



Woodchip storage at Skærbæk power station



-0.3%

The growth of inland consumption from solid biomass in the EU between 2017 and 2018

SOLID BIOMASS BAROMETER

A study carried out by EurObserv'ER.



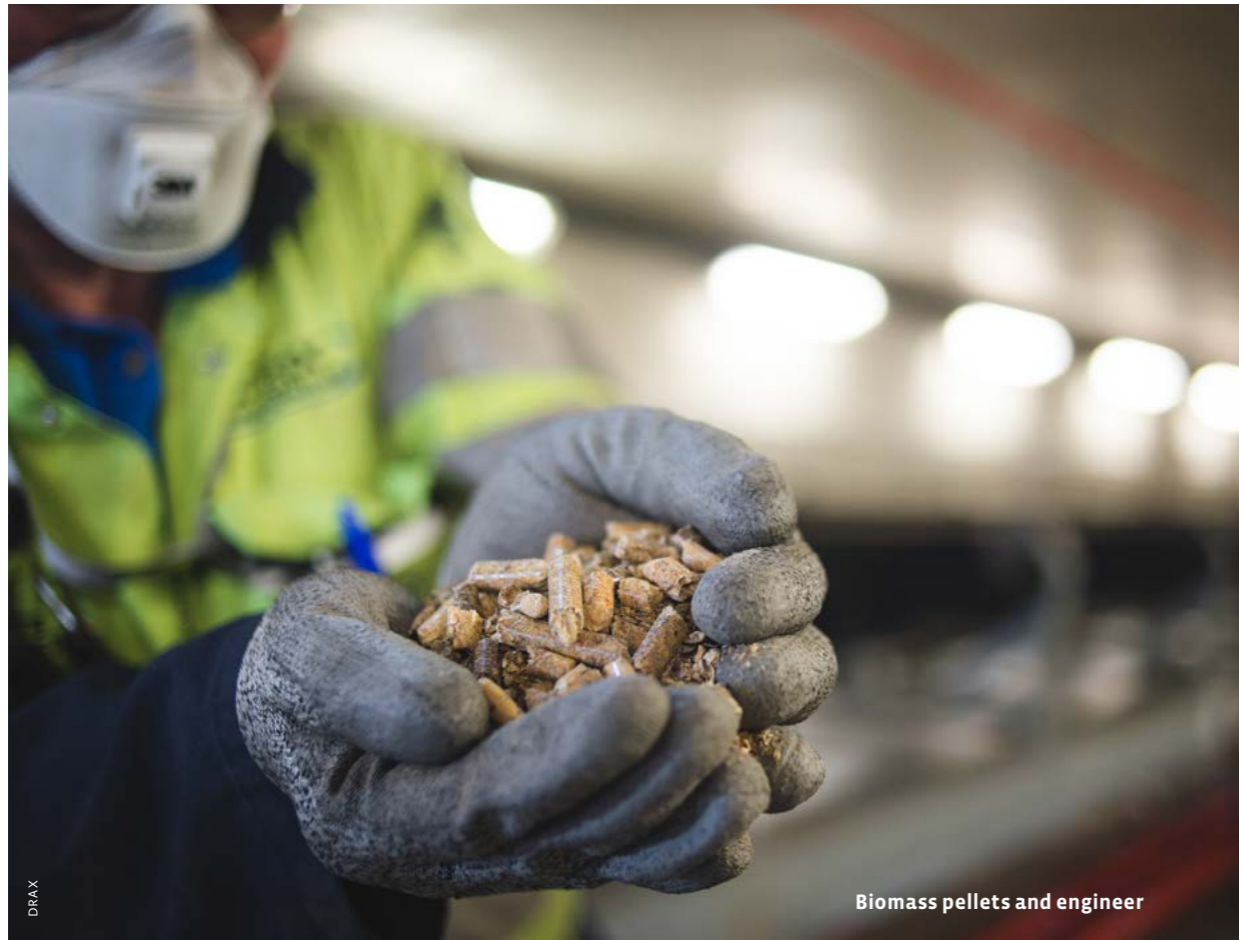
Solid biomass energy consumption trend swings depend on public policies promoting its use, but they are also highly susceptible to weather conditions. In 2018, it was a mixed bag, with variations across its uses. The demand for heat declined in the European Union, due to a milder winter, while there was a rise in electricity production. All in all, the sector's primary energy consumption was stable (0.3% lower than in 2017) and is still below the 100 Mtoe threshold (99.3 Mtoe).

99.5 TWh

The electricity production from solid biomass in the EU in 2018

78.9 Mtoe

The heat consumption from solid biomass in the EU in 2018



DRAX

Biomass pellets and engineer

Solid biomass includes all the solid components of organic origin used as fuels. They include wood, wood waste (wood chips, sawdust, etc.), wood pellets, black liquors from the papermaking industry, straw, bagasse, animal waste and other solid plant matter and residues including the renewable part of solid industrial waste. The renewable share of municipal waste is subject to specific monitoring by statistical organizations and is therefore not taken into account in the solid biomass indicator. Charcoal is another solid biomass component, but it is separately accounted for and excluded from this barometer's indicators. By way of illustration, final energy consumption of charcoal in the EU is about 200 ktoe (196.6 ktoe in 2017 according to Eurostat). The energy recovery of solid biomass is basically channelled into producing heat and electricity. Lignocellulosic biomass (cereal straw, forestry residue, etc.) can also be recovered in the form

of 2nd generation liquid biofuel or as gas, such as hydrogen or methane. For the time being, the output of these recovery modes is insignificant across the European Union.

CLIMATE HAS A STRONG BEARING ON SOLID BIOMASS CONSUMPTION

European Union solid biomass energy consumption has two main outlets – supplying heat and energy. The trend in the supply of heat – the main biomass energy recovery form – is particularly climate-sensitive during the heating season. According to the World Meteorological Organisation (WMO), 2018 was the third hottest year ever recorded. France, Germany, the Czech Republic and Hungary had the hottest year of their existences since climate surveys began. So, the heating requirements of many European countries dropped below their 2017 levels.

