



The Finnish group UPM biorefinery in Lappeenranta produces 120 million liters per year of biodiesel from wood residues from the forest industry.



# 6.1%

*the drop in biofuel consumption in European Union transport between 2013 and 2014 (in energy content)*

## BIOFUELS BAROMETER

*A study carried out by EurObserv'ER.*



**B**iofuel consumption for transport picked up in Europe after a year of uncertainty and decline, increasing by 6.1% over 2013, to 14 million toe (Mtoe) according to EurObserv'ER's first estimates. However it is still below its 2012 level when 14.5 Mtoe of biofuel was incorporated. Consumption of biofuel that meets the European Renewable Energy directive's sustainability criteria rose to 12.5 Mtoe, its highest level so far.

# 4.9%

*the biofuel incorporation rate in European Union transport in 2014 (in energy content)*

# 14 Mtoe

*total biofuel consumption in European Union transport in 2014*



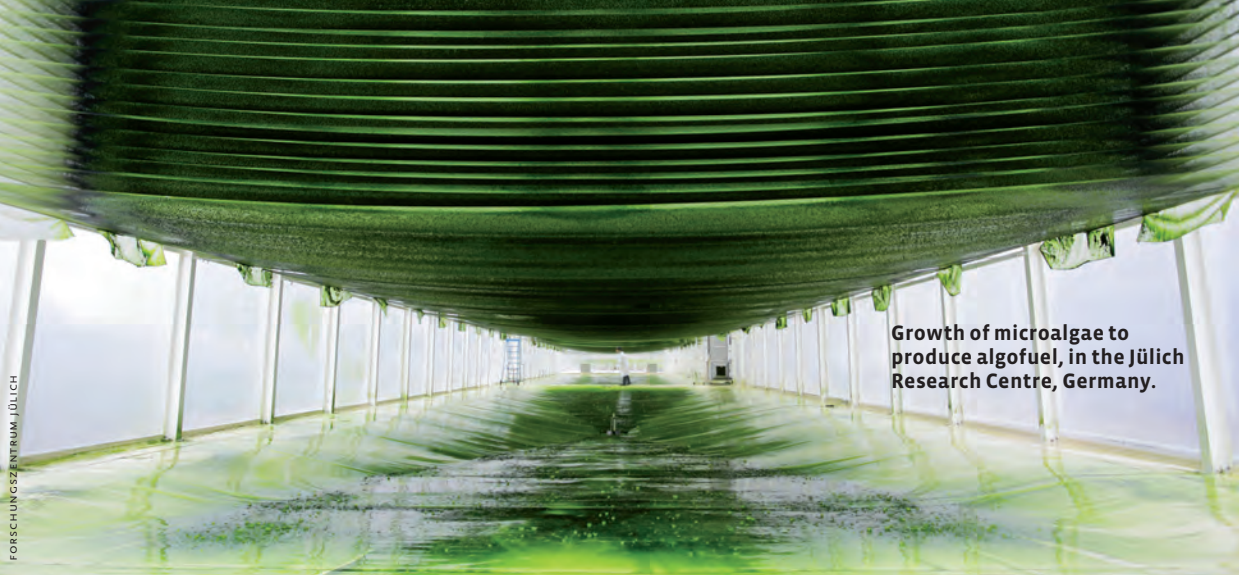
European Union biofuel consumption has come out of its 2013 doldrums (graph 1) and has quickened its stride. Preliminary estimates of EU biofuel consumption for transport point to 14 Mtoe (a 6.1% rise over 2013), yet could not match the 2012 level when 14.5 million toe of biofuel was incorporated. Biodiesel is the main beneficiary (with a 7.8% increase), as bioethanol consumption remained almost stable (shrinking by 0.1%). If energy content is factored in (as opposed to metric volumes), biodiesel amounted to 79.7% of biofuel consumption (78.4% in 2013), bioethanol to 19.1% (20.3% in 2013), biogas 1% (0.9% in 2013) and other types of biofuel (vegetable oils and unspecified biofuel, 0.2% (0.4% in 2013). The breakdown is 11 158 ktoe of biodiesel, 2 674 ktoe of bioethanol (directly blended with petrol or first transformed into ethyl tert-butyl ether (ETBE), 133 ktoe of biogas fuel and 32,4 ktoe of other types of biofuel (vegetable oils and unspecified biofuel). The biofuel incorporation rate (energy content) in fuels used for transport was 4.9% in 2014 leaving aside double counting, compared to 4.6% in 2013. The EurObserv'ER survey also covers the consumption of biofuel certified as sustainable, applying the criteria set up by the European Renewable Energy Directive as the only biofuel to be considered in national targets. First estimates suggest that it reached its

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Biofuels consumption for transport in the European Union in 2013 (in toe)

Country	Bioethanol	Biodiesel	Biogas fuel	Others biofuel*	Total consumption	% certified sustainable
France	394 000	2 294 000	0	0	2 688 000	100%
Germany	777 730	1 823 135	41 798	884	2 643 548	100%
Italy	56 220	1 177 790	0	0	1 234 009	100%
United Kingdom	410 791	603 755	0	0	1 014 546	100%
Spain	170 141	729 100	0	0	899 241	0%
Sweden	179 177	536 591	76 469	0	792 237	100%
Poland	145 946	583 552	0	0	729 498	100%
Austria	57 571	462 310	0	0	519 882	86%
Belgium	48 228	282 620	0	0	330 849	100%
Netherlands	125 108	174 095	0	0	299 202	97%
Portugal	4 725	273 582	0	0	278 307	3%
Czech Republic	51 765	221 007	0	0	272 772	100%
Finland	69 936	132 920	929	27 538	231 323	88%
Denmark**	0	223 616	0	0	223 616	100%
Romania	36 885	159 413	0	10 059	206 356	95%
Hungary	32 474	87 233	0	16 526	136 233	88%
Slovakia	55 872	79 570	0	0	135 442	76%
Greece	0	122 838	0		122 838	19%
Bulgaria	8 380	95 880	0	0	104 260	100%
Ireland	29 095	73 119	0	51	102 265	100%
Lithuania	6 769	51 907	0	0	58 675	95%
Luxembourg	647	52 721	0	137	53 504	100%
Slovenia	5 290	46 337	0	0	51 627	100%
Croatia	0	29 804	0	0	29 804	100%
Latvia	6 449	12 372	0	0	18 821	100%
Cyprus	0	14 772	0	0	14 772	31%
Estonia	3 201	0	0	0	3 201	0%
Malta	0	2 909	0	0	2 909	100%
Total EU 28	2 676 400	10 346 947	119 196	55 194	13 197 737	89%

\* Pure used vegetable oil and unspecified biofuel. \*\* For Denmark, biodiesel and bioethanol is mixed due to confidentiality, so the figure contains both bioethanol and biodiesel. Source: EurObserv'ER 2015.



Growth of microalgae to produce algofuel, in the Jülich Research Centre, Germany.

