



HVO biodiesel production unit in Finland

UPM



# +1.3 %

*The increase of biofuels consumption for transport in the European Union between 2015 and 2016 (in energy content)*

## BIOFUELS BAROMETER

*A study carried out by EurObserv'ER.*



**B**iofuel consumption for transport increased slightly in 2016. EurObserv'ER's preliminary estimates suggest the figure of 14.4 million toe, which equates to 1.3% year-on-year growth. This increase was entirely driven by biodiesel consumption (which rose 2.4% to 11.6 Mtoe), as bioethanol consumption slipped (by 3.1% to 2.6 Mtoe).

# 80.6 %

*Biodiesel part in the total biofuel consumption in EU transport in 2016 (in energy content)*

# 14.4 Mtoe

*Total biofuel consumption in EU transport in 2016*

Development of the European Union biofuel market for transport up to 2020 is now regulated by the 2015/1513 directive of 9 September 2015, known as the ILUC directive that amends the 98/70/EC directive on the quality of petrol and diesel fuels and the 2009/28/EC directive promoting the use of renewably produced energy. These two directives have been revised to acknowledge and lessen the negative environmental impact of GHG emissions created by producing biofuel involving indirect land use change. As a result, the energy share of biofuel produced from cereals and other food crops rich in starch, sugar and vegetable oil and crops grown as main crops essentially for producing energy on agricultural land (known as “agrofuel” in France) has been capped at 7% of final energy consumption in transport until 2020. The directive on biofuel quality also obliges fuel suppliers to reduce the level of greenhouse gas intensity in their fuel by 6% by 2020. The European Union has decided to maintain its main goal of achieving a 10% renewable energy share in transport fuel by 2020. The remaining 3% can be obtained through electric mobility or using biofuel produced from specific raw materials eligible for double counting. The latter include biofuel produced from used oil that has been thermo-chemically treated

with hydrogen, in addition to synthetic biomass-derived biodiesel and “biopetrol” (wood, straw, household refuse, etc.). The Directive stipulates that each Member State must work towards achieving a national target of a minimum percentage of advanced biofuel produced from the raw materials listed in Annex IX, part A. The reference value for this target is 0.5 of a percentage point in terms of energy content of the share of energy produced. Member States can set a lower target than this value, if comparable financial resources are allocated to transport to develop energy efficiency or the use of renewable electricity, if the technical characteristics of the vehicle fleet (composition and state) are inappropriate for using advanced biofuel or if objective factors limit the availability of this type of fuel at competitive prices.

**EUROPEAN UNION BIOFUEL CONSUMPTION AT 14.4 MTOE**

The European Union’s biofuel consumption has flattened out (Graph 1) after increasing steadily from the early 2000s until 2012. EurObserv’ER’s preliminary estimates suggest that it increased slightly in 2016 to 14.4 Mtoe, equating to 1.3% growth after stabilizing between 2014 and 2015 at >14.2 Mtoe. The only

reason for this rise (expressed as energy content as opposed to metric volume) is the increase in biodiesel consumption (by 2.4%)... bioethanol consumption contracted by 3.1%.

The distribution (in energy content) between the different types of biofuel is largely dominated by the biodiesel sector because of the size of the European Union’s diesel vehicle fleet. The breakdown of biofuel sources for 2016 is as follows:

- biodiesel: 80.6% (79.8% in 2015), i.e. 11 603 ktoe;
- bioethanol: 18.4% (19.2% in 2015) i.e. 2 646 ktoe (directly blended with petrol or converted beforehand into ETBE);
- biogas: 1% (1% in 2015) i.e. 138 ktoe.

The consumption of pure vegetable oil used as fuel is negligible (<0.1%) and has been included in the biodiesel consumption figure.

Turning to the biofuel consumption figures for the European Union’s main economic partners, we see that bioethanol consumption predominates in countries such as Canada, China and the USA (table 1). In 2015, the EU was the top global biodiesel consumer and ranked third for bioethanol consumption behind the USA and Brazil.

The EurObserv’ER survey also examined the consumption of biofuel certified as

sustainable according to the criteria set down in the European Renewable Energy Directive. Only certified fuel can be included in the national targets. First estimates show that the consumption certified by the Member States stood at around 13.3 Mtoe, i.e. 92.5% of EU biofuel consumption, compared to 92.2% in 2015. As in previous years, the explanation for the main difference is that Spain has still not implemented the official mechanism to account for sustainably certified bio-

fuel consumption. That does not mean that biofuel used in Spain is not certified, but that the administrative system enabling it to be accounted for has not been rolled out. Nonetheless, the IDAE (Institute for Energy Diversification and Savings) points out that the certified biofuel volume data for 2016 could be available at the end of the year. If this happens, Spain could include its 2016 biofuel consumption figure in its 2020 renewable energy target.

**NEWS FROM THE MAIN CONSUMER COUNTRIES**

**Advanced biofuel consumption rises in France**

Data released by the Department of Data and Statistical Studies (SDES) of the Ministry of Ecological Transition and Solidarity confirms that biofuel consumption rose 4% over the twelve-month period



**Tabl. n° 2**

Biofuels consumption for transport in the European Union in 2015 (in toe)