This limited household wood energy consumption and demand from solid biomass heating networks. Unfortunately, this climate warming trend is set to continue. According to the WMO, 2019 will conclude the end of a decade of exceptional heat worldwide. It is almost certain that the mean temperatures for the five-year (2015–2019) and ten-year (2010–2019) periods will be the highest ever recorded. Everything points to 2019 being the second or third hottest year on record.

BELOW THE 100-MTOE THRESHOLD

According to EurObserv'ER which bases its findings on the official data available at the beginning of December, solid biomass primary energy consumption in 2018 failed to pass the 100-Mtoe threshold (graph 1). Across the European Union, consumption dipped by 0.3%, from 99.6 to 99.3 Mtoe (table 1). The situation is patchier across the Member States with about half of the

countries showing lower consumption. The biggest drops were seen in Italy (-502 ktoe), Germany (-310 ktoe), Austria (-265 ktoe), Hungary (-211 ktoe), and Sweden (-209 ktoe). The biggest consumption rises were in the UK (885 ktoe), Bulgaria (339 ktoe) and Finland (273 ktoe), prompted by an increase in solid biomass electricity production (see below). The production of solid biomass-sourced primary energy, namely the solid biomass gleaned from European Union soil, also slipped, by 0.4% compared to 2017, to 94.3 Mtoe in 2018. The main reason for the difference, which is accounted for by net imports plus or minus stock variations, is made up of wood pellet imports mainly from the USA, Canada and Russia. EurObserv'ER distinguishes the two types of final energy from solid biomass, namely electricity (table 2) and heat (for heating or industrial processes). Solid biomass heat produced by the transformation sector and distributed via heating networks

(table 3) is differentiated from solid biomass heat directly used by the end consumer (in the residential or industrial sectors) (table 4). According to EurObserv'ER, the latter declined across the EU (by 1.1% compared to 2017) reaching 68.2 Mtoe, primarily because of the decrease in household wood energy consumption in France, Italy and Sweden. This drop could have been even steeper had it not been for the clear increases in final energy consumption in the UK (326 ktoe) and Finland (214 ktoe). The drop in solid biomass heat sold to heating networks (from the transformation sector) was sharper (-2.1%) to 10.7 Mtoe (10.9 Mtoe in 2017), attributable to lower input in Finland and Sweden. Total solid biomass heat consumption, decreased by almost 1 Mtoe to 78.9 Mtoe (by 1.2%), if these two elements – the heat sold by heating networks and directly used by households and industry – are added together.

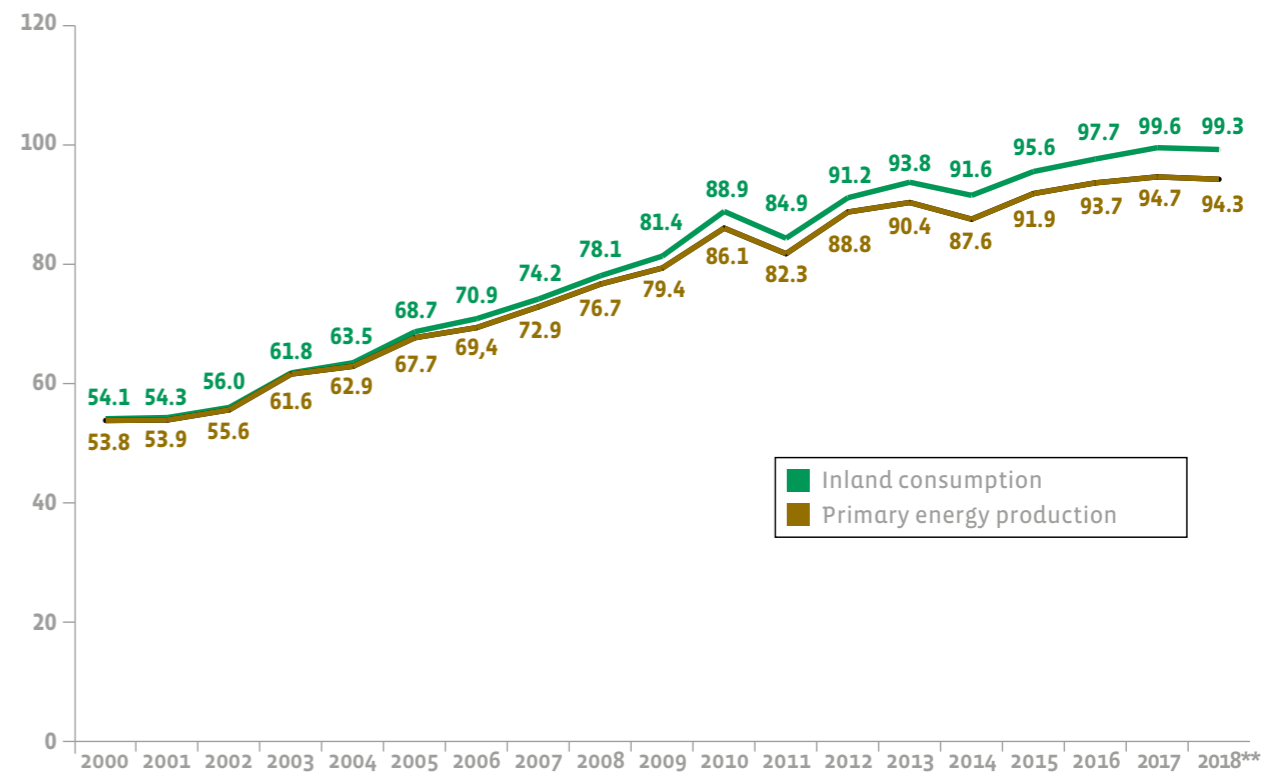
The solid biomass electricity production trend is largely governed by certain member states' policies to pull out of coal by converting or adapting all or part of their power (or cogeneration) plants to use solid biomass fuels (pellets, wood-chips, etc.). Across the EU, biomass electricity output increased by 5% over 2017 (by 4,7 TWh), which remains below the 100-TWh threshold with 99.5 TWh in 2018. Growth was essentially driven by the UK, Finland and Bulgaria.

