Alstom's hydrogen fuel cell train (Coradia iLint) made its maiden voyage at the Valenciennes Railway Testing Centre (France) on 6 September 2021.

SAMUEL DHOTE

-1.5 %

The decrease of biofuels consumption for transport in the EU27 between 2019 and 2020 (in energy content)

RENEWABLE ENERGY IN TRANSPORT BAROMETER[1]

A study carried out by EurObserv'ER.

The EU27 Member States' 2020 deadline for meeting their renewable energy targets for the transport sector passed in an exceptional context overshadowed by the COVID-19 pandemic which dramatically reduced mobility requirements. Nonetheless, the initial available estimates point to the fact that biofuel consumption in the EU of 27 contracted only slightly in 2020 (by 1.5% year-on-year) because its use was supported by the increase in incorporation rates required to achieve the year's 10% target for renewable energy in transport. The drop in renewable electricity consumption by railway transport was partly offset by the sharp rise in the number of electric vehicles on the road.

1. ***In the past this barometer was exclusively dedicated to biofuels. From now on it will cover all the renewable energies used in transport. The Observ'ER team viewed this development as essential, given the growing importance of alternative technologies to combustion engines.***

21.6 TWh
(eq 1.9 Mtoe)

Renewable electricity used in transport (road, rail, other transport modes) in the EU27 in 2020

15.8 Mtoe

Total biofuel consumption in EU27 transport in 2020

The Member States of the European Union had an important deadline to meet in 2020, because it marked their success or failure to meet their renewable energy targets as set out in the Directive 2009/28/EC. In addition to the main target for all energy uses made by end users (electricity, heating and cooling, transport), the directive also defined a specific target for the transport sector. It provides for each Member State's transport sector (road, railway and others) to use at least 10% of renewably-sourced energy including liquid and gaseous biofuels and also renewably-sourced electricity (in trains, trams, subways, electric cars, electric bus and others). This barometer presents the initial official results available and outlines the major renewable energy use trends in the transport sector for 2020 pending publication of the official results due for release at the end of this year.

2020 – AN EXCEPTIONAL CONTEXT

The 2020 target deadline expired in an exceptional context overshadowed by the COVID-19 pandemic. Over the year, the pandemic triggered a sharp fall in road fuel consumption and disrupted fuel supply lines for several months. Eurostat's preliminary 2020 data shows that gross internal market deliveries of transport fuels (petrol, diesel, LPG and kerosene type jet fuel) plummeted from their 2019 levels. Gross internal market deliveries of petroleum products dropped by 13% to their lowest level since 1990. In contrast, the impact on biofuel consumption was much lower, as its use was supported by the directive's renewable energy share target of 10% in transport. Countries that waited until 2020 to fulfil their commitments increased their biofuel incorporation rates.

The provisional data gathered by EurObserv'ER suggests that liquid and gaseous biofuel consumption for transport shrank by only 1.5% between 2019 and 2020 to 15.8 Mtoe (16 Mtoe in 2019) **(graph1)**. Bioethanol bore the brunt of this reduction in consumption (falling by 9.6% to 2.4 Mtoe). Biodiesel suffered much less (falling by 0.4% to 13 Mtoe). Biogas fuel use in transport increased significantly (by 31.3% to 321.4 ktoe) driven by greater use in Germany, Italy and the Netherlands **(table 1 and 2)**.

While overall biofuel consumption declined in 2020, this decline does not apply to the types of biofuel produced from those raw materials that are eligible for double accounting of their energy content (see inset p. 5). Their consumption increased from 4 Mtoe in 2019 to at least 4.4 Mtoe in 2020 **(table 3)**. We deduce about 11.2% growth from the partial data in our possession (not all the European Union countries had data available on the date of the survey). Most of this increase can be ascribed to the larger contribution made by biofuels from used cooking oils and animal fats (listed in Annex IX, part B of the Directive EC 2018/2001) primarily used in HVO biodiesel production. It affects the "advanced" biofuels to a lesser extent, namely those produced from the raw materials listed in Annex IX, part A of the same directive (such as algae, palm oil effluent, forestry waste and residue, straw, manure, sewage sludge, raw glycerine, bagasse, etc.).

In 2020, Spain increased its biofuel consumption appreciably using raw materials that benefit from double accounting. The Spanish Ministry of Ecological Transition data affirms that consumption more than doubled (from 200.6 to 553.5 ktoe) between 2019 and 2020. Other countries used this lever to aim at or help meet their consumption targets such as Belgium (by raising consumption from 17.8 to 55.5 ktoe), and even France and Germany which posted higher consumption levels (14.4% in France, for a total of 230.1 ktoe and 10% in Germany for a total of 685 ktoe).

Biofuels produced from the raw materials listed in Annex IX, part A of the Directive EC 2018/2001 said to be "advanced", and biofuels produced from the raw materials listed in Annex IX part B (cooking oil and animal fats) benefit from double accounting. The 2020 shares of these biofuels came to just over 29% and just over 71% respectively.

Incidentally, in addition to liquid biofuel uses in road vehicles (passenger

Tabl. n° 1

Biofuels consumption for transport in the European Union in 2019 (in ktoe)

Country	Biodiesel	Bioethanol	Biogas fuel	Total consumption	% compliant*
France	2 543.9	653.3	0.0	3 197.2	100.0%
Germany**	1 904.1	732.6	56.8	2 693.5	100.0%
Spain	1 626.6	140.6	0.0	1 767.1	99.7%
Sweden	1 185.2	93.2	109.5	1 387.9	100.0%
Italy	1 245.7	30.4	40.9	1 317.0	100.0%
Poland	837.8	187.3	0.0	1 025.1	100.0%
Netherlands	417.4	198.7	18.9	635.0	100.0%
Austria	426.3	56.5	0.4	483.2	99.6%
Belgium	352.8	106.3	0.0	459.1	100.0%
Finland	339.1	89.1	6.9	435.1	98.6%
Romania	314.5	97.8	0.0	412.4	100.0%
Czechia	268.3	73.0	0.0	341.3	100.0%
Portugal	275.6	8.2	0.0	283.8	100.0%
Denmark	169.6	43.7	6.1	219.4	97.2%
Hungary	155.2	45.7	0.0	201.0	100.0%
Ireland	161.9	26.2	0.0	188.1	100.0%
Greece	160.8	24.0	0.0	184.8	87.0%
Bulgaria	144.7	31.8	0.0	176.5	84.1%
Slovakia	132.6	19.8	0.0	152.4	100.0%
Luxembourg	111.1	17.1	0.0	128.2	100.0%
Slovenia	90.1	4.2	0.0	94.4	100.0%
Lithuania	65.5	9.8	0.0	75.3	100.0%
Croatia	61.9	1.0	0.0	62.8	100.0%
Latvia	29.1	7.3	0.0	36.4	100.0%
Estonia	20.3	7.4	5.2	32.8	100.0%
Cyprus	11.3	0.0	0.0	11.3	100.0%
Malta	11.0	0.0	0.0	11.0	100.0%
Total EU 27	13 062.2	2 705.1	244.7	16 012.0	99.5%

** Share of compliant biofuels (Articles 17 and 18 of Directive 2009/28/EC) ** German biodiesel consumption figures include a consumption of pure vegetable oil estimated to 0.9 ktoe.* ***Source: EurObserv'ER 2021***

