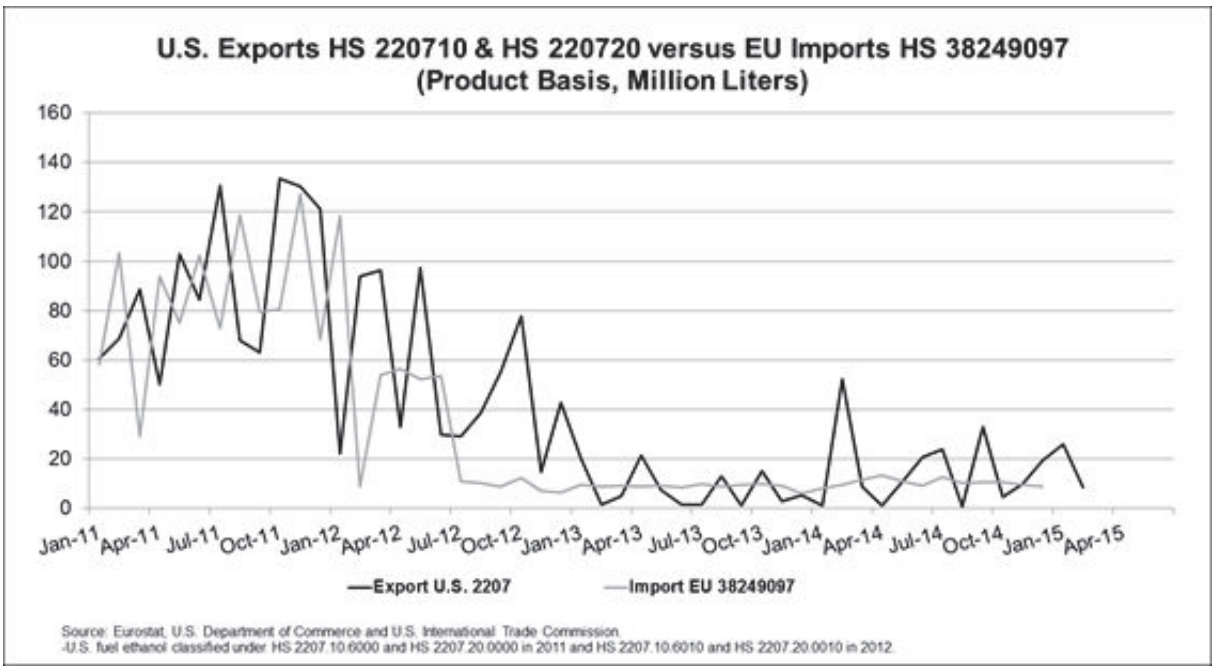
An effect of the stagnating demand for transport is that a part of the production will spill over to the industrial market for ethanol. On the longer term, EU consumption as fuel is not forecast to pick up due to all the factors mentioned above, plus the proposed cap on food based ethanol. Currently the policy and financial structure is insufficient to support the switch to the production of cellulosic bioethanol.

Trade

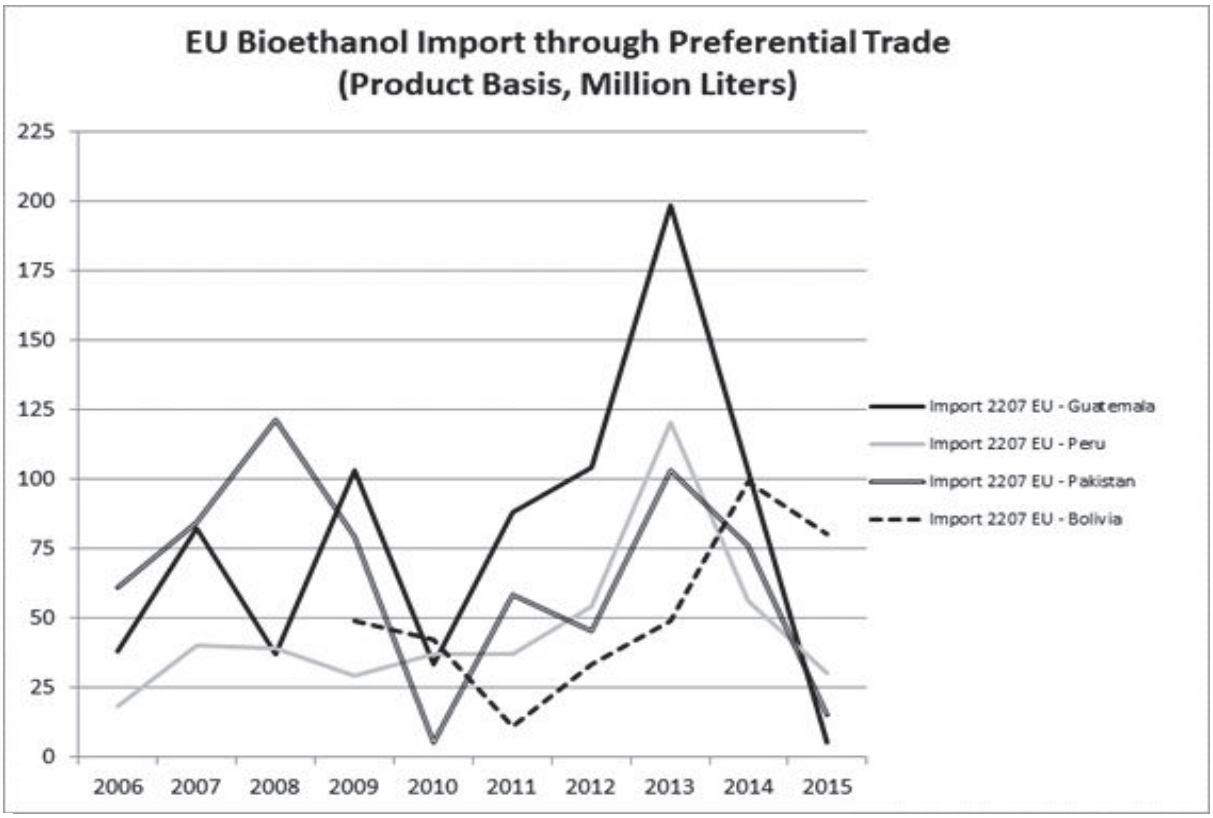


During 2009 – 2012, the major part of the bioethanol shipped to the EU was imported with a Binding Tariff Information (BTI) under the HS code 3824.90.97, subject to a tariff of 6.5 percent of the customs value. On April 3 2012, the EU's Customs Code Committee reclassified ethanol blends as denatured ethanol under HS 2207, subject to the higher import tariff of €102 per thousand liters (Regulation 211/2012). This reclassification was, however, insufficient to block trade. The

European Commission imposed an anti-dumping duty on the bioethanol imports from the United States. On February 23, 2013, the duty was set at €62.3 per MT (€49.2 per 1,000 liters) for the coming five years (see for more information the Policy Chapter). This duty is in addition to the import tariff of €102 per 1,000 liters, and as a consequence a volume of 1,000 liters of ethanol from the United States is charged with €151.2. This rate significantly cut U.S. exports of bioethanol to the EU. The graph below shows the correspondence of the exports of U.S. fuel ethanol classified under HS 2207 and the EU HS 3824.90.97 imports.



As in 2014, U.S. ethanol is expected to be the most competitive on the world market this year. But as a consequence of the anti-dumping duty, EU imports from the United States are restricted. Isolation from the most competitive suppliers did, however, attract supply through preferential trade measures. In 2013 and 2014 respectively, about 450 and 375 million liter of ethanol has been supplied through zero duty quotas, mainly used by Guatemala, Peru, Pakistan and Bolivia (see graph below). Ethanol from Pakistan is reportedly not applied as fuel, while the product from Peru and Guatemala is only partly used as transport fuel. During 2015 and 2016, EU bioethanol imports are not likely to recover to the levels of before 2012. Currently even a temporarily oversupply on the EU markets exists. In 2014, EU exports to the Middle East and India increased significantly. In 2015, exports are expected to expand further despite the strong competition from U.S. ethanol on the world market. EU exports will be supported by the restricted domestic demand and the weakening Euro against the US Dollar.



Conventional Biodiesel

Unless mentioned otherwise in this chapter the term biodiesel includes traditional first generation biodiesel (fame) and hydrotreated vegetable oil (HVO).

EU Production, Supply and Demand Table

The EU is the world's largest biodiesel producer. Biodiesel is also the most important biofuel in the EU and, on energy basis, represents about 80 percent of the total transport biofuels market. Biodiesel was the first biofuel developed and used in the EU in the transport sector in the 1990s. At the time, rapid expansion was driven by increasing crude oil prices, the *Blair House Agreement* and resulting provisions on the production of oilseeds under Common Agricultural Policy set-aside programs, and generous tax incentives, mainly in Germany and France. EU biofuels goals set out in Directive 2003/30/EC (indicative goals) and in the RED 2009/28/EC (mandatory goals) further pushed the use of biodiesel.