Country	Bioethanol	Biodiesel**	Biogas fuel	Total consumption	% certified sustainable
France	433 839	2 562 445	0	2 996 284	100,0%
Germany	756 707	1 768 698	30 333	2 555 738	100,0%
Italy	19 617	1 141 849	0	1 161 467	99,8%
Sweden	139 663	816 098	104 435	1 060 196	100,0%
Spain	191 938	787 436	0	979 374	0,0%
United Kingdom	406 922	525 819	0	932 741	100,0%
Poland	153 482	626 565	0	780 047	100,0%
Austria	57 792	593 372	522	651 686	97,5%
Finland	61 909	369 399	1 959	433 267	100,0%
Portugal	18 566	322 912	0	341 478	100,0%
Czech Republic	77 096	245 032	0	322 128	100,0%
Netherlands	141 875	178 514	0	320 388	100,0%
Belgium	38 037	216 661	0	254 697	100,0%
Denmark*	0	228 886	0	228 886	100,0%
Romania	61 909	141 397	0	203 306	100,0%
Hungary	43 207	130 792	0	173 999	100,0%
Slovakia	30 954	118 420	0	149 374	100,0%
Bulgaria	32 244	111 350	0	143 594	100,0%
Greece	0	142 281	0	142 281	22,4%
Ireland	30 426	97 575	0	128 001	100,0%
Luxembourg	7 203	73 856	0	81 059	100,0%
Lithuania	9 680	57 847	0	67 528	98,1%
Slovenia	5 804	22 977	0	28 781	100,0%
Latvia	7 739	16 791	0	24 529	100,0%
Croatia	0	23 861	0	23 861	100,0%
Cyprus	0	9 376	0	9 376	100,0%
Malta	0	4 818	0	4 818	83,1%
Estonia	3 224	0	0	3 224	100,0%
<b>Total EU 28</b>	<b>2 729 832</b>	<b>11 335 027</b>	<b>137 249</b>	<b>14 202 109</b>	<b>92,2%</b>

\* For Denmark, biodiesel and bioethanol are mixed for confidentiality reasons, so the figure contains both bioethanol and biodiesel. \*\* Vegetable oil and hydrogenated vegetable oil included in the biodiesel figure. Source: EurObserv’ER 2017.

**Tabl. n° 1**

Biofuels consumption for transport in 2015 and 2016 for main non UE trading partners (in toe)

Country	2015		2016	
	Bioethanol	Biodiesel	Bioethanol	Biodiesel
Norway	10 200	121 300	n.a	n.a
Turkey	70 400	70 000	n.a	n.a
Japan	306 109	9 507	376 827	9 507
Canada	1 423 962	277 289	1 389 108	274 120
USA	26 654 712	4 480 194	n.a	6 177 993
China	1 790 687	113 292	2 024 057	105 370
Russia	24 991	n.a	24 991	n.a
India	n.a	33 275	n.a	31 690
Brazil	14 545 730	2 318 926	12 993 465	2 185 827

Source: Eurostat, USDA Foreign Agricultural Service, U.S Department of energy.

to 3 115 ktoe. Bioethanol gained more from this increase (9.3% to 474 ktoe) than biodiesel (3.1% growth to 2641 ktoe). Yet biodiesel is in the lead with 84.8% of energy-equivalent biofuel consumption. It is worth pointing out that the main reason for this increase in biofuel consumption is the rise in synthetic biodiesel consumption from 140 861 tonnes in 2015 to 201 069 tonnes in 2016 (by volume) and a rise in synthetic “biopetrol” consump-

tion from 18 958 tonnes to 62 514 tonnes. In contrast, VOME (vegetable oil methyl ester) consumption was almost stable in 2016 (rising from 2 582 944 to 2 589 039 tonnes), as was bioethanol consumption (including ETBE) which slipped (from 641 846 to 633 280 tonnes). SDES claims the share of biofuel that met the sustainability criteria rose made a new record of 7.1% of total fuel consumption in 2016 (6.8% in 2015). In 2020, consumption is

expected to be 3 660 ktoe (2 850 ktoe of biodiesel, 650 ktoe of bioethanol and 160 ktoe of other types of biofuel). Advanced biofuel consumption is set to rise over the next few years. Article 43 of the Energy Transition Law for Green Growth places priority on developing advanced biofuel while preserving past investments made in the conventional



**Tabl. n° 3**

Biofuels consumption for transport in the European Union in 2016\* (in toe)

Country	Bioethanol	Biodiesel***	Biogas fuel	Total consumption	% certified sustainable
France	474 000	2 641 000	0	3 115 000	100,0%
Germany	758 061	1 771 260	29 378	2 558 700	100,0%
Sweden	109 381	1 096 511	106 356	1 312 248	100,0%
Italy	24 506	1 008 336	0	1 032 842	99,8%
Spain	135 163	846 123	0	981 286	0,0%
United Kingdom	388 495	556 473	0	944 968	100,0%
Poland	163 027	544 378	0	707 405	100,0%
Austria	57 789	575 794	522	634 106	97,9%
Finland	61 909	369 734	1 840	433 483	100,0%
Belgium	40 373	390 629	0	431 002	100,0%
Czech Republic	55 344	228 780	0	284 124	100,0%
Portugal	20 929	251 857	0	272 786	100,0%
Netherlands	120 593	136 094	0	256 688	100,0%
Denmark**	0	240 375	0	240 375	100,0%
Romania	61 909	141 397	0	203 306	100,0%
Hungary	45 584	137 986	0	183 569	100,0%
Slovakia	30 954	118 420	0	149 374	100,0%
Greece	0	146 699	0	146 699	42,8%
Bulgaria	32 244	111 350	0	143 594	100,0%
Ireland	33 380	85 116	0	118 495	100,0%
Luxembourg	8 903	78 165	0	87 068	99,9%
Lithuania	6 418	50 087	0	56 505	99,8%
Slovenia	5 804	22 977	0	28 781	100,0%
Latvia	7 739	16 791	0	24 529	100,0%
Croatia	0	23 861	0	23 861	100,0%
Cyprus	0	8 718	0	8 718	100,0%
Malta	0	4 419	0	4 419	100,0%
Estonia	3 224	0	0	3 224	100,0%
<b>Total EU 28</b>	<b>2 645 729</b>	<b>11 603 329</b>	<b>138 096</b>	<b>14 387 154</b>	<b>92,5%</b>

\* Estimate. \*\* For Denmark, biodiesel and bioethanol is mixed due to confidentiality, so the figure contains both bioethanol and biodiesel.  
 \*\*\* Oil vegetable and hydrogenated Vegetable oil include in the biodiesel figure. Note: 2016 consumption data were not available at the time of our survey for Croatia, Malta, Latvia, Estonia, Slovenia, Bulgaria, Romania, Slovakia and Finland (excluding biogas). By default, EurObserv'ER has decided to use the same consumption of 2015. Source: EurObserv'ER 2017.

