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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

Quality of petrol and diesel fuel used for road transport in the European Union (Reporting year 2021)

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1. INTRODUCTION

Pursuant to Article 7a of Directive 98/70/EC[1] relating to the quality of petrol and diesel fuels (henceforth the "Fuel Quality Directive") and Article 5 of Council Directive (EU) 2015/652 laying down calculation methods and reporting requirements pursuant to Directive 98/70/EC[2], Member States are required to report annually on the greenhouse gas (GHG) intensity of fuels and energy supplied in their territories. This reporting obligation applied for the first time for the reporting year 2017, following the application and transposition of Council Directive (EU) 2015/652. This annual report comprises the data reported for the year 2021.

Furthermore, pursuant to Article 8(3) of Directive 98/70/EC Member States are required to report on national fuel quality data for the preceding calendar year.

This annual report summarises the information provided by Member States in relation to the above-mentioned reporting requirements. It is based on the data submitted by Member States to the European Environment Agency (EEA) for the year 2021.

2. VOLUMES AND LIFE CYCLE GREENHOUSE GAS INTENSITY OF FUEL AND ENERGY TYPES

Article 7a of the Fuel Quality Directive, in conjunction with the Council Directive (EU) 2015/652, sets out reporting requirements concerning the following:

- the total volume of each type of fuel or energy supplied for road transport and non-road mobile machinery (including inland waterway vessels when not at sea), agricultural and forestry tractors, and recreational craft when not at sea;
- the life cycle GHG emissions per unit of energy, including the provisional mean values of the estimated indirect land use change (ILUC) emissions from biofuels[3];
- the feedstock and the biofuel production pathway used for each of the biofuels supplied on the territories of Member States.

The Fuel Quality Directive obliges Member States to require fuel suppliers to reduce the life cycle GHG intensity of transport fuels, i.e., the life cycle GHG emissions per unit of energy from fuel and energy supplied, by a minimum of 6% by 31 December 2020 compared with the fuel baseline standard for 2010 of 94.1 gCO2eq/MJ. ILUC GHG emissions are not taken into account in assessing compliance with the minimum 6% reduction target. The Renewable Energy Directive (EU) 2018/2001[4] foresees several measures to address ILUC including a cap

[1] Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC, OJ L 350 of 28.12.1998, p. 58.

[2] Council Directive (EU) 2015/652 of 20 April 2015 laying down calculation methods and reporting requirements pursuant to Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels, OJ L 107 of 25.4.2015, p. 26.

[3] Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources, OJ L239 of 15.9.2015, p. 8.

[4] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, OJ L 328, 21.12.2018, p. 82–209

on food- and feed-based biofuels, with its delegated act[5] setting out detailed criteria for determining high ILUC-risk feedstock for biofuels to be gradually phased-out by 2030 and the criteria for certifying low ILUC-risk biofuels, bioliquids and biomass fuels.

In the year 2021, all 27 Member States, UK (covering Northern Ireland[6]), Norway and Iceland provided data on greenhouse gas emission reductions in the appropriate format. The comparisons between aggregated figures refer to EU-27 for all reference years.

2.1 Greenhouse gas emissions and distance to 2020 target

According to the data provided, the average GHG intensity of the fuels and energy supplied in the 27 reporting Member States in 2021 was 89 gCO_{2eq}/MJ, which translates into a saving of 60 Mt of carbon dioxide equivalent (CO_{2eq}) during the year 2021. This is 5.5% lower than the 2010 baseline of 94.1 gCO2eq/MJ (corresponding to a similar level of reduction achieved by 27 EU Member States in 2020), which means that an additional 0.5% reduction in the GHG intensity of all fossil fuels, biofuels and energy supplied is needed to reach the 6% target.

Reported data for 2021 shows that the progress achieved by EU fuel suppliers varies greatly across the EU Member States. Thirteen Member States (Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Luxembourg, Malta, Netherlands, Slovakia and Sweden) have achieved their objective of reducing the GHG intensity of transport fuels by 6% by 2020, compared with 2010, which is by two Member States more than in previous year (see *Figure 1*). The largest progress within a year was achieved by Finland and Sweden with 6.0 and 2.5 percentage points increases between 2020 and 2021, against the 2010 baseline, followed by Portugal with 1.4 percentage points. However, most of the Member States made either a very minimal progress, i.e. below 1.0 percentage points (11 Member States), or remained at the same level (6 Member States) or made even a negative progress (7 Member States).