Tabl. n° 2

Biofuels consumption for transport in the European Union in 2020 (in ktoe)*

Country	Biodiesel	Bioethanol	Biogas fuel	Total consumption	% compliant*
Germany***	2 568.2	701.6	76.0	3 345.8	98.9%
France	2 078.2	554.7	0.6	2 633.5	100.0%
Spain	1 447.7	98.0	0.0	1 545.7	100.0%
Italy	1 245.1	19.6	82.1	1 346.8	99.9%
Sweden+	995.3	66.9	109.5	1 171.6	100.0%
Poland+	864.4	89.6	0.0	954.0	100.0%
Belgium	568.7	97.3	0.0	666.0	100.0%
Netherlands	301.4	226.4	34.6	562.4	100.0%
Austria+	469.4	49.1	0.4	519.0	99.9%
Romania+	314.5	97.8	0.0	412.3	100.0%
Finland+	304.1	92.5	6.9	403.5	98.5%
Czechia	308.8	65.5	0.0	374.3	100.0%
Portugal	254.1	0.0	0.0	254.1	100.0%
Hungary+	155.2	56.1	0.0	211.3	100.0%
Denmark	159.5	44.1	6.1	209.7	97.1%
Greece	136.8	62.7	0.0	199.5	100.0%
Ireland	155.1	19.4	0.0	174.5	100.0%
Slovakia+	135.2	23.0	0.0	158.2	100.0%
Bulgaria+	120.5	26.5	0.0	147.0	84.1%
Luxembourg	108.0	14.0	0.0	122.0	100.0%
Slovenia+	106.4	4.2	0.0	110.6	100.0%
Lithuania	87.2	15.8	0.0	103.0	100.0%
Croatia+	45.5	0.5	0.0	46.0	100.0%
Latvia+	33.2	12.8	0.0	45.9	100.0%
Estonia+	20.3	7.4	5.2	32.8	100.0%
Cyprus+	15.0	0.0	0.0	15.0	100.0%
Malta+	14.2	0.0	0.0	14.2	100.0%
Total EU 27	13 011.9	2 445.7	321.4	15 778.9	99.5%

** Estimation ** Share of compliant biofuels (Articles 17 and 18 of Directive 2009/28/EC) *** German biodiesel consumption figures include a consumption of pure vegetable oil estimated to 0.9 ktoe. Note: Biofuel consumption data for countries marked by a «+» were not available during the survey , EurObserv'ER made estimates taking into consideration the Eurostat «Energy Balance - early estimates» published in June 2021* ***Source: EurObserv'ER 2021***

vehicles, utility vehicles, buses and lorries), it is marginally used for other transport modes. The use of liquid biofuels in rail transport is marginal (0.2%), at 25.8 ktoe of consumption in 2020, and negligible in maritime and river transport **(table 4).**

ELECTRIC VEHICLES… A KEY TO CARBON NEUTRALITY

The sought-after electrification of road transport that is encouraged by policy makers in the effort to achieve carbon neutrality in 2050, is in its early days. The EurObserv'ER survey on the amount of renewable electricity used in European Union countries by chargeable electric vehicles in 2020 – all-electric **(BEV – Battery Electric Vehicles)** and rechargeable hybrid vehicles **(PHEV – Plug-In Hybrid Electric vehicle)** – came to slightly less than 100 ktoe (99.4 ktoe in 2020 compared to 82.6 ktoe in 2019) **(table 5)**. This production level is still very low when compared to the energy content of the liquid and gaseous biofuels incorporated into road fuels, even when allowing for the fact that the efficiency of an electric vehicle (EV) (i.e., the ratio between the useful energy and total energy used) is at least double that of a combustion engine (see inset).

Now, the increase in renewable electricity consumption in road transport does not completely correlate with momentum of EV sales, because 2020 will go down in history as an exceptional year marked by limited mobility requirements (because of mandatory working from home, for instance). So, in France, the SDES (Data and Statistical Studies Department which reports to the Ministry for the Ecological Transition) reckons that despite the high rise in electric vehicle registrations, the consumption of renewable electricity in road transport slipped a little. It increased only slightly in the Netherlands and Belgium, which also have buoyant electric vehicle markets (see further down).

The amount of electricity used in road transport is low when compared to that of the other electrified modes of transport (essentially railroad, trains, trams and subway) whose 2020 renewable energy consumption was about 1.8 Mtoe. In 2020, electric road vehicles accounted for only 5.4% of the renewable electricity used in transport (4.3% in 2019). Most of it was used in rail networks (trains, trams and subway). The electrification level of rail-based transport provides a logical explanation for this. The European Commission estimates that about 60% of the European Union network is electrified, which corresponds to 80% of all rail traffic volume. Furthermore, electrification of the railway infrastructure continues to expand. The first orders for hydrogen fuel cell trains have recently been placed by several Member States for the rail network sections whose electrification is not viewed as cost-effective. This new market segment will generate further outlets for renewable electricity generation through water electrolysis of the hydrogen used.

RENEWABLE TARGETS FOR TRANSPORT IN THE CURRENT RED II

The new renewable energy directive (2018/2001) raised the renewable energy target (described as the "minimum share" to be achieved) for the transport sector to 14% in 2030. It reformulated and added new sustainability and GHG reduction criteria and set new specific targets for biofuels produced from waste (oils and fats) and raw materials not sourced from food crops.

The RED II directive provides for the energy accounting of the biofuel (and biogas) energy content share used for transport and produced from certain raw materials[1] to be doubled in countries that use them in order to achieve the set target of 14%. This double accounting applies to "advanced biofuels" (and biogas), that are produced from the raw materials listed in Annex IX, part A of the directive (algae, forestry waste and residue, from the timber sector, straw, manure, sewage sludge, raw glycerine, bagasse, and others). It also applies to biofuels (and biogas) produced using other raw materials listed in part B of the same annex, namely, used cooking oils and animal fats. However, biofuels produced from these B-listed materials are not deemed to be "advanced" and therefore do not contribute to the specific minimum share targets vested in advanced biofuels. To encourage the industrial development of "advanced biofuels", the RED II provides for a specific 0.2% target in 2022, and targets of at least 1% in 2025 and at least 3.5% in 2030 for each Member State. The Directive enables the Member States to depart from these limits if they can prove that the sourcing of the relevant raw materials is problematic.

Other incentives have been implemented to encourage more GHG gas-sparing modes of transport. The renewable electricity share is deemed to equate to four times its energy content when employed by road transport and 1.5 times its energy content when employed by rail transport. The contribution of fuels suppled to air and maritime transport equates to 1.2 times their energy content, excluding biofuels produced from crops that ordinarily feed humans and animals. These incentives reduce the biofuel volumes required to be physically incorporated to achieve the minimum 14% in 2030.

The RED II also set a cap on biofuels produced from crops traditionally intended to feed humans and animals (that are defined as "agrofuels"). Their share in 2030 will face a double constraint: firstly, they will be prohibited from exceeding a maximum share of 7% of final energy consumption in the transport sector and secondly, their share will not be permitted to exceed more than one percentage point more than their 2020 rate. If they wish to, Member States may also set lower limits and make distinctions between types of biofuel. The RED II has finally introduced a contribution limit capped at 1.7% by 2030 for biofuels and biogas produced from used oils and animal fats (Annex IX, part B).

