UNION ZUR FÖRDERUNG VON OEL- UND PROTEINPFLANZEN E. V.

BIODIESEL & CO. 2023/2024

REPORT ON PROGRESS AND
FUTURE PROSPECTS – EXCERPT
FROM THE UFOP ANNUAL REPORT

ufop

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Biodiesel & Co.

The debate about the right policies to promote—or hinder—renewable energies shapes the contentious culture within the federal government and coalition factions. From the UFOP's perspective, it is particularly regrettable that this discussion is partly driven by ideology. Consequently, there is currently no consensus within the government on a technology-, raw material-, and competition-neutral strategy. On the contrary, there is a dispute over the electrification of as many areas as possible in the heating and transport sectors. From an external perspective, this debate seems perplexing and not fully thought through, as "physics" limits what is feasible and desirable. Meanwhile, the necessary expansion of renewable electricity production is driving up costs for the federal budget and electricity customers, undermining public acceptance. It's not just about large intercity transmission lines but also about regional and local distribution networks, which need to be upgraded nationwide to handle the additional electricity required for operating heat pumps and charging electric vehicles. The expansion of fast-charging networks in cities and on motorways is also a challenge that primarily requires time. Criticism is particularly directed at the Renewable Energy Sources Act (EEG) subsidy, which leads to additional financial burdens—even if these no longer appear on the electricity bills of end customers but are instead placing a more significant strain on the federal budget than expected. For 2024, nearly €8.7 billion (as of the editorial deadline) has already been transferred from the federal budget to the EEG account, managed by transmission system operators, to prevent it from going into the red. The reason is temporarily negative electricity prices due to weather-related electricity surpluses with no buyers. This effect intensifies year after year due to the accelerated expansion of photovoltaic and wind power plants. As welcome as this development is regarding the necessary energy transition, the federal government will need to counteract this dilemma to minimise the burden on the federal budget. In short, more electricity consumers are needed, especially during times when overproduction drives prices down. One possible solution could be the use of electrolysers, which convert this low-cost surplus into hydrogen, whose production is being promoted under European and national hydrogen strategies. Against this background, the UFOP welcomed the federal cabinet's decision on the Hydrogen Acceleration Act, which also provides for the acceleration of approval procedures (Amendment 4. BImSchV) for electrolysis.

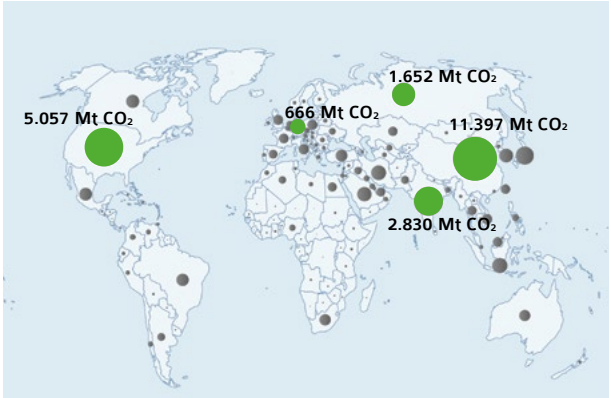
If the debt ceiling is not to be raised or circumvented by "special funds," savings in the federal budget are necessary. In the transport sector, the environmental bonus for the purchase of new electric vehicles was abolished in January 2024, albeit without protest from the vehicle industry. The precarious budgetary situation sets the framework for action on the energy transition in transport and heating sectors and for achieving climate protection goals in the coming years, thus also affecting future governments. This applies not only to Germany: all member states are affected, and so is the EU budget. Since the start of Russia's war of aggression against Ukraine in early 2022, the international democratic community of values has faced the necessity of excluding Russia from global trade as much as possible to cut off its revenue for war financing. It is also obliged to comprehensively support Ukraine militarily and financially and to provide additional financial resources for necessary national rearmament.

Just a few years ago, with the conclusion of the legally binding Paris Climate Agreement in 2015, combating global climate change was recognised as a challenge for all states to ensure a liveable world for future generations. 197 states committed to limiting global warming to 1.5 degrees Celsius. However, Russia's attack on Ukraine has led governments in Europe and North America to redirect state spending towards strengthening defence readiness and military deterrence. Combatting climate change has been pushed to the background. Yet, climate change does not pause. Physics is also globally creating "facts" here. Damage mitigation and prevention also bind huge sums of money in all regions of the world. However, this money is then missing for financing climate protection measures, not only in industrialised nations but especially in the Global South, which is particularly suffering from the consequences of climate change and regional military conflicts. Therefore, the biggest "climate killer" is Russian President Putin. Governments must take the new threat situation into account in their budget planning. It is an obvious and inhumane stance of the Russian political leadership, which is not interested in climate protection but instead strives to exploit all possible avenues for exporting oil, (stolen) grain, raw materials, etc., to finance the war. The resulting pressure on oil prices is driving up consumption, even in countries that have signed the Paris Climate Agreement.

International Cooperation on Alternative Fuels is Important

Germany and Europe's exemplary role is undoubtedly a crucial factor in advancing climate protection based on diverse cooperation, such as developing affordable technologies. Germany and Europe acknowledge their historical responsibility, as the global "Carbon Atlas" vividly conveys:

Russia and China have also historically "contributed" to climate change, with China, in particular, now called upon to increase its financial contribution given its rapid industrial and economic progress, rather than relying on its status as an "emerging economy." China is the world's largest producer and exporter of renewable energy technologies. The result is a competitive displacement in wind power,



Click here for the Global Carbon Atlas:
bit.ly/carbonatlas

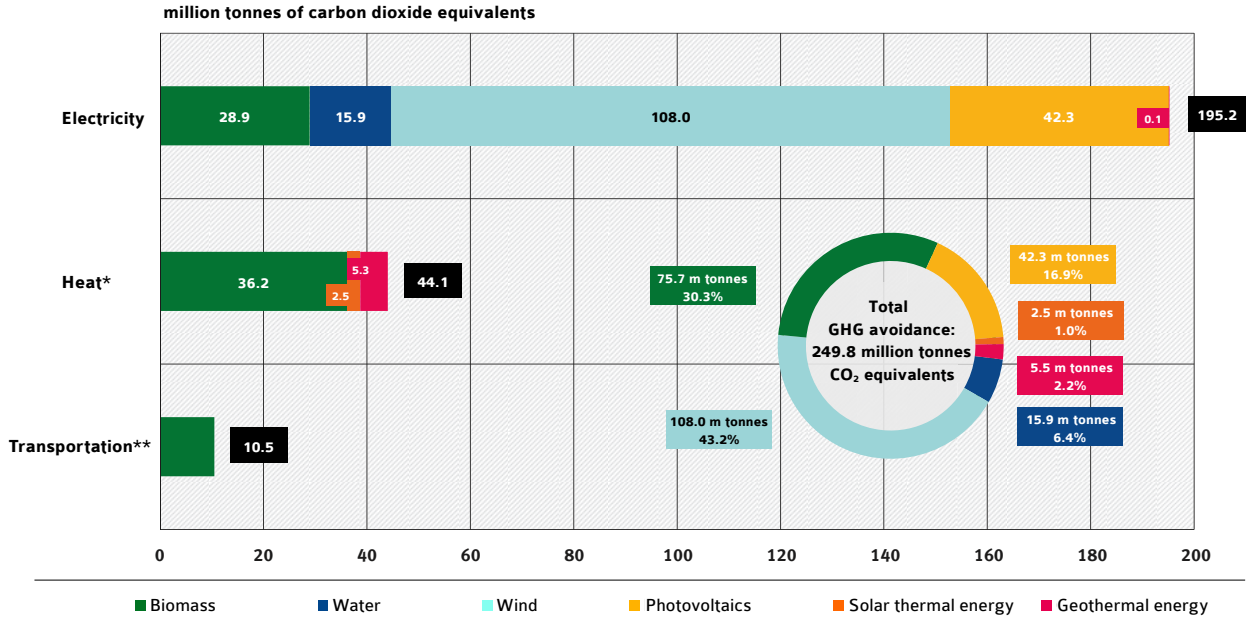
photovoltaics, and e-mobility. In Germany and the EU, the much-praised value creation and job creation effects of government promotion of renewable technologies and tenders for electricity production must be questioned. In the case of e-mobility, import tariffs must be introduced. China not only benefits enormously from this political support framework but is also driving the expansion of all production capacities so massively that even battery production projects in the EU are being cancelled or postponed. China is also the global leader in the development and production of solid-state batteries, which are considered a game-changer in e-mobility. The FAZ therefore noted on 18 July 2024: "There are already too many factories, where is there still room for European ambitions?" From the UFOP's perspective, it is hoped that German vehicle manufacturers will use the foreseeable price drop in batteries to offer affordable vehicles for everyone.