WOOD PELLET CONSUMPTION RISES BY 8% IN 2018

EPC (European Pellet Club) data published in its 2019 Bioenergy Europe pellet market overview, shows that wood pellet consumption in the European Union of 28 continued to rise in 2018. It reached 26.1 million tonnes, with 8% growth which equates to a consumption rise of 2.1 million tonnes. The

Graph. n° 1

Solid biomass primary energy production and inland consumption* growth figures for the EU since 2000 (in Mtoe)



*Excluding charcoal. **Estimate. Sources: years 2000-2014 Eurostat, years 2015, 2016 and 2017 EurObserv'ER.

annual growth pace was a little less robust than in 2017 (11%) against the backdrop of lower heating requirements in most EU countries. The EPC's statistics stipulate that in 2018, 55% of wood pellet consumption was used by the residential and commercial sectors (56% in 2017), thus the remaining 45% was used by industry.

When we go into detail, 10.3 Mt were used by the residential sector (9.8 Mt in 2017), 3.6 Mt by the commercial sector (3.3 Mt in 2017), 2.9 Mt in CHP plants (2.9 Mt in 2017) and 9.3 Mt in plants that only produce electricity (7.9 Mt in 2017). In 2019, the UK was the European Union's biggest wood pellet user with 8.5 million tonnes, ahead of Italy (3.3 million tonnes), Denmark

(3.1 Mt), Germany (2.2 Mt), Sweden (1.8 Mt), France (1.6 Mt), Belgium (1.5 Mt), Austria (0.96 Mt), the Netherlands (0.57 Mt), Spain (0.57 Mt), Poland (0.45 Mt) and Finland (0.44 Mt). The increase in demand for wood pellets came from both the residential-commercial and industrial sectors, whose respective growth rates were 5 and 13%. Thus, industry was the main wood pellet consumption growth driver. The biomass power stations of the UK (73.5%) and the Netherlands (17.5%) can take credit for almost all of this increase.

As a result of the better heating season in 2017, the residential-commercial sector's annual increase in wood pellet consumption was 5% lower than in 2017 (compared to 12% between 2016 and 2017). Also, pellet burner sales in Europe were less spectacular. However, France proved an exception to this rule as grants for oil-fired condensing boilers and aids for converting old fuel-oil equipment were curtailed, and despite the carbon tax freeze at 44.6 euros per tonne. According to the Observ'ER annual survey of wood-burning domestic heating appliances, sales of wood pellet burners increased from 135 180 in 2017 to 151 260 in 2018 (by 11.9%), wood pellet inserts from 3 320 to 4 390 (32.2%) and wood pellet boilers from 4 800 to 6 900 (43.8%).

The main uses of wood pellets vary wildly from country to country. They are basically directed for supplying electricity-only power stations in the UK (91.4%), Belgium (72.4%) and the Netherlands (61.4%), while in Denmark they are used more in CHP plants (69.1%). Uses are shared in Sweden (39.2% across the residential sector, 27.4% the commercial sector and 33.4% for cogeneration). In Italy, France and Germany, most of the consumption targets residential heating needs (92.3%, 88.5% and 67.8% respectively) followed by the commercial sector (7.7%, 11.5% and 29.2% respectively), with only marginal biomass recovery as electricity. European Union wood pellet output increased a little more than its consumption (by 9.6% between 2017 and 2018) from 15.4 to 16.9 Mt, which means that it imported 9.2 million tonnes of wood pellets (net imports), which equates to just over a third of its consumption (35.3%). Most of the imports come from the USA, Canada, Russia and other non-EU countries.

Tabl. n° 1

Primary energy production and gross inland consumption of solid biomass in the European Union in 2017 and 2018** (in Mtoe)*

Country	2017		2018**	
	Production	Consumption	Production	Consumption
Germany	11.9	12.4	11.7	12.1
France***	10.4	10.4	10.2	10.3
Sweden	9.5	9.5	9.2	9.3
Finland	8.6	8.6	8.9	8.9
Italy	7.8	9.0	7.1	8.5
United Kingdom	4.0	6.4	4.5	7.3
Poland	6.2	6.3	6.0	6.2
Spain	5.5	5.5	5.4	5.4
Austria	4.8	4.9	4.6	4.6
Romania	3.6	3.6	3.6	3.6
Denmark	1.7	3.2	1.8	3.2
Czechia	3.0	3.0	3.1	3.0
Portugal	2.6	2.4	2.7	2.5
Hungary	2.4	2.4	2.1	2.2
Belgium	1.2	2.1	1.2	2.0
Latvia	2.0	1.4	2.4	1.5
Bulgaria	1.2	1.1	1.5	1.4
Lithuania	1.3	1.3	1.2	1.2
Croatia	1.5	1.2	1.5	1.2
Netherlands	1.4	1.2	1.3	1.2
Estonia	1.5	1.0	1.6	1.0
Slovakia	0.8	0.8	0.8	0.8
Greece	0.8	0.9	0.8	0.8
Slovenia	0.6	0.6	0.5	0.5
Ireland	0.2	0.3	0.2	0.3
Luxembourg	0.1	0.1	0.1	0.1
Cyprus	0.0	0.0	0.0	0.0
Malta	0.0	0.0	0.0	0.0
Total EU 28	94.7	99.6	94.3	99.3

*Excluding charcoal. **Estimate. ***Overseas departments included for France.
Source: EurObserv'ER 2019.