Biodiesel (Million Liters)								
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014[e]**	**2015[f]**	**2016[f]**
Beginning Stocks	1,102	807	528	562	820	523	525	525
Production	9,857	10,707	11,041	10,778	11,676	12,661	12,560	12,590
Imports	2,192	2,400	3,164	3,293	1,393	626	650	650
Exports	76	117	100	116	416	181	150	150
Consumption	12,269	13,268	14,070	13,698	12,950	13,104	13,060	13,090

Ending Stocks	807	528	562	820	523	525	525	525
Production Capacity								
Number of refineries	248	250	266	268	251	247	248	248
Nameplate Capacity	23,239	23,201	24,727	26,281	25,791	25,165	25,256	25,256
Capacity Use (%)	42.4	46.1	44.7	41.0	45.3	50.3	49.7	49.9
Feedstock Use (1,000 MT)								
Rapeseed oil	6,300	6,700	6,600	6,150	5,770	6,170	5,970	5,970
Recycled vegetable oils (UCO)	330	500	750	840	1,280	1,610	1,650	1,670
Palm oil	550	690	700	1,050	1,640	1,620	1,630	1,620
Soybean oil	1,000	1,085	1,000	685	850	850	855	855
Animal fats	350	300	340	360	415	440	485	485
Sunflower oil	170	140	240	260	265	280	285	290
other (pine oil)	0	0	80	140	145	180	185	190
Market Penetration (1000 TOE)								
Biodiesel, on-road	9,357	10,222	10,721	11,492	10,293	10,400	10,370	10,390
Diesel, on-road	197,160	201,352	201,670	198,248	197,484	198,000	198,000	199,000
Blend Rate (%)	4.7	5.1	5.3	5.8	5.2	5.3	5.2	5.2
Diesel, total use	256,026	260,305	255,185	250,647	249,906	250,000	250,000	250,000

r = revised / e = estimate / f = forecast EU FAS Posts. Production capacity as of December 31 of year stated. The PSD is built on information in MT and converted to liters using a conversion rate of 1 MT = 1,136 liters. Sources: FAS Posts, Global Trade Atlas (GTA), European Biodiesel Board (EBB), Eurostat. Note: Data for feedstock use is not available. The figures above represent estimates by EU FAS posts.

Production Capacity

The structure of the biodiesel sector is very diverse and plant sizes range from an annual capacity of 2,000 MT owned by a group of farmers to 600,000 MT owned by a large multi-national company. EU biodiesel production capacity is expected to remain fairly flat in 2015 and 2016 at 25.2 billion liters, after decreasing by two percent in both 2013 and 2014. After years of rapid expansion from 2006 to 2009, when capacity almost quadrupled, capacity increased at a much slower rate from 2010 to 2012 in response to difficult market conditions resulting from higher feedstock prices and growing biodiesel imports. In 2013 and 2014, capacity decreased by two percent each year. Capacity use, however, has increased to 50 percent in 2014 (from 45 percent in 2013) due to a combination of higher domestic production and lower imports.

Production

EU biodiesel production is driven by domestic consumption and competition from imports. In 2014, EU production benefited from substantially lower imports and higher domestic consumption. As a result, biodiesel production increased by 11 percent, mainly in Germany, Spain, and the Benelux. The increase in the Benelux production can largely be attributed to increased hydrotreated vegetable oils (HVO) production.

Germany, the Benelux, and France remain the major producing countries within the EU. Spain reclaimed its position as the number four in 2014 from Poland which held that position in 2012 and 2013. The rebound of the Spanish production is a combination of factors that include the countervailing duties imposed to biodiesel imports originated in Argentina and Indonesia and, to a lesser extent, the implementation of a production quota system in Spain.

EU Biodiesel/HVO Production – Main Producers (million liters)								
Calendar Year	**2009**	**2010**	**2011**	**2012[r]**	**2013[r]**	**2014[e]**	**2015[f]**	**2016[f]**
Germany	2,598	3,181	3,408	2,954	3,067	3,408	3,180	3,180
Benelux	840	912	1,084	1,881	2,102	2,102	2,100	2,100

France	2,372	2,258	1,477	1,647	1,818	1,988	2,100	2,100
Spain	694	1,041	787	545	668	966	1,140	1,140
Poland	415	432	414	673	736	786	800	800
UK	398	227	261	364	648	648	650	650
Finland	290	375	253	320	399	409	410	410
Portugal	284	328	419	350	353	358	380	380
Italy	903	908	704	326	521	341	340	340
Others	1,064	1,045	2,233	1,719	1,364	1,657	1,460	1,490
Total	**9,857**	**10,707**	**11,041**	**10,778**	**11,676**	**12,661**	**12,560**	**12,590**

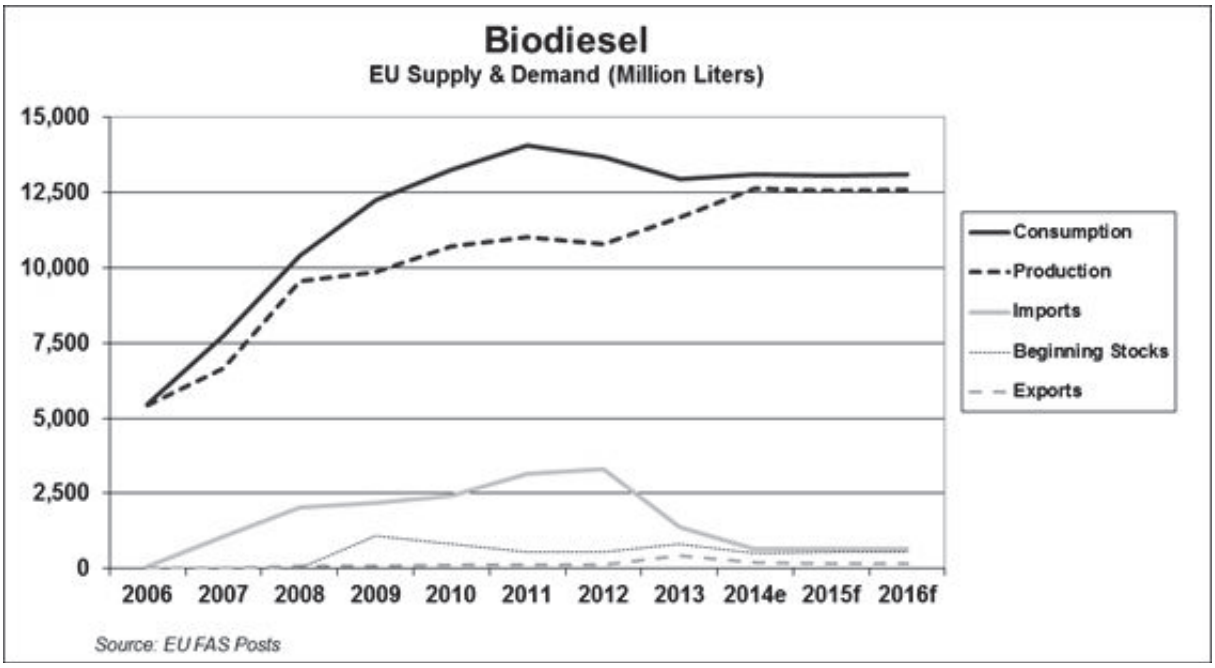
Source: FAS EU Posts based on information in MT and converted to liters using a conversion rate of 1 MT = 1,136 liters.

EU HVO Production (1000 MT)					
Calendar Year	**2012**	**2013**	**2014**	**2015[f]**	**2016[f]**
Benelux	320	680	790	790	950
Finland	380	380	400	450	500
Spain	64	158	331	352	374
Total	764	1,218	1,521	1,592	1,824

Source: FAS EU Posts. Spain based on information in liters and converted into MT. Conversion rate: 1,000 liter = 0.8803 MT

EU HVO Production (1 million Liters)					
Calendar Year	**2012**	**2013**	**2014**	**2015[f]**	**2016[f]**
Benelux	364	772	897	897	1,079
Finland	432	432	454	511	568
Spain	73	179	376	400	425
Total	868	1,384	1,728	1,809	2,072

Source: FAS EU Posts. Benelux and France based on information in MT and converted to liters. Conversion rate: 1 MT = 1,136 ltrs



Feedstock Use

Rapeseed oil is still the dominant biodiesel feedstock in the EU, accounting for 55 percent of total production in 2014. However, its share in the feedstock mix has considerably decreased compared to the 66 percent in 2012, mostly due to higher use of palm oil and recycled vegetable oil / used cooking oil (UCO). Palm oil has become the second most important feedstock, mainly because of its use in the Neste Oil plants. Currently, palm oil is mainly used in the Benelux, Spain, Finland, and France, and to a much lesser extent in Germany, Italy, and Portugal.