1. *The raw materials in question are listed in Annex IX of the RED II*

MORE THAN 1 MILLION EVS REGISTERED IN THE EU IN 2020

There was a sharp acceleration in EV sales in 2020. Data released by the European Automobile Manufacturers' Association (ACEA) shows that EU registrations of passenger battery electric vehicles (BEVs) more than doubled between 2019 and 2020 (by 117.4%), rising from 247 854 to 538 772 **(table 6)**. Rechargeable hybrid petrol- or diesel-driven passenger vehicle registrations (PHEVs –Plug-in Hybrid Electric Vehicles), more than trebled between 2019 and 2020 (by 262.3%) from 139 954

THE ELECTRIC MOTOR MORE THAN TWICE AS EFFICIENT

The energy efficiency of an electric motor is much higher than that of a combustion engine. According to the IFP (French Institute of Petroleum), the maximum efficiency of a petrol engine is about 36% and that of a diesel engine is 42% in optimum running conditions. Over short distances in town, petrol engine efficiency is drastically reduced and comes to only 15%. This contrasts with the efficiency of EVs, which is much higher. According to the US Department of Energy, the efficiency of an electric car is 69–73% on its own, to which 17% can be added, recovered by dynamic braking, delivering 86–90% of efficiency, which is more than double the efficiency of combustion engines.

Tabl. n° 3

Consumption of biofuels produced from raw materials that enable their energy content to be considered as doubled in 2019, illustrative data for 2020 (in ktoe).

	2019			2020		
Country	Advanced biofuel [1]	Used cooking oil and animal fats [2]	Total 2019	Advanced biofuel [1]	Used cooking oil and animal fats [2]	Total 2020
Italy	403.2	571.2	974.4	407.6	536.5	944.0
Germany	17.6	605.0	622.6	17.6	667.4	685.0
Spain	9.3	191.4	200.6	67.0	486.4	553.5
Netherlands+	88.6	413.4	502.0	88.6	413.4	502.0
Finland+	377.6	0.0	377.6	377.6	0.0	377.6
Sweden+	244.9	58.8	303.8	244.9	58.8	303.8
France	37.4	163.6	201.0	47.8	182.3	230.1
Portugal	0.0	177.5	177.5	0.0	178.0	178.0
Ireland+	5.2	160.9	166.2	5.2	160.9	166.2
Hungary+	0.0	118.0	118.0	0.0	118.0	118.0
Belgium	6.0	11.8	17.8	16.7	38.8	55.5
Czechia+	0.0	53.3	53.3	0.0	53.3	53.3
Bulgaria+	6.0	44.8	50.8	6.0	44.8	50.8
Slovenia+	0.2	42.8	43.1	0.2	42.8	43.1
Luxembourg	0.0	28.6	28.6	0.0	41.0	41.0
Croatia+	0.0	37.8	37.8	0.0	37.8	37.8
Slovakia+	0.0	30.1	30.1	0.0	30.1	30.1
Denmark+	7.8	13.6	21.4	7.8	13.6	21.4
Greece	0.0	35.7	35.7	0.0	18.2	18.2
Cyprus+	0.0	11.3	11.3	0.0	11.3	11.3
Malta+	0.0	10.6	10.6	0.0	10.6	10.6
Estonia+	5.4	0.0	5.4	5.4	0.0	5.4
Austria+	0.0	0.4	0.4	0.0	0.4	0.4
Poland+	0.0	0.0	0.0	0.0	0.0	0.0
Romania+	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0
Latvia+	0.0	0.0	0.0	0.0	0.0	0.0
Total EU 27	1 209.2	2 780.6	3 989.8	1 292.4	3 144.5	4 436.9

1. Advanced biofuels means biofuels that are produced from the feedstock listed in Part A of Annex IX of the Directive (EU) 2018/2001 . 2.Biofuels that are produced from the feedstocks listed in Part B of Annex IX of the Directive (EU) 2018/2001 Note: Note: the consumption data of the biofuels produced from raw materials enabling them to be considered as equating to twice their energy content for the countries marked with an «+» were not available for the year 2020 during our survey, by default EurObserv'ER used for the year 2020 the same consumption data as for 2019. The data for 2020 for the consumption of these types of biofuels therefore remain indicative. ***Source: EurObserv'ER 2021***

to 507 059. So, more than a million electric passenger vehicles (1 045 831 units) were put on the road during 2020 compared to 387 808 in 2019. The chargeable electric vehicle market share of total passenger vehicle sales rose to 10.5% in 2020 (5.4% for BEV vehicles and 5.1% for PHEV), yet they only had a 3% share in 2019. The market share for HEV (Hybrid Electric Vehicles) which have a small battery that only recharges automatically harnessing vehicle inertia during the braking and deceleration phases is a little higher at 11.9% according to the same source (5.7% in 2019). Although HEVs offer great improvements on combustion engine vehicle performance levels, they are not included in the figures for renewable electricity consumption in transport, as this consumption depends entirely on the biofuel share of the petrol or diesel they use.

THE EV CHARGING STATION NETWORK IS BECOMING DENSER

Electric vehicles are steadily gaining popularity in Europe, which cannot only be put down to lower manufacturing costs, but also the fact that the charging station network is growing all the time. According to EAFO data (European Alternative Fuels Observatory), the number of public charging stations in the European Union increased by 37.7% between 2019 and 2020 (from 164 101 to 226 008) **(table 7)**. The number of fast charging stations (defined as in excess of 22 kW) grew by 66.8% between 2019 and 2020 to 25 282. However, this rapid European Union-wide increase conceals huge variations in countries' network densities. Some have little coverage contrasting with countries that are enjoying very rapid rollouts, such as Germany, France and the Netherlands. In 2020, these three Member States accounted for about 70% of the public charging stations and 54% of the fast charging stations in the European Union.

Tabl. n° 4

Use of liquid or gaseous biofuels ***by mode of transport in 2019, indicative data for 2020 (in ktoe)***

	2019					2020				
Country	Liquid biofuels in road transport	Liquid biofuels in rail transport	Liquid biofuels in other modes	Gaseous biofuels in road transport	Total	Liquid biofuels in road transport	Liquid biofuels in rail transport	Liquid biofuels in other modes	Gaseous biofuels in road transport	Total
Germany	2 622.3	14.3	-	56.8	2 693.4	3 252.9	16.9	-	76.0	3 345.8
France	3 197.2	-	-	-	3 197.2	2 632.9	-	-	0.6	2 633.5
Spain	1 767.1	-	-	-	1 767.1	1 545.7	-	-	-	1 545.7
Italy	1 276.1	-	-	40.9	1 317.0	1 264.7	-	-	82.1	1 346.8
Sweden+	1 278.4	-	-	109.5	1 387.9	1 062.2	-	-	109.5	1 171.6
Poland+	1 025.1	-	-	-	1 025.1	954.0	-	-	-	954.0
Belgium	459.1	-	-	-	459.1	666.0	-	-	-	666.0
Netherlands	611.7	1.6	2.8	18.9	635.0	524.9	1.4	1.5	34.6	562.4
Austria+	481.0	1.8	-	0.4	483.2	516.8	1.8	-	0.4	519.0
Romania+	412.4	-	-	-	412.4	412.3	-	-	-	412.3
Finland+	426.3	-	2.0	6.8	435.1	394.7	2.0	-	6.9	403.5
Czechia	341.3	-	-	-	341.3	374.3	-	-	-	374.3
Portugal	283.8	-	-	-	283.8	254.1	-	-	-	254.1
Hungary+	201.0	-	-	-	201.0	211.3	-	-	-	211.3
Denmark+	213.3	-	-	6.1	219.4	203.6	-	-	6.1	209.7
Greece	184.3	-	0.5	-	184.8	199.1	-	0.4	-	199.5
Ireland+	188.1	-	-	-	188.1	174.5	-	-	-	174.5
Slovakia+	152.4	-	-	-	152.4	158.2	-	-	-	158.2
Bulgaria+	176.5	-	-	-	176.5	147.0	-	-	-	147.0
Luxembourg	128.2	-	-	-	128.2	122.0	-	-	-	122.0
Slovenia+	94.4	-	-	-	94.4	110.6	-	-	-	110.6
Lithuania	73.5	1.8	-	-	75.3	100.6	2.4	-	-	103.0
Croatia+	62.8	-	-	-	62.8	46.0	-	-	-	46.0
Latvia+	35.1	1.3	-	-	36.4	44.6	1.3	-	-	45.9
Estonia+	27.4	-	-	5.4	32.8	27.7	-	-	5.2	32.8
Cyprus+	11.3	-	-	-	11.3	15.0	-	-	-	15.0
Malta+	10.7	-	0.3	-	11.0	13.9	-	0.3	-	14.2
Total EU 27	15 740.8	20.8	5.6	244.8	16 012.0	15 429.6	25.8	2.2	321.4	15 778.9