Tabl. n°2

Biofuels consumption for transport in the European Union in 2014\* (in toe)

Country	Bioethanol	Biodiesel	Biogas fuel	Others biofuel**	Total consumption	% certified sustainable
France	414 000	2 541 000	0	0	2 955 000	100%
Germany	792 563	1 907 974	42 992	5 302	2 748 831	100%
United Kingdom	407 280	752 723	0	0	1 160 003	100%
Italy	7 739	1 055 174	0	0	1 062 912	100%
Spain	180 891	798 489	0	0	979 380	0%
Sweden	165 421	687 237	88 744	0	941 403	100%
Poland	142 606	595 931	0	0	738 538	100%
Austria	60 163	480 131	0	0	540 293	87%
Belgium	36 758	350 841	0	0	387 599	100%
Netherlands	128 332	220 933	0	0	349 265	96%
Czech Republic	78 617	265 484	0	0	344 101	100%
Portugal	5 121	290 759	0	0	295 880	5%
Denmark***	0	262 468	0	0	262 468	100%
Romania	36 885	159 413	0	10 059	206 356	95%
Finland	69 936	132 920	1 462	0	204 318	100%
Hungary	38 943	95 666	0	16 968	151 577	89%
Slovakia	55 872	79 570	0	0	135 442	100%
Greece	0	133 443	0		133 443	23%
Ireland	27 121	88 929	0		116 050	100%
Luxembourg	3 115	65 451	0	65	68 632	100%
Lithuania	6 751	57 556	0	0	64 308	85%
Bulgaria	0	53 429	0	0	53 429	100%
Croatia	0	29 804	0	0	29 804	100%
Slovenia	6 016	23 095	0	0	29 111	100%
Latvia	6 449	12 372	0	0	18 821	100%
Cyprus	0	13 277	0		13 277	100%
Malta	0	3 975	0	0	3 975	100%
Estonia	3 201	0	0	0	3 201	0%
Total EU 28	2 673 781	11 158 044	133 199	32 394	13 997 417	89%

Note: The consumption data were not available at the time of our survey for Croatia, Latvia, Estonia, Romania, Slovakia and Finland (excluding biogas). By default, EurObserv'ER has decided to postpone the same figures as for 2013. \* Estimate. \*\* Pure used vegetable oil and unspecified biofuel. \*\*\* For Denmark, biodiesel and bioethanol is mixed due to confidentiality, so the figure contains both bioethanol and biodiesel. Source: EurObserv'ER 2015.

highest level in 2014 with 12.5 Mtoe of consumption (11.7 Mtoe in 2013) and thus represents 89.4% of European Union biofuel consumption. The certified biofuel share (leaving aside double counting) amounts to 4.3% of European Union fuel consumption. The main difference is explained by Spain's failure to implement the legal framework in 2014 that would have officially certified its biofuel consumption.

### BIOFUEL'S FUTURE IS A LITTLE CLEARER

#### THE EUROPEAN PARLIAMENT SETS OUT A NEW LEGAL FRAMEWORK

On 28 April 2015, a legal compromise on the issue of the environmental impact of greenhouse gases released by the burgeoning use of farmland to produce biofuel was finally passed by the European Parliament. The decision was a long time in the making. It took specific account of the ILUC effect (relating to indirect land use changes) in European Union biofuel policy.

#### What is the ILUC effect?

The ILUC effect is based on general economic equilibrium reasoning that is particularly hard to model. It shows that a global increase in agricultural raw materials consumption by the energy sector, when compensated by the planting of plots not originally dedicated to agriculture (forest areas, natural meadows, peat bogs, etc.), generates additional greenhouse gas (GHG) emissions worldwide.

The European Commission and Parliament stance was that this ILUC effect should be included in the biofuel production carbon balance, which called for adapting the relevant European directives. The parliamentarians hold that this inclusion which effectively calls into question the environmental performance levels of first-generation biofuel, justifies a change to the Member States' agrofuel consumption trajectories.

In October 2012, the European Commission published a draft directive geared to capping the agrofuel share of energy

### Three generations of biofuel

*Biofuel is a liquid or gaseous fuel used for transport and produced from biomass.*

*Three types of biofuel are generally distinguished:*

- *First-generation biofuel (said to be "conventional") which includes bioethanol and biodiesel outputs from the conversion of food crops (rapeseed, soy, beets, cereals...). The category also includes the production of vegetable oil that can be used pure and directly by specific engines. The production of biogas fuel (generally in the form of biomethane) obtained by the anaerobic digestion process followed by purification is a somewhat special category because it can be produced both from fermentable waste and energy and food crops.*
- *Second-generation biofuel – sectors totally devoted to energy that do not rely on agri-food crops (no ILUC effect). They offer better yields and are more environmentally-friendly in terms of GHG emissions because they recover all the plant ligno-cellulose contained in the plant cells. The raw materials range from straw, green waste (tree cuttings, etc.) or even fast-growing energy plants such as miscanthus. They enable alcohol to be produced and thus bioethanol. Additionally some of the processes produce biodiesel.*
- *Third-generation biofuel which includes biofuel produced from algae (also known as algofuel) that present the advantage of not competing with food or energy crops (plants and forestry). Recovery is through an oil sector and thus produces biodiesel.*

used in transport. This angered the industry players who had already made investments to satisfy the Renewable Energy directive requirements. The new threshold effectively meant halting biofuel development in Europe, as the incorporation rate was almost up to that level. It took the European Parliament almost a year to decide on a 6% ceiling for these agrofuels, in addition to a 2.5% advanced biofuel (known as 2nd- and 3rd-generation, see text box) incorporation level for biofuel produced from biomass waste or algae on 11 September 2013. However the European Council of Energy ministers viewed that setting such a low ceiling was out of the question. It took another six months to 13 June 2014 for the European Energy ministers to reach a political agreement on the draft directive in relation to land use change, and its main features were voted through by the European Parliament on 28 April 2015.

The adopted wording modifies directive 98/70/CE on the quality of petrol and diesel fuels, and directive 2009/38/CE regarding promoting energy produced from renewable sources. It stipulates that agrofuels should not exceed 7% of

final energy consumption in transports by 2020, yet does not challenge the aim of achieving 10% of renewable energy in transport energy consumption by the same timeline.

The setting of a ceiling implicitly acknowledges the impact of land use change and takes it into account. However, the wording adopted by the parliamentarians fails to set biofuel sustainability and eligibility as a criterion. It simply obliges fuel suppliers to calculate and report on the estimated level of emissions caused by the ILUC effect to the European Union states and the European Commission. So the issue is not conclusively resolved. The European Commission is due to publish the data on ILUC-related emissions by 31 December 2016 at the latest. It is charged with notifying the European Parliament and Council of the possibility of including ILUC emission factors with the existing sustainability criteria, based on the best scientific data. Another progress report is due to come out on 31 December 2017. Yet it is unlikely that the issue will be re-opened before 2020, given the political difficulties encountered in reaching an agreement.

The other major element of the text, which is in line with the compromise adopted in June 2014 by the European Council of Energy ministers, is the plan to stimulate advanced 2nd- and 3rd-generation biofuel consumption by setting a non-binding target of 0.5% for the energy share that should be produced from advanced biofuel. It is non-binding in that the Member States will be allowed to set a lower target on certain grounds, such as limited production potential, technical or climatic constraints, or the existence of national policies that already devote suitable financing to incentive measures to boost energy efficiency and electric transport, etc. Whatever happens, Member States must set a national target for advanced biofuel no later than 18 months after the directive comes into force and adopt the new legislation by 2017. The text adopted by the European Parliament must now be formally endorsed by the European Council of Energy ministers.

Insofar as it restores a measure of clarity to the future of the first-generation biofuel industry, the compromise wording is perceived with relief and as being a lesser evil, at least until 2020. The introduction of a binding 7% ceiling on first-generation biofuel shackles the industry's growth possibilities, yet will

enable some of the investments made over some ten years to pay off.

The compromise is not relished by the industry, as the text does not guarantee the long-term sustainability of European agrofuel production. It provides for a potential re-examination of the ILUC effect based on new scientific data, and enables the Commission to advise Parliament and the Council on including ILUC emission factors within the existing sustainability criteria. The biodiesel sector is slightly more exposed than the bioethanol sector, as its GHG emission results are somewhat poorer. A new annex, Annex VIII, has thus been added to the directive, setting provisional estimated emissions from raw materials for biofuel and bioliquids relating to indirect changes to land use. They are expressed in gCO<sub>2</sub>eq/MJ, and average 12 for cereals and other starch crops, 13 for sugar crops and 55 for oilseed crops.