The UFOP has repeatedly maintained that, with regard to the defossilisation of the transport sector and the ambitious climate protection targets for 2030 and 2045, technological openness is the order of the day. All options are needed to accelerate the reduction of fossil fuel consumption and crude oil imports. Alternative fuels are characterised by high energy density and, above all, integration capability into existing distribution systems. The pace of defossilisation in the existing fleet and in new vehicles will be determined by their availability and the approvals granted by vehicle manufacturers for pure fuels (B100/HVO100) and for fuel blends such as B20/B30 or E20. Approvals have been and are being granted for biodiesel as a pure fuel and for hydrotreated vegetable oil (HVO), including for existing vehicles. The energy transition in transport must necessarily be accompanied holistically. This includes measures to increase efficiency by switching to battery-electric propulsion, to exploit potential fuel savings, and to develop attractive, i.e., above all, affordable mobility concepts in public transport. In this context, the current significance and sustainable contribution of the limited available biofuels must be properly classified and specifically concentrated in an energy mix that accounts for the gradual reduction in demand for fossil fuels. The current significance of sustainably certified biofuels or biomass in the renewable energy mix for greenhouse gas reduction is illustrated in Fig. 1. The renewable electricity for e-mobility is, statistically speaking, barely "visible" so far.

Amendment to the Federal Climate Protection Act ...

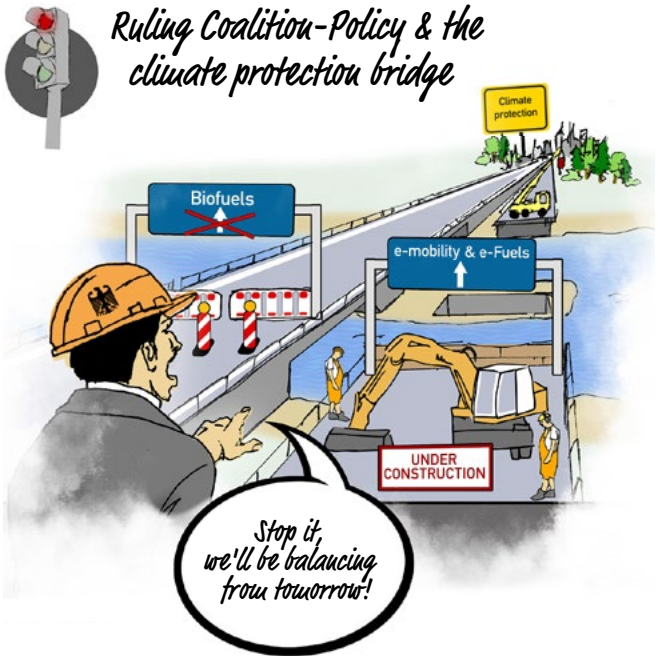
In the reporting year, the federal government passed the amendment to the Federal Climate Protection Act (KSG) announced in the coalition agreement—despite massive public criticism – thus formally abolishing the sector-specific and bindingly dated reduction targets. In the German Environment Agency's reports, such as the "Projection Report for Germany 2023": *bit.ly/3Xrnkcz*, the differentiation by sectors is necessarily continued, and measures for target achievement are described. The UFOP had publicly questioned the federal government's decision (see above). The deputy chairwoman of the German government's Expert Council on Climate Issues, Brigitte Knopf, made it very clear during the presentation of the "Review Report on the Calculation of German Greenhouse Gas Emissions for 2023" (*www.expertenrat-klima.de/en/*). "The measures adopted in the federal government's climate protection programme are not sufficient to achieve the sectoral targets. Above all, there remains a significant shortfall in the transport sector until 2030." The UFOP pointed out in its press release

Fig. 1: Net balance of greenhouse gas emissions avoided through the use of renewable energies (2023)



* Charcoal consumption not included
** exclusively biogenic fuels in transport (excluding agriculture, forestry, construction and the military), based on provisional data from the Federal Office for Agriculture and Food (BLE) Agriculture and Food (BLE) and the fossil base values in accordance with § 3 and § 10 of the 38th BImSchV

Quelle: Umweltbundesamt (UBA) auf Basis UBA, AGEE-Stat: "Zeitreihen zur Entwicklung der erneuerbaren Energien in Deutschland" (Stand 02/2024)



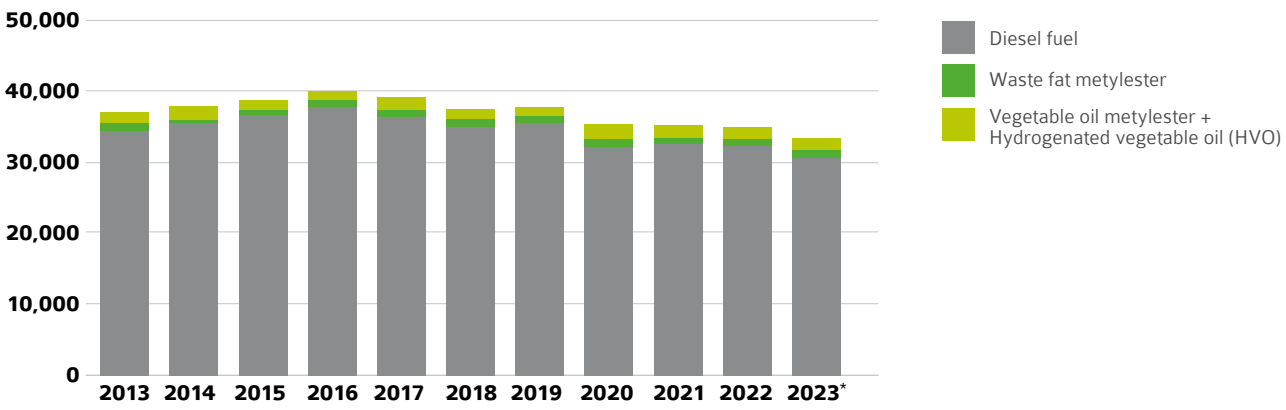
Source: UFOP e. V.

