5.4%

The growth of primary energy production from solid biomass in the EU between 2011 and 2012.

SOLID BIOMASS BAROMETER

A study carried out by EurObserv'ER.

EurObserv'ER

Primary energy production from solid biomass is back on the road to growth, which according to EurObserv'ER stood at about 5.4% between 2011 and 2012. Output rose to 82.3 million tonnes of oil equivalent, which is a 4.2 Mtoe improvement on 2011, whose exceptionally mild winter put paid to the sector's uninterrupted rise since 1999. This growth was enjoyed by all the solid biomass energy application sectors. Heat sales to heating networks increased 12.9% to 7.9 Mtoe in 2012 while electricity production, boosted by coal-fired power station conversions, gained 7.8% to produce 79.5 TWh.

68.0 Mtoe

Heat consumption from solid biomass in the EU in 2012.

79.5 TWh

Electricity produced from solid biomass in the EU in 2012.

82.3 Mtoe

Primary energy production from solid biomass in the EU in 2012.

SOLID BIOMASS BAROMETER – **EUROBSERV'ER** – DECEMBER 2013

Delivery of the biomass fuel to the boiler (plant of Facture, Gironde).

RODOLPHE ESCHER/PHOTOTHÈQUE VEOLIA

An increasing part of European Union heat and electricity production is played by solid biomass, which includes wood, wood waste, pellets and other green or animal waste. Primary energy production in the EU has increased at a mean annual rate of 3.8% since the year 2000, when it stood at 52.5 Mtoe and had risen to 82.3 Mtoe by 2012 according to preliminary estimates gathered by EurObserv'ER **(graph 1)**. The dip in production in 2011 turned out to be one-off because of the abnormally mild winter. In 2012, the solid biomass sector returned to growth, as output increased by 5.4% year-on-year, delivering an additional 4.2 Mtoe **(table 1)**. EurObserv'ER puts gross solid biomass primary energy consumption at 85.7 Mtoe in 2012, which takes into account imports and exports and amounts to a 5.8% rise (or 4.7 Mtoe). Imports of wood pellets from Canada, the United States and Russia (see box) primarily make up the difference between production and consumption.

Our survey reveals that a large part of the rise in solid biomass consumption in 2012 was taken up by heat production in the processing sector (sales to heating networks) resulting in a 12.9% increase between 2011 and 2012 for 7.9 Mtoe of consumption **(table 2)**. As consumption in 2011 was unusually low because Northern Europe's heating networks' needs were reduced by the mild winter temperatures, part of this growth can be ascribed to catching up. At the same time, heat production was revived in this segment in Austria and Poland. The processing sector is only one part of biomass heat **(table 3)**. In 2012, 88.3% of solid biomass heat was directly used by the domestic and industrial sectors, so the total final heat consumption amounted to 68 Mtoe – 4.6% increase.

The solid biomass electricity production trend is less vulnerable than heating to annual temperature variations, as electricity usage is less dependent on temperature. Europe's electricity output according to EurObserv'ER data for reached 79.5 TWh in 2012, which equates to 7.8% year-on-year growth **(table 4)**, with particularly good performances from Poland and the UK, and also Germany, Sweden and Spain.

The wood pellet market is booming

The European Union is the world's largest wood pellet market. According to data in the 2013 European Bioenergy Outlook published by AEBIOM, the European Biomass Association, EU consumption was approximately 15.1 million tonnes in 2012, compared to world consumption of 22.4–24.5 million tonnes. European Union Member State wood pellet production in 2012 is put at 10.5 million tonnes (9.5 million tonnes in 2011), which means that the EU must have imported approximately 30% of its consumption. The four main European Union producer countries are Germany (2.2 million tonnes), Sweden (1.2 million tonnes), Latvia (1 million tonnes) and Austria (0.9 million tonnes).

According to GTIS (Global Trade Atlas Services) data, the United States became the top wood pellet exporter to the EU in 2012 with 1.764 million tonnes (1.029 in 2011), overtaking Canada, which exported 1.346 million tonnes in 2012 (1.174 in 2011). The other main suppliers to the EU are Russia (0.637 million tonnes), Ukraine (0.217 million tonnes) and Belarus (0.112 million tonnes).

NEWS FROM SOLID BIOMASS COUNTRIES

SWEDEN & NORWAY – A COMMON MARKET FOR GREEN CERTIFICATES

In 2012, Sweden reverted to its 2010 output level. According to Statistics Sweden, it produced more than 9.4 Mtoe of solid biomass energy in 2012, which is a 5.8% increase. In 2012, the gross consumption of solid biomass reaches 1 toe/capita **(table 5)**. As no biomass is imported, all of this output was earmarked for national consumption. Most of the energy was used in the processing sector, through sales to heating networks (a 15.1% rise between 2011 and 2012, which is an increase of 308 ktoe), but also for producing electricity (6.2% more, or a 599-GWh increase). Heat consumption, outside the processing sector only increased by 1% and related to direct consumption of wood logs and wood pellets by the forestry and paper pulp industries and by domestic heating systems.

In January 2012, Sweden and Norway launched a common market for green certificates to encourage investments in renewable electricity, and particularly in biomass cogeneration. This new common market aims to increase renewable electricity output by 26.4 TWh between 2012 and 2020, namely by 13.2 TWh in each country. In the case of Sweden, this target is additional to the extra 25 TWh of electricity planned for between 2002 and 2020. Under the terms of the system, the law forces all electricity consumers, both direct consumers – the industrial who purchase on the wholesale market, and indirect consumers who source their electricity from electricity suppliers who pass on the cost to end consumers (businesses and households), to purchase green certificates. The quotas for 2013 were set at 13.5% on the Swedish market and will gradually rise to 19.5% in 2020.