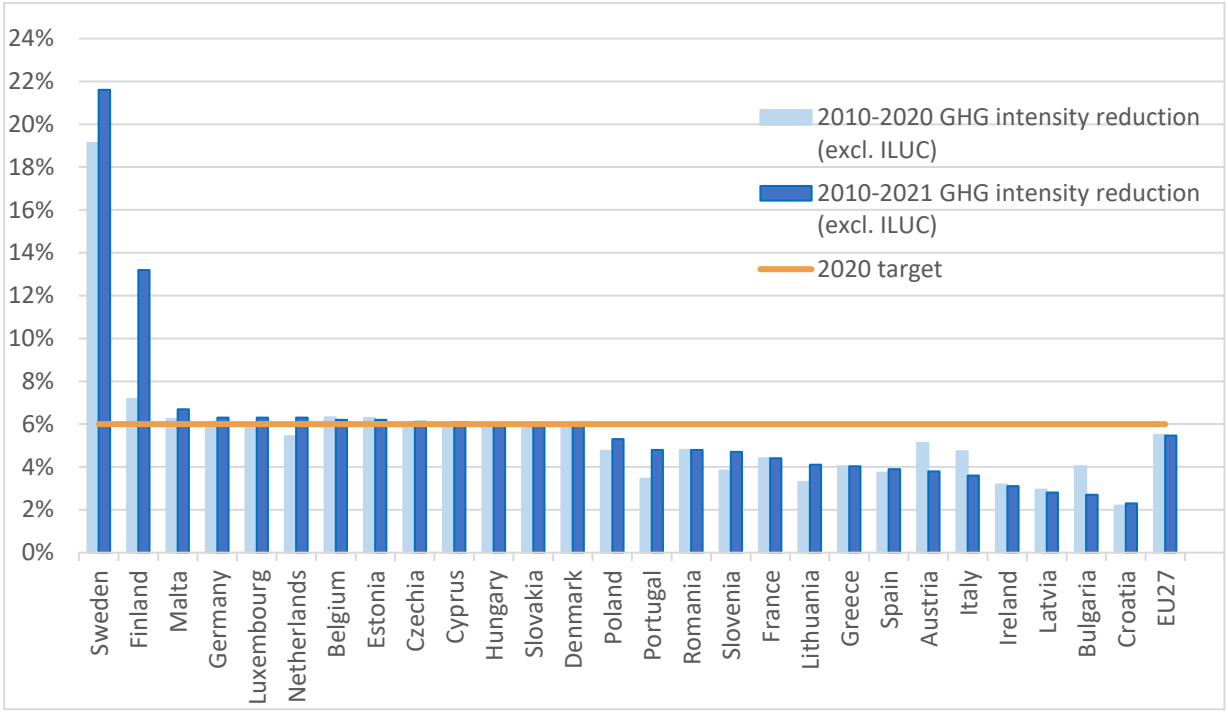
In terms of the remaining distance towards the target, Poland is rather close to achieving the 6% target with 5.3%, while Portugal, Romania, Slovenia, France, Lithuania and Greece have achieved reductions in the range between 4% and 5%. Finally, in seven Member States (Spain, Austria, Italy, Ireland, Latvia, Bulgaria and Croatia), the reduction of GHG intensity remains lower than 4%. Further information can be found in the EEA Technical Report No 2023/03 on "Greenhouse gas intensities of transport fuels in the EU in 2021"[7].

[5] Commission Delegated Regulation (EU) 2019/807 of 13 March 2019 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council as regards the determination of high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed and the certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels, OJ L 133, 21.5.2019, p. 1–7

[6] Following the end of the transition period, Council Directive (EU) 2015/652 setting out relevant reporting obligations no longer applies to the UK as whole. However, pursuant to Article 5(4) read in conjunction with Annex 2, point 47 of the Protocol on Ireland/Northern Ireland to the Withdrawal Agreement (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12020W/TXT), Council Directive (EU) 2015/652 continues to apply to and in the UK in respect of Northern Ireland.