UCO received the bronze medal in terms of feedstock use in 2014 and is expected to become the number two in 2015. The use of UCO has received a push after some Member States (Austria, Denmark, Finland, France, Germany, Ireland, the Netherlands, and the United Kingdom) introduced double-counting (for details see Policy section). Largest EU producers of UCOME are the United Kingdom, the Benelux, and Germany.

The use of soybean and palm oil in conventional biodiesel is limited by the EU biodiesel standard DIN EN 14214. Soybean-based biodiesel does not comply with the iodine value prescribed by this standard (the iodine value functions as a measure for oxidation stability). Palm oil-based conventional biodiesel reportedly does not provide enough winter stability in northern Europe. However, it is possible to meet the standard by using a feedstock mix of rapeseed oil, soybean oil, and palm oil.

The vast majority of soybean oil is used in Spain, France, Germany, Portugal, and Italy. However, in Portugal, the implementation of sustainability requirements as of July 1, 2014, along with a positive price differential, has led to a reduction of soybean oil use to the benefit of rapeseed oil.

Animal fats benefited far less from double-counting as the range of MS that allow double-counting for animal fat is smaller than that for UCO (Denmark, Finland, France, the Netherlands). In 2014, Germany and the U.K. were the largest users of animal fat for biodiesel production, despite the fact that animal fat based biodiesel does not count against mandates in Germany at all. The

Benelux and France followed with little distance. In 2015, France is expected to become the largest user of animal fat for biodiesel production in Europe.

Sunflower oil only comprised three percent of the total biodiesel feedstock and is mainly used in France and Greece. The category "other" includes cottonseed oil (Greece), as well as pine oil and wood (Sweden).

At least 1.5 million MT of vegetable oil is imported (palm oil, soybean oil, and to a lesser extent rapeseed oil) for biodiesel production. A significant share of domestically produced biodiesel feedstock is crushed from imported oilseeds (soybeans and rapeseed). The 6 MMT of rapeseed oil feedstock projected for 2015 is equivalent to about 14.9 MMT of rapeseed. This also generates about 8.9 MMT of rapeseed meal as byproduct, most of which is used for animal feed. Similarly, the 0.9 MMT of soybean oil will have to be crushed from 4.3 MMT of soybeans and will generate about 3.4 MMT of soybean meal as co-product (see also FAS EU Oilseeds Annual).

Consumption

Biodiesel consumption is driven almost exclusively by MS mandates and to a lesser extent by tax incentives. After years of rapid use increases, EU biodiesel consumption peaked in 2011 and declined in 2012 and 2013, by 3 and 5 percent, respectively. The decline was largely a result of two factors: double-counting and reduced mandates. Double-counting of certain biofuels is/was applied in Germany (2011-2014), the Benelux, the United Kingdom, Portugal, Austria, Italy (2012 until early 2014). In Spain the measures were published in April 2014, but will only enter into force after more detailed guidelines are issued and sustainability requirements are fully in place, presumably not earlier than 2016. Double counting diminishes the physical demand even if the blending mandates remain unchanged. In addition, Spain reduced its consumption mandates from 7 percent down to 4.1 percent at the beginning of 2013. In 2014, consumption marginally increased by 1 percent as decreasing consumption in Italy and Poland was more than offset by increases in France, the U.K., Germany, and the Czech Republic.

For 2015 and 2016, consumption is expected to remain practically flat, as diminishing demand in Germany is compensated by increases in France and the Benelux, and a slight rebound in Spain and Portugal (2015) and increases in the U.K. (2016), respectively. In Germany, the transition from an energy based use mandate to a minimum greenhouse gas (GHG) reduction mandate in 2015 favors biofuels with a high GHG saving. As a result, companies are inclined to calculate actual GHG values rather than using the default values of the RED. This is expected to result in a decrease in physical demand, because the higher the GHG reduction the fewer biofuel will be needed to fill the mandates.

In 2014, France, Germany, Italy, and the United Kingdom were the largest biodiesel consumers in the EU accounting for 58 percent of EU-28 biodiesel consumption (see table). Projections for the following years indicate that France and Germany still remain the leading consumers, followed by Italy, Spain, Poland, and the United Kingdom.

Despite the declining trend, a few Member States like France, the Benelux, Poland, Portugal, Austria, and Romania are expected to increase their consumption in 2015, albeit to a small extent, while Spain's consumption is forecast to slightly rebound. For 2016, only the U.K. forecasts an increase in consumption.

EU Biodiesel Consumption – Main Consumers (million liters)								
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014[e]**	**2015[f]**	**2016[f]**
France	2,624	2,579	2,499	2,613	2,670	2,840	2,900	2,900

Germany	2,859	2,933	2,756	2,816	2,513	2,606	2,440	2,390
Italy	1,309	1,670	1,654	1,623	1,517	1,136	1,140	1,140
U.K.	909	966	1,034	636	977	1,079	1,080	1,140
Poland	602	784	1,079	837	843	730	740	740
Spain	1,168	1,553	1,830	1,677	700	679	700	700
Benelux	740	541	561	620	609	670	690	690
Austria	593	602	576	567	575	575	580	580
Sweden	201	219	289	415	569	568	570	570
Portugal	293	423	395	358	352	373	380	380
Czech Rep.	154	209	278	275	259	341	340	340
Others	817	791	1,119	1,261	1,368	1,506	1,500	1,520
Total	**12,269**	**13,268**	**14,070**	**13,698**	**12,950**	**13,104**	**13,060**	**13,090**

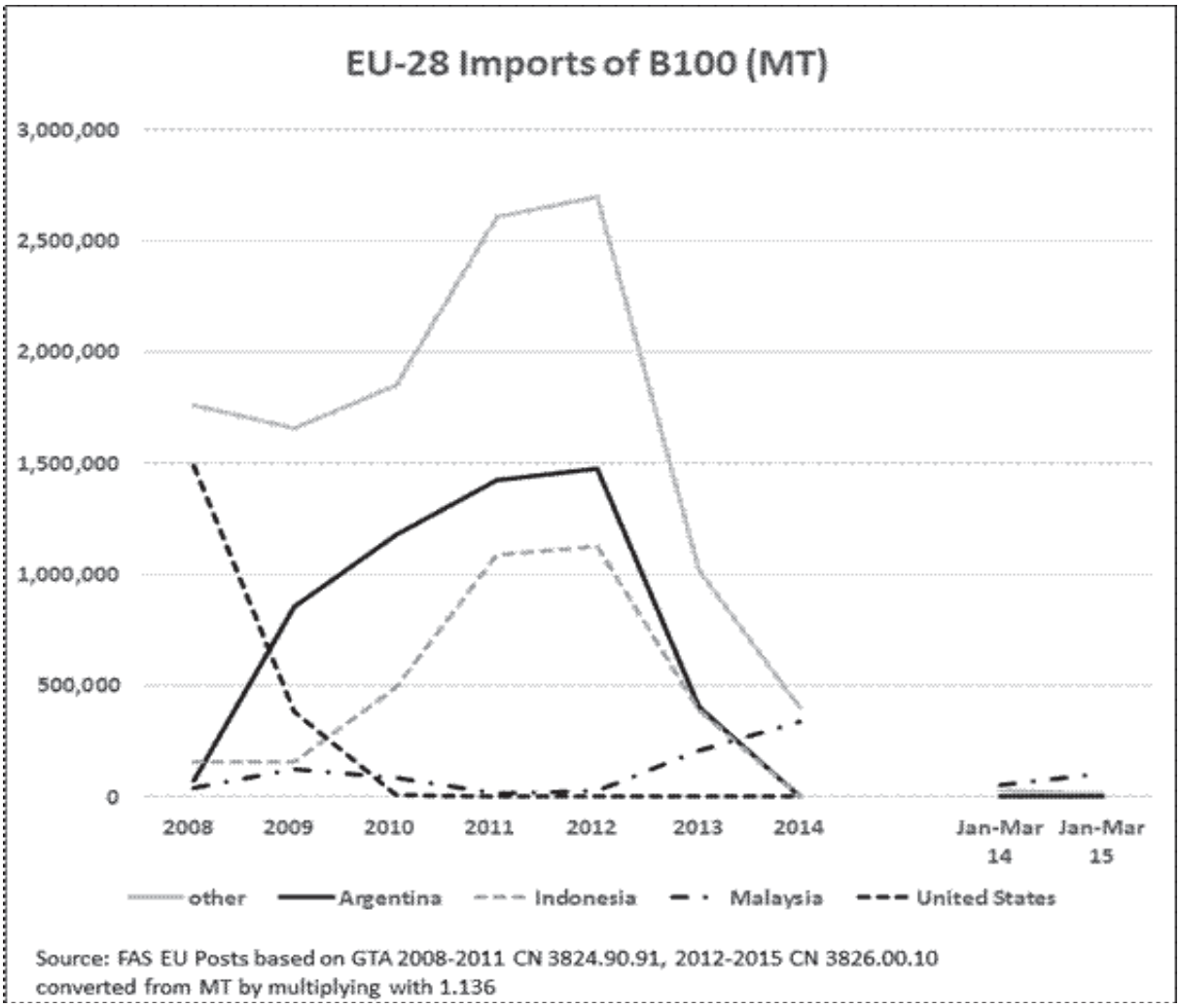
Source: FAS EU Posts, converted from MT by multiplying with 1.136 and rounded