Note: The consumption data of liquid and gaseous biofuel by type of transport in the countries marked with a «+» were not available for the year 2020 during our survey, by default EurObserv'ER made estimates taking into account the distribution of year 2019 and estimated consumption data for 2020. ***Source: EurObserv'ER 2021***

THE NETHERLANDS AND SWEDEN ARE ONE STEP AHEAD ON THE ELECTRIFICATION OF ROAD TRANSPORT

The Netherlands is one of the countries which achieved the directive's transport target simply as a formality. Statistics Netherlands reports that the renewable energy share in transport stood at 12.7% in 2020 (provisional result compared to 12.5% in 2019). Compared to last year, the country has adjusted the rate of incorporation of biofuels to the lowering of fuel consumption in transport. It corresponds to a decrease of his biofuel consumption from 635 ktoe in 2019 to 562,4 ktoe in 2020. If we go into detail, it is only biodiesel that suffered from the drop in biofuel consumption. It effectively fell by 27.8% (from 417.4 ktoe to 301.4 ktoe) while at the same time bioethanol consumption rose by 13.9% (from 198.7 to 226.4 ktoe), and biogas fuel consumption rose by 83.6% (from 18.9 to 34.6 ktoe). The decrease in biofuel consumption, which incidentally was 100% certified as sustainable, was less than the drop in energy consumption in transport, and so slightly increased the renewable share in transport. Besides, if we consider the Netherlands' number of inhabitants, it is the most advanced European Union country for road transport electrification. According to the ACEA, the chargeable electric vehicle market share (all-electric and PHEVs) rose to almost 25% in 2020, split between 73 204 registrations of all-electric passenger vehicles (BEV) and 15 925 PHEVs, out of total passenger vehicle sales of 358 330 of all engine types taken together.

The EAFO reports that at the end of 2020, the Netherlands had a fleet of 272 895 electrified passenger vehicles, not to mention its electric utility vehicles and bus fleets. The Netherlands

Germany's Birkenfeld University campus has been equipped with EV charging stations supplied by solar panels since 2019.

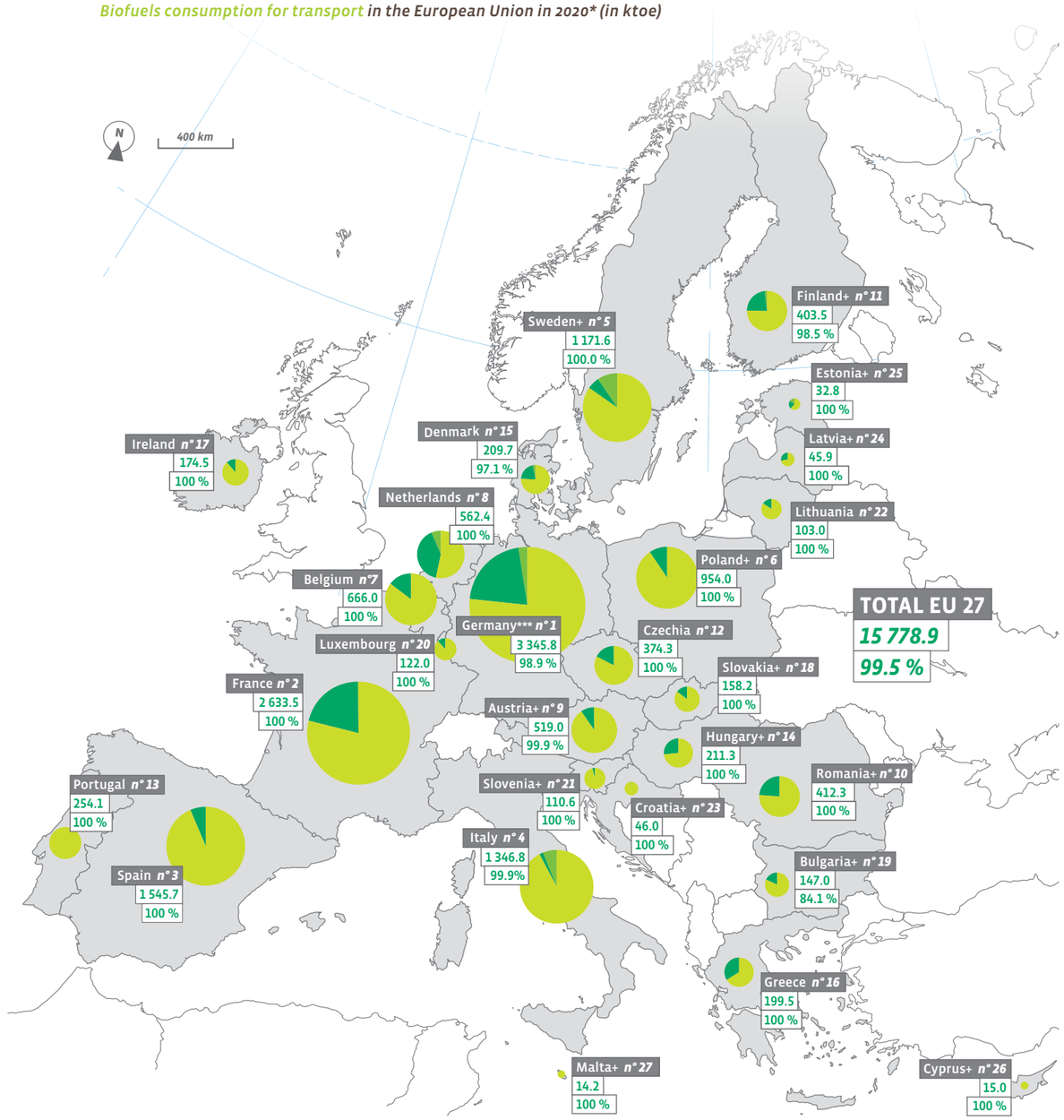
also has the densest charging station network in the European Union with 66 665 charging stations (including 2 429 fast charging stations), in 2020, which works out at one charging station for every 4 EVs. According to Statistics Netherlands' provisional data, renewable electricity consumption in road transport stood at 20.7 ktoe in 2020 (20 ktoe in 2019), which is almost on a par with Germany. This result is a priori counter-intuitive because according to Eurostat, Germany has a larger renewable energy share in its electricity production mix (40.8% in 2019,) than the Netherlands (18.2% in 2019) and also has a bigger fleet of rechargeable EVs. At the end of 2020, the EAFO said Germany had 308 139 BEVs and 287 037 PHEVs. The explanation for the discrepancy between the Dutch and German results can no doubt be ascribed to the assumptions that they individually use to estimate the electricity consumption of vehicles on the basis of the technical characteristics of their respective vehicle fleets (vehicle type, battery range, kWh/100 km) and the average annual kilometrage travelled by the various driver profiles.