**Tabl. n° 4**

European Commission proposal for biofuel blending targets in the RED II

Pays	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Maximum Conventional	7,0%	6,7%	6,4%	6,1%	5,8%	5,4%	5,0%	4,6%	4,2%	3,8%
Minimum Advanced *	1,5%	1,9%	2,2%	2,6%	2,9%	3,6%	4,4%	5,2%	6,0%	6,8%
Minimum Advanced Non-Established **	0,5%	0,7%	0,9%	1,1%	1,3%	1,8%	2,2%	2,7%	3,1%	3,6%

\* Annex IX of the RED II proposal. \*\* Part A of Annex IX of the RED II Proposal. Source: Gain Report USDA 2017



Neste's biodiesel production unit in Rotterdam

biofuel production sectors. The following targets were set for advanced biofuel incorporation in the Multiannual Energy Programme adopted by Decree 2016-1442 on 27 October 2016. For 2018, they are 1.6% for the petrol sector and 1% for the diesel fuel sector. They will rise in 2023 to 3.4% for the petrol sector and to 2.3% for the diesel fuel sector.

### Consumption stable in Germany

The German Environment Agency (UBA – Umweltbundesamt), which coordinates the German Working Group on Renewable Energy – Statistics (AGEE-Stat), claims that biofuel consumption remained stable in 2016. In terms of volume, it breaks down as 2 000 700 tonnes of biodiesel (including biodiesel HVO) (0.1% more than in 2015), 1 175 500 tonnes of bioethanol (0.2% more) as well as 3 600 tonnes of vegetable oil (2000 tonnes in 2015) and 24 600 tonnes of biogas fuel (25 400 tonnes in 2015). After performing the volume-to-energy unit conversion, EurObserv'ER puts this biofuel consumption at 2 558.7 ktoe (1 768 ktoe of biodiesel, 758 ktoe of bioethanol, 29.4 ktoe of biogas fuel and 3.2 ktoe of vegetable oil). The energy content share of total road fuel consumption dropped 0.1 point to 4.8% because of an increase in road fuel consumption. Germany's incorporation rate is the lowest since 2005, and nothing like those observed in 2006 and 2007. This drop is the result of implementing the new system based on a GHG emissions reduction quota in relation to diesel and petroleum fuels that indirectly stimulates the use of biofuel. Since the Federal Emission Control Act (Bundes-Immissionsschutzgesetz) enactment in 2015, the oil industry is obliged to reduce its fuel emissions by 3%. This reduction level will increase to 4.5% from 2017 onwards, then to 7% from 2020 onwards. The system is designed to encourage the incorporation those types of biofuel that emit the least amount of CO<sub>2</sub>. Now, producers who launch their certified biodiesel and bioethanol on the market must indicate the amount of GHG emissions saved by using these fuels. Thus, to be more attractive, it is in the biofuel producers' interest to improve their industrial processes to enhance GHG efficiency. The downside is that as biofuel production methods improve their performance by reducing



La Rábida refinery in Spain

GHG, the biofuel incorporation volume drops for the fuel suppliers. Thus, the oil suppliers have everything to gain by incorporating biofuel with the lowest possible CO<sub>2</sub> emission level to maximise their petroleum fuel sales.

### Sweden adopts a 19% incorporation rate

Sweden per capita use of biofuel is the highest in the European Union. According to the Swedish Energy Agency, the incorporation rate upholding the sustainability criteria reached 19% in 2016, compared to 15% in 2015. Biodiesel consumption increased sharply in reaction to increased availability of HVO-type biodiesel. Thus biodiesel consumption rose from 923 470 tonnes (including 549 656 tonnes of HVO) to 1 240 776 tonnes (including 938 811 tonnes of HVO), which equates to 34.4% growth for biodiesel as a whole and 70.8% for HVO-type biodiesel. In contrast, bioethanol consumption contracted, in volume, by 21.7%, dropping from 216 570 to 169 614 tonnes. Incidentally Sweden is the leading consumer of biogas fuel with 89 058 tonnes in 2016. If we convert this data to energy equivalent, EurObserv'ER puts Swedish biofuel consumption at 1 312 ktoe (1 096.5 ktoe of biodiesel, 109.4 ktoe of

bioethanol and 106.4 ktoe of biogas fuel), which represents a 23.8% increase. The incorporation rate should keep rising over the next few years. The Swedish Energy Agency targets an incorporation volume of 1 944 952 tonnes in 2020, namely 1 709 944 tonnes of biodiesel, 143 706 tonnes of bioethanol and 91 302 tonnes of biogas fuel.

The Swedish energy transition strategy has some of the most ambitious long-term goals in the world... to make vehicles independent of fossil fuels by 2030 and achieve a carbon-neutral economy by 2050. This does not imply eliminating fossil fuel from transport altogether. The definition used by the expert commission responsible for implementing this plan is to "roll out a fleet of fossil-fuel-independent vehicles mainly fuelled by biofuels or electricity". This qualifier enables rechargeable hybrid vehicles to contribute to making the goal. This policy has implications for industry. Swedish manufacturer Volvo announced early in July 2017 that all the new models it would be launching from 2019 onwards would be 100% electric or hybrid. The models launched prior to that date will still be fitted with combustion engines. It will gradually introduce models ranging from

all-electric (EV) to hybrid vehicles with rechargeable batteries.

### The UK increases its biodiesel consumption

According to BEIS (Department for Business, Energy & Industrial Strategy) data, the UK used 708 million litres of biodiesel and 759 million litres of bioethanol in transport in 2016. In volume terms, biodiesel consumption increased by 5.8% over 2015 while bioethanol consumption dropped by 4.5%. In 2016, biodiesel accounted for 2.4% of the diesel volume and bioethanol, 4.4% that of petrol. Thus, the two types of biofuel accounted for 3.1% of the petroleum fuel volume, i.e. 0.1 of a percentage point less than in 2015. When we convert this data to energy units, biofuel consumption was of the order of 945 ktoe in 2016, which is 5.2% more than in 2015. The BEIS also calculated the renewable energy share of transport applying the calculation method for the transport target of the 2009 renewable energy directive. It comes to 4.5% in 2016, which is 0.1 of a percentage point more than in 2015. The same share was 5.3% in 2014, which is the largest ever measured since the target was monitored. In the UK, the fuel suppliers decide how they meet

### HVO biodiesel

*The hydrogenation process has been patented and developed by Finland's Neste Oil, involving a catalytic reaction just as in the traditional process. Hydrogen rather than methanol is introduced to the oil as happens with the other types of biodiesel. The advantage of this technology is that it avoids the coproduction of glycerine, which so far has no local outlets. The technology also removes all the oxygen atoms, which enhances the final product's stability. Lastly, the reaction products are essentially alkanes, which ensure that higher cetane indices are obtained than with the other types of biodiesel.*

the Renewable Transport Fuel Obligation (RTFO) by choosing the biodiesel or bioethanol incorporation quantity. Since tax year 2013/2014, the incorporation obligation has been set at 4.75% by volume.