SOLID BIOMASS CONSUMPTION CONTRACTS AGAIN IN FRANCE

Household wood consumption has been in decline for two years in France, according to the SDES (Data and Statistical Studies Department). It stood at about 7 Mtoe in 2016 but was only 6.5 Mtoe in 2018. If all the usage sectors are considered

(including wood-fired heating networks and industry), biomass heat consumption slipped from 10 Mtoe in 2016, to 9.4 Mtoe in 2017 and to 9.3 Mtoe in 2018, which equates to a 0.7 Mtoe drop in two years. The SDES, attributes this drop to the milder climate and lower installation figures for wood-burning appliances than at the end of the 2000s and the start of the

2010s. The drop in biomass heat consumption has hit the French 2020 targets for the European directive, given that France was counting heavily on biomass heat. The SDES gauged the renewable energy share of gross final energy consumption at 16.6% in 2018, yet the indicative trajectory for 2017-2018 was set at 18.6% and that the 2020 target is 23%. ↘

Tabl. n° 2

Gross electricity production from solid biomass in the European Union in 2017 and 2018** (in TWh)*

Country	2017			2018**		
	Electricity only plants	CHP Plants	Total electricity	Electricity only plants	CHP Plants	Total electricity
United Kingdom	20.542	0.000	20.542	23.532	0.000	23.532
Finland	0.918	9.973	10.890	1.429	10.392	11.821
Germany	4.600	6.044	10.644	5.400	5.427	10.827
Sweden	0.000	10.250	10.250	0.000	10.195	10.195
Poland	1.415	3.893	5.309	1.422	3.911	5.333
Denmark	0.000	4.797	4.797	0.000	4.418	4.418
Spain	3.458	0.907	4.365	3.289	0.932	4.221
Italy	2.198	2.033	4.232	2.168	2.024	4.192
Austria	0.931	3.004	3.935	0.985	2.981	3.966
France***	0.190	3.241	3.431	0.566	3.201	3.767
Belgium	2.491	1.326	3.816	2.177	1.307	3.484
Portugal	0.709	1.864	2.573	0.746	1.811	2.558
Czechia	0.004	2.209	2.213	0.003	2.118	2.121
Hungary	0.955	0.691	1.646	1.044	0.755	1.799
Netherlands	1.099	0.674	1.772	0.424	1.072	1.496
Bulgaria	0.014	0.167	0.180	0.096	1.184	1.280
Estonia	0.140	0.856	0.996	0.172	1.051	1.223
Slovakia	0.000	1.080	1.080	0.000	1.070	1.070
Latvia	0.000	0.525	0.525	0.000	0.570	0.570
Romania	0.064	0.395	0.458	0.051	0.316	0.367
Lithuania	0.000	0.303	0.303	0.000	0.355	0.355
Ireland	0.366	0.016	0.381	0.317	0.013	0.330
Croatia	0.000	0.216	0.216	0.000	0.313	0.313
Slovenia	0.000	0.155	0.155	0.000	0.146	0.146
Luxembourg	0.000	0.052	0.052	0.000	0.095	0.095
Greece	0.010	0.000	0.010	0.012	0.000	0.012
Total EU 28	40.102	54.671	94.773	43.833	55.657	99.491

*Excluding charcoal. **Estimate. ***Overseas departments included for France.
Source: EurObserv'ER 2019.



Biomass domes at Drax Power station (United Kingdom)

To put matters straight, the French government, through its leading arm Ademe, decided to grant more funding to the Heat Fund, which is the main support mechanism for developing renewable heat in the habitat, service sector and industry. Accordingly, the Heat Fund budget rose from 307 million euros in 2019 to 350 million euros in 2020, as planned in the Multiannual Energy Programme. By way of example, in 2019 Ademe supported nine new tender operations “Biomass Heating for Industry, Agriculture and Services” (BCIAT)... for annual thermal production of 825 GWh for an investment of € 107 M of which € 33.2 M comes from Heat Fund grants. The projects in question cover the industrial sectors (wood veneer, production of wood pellets, paper, pet food, etc.), and a farming project (market gardening).

THE UK PURSUES ITS CONVERSION POLICY

Once again, the highest contribution to the increase in the European Union’s solid biomass consumption came from the UK. Its gross domestic consumption, according to BEIS (Department for Business Energy and Industrial Strategy) data, rose from 6.4 Mtoe in 2017 to 7.3 Mtoe in 2018, which is an increase of 885 ktoe (note: the UK has revised its statistics since 2015). The country has enjoyed very fast growth in solid biomass consumption

over the past 15 years. It stood at less than 1 Mtoe in 2004 (933 ktoe) and has increased almost threefold since 2010 (when it reached 2.7 Mtoe). The UK is also a major solid biomass fuel importer (2.9 Mtoe in 2018) and particularly of wood pellets. Its primary energy output (solid biomass taken from its own soil) has also increased, rising at the same time from 4.0 to 4.5 Mtoe.

The main reason for the high growth in the UK’s solid biomass energy consumption is its decision to abandon coal for electricity production by converting some of its power stations to wood fuels. Thus, in the space of a few years, the UK has become the leading solid biomass electricity producer in the European Union with 23.5 TWh of output in 2018 (14.6% growth on 2017). Much of this increase can be put down to the 2018 conversion of a fourth tranche of the Drax thermal power station (about 700 MW more) and in the same year by restarting the Lynemouth coal-fired power station that was stopped in 2015, following its full conversion to wood pellets (adding 420 MW). The BEIS also claims that the UK’s nett solid biomass electricity capacity stood at 4563 MW in 2018 compared to 3118 MW in 2017. It goes on to state that the increase in output is unrepresentative of the capacity increase, because new tranches were commissioned during the year. Therefore, 2019 should see a further rise in electricity output.

FINLAND AIMS FOR CARBON NEUTRALITY WITHIN 15 YEARS

Finland has the highest climate ambitions of any EU country. On 14 June 2019, its government published a document targeting carbon neutrality by 2035 and to present negative carbon dioxide emissions a little later, by accelerating its emission reduction measures and boosting its carbon sinks. Finland had already decided to stop using coal as an energy source by 2029. To achieve its goal, the government plans to increase the output from its renewable energy production sectors sharply (wind and solar energy), it aims for mass electrification of heating and transport and to increase bioenergy by 10%. The current solid biomass energy trend remains positive. According to Statistics Finland, solid biomass-sourced energy consumption increased again by 3.2% in 2018 (from 8.6 to 8.9 Mtoe), after increasing by 3% in 2017 (from 8.4 to 8.6 Mtoe). This was mainly in favour of solid biomass electricity production which reached 11.8 TWh, or 0.9 TWh (8.5% more than in 2017. No new solid biomass capacity was connected in 2018 (which still stands at 1966 MW) but the new CHP plant of Naantali connected in 2017 was run at full capacity. The plant, owned by Turun Seudun Energiantuotanto Oy, partly replaces the existing coal-fired plant. It operates in co-firing with coal, but mainly uses biomass fuel (60-70%).