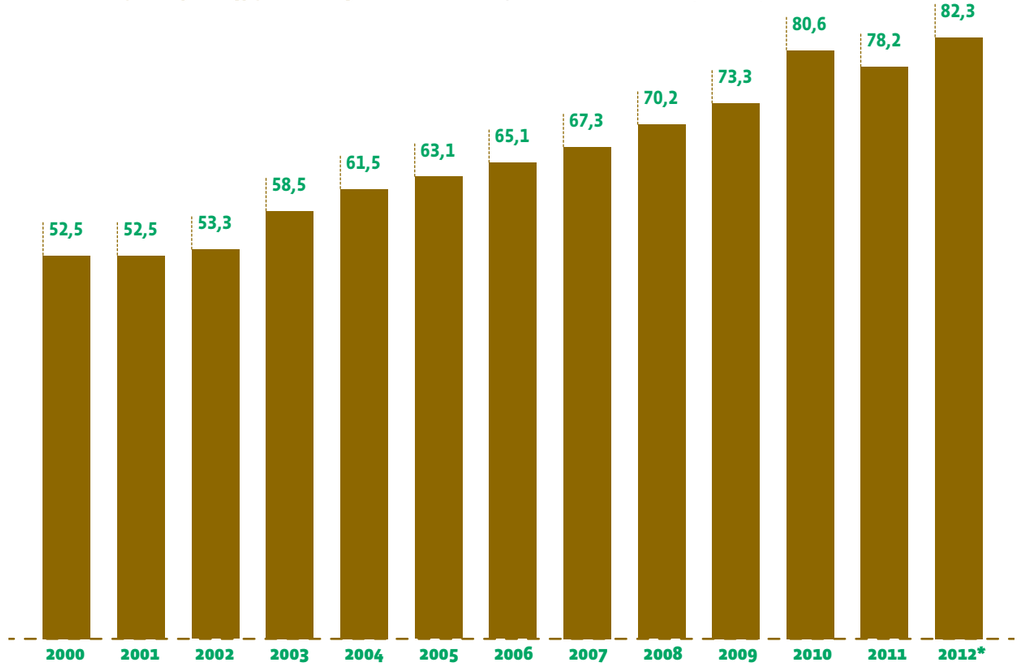
CONTRACTS OF DIFFERENCE TO BE IMPLEMENTED IN THE UK IN 2014

The Department of Energy & Climate Change – DECC – claims that the UK used 2.5 Mtoe in 2012 (having produced 1.8 Mtoe the same year). This represents a 10.4% increase, which basically went towards electricity production, which leapt 25.7% (or 1.4 TWh) between 2011 and 2012. The main explanation for this change is the conversion of the Tilbury B (750 MW) coal-fired power station into a wood pellet-fuelled biomass plant at the end of 2011. However the plant shut down in August 2013 (explanation follows further on).

The UK is preparing to implement a new market mechanism – contracts of difference – to support decarbonized electricity production (renewable and nuclear power) from 2014 onwards. The system,

Graph. n° 1

***Solid biomass primary energy prodution growth** for the European Union since 2000 (in Mtoe)*



Estimate. Decimals are written with a comma.* ***Sources: years 2000-2010 Eurostat, years 2011 and 2012 EurObserv'ER.*

which is one of the main elements of the British Electricity Market Reform – EMR, will continue to exist alongside the ROCs system until March 2017, when it will take over as the only renewable electricity promotion mechanism. In a contract of difference system, producers sell their energy at the wholesale market price and are paid an additional premium if the "difference" between a strike price and a reference price (which tends to be the wholesale market price) is positive. If the difference is negative, the producers have to reimburse the overpayment. As far as investors are concerned, the terms of this new system is still shrouded in uncertainty because the strike price, which dictates the system's attractiveness, will be set for the years 2014–18 is not due to be announced until the end of 2013. In the meantime, the government has plumped for converting existing coal-fired power stations into biomass plants rather than constructing new plants. In October 2012, this policy was underpinned by the introduction of new bonuses under the ROCs system to set a 400-MW capacity ceiling for the construction of new biomass plants. The ceiling was raised to 500 MW in 2013.

The British government along with that of the Netherlands shares the distinction of having implemented a Feed-in Tariff system for heat. As it stands, the Renewable Heat Incentives (RHI) system, introduced in November 2011, only applies to non-domestic installations in the public, industrial and business sectors. To be eligible, an installation must be equipped with a heat meter, and the agreement, which also applies to cogeneration plants, is for a 20-year period, and is geared to the system's thermal output capacity. The tariff rates from 1 April 2013 to 31 March 2014 were reviewed as follows: 8.6 p (€ 0.076) per kWh for <200-kWth plants, and 5.3 p (€ 0.063) per kWh for 200-kWth to 1-MWth plants. Lower rates apply to larger plants as follows: 1 p (€ 0.012) per kWh for ≥1 000-kWth plants. The plant under 1 MWth that run at full capacity for more than 1 314 hours per annum (i.e. a 15% load factor) are paid just 2.2 p (€ 0.026) per kWh. The measure is a safeguard to avoid plants operating unnecessarily when there is no real need for heating. During the scheme's first year (extended from November 2011 to March 2013), DECC accredited 1 238 plants for 266 MW of combined total thermal output capacity. Biomass boilers were the main recipients of these accreditations (92.1%), leaving the remained to solar thermal (3.9%), ground-source heat pumps (3.4%), hydrothermal heat pumps (0.4%), biogas and biomethane plants (0.2%). RHI payouts in March 2013 amounted to £ 7.62 million (9.21 million EUR), which equates to 167.8 GWh (14 428 toe) of heat output.