#### NEWS FROM AROUND THE MAIN CONSUMER COUNTRIES

##### France chalks up 10% growth

Biofuel consumption picked up after stagnating in 2013. The Sustainable Development Ministerial Statistical Department (SOeS) statistics demonstrate that release for biofuel consumption in transport reached 2 955 ktoe

(414 ktoe of bioethanol and 2 541 ktoe of biodiesel). Growth in biodiesel consumption (10.8%) exceeded that of bioethanol (5.2%) and is put down to the rise in the General Tax on Polluting Activities (TGAP), which rose to 7.7% for the diesel sector on 1 January 2014 (kept at 7% for the petrol sector).

In the French system, the TGAP rate is reduced in proportion to the renewable energy share of sustainable biofuel incorporated into the fuels released for consumption. Hence it represents the government's incorporation target. A circular issued on 25 March 2015 caps the renewable energy share that can be double counted at 0.35% for biofuel incorporated into diesel and at 0.25% for biofuel incorporated into petrol. This provision thus limits inedible lipid esters (waste and other oils) to 35%.

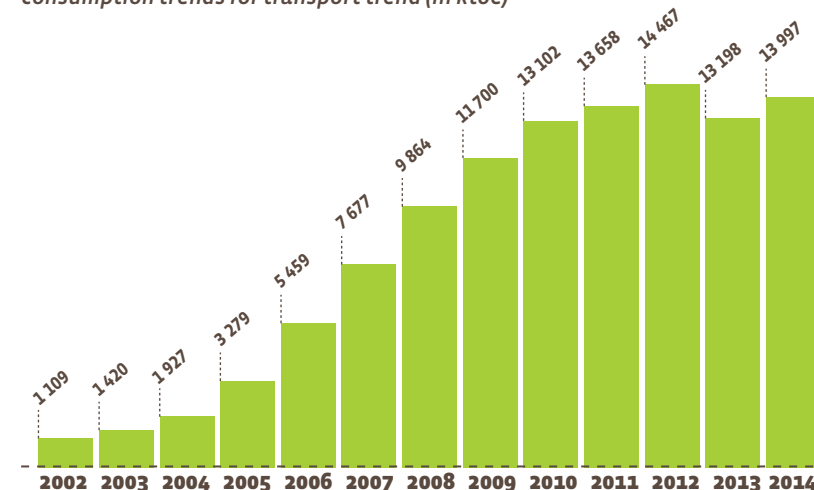
An order dated 31 December 2014 also raised the maximum content of biodiesel authorized in diesel from 7 to 8% to enable the country to meet its 7.7% biodiesel in diesel incorporation target rate set by law. Bioethanol consumption has risen because of the increase in unleaded E10 petrol consumption (that contains 10% bioethanol) through the spread of service stations selling E10. According to the French Union of Alcohol Producers (SNPAA), unleaded E10 petrol accounts for an average of 32% of all petrol sold in France, which is a three point increase over 2013. At the end of 2014, almost 5 000 were equipped for E10, representing 45% of the biggest French service stations. Sales of super ethanol, E85, increased by 9% in 2014, also assisted by the development of the network of distributing service stations, which equates to 200 new outlets in a year for a total of 560.

##### Revival of consumption in Spain

According to the IDAE, the Spanish Institute for Diversification and Saving of Energy, biofuel consumption bounced back in 2014 to 1 184 045 tonnes of biofuel in 2014 (903 544 tonnes of biodiesel to 280 501 tonnes of bioethanol) compared with 1 088 858 tonnes in 2013 (825 026 tonnes of biodiesel to 263 832 tonnes of bioethanol). If the figures are converted into energy

### Graph. n°1

European Union (EU-28) biofuel (liquid and biogas) consumption trends for transport trend (in ktoe)



\* Estimate. Sources: Data from 2002 to 2012 (Eurostat 2015), data for 2013 to 2014 (EurObserv'ER 2015).



content, Spanish consumption reached 979 380 toe in 2014 (798 489 toe of biodiesel to 180 891 toe of bioethanol) compared to 899 241 toe in 2013 (729 100 toe of biodiesel to 170 141 toe of bioethanol), which equates to 8.9% growth. Data published early in February by CORES, the Spanish oil statistics body, was slightly lower at 885 517 tonnes of biodiesel in 2014 (7.4% growth) for an incorporation volume of 4.23% in diesel and 274 510 tonnes of bioethanol (4% growth) for an incorporation volume of 5.95% in petrol.

According to fuel market sources quoted by Platts magazine, biofuel consumption started to pick up in Spain as the country's economy started to recover with the concomitant increase in road fuel consumption. As the biofuel incorporation rate is legally binding, an increase in fuel consumption automatically increases biofuel consumption. Another source explained this rise by the hoarding of sustainability certificates carried forward to 2015, as traders anticipated that the country will fall in line with the European Renewable Energy directive on the issue of biofuel sustainability. Spain is the last country to transpose all the provisions of the Renewable Energy directive on biofuel. Thus while the official certification mechanism for verifying certificates is not up and running and so Spanish biofuel consumption cannot be taken into account in the country's renewable energy targets, it would be wrong to assume that Spain uses non-sustainable biofuel.

Italy – “advanced” biofuel compulsory in 2018

A decree dated 10 October published in the Official Journal (Gazzetta Ufficiale) set Italy's new biofuel incorporation targets for 2015–2022. The incorporation rates in biofuel energy content will gradually rise from 5% in 2015 to 10% in 2020 (5.5% in 2016, 6.5% in 2017, 7.5% in 2018 and 9% in 2019), then stay at 10% in 2021 and 2022. Furthermore Italy has set a compulsory incorporation rate target for advanced biofuel, a first in the European Union, while in 2018 and 2019, petrol and diesel must contain at least 1.2% of advanced bio-

fuel. In 2020 and 2021, this incorporation rate will rise to 1.6% and further to 2% in 2022. In the interim, the Ministry of Economic Development's first estimates suggest lower biofuel consumption. Consumption of biodiesel used in blends dropped from 1 330 000 to 1 194 000 tonnes and bioethanol consumption from 87 000 to 12 000 tonnes. These figures are provisional and will be firmed up in the coming months.

Sharp rise in UK biodiesel consumption

Department of Energy and Climate Change (DECC) data shows that the volume of biodiesel used in transport in the UK rose sharply, from 766 million litres in 2013 to 955 million litres in 2014 (provisional figures) contrasting with bioethanol consumption for transport that remained practically static – 819 million litres in 2013 compared to 812 million litres in 2014 (provisional

Tabl. n°3

Minimum biofuel incorporation target in energy content for 2014

Country	Overall target	Target for petrol	Target for diesel
France	7.57%	7.00%	7.70%
Poland	7.10%		
Slovenia	7.00%		
Sweden	6.41%	3.20%	8.78%
Germany	6.25%	2.80%	4.40%
Finland	6.00%		
Lithuania	5.80%	3.34%	6.45%
Austria	5.75%	3.40%	6.30%
Denmark	5.75%		
Portugal	5.50%		
Netherlands	5.50%	3.50%	3.50%
Belgium	5.09%	2.66%	5.53%
Ireland	4.94%		
Bulgaria	4.94%	3.34%	5.53%
Hungary	4.90%	4.90%	4.90%
Romania	4.79%	3.00%	5.53%
Luxembourg	4.75%		
Czech Republic	4.57%	2.73%	5.53%
Slovakia	4.50%	2.73%	6.27%
Italy	4.50%		
Malta	4.50%		
Spain	4.10%	3.90%	4.10%
United kingdom	3.90%		
Greece	2.64%		
Croatia	2.06%		
Mean target	5.15%	3.58%	5.81%

*Note: Twenty-five EU Member States have set binding incorporation targets for 2014. All the percentages are expressed in energy content, which means that the percentages of the countries that set their targets in volumetric terms have been recalculated (Sweden, Lithuania, Belgium, Ireland, Bulgaria, Romania, Czech Republic, Slovakia, the United Kingdom, Greece and Croatia). Those countries that have set specific incorporation targets for petrol and diesel (France, Sweden, Lithuania, Belgium, Bulgaria, Hungary, Romania, Czech Republic and Greece) have also been recalculated to produce an overall target, bearing in mind each individual country's petrol and diesel figures.*

*Source: APPA press release, 20 May 2014.*

figures). In volume terms consumption increased by 11.5% (24.7% for biodiesel and a 0.9% fall for bioethanol. The biofuel fuel incorporation rate by volume for transport is put at 3.9% in 2014, which is 0.3 of a percentage point higher (the respective incorporation rates are 3.4% for biodiesel and 4.6% for bioethanol). In tables 2 and 3, EurObserv'ER, which has converted DECC's data into energy equivalent, puts consumption at 1 160 003 toe in 2014, which equates to 14.4% growth.