It produces both electricity (800 GWh p.a.), steam for its industrial customers (200 GWh of process heat) and supplies the heating network of the Turku region... one of Europe’s longest networks (1400 GWh of heat). The plant’s design capacities are 350 MW of thermal capacity and 256 MW of electrical capacity, in addition to 80 MW of steam capacity. All in all, the heat consumption increase was smaller, at 7.1 Mtoe in 2018 (1.5% more than in 2017). Finland is still the European Union’s leading per capita solid biomass energy consumer with an annual ratio of 1.6 toe (graph 2).

INDUSTRIAL INVESTMENTS ACROSS THE SECTOR

Biomass deployment affects the models of the major energy groups that criss-cross the European continent and that are in the business of supplying plentiful thermal or electrical energy, via huge plants that supply several thousand households and industries. One of the sector’s fundamental shifts is the gradual substitution of coal-fired plants by biomass plants, not by demolishing and rebuilding, but by adapting the plants to run on the new fuels. Thus, in the UK, the

Drax company, one of Europe’s biggest biomass sector companies (see table 5) commissioned the fourth biomass tranche of the former North Yorkshire coal-fired power plant. The conversion of the fourth tranche means that it has abandoned coal before the government’s 2025 deadline. The conversion cost of this fourth tranche was 30 million pounds (35.6 million euros), to which should be added the 830 million euros already invested in upgrading the first three tranches and the associated supply chain infrastructure to use sustainable biomass instead of coal.

Tabl. n° 3

Gross heat production from solid biomass* in the European Union in 2017 and in 2018** (in Mtoe) in the transformation sector***

Country	2017			2018		
	Heat only plants	CHP plants	Total Heat	Heat only plants	CHP plants	Total Heat
Sweden	0.709	1.808	2.518	0.685	1.799	2.484
Finland	0.711	0.995	1.706	0.691	0.903	1.594
Denmark	0.471	0.877	1.349	0.494	0.865	1.360
France****	0.569	0.555	1.124	0.574	0.548	1.122
Austria	0.530	0.372	0.902	0.519	0.353	0.872
Germany	0.208	0.401	0.609	0.141	0.428	0.568
Italy	0.078	0.466	0.544	0.080	0.458	0.538
Lithuania	0.422	0.124	0.545	0.396	0.135	0.532
Latvia	0.145	0.147	0.292	0.154	0.156	0.310
Poland	0.054	0.225	0.279	0.056	0.232	0.288
Estonia	0.165	0.132	0.296	0.159	0.127	0.287
Czechia	0.032	0.139	0.171	0.033	0.129	0.162
Netherlands	0.024	0.077	0.101	0.030	0.131	0.161
United Kingdom	0.086	0.000	0.086	0.087	0.000	0.087
Hungary	0.048	0.064	0.112	0.037	0.050	0.087
Slovakia	0.049	0.083	0.133	0.028	0.047	0.075
Romania	0.018	0.047	0.065	0.018	0.047	0.065
Luxembourg	0.004	0.018	0.022	0.004	0.032	0.036
Croatia	0.000	0.036	0.036	0.000	0.036	0.036
Slovenia	0.011	0.020	0.030	0.010	0.018	0.029
Bulgaria	0.004	0.010	0.014	0.004	0.010	0.014
Belgium	0.000	0.007	0.007	0.000	0.006	0.006
Total EU 28	4.339	6.603	10.942	4.201	6.511	10.712

*Excluding charcoal. **Estimate. ***Corresponds to “Derived heat” (see Eurostat definition). **** Overseas departments included for France. Source: EurObserv’ER 2019.

The Danish group Ørsted (formerly Dong Energy), which is 50.1% owned by the Danish government is also undergoing a deep change by gradually jettisoning fossil fuels in favour of renewable energies. It aims to use no more coal by 2023. So far, the group has closed 40% of its

conventional production capacities and all the remaining gas- or coal-fired plants should be converted to biomass within the next four years. One of the biggest solid biomass projects is the conversion of the Asnæs power plant in Denmark that produces process steam, heat and

electricity. In November 2019, the new biomass turbine with a design capacity of 25 MW (fuelled by wood chips) was installed and will generate electricity, as well as steam at 100 bar of pressure and a temperature of 540°C to be fed into a turbine.

The fast growth of biomass fuel use across Europe raises the issue of supplies. Portugal is one of the major net exporter states of wood pellets. However, the sector has been disrupted by recent summer forest fires. In 2017, the fires not only destroyed about 520 000 hectares of forest, but also several timber processing plants, including two wood pellet plants. So, the announcement that the bioenergy start-up, Futerra Torrefação e Tecnologia S.A (Futerra Fuels) will start constructing its first commercial-scale torrefied pellet production plant in Valongo, Portugal, is most welcome. The plant's annual production capacity will be 120 000 tonnes of torrefied pellets and 55 000 tonnes of industrial wood pellets. The total investment is 38 million euros, financed by the founders together with the BPI bank (Banco Português de Investimento) and the Portugal 2020 programme. The torrefied pellets will be delivered to power plants and industrial users in Europe as part of long-term supply contracts. The firm has already announced that it has contracted to deliver 40 000 tonnes of white wood pellets to CM Biomass in Copenhagen, Denmark.

The sector has set up a European certification mechanism to cover the quality of wood chips and residue used for fuel to structure its wood fuel supply sectors. The certificate called "GoodChips", produced by the European biomass sector association (Bioenergy Europe) has introduced eight quality classes for wood chips and 4 classes for wood residue. Elements such as humidity content, size of the elements, the ash content are checked. GoodChips certification is modelled on the EnPlus certification that adopted the same approach for wood pellets. In November 2019, the British wood heating specialist, LC Energy Ltd, became the world's first company to be awarded GoodChips certification. LC Energy Ltd supplies wood chips to private individuals as well as major industrial and service industry customers. Certification is an important additional stage towards recognising wood fuel as a reliable and relevant alternative to fossil energies.