Trade

In March 2009, the EC introduced countervailing duties (CvD) and anti-dumping duties (AD) on biodiesel imports from the United States on B20 and above (see Policy Chapter). In May 2011, the duties were extended to all U.S. biodiesel irrespective of the blending ratio. The duties dramatically reduced EU biodiesel imports from the United States. Hopes by the EU domestic biodiesel industry that this would reduce the pressure on the market were not fulfilled as the void was filled with increased biodiesel imports from mainly Argentina and Indonesia (see graph below). In an attempt to curb down the biodiesel imports from Argentina and Indonesia, the EC enforced anti-dumping duties on biodiesel imports from these origins as of May 29, 2013. As a result, imports from both countries dropped considerably in 2013 and almost ceased 2014. The void was partially filled with domestic EU production and partially with higher imports from countries not covered by AD. Here the biggest beneficiaries were Malaysia, South Korea, India, and Brazil. For 2015 a slight rebound of imports is expected as first quarter import data shows that Malaysia was able to once again increase its exports to the EU28.

In 2014, most biodiesel, about 611 million liters, was imported under HS code 3826.00.10 containing at least 96.5 percent biodiesel. The equivalent of 1 million liters and 14 million liters was imported as blend under HS code 3826.00.90 (containing between 30 and 96 percent of biodiesel) and 2710.20.11 (containing at most 30 percent of biodiesel), respectively. It is assumed that most of the product traded under the last HS code is B5. Most of the biodiesel is imported through the Netherlands, Italy, Bulgaria, and Spain.

A constraint for biodiesel imports are the sustainability requirements laid down in the Renewable Energy Directive (RED). Since April 1, 2013, all biofuels must achieve greenhouse gas (GHG) savings of at least 35 percent. Default values of biodiesel produced from both soybean oil and palm oil are set lower than that in the RED (see policy section). As a result, instead of applying default values, actual GHG values have to be calculated for each shipment using the provisions of article 19/part C of Annex V of the RED.



EU 28 biodiesel exports to destinations outside the bloc are marginal and normally only amount to around one percent of production. The exceptional increase of exports in 2013 was due to higher exports to the United States and can be attributed to one company taking advantage of an elevated demand in the U.S. and the U.S. blenders' credit. The latter expired at the end of 2013 and was only reintroduced for 2014 very late in the year. As a result EU exports to the United States and thus total exports dropped sharply in 2014. Exports are forecast to drop further but at a slower rate in 2015 and remain flat in 2016.

Stocks

In 2008, the use of B99 substantially increased and prompted the EC to start an anti-dumping investigation. In anticipation of the EU imposing duties on biodiesel imports from the United States, European traders and mineral oil industry accumulated large stocks at the end of 2008. These were partially reduced in 2009 and by the end of 2010 should have fallen to the assumed average level. In the absence of reliable data, the data for stocks is based on the assumption that average stocks amount to the equivalent of two weeks supply of consumption.

Advanced Biofuels

There is no commonly agreed upon set of criteria used to define advanced biofuels. In this report, advanced biofuels include cellulosic ethanol, butanol, methanol, and dimethyl ether (DME), Fischer-Tropsch diesel, drop-in fuels, and biofuels made from algae. Second generation biofuels are commonly agreed to be biofuels derived from non-food feedstocks.

In the RED (Renewable Energy Directive 2009/28/EC, see policy section of this report), second generation biofuels get a double credit. This means that biofuels made out of ligno-cellulosic, non-food cellulosic, waste and residue materials will count double towards the ten percent target for renewable energy in transport in 2020. On April 28, the European Parliament supported a 0.5 percent non-binding Member State target for advanced biofuels in 2020 (see policy section of this report). With the goal to support the commercialization of advanced biofuels and the bio-based economy in general the European Commission (EC) developed the following programs:

-On February 13, 2012, the EC adopted a strategy entitled "Innovating for Sustainable Growth: a Bioeconomy for Europe". The main goal of the strategy is to reduce the EU's dependency on fossil resources; for more information see the Bioeconomy website of the EC. One of the policy areas under the strategy is biorefinery, including the production of biofuels. The EC will fund biorefinery research and commercialization by the Horizon 2020 program. This financial instrument has a budget of €80 billion for the period 2014-2020. An example of the projects receiving funds is the NEMO project investigating micro-organisms and enzymes which convert lignocellulosic biomass to bioethanol.

-The goals of the biorefinery policy area overlap the goals of the European Strategic Energy Technology (SET) Plan. The SET-Plan includes the European Industrial Bioenergy Initiative (EIBI), which key objective is to accelerate the commercial development of sustainable bioenergy. The estimated budget is €8 billion over 10 years to support 15-20 projects. An example of the demonstration projects is the production of microbial oil from lignocellulosic sugars for the production of drop-in biofuels.

-On July 10, 2013, the EC presented the Biobased Industries Public Private Partnership with the Bio-based Industries Consortium (BIC), a cross sector group of 48 private companies. The partnership plans to accelerate the exploitation of bio-based products in Europe by 2020, and has a budget of €3.8 billion. The goal of the program is to convert biomass into common consumer products through innovative technologies by bio-refineries. In contrast to biofuels there is no supportive harmonized EU legislation for the production and marketing of bio-based materials and chemicals. On February 4, 2015, the European Bioeconomy Alliance (EBA) was launched. The EBA is an informal alliance of European organizations which are active in the bio-economy. For more information see GAIN Report – The EU Bio-based Economy and Its Inputs.

Since the past five years, the production of hydrotreated vegetable oils (HVO) has taken off in the EU. The current capacity is estimated at 2.2 billion liters, and is expected to increase to about 2.7 billion liters in the next two years. The commercialization of cellulosic ethanol is lagging behind compared to the development of HVO. The current capacity is about 75 million liters in the EU. Expansion of capacity has been announced in Italy, the Slovak Republic, Finland and France. During the next two to three years, the capacity for cellulosic ethanol production could possibly double to about 150 million liters.

Commercial production of advanced biofuels

Currently there are nine advanced biofuel plants operational at commercial scale in the EU (see

table below).

Advanced Biofuels Plants in the EU					
Country	**Process**	**Biofuel**	**Feedstock**	**Capacity (million liters per year)**	**Year of opening**
Thermochemical					
Finland	H	HVO	Oils and fats	430 (2 lines)	2009
Spain	H	HVO	Oils and fats	375 (3 plants)	2011
The Netherlands	H	HVO	Oils and fats	910	2011
Italy	H	HVO	Palm Oil	400	2014
Finland	H	HVO	Tall Oil	115	2015
The Netherlands	P/FT	Methanol	Glycerine	250	2010
Biochemical					
Italy	HL/F	Ethanol	Wheat straw	75	2013

Source: EU FAS Posts BtL=Biomass to Liquid, DME=Dimethyl Ether, F=fermentation, FT=Fischer Tropsch synthesis, G=gasification, H=hydrogenation, HVO=Hydrotreated Vegetable Oils, HL=hydrolysis, OS=oxygenate synthesis, P=pyrolysis

Thermochemical processes

Finland / The Netherlands: Neste Oil has developed a process of hydrogenation to produce hydrotreated vegetable oils (HVO) with the product name NExBTL. The product is sold as drop-in fuel for road transport and also used by commercial airlines. In addition to drop-in biofuels, the Neste plants also produce renewable naphtha, propane and alkanes. In Finland, Neste operates one plant with two lines of about 215 million liters each. In 2010, Neste Oil opened up a renewable diesel plant in Singapore with an annual capacity of 910 million liters and a similar scale plant in Rotterdam in 2011. In 2013, the Neste plants were operating at full capacity. By the end of 2015, Neste is expected to expand the annual capacity of both plants to 1,080 million liters. In 2014, Neste refined globally 1.6 MMT of waste residues and 0.97 MMT of palm oil. The waste and residues consist of mainly palm fatty acid distillate (PFAD), animal fats, UCO, and in smaller volumes, tall oil pitch, technical corn oil, and spent bleaching oil. Neste Oil is gradually replacing palm oil with waste fats and oils. The company's goal is to use only waste oils and fats as feedstock as from 2017. In 2013 and 2014, Neste exported significant volumes of its product to the United States and Canada.

Spain: In July 2011, the company CEPSA started producing HVO at two refineries. Since February 2012, also the company REPSOL started producing HVO in Spain. Spanish HVO production increased from 179 million liters in 2013 to 376 million liters in 2014. For more information see GAIN Report SP1321.