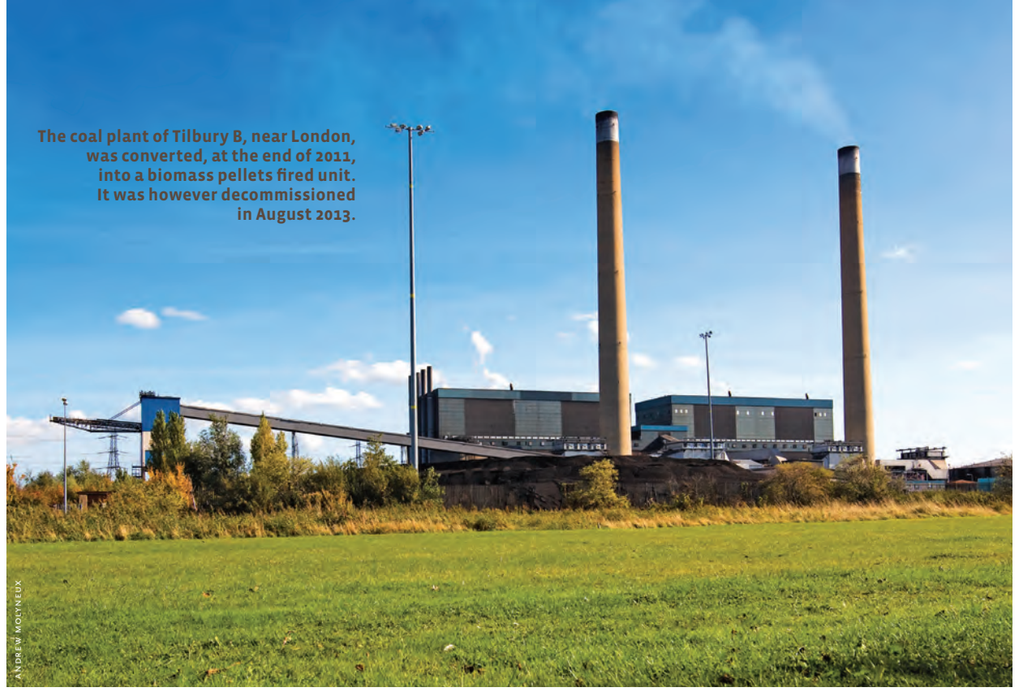
The second phase of the RHI scheme scheduled for March 2014 will extend coverage to domestic installations. In July 2013, the government-proposed Feed-in Tariff (for a seven-year term) for domestic biomass boilers was set at 12.2 p (€ 0.146) per kWh and will be based on the system's theoretical efficiency – thus obviating the need for heat meters.

Tabl. n° 1

Primary energy production and inland consumption of solid biomass in the European Union in 2011 and 2012 (en Mtoe)*

	2011		2012	
Country	Production	Consumption	Production	Consumption
Germany	11,054	11,054	11,811	11,811
France**	9,089	9,089	10,457	10,457
Sweden	8,934	8,934	9,449	9,449
Finland	7,607	7,593	7,919	7,945
Poland	6,350	6,350	6,851	6,851
Spain	4,812	4,812	4,833	4,833
Austria	4,537	4,681	4,820	5,029
Italy	3,914	5,127	4,060	5,306
Romania	3,476	3,459	3,470	3,470
Portugal	2,617	2,617	2,342	2,342
Czech Republic	2,079	1,959	2,153	2,057
United Kingdom	1,623	2,240	1,810	2,473
Latvia	1,741	1,121	1,741	1,121
Denmark	1,499	2,384	1,489	2,473
Hungary	1,429	1,435	1,429	1,435
Belgium	1,105	1,516	1,105	1,516
Netherlands	1,000	1,322	1,099	1,350
Estonia	0,939	0,794	1,012	0,814
Greece	0,940	1,036	1,000	1,136
Lithuania	0,983	0,914	0,992	1,003
Bulgaria	0,834	0,961	0,974	1,275
Slovakia	0,784	0,760	0,717	0,717
Slovenia	0,566	0,566	0,560	0,560
Ireland	0,190	0,203	0,195	0,212
Luxemburg	0,046	0,042	0,048	0,043
Cyprus	0,005	0,012	0,005	0,012
Malta	0,001	0,001	0,001	0,001
European Union	78,152	80,983	82,341	85,689

** Estimate. ** Overseas departments included for France. Decimals are written with a comma.*
Source: EurObserv'ER 2013.



The coal plant of Tilbury B, near London, was converted, at the end of 2011, into a biomass pellets fired unit. It was however decommissioned in August 2013.

ANDREW WOLSTENCROFT

Tabl. n° 2

Heat production from solid biomass in the European Union in 2011 and 2012 (en Mtoe) in the transformation sector***

	2011			2012		
Country	Heat plants only	CHP plants	Total heat	Heat plants only	CHP plants	Total heat
Sweden	0,760	1,287	2,047	0,802	1,554	2,356
Finland	0,455	1,016	1,471	0,488	1,143	1,631
Denmark	0,357	0,484	0,841	0,391	0,552	0,943
Austria	0,403	0,398	0,801	0,419	0,401	0,819
Germany	0,149	0,296	0,444	0,251	0,304	0,555
Poland	0,036	0,308	0,343	0,052	0,446	0,498
Italy	0,059	0,182	0,241	0,050	0,179	0,229
Lithuania	0,152	0,036	0,188	0,180	0,060	0,240
Estonia	0,091	0,078	0,169	0,071	0,108	0,179
Slovakia	0,044	0,057	0,101	0,043	0,056	0,099
Lettonia	0,080	0,010	0,090	0,080	0,010	0,090
Czech Republic	0,029	0,042	0,071	0,022	0,048	0,070
Hungary	0,010	0,052	0,062	0,010	0,049	0,059
Romania	0,043	0,005	0,048	0,043	0,005	0,048
Netherlands	0,000	0,046	0,046	0,000	0,043	0,043
United Kingdom	0,023	0,000	0,023	0,032	0,000	0,032
Slovenia	0,006	0,013	0,019	0,008	0,012	0,020
Bulgaria	0,009	0,000	0,009	0,012	0,000	0,012
Belgium	0,000	0,007	0,007	0,000	0,007	0,007
Luxemburg	0,002	0,001	0,003	0,002	0,001	0,003
EU 27	2,709	4,317	7,026	2,955	4,978	7,933