REGULATED DEPLOYMENT FOR SUSTAINABLE AND EFFICIENT USE OF BIOMASS

As solid biomass has the technical capacity substitute coal in producing heat and electricity, it has become the focus of many states' strategies for achieving the 2020 targets they set out to achieve as part of the 2009/28/CE

renewable energies directive. After that deadline, solid biomass will continue to play a major role in decarbonising the European Union's energy system, but stricter regulations will apply to its deployment. It will be subject to new rules following the recast renewable energies directive (2018/2001) that defines the legal framework

Tabl. n° 4

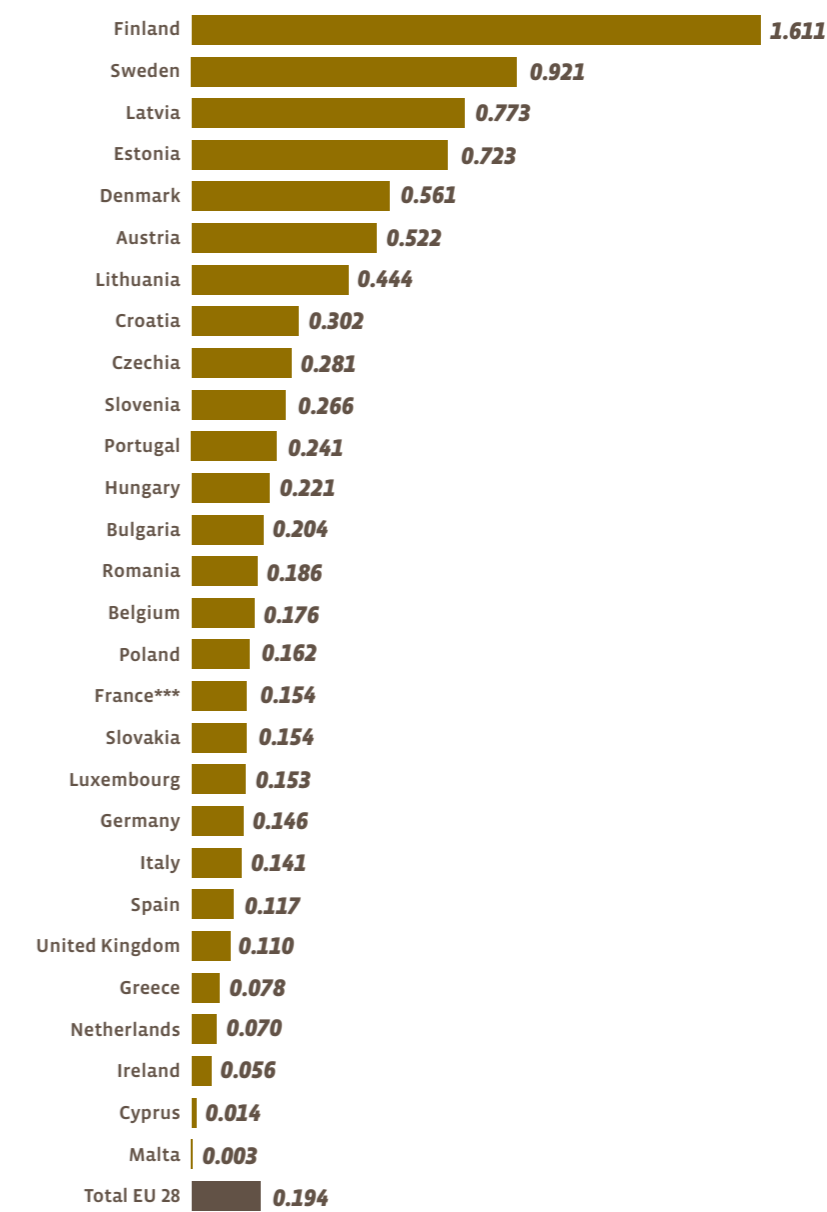
Heat consumption from solid biomass in the countries of the European Union in 2017 and 2018** (in Mtoe)*

Country	2017	Of which final energy consumption	Of which derived heat***	2018	Of which final energy consumption	Of which derived heat***
Germany	9.781	9.172	0.609	9.454	8.885	0.568
France****	9.369	8.245	1.124	9.261	8.139	1.122
Sweden	7.792	5.275	2.518	7.584	5.100	2.484
Italy	7.716	7.173	0.544	7.211	6.673	0.538
Finland	7.012	5.306	1.706	7.115	5.521	1.594
Poland	5.272	4.993	0.279	5.188	4.900	0.288
Spain	4.065	4.065	0.000	4.056	4.056	0.000
Austria	4.141	3.239	0.902	3.888	3.017	0.872
Romania	3.512	3.447	0.065	3.512	3.447	0.065
United Kingdom	2.798	2.712	0.086	3.125	3.038	0.087
Denmark	2.650	1.301	1.349	2.688	1.329	1.360
Czechia	2.446	2.275	0.171	2.486	2.324	0.162
Hungary	1.932	1.820	0.112	1.907	1.820	0.087
Portugal	1.799	1.799	0.000	1.818	1.818	0.000
Latvia	1.231	0.939	0.292	1.306	0.996	0.310
Belgium	1.270	1.263	0.007	1.286	1.280	0.006
Croatia	1.160	1.124	0.036	1.160	1.124	0.036
Lithuania	1.157	0.612	0.545	1.144	0.612	0.532
Bulgaria	1.069	1.055	0.014	1.046	1.032	0.014
Greece	0.857	0.857	0.000	0.827	0.827	0.000
Netherlands	0.748	0.646	0.101	0.816	0.655	0.161
Estonia	0.720	0.423	0.296	0.734	0.447	0.287
Slovenia	0.562	0.531	0.030	0.522	0.493	0.029
Slovakia	0.527	0.394	0.133	0.469	0.394	0.075
Ireland	0.197	0.197	0.000	0.201	0.201	0.000
Luxembourg	0.067	0.045	0.022	0.076	0.040	0.036
Cyprus	0.008	0.008	0.000	0.008	0.008	0.000
Malta	0.001	0.001	0.000	0.001	0.001	0.000
Total EU 28	79.860	68.918	10.942	78.890	68.178	10.712

*Excluding charcoal ** Estimate *** Essentially district heating (see Eurostat definition) **** Overseas departments included for France
Source: EurObserv'ER 2019.