While the UK the consumption growth rate appears significant, that of the incorporation is still a long way behind the directive target of 10% of renewable energy in transports energy consumption. The contentious proposals of the European Union bodies (Commission, Council and Parliament) on including the ILUC effect and the incorporation ceiling for agrofuels prompted the UK government to stop raising the compulsory incorporation rate under the RTFO (Renewable Transport Fuel Obligation) framework. The country, which is in year seven of implementing this mechanism, has thus limited the incorporation volume to 4.75% over the period 15 April 2014 to 14 April 2015 (i.e. the same amount as the previous year). It should be noted that although the periods do not coincide exactly, the difference in the incorporation rate by volume between the RTFO and that of the incorporation rate for the calendar year can be explained by the double counting of biofuel produced from waste (primarily frying oil) and non-agricultural raw materials. The biofuel industry, and particularly the NFU (the UK National Farmers' Union), hope that the clarification made to the Renewable Energy directives and on fuel quality (see above), will shortly prompt the government to reassess the incorporation rates, so that they fall in line with the European directive target for 2020.

Slight increase in German consumption

German biofuel consumption recovered slightly after posting a sharp drop between 2012 and 2013. Provisional figures from AGEE-Stat, the Working Group on Renewable Energy Statistics for the Federal Ministry for Eco-

nomics Affairs and Energy, show that in 2014 the German road and rail transport sectors (excluding farming and the army) used 3 430 000 tonnes of biofuel (2 159 000 tonnes of biodiesel, 1 229 000 tonnes of bioethanol, 36 000 tonnes of biogas fuel and 6 000 tonnes of pure vegetable oil), compared to 3 305 000 tonnes in 2013 (2 063 000 tonnes of biodiesel, 1 206 000 tonnes of bioethanol, 35 000 tonnes of biogas and 1 000 tonnes of vegetable oil). When EurObserv'ER converts this data to energy equivalent consumption, total German consumption is put at 2 748 831 toe in 2014... a 4% rise on 2013 (2 643 548 toe in 2013). AGEE-Stat's provisional incorporation rate in energy content is put at 5.3% in 2014, as against 5.2% in 2013. Officially the incorporation quota, which factors in double counting, was set at 6.25% from 2010 to 2014 (thus this figure cannot be directly compared with the 5.3% for 2014). A new system based on a GHG emission reduction quota for diesel and petrol fuels has been implemented since 2015, which indirectly stimulates biofuel use. In 2015 and 2016, GHG emissions should fall by 3%, then by 4.5% from 2017 and by 7% from 2020 onwards. This new system expresses the country's determination

to develop second- and third-generation biofuel, which release much less GHG.

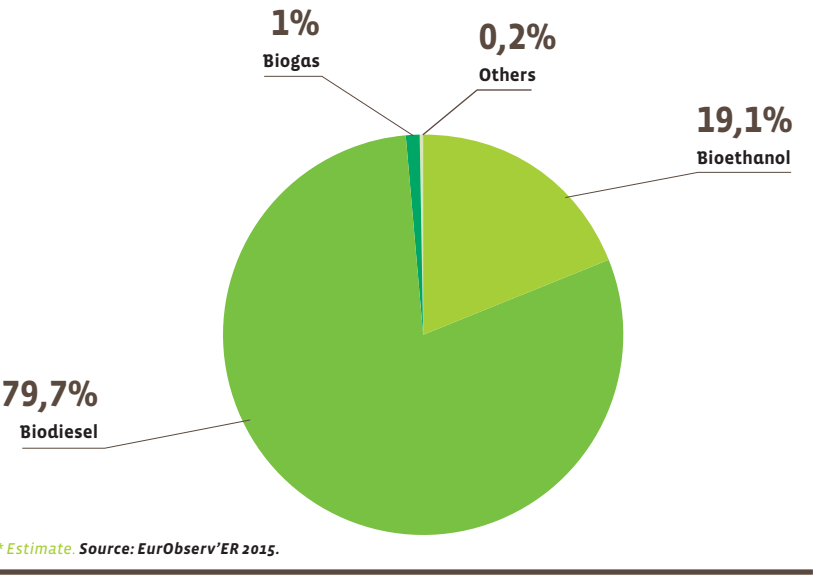
TOUGH MARKET ENVIRONMENT FOR THE INDUSTRY

EUROPEAN BIOETHANOL OUTPUT INCREASES

Recent estimates published by ePURE, the group that defends the interests of the EU renewable ethanol industry, show that bioethanol output in the EU has increased continuously over the past few years. ePURE points out that this data is not exhaustive, because it only includes output (or capacity) data from its affiliated members, in addition to that of the Roquette group, i.e. about 90% of the EU's bioethanol output. This data shows that after falling in 2011 (by >20.9% between 2009 and 2010, and >3% between 2010 and 2011), bioethanol output gradually picked up in 2012 and returned to double-digit growth in 2013 (>11.3%) and 2014 (>12.7%). It rose from 5 246 million litres in 2012, to 5 841 million litres in 2013 and 6 582 million litres in 2014. This bioethanol is primarily ear-

Graph. n°2

Breakdown of total EU 2014\* biofuel consumption in energetic content for transport by biofuel type





The Beta Renewables factory in Crescentino (Italy), commissioned in 2013, was the first second generation biofuel in Europe of a commercial size, with 80 million liters of bioethanol per year.

marked for use as fuel, with an 85.3% share (5 617 million litres) in 2014 estimated by ePURE, compared to 85.5% in 2013 (4 993 million litres). Ethanol production is also channelled for industrial use (7.3% of the total in 2014, or 479 million litres) in the chemicals, medical and cosmetics sectors, and also into food-processing (7.4% of the total in 2014, or 486 million litres). It should also be noted that the production data indicates an increase in European consumption that is not apparent in the provisional data gathered by EurObserv'ER. One of the possible explanations could be a drop in European imports of bioethanol fuel. EU ethanol production capacities have increased by steps (stable in 2010 and 2011, increase through to 2013 and renewed stability in 2014). Capacity reached 7 777 million litres in 2014 (7 702 million litres in 2013), which means that 84.6% of the EU's bioethanol production capacities were deployed in 2014. The ePURE statistics for 2014 show that 12 813 000 tonnes of agricultural

raw materials were converted, namely 5 400 000 tonnes of corn, 4 264 000 tonnes of wheat, 910 000 tonnes of other cereal crops, 2 207 000 tonnes of sugar beet (sugar equivalent) and 32 000 tonnes of other unspecified material.

#### BIOETHANOL INDUSTRY PROFITS FREEFALLING

The European bioethanol industry had a bad year in 2014 (the main players are shown in **table 4**), which saw its profits plummet because of the drop in the market price of ethanol. According to the sugar cooperative Tereos, the price of ethanol in Europe ("FOB Rotterdam" price) has fallen by an average of 16% over the last financial year. Ethanol prices have primarily fallen because of the low demand on the global oil market, and oversupply in the European market.