** Estimate. ** Heat sold in district heating. Decimals are written with a comma.* ***Source: EurObserv'ER 2013.***

SOLID BIOMASS BAROMETER – **EUROBSERV'ER** – DECEMBER 2013

FRANCE'S HEAT FUND MAKES ITS MARK

The more normal weather conditions of winter 2012 resulted in solid biomass energy consumption and output picking up in France. The Sustainable Development Ministry's Observation and Statistics Office (SOeS) published preliminary solid biomass primary energy production figures suggesting that output increased by 15.1%, and climbed back over the 10 Mtoe bar (10.5 Mtoe, if the overseas territories are included). Household wood-energy consumption was not alone in increasing its production of heat, but also the industrial and collective residential and services sectors. Household wood burning increased by 1 Mtoe, and rose from 6.2 Mtoe in 2011 to 7.2 Mtoe in 2012. The collective residential and services sectors witnessed a 30.7% increase to 460 ktoe and the industrial sector a 10.2% increase to 1.9 Mtoe. The Ministry claims that the reason for this increase in final energy consumption in these sectors is the implementation of heat fund projects. Since they were implemented in 2008, the French Environment and Energy Management Agency (Ademe) has launched 5 calls for biomass projects in the industry, agriculture and services sectors, that have led to the start-up of 109 projects amounting to 1 150 MWth of thermal capacity and total energy production of 585 000 toe p.a. In November 2013, 38 of the successful projects were up and running, producing more than 150 000 toe p.a. of heat. The fifth call for projects (BCIAT 2012) led to the selection of 22 projects for total production of 104 130 toe p.a. In September 2013, the agency launched its sixth call for projects. It aims to support the construction of plants with minimum unit output of 1 000 tonnes oil equivalent (toe) and a global indicative target of 12 000 toe p.a. Ademe has changed the aid payment terms for this tender so that the successful projects are awarded a 40% advance (instead of the 25% received up to now) on selection, and the remaining 60% to be paid over 4 years (instead of 5 years). Applications must be submitted before 30 January 2014 and the results will be announced in July 2014 to enable the installations to be commissioned no later than 1 September 2016. Incidentally, smaller projects (100–500 toe) will be awarded flat-rate aid per toe depending on eligibility, which will dispense their stakeholders from having to submit their projects to economic analysis.

Heat production also benefited projects carried out under the terms of the CRE (Regulatory Commission of Energy) tenders for biomass cogeneration. CRE 2 and CRE 3 led to the construction of some ten urban heating networks supplied by wood-energy cogeneration. For the time being these tenders are the only mechanisms likely to increase biomass electricity production as the other Feed-in Tariffs operating in the sector are unattractive. Solid biomass electricity output should increase in the coming years through the implementation of projects retained under the fourth CRE tender, whose results were announced in October 2011. Fifteen projects were accepted at the time for combined electricity generating capacity of 420 MW. However the interruption of this mechanism (no tenders in 2012 or 2013) raises concerns of a likely lull in project commissioning after 2015. At the end of September 2013, France had 28 solid biomass electricity production sites with combined capacity of 291 MW.

THE DANISH BIOMASS MODEL

Denmark uses more solid biomass energy than it produces (about 2.5 Mtoe used in 2012 to 1.5 Mtoe produced). A major part of the biomass used is assigned to producing electricity exclusively in cogeneration plants, which enabled the country to generate 3.2 TWh in 2012, and represents about 10% of electricity production. Solid biomass heat production to supply heating networks is also highly developed and amounted to 943 ktoe in 2012, roughly 12% more than in 2011.

Both branches of the solid biomass sector have very good growth prospects as the Danish Parliament adopted its

Tabl. n° 3

Heat consumption from solid biomass in the countries of the European Union in 2011 and 2012***

Country	2011	of which district heating	2012	of which district heating
France***	8,627	0,000	9,900	0,000
Germany	8,269	0,444	8,700	0,513
Sweden	7,485	2,047	7,846	2,356
Finland	5,904	1,471	6,322	1,631
Poland	5,078	0,343	5,298	0,498
Austria	3,802	0,801	4,093	0,914
Italy	3,948	0,241	3,936	0,229
Spain	3,776	0,000	3,776	0,000
Romania	3,470	0,048	3,206	0,048
Denmark	1,919	0,841	2,020	0,943
Portugal	2,149	0,000	1,802	0,000
Czech Republic	1,582	0,071	1,642	0,070
Bulgaria	0,946	0,009	1,265	0,012
Greece	1,033	0,000	1,133	0,000
Hungary	1,002	0,062	1,059	0,059
Latvia	1,048	0,090	1,048	0,090
United Kingdom	0,862	0,023	0,890	0,032
Lithuania	0,865	0,188	0,878	0,188
Belgium	0,814	0,007	0,814	0,007
Estonia	0,665	0,169	0,654	0,179
Slovenia	0,539	0,019	0,537	0,020
Slovakia	0,525	0,101	0,499	0,099
Netherlands	0,454	0,046	0,459	0,043
Ireland	0,172	0,000	0,175	0,000
Luxemburg	0,042	0,003	0,044	0,003
Cyprus	0,011	0,000	0,011	0,000
Malta	0,000	0,000	0,000	0,000
UE 27	64,989	7,026	68,008	7,933

** Consumption of the end user (either as heat sold by the district heating or self-consumed, either as fuels for the production of heat and cold).*
*** Estimate. *** Overseas departments included for France. (-) unpublished data.*
Decimals are written with a comma. ***Source: EurObserv'ER 2013.***

Tabl. n° 4

Gross electricity production from solid biomass in the European Union in 2011 and 2012 (in TWh)*

	2011			2012		
Country	Electricity plants only	CHP plants	Total electricity	Electricity plants only	CHP plants	Total electricity
Germany	4,901	6,396	11,297	5,288	6,903	12,191
Finland	1,800	9,018	10,818	1,728	8,657	10,385
Sweden	0,000	9,641	9,641	0,000	10,240	10,240
Poland	0,000	7,149	7,149	0,000	9,477	9,477
United Kingdom	5,606	0,000	5,606	7,046	0,000	7,046
Netherlands	2,328	1,649	3,977	2,383	1,577	3,960
Austria	1,153	2,548	3,701	1,379	2,398	3,777
Spain	1,572	1,365	2,937	1,813	1,574	3,387
Denmark	0,000	3,078	3,078	0,000	3,176	3,176
Belgium	1,958	1,167	3,125	1,949	1,162	3,111
Italy	1,668	0,845	2,512	1,545	1,024	2,569
Portugal	0,745	1,722	2,467	0,786	1,710	2,496
France**	0,202	1,964	2,166	0,208	2,022	2,230
Czech Republic	0,756	0,928	1,684	0,468	1,348	1,816
Hungary	1,396	0,131	1,527	1,195	0,112	1,307
Estonia	0,327	0,439	0,766	0,404	0,581	0,985
Slovakia	0,000	0,682	0,682	0,000	0,636	0,636
Romania	0,085	0,104	0,189	0,095	0,116	0,211
Ireland	0,120	0,016	0,137	0,164	0,016	0,180
Lithuania	0,000	0,121	0,121	0,000	0,175	0,175
Slovenia	0,000	0,125	0,125	0,000	0,114	0,114
Bulgaria	0,000	0,037	0,037	0,000	0,037	0,037
Latvia	0,003	0,010	0,013	0,003	0,010	0,013
EU 27	24,620	49,134	73,755	26,454	53,065	79,519