[7] https://www.eionet.europa.eu/login?came_from=/etcs/etc-cm/products/greenhouse-gas-intensities-of-transport-fuels-in-the-eu-in-2021/view

Figure 1: Reductions in GHG intensity of fuels achieved by EU fuel suppliers in Member States in the periods 2010-2020 and 2010-2021 *(Source: EEA)*



Furthermore, in 2021, upstream emission reductions (UER)[8] were reported by fifteen Member States (Austria, Croatia, Cyprus, Czechia, Denmark, Estonia, Germany, Hungary, Italy, Luxembourg, Malta, Poland, Romania, Slovakia and Slovenia) contributing between 0.1 and 2.7 percentage points in these Member States to the overall GHG emission reduction achievement. Consequently, the total reported UER were 4 795 kt CO_2eq in 2021 resulting in an additional reduction of 0.4 percentage points of the fuel GHG intensity from 5.1% to 5.5% (see *Table 5 in the Annex of the report*). The UER claimed by a supplier have to be quantified and reported in accordance with the requirements set out in Council Directive (EU) 2015/652. More detailed information on approaches to quantify, monitor and report on UER can be found in a guidance note[9].

When taking ILUC emissions into account[10], the average GHG intensity of the fuels supplied in 2021 in the EU was 3.7% lower than in 2010. This corresponds to a saving of 40 Mt CO_{2eq} during the year 2021. According to Article 7d of Directive 98/70/EC laying down the calculation of life cycle greenhouse gas emissions from biofuels, ILUC emissions are not taken into account in assessing compliance with the minimum 6% reduction target.

Further action will be necessary in order to decarbonize the fuel used in transport and contribute to the increased climate ambition, as set out in the European Green Deal and the subsequent "Fit For 55" legislative package proposed by the Commission on 14 July 2021. Most of the legislative proposals have reached the political agreement and are close to the adoption or have already been adopted. The political agreement reached on the Renewable Energy Directive substantially increases the overall ambition of decarbonising transport fuels and energy carriers. Member States will have to reduce their greenhouse gas intensity by at least 14.5 % compared to the 2010 baseline or will need at least a 29% share of renewable energy within the final consumption of energy in the transport sector by 2030. The new

[8] "Upstream emissions" means all greenhouse gas emissions occurring prior to the raw material entering a refinery or a processing plant where the fuel is produced.

[9] https://ec.europa.eu/clima/system/files/2016-11/guidance_note_on_uer_en.pdf

[10] For this calculation, the provisional estimated indirect land-use change emissions from biofuels were taken into account as listed in Annex V of the Fuel Quality Directive.

transport target of the Renewable Energy Directive will repeal the 6% reduction target of the FQD in order to streamline the legislation. In addititon, the ReFuelEU Aviation and FuelEU Maritime Regulations will boost the production and uptake of the sustainable alternative fuels in the aviation and maritime sectors.