The Tereos Group's consolidated sales fell to 4 300 million euros in 2014/2015 (on 31 March), from 4 697 million euros in 2013/2014, with net profit over the same

period divided by 10, from 176 to 17 million euros! The Group puts this development down to extremely depressed market conditions, primarily in Europe, where sugar and ethanol prices continued to fall. This contrasts with alcohol and ethanol output that have risen sharply (by 16.5%), i.e. 1.9 million m<sup>3</sup> (1.9 billion litres). The Tereos annual statement had no fuel production statistics available for bioethanol.

France, the Czech Republic and Romania all had higher than average beet yields for the past five years that explain the sharp rise in ethanol production.

In Germany, CropEnergies the bioethanol producer and a subsidiary of the German sugar refiner Südsucker, increased its output yet also had to contend with the plunge in the bioethanol price. For the first time, the company produced more than 1 million m<sup>3</sup> of bioethanol, 1 056 000 m<sup>3</sup> compared to 884 000 m<sup>3</sup> the previous season. The group's four plants, located in Germany, Belgium, the UK and France, have 1.2 million m<sup>3</sup> of annual bioethanol de production capa-

city between them. This strong increase in output explains the rise in sales. It increased by 6% or 827 million euros for fiscal year 2014/2015 compared to 780 million euros in FY 2013/2014. But the very low bioethanol prices were not matched by lower raw materials prices, which hit the company's profits. The temporary closure of the Wilton production plant in the UK accentuated its losses further, which rose to 58 million euros compared to positive earnings of 12 million euros during the previous FY. CropEnergies expects its revenues for the next season to stabilize, despite lower than expected bioethanol prices. The company is primarily counting on expanding its alcohol production in its Zeitz plant (pharmaceutical, chemical and cosmetics uses). CropEnergies also notes that while bioethanol prices recovered at the beginning of the year, they are still highly volatile. It considers that the European Parliament agreement on amending the Renewable Energy directive will dispel the uncertainty hanging over the market, and enable bioethanol to play a more important role, especially through the development of E10 fuel.

#### BETTER PROTECTION FOR EUROPEAN BIODIESEL

When this barometer was being written, the biodiesel output data for 2014 of the European Biodiesel Board (EBB), the association that promotes biodiesel in Europe, was not ready. In 2013, the EBB put European Union output at about 10 367 000 tonnes (±5%), i.e. a 16.1% increase over 2012. The 2014 indicators suggest that European biodiesel consumption increased at the expense of exports. Last March, the port of Rotterdam, which is the biggest European biofuel platform, indicated that the incoming volume of biodiesel had fallen by 1.1 million tonnes in 2013 to 700 000 tonnes in 2014. The port explains that the drop is due to the introduction of additional import taxes and anti-dumping taxes to counter Indonesian and Argentine biodiesel imports. The general impression given by the port is that Europe is in the throes of becoming an internal market for biodiesel. The communiqué states that this drop in imports had created opportunities

for the European domestic market, and that at Rotterdam biodiesel production capacities had been restarted. This change, if confirmed, will be a step in the right direction for the European biodiesel industry. While it is still in a chronic overcapacity situation, EBB claims that European Union biodiesel production capacities were estimated at 23 093 000 tonnes in 2014 (24 216 000 tonnes in 2013), i.e. a little less than twice European Union consumption. Many plants have been shut down for several years.

#### BIODIESEL MARKET – THE OIL COMPANIES LOOKING FOR A SLICE OF THE ACTION

The oil groups continue to make inroads into the biofuel market and they are already some of the major biodiesel producers (**see table 5**). Neste (formerly Neste Oil) the Finnish oil company, is one of the segment leaders, having commissioned its first 190 000 tonne capacity biodiesel plant (of the NexBTL type) at Porvoo (Finland) in 2007, followed by a second similarly-dimensioned plant on the same site in 2009. The company then commissioned Europe's largest biorefinery in 2011 in Rotterdam (800 000 tonnes). It also has a plant of a comparable size in Singapore and claims to have global production capacity of almost 2 million tonnes. It plans to raise this capacity to 2.3 million tonnes in 2015, then to 2.6 million tonnes at the end of 2016.

Neste claims to be the world's top biodiesel producer and also the leading global biofuel producer from waste and residue (frying oil, animal fats, fish oil, vegetable oil refinery residue, etc.). In 2014, the group stated that it had produced 1.3 million tonnes of biodiesel from waste. These raw materials account for 62% of the renewable materials that Neste used in 2014 (52% in 2013, and 35% in 2012). The vegetable oil share (essentially palm oil) used as feedstock has fallen considerably over the past few years and was only 38% in 2014 (47% in 2013 and 35% in 2012). Other oil companies are following suit. Total from France and Eni from Italy have both declared their intention to convert one of their oil refinery sites

into biodiesel production plants. Their choice is primarily motivated by the need to reduce their refining capacity, limit the number of lay-offs due to site closures and regain fuel market shares. In October, Eni, which started up its new 300 000 tonne HVO (hydrogenated vegetable oil) biodiesel biorefinery on its Venice (Porto Marghera) refinery site in June 2014, announced that it was converting a second oil refinery site at Gela in Sicily, which will have 750 000 tonnes of HVO biodiesel production capacity.

On 16 April 2015, Total announced that it was investing 200 million euros in transforming its La Mède refinery site at Dunkirk, to create France's first biorefinery. According to the Group's press release, the site will have 500 000 tonnes of capacity and produce HVO biodiesel by refining waste oil and vegetable oil. The Group explains that its decision was prompted by the draft energy transition law for green growth that plans to boost the biofuel share from about 7.7% in 2014 to 15% in 2030.

As previously explained, these announcements have been made while a major part of European capacity has been mothballed because of insufficient demand. Despite this tough context, the oil companies want a cut of the sharp rise in European demand for biodiesel produced from waste oil and animal fats – a sector that benefits from double counting and that is not subject to EU restrictive measures (these measures may be member state-specific). The oil groups' positioning on the biofuel market stands to reason because of dwindling market shares in road fuel.

#### RAPSEED PRODUCERS ON THE DEFENSIVE

Total's announcement naturally dealt the French oilseed grower federation (FOP) members a blow, as its consequences could be disastrous for them. They suspect that the refinery activity at la Mède essentially involves using palm oil, which is not produced in France, alongside waste oil. They also point out that the French biodiesel sector players have only just emerged from



a restructuring phase that has enabled them to adjust their capacities to market requirements.

In January 2015, reorganization of the French vegetable oil industry took the form of the implementation of new governance of the Sofiproteol Group which became the Avril Group (of which FOP is a limited partner). The group, a French agricultural industry giant, is number one in Europe for biodiesel from oilseeds, under the Diester brand, and number one for oilseed crushing and production of edible oils (Lesieur, Puget, and other brands). At the end of 2013, it had been forced to close its Capelle-la-Grande (Nord) and Venette (Oise) production plants, and its Sai-pol crushing plant on the Venette site. The Avril Group's production capacities thus contracted from 3 million tonnes in 2013 to 2.7 million tonnes in 2014. In 2014, Avril posted sales of 6 455 million euros (7 049 million euros in 2013) and on 31 March 2015, employed 7 200 people across 22 countries.

## SECOND-GENERATION BIOFUEL ON TRACK

The compromise text passed by the European Parliament that sets a non-binding incorporation rate of at least 0.5% for advanced biofuel by 2020, is a major step forward for the segment. While this target might seem to be somewhat modest in relation to the 2.5% minimum incorporation rate originally recommended by the Parliament, the text finally lays the ground rules for a legislative framework that the second-generation biofuel industry will be able to rely on. The Member States effectively have 18 months (until 2017), once the text is finally endorsed, to set their own nationally-binding incorporation rates. These national decisions will at last give investors in second-generation biofuel, who often invested in first-generation biofuel, the long-term visibility they need.