### Italy plans for 2% of advanced biofuel in 2022

Italy was the first European Union country to set its own advanced biofuel development framework through the decree of 10 October 2014. The decree stipulates that petrol and diesel should contain at least 1.2% of advanced biofuel in 2018 and 2019. In 2020 and 2021, this incorporation rate will rise to 1.6% and reach 2% in 2022. Biofuel produced

from waste cooking oil and animal fat cannot be factored in. The energy content incorporation rates of all types of biofuel will gradually increase to 10% in 2020 (6% in 2016, 6.5% in 2017, 7.5% in 2018, 9% in 2019), then be pegged at 10% in 2021 and 2022. Incidentally, the Ministry of Economic Development's preliminary estimates indicate that biofuel consumption decreased in 2016. Biodiesel consumption intended for blending dropped from 1 292 079 to 1 141 000 tonnes and bioethanol consumption increased from 30 420 to 38 000 tonnes. When we convert this data to energy units we arrive at 1 033 ktoe, which implies an 11.1% decrease.

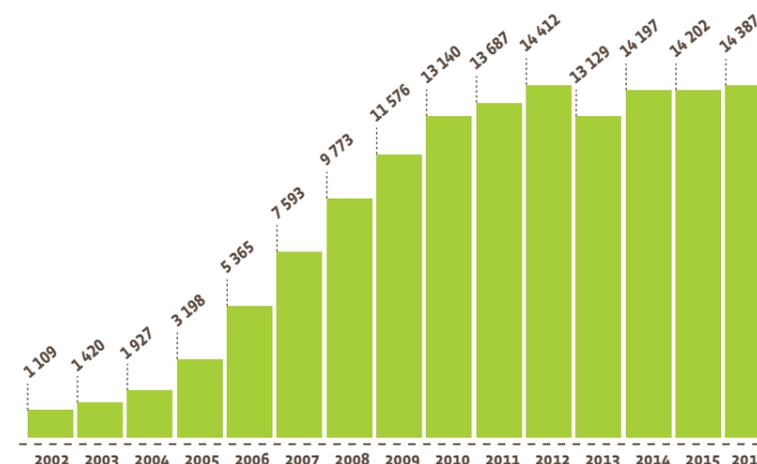
### CONFLICTING INDUSTRIAL INTERESTS

#### The bioethanol market remains stable

According to the European renewable ethanol producers' association (ePURE), the European sector produced 6.4 billion litres of ethanol in 2015. The association's members produced 5.8 billion litres themselves of which 4.54 billion were turned into biofuel. This figure is slightly lower than the 2014 figure (4.77 billion litres). The ethanol production capacity of European ePURE's members over the two years was 6.9 billion litres in 2015 and 6.8 billion in 2014. Thus, the industry is currently operating at an 84% utilisation rate. Total European ethanol production capacity stands at 8.9 billion litres, including 2.3 billion in France, 1.1 billion in Germany and 1.0 billion in the UK. Bioethanol output

### Graph. n° 1

Trend in biofuel (liquid and biogas) consumption for transport in the European Union (EU 28) in ktoe



\* Estimate. Sources: Data from 2002 to 2014 (Eurostat 2017), data for 2015 to 2016 (EurObserv'ER 2017).

declined by 3% in 2016, according to the USDA Foreign Agricultural Service's 2017 annual European biofuel market survey. The same survey pointed out that the European bioethanol sector took advantage of low raw material costs in 2014 in addition to customs barriers to bioethanol imports entering the continent. However, 2016 was marked by lower output that can be ascribed to financial problems encountered by the sector players. Production should pick up again in 2017 and 2018 as Member States' consumption increases in a bid to meet their 2020 targets.

The German company Crop Energies timed its investments perfectly to seize the opportunities offered by the bioethanol market. According to the group's annual report, it produced 837 000 m<sup>3</sup> of bioethanol in 2015/16 and 1 030 000 m<sup>3</sup> in 2016/2017, i.e. an increase of 23%, while its sales rose from € 722 602k to € 801 736k, which outstripping the previous year's results. This is partly due to outside factors, such as the increase in the price of ethanol during the group's last business quarter. The increase in output can be ascribed to the modernization of one of the group's plants located at Wilton in the UK, which was closed from February 2015 until July 2016. This

refurbished site puts the group in an enviable situation for any forthcoming bioethanol market developments.

### Aggravated competition characterizes the biodiesel market

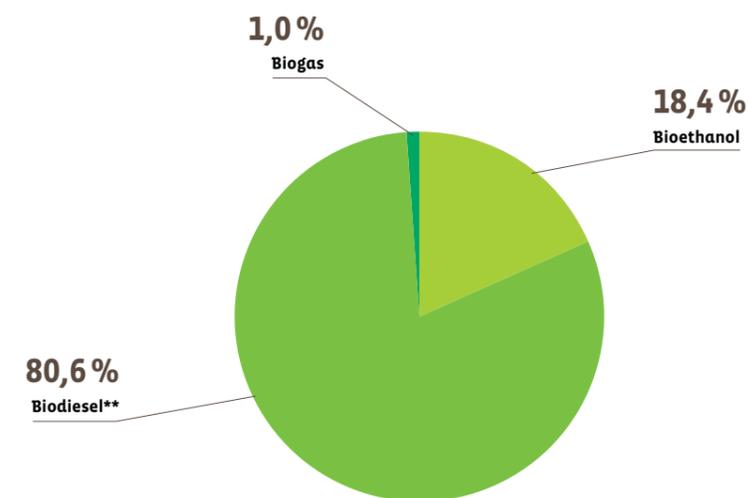
Although the European Union is the leading biodiesel producer, its manufacturers are in a quandary. Biodiesel is manufactured from oils of various origins, rapeseed or palm oil. The traditional production process is designated by the FAME (Fatty Acid Methyl Ester) acronym. A new biodiesel sector came onto the scene a few years ago derived from Hydrogenated Vegetable Oils (HVO) that use a different conversion process. The plurality of raw materials and processes is matched by the plurality of biodiesel producers. A number of them hail from farming, exemplified by biodiesel produced from rapeseed. Other players have oil and refinery backgrounds and make HVO. This also implies diversity in the production capacities of each plant. They range from that have emerged from farming cooperatives that produce 2.3 million litres of biodiesel, to the sites of the multinationals capable of producing 680 million litres per annum.