Italy: In 2014, a HVO plant with an annual capacity of 400 million liters was opened in Venice, Italy by Energy Group Eni SpA. The feedstock is expected to be initially palm oil and will later possibly include also animal fats, waste oils, oils from algae, and various types of biological waste.

Finland: This year, the forest product company UPM opened a HVO plant in Finland. The capacity of the plant will be about 115 million liters per year. The feedstock used is tall oil, a residue of pulp production.

Germany: Choren Industries, which ran a 15 million liters BtL plant in Freiberg became insolvent in 2011. Linde Engineering bought the rights to the technology in 2012, while the plant itself has been liquidated. In a separate project the Karlsruhe Institute for Technology (KIT) developed a process called Bioliq® to convert crop residues and wood residues into diesel and gasoline fuels.

The pilot plant has an annual capacity of 1 million liters and started production in November 2014.

France: Commercial production of HVO has not yet taken off in France but several projects have recently been announced. In April 2015, the French group Total stated that it will convert its refinery site in La Mede (southern France) into the largest biodiesel plant in France. The new biorefinery with a total capacity of 570 million liters will be put into operation in 2017. About 40 percent of the production will be HVO produced from waste and vegetable oils. Total also aims at producing jet fuel for civil aviation, the objective being to account for 30 percent of EU market shares in the jet fuel sector. Another project in France is the BioTFuel project, a cooperation of Avril, Axens, CEA, IFPEN, ThyssenKrupp and Total. This project aims at producing 230 million liters biodiesel and bio-jet fuel per year from one million MT of biomass by 2020. The construction of two pre-industrial units for a total investment cost of €180 million should begin at the first semester of 2015.

The Netherlands: In June 2010, the advanced biofuel plant BioMCN started production. The plant has a capacity of 250 million liters and produces biomethanol from glycerine. The glycerine is a byproduct of biodiesel production. Biomethanol can be blended with gasoline or used for the production of bio-MTBE, bio-DME, or synthetic biofuels. On December 18, 2012, BioMCN received a grant of €199 million for the construction of a commercial scale biomass refinery using wood residues as feedstock. Through torrefaction and gasification, the feedstock will be transferred into syngas and finally biomethanol. Full commercialization of the project is expected to take four years.

Biochemical processes

Spain: In 2008, Abengoa Bioenergy completed a demonstration plant in Babilafuente (Salamanca). The plant had a 5 million liters/year production capacity, and used wheat and barley straw as feedstock. The process is based on enzymatic hydrolysis. Since 2013, the plant has been converted to waste to biofuels technology, by which 25,000 MT of urban solid waste per year can be processed to produce 1.5 million liters of biofuels. The straw-based technology is now being implemented at a commercial stage in Hugoton (Kansas). For more information see GAIN Report SP1321.

Italy: In 2013, Beta Renewables started the commercial production of cellulosic ethanol. The Crescentino plant has an annual production capacity of 75 million liters using 270,000 MT of biomass. The feedstock consists of wheat straw, rice straw and husks, and Arundo donax, an energy crop grown on marginal land. Wood waste from the forest industry and lignin from the ethanol plant are used as feedstock at the attached power plant. During the next five years advanced biofuels production is expected to expand further in Italy. Through Ministerial Decree of October 10, 2014, Italy was the first EU Member State to mandate the use of advanced biofuel. The Italian Decree requires gasoline and diesel to contain at least 1.2 percent of advanced biofuel as of January 2018, rising to 2 percent by 2022. The Decree came six months after the Italian Ministry of Economic Development announced the intention to fund the construction of three advanced biofuel facilities in Southern Italy. Each plant is expected to have a production capacity of 100 million liters of bioethanol per year and feature a mix of wheat straw and energy crops as feedstock. The three sites are still at an early stage and further investigations are to be made into their viability.

So far, commercial production of cellulosic ethanol is limited in the EU. Beside the three plants in Italy, several more commercial operations have recently been announced. In Finland a plant with a capacity of 10 million liters is planned to be operational in 2016. Beta Renewable is planning to use its technology for a 70 million liters cellulosic ethanol plant in the Slovak Republic. The startup is expected to take place in 2017. In Denmark, a cellulosic plant of 80 million liters is planned to

be constructed, the start-up date is not public yet. Launched in 2008, the French pilot project Futurol aims at developing a process of production of cellulosic ethanol. The industrialization of the process is expected in 2016, it will be commercialized by the French company Axens.

Use of conventional and advanced biofuels by the aviation sector

In 2011, the EC, Airbus, and the aviation and biofuel producers industries, launched the European Advanced Biofuels Flightpath. This action is scheduled to achieve 2 million MT of sustainable biofuels used in the EU civil aviation sector by the year 2020. Since 2008, the aviation sector has been conducting test flights with biofuels. The project is planning to make 300,000 MT of aviation biofuels available in 2016.

Biomass for Heat and Power

The European Commission (EC) expects heat and power production from biomass to account for about 45 percent of the renewable energy use in 2020. Biofuels for transport are expected to account for about twelve percent of the renewable energy use. Based on the Renewable Energy Action Plans (NREAPs) submitted by the Member States to the EC, focus is on biomass for heating and cooling rather than for electricity generation. A major part of the biomass used is forecast to be forestry products.

Wood Pellets

EU Production, Supply and Demand Table

Wood Pellets (1,000 MT)									
Calendar Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014[c]**	**2015[c]**	**2016[c]**
Beginning Stocks	299	393	467	696	713	642	506	747	447
Production[a]	6,294	7,940	9,186	9,470	10,652	12,200	12,500	12,800	13,000
Imports[b]	1,250	1,698	2,515	3,115	4,367	6,096	6,546	7,000	8,000
Exports[b]	50	64	72	68	90	132	105	100	100
Consumption[c]	7,400	9,500	11,400	12,500	15,000	18,300	18,700	20,000	21,000
Ending Stocks	393	467	696	713	642	506	747	447	347
Production Capacity									
No. of Plants[a]		499			497				
Capacity[a]	11,283	13,694	14,845	15,000[c]	15,980	16,200[c]	16,400	16,600	16,800
Cap. Use (%)	56%	58%	62%	63%	67%	71%	76%	77%	77%

Source: (a) The European Biomass Association (AEBIOM), (b) GTIS, (c) FAS Post Estimates

The EU is the world's largest wood pellets market, with a consumption of about 18.7 MMT of pellets in 2014 (see table above). Based on the EC mandates and Member State incentives, the demand is expected to expand further to nearly 21.0 MMT in 2016. Future consumption will significantly depend on a range of market factors and in particular Member State incentives and conditions.

Main Pellet Producers (1,000 MT)						
Calendar Year	**2010**	**2011**	**2012**	**2013**	**2014[e]**	**2015[e]**
Germany	1,750	1,880	2,200	2,250	2,100	2,300
Sweden	1,650	1,340	1,340	1,310	1,490	1,500
France	465	550	680	885	1,200	1,450

Latvia	615	713	979	1,200	1,300	1,350
Austria	850	940	893	962	1,050	1,100
Portugal	627	675	700	900	900	900
Poland	510	600	600	600	600	600
Total	**9,186**	**9,470**	**10,652**	**12,200**	**12,500**	**12,800**

Source: AEBIOM and Member State sector organisations, e = estimate EU FAS Posts.

With a production of about 12.5 million MT in 2014, and about fifty percent of global production, the EU is the world's biggest producer of wood pellets. Compared to production plants in North America, plants in the EU are mainly small or medium sized. Most of the main pellet producing countries have a sizeable domestic market for residential heating pellets. Recent growing demand for these pellets has supported a further increase in the domestic production. Exceptions in the table above are Latvia and Portugal, which sectors are producing mainly for export and use in large scale power plants abroad.

Germany is the third largest wood pellet producer in the world after the United States and Canada. It has currently about seventy production facilities for wood pellets with a total annual production capacity of 3.5 million MT. In 2014, production amounted to 2.1 million MT, 90 percent of which were produced from residues of the timber industry. The second largest producer in the EU is Sweden. Depending on the domestic use, Swedish self-sufficiency fluctuates between seventy and ninety percent. In years of high demand, Sweden increases imports from Russia and the Baltics. French wood pellet production increased significantly during the past four years. The growth in pellet production is driven by a strong increase in the demand of residential heating. Also in Austria pellet production is on a steadily rising trend. Like Germany and France, Austria is a net exporter of wood pellets but demand for residential use is increasing progressively. There is an excess of capacity present in most Member States, but particularly in Spain. Of the 900,000 MT of annual production capacity only about a third to a half is being used. Use of this capacity has, however, shown steady growth during the past four years supported by an increased domestic demand.