For the time being, many demonstration projects aiming to set up commer-

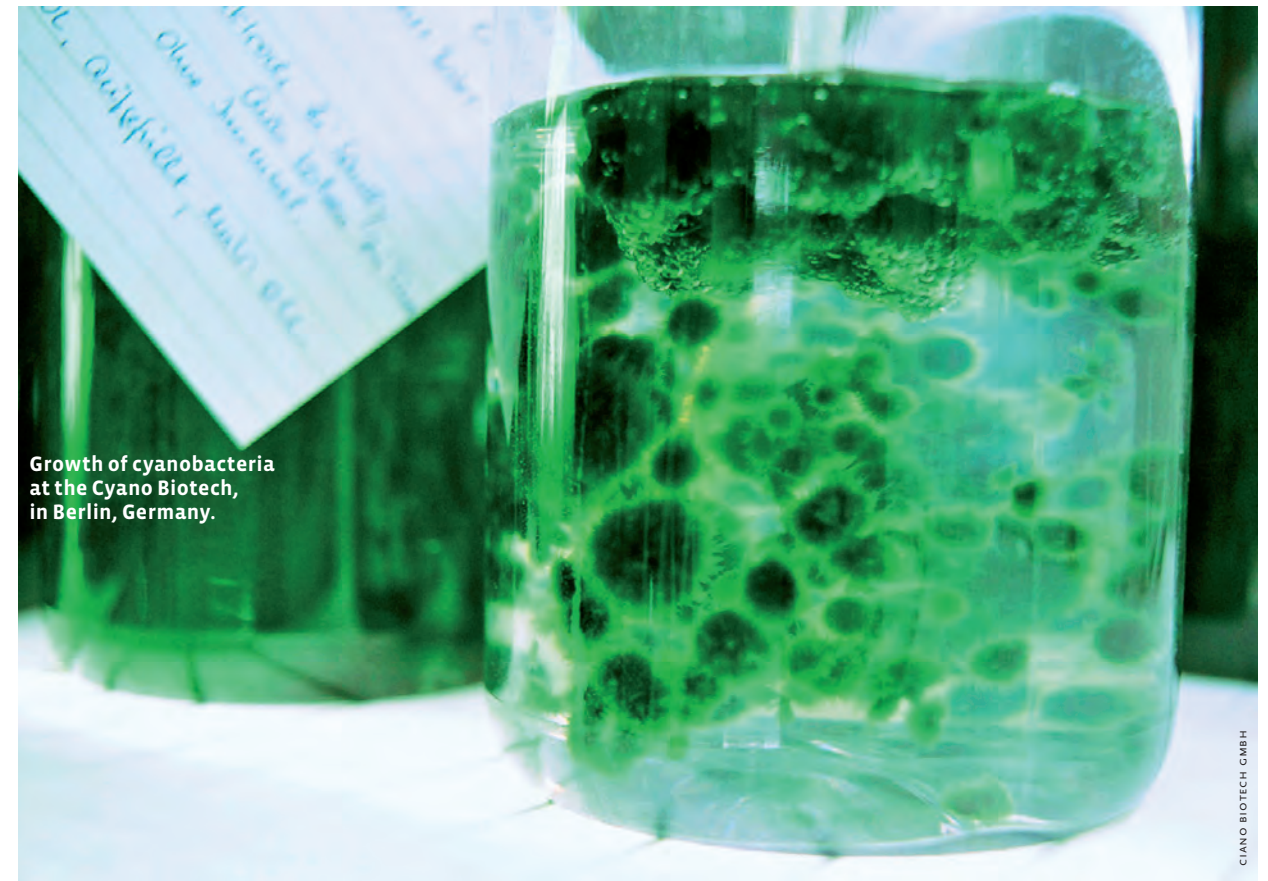
cially-viable plants have been funded under national programmes, such as Oseo in France, or European funding programmes, such as NER 300. There are projects geared to producing cellulosic ethanol using a biochemical process that combines pre-treatment to separate out the constituents (cellulose, hemicellulose and lignin) from enzymatic hydrolysis of the cellulose. We mention a number of these projects (the list is not exhaustive) – the Futurol projects developed by Procethol 2G, the Biolife and Gometha projects developed by Chetex Italia and the LED project funded by Abengoa. For diesel-powered vehicles, the most commonly envisaged cellulosic biofuel is BtL (Biomass to-Liquids), whose manufacture combines a gasifier with a Fisher-Tropsch type synthesis unit. Examples of BtL projects are Ajos BtL, developed by Forest BtL, Stracel BtL, developed by UPM Kymene, and Syndiese, developed by the CEA, Air Liquide and Cnim. The European Commission also supports third-gene-

**Tabl. n°4**

*Production capacity located in Europe of the main European bioethanol producers in Europe in 2014\* (in millions of litres)*

Company	Country	Location of the units	Production capacity in 2013 (million litres)	Raw materials
Abengoa BioEnergie	Spain	Spain (3), Netherland (1), France (1)	1 281	Barley, wheat, maize, renewable municipal waste fraction
Crop Energies	Germany	Germany (1), Belgium (1), France (1), Uni-Kingdom (1)	1 200	Sugar juice, wheat, maize, triticale
Tereos	France	France (6), Czech Republic (3), Belgium (1), United (1)	1 260	Sugar juice, wheat
Cristanol	France	France (4)	550	Sugar juice, wheat
Vivergo	United-Kingdom	United-Kingdom (1)	420	Wheat
Agrana	Austria	Austria (1), Hongary (1 - 50 %)	420	Wheat, maize
Verbio	Germany	Germany (2)	340	Céréales (principalement seigle)
Agroetanol	Sweden	Sweden (1)	250	Wheat

Note: no ethanol plant in Europe is using sugar beet directly. What is processed is sugar juice, also often know as syrup or molasses. \* Only units in Europe are taken into account. Source: EurObserv'ER 2015.



**Growth of cyanobacteria at the Cyano Biotech, in Berlin, Germany.**

CIANO BIOTECH GMBH

ration biofuel projects using algae as feedstock such as Biofat, All-Gas and InteSusal.

In Europe, the first commercially-sized second-generation biofuel plant (cellulosic ethanol), the Beta Renewables plant at Crescentino, Italy, was commissioned in 2013 with 80 million litres

of production capacity. The feedstocks for the bioethanol are rice, wheat and arundo donax straw (a tall herbaceous cane, the Giant cane). UPM Biofuel, a subsidiary of UPM, the world's leading paper pulp maker leader based in Finland, is the first to have started up a commercially-sized plant, on 12 January

2015, to produce biodiesel from forest waste. The Lappeenranta biorefinery required investment of 175 million euros and has 100 000 tonnes of production capacity (which equates to 120 million litres). It shares the same site as UPM's