** Estimate. ** Overseas departments not included for France. Decimals are written with a comma.* ***Source: EurObserv'ER 2013.***

SOLID BIOMASS BAROMETER – **EUROBSERV'ER** – DECEMBER 2013

"Energy Agreement" on 22 March 2012 for 2020, which plans to reduce energy consumption by 12% from the reference year of 2006 (through enhanced energy efficiency), achieve a 35% renewable energy share of its final energy consumption and a 50% wind power share in the country's electricity consumption. The text is part of the declared aim to achieve 100% renewably-sourced energy consumption (electricity, heat, industry and transport) in 2050. The government's intentions for solid biomass are to make it easier to convert large coal-fired power plants into biomass plants by modifying the law on heating supply (Heating supply act). The Energy Agreement also has implications for the domestic heating sector as it prohibits the installation of oil- and gas-fired boilers in new dwellings from 2013 onwards, while new installations of these boilers in old dwellings will also be prohibited from 2016 onwards in areas covered by heating networks. The government has provided for a 42 million DKK (5.6 million EUR) financing programme between 2012 and 2015 to ease the transition and encourage the replacement of oil- and gas-fired boilers in existing housing.

A subsidy programme has also been voted through to aid industries increase their energy efficiency and use of renewable energy sources. An annual allocation of 500 million DKK (67 million EUR) will be made from 2014–2020.

Tabl. n° 5

Gross energy consumption of solid biomass* by toe per inhab in the European Union in 2012

Country	toe/hab
Finland	1,471
Sweden	0,996
Estonia	0,610
Austria	0,598
Latvia	0,548
Denmark	0,443
Lituania	0,334
Slovenia	0,272
Portugal	0,222
Czech Republic	0,196
Poland	0,178
Bulgaria	0,174
Romania	0,173
France**	0,160
Hungary	0,144
Germany	0,144
Belgium	0,137
Slovakia	0,133
Spain	0,103
Greece	0,102
Italy	0,087
Luxemburg	0,082
Netherlands	0,081
Ireland	0,046
United Kingdom	0,039
Cyprus	0,014
Malta	0,002
EU 27	0,170

** Estimate. ** Overseas departments included for France. Decimals are written with a comma.*
Source: EurObserv'ER 2013.

GERMANY WANTS TO REFORM ITS RENEWABLE ENERGIES LAW

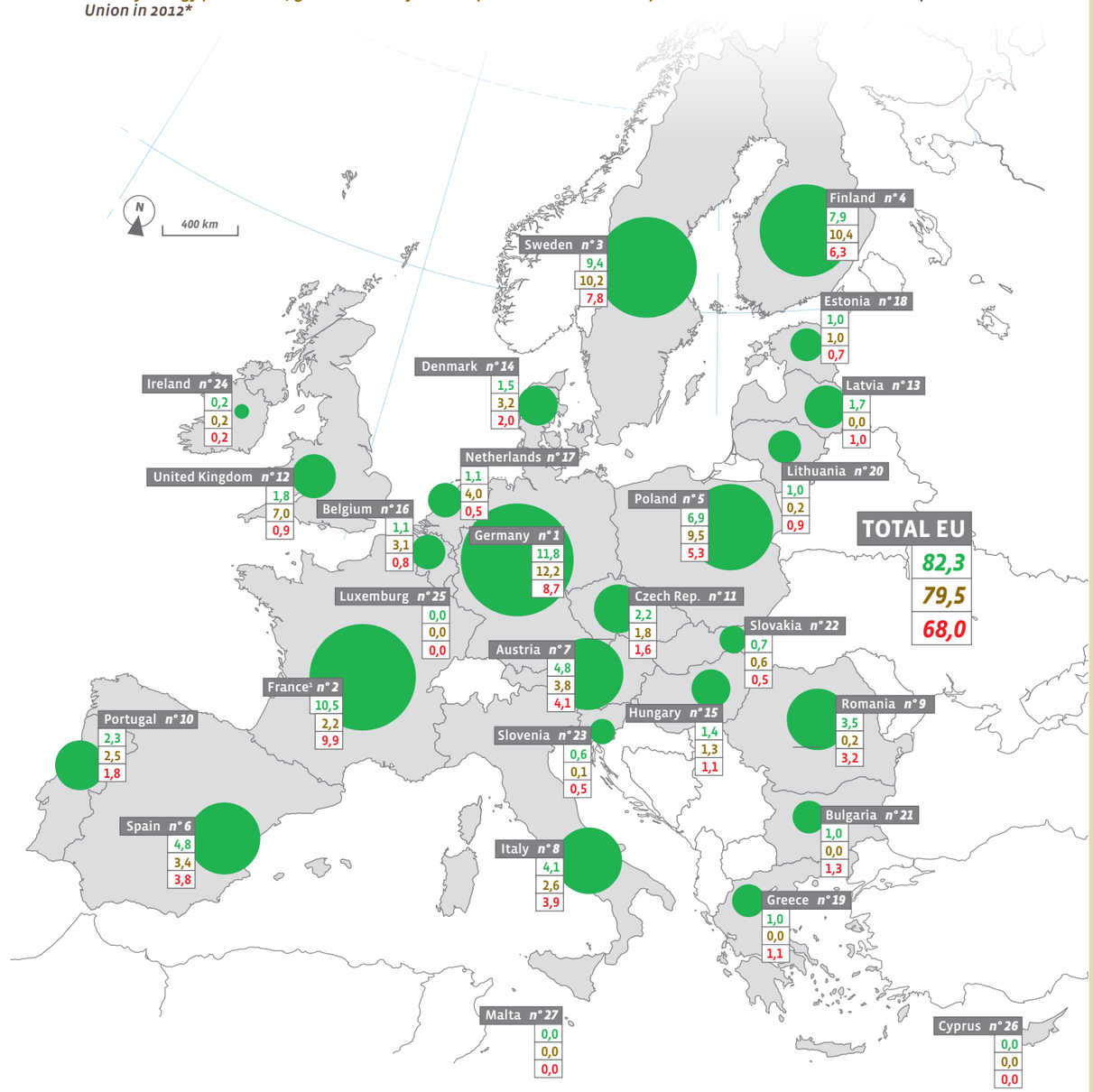
In 2012, Germany was the leading European Union country for solid biomass production and consumption with 11.8 Mtoe produced and used. This data, supplied by AGEE-Stat (the German Environment Ministry's renewable energies statistics office), testifies to a solid biomass electricity production increase of about 6.8% or 0.9 TWh rise to 12.2 TWh.