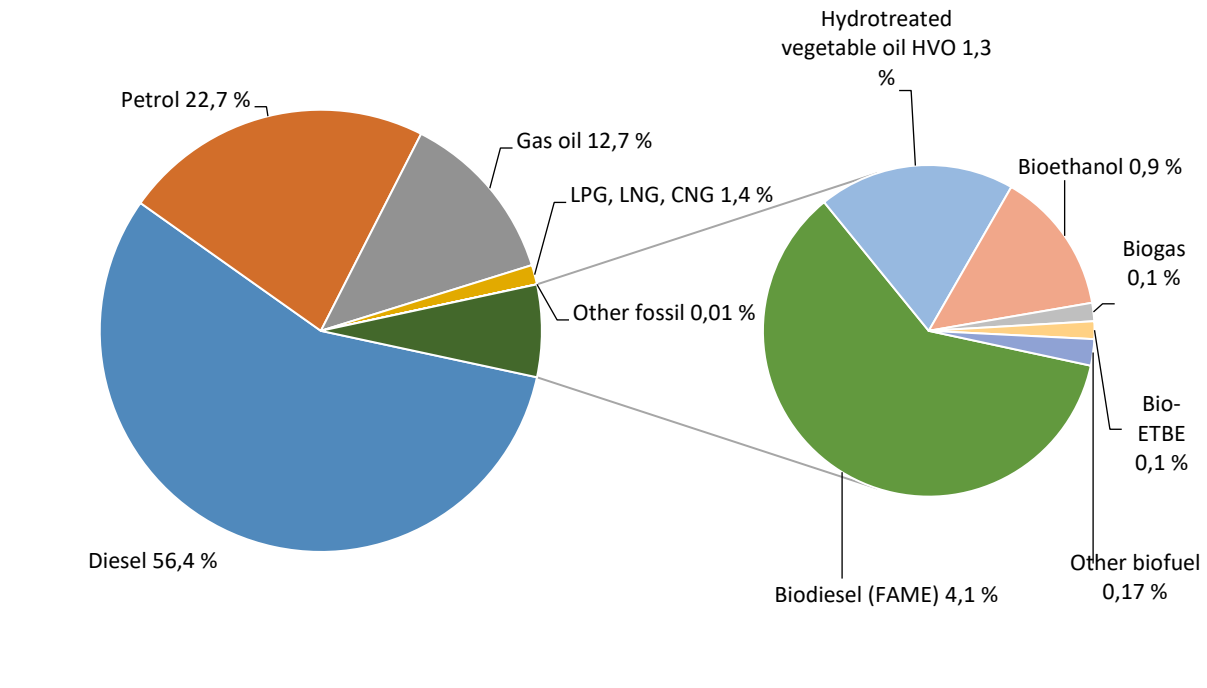
2.2 Fuel supply

This section summarises the data submitted by Member States on all fossil fuels, biofuels and fuels of non-biological origin within the scope of the Fuel Quality Directive for road transport and non-road mobile machinery.

Total fuel supply reported by the 27 Member States in 2021 was 11 592 petajoules (PJ), representing an increase of 10% compared to 2020, largely as a result of economic rebound after the COVID-19 crisis. The fuel supply remained dominated by fossil fuels (93.3%) followed by biofuels (6.7%) and a very minor share (0.03%) of electricity (see *Section 2.4*). No renewable fuels of non-biological origin were reported in 2021.

The fossil fuel supply in 2021 remained dominated by diesel (56.4%; 6 543 PJ), followed by petrol (22.7%; 2 629 PJ) and gas oil[11] (12.7%; 1 472 PJ). Liquefied petroleum gas and natural gas had a combined share of 1.4% (165 PJ) (see *Figure 2*).