Sweden, for its part, with 10.2 million inhabitants, is the other European Union road transport electrification leader. It has the largest chargeable vehicle market share in the European Union (32.2% in 2020), but its 100% EV registration share is smaller (i.e., 27 968 BEV and 66 109 PHEV registrations, out of a total of 292 024 passenger vehicle registrations in 2020). The EAFO put the chargeable electric vehicle share in Sweden at 190 680 (58 240 BEVs and 132 440 PHEVs) at the end of 2020.

MINIMUM SERVICE IN GERMANY

Provisional data from AGEE-Stat, the Working Group on Renewable Energy Statistics that reports to the Federal Ministry for Economic Affairs and Energy (BMWi) suggests that Germany met its renewable energy commitment in transport to the nearest figure, namely a 9.8% share in 2020 (7.7% in 2019). In 2020 it increased its biofuel consumption sharply from 2.7 to 3.3 Mtoe, i.e., additional volumes of 652,4 ktoe (a 24.2% year-on-year increase). Thus, for the year 2020, it is the top EU biofuel consumer, ahead

Biofuels consumption for transport ***in the European Union in 2020* (in ktoe)***



Key

Country
3 345.8
98.9 %

Biofuel consumption for transport (ktoe)
*% Compliant***

Bioethanol *Biodiesel* *Biogas*

** Estimation ** Share of compliant biofuels (Articles 17 and 18 of Directive 2009/28/EC)*
**** German biodiesel consumption figures include a consumption of pure vegetable oil estimated to 0.9 ktoe. Note: Biofuel consumption data for countries marked by a "+" were not available during the survey , EurObserv'ER made estimates taking into consideration the Eurostat "Energy Balance - early estimates" published in June 2021.*
Source: EurObserv'ER 2021.

A public car shelter installed at Ajaccio (Corsica) in May 2016, supplies eight self-consumption charging points. It is now possible to drive across Corsica powered by 100% solar energy thanks to a similar carport installed at Bastia. The same technology has already been rolled out at three other French sites – Perpignan, Vénissieux and Béthune-Bruay.

of France. The fact that Germany was relatively under-target in 2019 explains why despite the pandemic its biofuel consumption level surged in 2020. In order to catch up, it not only significantly increased the biodiesel incorporation rate (by 34.9 %, i.e., consumption of 2 568.2 ktoe in 2020) but the incorporation rate of the biofuel that benefits from double accounting (by 622.6 ktoe in 2019 to 685 ktoe in 2020). Biogas fuel consumption also rose (from 56.8 ktoe in 2019 to 76 ktoe in 2020), in contrast with bioethanol consumption, which slipped by 31 ktoe to 701.6 ktoe.

Germany's renewable electricity consumption trend in transport (road, rail and others) picked up. Renewable electricity consumption in road transport doubled (from 10 to 20.8 ktoe) and in rail transport increased by 2.9% to 363.2 ktoe (a year-on-year increase of 10.2 ktoe). This growth can be ascribed to the higher renewable energy share of its energy mix and also brisk EV sales. This decisive input by renewable energies in transport was achieved although Germany's mobility requirements were curbed by the COVID-19 pandemic. AGEE-Stat says that total energy consumption in transport fell by about 7.6% to 51.1 Mtoe.

FRANCE, ONE POINT OFF-TARGET

France should arrive at less than one percentage point below its renewable energy directive target for transport, i.e., a 9.14% renewable energy share in transport in 2020 (the share was 9.25% in 2019) compared to the 10% target it aimed for, according to the provisional estimates of the SDES (Data and Statistical Studies Department which reports to the Ministry for the Ecological Transition). It means that France found it harder to adjust its renewable energy consumption, which may be explained by the fact that the French transport sector was badly affected by the COVID-19 pandemic. The SDES reckons that the total energy consumption, corresponding to the denominator used for calculating the RES share in the transport sector, contracted by almost 15% between 2010 and 2020, from 43.7 to 37.2 Mtoe. Despite the increase in incorporation rates planned in 2020 (from 7.9 to 8.2% for petrol and 7.9 to 8% for diesel), biofuel consumption plummeted. The fall was 18.3% for biodiesel (from 2 543.9 to 2 078.2 ktoe) and 15.1% for bioethanol (from 653.3 to 554.7 ktoe). Consumption of biofuels produced from raw materials considered as equating to double

Tabl. n° 5

Renewable electricity used in transport (road, rail, other transport modes) en 2019, indicative data for 2020 (in ktoe)

	2019				2020			
Country	Ren. elec. in road transport	Ren. elec. in rail transport	Ren. elec. in all other transport modes	Total	Ren. elec. in road transport	Ren. elec. in rail transport	Ren. elec. in all other transport modes	Total
Germany	10.0	353.0	-	363.0	20.8	363.2	-	384.0
Italy+	4.0	162.7	171.7	338.4	4.7	162.7	171.7	339.2
France	8.8	226.5	34.3	269.6	8.1	186.1	31.7	225.8
Austria+	0.9	122.4	78.7	201.9	1.6	122.4	78.7	202.6
Sweden+	14.5	140.7	-	155.2	16.3	140.7	-	157.0
Spain	4.8	108.5	9.5	122.8	6.1	88.1	6.4	100.6
Poland+	0.9	84.1	6.3	91.3	0.9	84.1	6.3	91.3
Netherlands	20.0	43.2	-	63.2	20.7	41.3	-	62.1
Belgium	2.6	42.9	0.3	45.8	2.6	44.1	0.3	47.1
Czechia+	1.8	43.6	1.5	46.9	1.9	43.6	1.5	46.9
Romania+	1.4	36.2	0.7	38.3	1.5	36.2	0.7	38.3
Hungary+	0.9	30.6	0.3	31.8	0.9	30.6	0.3	31.8
Finland+	2.2	23.8	-	26.0	2.4	23.8	-	26.2
Denmark+	2.8	21.2	-	24.0	3.5	21.2	-	24.7
Portugal	0.5	22.2	0.3	23.0	0.5	18.6	-	19.1
Slovakia+	0.6	11.7	1.8	14.2	0.7	11.7	1.8	14.2
Croatia+	0.1	9.6	1.3	10.9	0.1	9.6	1.3	10.9
Bulgaria+	1.0	8.3	0.3	9.6	1.0	8.3	0.3	9.6
Slovenia+	0.1	6.2	0.2	6.4	0.1	6.2	0.2	6.5
Greece+	0.5	4.9	-	5.4	0.6	4.9	-	5.4
Latvia+	2.0	3.2	0.3	5.4	2.0	3.2	0.3	5.4
Luxembourg	0.1	3.8	-	3.9	0.3	3.9	-	4.2
Ireland+	0.7	1.4	-	2.1	0.8	1.4	-	2.2
Lithuania	1.0	0.4	0.7	2.1	1.1	0.4	0.5	2.0
Estonia+	0.5	0.3	0.7	1.5	0.5	0.3	0.7	1.5
Malta+	0.0	-	-	0.0	0.0	-	-	0.0
Cyprus+	-	-	-	0.0	0.0	-	-	0.0
Total EU 27	82.6	1 511.5	308.8	1 902.9	99.4	1 456.7	302.6	1 858.7

Note: 2020 data not available at the date of the survey for countries marked with a "+". For rail transport and the «other modes of transport» category, EurObserv'ER has used the same consumption data from 2019 for the year 2020. Regarding road transport, EurObserv'ER has made estimates taking into account the new registrations of electric vehicles (all electric or plug-in hybrid) in 2020. Consumption data for 2020 for the EU-27 therefore remain indicative ***Source: EurObserv'ER 2021***

Tabl. n° 6

New passenger electric car registrations (battery electric vehicles and plug-in hybrid electric vehicle).