The Baltic Region and Portugal are almost exclusively producing for the export market. Wood pellet production has expanded rapidly in Latvia, Lithuania and Estonia. In 2014, exports totaled 2.2 MMT. The main markets are Denmark, the United Kingdom and Sweden. With about 1.3 MMT, Latvia is the main producer in this region. In the Baltics new plants are planned to be build. The Baltics are producing both for the residential and industrial markets, and production expansion is expected to be for both markets. Portugal has increased its production since 2008, and exported nearly its entire production to the United Kingdom and Denmark.

The major raw material for pellets has traditionally been sawdust and byproducts from sawmills. With the increasing competition for the sawdust resources, a broader sustainable raw material basis is becoming necessary. There is an increased interest in forest residues, wood waste and agricultural residues. In Central Europe, such as Poland and Hungary, some expansion is anticipated for on-site energy generation or supplying the residential heating market. Capacity growth will however not be sufficient for supplying the full demand in Western Europe. Overall, EU wood pellet production is not expected to be able to keep up with the demand from both the residential heating market and for power generation.

Consumption

While the EU produces about fifty percent of world production, the EU market represents about eighty percent of the market. Of the consumption of 18.7 MMT in 2014, about two-thirds are used for heating and a third for power. While about an equal share is estimated to be used for industrial

use and household use. The residential use for heating is relatively stable growth market compared to the use for power generation as the latter is highly dependent on government funding. The relatively mild winters of 2013/2014 and 2014/2015, however, tempered the use of pellets for residential heating. The major users of wood pellets in the EU are the United Kingdom, Italy, Denmark, Germany, Sweden, France, Belgium and Austria.

Main Pellet Consumers (1,000 MT)						
Calendar Year	**2010**	**2011**	**2012**	**2013**	**2014[e]**	**2015[f]**
UK	180	1,000	1,400	3,700	4,900	6,000
Italy	1,650	1,950	2,200	2,500	2,900	3,250
Denmark	1,600	1,600	2,100	2,400	2,100	2,200
Germany	1,200	1,400	1,700	2,000	1,800	2,100
Sweden	2,280	1,880	1,700	1,860	1,650	1,700
France	400	400	550	600	1,100	1,400
Belgium	920	1,200	1,700	1,500	900	1,100
Austria	660	720	790	880	950	1,000
Netherlands	910	1,000	1,250	1,200	150	500
Total	**11,400**	**12,500**	**15,000**	**18,300**	**18,700**	**20,000**

Source: AEBIOM and Member State sector organisations, e = estimate EU FAS Posts

Besides wood pellets, also large quantities of wood chips and briquettes are used. The EU sector estimates the current EU consumption of wood chips at 15 MMT and expects it to grow to 28 MMT in 2020. Growth in demand is supported by increased investments in medium seized combined heat and power (CHP) plants. Most chips are sourced locally, but Scandinavia is regarded as a potential growth market for imports from non-EU destinations. Wood pellets are traded more internationally. The EU pellets market can be divided in three regions.

In Italy, Germany, France and Austria pellets are mainly used in small-scale private residential and industrial boilers for heating. Based on the sales of boilers and stoves, the consumption of residential pellets is expected to surge in mainly Italy and France. In some Member States, such as Italy, France and Austria, household heating with biomass as input receives subsidies by the federal and local governments. In most countries, however, government funding is limited. The residential pellet market is mainly driven by prices of alternative fuels, while the demand for industrial pellets depends primarily on EU Member State mandates and incentives.

Italy is the biggest European market for the domestic use of pellets; according to the heating market growth expectations and the National Renewable Energy Action Plan statement, the use of pellets will increase to over 3 MMT in 2015 and 5 MMT in 2020. Because domestic pellet production is expected to stagnate at around 0.5 MMT, Italy will depend strongly on pellet imports. In 2014, Italy imported 1.9 MMT of wood pellets, of which 0.8 MMT from third countries. Market logistics and economics indicate that in the close future North America will become the major supplier. Also in France, there is a potential for wood pellets from the United States and Canada. The government favors local wood but wood energy is gradually outpacing domestic supply. Some bioenergy projects are located close to harbors and use already imported pellets. Such projects are expected to grow in the coming years.

The wood pellet market in Sweden and Denmark is diverse. Wood pellets are being used in small boilers in private homes, medium sized district heating plants as well as in large CHP plants. Both countries have a high target for renewable energy use in 2020, respectively of 49 and 35 percent. The majority is planned to be obtained from biomass. Already in 2012, Sweden has reached its goal set for 2020.

In markets such as the United Kingdom, Belgium, and the Netherlands residential use is negligible and the demand is dominated by large scale power plants. The large scale use of wood pellets by the power plants is driven by the EU mandates for renewable energy use in 2020. The governments of these countries opted to fulfill their obligations mainly by the use of biomass for the generation of electricity. As these countries lack a sufficient domestic production of pellets they largely dependent on imports.

The UK Government enforced the Industrial Emissions Directive, which boosted consumption from 1.4 MMT in 2012 to 4.9 MMT in 2014. In 2015, consumption is expected to reach 6 MMT. The UK government has mandated UK electricity suppliers to source an increasing proportion of their electricity from renewable production (see GAIN Report UK Wood Pellet Market).

In Denmark, pellet use by combined heat and power plants is also ongoing. Pellets are mainly used for the generation of heat during the cold season. Based on Danish Government policy and private sector investments, Danish consumption is expected to stagnate at about 2.2 MMT until 2018 (see GAIN Report NL3036).

Between March and July 2014, the Belgian power sector temporarily stopped combustion of wood pellets because the domestic wood sector argued that pellet production cannibalized their same raw material. In August 2014, generation of electricity from wood pellets resumed as a new Belgian Decree requires the wood sector to prove the threat to their inputs prior to limiting its use for pellets. This new mechanism favors imports as the raw materials from long distances are not used by the Belgian wood sector (see GAIN Report NL4018 and GAIN Report NL4040). The current Belgian industrial use is estimated at about 1 MMT per year, but is estimated to expand to about 2 MMT in 2018. The Belgian biomass and wood sector reported that future projects, such as the recently announced Belgian Eco Energy plant in the port of Ghent, will likely be sourced form a long distance to prevent competition with domestic sectors for the same feedstock.

On September 6, 2013, the Dutch Government, private sector and NGOs signed the Dutch Energy Accord (see GAIN Report NL3029). In the agreement subsidized co-firing of biomass is capped at annually about 3.5 million MT of wood pellets. In the Accord it was also decided that the biomass will have to be subject to sustainability criteria (GAIN Report NL5002 and GAIN Report NL5015). A final agreement on these criteria was made on March 18, 2015. It is still uncertain what the implications will be for the sourcing of pellets. First indications from the U.S. industry are that with this strict requirement, Dutch buyers will not be able to close long term contracts with pellet producers (for more information see under *Pellet Sustainability Criteria*). Apart from the Dutch power sector, also the Dutch chemical sector is planning to use wood pellets. The pellets will be used for the generation of process energy. The Dutch use of pellets is expected to gradually increase as of the beginning of 2016.

Trade

Main EU Importers of Wood Pellets (1,000 MT)

	Total Imports[a]		Imports from U.S.	
Calendar Year	**2013**	**2014**	**2013**	**2014**
United Kingdom	3,432	4,715	1,573	2,895
Denmark	2,320	2,121	121	86
Italy	1,756	1,936	120	180
Belgium	896	657	588	423
Sweden	713	522	35	29
Netherlands	543	383	314	272

Germany	547	374	19	4
Austria	385	342	5	0
Total EU28	**-**	**-**	**2,787**	**3,922**

Source: GTIS (HS Code: 440131) (a) Includes EU intra-trade.

Following the three regional markets in the EU, also three trade flows can be determined in the EU market. The Benelux countries and the United Kingdom mainly import from the United States and Canada. To secure sufficient supply, European power companies are investing in U.S. pellet mills and logistical infrastructure.

Despite their significant domestic production, the Scandinavian countries, mainly Denmark and Sweden, partly depend on imports from the Baltic Region and Russia. The port restrictions in Scandinavia are favoring the Baltic Sea supply, which generally shipped with smaller vessels than used in the Atlantic trade. In Denmark, one plant is located at a deep seaport and is supplied from North America. Improved flexibility in the infrastructure is expected to further increase the sourcing from North America. The market for pellets in Germany, Austria and Italy is more isolated and depends mostly on the production in this region itself.

Main Suppliers of Wood Pellets to EU (1,000 MT)					
Calendar Year	**2010**	**2011**	**2012**	**2013**	**2014**
United States	763	1,001	1,764	2,776	3,890
Canada	983	1,160	1,346	1,963	1,259
Russia	396	477	645	702	825
Ukraine	57	150	217	165	136
Belarus	90	101	112	116	122
Other	226	226	283	374	314
Total	**2,515**	**3,115**	**4,367**	**6,096**	**6,546**

Source: GTIS (HS Code: 44013020 and 440131 as from 2012).