Figure 2: Fuel energy supply shares per fuel type in 2021 *(Source: EEA)*



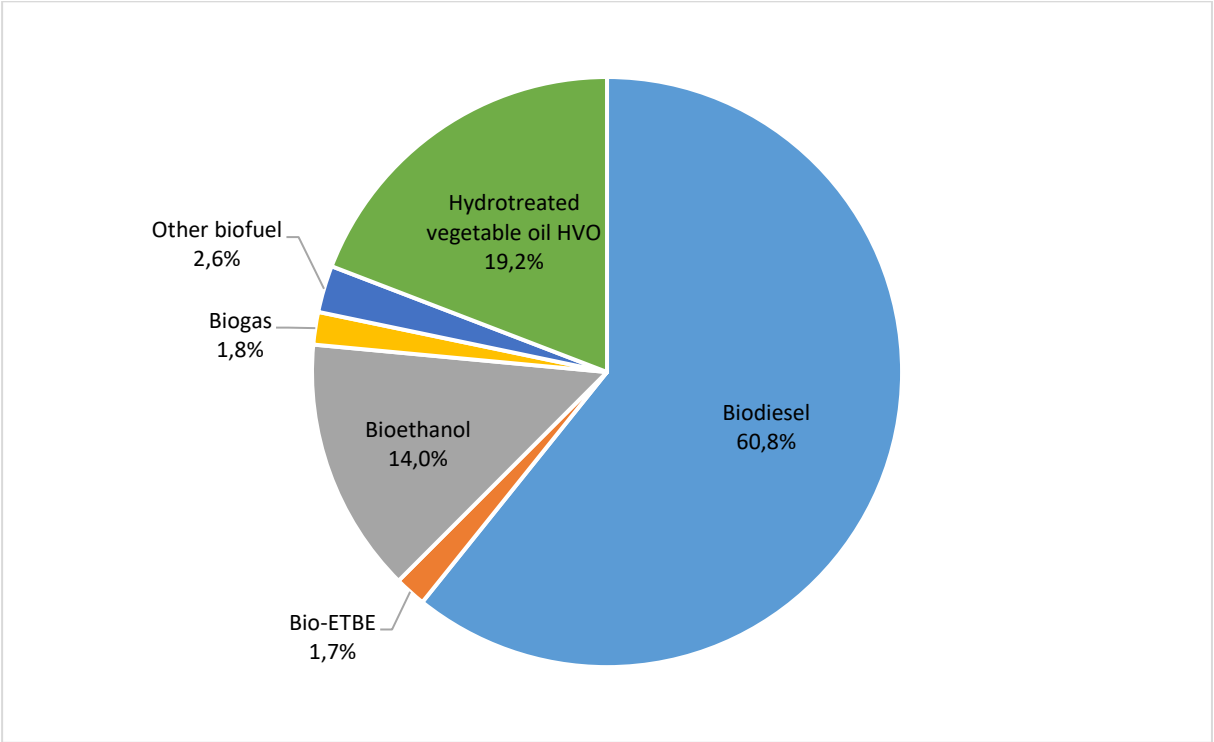
2.3 Biofuel consumption

The total biofuel consumption increased slightly from 723 PJ to 781 PJ between 2020 and 2021 in the 27 Member States. It continues to be dominated by biodiesel (fatty acid methyl ester, FAME) accounting for 60.8% of the total biofuel consumption (475 PJ), followed by hydrotreated vegetable oil (HVO) (19.2%; 150 PJ), and bioethanol (14.0%; 109 PJ). Bio-ethyl tert-butyl ether (bio-ETBE) accounted for 1.7% (13 PJ) and biogas for 1.8% (14 PJ) of the total biofuel consumption. All other biofuels represented a share of 2.6% or 20 PJ (see *Figure*

[11] "Gas oil" denotes fuel used for non-road mobile machinery as per definition in Article 2(3) of the Fuel Quality Directive.

3). Thus, about 80% of all biofuels are blended into diesel fuel. Detailed information for all biofuels and pathways can be found in the EEA Technical Report No 2023/03.

Figure 3: Biofuel energy supply shares per fuel type in 2021 *(Source: EEA)*



2.4 Electricity consumption

The reporting of electricity consumption by fuel suppliers is voluntary and eleven Member States (compared to fifteen in 2020) reported data on electricity consumed by electric vehicles, including motorcycles (see *Table 1*). The total reported quantity of electricity consumed by electric vehicles has increased to 9 859 593 GJ (excluding powertrain efficiency adjustment) from 6 218 196 GJ in 2020, representing about 60% of increase. The actual electricity consumption of electric vehicles in the different Member States may be larger since the reporting of electricity is not compulsory under Article 7a and is not reported by many Member States albeit it would contribute towards achieving the 6% target.

Table 1: Electricity consumed by electric vehicles and motorcycles in 2021 as a reported contribution by fuel suppliers to their GHG reduction target (*Source: EEA*)

Member State	Quantity of energy		GHG intensity	
	excluding powertrain efficiency (GJ)	including powertrain efficiency (GJ) [12]	reported by Member State (g CO_2e/MJ)	reported by Member State (g CO_2e/kWh)
Austria	178 818	71 527	21.8	78
Czechia	2 234	893	177.0	637
Estonia	62 091	27 659	114.5	412
France	2 853 505	1 141 402	15.8	56.9
Germany	4 989 600	1 995 840	147	529
Hungary	28 065	11 226	58.7	211
Italy	310 951	124 380	110.3	397
Netherlands	1 236 277	494 511	133.4	480
Slovakia	10 158	4 063	13.1	47
Slovenia	4 116	1 646	90.7	327
Spain	408	1 633	102.1	368
Sweden	10 158	4 063	13.1	47
Total	**9 859 593**	**4 052 598**		

3. OVERVIEW OF THE 2021 FUEL QUALITY DATA IN THE EU

According to Article 8 of the Fuel Quality Directive, all 27 Member States, Norway, and the United Kingdom in respect of Northern Ireland submitted reports on national fuel quality data for the year 2021.

This section provides the data for petrol and diesel sales, and the biocomponents included therein, for road transport reported by 27 EU Member States. It excludes other fossil fuels, other biofuels and fuels of non-biological origin, as well as fuels used for non-road mobile machinery.