The USDA Foreign Agricultural Service claims that the number of plants devoted to FAME in the EU has dropped from 265 in 2011 to 202 in 2016, and production capacity from 24 900 to 21 140 million litres. The sharper drop in the number of plants compared to production has increased the utilisation rate from 44.4% to 58.1%. As for HVO, the number of bio-refineries rose from 4 to 11 in the EU from 2011 to 2016, increasing production capacity from 1 700 to 3 395 million litres. This scenario of lower FAME production and higher HVO production has resulted in declining use of rapeseed as the feedstock for biodiesel, as it is mainly used in the FAME process. While rapeseed oil was the raw feedstock for 72% of biodiesel production in 2008, it only amounted to 46% in 2016, even if that put it in first place. It is now followed by palm oil, mainly used in HVO plants. Rapeseed oil is primarily produced in the European Union in contrast with palm oil, most of which is imported.

The competition between FAME and HVO is feeding through to the companies originating from agriculture and those from oil refining. The competitive environment in France illustrates this observation. Historically, the Avril farm group has been the leading biodiesel producer known through the Diester brand. For the past few years, the group has been forced to rein in production. A reminder of this slowdown was recently given on 28 June 2017 when the group published a press release announcing that it was reducing the volume of grain processed in its Mériot plant by 25% and at the same time was renegotiating its grain purchasing contracts with its suppliers. Furthermore, the group has launched a major communications campaign to enhance its Diester brand, based on the "Made in France" theme. The reason put forward by Avril as an explanation for these difficulties, is "competition aggravated by adverse market conditions". This competition is symbolized by Total's La Mède refinery that has started conversion works to enable it to produce HVO biodiesel. It should come on stream in the first half of 2018 and produce 500 000 tonnes of biodiesel per annum. The oil used on this site will have a variety

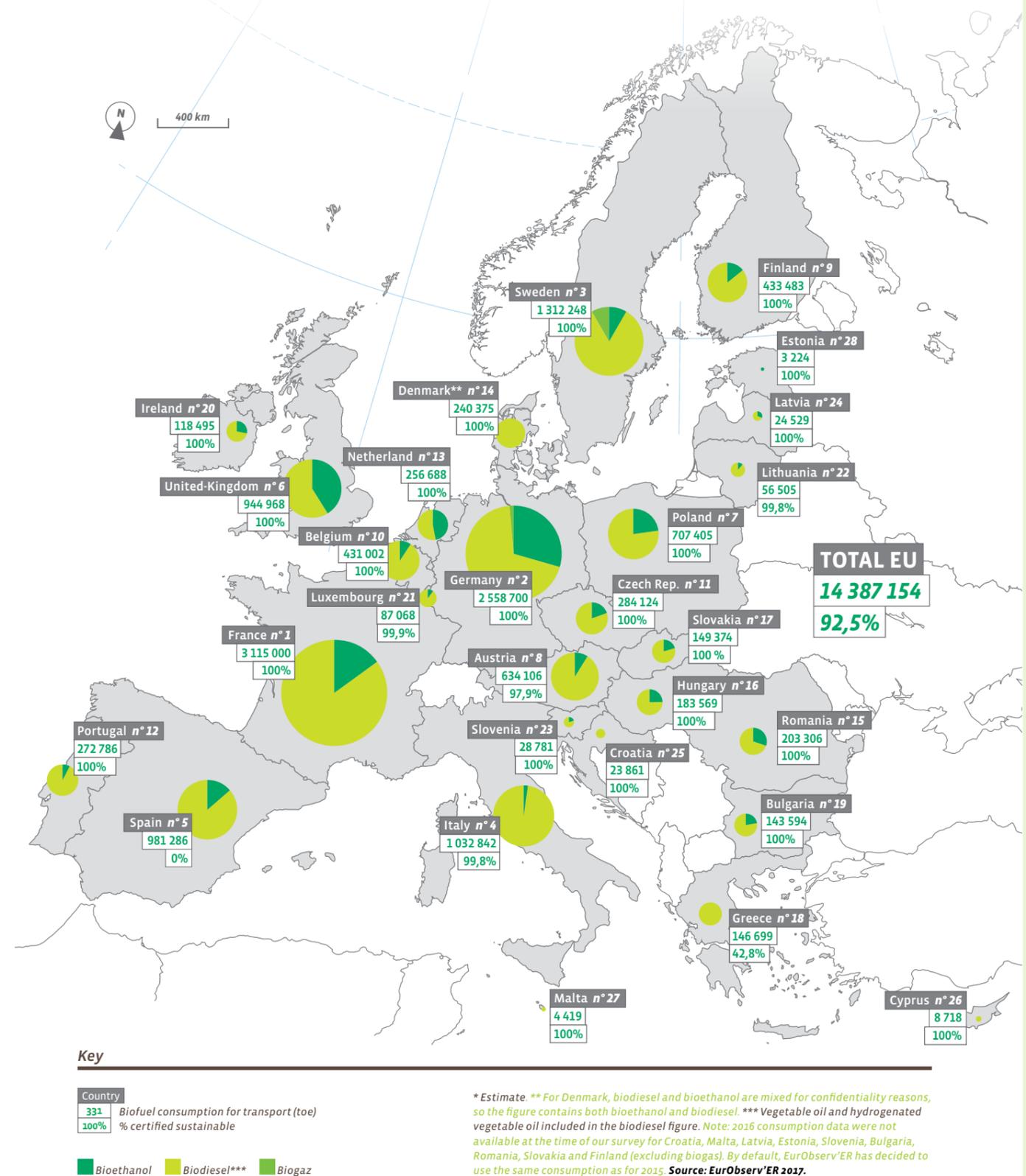
### Graph. n° 2

Breakdown of total EU 2016\* biofuel consumption in energetic content for transport by biofuel type.