Reconsideration of the current Feed-in Tariff-based incentive system is partly responsible for this as the Merkel Conservative and Social Democrat coalition government in their negociation round are planning and preparing a major renewable energies law reform (Erneuerbare-Energien-Gesetz – EEG) to reduce energy transition-related costs in the short term. In particular the negotiators want to lower the offshore wind power targets, reduce onshore wind power aid and restrict biomass plant aid to projects converting waste and residue to energy. In the medium term the reform is also geared towards involving the renewably-sourced electricity generators in market risk. One possible avenue would be to force producers with capacities in excess of 5 MW, to sell the green energy themselves in exchange for a premium added to the market price. This possibility has already been written into the renewables energies law on electricity production (EEG 2012) since 1 January 2012, as an alternative to the Feed-in Tariff system. Under the terms of the mechanism, the premium is reassessed against the mean market price of electricity for the month. Heat production for industry and heating networks is essentially promoted by developing cogeneration. Eligibility for the full solid biomass electricity Feed-in Tariff requires the operators to produce a fixed proportion (about 60%) of their electricity by cogeneration. If they do not meet this commitment, the Feed-in Tariff is reduced to the market price.

In the construction sector, the German Renewable Energies Heat Act (EEWärmeG) forces new building owners to use a set amount of renewable energy for producing heat or cooling, which varies in line with the chosen technology. In the case of biomass, the quota is set at 50%, as solid biomass-fuelled boilers are subject to high minimum performance levels (e.g.: minimum energy efficiency of 86% for producing hot water and heat for <50-kW systems).

Since the law was enacted at the beginning of 2009, 5–7% of new buildings (be they residential or otherwise) have been equipped with mainly wood pellet-fuelled solid biomass boilers (or burners). In the case of existing dwellings, the "Marktanreizprogramm" (Market Incentive Programme) subsidized 30 635 new biomass boilers in 2012, which took the number of boilers funded since the programme was created to 304 000 at a total cost of 508 million EUR. Most of these subsidies have gone into pellet-fuelled burners or boilers, because traditional log heating systems are ineligible. In 2013, a 5–100-kW pellet-fuelled boiler was subsidized to the tune of 36 euros per kW capped at 2 400 EUR. Innovative or special technologies may also attract aid, such as wood-chip boilers and wood gasification boilers, in which case 1 400 EUR of aid is awarded for capacities in the range 5–100 kW. All systems that are installed coupled to a solar thermal system attract a 500-EUR bonus. An efficiency premium which amounts to half the basic

Primary energy production, gross electricity consumption and heat consumption* from solid biomass in the European Union in 2012



Key

9,2 Primary energy production of solid biomass in the European Union in 2012* (in Mtoe).

1,5 Gross electricity production from solid biomass in the European Union in 2012* (in TWh).

8,7 Heat consumption from solid biomass in the European Union in 2012* (in Mtoe).

** Estimate. ¹ Overseas departments included. Decimals are written with a comma.* ***Source: EurObserv'ER 2013.***

SOLID BIOMASS BAROMETER – **EUROBSERV'ER** – DECEMBER 2013

premium is also awarded if the installation is made in a particularly well-insulated building.

CONVERSION TO SOLID BIOMASS STOPPED IN ITS TRACKS

Wide-scale expansion of electricity production and biomass cogeneration, through new plant construction or the conversion of coal-fired power plants, will be the main solid biomass energy development priority for the years to come. However there are several reasons why the current context is not conducive to rapid development of plant conversions. Many key countries (primarily Germany and the UK) that want to commit to this process are causing investors anxiety by making market-type adjustments to their incentive systems. The trend is backed by the European Commission which presented its new orientations for reforming renewable energy mechanisms at the beginning of November 2013. The Commission specifically advocates phasing out Feed-in Tariffs in favour of other support instruments to encourage producers to adapt to market trends. These alternative mechanisms include tenders, purchase premiums added to market prices and quotas that oblige energy suppliers to purchase a certain amount of renewable energy. The Commission points out that this change should be gradual to avoid a freeze on investments. The underlying idea is that renewable energies, biomass, wind power and solar power, continue to grow within the framework of rational price-formation mechanisms.

Another factor is the currently very low price of coal which makes it more competitive than natural gas, even allowing for the cost of a tonne of carbon. At the moment coal-fired power stations are highly profitable, even when new production investments are made. Operators no longer view the decision to convert some of their power plants into biomass co-firing plants as urgent, even if they intend to make this type of investment in the next few years.

As for constructing new capacities, many operators intend to adopt co-firing but want to keep open the technical option of limiting the use of biomass, to cover themselves against the potential supply risks and wild fluctuations in fuel prices. Yet another sticking point is that converting coal-fired plants into co-firing plants is expensive and technically challenging, especially when the power plants are old. An alternative solution would be to resort to biochar, which is a much less energy-hungry new-generation wood-coal production process. It has the advantage that it can be pulverized like coal in thermal power plans without involving major modifications. Its energy density is higher than that of conventional wood pellets – 21 gigajoules per tonne compared to 17 for pellets, which reduces transport costs. However its price, which is higher than that of coal, acts as a curb to its growth.

These various elements are well illustrated by the announcement made by German operator RWE's UK subsidiary npower, in July 2013, that it was halting production at the Tilbury B biomass plant just eighteen months after it started operating, blaming the poor outlook for profitability (**table 6**).