that biofuels contribute to a greenhouse gas reduction of around 11.5 million tonnes of CO_2 equivalents annually. This significant contribution is not subsidised like other options, as biofuels are fully taxed towards the GHG reduction obligation. On the contrary, biofuels help ensure that the federal government does not have to buy unnecessary CO_2 certificates from other member states to meet the greenhouse gas reduction requirement under the EU Effort Sharing Regulation. The challenges of the transport sector's targets are shown in Fig. 2. However, the greenhouse gas reduction potential of biofuels is legally limited, primarily due to the cap on biofuels from cultivated biomass at 4.4%, measured by final energy consumption in transport. At the same time, a large greenhouse gas reduction potential is exported year after year. Germany, with about 3.7 million tonnes of biodiesel production (2023), is by far the largest producer in the EU (see Appendix Tab. 60), including biodiesel from rapeseed oil with a share of about 52.3%. The German biodiesel industry is by far the largest buyer of rapeseed oil or rapeseed for rapeseed producers in the EU, with about 1.9 million tonnes. The demand for rapeseed oil for biodiesel production increased from 5.52 million tonnes in 2020 to an estimated 6.55 million tonnes in 2024 (Fig. 3). This corresponds to a cultivated area of about 4 to 4.7 million hectares of rapeseed, out of a total EU cultivation area of about 6 million hectares. To utilise the German oil mill capacity of about 9 million tonnes of rapeseed, rapeseed is also imported, including for biofuel production. In 2022, about 165,000 tonnes of rapeseed oil from Australia or the corresponding quantity of seeds for processing in German oil mills were imported for crediting towards the GHG quota obligation (see Appendix Tab. 14). More recent data is not possible because the responsible agency for implementing the Biofuel Sustainability Ordinance, the Federal Office for Agriculture and Food (BLE), does not publish the corresponding report for the relevant calendar year until the end of the following calendar year. (report for 2022: *bit.ly/3z8aurV*)

...and Combustion Engine Ban in Discussion – Need for Fuel Strategy Coordination

In this context, the debate over the "combustion engine ban" from 2035 gained momentum again in the reporting year. The UFOP took the vote on stricter CO_2 fleet limits for trucks and buses at the Brussels level as an opportunity to once again call for the lack of coordination of a comprehensive strategy for alternative fuels. Action is needed not only at the national level but also at the European level to consider biofuels in the defossilisation of the existing fleet (cars and commercial vehicles), as millions of vehicles with internal combustion engines will still be in operation across the EU after 2035. The UFOP welcomed Federal Transport Minister Volker Wissing's commitment to a technology-open decarbonisation strategy and wished that the vehicle industry itself would do more to preserve the internal combustion engine, especially since the state subsidy

Fig. 2: Diesel/biofuel consumption 2013 – 2023 (in 1,000 tonnes)



Source: UFOP, according to BAFA, BLE (* UFOP estimate)

Fig. 3: EU-27: raw materials used for biodiesel / year / million tonnes

Feedstock	Dec. 2020	Dec. 2021	Dec. 2022	Jan. 2023	Jan. 2024F
Rapeseed oil (b)	5.52	5.90	6.16	6.35	6.55*
Palm oil	4.71	4.30	3.53	3.32	3.15*
Soya oil	1.11	1.00	1.02	1.18	1.00*
Sunflower oil	0.65	0.34	0.55	0.61	0.65*
Tallow and fat	0.69	0.78	0.76	0.65	0.65*
Used waste oils	2.61	2.79	3.16	3.12	3.00*
Other	0.11	0.14	0.16	0.21	0.15*
Biodiesel output	**15.40**	**15.25**	**15.34**	**15.44**	**15.15***

(a) incl. HVO. (b) incl. canola oil

Source: Oil World

for the purchase of electric vehicles was scrapped at the beginning of the year by Federal Finance Minister Christian Lindner. Physics limits electrification, especially in heavy-duty transport and off-road sectors (agriculture and construction), which must be considered in a holistic propulsion and fuel strategy. Moreover, energy imports will continue to be necessary to meet energy demand in the future, including in the form of synthetic fuels. These issues were also the subject of presentations and intensive discussions at the 21st "International Congress on Renewable Mobility – Fuels of the Future," co-organised by the UFOP from the beginning. Experts agreed that electricity, converted into energy carriers such as methanol, would have to be imported. This is because the absolute electricity demand cannot be met locally considering the energy hunger of all modes of transport powered by electricity. Against this background, biofuels already introduced to the market are to be considered an important but legally limited contribution (cap limits), which is physically available—unlike e-fuels. Precisely for this reason, their use in heavy-duty transport with varying route profiles and high power demands must be recognised and considered important in the future (bridging function). In this sense, the HVO100 strategy initiated by associations and companies in the mineral oil industry (HVO100 goes Germany – *hvo100.team/* (only in German) is to be understood as a door-opener for paraffinic synthetic fuels. The UFOP demanded that, ideally, a European-coordinated propulsion and fuel strategy must set the framework for action and provide reliable support policies. EU Commission President Ursula von der Leyen, upon her re-election, emphasised not only her commitment to the Green Deal but also announced her goal of reducing CO_2 emissions by 90% by 2040 (compared to 1990) in the European climate law. She linked this ambitious announcement with a conciliatory promise that, with a view to the review of the regulation on CO_2 fleet limits scheduled for 2026, CO_2 emissions would be allowed, provided that only synthetic fuels from renewable electricity and "C" from carbon capture are used. This means that the engines then permitted must be equipped (fuel detection) so that they can only operate on e-fuels.

This technical application issue is, from the UFOP's perspective, resolved today. Against this background, the UFOP notes that the future of biofuels in the EU depends on the existing fleet of vehicles. However, the EU's comprehensive regulatory packages (see UFOP Report 2022/23, p. 30 – "Fit-for-55") do not set a precedent for imitation. On the contrary, on 22 July 2023, the Global Biofuel Alliance was founded in India during the G20 Summit (*bit.ly/4enhHTH*). So far, only Italy from the EU has joined this alliance. This alliance signals the continuation and coordination of an international biofuel policy, including the requirements for sustainable biomass utilisation (cultivated biomass, residues, etc.), and simultaneously sets a market signal for potential exports from the EU to these countries to meet their demand.

National Biomass Strategy vs. U.S. BioMASS Strategy?!

The importance of biofuels or biomass as a renewable raw material as an instrument of national agricultural, income, and climate protection policies can be seen in the political acceptance of these raw material sources and their exploitation. At the national level, the federal government should have presented the draft of a National Biomass Strategy (NABIS) to the relevant specialist associations for consultation by early 2024, according to its self-imposed timetable. By the editorial deadline, it was not known when or if the draft would be presented at all. The "green" ministries BMEL, BMUV, and BMWK are responsible for drafting a proposal for adoption

Global Biofuels Alliance auf dem G20-Gipfel in Indien

by the federal cabinet. The coordination process is apparently stalled. The UFOP has repeatedly emphasised the holistic approach with regard to the affected crops in arable farming. This means that not only the purpose of the yield for energy or material use but also the entire use of all plant parts, including the protein component, the contribution to diversification and improvement of biodiversity in crop rotation, and substitution effects (reduction of soybean imports and thus land use) must be considered.