\* Estimate \*\* Vegetable oil and hydrogenated vegetable oil included in the biodiesel figure. Source: EurObserv'ER 2017.

Biofuels consumption for transport in the European Union in 2016\* (in toe)



#### Key

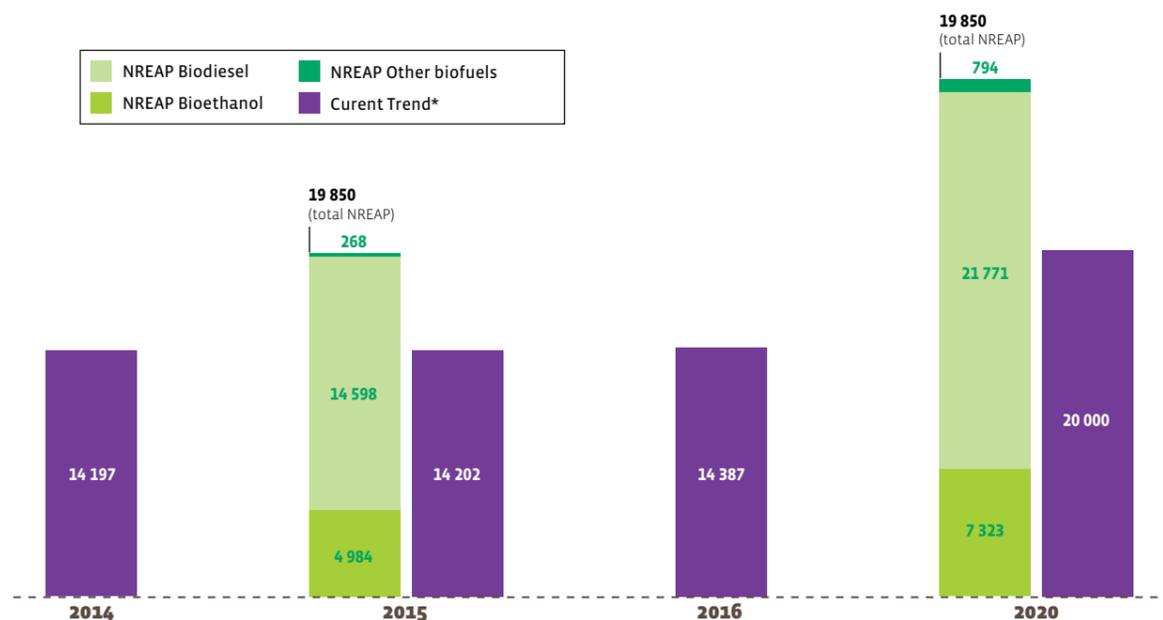
Country  
331 Biofuel consumption for transport (toe)  
100% % certified sustainable

■ Bioethanol ■ Biodiesel\*\*\* ■ Biogaz

\* Estimate. \*\* For Denmark, biodiesel and bioethanol are mixed for confidentiality reasons, so the figure contains both bioethanol and biodiesel. \*\*\* Vegetable oil and hydrogenated vegetable oil included in the biodiesel figure. Note: 2016 consumption data were not available at the time of our survey for Croatia, Malta, Latvia, Estonia, Slovenia, Bulgaria, Romania, Slovakia and Finland (excluding biogas). By default, EurObserv'ER has decided to use the same consumption as for 2015. Source: EurObserv'ER 2017.

### Graph. n°3

Comparison of the current biofuel consumption for transport trend against the NREAP (National Renewable Energy Action Plan) roadmaps (in ktoe) Action Plan) roadmaps (ktoe)



\* Consumption of certified and not certified biofuels. Projection for 2020 does not include the biofuel consumption of the UK. Source: EurObserv'ER 2017.

of sources. Everywhere in Europe, the oil companies are going for biodiesel: Neste Oil has created plants in Finland and the Netherlands. In Italy, Eni opened an HVO refinery in 2014 that should produce 325 million litres per annum from 2017 onwards, partly from used edible oil feedstock.