Since 2008, EU demand for pellets has significantly outpaced domestic production. This has resulted in increased imports from the United States. Driven by the demand of large scale power plants in the EU, U.S. wood pellets exports were boosted by eighty percent in 2012, by fifty percent in 2013, and another forty percent in 2014. In 2014, U.S. exports totaled 3.9 MMT, representing a value of $750 million.

If trade flows remain consistent with current patterns, the United States has the potential to supply at least half of the import demand, which would represent a trade value of potentially over $1 billion in 2020. Other significant exporters of pellets to the EU are Canada and Russia. In response to the EU demand for industrial pellets, capacity has expanded in the supplying regions. These third country imports could, however, be affected by the implementation of sustainability requirements by the individual Member State governments, in particular by the Dutch, Danish and Belgian Governments.

Pellet Sustainability Criteria

A key factor to capture the market and benefit from the growth potential is the sustainability of the supply. European traders and end-users of industrial wood pellets are calling for clear, consistent, harmonized and long term government regulations. The EC was expected to come forward with a proposal on sustainability criteria for biomass destined for the generation of power, heat and cooling, but the EC has announced such regulations will not be implemented before 2020 (for more

information see the Policy Chapter of this report).

EU third country imports could be affected by biomass sustainability requirements imposed by the individual Member State governments. Awaiting the sustainability criteria of the Member States, the industry is actively formulating their own criteria. For *non-industrial wood pellets*, the EPC developed ENplus. The program is based on EN 14961-2, includes sustainability requirements and covers the entire supply chain. In 2014, nearly 6.5 MMT were ENplus certified.

For *industrial pellets*, the Wood Pellet Buyers Initiative (WPBI) developed harmonized quality and sustainability standards parallel with the ENplus program. To include biomass feedstocks other than wood pellets, the WPBI has been transformed to the Sustainable Biomass Partnership (SBP) in October 2013. Similar to the WPBI, the SBP is an industry initiative of the power sector to develop a sustainability scheme based on existing programs (such as FSC and PEFC) and compliant with requirements in the United Kingdom, Denmark, the Netherlands and Belgium. The Danish Government accepted the SBP program, while a decision by the UK Government is pending. On March 26, the SBP Framework was officially launched in Brussels with an event that included many EU stakeholders including Commission officials and Parliamentarians.

So far, the U.S. wood pellet sector has been able to comply with UK requirements by providing "Category A" chain of custody based certification such as Forest Stewardship Council or Program for the Endorsement of Forest Certification (PEFC), or bespoke "Category B" data. "Category B" incorporates risk assessments, regionally aggregated sustainability monitoring and reporting, and recognizes compliance with local laws and regulations. For more information see GAIN Report UK Wood Pellet Market.

In May 2014, the Belgian Government implemented a new Energy Decree which changed the procedure of granting Green Certificates (see GAIN Report NL4040). The sustainability of the U.S. pellets is assured with a dossier with relevant production methods in the South East of the United States. In the Dutch Energy Accord of September 2013, it was decided that the biomass will have to be subject to sustainability criteria. A final agreement on these criteria was made on March 18, 2015 (see GAIN Report NL5002 and GAIN Report NL5015). The agreement includes the classification of the biomass, the mandatory sustainability criteria, the chain of custody, and the time table of implementation. On March 30, the details of the agreement were laid down in official Dutch legislation. A translated version of the criteria in the legislation can be downloaded from the website of the Netherlands Enterprise Agency (RVO). The agreement also includes a, not yet signed, Covenant of the power sector and NGOs to gradually implement the requirements for the forests smaller than 500 hectares. Critical is that the chain of custody requires forest level certification. A worry of pellet producers and users is that the sustainability requirements will possibly not be harmonized in the EU. This would have as consequence that pellets could not be traded as a commodity between the different markets.

Biogas

The European biogas sector is very diverse. Depending on national priorities, i.e. whether biogas production is primarily seen as a means of waste management, as a means of generating renewable energy, or a combination of the two, countries have structured their financial incentives (or the lack thereof) to favor different feedstocks.

According to Eurostat data, Germany and the UK, the two largest biogas producers in the EU represent the two ends of the scale. Germany generates 92 percent of its biogas from the fermentation of agricultural crops and residue while the UK, along with Bulgaria, Estonia, and Portugal, relies almost entirely on landfill and sewage sludge gas. All other countries use a variety of feedstock combinations.

Biogas Production for Heat and Electricity in the EU-28 (Ktoe)								
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014 [e]**	**2015 [f]**	**2016 [f]**
Anaerobic fermentation of biomass[1]	3,816	4,829	6,431	8,102	9,424	9,600	9,750	9,800
Landfill	2,631	2,659	2,741	2,747	2,791	2,820	2,850	2,870
Sewage Sludge	947	1,017	1,169	1,194	1,276	1,350	1,400	1,450
Total	**7,394**	**8,504**	**10,341**	**12,044**	**13,491**	**13,770**	**14,000**	**14,120**

1 = Field Crops /Manure/Agro-food industry waste; Sources: 2009-2013 Eurostat, downloaded May 27, 2015; 2014-2016: e, f = Estimate/Forecast EU FAS Posts

Electricity generation in the EU-28 (ktoe)								
Calendar Year	**2009**	**2010**	**2011**	**2012**	**2013**	**2014 [e]**	**2015 [f]**	**2016 [f]**
From biogas	7,394	8,504	10,341	12,044	13,491	13,770	14,000	14,120
Total electricity	276,993	289,288	283,409	283,452	280,442	283,000	283,000	283,000
Percent from biogas	2.7%	2.9%	3.7%	4.3%	4.8%	4.9%	4.9%	5.0%

Sources: 2009-2013 Eurostat, downloaded May 27, 2015; 2014-2016: e, f = Estimate/Forecast EU FAS Posts

Germany is the leader in biogas production from biomass with more than 65 percent of the EU production in 2013. Italy, the Czech Republic and the Netherlands followed with a production share of 14, 5, and 2 percent, respectively. The incentive for farmers in Germany to invest in biogas digesters is a guaranteed feed-in price for the generated electricity which is considerably higher than that of electricity generated from fossil fuels, natural gas coal, or nuclear sources. This feed-in price is guaranteed for 20 years from the erection of the plants. However, changes to the German renewable energy law (EEG) in 2012 and 2014, reduced the attractiveness of investing in new plants. As a result, the further increase in biogas plants will be minimal. Instead, investments will focus on rejuvenating existing plants.

Biogas production is increasing in the Czech Republic (driven by feed-in tariffs for the derived electricity) and Denmark (driven by the goal to use 50 percent of livestock manure for biogas production in 2020). In France, the government seeks to increase the number of biogas facilities by means of investment support, however, administrative burden and a lack of profitability for investors limit the expansion.

The development is stagnant in the Slovak Republic and Hungary. Slovak energy distribution companies announced a blanket stop on connecting new electricity producing facilities (over 10 kW) to the grid until further notice. Hungary reports the problems with green energy feed-in systems and the complicated non-harmonized investment licensing. In addition, low electricity purchase prices make further investments into biogas facilities economically unattractive. In the Netherlands the low electricity prices have even led to a decline in biogas production.

Biogas production is under criticism for various reasons. In Germany, the criticism that too much arable land is used for corn production because of biogas has been addressed by the EEG reform of 2012 which limits the feedstock share of corn silage to a maximum of 60 percent. In other MS (for example Poland and Portugal) investments in biogas facilities face opposition from local communities out of concerns over odor pollution.

The majority of the biogas is used to generate electricity and/or heat. Here the trend is toward the so-called cogeneration plants which produce electricity and capture the process heat at the same time (Germany, the Netherlands). The heat can be supplied to nearby buildings or sold to district heating systems. A growing number of large scale operations are purifying the biogas, which contains 50-75 percent of methane, to bio-methane (99 percent of methane) and subsequently

enter it into the natural gas grid (Germany, Austria).

The use of purified biogas as transportation fuel is still marginal in most EU countries with the exception of Sweden and Germany. In 2013, the EU-28, according to Eurostat consumed 121 TOE of biogas for transportation uses. Sweden was the biggest consumer with 75 TOE followed by Germany with 46 TOE.