	BATTERY ELECTRIC VEHICLES (BEV)			PLUG-IN HYBRID ELECTRIC VEHICLES (PHEV)			Total 2020 (BEV +PHEV)
Country	2019	2020	Growth rate	2019	2020	Growth rate	
Germany	63 491	194 474	206.3	45 348	200 469	342.1	394 943
France	42 827	111 127	159.5	18 592	74 592	301.2	185 719
Sweden	15 596	27 968	79.3	24 810	66 109	166.5	94 077
Netherlands	61 703	73 204	18.6	4 904	15 925	224.7	89 129
Italy	10 685	32 487	204.0	6 485	27 407	322.6	59 894
Belgium	8 837	14 994	69.7	8 900	31 343	252.2	46 337
Spain	10 042	17 927	78.5	7 432	23 306	213.6	41 233
Denmark	5 532	14 284	158.2	3 883	18 249	370.0	32 533
Austria	9 261	15 986	72.6	2 156	7 632	254.0	23 618
Portugal	6 883	7 830	13.8	5 798	11 867	104.7	19 697
Finland	1 897	4 244	123.7	5 966	13 231	121.8	17 475
Poland	1 491	3 683	147.0	1 226	4 416	260.2	8 099
Ireland	3 444	4 013	16.5	1 346	2 492	85.1	6 505
Hungary	1 833	3 046	66.2	1 106	2 996	170.9	6 042
Czechia	756	3 262	331.5	473	1 981	318.8	5 243
Luxembourg	986	2 473	150.8	913	2 685	194.1	5 158
Romania	1 506	2 837	88.4	n.a.	n.a.	n.a.	2 837
Greece	190	679	257.4	290	1 456	402.1	2 135
Slovenia	186	1 647	785.5	28	39	39.3	1 686
Slovakia	165	918	456.4	202	566	180.2	1 484
Croatia	192	533	177.6	67	143	113.4	676
Lithuania	162	453	179.6	n.a.	n.a.	n.a.	453
Estonia	80	360	350.0	17	65	282.4	425
Latvia	86	301	250.0	12	90	650.0	391
Cyprus	23	42	82.6	n.a.	n.a.	n.a.	42
Total EU 27	247 854	538 772	117.4	139 954	507 059	262.3	1 045 831

1. Includes fuel cell electric vehicles (FCEV type) . 2. Only countries for which sourced data is available are listed. ***Source: National Automobile Manufacturers' Associations via EACA (European Automobile Manufacturers Association).***

RENEWABLE ENERGY IN TRANSPORT BAROMETER – **EUROBSERV'ER** – SEPTEMBER 2021

Tabl. n° 7

Normal and high power public charging stations installed in the European Union countries in 2019 and 2020

Country	2019			2020		
	Normal charge ≤ 22 kW	Fast charge > 22 kWw	Total	Normal charge ≤ 22 kW	Fast charge > 22 kW	Total
Netherlands	49 520	1 072	50 592	64 236	2 429	66 665
France	27 661	2 040	29 701	42 000	3 751	45 751
Germany	34 203	5 088	39 291	37 213	7 456	44 669
Italy	8 312	864	9 176	12 150	1 231	13 381
Sweden	4 036	1 030	5 066	8 804	1 608	10 412
Belgium	6 070	359	6 429	8 006	476	8 482
Austria	3 742	594	4 336	6 885	1 347	8 232
Spain	4 500	1 003	5 503	6 045	2 128	8 173
Finland	1 786	333	2 119	3 244	484	3 728
Denmark	2 244	449	2 693	2 699	555	3 254
Portugal	1 471	236	1 707	1 976	494	2 470
Poland	529	308	837	1 039	652	1 691
Hungary	592	124	716	1 008	287	1 295
Czechia	410	365	775	590	610	1 200
Ireland	845	207	1 052	812	270	1 082
Luxembourg	900	12	912	1 051	12	1 063
Slovakia	350	233	583	656	268	924
Slovenia	452	127	579	612	135	747
Croatia	497	116	613	483	187	670
Romania	211	100	311	317	185	502
Estonia	202	187	389	223	201	424
Greece	40	18	58	253	81	334
Latvia	83	155	238	79	235	314
Bulgaria	70	52	122	119	76	195
Lithuania	79	84	163	79	100	179
Malta	102	-	102	101	-	101
Cyprus	38	-	38	46	24	70
European Union	148 945	15 156	164 101	200 726	25 282	226 008

Source: Data gathered by the European Alternative Fuels Observatory (https://www.eafo.eu)

their energy content rose from 201 to 330.1 ktoe, through the increased input of biofuels produced from used cooking oils (Annex IX, part B of the Directive (EU) 2018/2001).

The SDES claims that electricity consumption in the transport sector was also hit. Renewable electricity consumption in rail transport fell by 17.9% from 226.5 to 186.1 ktoe. While in road transport the level dropped by 7.7% from 8.8 to 8.1 ktoe even though chargeable electric vehicle sales (passenger vehicles) more than trebled between 2019 and 2020, with 185 719 registrations in 2020 (111 127 all-electric vehicles and 74 592 PHEVs) compared to 61 419 in 2019 (42 827 all-electric vehicles and 18 592 PHEVs). The EAFO reports that at the end of 2020, the electrified passenger vehicle fleet in France stood at 439 310 (277 001 all-electric and 132 309 PHEVs). This boom should boost the use of renewable energies in road transport starting in 2021, however this must be put into perspective given nuclear energy's weight in the French electricity mix.

COVID PUTS THE INDUSTRIAL BIOFUEL SECTOR UNDER PRESSURE

The European industrial bioethanol production volume contracted by 9.2% in 2020. The root cause can inevitably be ascribed to the downturn in the global economy against the backdrop of the COVID pandemic. While France is the leading European bioethanol producer through its Tereos, Cristal Union and other groups, it witnessed a decline in its volumes of over 19% caused by the fall in demand in its domestic market as well as in its main export markets (the UK, Sweden and Finland). Furthermore, production was depressed by lower sugar beet harvests in 2019 and 2020 that supply almost 50% of French bioethanol. In most of the other Member States, production slowed down for just a few months (in the spring of 2020 while the strictest COVID-19 health measures were in force). The German, Spanish and Austrian bioethanol plants managed to make up for the fall in demand by supplying ethanol for medical purposes (primarily for hand sanitizer gel). Hungary's processing plants increased their capacities to focus their activity on starch- and non-combustible ethanol-based products, primarily for chemical use. The USDA (United States Department of Agriculture) 2021 report on the European biofuel sector expects

The Lhyfe start-up's wind-powered electrolyser-based hydrogen production site on the edge of the Bouin Wind Farm (Vendée) should start operating at the end of September 2021, eventually supplying up to one tonne of green hydrogen per day.

production to pick up. The scale of this recovery will depend on cereal price trends and also the pressure of competition from major bioethanol exporting countries such as the United States and Brazil.

In the biodiesel sector, we should distinguish between the producers of FAME (Fatty Acid Methyl Esters) with backgrounds in farming from the producers of HVO (Hydrotreated Vegetable Oil) with their oil and refinery backgrounds. The latter sector is more recent. So far, only eight European countries have developed HVO on an industrial scale, whereas FAME production plants are to be found in all the Member States except Finland, Luxembourg, Croatia and Malta. FAME production declined by 7% in 2020 because of the fall-off in consumption in European and global markets. The USDA report anticipates a 3-4% increase in the sector's output on condition that the European rapeseed harvest is adequate and that raw material prices stabilize.