Members of the Global Biofuel Alliance, led by the USA, are already strategically and forward-looking. The U.S. Department of Energy has presented a comprehensive strategy report that also sets the framework for action: "2023 Billion-Ton Report: An Assessment of U.S. Renewable Carbon Sources" (*bit.ly/strategiebericht_USA*) and published the data sources: *bit.ly/datenquellen_strategie_USA*. The goal is to provide 1.3 billion tonnes of biomass annually in the future. It is clear that the strategy focuses on "mass," but with attention to the necessary requirements for sustainable agriculture and the use of residues as well as the development of new biomass resources (algae). It should not be overlooked that biotechnology is also a key enabler in the U.S. for the accelerated and GHG-reduced (reduction of tillage) exploitation and yield security of potential.

RED III and GHG Quota Legislation Between Tightened Control ...

At the EU level, the implementation of the amended Renewable Energy Directive (RED III – 2023/2413) is in focus. The directive gives member states until June 2025 to comply. They are free to choose whether to meet the obligation of at least a 29% share of renewable energies in transport by 2030 based on energy quota obligations (see also Appendix Tab. 14 ff) or a GHG reduction obligation as in Germany. The outcome of the trilogue procedure (see UFOP Report 2022/23, p. 30) alternatively provides for a minimum obligation of 14.5% GHG reduction. By the editorial deadline, not all EU member states had submitted their final National Energy and Climate Plans (NECPs) to the Commission (deadline: end of June), including the federal government. In these plans, member states were supposed to outline their national strategies with the legal framework and support conditions.

The EU Commission had previously been tasked with reviewing the drafts to determine whether the measures described could meet the targets, e.g., the tightened EU Effort Sharing Regulation. Overall, the measures must contribute to actually achieving the climate protection target of a 55% GHG reduction by 2030, anchored in the EU Climate Law. This is binding for every member state. Measures must be nationally adjusted according to the so-called EU Governance Regulation (2018/1999). The regulation governs the biennial reporting by states to the Commission on progress in implementing their plans and the monitoring and evaluation of reports by the Commission—correspondingly difficult discussions are expected from the UFOP's perspective.

The UFOP repeatedly emphasised to policymakers and in its public relations work that the German GHG reduction obligation law is exemplary for the EU because it combines the resource-related and environmentally desired effect of a priced GHG efficiency competition. The regulation also meant that, as early as 2019, the share of biofuels from waste oils (UCOME) in Germany exceeded the share of biodiesel from rapeseed oil (RME), and this trend continued through 2022, with over 1 million tonnes of UCOME for the first time (Fig. 4). Nevertheless, German biodiesel production of 3.7 million tonnes (2023) finds buyers because in certain member states (including France, Germany, Austria, Sweden, the Netherlands), biofuels from palm oil are no longer eligible for quota obligations. The corresponding raw material demand must therefore be compensated by rapeseed oil. The winner of this legal regulation under RED II is rapeseed oil (see Fig. 3). This observation applies not only to the use of rapeseed oil for biodiesel production but also for HVO, as in some EU member states like Finland, the Netherlands, Poland, Spain, Italy, and globally, investments are being made in HVO plants—though not in Germany. German mineral oil refineries are beginning to

invest in the option, approved since 2024, of co-processing waste oils in the refinery process (hydrogenation stage) – co-HVO processing. The legal requirement for crediting towards the GHG quota obligation that only waste oils listed in Part A of Annex IX of RED II are approved is problematic, as this severely limits the substitution potential. The global production of vegetable oils amounts to about 220 million tonnes, so with an estimated collection rate of 10%, about 22 million tonnes of waste oil are globally available. It is impossible to estimate how much of this is "Part A raw material." The UFOP believes that the approval of co-processing will intensify international competition for this very scarce waste resource. Viewed from the outside, this raw material and support policy seems absurd because biofuels made from these wastes can be doubly credited towards the GHG quota obligation. The availability of waste oils is a challenge that is currently driving and escalating the biofuel industry, as can be seen in the suspected fraudulent imports from China. In the reporting year, the UFOP, therefore, worked intensively on fraud prevention issues in cooperation with the affected associations. As a result, a catalogue of measures with proposals for fraud prevention was developed: "Joint Position Paper Fraud in Climate Protection in the Transport Sector: UERV Amendment Does Not Solve the Problems and Prevents Real CO_2 Savings"(*bit.ly/positionspapier_UERV*) (only in German).

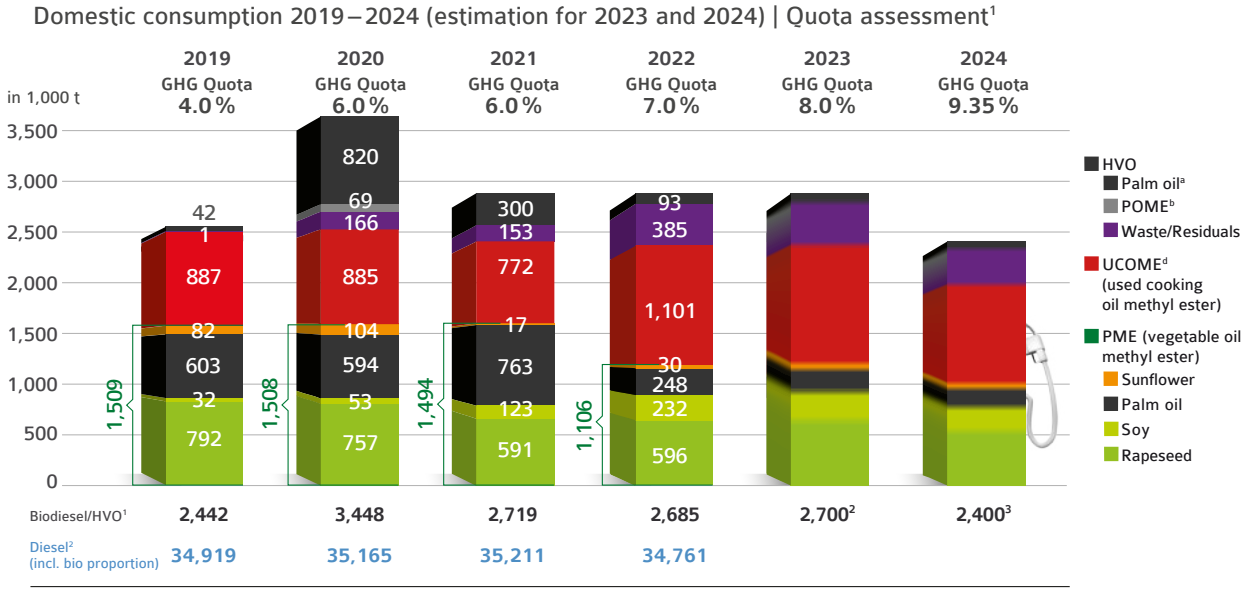
The focus is primarily on sharpening official controls on-site, the necessary registration of biofuel producers, and, above all, controlling the certification systems, which are legally obliged to also review the certifiers or certification bodies to be trained by the systems—especially if an on-site inspection is refused. Is then a license for the EU market even possible? As a result of the massive criticism from the associations regarding the obvious control and monitoring gaps, the German Bundestag also addressed this problem. The federal government had to respond accordingly to questions from the opposition, see Bundestag document 20/10099: "Import of possibly palm oil-based biodiesel" (*bit.ly/biodiesel_palmoel*) (only in German). The UFOP reiterated its position that the responsibility of certification systems and the supervisory duty of the EU Commission must be improved because the labelling of a priced product feature for a specific GHG reduction performance is ultimately the result of a cross-stage correct certification of the "trust product" biofuel—and this is ultimately the basis of the business.