**Tabl. n° 5**

*Production capacity of the main biodiesel producers in Europe in 2014\* (tons)*

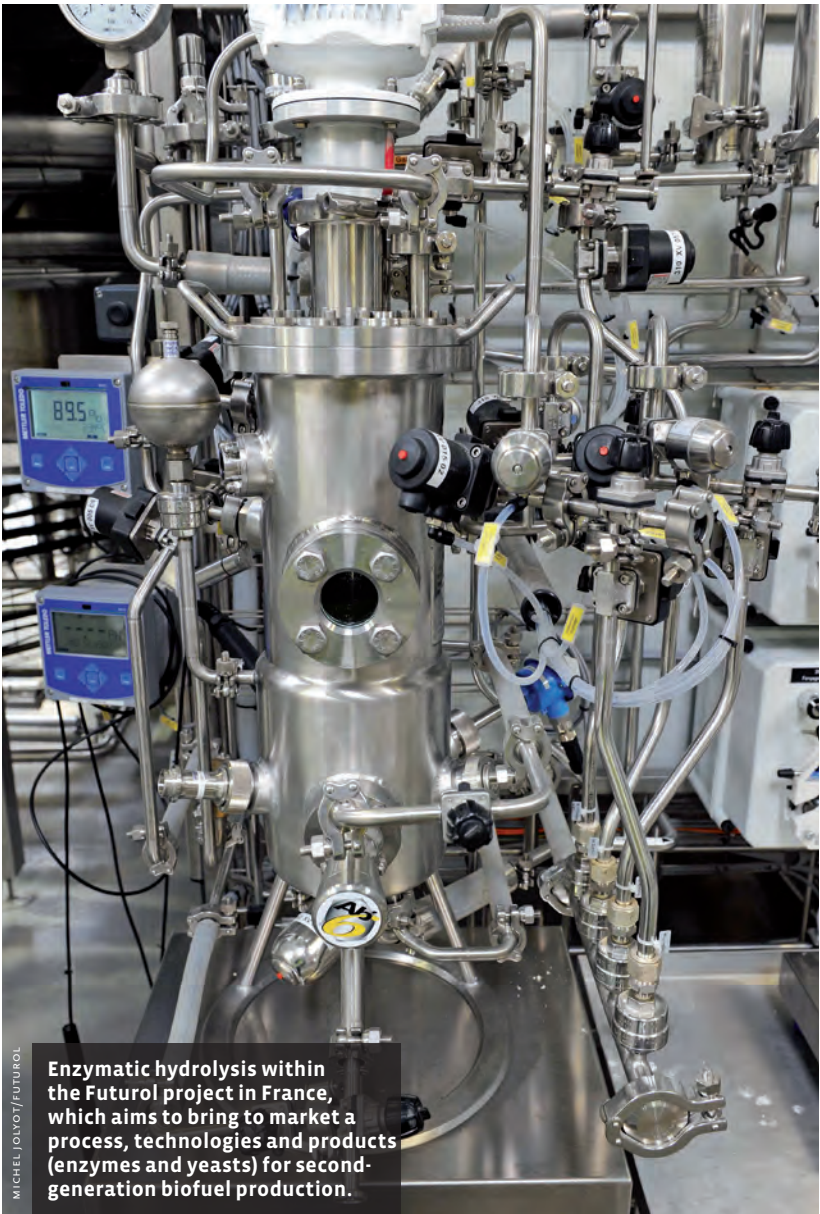
Company	Country	Number and location of plants	Bioethanol production capacity (in tons)
Avril (formerly Sofipetrol)	France	France (7), Germany (2), Italy (2), Austria (1), Belgium (1)	2 700 000
Neste Oil	Finland	Finland (2), Netherlands (1)	1 180 000
ADM Biodiesel	Germany	Germany (3)	975 000
Infinita (Musim Mas)	Spain	Spain (2)	600 000
Marsegia Group (Ital Green oil and Ital Bi Oil)	Italy	Italy (2)	560 000
Verbio AG	Germany	Germany (2)	450 000
Eni	Italy	Italy (1)	300 000
Petrotec	Germany	Germany (2), Spain (1)	185 000

\* Only units in Europe are taken into account. Source: EurObserv'ER 2015.



Kaukas paper pulp plant. This biodiesel, called UPM Bioverno diesel, is produced from crude tall oil, a pulp production residue. These commercially-sized plants are the exception to the rule in Europe. So far, the absence of any European regulatory framework to guide the development of second-generation biofuel has curbed the investments needed to move on to the large-scale industrialization stage. The new legal framework that is being implemented should transform the situation, with the announcement of the construction of new projects.

Biochemtex and Beta Renewable have announced the signing of a contract with Energochemica SE to construct a plant in Strazske, Slovakia. The plant will have 55 000 tonnes of annual production capacity and produce cellulosic ethanol from non-food biomass. It is due to be fully up and running in the first half of 2017. Biochemtex is now one of the cellulosic ethanol segment leaders. In 2014 it commissioned the “GrandBio – Bioflex 1” in Brazil... a plant using the same process with design production capacity of 82 million litres.

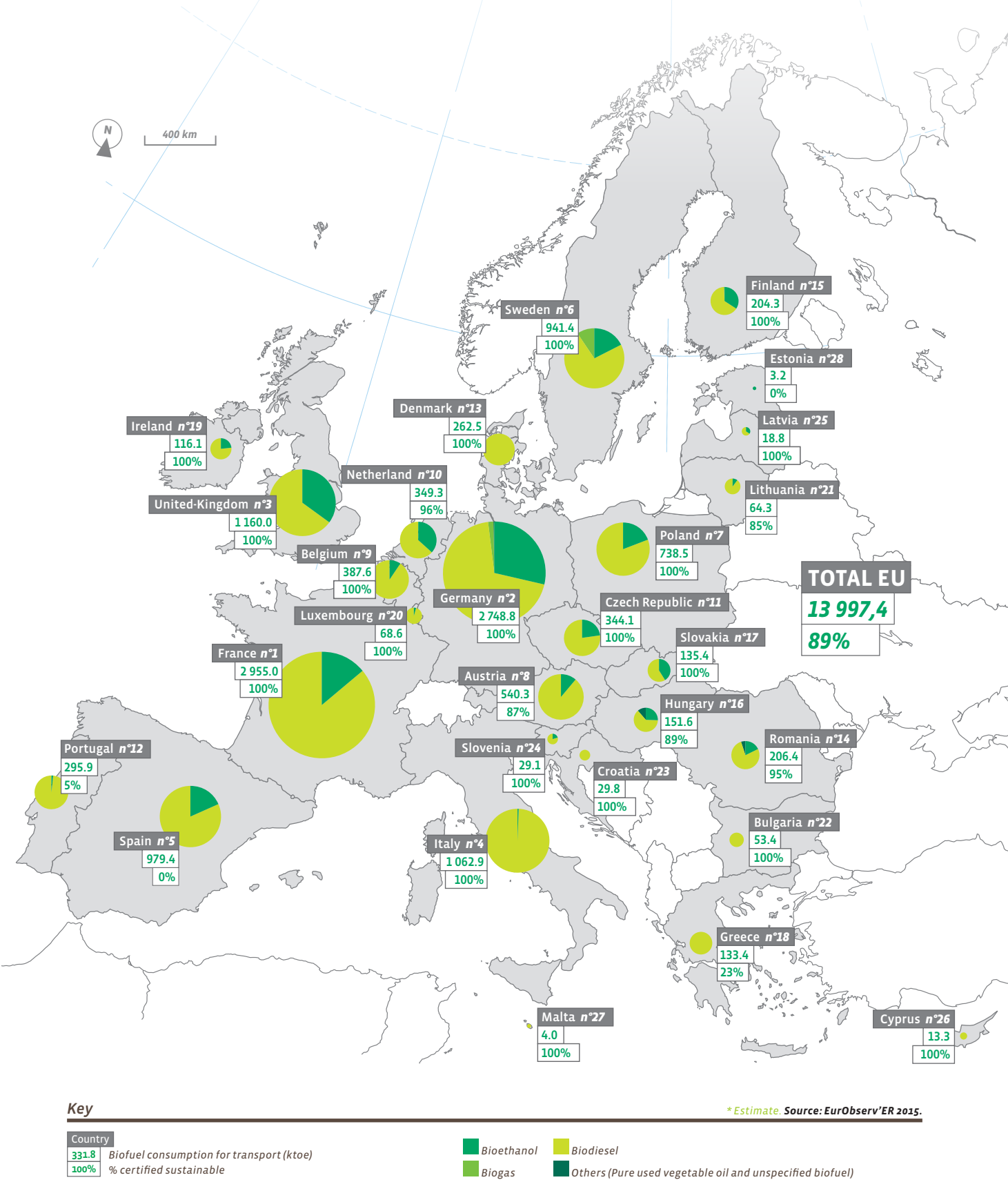


Enzymatic hydrolysis within the Futurol project in France, which aims to bring to market a process, technologies and products (enzymes and yeasts) for second-generation biofuel production.