Turning to HVO, the thrust is more positive as output increased by more than twenty percent in 2020, raising volumes to over 3.6 billion litres. This growth was mainly driven by the expansion in

Tabl. n° 8

Bioethanol production in Europe (million of liters)

	2019	2020
France	1 299	1 049
Germany	676	875
Hungary	689	639
Netherlands	570	538
Spain	547	487
Belgium	620	380
Poland	286	277
Austria	254	241
Total	4 941	4 486

Tabl. n° 9

EMAG Biodiesel production in Europe (million of liters)

	2019	2020
Germany	4 070	3 862
France	2 556	2 045
Spain	1 835	1 550
Netherlands	1 081	1 102
Poland	1 091	1 081
Italy	616	616
Rest of the EU27	974	1 118
Total	12 223	11 374

Tabl. n° 10

HVO Biodiesel production in Europe (million of liters)

	2019	2020
Netherlands	1 218	1 218
Italy	397	910
France	150	385
Spain	549	480
Finland	424	423
Sweden	160	160
Portugal	37	32
Czechia	3	3
Total	2 938	3 611

In Denmark, the Ellen project has supplied renewable electricity to an electric ferry since 2019, replacing an old diesel-powered ferry.

Italy's and France's production capacities. France has only one production plant at La Mède (in the South of France) operated by the Total group. The site was commissioned in the middle of 2019 and built up production achieving an output of 385 million litres in 2020, which is still a far cry from its maximum annual design capacity of 640 million litres. The Eni group operates two Italian production sites. In 2020, the first site in Venice that produces 325 million litres per annum, was backed by a second plant at Gela (Sicily). This plant is a converted disused oil refinery, which should eventually develop 770 million litres of annual production capacity compared to its 2020 output of 585 million litres. Nonetheless, the HVO pioneer and sector leader is Neste of Finland, which devised this type of biodiesel. The group operates two ±215 million litre production lines in Finland, but most importantly owns a site in Rotterdam (the Netherlands) with annual biofuel production capacity of 910 million litres. The Finnish group intends to build another plant in the Port of Rotterdam with a capacity of about 2 billion litres.

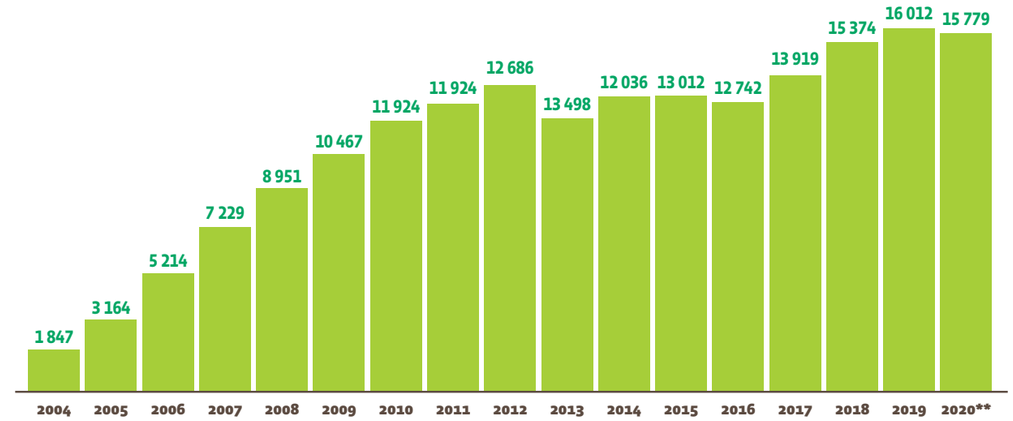
While production volumes of advanced biofuel technologies, as defined by RED II, are still insignificant, the first plants are already up and running and others are under construction. One such example is the Finnish Cellunolix project that produces 10 million litres of bioethanol from sawdust. It was jointly developed by St1 Biofuels Oy and North European Bio Tech Oy. The two partners envisage constructing three similar plants, each with a capacity of 50 million litres at Kajaani (Finland), Pietarsaari (Finland) and Follum (Norway).

THE ELECTRICITY AND HYDROGEN SECTORS ARE TAKING SHAPE

Alongside the industry for biofuels used by combustion engines, the spread of EVs is the way forward for energy transition in transport. This transition will not really be commendable unless the electricity used is renewably-sourced. So, it is important to identify the green part of the electricity used by the various transport modes. Within the European Union, the energy used by 100% electric or rechargeable hybrid vehicles includes a renewable component that can be generally taken to equal that of the electricity mix of each member country. In 2019, an average of 34.1% of this electricity output was generated from renewable sources in the EU of 27. Now, several commercial offers have been developed targeting consumers who are particularly keen on green driving and who want to cover their vehicle charging consumption specifically with renewable production. These contracts offer attractive rates during off-peak periods (generally overnight or over the weekend) that happen to coincide with when the vehicles are most likely to be charged. In France, the historic producer EDF has come up with its Vert Électrique Auto offer that guarantees that the

Graph. n° 1

European Union (EU-27) biofuels (liquid and gaseous) consumption trends for transport trend (in ktoe)*



** Compliant biofuels and not compliant. ** Estimation.* ***Source: Data from 2004 to 2018 (Shares Eurostat 2021); 2019-2020 (EurObserv'ER 2021)***

amount of renewable energy (hydraulic, wind or solar power) matches the supply injected into the power grid. The German operator E.ON has a similar offer known as E.ON Next Drive that offers its lowest rates between midnight and 4 a.m. There are other technical ways of ensuring a more direct link between electrical charging and renewable electricity production, such as vehicle charging stations incorporating photovoltaic car shelters. For instance, since December 2019, the charging terminal supplier KLE Energie GmbH and the solar panel manufacturer IBC SOLAR have together equipped Germany's Birkenfeld campus with three car shelters with total capacity of 96.6 kW combined with a battery storage system. The installation can supply up to 96 MWh of solar electricity per annum to the university's EVs thereby avoiding the potential emission of 1 000 tonnes of CO_2.

The major transport companies have other ways of ensuring that their energy consumption is covered by renewable output. The most commonly used instrument is the PPA (Power Purchase Agreement) that they use to purchase the renewable output from one or more sites directly to cover their consumption. This energy can no longer be sold on the markets or be enhanced through a supplementary remuneration contract. This applies to France's national railway operator SNCF (Société nationale des chemins de fer), for example, which has signed contracts with several renewable electricity producers to cover part of its consumption. As it stands, these initial PPAs are for relatively small amounts, as the contract entered into with EDF's Lachapelle-Auzac (Lot) solar plant will only supply 25 GWh per annum which equates to half the energy used by high-speed trains on the Paris-Lille route. Although it currently pales by comparison with the group's consumption of 9 TWh of electricity (17 TWh of the energy for all its activities), SNCF aims to become a net zero emitter by 2035.

Maritime transport is also making energy transition progress through projects emerging in Europe. In Denmark, the Ellen project has supplied renewable electricity to an electric ferry since 2019, replacing an old diesel-powered ferry. The vessel is the only means of transport for the 6 000 or so inhabitants of Denmark's Aeroe Island. It is a 100% electrically-powered ferry with 4.3 MWh of battery storage capacity, enabling it to travel long distances, and that could save up to 2 520 tonnes of CO_2 and 500 kg of harmful particles per annum.