.. and Forced Biofuel Strategy – A Look Ahead

The EU has anchored more ambitious targets in RED III. Germany has already established these with the GHG quota obligation rising to 25% by 2030. Will these need to be further tightened or increased? This question cannot be answered because the Federal Environment Ministry has not met the requirement under the Federal Immission Control Act (BImSchG § 37g) to submit an experience report to the Bundestag by 31 March 2024, according to the legally specified structure (see box below). No draft was known by the editorial deadline. From the UFOP's perspective, this is a mandatory prerequisite for policymakers to assess the changes in the draft law. If the existing multiple credits are maintained, the quota obligation would have to be raised to 37%, according to calculations by the German Biofuel Industry Association. It is assumed that the federal government's target number of electric vehicles by 2030 will fall short by 3 million units (12 million instead of 15 million e-cars) and that the share of renewable energies in the electricity mix will at least reach 70%. A correspondingly intensely debated draft law is expected by the UFOP in autumn 2024.

However, current and future legal GHG quota obligations face biofuel potential, whose usage options are, in turn, determined by the respective fuel standard. Even if HVO100 is increasingly offered at public filling stations and, therefore, the also formally approved B10 since 2024 will hardly be used

Fig. 4: Sales performance and raw material composition of biodiesel/HVO (GER)



Sources: [1] BLE [Federal Office for Agriculture and Food]: Evaluation and Progress Report 2022
[2] Estimation by UFOP [3] Estimation by UFOP based on BAFA [4] BAFA: Mineral oil statistics
[a] incl. Palm-HVO from co-processing [b] HVO from wastewater sludge from the processing of palm oil (POME)
[c] from waste and residual materials, sunflower incl. co-processed HVO [d] from waste oils

08/2024

due to a lack of available filling stations, restraint is to be expected due to cost pressures. Nevertheless, HVO100, despite cost pressures, is an option in freight transport and diesel locomotives. Deutsche Bahn is already promoting the green transition on non-electrified routes. The transport industry must improve its CO_2 footprint, as customers want to demonstrate an improved CO_2 footprint as part of sustainability reporting (Scope 3). The most elegant and least noticeable way for customers to meet ever-increasing GHG quota obligations is to increase the share of HVO as a blending component in diesel fuels. This is or must already be done to meet GHG reduction targets. Another option is to increase the market share of E10 and introduce E20. Otherwise, mineral oil companies, as quota obligors, would have to pay a compensatory levy of €600/t CO_2. This is also a form of CO_2 pricing. These and other questions about the future development of fuel and biofuel demand are the subject of presentations and intense discussions between the biofuel and mineral oil industries, the vehicle industry, and policymakers at the "22nd International Congress on Renewable Mobility – Fuels of the Future," which will take place on 20 and 21 January 2025 in Berlin – *www.fuels-of-the-future.com/en*.

Federal Government's Report on BImSchG Still Pending

The report contains, in particular, information on:

1. the development of sustainable raw material potential for the different fulfilment options,
2. the state of technical development and costs of various production technologies for biofuels, hydrogen, electricity-based fuels, and other fulfilment options,
3. the production capacities of different fulfilment options, particularly the quantities of hydrogen and electricity-based fuels incentivised by this law,
4. the compliance with sustainability criteria and the impact of the increasing greenhouse gas reduction quota on nature, the environment, and biodiversity,
5. the appropriateness of the different crediting factors of the respective fulfilment options and the amount of compensatory levies.

The report also makes recommendations for further developing the regulatory framework.

SUSTAINABLE BIOFUELS IN AGRICULTURE

For years, sustainable and certified biofuels made from domestic rapeseed have significantly contributed to climate protection in transport. The by-product of their production, rapeseed meal, is also an important source of protein for both humans and animals.

Our Demands:

1. The UFOP advocates for technological openness to renewable propulsion energies, as all options will be needed for the various performance sectors and widespread use in the future.
2. Fuels derived from cultivated biomass are today and will continue to be one of the most important pillars in advancing climate protection significantly in the heavy-duty transport sector.
3. The UFOP calls for full tax exemption of biofuels and renewable fuels for use in agriculture and forestry (biomethane, vegetable oil, HVO, biodiesel, and synthetic fuels) as a basis for market uptake. This requires an EU notification to be applied for by the Federal Government in Brussels so that it can be implemented in the national energy tax law.
4. The UFOP also considers a reliable and attractive investment support programme for renewable propulsion energies at the federal level as a necessary political measure.
5. Additionally, a practical and application-oriented time and strategy plan is needed for the gradual conversion of agricultural and forestry vehicle fleets to renewable propulsion energies.

*Compared to fossil fuel (Source: BLE evaluation and experience report for 2022, bit.ly/4eiEWye)

Renewable Alternatives for Tractors and other Vehicles

Already today, there are market-ready propulsion concepts based on renewable energies or renewable raw materials. Notable examples include:

- **Vegetable oil** (direct from the oil mill), 65% emission savings*
- **Biodiesel** (fatty acid methyl ester; FAME), 84% emission savings*
- **HVO** (Hydrotreated Vegetable Oil; hydrogenated vegetable oils), often from used fats or waste and residual materials; 87% emission savings*
- **Biomethane** (from local biogas plants), over 100% emission savings*
- **Electric** (from on-farm renewable energy generation)

As a result, fossil fuels could be phased out in the medium term for agriculture and forestry.

A key focus of renewable propulsion energies is biofuels from cultivated biomass such as biodiesel and vegetable oil. Their climate balance is excellent, with savings of more than 60% (see report by BLE for 2022: *bit.ly/3zh4pt1*).

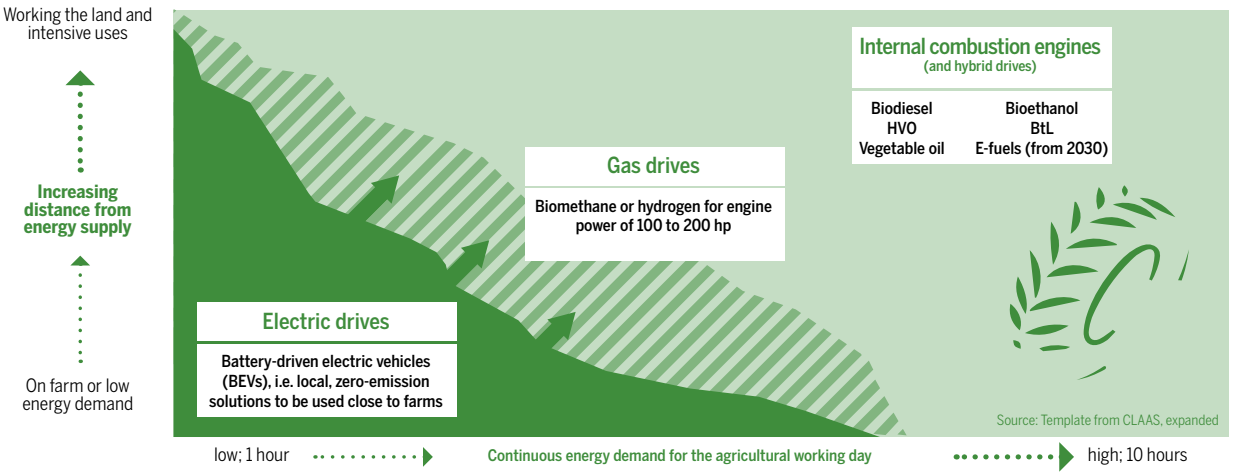
For longer operations involving heavy fieldwork or high towing loads, liquid or gaseous biofuels are the only way to significantly reduce emissions while operating cost-effectively. (See Fig. 5)

In the case of vegetable oil tractors, the fuel can be sourced from the local oil mill, ensuring that the value creation remains entirely within the rural region.