Graph. 2

Gross inland consumption of solid biomass by toe per inhab in the European Union in 2018***



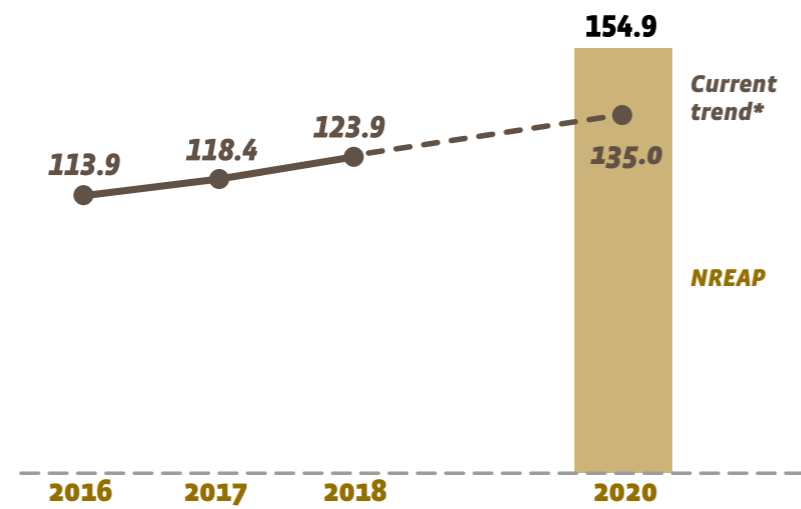
*Excluding charcoal ** Estimate *** Overseas departments included for France.
Source: EurObserv'ER 2019.

for renewable energies from 2021-2030 and in particular the rules set by article 29 on the sustainability requirements and GHG reduction criteria for liquid, solid and gaseous fuels. The sustainability criteria now cover all bioenergy uses (biofuel, electricity and heat). The directive aims to minimise negative environmental risks such as deforestation, the loss of biodiversity and minimise the risks of negative impacts on forest carbon sinks. Paragraph 11 of article 29 sets out specific rules for the recovery of electricity from biomass. To be eligible for inclusion in the targets, they must meet one or more requirements such as limiting thermal input to 50 MW or for higher capacities, making eligibility conditional on very high energy performance criteria for electricity-only installations, by harnessing high-yield cogeneration technology, or by being equipped with a CO2 capture system. Furthermore, electricity-only installations are only considered if they do not use fossil fuels as a main feedstock and if there is no cost-effective potential for the use of high-yield cogeneration technology on the site. However, breathing space has been granted. The new conditions will only apply to installations commissioned or installed for using biomass fuels after 25 December 2021.

In the short and medium term, if we include the projects under development, there are good growth prospects for electricity production across the European Union with current growth at the same rate. In the Netherlands, several major biomass co-firing projects in existing coal-fired plants have taken up grants through the SDE+ programme and should be producing 7 TWh of electricity per annum by 2020. The solid biomass electricity sector will also benefit from the conversion of Danish coal-fired power plants and the development of biomass cogeneration in Sweden. Acceleration is expected in 2019 and 2020 and according to EurObserv'ER, could increase solid biomass and municipal waste electricity output to 135 TWh in 2020 (graph 3).

Graph. n° 3

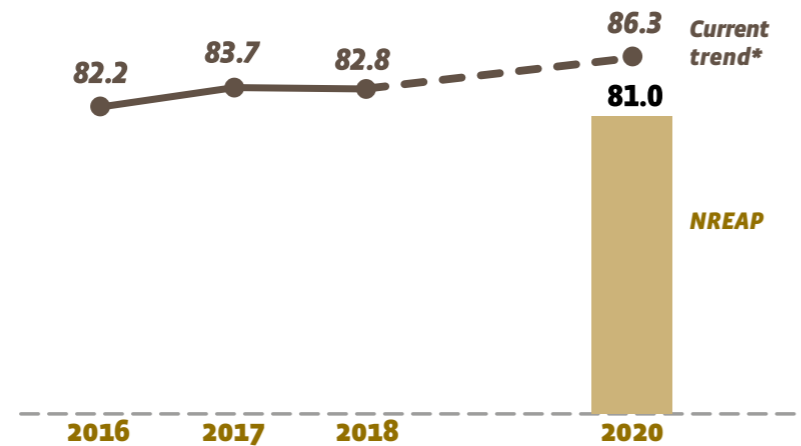
Comparison of the current trend of electricity production from solid biomass against the NREAP (National Renewable Energy Action Plan) roadmaps (in TWh)



These data include an estimate of the renewable electricity from renewable municipal waste. Source: EurObserv'ER 2019.