3.1 Petrol and diesel

The share of diesel has remained stable between 2017 and 2021, reaching the value of 72.6% of total sales in 2021. The total amount of diesel sold in 2021 has increased by 6.4% when compared with 2020 likely due to the economic recovery after the COVID-19 crisis in 2020. Likewise, the petrol sales in 2021 have increased by 9.7% (see *Table 2*).

[12] In accordance with Annex I, Part 1 of the Council Directive (EU) 2015/652, the GHG reduction target is calculated on the basis of electricity quantities using the adjustment factor for the EV technology, which corresponds to the inclusion of the powertrain efficiency.

Table 2: Diesel and petrol fuel sales for EU-27 (in million litres and their respective shares) in 2017 – 2021

	2017	2018	2019	2020	2021
Diesel fuel sales	235 388 (73.3%)	241 653 (73.3%)	246 865 (73.0%)	217 395 (73.2%)	231 224 (72.6%)
Petrol fuel sales	85 911 (26.7%)	87 994 (26.7%)	90 917 (27.0%)	79 659 (26.8%)	87 385 (27.4%)
Total (diesel and petrol)	**321 299**	**329 629**	**337 782**	**297 054**	**318 609**

Diesel fuel consumption is dominant in all EU Member States, except in Cyprus where the proportion of petrol use is 50%. Other countries with relatively high petrol consumption are Netherlands, Greece and Finland with the corresponding shares of 48%, 46% and 38% respectively, while on the other end, in Bulgaria, Latvia and Lithuania, the corresponding petrol shares range from 18%, 15% and 14% respectively.

There are no significant changes in the distribution of petrol sales in terms of petrol grade research octane numbers (RON) between 2020 and 2021. The majority of petrol sales in 2021 comprised fuels with a petrol grade RON 95, the share of which slightly increased compared to 2020. The share of $95 < RON < 98$ sales decreased, while the share of $RON \geq 98$ sales remained the same compared to preceding year (see *Table 3*).

Table 3: Share of petrol sales in EU-27 according to RON numbers

	2017	2018	2019	2020	2021
RON 95	84.3%	80.0%	77.8%	79.3%	80.5%
95 < RON < 98	8.5%	14.9%	16.7%	14.3%	13.1%
RON ≥ 98	6.9%	4.9%	5.4%	6.4%	6.4%
RON = 91	0.2%	0.2%	0.1%	0.01%	0.03%

3.2 Biocomponents content

In 2021, almost all petrol and diesel sold in the EU is marketed as containing biocomponents. Of all petrol sold, 99.7% contained biocomponents[13] with the following breakdown: 65.4% contained up to 5% ethanol content by volume (E5), while 34.2% contained up to 10% ethanol content (E10), both remaining at about the same level as in 2020; 0.4% of petrol contained more than 10% ethanol (E+[14]).

All the diesel fuel sold in 2021 contained biocomponents, whereas 99.8% of diesel fuel contained up to 7% FAME (B7) and 0.2% contained more (B+)[15]. The share of B+ has decreased in 2021 because of lower contribution of Belgium and France (see *Table 4*).

[13] This includes bioethanol directly blended into petrol or converted to ETBE and then blended into petrol.
[14] E+ is petrol fuel with > 10% (% v/v) ethanol content
[15] B+ is diesel fuel with > 7 % (% v/v) biodiesel content

Table 4: Use of biocomponents in petrol and diesel fuels sold in the EU-27 in 2017-2021

Fuel type		2017	2018	2019	2020	2021
Petrol	E0	14.5%	4.9%	0.7%	0.0%	0.0%[16]
	E5	66.7%	81.5%	73.3%	65.7%	65.4%
	E10	18.6%	13.4%	25.7%	33.3%	34.2%
	E+	0.1%	0.2%	0.4%	1.0%	0.4%
Diesel	B0	0.0%	0.0%	0.0%	0.0%	0.0%
	B7	81.8%	99.2%	99.1%	86.2%	99.8%
	B+	16.2%	0.8%	0.8%	13.8%	0.2%

3.3 Compliance of sold fuels with quality limits

Overall in the EU, a high compliance with the fuel quality limits is observed. The very large majority of key fuel parameters in the samples taken in 2021 were reported within the tolerance limits.