In the case of this particular coal-fired plant, which was one of the oldest in the UK, it was scheduled for decommissioning in 2015 for environmental reasons (as per the Large Combustion Plants Directive). In 2010 RWE npower opted to convert it into a biomass plant, hoping to obtain a new operating licence and thus lengthen its service life by 10–12 years. DECC's refusal to include the plant in the new GHG-reduction incentive system prompted the operator to bring forward its closure, which took effect in August 2013. The economic viability of Tilbury B had already been compromised by a fire that damaged it in February 2012, just a few weeks after it started operating.

The conversion of the Ironbridge power plant (two 300-MW units), made early in 2013, by German energy supplier E.ON (**table 7**), was conducted in the same context, as its operating licence expires in 2015. E.ON has no intention of applying for a licence extension because it views the investment costs as too high.

These examples do not mean that E.ON is totally disenchanted with biomass fuel. Its new thermal power station, Maasvlakte Power Plant 3 (1 100 MW), in the port of Rotterdam, which has been operating since 2012, has co-firing capability, yet it plans to keep the coal-to-biomass ratio in coal's favour – 80% coal: 20% biomass.

In the UK, conversion projects should have better luck than Tilbury B or Ironbridge. The British power generator Drax Group Plc operates the Drax coal-fired power plant, the largest in Britain (6 units of 660 MW each). It plans to convert three of its coal-fired units to 100% biomass. The first, funded through the ROCs scheme, was converted in July 2013, the second could be up and running by 2014 and the third by 2015 or 2016. Conversion costs to cover the modifications to the boilers and the construction of wood pellet storage silos and conveyer systems have been put at £ 700 million (845.5 million EUR). Each unit will use approximately 2.3 million tonnes of biomass every year that will be shipped from the United States and Canada. Wood pellet consumption could even rise to 7.5 million tonnes in 2017. Agreements have been signed with Hull, Immingham and Grimsby ports to deliver the pellets.

In 2012 Drax Group Plc set its sights on investing £ 2 billion (2.4 billion EUR) in the construction of three new biomass power plants in North Yorkshire and Humberside, but these have been dashed for want of adequate financial guarantees. It has abandoned its project, as the government planned to reduce the level of aid and cap new biomass power station capacities at 500 MW in 2013. Another British energy producer, Centrica, dropped its plans to invest an initial £ 400 million (483.4 million EUR) in two biomass power plants in Cumbria and Lincolnshire for the same reason.

Other major energy suppliers have announced conversion projects. Following the "Energy Agreement", Dong Energy, the Danish state-owned utility announced plans to invest in converting three of its fossil cogeneration plants to biomass cogeneration (two coal-fired and one gas-fired), namely the coal-fired Studstrup plant (760 MW), at Aarhus,

Dong Energy A/S

The coal plant from Avedøre (790 MW) in Copenhagen will soon be converted into a biomass plant.

Tabl. n° 6

Largest solid biomass plants in the European Union

Plant name	Country	Fuel	Operator	Electrical capacity	Commissioning date
Drax	United Kingdom	Pellets (one unit converted in 2013)	Drax Group Plc	660	2013
Ironbridge	United Kingdom	Pellets (two units converted in 2013)	E.ON	600	2013
Maasvlatke 3	Netherlands	Co-firing (80% coal, 20% biomass)	E.ON	1 100	2012
Tilbury B*	United Kingdom	Pellets	nPower (RWE)	750	2011
Alholmens	Finland	Coal and biomass co-firing	Metso	240	1996
Rodenhuize	Belgium	Pellets	Electrabel/GDF-Suez	180	2011
Wisapower	Finland	Black liquor	Pohjolan Voima Oy	150	2004
KauVo	Finland	Biomass, peat	Kaukaan Voima Oy	125	2010
Arneburg	Germany	Wood residues, black liquor	Zellstoff Stendal GmbH	100	2004

** Tilbury B's production stopped in 2013.* ***Source: EurObserv'ER 2013.***

Tabl. n° 7

Main operators of solid biomass plants in the European Union

Operators	Countries	Capacity in operation (MWe)	Main fuels used
Drax Group Plc	United Kingdom	660, 1 320 MW in conversion	Pellets
E.ON	Germany	643, 150 MW in conversion (Gardanne, France)	Pellets, wood chips
Pohjolan Voima Oy	Finland	589	Wood and wood residues, black liquor
Vattenfall	Sweden	443	Solid biomass, wood residues
Electrabel/GDF-Suez	Belgium	313	Pellets, wood chips
Metso	Finland	240	Biomass co-firing
Fortum	Finland	225, 216 MW in construction	Wood and wood residues, liquid biomass
GDF/Suez Cofely	France	223, 736 MW in construction (Rotterdam)	Biomass co-firing
Kaukaan Voima Oy	Finland	125	Wood, peat

Source: EurObserv'ER 2013.

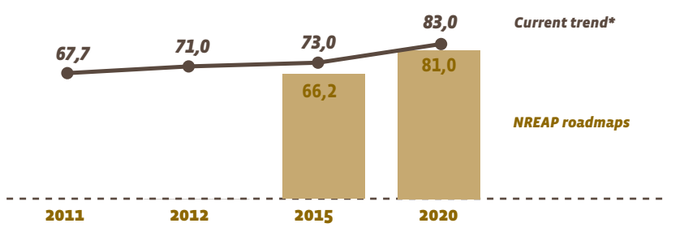
SOLID BIOMASS BAROMETER – **EUROBSERV'ER** – DECEMBER 2013

the coal-fired Avedøre plant (790 MW), in Copenhagen, and the gas-fired Skærbæk plant (418 MW), at Kolding. As these plants are among the biggest in the country, the share of renewable heat in heating networks will be significantly increased. Construction of a 100 000-tonne capacity silo for solid biomass storage will be required for each of these plants. Dong Energy thus intends to halve its coal consumption from the current 4 million tonnes once the conversions are completed in 2015. Nonetheless the company points out that although these plants will be able to run 100% on biomass, they will retain their coal or gas combustion capability for contingencies. In May 2013, Dong Energy announced that the conversion of unit 3 of the Studstrup plant would take a little longer than planned as the legal framework regarding the tax on biomass sustainability was still pending.