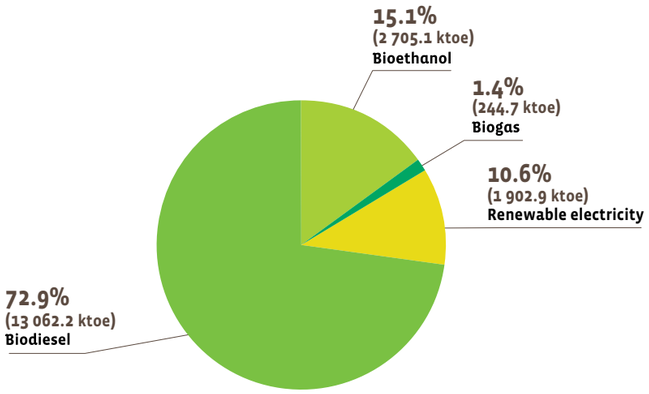
Now, electricity is not the only vector used to green means of transport. Hydrogen is also under development even though renewable energies are marginally used in its production. Several industrial projects are at different development stages, such as the Coradia iLint, the first hydrogen fuel cell train manufactured by Alstom which should replace diesel trains in four regions of France in the next few years. These trains should have a 1 000-km operating range thanks to a roof-mounted liquid dihydrogen tank and should achieve top speeds of 140 kph.

A PARADIGM SHIFT

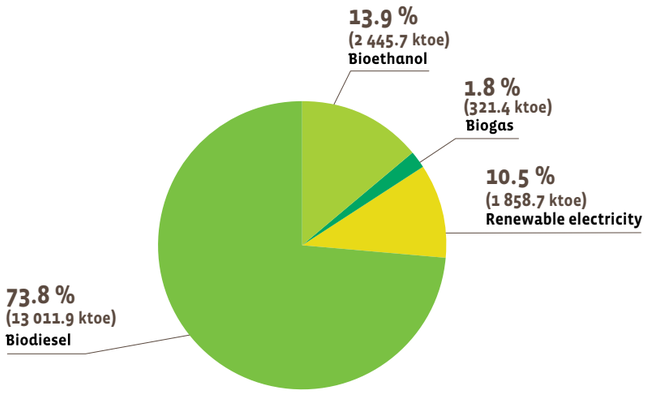
During the survey conducted by EurObserv'ER in September, it emerged that it was a little too early to obtain a precise and exhaustive assessment of each country's Renewable Energy Directive transport target results. Preliminary estimates supplied by the relevant ministries and official statistics bodies suggest that a significant number of countries have more or less reached target. This can be confirmed as Belgium (11.06%), the Netherlands (12.7%), Luxembourg (10.09%). Germany (9.8%), Portugal (9.69%), Spain (9.53%) and France

Graph. n° 2

Breakdown of renewable energy used in transport (all types) of the countries of the European Union to 27 (in % and ktoe) in 2019



*Breakdown of renewable energy used in transport (all types) of the countries of the European Union to 27 (in % and ktoe) in 2020**



** Estimation.* ***Source: EurObserv'ER 2021.***

(9.14%) are less than a percentage point away from the leaders. Lithuania (5.5%) is a long way away from its target. While the provisional results of other countries were unavailable, Finland (21.3%) and Sweden (30.3%) had already achieved their targets in 2019. There is no doubt of Austria's intention to achieve its target as it has regularly overshot its target since 2009 (it was 9.8% in 2019), or for that matter Italy (9.5% in 2019), Slovakia (8.3% in 2019), Malta (8.7%) and Ireland (8.9%). Member States that do not reach their renewable energy targets theoretically run the risk of financial sanction. If they do not meet target, the European Commission may instigate sanctioning proceedings against these underachievers in the European Court of Justice if it deems necessary.

The minimum renewable energy target in transport stipulated in the RED II for 2030 is 14%. As it stands today, this target looks inconsequential, if not to say obsolete, given the European Commission's Green Deal to raise the binding renewable energy target of the EU's energy mix to 40% in 2030. Effectively, the new focus on road transport carbon neutrality means the gradual abandonment of agricultural biofuel, in favour of using all-electric vehicles, advanced biofuels, renewable fuels of non-biological origin (RFNBO) or fuels based on recycled carbon. This paradigm shift, or sustainable transport energy policy reset will be protracted, given the inertia of past policies. Yet, it will take a sea change over the rest of this decade to turn the European target of becoming the first climate-neutral continent by 2050 into reality. The transport sector will have to make a 90% reduction in GHG emissions by 2050 as indicated in the Green Deal for Europe.

The European Commission has already formalized the way ahead and the legal framework. In July 2021, it presented a set of twelve draft regulations and directive revisions to set Europe on track to reduce GHG emissions by 55% in 2030 (compared to 1990 levels). This approach, known as "Fit for 55", is part of the follow-up to the December 2020 vote for this 55% target by the European Parliament and the Green Deal voted in December 2019.

The Commission proposes an increase to match its renewable energy level for transport in this new package, by setting a 13% GHG intensity reduction target (compared to the previous 9% target). Additionally, Europe has raised the advanced biofuel sub-target from at least 0.2% in 2022 to 0.5% in 2025 and to 2.2% in 2030 and introduced a 2.6% sub-target for renewable fuels of non-biological origin. This sub-target anticipates the fact that RFNBOs will most likely play a major role in such sectors as aviation and maritime transport that will be dependent on liquid fuels in the long term. These synthetic fuels that combine carbon dioxide with hydrogen, will be sourced from green hydrogen produced by water electrolysis exclusively from renewable electricity. The RED II article on renewable fuels of non-biological origin (RFNBO) should shortly be published. It will define the scheme and methodology under which the hydrogen, be it locally produced or imported, could be labelled as renewable hydrogen in Europe, thereby determining its sustainability and eligibility for subsidies. The sun-drenched and semi-desert regions of Spain, Portugal and North Africa (Morocco, Tunisia and Algeria) capable of accommodating solar farms with capacities of several hundred megawatts should broadly benefit from these new green hydrogen markets because the competitiveness of the photovoltaic solar kWh that these regions can produce cannot be matched. Offshore wind is an another important way to produce renewable hydrogen in the North sea at scale off the United kingdom, Germany, Netherlands and Denmark facilitated by the presence of exceptional wind resources, extensive subsea gas network infrastructures and a significant hydrogen support policy.

Specific proposals have also been made for road transport emission reductions. The average emission reduction of new cars should be 55% from 2030 (compared to 2021 levels) and zero in 2035 (i.e., in less than 14 years). The utility vehicle thresholds are 50% in 2030 and 100% in 2035. In other words, this changeover to zero emission vehicles will simply curtail sales of combustion engines for private and utility vehicles by this timeline, but also put an end to sales of hybrid cars. There is another proposal in the pipeline on the implementation of a new regulation to roll out an alternative fuel infrastructure (that repeals Directive 2014/94/EU). This regulation proposes that the electric charging network should be extensively expanded on main trunk roads to provide an electric charging station every 60 km, while there would be a charging station every 150 km for hydrogen vehicles. That should mean 1 million electric charging stations in 2025 and 3.5 million in 2030. Another crucial lever is that the European Commission intends to extend the carbon market to the transport and building sectors. □

Sources used : Ministry of Ecological Transition-SDES (France), AGEE-Stat (Germany), Ministry for the Ecological Transition (Spain), Ministry for the Ecological Transition (Italy), Statistics Netherlands, Federal Public Service Economy-FPS (Belgium), Ministry of Industry and Trade (Czechia), Danish energy authority, DGEG- General Directorate of Energy and Geology (Portugal), Ministry of Environment and Energy (Greece), SEAI- Sustainable Energy Authority of Ireland (Ireland), STATEC- The national institute of statistics and economic studies (Luxembourg), Statistics Lithuania, EAFO, EACA, Eurostat, EurObserv'ER

The next barometer will cover the heat pump sector.

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