Overview of the EU-28 Biogas Sector by Member State					
Country	**No. of biogas plants**	**Total capacity in MW**	**Biogas production in million m^3**	**Electricity production GWh**	**Feedstock**
Austria (2014)	373	109	between 392 and 615 mn m^3	544 from biogas plus 26 from sewage and landfill gas (CY2013)	Corn silage, manure, agricultural and food waste, sewage gas, landfill gas
Belgium (2012)	39				Manure, corn silage, agricultural and food waste
Czech Republic (2014)	500	392		2,243	Corn silage, hay, industrial and municipal waste
Denmark (2011)	81				Manure
Estonia (2013)		4	17	16	Landfill gas, sewage sludge, manure
Finland (2010)	70		139		Municipal waste
France (2014)	389	310		1,279 (2012)	Municipal waste, sewage sludge, industrial waste, farm waste
Germany (2014)	7,944	3543		29,000 for electricity 13,960 for heat 550 for fuel	Corn and rye silage, grains, manure, waste, sugar beets
Hungary (2014)	74	45		107	Manure, corn silage, sugar beet slices, sewage sludge, landfill gas
Italy (2010)	243				Manure, agro-industry waste, OFSUW
Latvia (2013)		45	17	222	Manure, municipal and food processing waste, waste water treatment sludge
Lithuania (2013)	9	15	15	42	Agricultural crops, food industry waste, sludge, energy crops
Netherlands (2013)	95				Manure, corn silage, agricultural and food waste
Poland (2013)	58 thereof 42 using agricultural feedstock)	electricity50 MW, heat 50 MW	174	355	Sewage sludge, landfill gas, energy crops, plant and animal waste
Portugal (2011)	100	42		140	Manure Landfill gas, OFSUW

Slovakia (2014)	100	102		810	Corn silage, manure, agricultural waste
Slovenia (2010)	21	21	n/a	n/a	Manure, agricultural crops, waste water, landfill gas
Spain (2014)	126	223	n/a	908 (2013)	Landfill collections, agro-industrial waste, sewage sludge, OFSUW
Sweden (2011)	230			1400	waste materials, manure, crops
United Kingdom (2010)	55				Food waste, brewery waste, OFSUW, animal slurry & manure

OFSUW = organic fraction of solid urban waste; MW = Megawatt; GWh = Giga watt hours
Source: EU FAS Posts

Notes on Statistical Data

Bioethanol

Production capacity, production and consumption figures are based on statistics of the European Commission, Eurostat, the European Renewable Ethanol Association (ePURE) and FAS Posts. FAS Posts based their estimates on figures of national industry organizations and government sources. Ethyl tert-butyl ether (ETBE) is not included in ethanol production, but is included in the consumption figures. ETBE is predominantly consumed in France, Spain, the Netherlands and Poland.

Bioethanol import figures during 2006-2009 are based on estimates of ePURE. Other trade figures are based on Eurostat and Global Trade Atlas (GTA) data, which are sourced from EU MS customs data, and the U.S. Bureau of Census. As the EU has no Harmonized System (HS) code for bioethanol, trade numbers are difficult to assess. The estimation of the EU import figures after 2009 is based on EU imports through preferential trade under HS 2207, EU imports from Brazil under HS code 3824.90.97, U.S. exports to the EU under HS 2207, and EU imports of HS code 29091910 (ETBE, 45 percent ethanol).

Feedstock and co-product figures: Official data for feedstock use is scarcely made available by industry and government sources. The figures in this report represent FAS Posts estimates of the percentage of bioethanol (MT) produced by feedstock (MT). The conversion factors used are the following; wheat: 0.31; corn: 0.32; barley and rye: 0.19; and sugar beet: 0.075 (source: USDA publication "The Economic Feasibility of Ethanol Production from Sugar in the U.S."). The applied conversion factor for the production of DDG is 0.31 across all grains.

Biodiesel

Production and consumption figures are based on statistics of the European Biodiesel Board (EBB) and adjusted by EU FAS Posts using additional information obtained from national industry organizations and government sources.

Trade figures are based on Global Trade Atlas (GTA) data, which are sourced from EU MS customs data, and the U.S. Bureau of Census, and adjusted for U.S. exports of biodiesel blends. A specific customs code for pure biodiesel (B100) and biodiesel blends down to B96.5 (HS 3824.90.91) was first introduced in the EU in January 2008. In January 2012 the code was changed to HS

3826.00.10 for blends containing at least 96.5 percent biodiesel, HS code 3826.00.90 (containing between 30 and 96 percent of biodiesel), and HS 2710.20.11 for blends containing at most 30 percent biodiesel. In this report it is assumed that these codes represent a blend of 99, 95, and 5 percent, respectively.

Prior to 2008, biodiesel entering the EU was subsumed under the CN code 38.24.90.98 (other chemicals). CN stands for "Combined Nomenclature" and is the equivalent of the "Harmonized System" used in the United States. Therefore, biodiesel imports prior to 2008 are estimated based on industry information. The U.S. Bureau of the Census introduced HTS export code 3824.90.40.30 in January 2011 which exclusively covers pure biodiesel (B100) and biodiesel blends above B30.

Feedstock and co-product figures: Data for feedstock use is not available. The figures in this report represent estimates by EU FAS posts.

Abbreviations and definitions used in this report

Benelux = Belgium, the Netherlands and Luxembourg
Biodiesel = Fatty acid methyl ester produced from agricultural feedstock (vegetable oils, animal fat, recycled cooking oils) used as transport fuel to substitute for petroleum diesel
Bioethanol = Ethanol produced from agricultural feedstock used as transport fuel
BtL = Biomass to Liquid
Bxxx = Blend of mineral diesel and biodiesel with the number indicating the percentage of biodiesel in the blend, e.g. B100 equals 100% biodiesel, while B5 equals 5% biodiesel and 95% conventional diesel.CEN = European Committee for Standardization (Comité Européen de Normalisation)
DDG = distillers dried grains
EBB = European Biodiesel Board
Exxx = Blend of mineral gasoline and bioethanol with the number indicating the percentage of bioethanol in the blend, e.g. E10 equals 10% bioethanol and 90% conventional gasoline.
GHG = greenhouse gas
GJ = Gigajoule = 1,000,000,000 Joule or 1 million KJ
Ha = Hectares, 1 hectare = 2.471 acres
HS = Harmonized System of tariff codes
HVO = Hydrotreated Vegetable Oil
Ktoe = 1000 MT of oil equivalent = 41,868 GJ = 11.63 GWh
MJ = Megajoule
MMT = Million metric tons
MS = Member State(s) of the EU
MT = Metric ton (1,000 kg)
Mtoe = Million tons of oil equivalent
MWh = Mega Watt hours = 1,000 Kilo Watt hours (KWh)
MY = Marketing Year
Nordics = Denmark, Sweden, Finland, Norway and Iceland
PVO = Pure vegetable oil used as transport fuel
RME = Rapeseed Methyl Ester
Toe = Tons of oil equivalent = 41,868 MJ = 11.63 MWh
TWh = Tera Watt hours = 1 billion Kilo Watt hours (KWh)
UCO = Used cooking oil / recycled vegetable oil
UCOME = UCO based methyl ester biodiesel
US$ = U.S. Dollar

Energy content and Conversion rates:

Gasoline = 43.10 MJ/kg = 43.1 GJ/MT
Ethanol = 26.90 MJ/kg
Diesel = 42.80 MJ/kg
Biodiesel = 37.50 MJ/kg
Pure vegetable oil = 34.60 MJ/kg
BtL = 33.50 MJ/kg

1 Toe = 41.87 GJ

1 MT Gasoline = 1,342 Liters = 1.03 Toe
1 MT Ethanol = 1,267 Liters = 0.64 Toe
1 MT Diesel = 1,195 Liters = 1.02 Toe
1 MT Biodiesel = 1,136 Liters = 0.90 Toe
1 MT Pure veg Oil = 1,087 Liters = 0.83 Toe
1 MT BtL = 1,316 Liters = 0.80 Toe

Related Reports from USEU Brussels and MS Posts in the EU

Related reports from FAS Post in the European Union:

Country	Title	Date
EU	Biofuel Mandates in the EU by Member State	07/13/15
Netherlands	Legislation on Biomass Sustainability Criteria	04/23/15
EU	EU Sugar Annual 2015	04/22/15
EU	EU Grain and Feed Annual 2015	04/10/15
EU	EU Oilseeds Annual 2015	04/03/15
UK	UK Wood Pellet Market	01/22/15
Netherlands	Dutch Proposal for Biomass Sustainability Criteria	01/08/15
Belgium	Belgian Power Sector Resumed Firing of Biomass	11/21/14
Germany	German Industry Leaders Impressed by U.S. Sustainability Efforts	11/21/14
EU	EU Biofuels Annual 2014	07/08/14
Belgium	Flanders Stopped Co-firing Pellets	05/27/14
Italy	Biofuels Overview 2014	04/16/14
EU	EU Sugar Annual	04/16/14
EU	EU Grain and Feed Annual	04/04/14
EU	EU Oilseeds Annual	04/04/14
Romania	Romania revises down the biofuel mandates	01/21/14
Spain	Biodiesel Standing Report	12/13/13
Spain	Spain's Bioethanol Standing Report	11/29/13
Denmark	The Market for Wood Pellets in Denmark	11/08/13
France	France and the Bioeconomy or Green Economy	04/23/13
Benelux	The Market for Wood Pellets in the Benelux	01/07/13
Poland	Renewable Energy and Bio-fuel Situation in Poland	01/02/13

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