### THE UNITED STATES AHEAD ON 2ND GENERATION

In the USA, second-generation biofuel development has taken off faster than in Europe, and several commercially-sized plants have recently entered into production. Ineos Bio commissioned its first 30 million-litre (8 million-gallon) cellulosic ethanol plant in July 2013 – the Vero Beach project in Florida, also known as the “Indian River BioEnergy Center”. The following year, in September 2014, the Liberty project went on stream in Emmetsburg, Iowa, with 75 million litres (20 MG) of cellulosic ethanol production capacity. The plant, which will process 770 tonnes of biomass every day, is owned by POET-DSM Advanced Biofuels, a joint subsidiary of POET of the USA and Royal DSM of the Netherlands. A month later, in October 2014, Spain’s Abengoa started up its first cellulosic ethanol plant, at Hugoton, Kansas, and did so seven years after having commissioned its first pilot plant in York, Pennsylvania. The Hugoton plant, which cost 685 million dollars, has 95 million litres (25 MG) of production capacity. It will use 350 000 tonnes of biomass, primarily harvest residue, every year. The main feedstock will be maize stalks (about 80%); the remainder includes wheat straw, sorghum stubble and switchgrass. The plant will also produce electricity (21 MW) from the lignin solids resulting from the conversion process. DuPont’s cellulosic ethanol production plant, “DuPont Nevada CE site” – a 114 million-litre (30 MG) plant – should shortly be started up in Nevada. American incorporation targets are differentiated by the type of biofuel, primarily for the purpose of promoting the emergence of cellulosic biofuel. On 29 May 2015, the US Environmental Protection Agency (EPA) proposed new incorporation quotas for cellulosic biofuel. They will rise from 33 MG in 2014 (125 million litres), to 106 MG in 2015 (401 million litres) then to 206 MG in 2016 (780 million litres). These proposals are open to negotiation between the stakeholders until 27 July. The EPA deadline for finalizing the standard

Biofuel consumption for transport in the European Union in 2014\* (ktoe) with respective shares of each sector

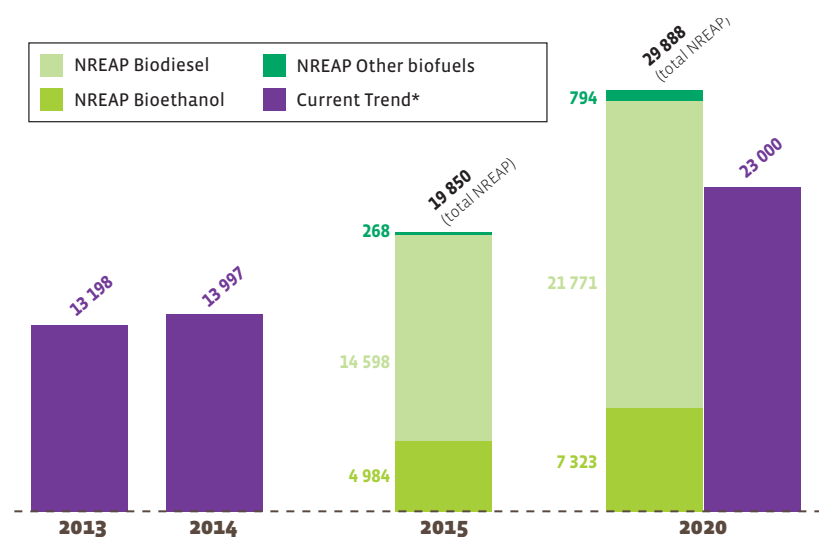






### Graph. n°3

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



\*Subject to possible changes in line with the new European regulation. Source: EurObserv'ER 2015.

incorporation volumes is 30 November. According to the E2 Environmental Entrepreneurs' 2014 report, North American (the USA and Canada) cellulosic ethanol production capacity was already about 57.5 MG in 2014 (218 million litres) and should rise to between 182 and 215 MG by the end of 2017 (689–815 million litres).

### THE 2020 TARGETS... STILL ACHIEVABLE

The three years it has taken to settle the issue of factoring in the ILUC effect, have stalled biofuel development, whose growth has fallen behind the directive's targets. First-generation biofuel was the main target of the reform, but regulatory uncertainties have also retarded the development of second-generation biofuel. The delays in making decisions, and in particular

setting their incorporation rate for 2020, have tended to negate the efforts made to give long-term visibility to investors in advanced biofuel, especially as major investment projects were supported by the first-generation industry. As a result, reaching the 10% renewable energy target in transport is still achievable, but depends more than ever on the individual countries' political determination. EurObserv'ER's forecast for 2020 does not echo the trend observed over the past two years, but is based on an effective biofuel incorporation rate of about 8%. In economic terms, agrofuel is less troubled by this issue as production capacities are surplus to requirements and can rapidly respond to the incorporation ceiling set at 7% by 2020. Likewise biofuel derived from waste oil and animal fats (outside the ceiling) are less troubled. With the benefit of double energy content counting, their output has burgeoned over the past few years. The announcement of new production plants made by the oil groups will increase output further. Member States' capacity to fulfil their targets by using "advanced" biofuel and via "renewable" electrical mobility (the States can opt for either of these solutions) is a not so clear-cut, and is so although their consumption also benefits from special accounting in target calculations. We have to remember that advanced biofuel consumption equates to twice their energy content (Annex IX was added to the text and in part A stipulates which raw materials are eligible for this double counting).

The new text also further boosts the electric road vehicle segment. Their consumption of renewable electricity is now considered as equivalent to five times the energy content of the electricity contribution produced from renewable energy sources compared to 2.5 times in the original directive's text. However, there is no change on factoring renewable electricity consumption by the rail sector, which stays at 2.5.

For cellulose-based advanced biofuel, the countries that want to become involved in this production must follow Italy's example and implement a legislative framework as soon as possible. The USA has already outstripped Europe in this segment with the number of projects and achievements. If Europe wants to remain competitive and export its know-how, it must address industrialization as a matter of urgency. The projects that will be announced in the next two to three years are likely to contribute to the 2020 targets.

Effectively, the European Commission wishes to concentrate its efforts through these two channels... alternative fuels and e-mobility. On 25 February 2015, it presented a strategic document on the creation of an Energy Union that proposes to set up a "strategic framework for a resilient Energy Union with a forward-looking climate change policy". One of the action points covers decarbonisation in the transport sector, in which the Commission undertakes to take additional measures to create market

conditions that are conducive to the increased deployment of alternative fuels and accelerate the electrification of road vehicles and other means of transport. The European Commission has already announced that in 2017 it will be submitting a legal text on "decarbonising the transport sector, comprising a Plan of action on alternative fuels". □

Sources: AGEE-Stat (Germany), SOES (France), DECC (United Kingdom), IDAE (Spain), Ministry of economic development (Italy), The Institute for Renewable Energy (Poland), Statistics Sweden, Statistics Netherlands, Statistics Austria, DGGE (Portugal), University of Miskolc (Hungary), Ministry of industry and trade (Czech Republic), SPF Economy (Belgium), Ministry of Environment, Energy and Climate Change (Greece), Finnish biogas association, Statistics Lithuania, SEAI (Ireland Republic), STATEC (Luxembourg), APEE (Bulgaria), Institut Jozef Stefan (Slovenia), ENS (Denmark), NSO (Malta), Ministry of Energy, Commerce, Industry and Tourism (Estonia).

The next barometers will cover the subjects of heat pumps



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