Ireland, Lithuania, Netherlands and Sweden verified and reported full compliance for both petrol and diesel fuels. Eight Member States verified and reported full compliance for petrol (Finland, Ireland, Lithuania, Malta, Netherlands, Romania, Slovenia and Sweden), and nine for diesel (Croatia, Cyprus, Ireland, Lithuania, Luxembourg, Netherlands, Poland, Slovakia and Sweden).

Member States reported a total of 205 cases of non-compliance for petrol and 77 for diesel, corresponding to a share of 3.5% and 1.6% respectively of the total number of samples taken in 2021. For petrol, the most common parameters falling outside the specifications were exceedances of the summer vapour pressure (in fifteen Member States), aromatics content (in five Member States), research octane number (RON), motor octane number (MON) and sulphur content (in four Member States for all three parameters). For diesel, the most common parameters falling outside the specifications were the sulphur content and the FAME content (in six Member States for both parameters).

All Member States described the actions taken when non-compliant samples were identified. These actions included informing the competent authorities, initiating investigations, imposing penalties and fines, and resampling. In a small number of cases, no action was taken where the non-compliant parameters were found to be very close to the tolerance limits.

There was therefore no need for the Commission to launch any investigation in this area. It can be concluded that the fuel quality monitoring system in place ensures that high quality fuels are sold in the EU in accordance with the requirements of the Fuel Quality Directive.

[16] Only Latvia, Malta and Slovakia reported 247 million litres of petrol sold with no biofuel content, corresponding to a share of 0.3% of the total petrol sales in 2021 (due to the low share, it is left out of Table 4).

Annex

Table 5: Upstream Emission Reduction contribution towards the 6% GHG emission intensity target in 2021, excluding ILUC (Source: EEA)

Member state	GHG intensity reduction excluding UERs	UERs contribution	GHG intensity reduction including UERs	GHG intensity incl. UERs (g CO2eq/MJ)	GHG intensity excl. UERs (g CO2eq/MJ)	Reported UERs (Kt CO2eq)
Cyprus	3.4%	2.7%	6.1%	90.9	90.6	707.0
Denmark	3.8%	2.2%	6.0%	90.6	90.6	3922.3
Hungary	4.2%	1.9%	6.1%	90.2	90.1	4164.1
Malta	4.8%	1.9%	6.7%	89.6	88.2	130.0
Slovakia	4.6%	1.4%	6.0%	89.7	89.9	1439.7
Estonia	4.8%	1.4%	6.2%	89.6	89.5	562.5
Luxembourg	5.2%	1.0%	6.3%	89.2	88.8	745.3
Poland	4.3%	1.0%	5.3%	90.1	90.0	10011.6
Czechia	5.2%	1.0%	6.1%	89.3	89.0	2471.1
Germany	5.4%	0.9%	6.3%	89.0	88.3	18282.4
Romania	4.0%	0.8%	4.8%	90.3	90.3	2501.9
Austria	3.1%	0.8%	3.8%	91.2	91.1	2390.2
Slovenia	4.1%	0.6%	4.7%	90.3	90.5	456.9
Croatia	2.1%	0.1%	2.3%	92.1	92.0	121.0
Italy	3.6%	0.0%[17]	3.6%	90.8	89.9	49.0
Belgium	6.2%	0.0%	6.2%	88.3	88.1	0.0
Bulgaria	2.7%	0.0%	2.7%	91.5	90.3	0.0
Finland	13.2%	0.0%	13.2%	81.6	87.4	0.0
France	4.4%	0.0%	4.4%	90.0	90.0	0.0
Greece	4.0%	0.0%	4.0%	90.4	90.3	0.0
Ireland	3.1%	0.0%	3.1%	91.1	91.1	0.0
Latvia	2.8%	0.0%	2.8%	91.5	91.3	0.0
Lithuania	4.1%	0.0%	4.1%	90.2	91.0	0.0
Netherlands	6.3%	0.0%	6.3%	88.2	89.0	0.0
Portugal	4.8%	0.0%	4.8%	89.5	90.9	0.0
Spain	3.9%	0.0%	3.9%	90.5	90.6	0.0
Sweden	21.6%	0.0%	21.6%	73.7	76.1	0.0
EU27	**5.1%**	**0.4%**	**5.5%**	**90.7**	**89.3**	**47954.9**

[17] The reported UER contribution for Italy is 0.004%. Due to its rounding up, the value in the table shows 0.0%.