Advantages of Biofuels:

- High climate protection performance through 60-90% lower GHG emissions
- All agricultural performance requirements can be met
- In the event of an accident or spill: no soil contamination and no groundwater damage
- Promotion of regional economic cycles
- GHG savings can be credited towards the "agriculture" sector target

Fig. 5: Use of renewable drive energies in agriculture and forestry



Quelle: www.erneuerbar-tanken.de

Key figures on propulsion energies in agriculture:

- In 2023, agricultural machinery in Germany ran almost exclusively on fossil diesel fuel, with annual CO_2 emissions amounting to 5.1 million tonnes of CO_2 equivalents.
- Currently, a quarter of the fuel consumption of mobile agricultural machinery is accounted for by livestock farming, and three-quarters by plant production.
- Within plant production, fuel consumption is roughly evenly distributed across light, medium, and heavy work.
- The total energy demand for powering agricultural machinery in 2045 is estimated to be 45 to 52 PJ. This estimate includes increasing electrification, meaning savings of up to 33% compared to current energy usage. The agricultural sector can meet this demand itself with pure biofuels and renewable energies.

(Source: KTBL paper, see below)

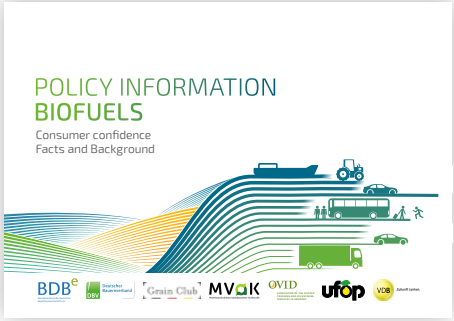
Further sources of information:

The UFOP is a co-initiator and member of the *Renewable Propulsion Energy Platform for Agriculture and Forestry* (in German), a coalition of agricultural technology companies and associations aiming to accelerate the transition of agriculture and forestry to a post-fossil era.

PLATTFORM ERNEUERBARE ANTRIEBSENERGIE FÜR DIE LAND- UND FORSTWIRTSCHAFT

www.erneuerbar-tanken.de (in German)

The brochure *"Policy Information Biofuels"* from a broad coalition of associations outlines the current pressure on political decision-makers to shape the entire future mobility in Germany with renewable energies and renewable raw materials. The status quo is commented on, and solution paths are presented over 52 pages.



Background information, particularly on current energy consumption, possible courses of action, and scenarios for climate-neutral agriculture by 2045, can be found in the latest publication by the German Agricultural Society for Technology and Construction (KTBL): *"Use of Renewable Propulsion Energies in Agricultural Machinery"* (in German). (Particular attention should be paid to the recommendations for action to policymakers and the industry on pages 36 to 41.)

Tabular Annex

TABULAR ANNEX

Biofuels

Biofuel mandates

Tables BLE Evaluation Report 2022

Legend/explanation of symbols in the tables:

–	nothing or less than one unit
.	no information available until editorial deadline
0	less than half of 1 in the final digit shown, but more than nothing
/	no information, since the numeric value is not reliable enough
()	Numeric value statistically relatively unreliable

Biofuels

Table 1: Germany: Development of biofuel consumption since 1990

Year	Biodiesel[1)]	Vegetable oil	Bioethanol	Total renewable Fuel supply
				Specification in 1,000 tonnes
1990	0	0	0	**0**
1995	35	5	0	**40**
2000	250	16	0	**266**
2001	350	20	0	**370**
2002	550	24	0	**574**
2003	800	28	0	**828**
2004	1,017	33	65	**1,115**
2005	1,800	196	238	**2,234**
2006	2,817	711	512	**4,040**
2007	3,318	838	460	**4,616**
2008	2,695	401	625	**3,721**
2009	2,431	100	892	**3,423**
2010	2,529	61	1,165	**3,755**
2011	2,426	20	1,233	**3,679**
2012	2,479	25	1,249	**3,753**
2013	2,213	1	1,208	**3,422**
2014	2,363	6	1,229	**3,598**
2015	2,149	2	1,173	**3,324**
2016	2,154	3	1,175	**3,332**
2017	2,216	0	1,156	**3,372**
2018	2,324	0	1,187	**3,511**
2019	2,348	0	1,161	**3,509**
2020	3,025	0	1,097	**4,122**
2021	2,560	0	1,153	**3,713**
2022	2,516	0	1,186	**3,702**
2023	2,616	0	1,248	**3,864**

Sources: BAFA, BLE
[1)] ab 2012 inkl. HVO
Data 2023 prelimenary

Table 2: Germany: Domestic consumption of biofuels 2018–2023 in 1,000 t

	2018	2019	2020	2021	2022	2023
Biodiesel admixture	2,323.3	2,301.4	3,026.0	2,534.0	2,500.1	2,616.1
Biodiesel pure fuel	.	.	.	.	.	.
Total biodiesel	**2,323.3**	**2,301.4**	**3,025.3**	**2,534.0**	**2,500.1**	**2,616.1**
Vegetable oil	.	.	.	.	.	.
Total biodiesel & veg oil	**2,323.3**	**2,301.4**	**3,025.3**	**2,534.0**	**2,500.1**	**2,616.1**
Diesel fuel	35,151.7	35,546.8	32,139.4	32,677.3	32,035,.4	30,763.6
Share of admixture in %	6.2	6.1	8.6	7.2	7.2	7.8
Total fuels	**37,475.0**	**37,848.2**	**35,164.8**	**35,211.3**	**34,535.6**	**33,379.7**
Bioethanol ETBE	109.9	88.1	125.8	157.4	131.3	132.3
Bioethanol admixture	1,077.4	1,054.6	971.7	990.3	1,051.9	1,115.4
Bioethanol E 85	.	.	.	.	.	.
Total bioethanol	**1,187.4**	**1,142.7**	**1,097.5**	**1,147.7**	**1,183.2**	**1,247.7**
Petroleum fuels	16,649.7	16,823.2	15,120.4	15,366.9	15,776.1	16,083.8
Petroleum + bioethanol fuels	17,837.1	17,965.9	16,217.9	16,514.6	16,959.2	17,331.5
Share of bioethanol in %	6.7	6.4	6.8	6.9	7.0	7.2