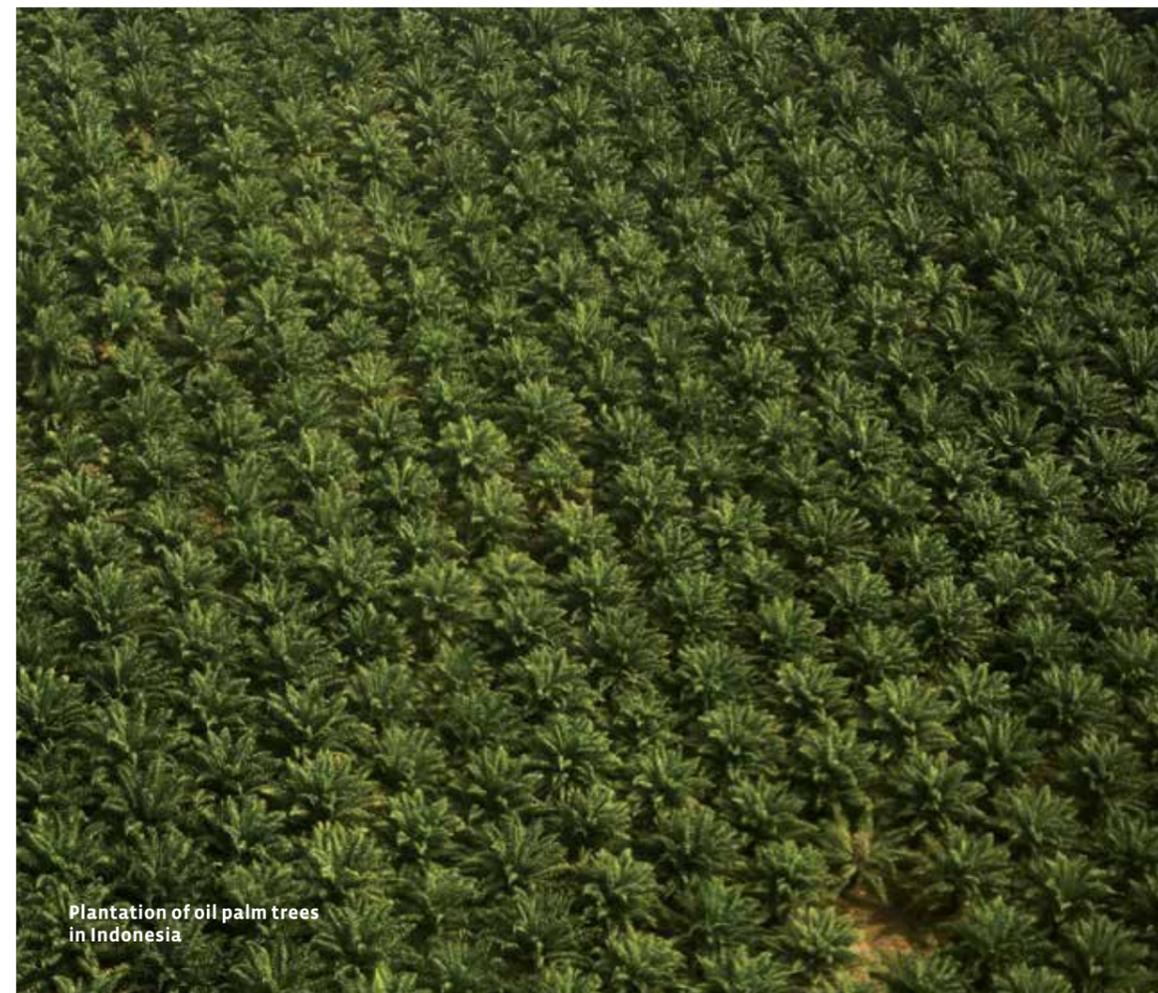
#### Are advanced biofuels in the industrialization phase?

The challenge for advanced biofuel is to use raw material that does not compete with a product that could be used for food. It may be of vegetable origin, provided it is waste, but can also comprise cooking oil or animal fat. Advanced biofuel is a sector-wide development that applies to both bioethanol and biodiesel, which are manufactured using biochemical processes for the former and thermo-chemical process for the latter. Plant residue-based advanced biofuel production, consisting of pilot projects, closely resembles that of last year. The Futurool project, for example, devoted to advanced bioethanol was meant to have

entered its final development phase in 2015 and an industrial pre-processing plant was due to be commissioned in 2016. However, there have been no new announcements as to the success or failure of this operation. Advanced biodiesel also has its pilot projects, such as BioTfuel, launched in 2010, that brings together six partners including Total and Avril. It aims to develop a full process chain. At the end of 2016, the project set up two demonstrators. The first, dedicated to the upstream part of the sector is located on a site near Compiègne owned by the Avril Group. The second is dedicated to gasification and purification of the synthetic gas and is located on a site owned by the Total Group near Dunkirk. Advanced biofuel production plants based on used oil or animal fat have also been opened. For example, Neste Oil is gradually changing its production sites to vary the raw materials used. It aims to process exclusively used oil and animal fat from the end of 2017 onwards in its Rotterdam plant in the Netherlands.

#### STRUGGLE FOR INFLUENCE OVER BIOFUEL'S FUTURE

The ILUC Directive adopted in September 2015 clarified the requirements, which should naturally enable those Member States that have not already done so, to set their incorporation rate roadmap through to 2020. EurObserv'ER believes that if Europe's commitments are met, the effective (conventional and advanced) biofuel incorporation rate should be about 8% by the 2020 timeline. This share would take biofuel consumption to roughly 20 Mtoe for the European Union of 27, presuming the UK leaves the EU. However that lack of clear prospects for the future of edible crop feedstock biofuel after 2020 could lead a number of States – those whose economies are least affected by agrofuel production – to revise their commitments or defy the 2009 renewable energy directive's demands for transport. The Commission's policy formulated in the new draft Directive is to offer the Member States greater discretion over the way they meet



Plantation of oil palm trees in Indonesia

their national targets. They must be negotiated as part of a common target involving the whole of the European Union. So which types of biofuel will be available on the market from 2021 and through to 2030 and in what proportion? The answer is at the crux of the on-going political negotiations within the European institutions. The European Commission, for its part, recorded its view in its 22 January 2014 release entitled "A policy framework for climate and energy in the period from 2020 to 2030". This radical change of strategy in its biofuel promotion policy for transport, proposes to abandon the 10% renewable energy target in transport. This proposal relates to the uncertainties surrounding how the indirect effects of land-use changes used for biofuel crops affect emissions. This intent was confirmed in the European Commission's draft

renewable energies directive revision of 30 November 2016. The draft text removes the renewable energy target for transport and leaves countries free to choose the proportion devoted to transport, producing renewable electricity and heat, as part of a common European Union target (with efforts negotiated between the Member States) of at least 27% of renewable energy in the European Union's total energy consumption by 2030. Additionally the European Commission wants to impose a gradual reduction in the "agrofuel" share and cap it at 3.8% by 2030. The proposal is to introduce an annual 0.3 of a percentage point reduction from 2021 to 2025 and increase this reduction to 0.4 of a percentage point from 2026 to 2030. Another important aspect of the project is that the Member States are obliged to demand their fuel

suppliers to include a minimum share of renewable energy and low-carbon fuels in the total quantity of fuel used for transport. These include advanced biofuel, non-biologically sourced fuels (e.g. hydrogen), fuels produced from waste or renewable electricity-sourced fuel. The minimum share must be no less than 1.5% in 2021 and must rise to at least 6.8% in 2030, applying a pre-established trajectory set out in Annex X part B of the draft directive. The raw materials eligible for producing advanced biofuel and biogas fuel are listed in parts A and B of Annex IX of the proposal. The text stipulates that the input of advanced biofuel and biogas produced from the raw materials listed in Annex IX, part A (such as seaweed, bio-waste, straw, manure, wood waste, non-