Other operators have also made statements of their intentions to increase their biomass consumption. In this vein Vattenfall, the Swedish state energy company and number six European electricity generator and one of the top heat producers, plans to replace more than half its coal consumption with biomass by 2020. The company, which is highly active in the Nordic countries, the Netherlands and Germany, states that it already runs about forty plants either entirely or partly on biomass fuel running to more than 3 million tonnes per annum. In the next few years it intends to increase biomass consumption significantly in its plants, primarily through co-firing. Other biomass projects are in the pipeline in Berlin and Hamburg Germany, and also in Denmark and the Netherlands. The speed at which these investments are made will again depend on the solidity of finances.

Graph. n° 2

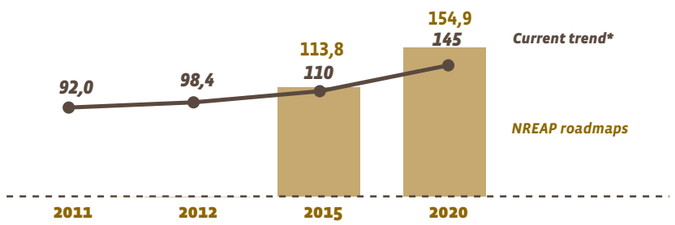
***Comparison of the current trend of heat consumption** from solid biomass against the NREAP (National Renewable Energy Action Plan) roadmaps (in Mtoe)*



These data include an estimate of the renewable heat from incineration plants of municipal waste.
Decimals are written with a comma. ***Source: EurObserv'ER 2013.***

Graph. n° 3

***Comparison of the current trend of electricity production** from solid biomass against the NREAP (National Renewable Energy Action Plan) roadmaps (in TWh)*



These data include an estimate of the renewable electricity from waste incineration units.
Decimals are written with a comma. ***Source: EurObserv'ER 2013.***

NEW START, NEW RULES

Solid biomass' progress against the European Union targets is measured by the benchmark of the 27 individual National Renewable Energy Action Plans of its Member States. The Energy research Centre of the Netherlands (ECN) has extracted the key data to produce a summary that translates these country roadmaps for developing each of the renewable sectors, be they for generating electricity, heat or transport fuel. These plans earmark biomass (wood, waste, crops and farm waste) to provide almost half of the European 20% target of renewable energy in the 2020 energy mix. In the ECN summary, the solid biomass data includes renewable municipal waste incineration, which while technically similar to solid biomass, is dealt with in its own right in our barometers and by the statistics offices. Accordingly, the NREAP data that distinguishes electricity production from heat consumption cannot be compared directly to the data in this barometer. The electricity production and heat consumption figures for renewable municipal waste should be added in.

In the case of electricity production, it will be hard to achieve the NREAP targets for 2020 of 155 TWh, as they call for regular, structural capacity build-up across the sector, of both generating capacities and infrastructures enabling the fuels to be produced and shipped. However if uncertainties surrounding the funding of these conversions persist, the target production level will be unfeasible as the pick-up in the conversion pace after 2015, announced by most of the operators will no longer suffice.

The same applies to heat consumption. It is partly linked to the development of electricity-generating infrastructures that will be constructed by deploying cogeneration. In this case, the 2020 targets still seem achievable provided resource availability suffices.

By force Europe's targets will call for increased imports, because supplies across Europe are insufficient and too

The Drax Group Plc company has planned to convert three of its coal units into 100% biomass units from 2013 to 2016.

expensive to cater for the market's needs. The expected increase in imports makes the introduction of binding sustainability criteria for entry to the European market essential if the biomass is to be guaranteed as having been produced responsibly and sustainably, and meeting the requirements for GHG emission reduction. In the interim time, those operators who are importing biomass have pre-empted the criteria by setting up voluntary sustainability verification systems for pellet production and also to ensure that the wood is actually sourced from certified forests. The time has come for this initiative to be enshrined in an EU community-wide legal framework. The problem is that there are disagreements between Member States and within the Commission on the requirement level of these sustainability criteria, which is delaying the publication of such a directive. A draft directive was published in August 2013, but it appears that the text was too contentious to form the basis for discussion.

Nonetheless this directive is anxiously awaited by the industry. In a joint communiqué signed in March 2013, Aebiom, the European Biomass Association and Eurelectric, the association of the electricity industry in Europe, pleaded for the rapid introduction of binding criteria across Europe. Their view is that these criteria will pave the way for establishing a stable legal framework that will encourage energy producers and biomass suppliers to invest. This uncertainty is an obstacle to sector development. If the European Union wants to put an end to the standstill, it must assert its political and strategic resolve.

Sources: *Statistics Austria, APEE (Bulgaria), Ministry of Industry and Trade (Czech Republic), ENS (Denmark), Statistics Estonia, Statistics Finland, SOeS (France), ZSW-AGEE Stat (Germany), CRES (Greece), SEAI (Ireland Republic), Ministry of Economic Development (Italy), Terna (Italy), Econet Romania, Statistics Lithuania, STATEC (Luxemburg), Statistics Netherlands, DGEG (Portugal), Jožef Stefan Institute-Energy Efficiency Centre (Slovenia), Statistics Sweden, DECC (United Kingdom), Renewable Information 2013 (IEA).*

The next barometer will cover wind power

Download

EurObserv'ER is posting an interactive database of the barometer indicators on the www.energies-renouvelables.org (French-language) and www.eurobserv-er.org (English-language) sites. Click the "Interactive EurObserv'ER Database" banner to download the barometer data in Excel format.

Co-funded by the Intelligent Energy Europe Programme of the European Union

This barometer was prepared by Observ'ER in the scope of the "EurObserv'ER" Project which groups together Observ'ER (FR), ECN (NL), Institute for Renewable Energy (EC BREC I.E.O, PL), Jožef Stefan Institute (SL), Renac (DE) and Frankfurt School of Finance & Management (DE). Sole responsibility for the publication's content lies with its authors. It does not represent the opinion of the European Communities. The European Commission may not be held responsible for any use that may be made of the information published. This action benefits from the financial support of Ademe, the Intelligent Energy – Europe programme and Caisse des dépôts.

SOLID BIOMASS BAROMETER – **EUROBSERV'ER** – DECEMBER 2013