Graph. n° 4

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

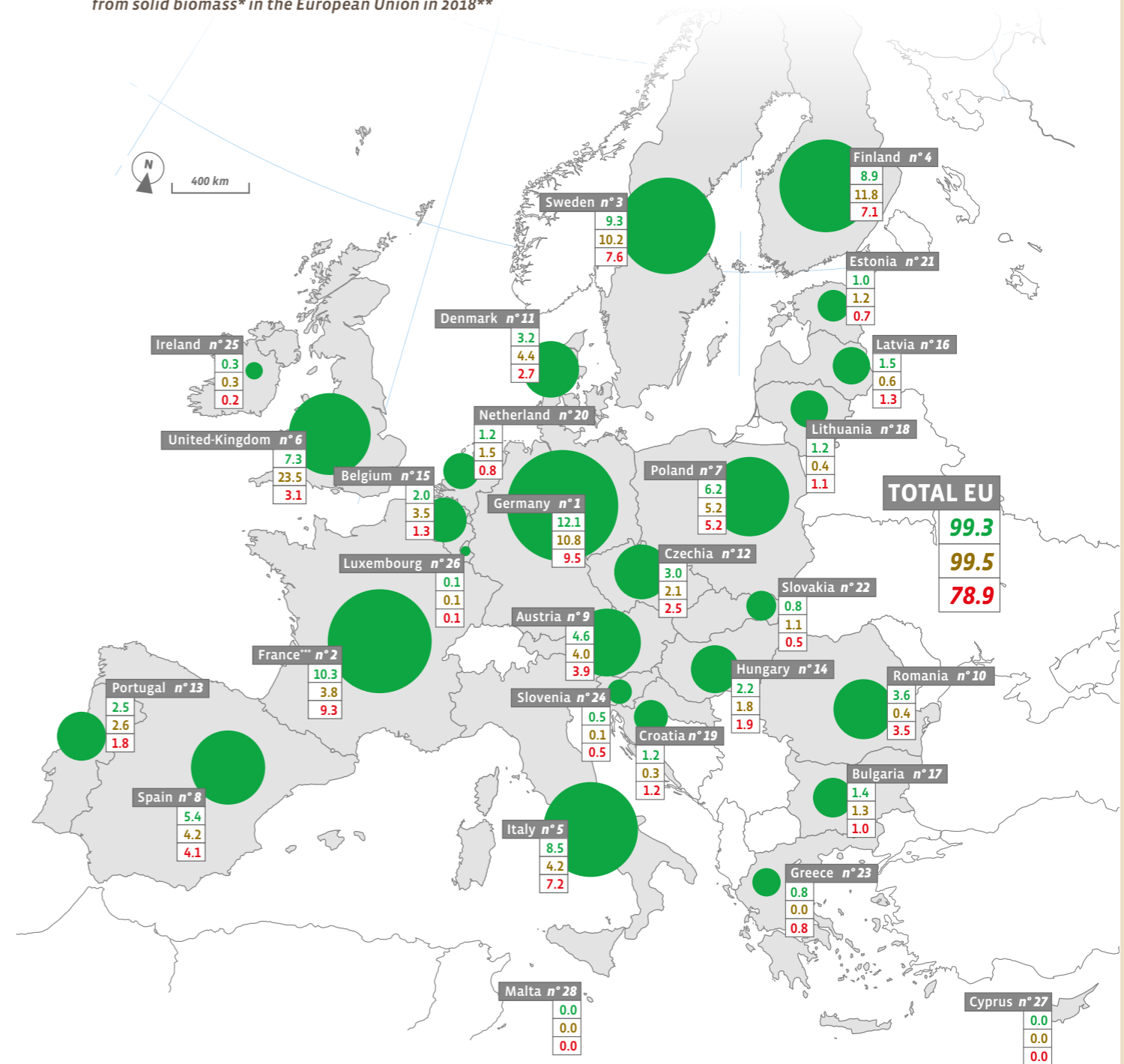


These data include an estimate of the renewable heat from renewable municipal waste. Source: EurObserv'ER 2019.

renewable energy consumption by 2030, i.e. about twice the current share. As for solid biomass heat, it has to be said that current deployment has slowed down with readability blurred

by milder winters. Yet, the situation should improve as the new RES directive sets an indicative 1.3 of a percentage point target for annual increase in renewable energies use in final

Gross inland consumption, gross electricity production and heat consumption from solid biomass* in the European Union in 2018**





Skærbæk power station (Denmark)

ORSTED

Tabl. n° 5

Major European operators of biomass plants in 2018

Operator	Country	Operational capacity (MW)	Production (MWh)
Drax Group	United-kingdom	2 600 Mwe	18 300 (elec)
Orsted	Denmark	1 200 Mwe 1 900 MWth	6 700 (elec) 8 800 (heat)
Pohjolan Voima	Finland	620 MWe 623 MWth	1 900 (elec)
RWE	Netherland	660 MWe 350 MWth	n.c.
E.on	Germany	457,5 MWe 173,8 MWth	n.c.
Fortum Varme	Finland	667 MWe 622 MWth	n.c.
Vattenfall	Sweden	236 Mwe	400 (elec)
Engie	France	285 Mwe	1 750 (elec)
Zellstoff Stendal	Germany	135 Mwe	n.c.

Sources: Eurobserv'ER 2019, based on companies annual reports and communication.

heat consumption, taking the situation in 2020 as the reference point. However, there is a limiting factor, because the directive allows for the possibility of integrating recovery of up to 40% of waste heat and cold of the average annual increase in this target. Waste energy recovery is defined as a by-product in industrial, service installations or electricity production sites, which for want of access to an urban heating or cooling system, will not be used and will dissipate into the atmosphere or into water. Thus, the Member States have two levers available to them to meet this trajectory, energy efficiency via the deployment of heating networks or the development of renewable cooling or heat.

If we stick to the targets set in the National Renewable Energy Action Plans (NREAP) for solid biomass heat, the combined targets of the European Union countries taken together were exceeded back in 2016 (graph 4). Only a few countries who have opted for electricity recovery from biomass (the UK, the Netherlands and Ireland) appear unable to achieve them. This overall success,

four years prior to the 2020 deadline, can be put down to poor sizing of the targets, and in particular the fact that the solid biomass sector includes renewable municipal waste-to-energy recovery. The future growth of biomass heat will depend on the implementation and strategic choices defined by the National Energy and Climate plans for 2030 which will have to factor in the annual increase target of 1.3% of a percentage point. □

Sources : AGEE Stat (Germany), SEAI (Ireland Republic), DBEIS (United Kingdom), CBS (Netherlands), CRES (Greece), NSO (Malta), Ministry for the Ecological Transition (Spain), IDAE (Spain), SCB (Sweden), Statistics Austria, Statistics Lithuania, ENS (Denmark), STATEC (Luxembourg), DGEG (Portugal), Statistics Finland, GSE (Italy), Ministry of Industry and Trade (Czechia), SDES (France), SPF Economy (Belgium), NSI (Bulgaria), Statistical office of the Republic of Slovenia, Statistics Estonia, Central Statistical Bureau of Latvia, Observ'ER, Eurostat, IEA.

The next barometer will be dedicated to wind power



This barometer was prepared by Observ'ER in the scope of the EurObserv'ER project, which groups together Observ'ER (FR), ECN part of TNO (NL), RENAC (DE), Frankfurt School of Finance and Management (DE), Fraunhofer ISI (DE) and Statistics Netherlands (NL). The information and views set out in this publication are those of the author(s) and do not necessarily reflect the official opinion of the Commission. The Commission does not guarantee the accuracy of the data included in this study. Neither the Commission nor any person acting on the Commission's behalf may be held responsible for the use which may be made of the information contained therein.