Tabl. n° 5

Production capacity of the main European bioethanol producers in Europe in 2016 (in millions of litres)

Company	Country	Number and location of plants in Europe	Bioethanol production capacity (in million liters)	Raw materials
Crop Energies	Germany	Germany, Belgium, France, UK	1 300	Sugar juice, wheat, maize, triticale
Tereos*	France	France, Czech Republic, Belgium, UK	1 260	Sugar juice, wheat
Cristanol	France	France	500	Sugar juice, wheat
Vivergo	United Kingdom	UK	420	Wheat
Agrana	Austria	Austria (1), Hungary (1-50 %)	420	Wheat, maize
Agroetanol	Sweden	Sweden (1)	250	Wheat

\*Data from 2015. Although production decreased, no plants have been known sold or dismantled. The production capacity remains unchanged. No ethanol plant in Europe is using sugar beet directly. What is processed is sugar juice also often known as syrup or molasses. Source: EurObserv'ER 2017.

food cellulosic material, and so on) must represent at least 0.5% of the transport sector fuel intended for consumption or use in the market from 1 January 2021 onwards. The share must be at least 3.6% by 2030, in line with the trajectory set out in Annex X, part C. The list in part B primarily includes raw materials sourced from waste and sub-products such as cooking oil and animal fat unsuitable for food use and molasses.

The draft also stipulates that from 1 January 2021, GHG emission reductions achieved by using advanced biofuel and biogas produced from the raw materials listed in Annex IX should be at least 70%. The draft directive capping proposal for biofuel sourced from food crops is strongly criticised by the professional organization that represent the biofuel industry, primarily ePURE, which represents the European bioethanol industry and the European Biodiesel Board (EBB) which represents the European biodiesel industry. They contest the European Commission's conclusions and proposals and demand greater ambitions for renewable energy consumption in transport namely a 15% share in 2030 and retaining the share of biofuel produced on agricultural land at 7%. They argue that fixing this percentage is already the result of a compromise struck during a three-year debate, which acknowledges the input of conventional biofuel in the production of

co-products that are essential for animal husbandry and food security. The other arguments proffered are job losses in rural areas (220 000 jobs could be affected), undermined investor confidence (including those who invested in the advanced biofuel sector), measures that support the oil industry and measures that are detrimental to the European Union's energy security. In the words of an EBB communiqué, "As recognized by the Commission many times, and stressed out on several occasions by independent scientific parties such as California Air Resources Board in the USA, ILUC is a theory and cannot be observed nor measured." Raffaello Garofalo, the Secretary General, considers that the limit imposed on traditional biofuel encourages the use of fossil fuel in transport, given the non-availability of second-generation biofuel. The oil industry's interests are also highlighted by ePURE, which notes, "Instead of further promoting renewable alternative fuels, such as sustainable biofuels made in Europe and produced from European feedstock, the Commission's proposal is incredibly friendly to oil. Conventional ethanol produced in Europe has high GHG savings of 64% compared to petrol and the Commission's research proves that it has a low risk of negative land use consequences". ePURE also regrets the lack of distinction made between biofuel production methods.

Referring to a report published by the European Commission (a study conducted by the Globium consortium), the organisation considers that ethanol has a lower carbon footprint than biodiesel. The report identifies palm oil, which is used in biodiesel and food production, as the most devastating, primarily because of the massive deforestation it has led to in Indonesia.

Cheap palm oil, widely used by the oil industry to produce hydrotreated biodiesel, is under fire from European Parliament critics. On 4 April 2017, Europe's MPs adopted a resolution (2016/2222(INI)) calls for the European Union to take new steps to establish the sustainable cultivation of palm oil. The resolution claims that palm oil accounts for roughly 40% of global vegetable oil exchanges and that the EU is the second biggest global importer taking about 7 million tonnes per annum. It also notes that 46% of the palm oil imported into the European Union is used for producing biofuel, and represents roughly 1 million hectares of tropical land. Projections suggest that demand for palm oil could double by 2050. The European Parliament aims to ensure that the forthcoming directive is much more binding as regards this type of biofuel.

The proposal for the new European renewable energy directive has entered a legislative process in which each country

Tabl. n° 6

Production capacity of the main biodiesel producers in 2016 (in tons)

Company	Country	Number and location of plants in Europe	Production capacity in 2016 (in tonnes)
Avril*	France	France, Germany, Italy, Austria, Belgium	2 700 000
Neste Oil	Finland	Finland, Netherlands	2 600 000
Musim Mas (Infinita)	Spain	Spain	600 000
Marseglia Group (Ital Green oil and Ital Bi Oil)	Italy	Italy	560 000
Verbio AG	Germany	Germany	470 000
Eni	Italy	Italy	360 000

\*Data from 2015. Although production decreased, no plants have been known sold or dismantled. The production capacity remains unchanged. Source: EurObserv'ER 2017.

will try to push for its own political and economic interests. It could still be subject to amendments by the European Parliament and the European Council. A number of European Parliament committees are involved in this process, such as the Committee on Environment, Public Health and Food Safety (ENVI), the Committee on Agriculture and Rural Development (AGRI) and the Committee on Industry, Research and Energy (ITRE). The legislative process should take at least 18 months and the final draft text is scheduled for the second half of 2018. □

The next barometer will deal with the biogas sector

Sources for tables 2 and 3: Umweltbundesamt UBA (Germany), SDES (France), BEIS (United Kingdom), Ministry of economic development (Italy), IDAE (Spain), POPIHN (Poland), Swedish Energy Agency, CBS statline (Netherlands), Statistics Austria, DGEG (Portugal), University of Miskolc (Hungary), Ministry of Industry and Trade (Czech Republic), SPF Economy (Belgium), University of Eastern Finland, Ministry of Environment and Energy (Greece), Statistics Lithuania, SEAI (Ireland Republic), STATEC (Luxembourg), Ministry of Energy, Commerce, Industry and Tourism (Cyprus), ENS (Denmark), Eurostat.



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