Data 2023 preliminary

Sources: German Federal Office of Economics and Export Control, AMI

Table 3: Germany: Monthly domestic consumption of biofuels 2018–2023 in 1,000 t

	2018	2019	2020	2021	2022	2023
Biodiesel blending						
January	182.81	182.62	221.72	172.19	180.41	195.36
February	176.12	145.13	212.69	157.71	206.67	189.36
March	203.28	172.67	221.96	182.48	235.94	236.76
April	196.00	180.57	194.34	211.29	214.41	209.30
May	204.94	185.78	242.25	204.73	206.48	209.57
June	197.08	191.11	227.75	210.05	195.00	231.72
July	225.16	220.98	288.80	232.45	200.81	227.66
August	212.19	214.37	282.56	266.71	212.96	233.39
September	190.39	204.33	303.29	260.45	200.22	224.24
October	184.91	198.19	271.76	248.84	214.93	198.38
November	173.29	204.24	229.77	197.61	217.48	222.09
December	177.17	201.44	209.55	186.54	214.83	235.82
Average	**193.61**	**191.79**	**242.20**	**210.92**	**208.34**	**217.80**
Total amount	**2,323.33**	**2,301.42**	**2,906.44**	**2,531.03**	**2,500.14**	**2,613.65**
Bioethanol						
January	104.92	95.26	102.21	75.89	94.47	94.47
February	87.45	81.95	95.53	59.39	83.64	83.64
March	98.15	82.28	84.99	81.11	98.46	98.46
April	95.30	89.45	60.84	90.79	112.84	112.33
May	106.85	103.94	89.23	112.20	94.50	94.09
June	103.01	100.48	93.68	93.45	91.52	90.91
July	104.91	99.77	112.67	98.31	104.33	102.73
August	109.72	94.37	105.04	99.76	106.71	105.35
September	92.64	96.81	92.12	98.89	100.34	99.44
October	95.94	101.45	100.67	126.67	97.92	97.03
November	93.70	100.66	86.26	99.03	105.76	105.12
December	94.75	96.28	75.84	95.11	99.76	99.60
Average	**98.95**	**95.22**	**91.59**	**94.22**	**99.19**	**98.60**
Total amount	**1,187.36**	**1,142.68**	**1,099.08**	**1,130.59**	**1,190.25**	**1,183.17**

Data 2023 prelimenary
Sources: German Federal Office of Economics and Export Control, AMI

Table 4: Germany: Foreign trade in biodiesel 2018–2023 in t

	2018	2019	2020	2021	2022	2023
Import of biodiesel						
January	85,583	97,340	118,498	52,484	102,356	110,757
February	78,473	71,163	103,546	45,214	89,925	87,255
March	115,706	86,856	93,790	53,510	102,147	99,780
April	116,581	122,073	119,514	84,349	184,858	128,704
May	138,737	124,686	143,256	105,065	132,178	136,478
June	130,556	107,161	186,604	92,248	164,804	165,978
July	121,159	159,543	159,334	107,870	115,982	141,547
August	92,421	126,501	170,039	99,627	218,193	201,918
September	127,237	155,319	122,840	139,342	137,908	124,279
October	79,313	112,635	87,584	110,481	244,244	134,057
November	55,765	111,581	91,980	85,252	123,072	121,879
December	75,638	130,722	86,543	133,541	97,954	154,402
total	**1,217,168**	**1,405,579**	**1,483,526**	**1,108,982**	**1,713,621**	**1,607,034**
Biodiesel export						
January	141,104	183,590	206,446	212,388	212,483	266,109
February	156,687	193,992	195,023	172,209	280,371	238,557
March	143,594	205,928	193,790	165,372	264,242	211,221
April	172,016	169,000	183,303	191,654	198,225	254,422
May	114,487	230,393	133,350	201,186	135,413	194,404
June	166,584	163,145	260,696	190,130	209,466	281,464
July	155,086	172,055	187,574	176,678	149,576	178,230
August	191,730	192,742	218,806	190,007	240,355	255,669
September	173,519	197,228	238,532	199,481	297,900	241,657
October	181,676	193,140	166,365	196,706	259,963	344,199
November	170,864	181,609	181,040	218,676	239,672	205,719
December	176,551	177,904	247,227	210,784	238,728	209,628
Total	**1,943,897**	**2,260,727**	**2,412,153**	**2,325,271**	**2,726,394**	**2,881,279**

Note: Data for 2023 prelimenary
Sources: Federal Statistics Office of Germany, AMI

Table 5: Germany: Export of biodiesel [FAME] (2018–2023) in t

	2018	2019	2020	2021	2022	2023
Belgium	132,413	264,411	342,420	394,883	636,461	381,791
Bulgaria	1	1	1,200	5	1	1
Denmark	39,511	27,269	22,451	22,649	17,982	36,667
Estonia			1,890	786	337	0
Finland	9,156	2,626	525	790	635	470
France	64,945	53,701	68,473	76,455	53,811	103,612
Greece	3	1	,	,	,	,
Ireland	,	,	0	,	,	,
Italy	5,410	12,829	17,848	28,693	20,492	23,577
Croatia	,	500	100	1,013	2	10
Latvia	50	0	242	11,912	,	,
Lithuania	660	977	1,920	17,720	1	0
Luxembourg	308	417	,	,	6,363	151
Malta	,	,	,	,	,	,
Netherlands	667,121	855,472	1,032,521	961.937	1,168,553	1,210,189
Austria	185,335	171,617	137,019	127,092	60,655	99,779
Poland	242,008	239,225	261,153	240,008	248,917	302,381
Portugal	8	8	4	5	8	11
Romania	-	-	3.935	22.214	4	-
Sweden	138,524	135,833	116,794	108,827	97,859	113,882
Slovakia	12,486	21,271	18,411	11,416	1,926	15,827
Slovenia	14,988	34,917	32,719	42,480	18,962	28,370
Spain	274	350	669	77	163	193
Czech republic	61,155	56,036	26,308	35,280	25,997	39,437
Hungary	4,902	315	7,072	531	778	2,167
Cyprus	,	,	,	,	,	,
EU-27	**1,579,258**	**1,877,773**	**2,093,672**	**2,104,773**	**2,359,903**	**2,358,514**
Norway	18,035	7,184	7,300	,	5	2
Switzerland	97,819	83,865	79,358	74,878	77,801	77,534
USA	197,412	183,250	164,062	144,071	287,209	444,104
UK	50,581	107,902	67,004	964	634	610
Other countries	792	753	757	582	842	516
Total	**1,943,897**	**2,260,727**	**2,412,153**	**2,325,268**	**2,726,394**	**2,881,280**

Note: Data for 2023 provisional
Sources: Federal Statistics Office of Germany, AMI

Table 6: Germany: Import of biodiesel [FAME] (2017–2022) in t

	2018	2019	2020	2021	2022	2023
Belgium	236,150	293,449	296,691	229,363	383,290	295,518
Bulgaria	33,142	24,954	25,302	12,816	30,879	11,220
Denmark	532	1.001	785	76	121	.
Estonia	.	23	.	.	.	.
Finland	.	.	1,992	18,020	37,058	43,620
France	9,678	21,749	73,519	77,287	42,524	4,460
Italy	827	33	177	1,017	732	29,043
Lithuania	536	.	.	.	.	1,124
Netherlands	618,523	713,134	701,379	519,418	879,356	901,159
Austria	90,538	80,537	84,274	31,452	90,424	92,481
Poland	88,955	94,316	138,690	116,362	86,771	82,309
Portugal	.	.	.	.	277	85
Romania	.	25	3,440	8,213	2,287	3,567
Sweden	1	9	2	15	78	81
Slovakia	959	1,464	2,278	249	3,642	7,506
Slovenia	1,341	.	0	0	1	0
Spain	1,001	27	.	.	.	.
Czech republic	922	12,987	7,551	22,753	30,569	3,212
Hungary	.	.	.	114	23	.
EU-27	1,083,104	1,243,706	1,336,081	1,037,153	1,588,031	1,475,386
Indonesia	**718**	**44**	**239**	**2,244**	**1,106**	**39**
Canada	.	.	968	1,152	1,415	1,428
Malaysia	128,109	153,182	139,309	64,654	119,136	127,032
Norway	593	522	509	660	473	54
Philippines	2,988	1,517	263	1,255	1,877	1,805
USA	36	199	807	1,377	934	1,002
United Kingdom	709	5,992	354	5	1	93
Other countries	911	417	4,996	482	648	193
Total	**1,217,168**	**1,405,579**	**1,483,526**	**1,108,982**	**1,713,621**	**1,607,032**

Anmerkung: Angaben 2023 vorläufig
Quellen: Statistisches Bundesamt, AMI

Table 7: Statistical data on the fulfilment of the greenhouse gas quota 2017 – 2022

	2017	2018	2019	2020	2021	2022*
Quotas placed on the quantities placed on the market (Quantities in million litres)						
Diesel fuel	42,372	41,746	41,701	37,513	37,344	35,979
Petroleum fuels	22,935	23,105	23,432	20,981	20,583	20,736
For the fulfilment of the Greenhouse gas reduction quantity required in t CO_{2eq}						
Reference value	198,806,042	224,409,745	225,553,789	207,950,673	203,526,286	200,790,522
Target value	7,952,240 (-4,0%)	215,433,356 (-4%)	216,531,638 (-4%)	195,439,792 (-6%)	191,314,710 (-6%)	186,735,186 (-7%)
Actual quota**						7.39%
Actual emissions	-	214,592,554	215,545,804	195,305,575	188,910,680	183,419,224
Quantities for greenhouse gas mitigation eligible for consideration (in million litres)						
Replacing diesel fuel:						
Blending	2,458	2,659	2,778	4,059	3,138	3,107
Petroleum fuels complementary:						
Blending (incl. E85)	1,436	1,467	1,468	1,408	1,462	1,545
Pure fuels (FAME+PÖL+HVO)	4	4	3	11	17	19
Biogas in GWh (compressed and liquefied)	449	389	341	713	982	1,357
Natural gas (CNG+LNG+ synth. methane) in GWh	-	830	845	943	1,872	-
Liquefied petroleum gas (LPG+ Bio-LPG) in tons	-	423,473	397,025	339,552	359,855	-
Electricity in GWh	-	2	59	111	199	1,714
Hydrogen in tonnes	-	2	2	82	182	-
Achieved emission reduction of the fuels, in t CO_{2eq}						
Blending	7,552,170	9,329,327	9,485,954	12,763,118	10,654,212	10,928,302
Pure biofuels (incl. biomethane and bio LPG)	131,491	127,950	110,136	245,984	356,285	636,422
Liquefied petroleum gas (LPG)	-	399,335	374,394	321,608	339,344	
Natural gas (NG, LNG and synth. methane)	-	73,571	71,517	70,515	134,909	
Hydrogen	-	12	11	518	1,147	-
Power	-	197	5,730	13,636	25,013	843,536
Reductions from UER	-	-	-	784,852	1,825,783	1,918,251
Carried forward from the previous year	1,045,710	798,500	854,050	-	922,477	2,386,610
Total	**8,729,371**	**-**	**10,901,792**	**14,200,231**	**15,249,568**	**16,713,121**

Continued on the next page

	2017	2018	2019	2020	2021	2022
Quantities exceeding the upper limits quantities						
Upper limit in accordance with Section 13 of the 38th BImSchV (biofuels from food and feed crops) in GJ	-	-	-	-	-	34,592
Upper limit in accordance with Section 13a of the 38th BImSchV (waste-based biofuels) in GJ	-	-	-	-	-	6,372
Upper limit in accordance with Section 13b of the 38th BImSchV (biofuels from raw materials with a high ILUC risk) in GJ	-	-	-	-	-	66,393
Quantities in t CO_{2eq}, eligible for the commitment year						
Overfulfilment	798,580	855,171	991,136	921,860	2,421,140	3,369,923
Obligation not fulfilled in the year						
Existing or legally established levy pursuant to § 37c para. 2 BImSchG in euros	10,081,000	6,594,000	2,425,000	552,000	59,537,000	31,488

* The figures are rounded values. These statistics reflect the situation as of 01.06.2024. Changes may occur, for example, as a result of changes may occur, e. g. as a result of subsequent notifications or appeal proceedings.
** Since diesel and petrol fuels are included in the actual emissions with a value that deviates from the base value, the actual savings required may differ from the calculated savings.
Source: zoll.de

Table 8: Statistical data on the fulfilment of the progressive quota – quota year 2022*

Key figures of the 2021 advanced quota (FQ) in GJ (gigajoules)	
Total energy in the reference value from the GHG quota	2,188,807,985
Quota (0.2 % of the reference value energy)	3,871,929
Quantities considered for the calculation of the FQ in GJ	
Biodiesel	8,349,744
HVO (incl. co processed HVO + biogenic oils)	14,185,761
Bioethanol and ETBE	520,782
Biomethanol and MTBE	514,411
Biomethane (compressed + liquefied)	4,654,116
Biogenic liquefied petroleum gas (Bio-LPG)	-
Hydrogen	-
Quota transfer from previous year	13,025,332
total	**41,250,146**
Quantities eligible for the commitment year 2023 in GJ	
Overachievement 2022	22,155,990
Obligation not fulfilled in 2021	
Existing or legally established levy pursuant to § 14 para. 3 of the 38th BImSchV in conjunction with § 37c para. § 37c para. 2 sentence 3 BImSchG in 1,000 euros	-

The figures are rounded values. These statistics reflect the current state of affairs and processing as of 01.06.2023.
Due to subsequent notifications and corrections, the figures may still change.
Source: zoll.de

Table 9: (Bio-)fuel production capacities 2023 in Germany

Operator/Plant	Location	Capacity (t/year)	
Biodiesel			
ADM Hamburg AG	Hamburg	not available	●
ADM Mainz AG	Mainz	not available	●
Bioeton Deutschland GmbH	Kyritz	80,000	
Biosyntec GmbH	Regensburg	50,000	
Biowerk Sohland GmbH	Sohland	100,000	●
BKK Biodiesel GmbH	Rudolstadt	4,000	
Bunge Deutschland GmbH (ehemals MBF GmbH)	Mannheim	100,000	●
Cargill Deutschland GmbH	Frankfurt am Main	350,000	●
ecoMotion GmbH	Sternberg	100,000	●
ecoMotion GmbH	Lünen	50,000	●
ecoMotion GmbH	Malchin	12,000	●
gbf german biofuels gmbh	Pritzwalk-Falkenhagen	132,000	●
Gulf Biodiesel Halle GmbH	Halle (Saale)	80,000	
KFS Biodiesel GmbH & Co. KG	Cloppenburg	50,000	●
KFS Biodiesel Kassel GmbH	Kaufungen	50,000	
KFS Biodiesel Köln GmbH	Niederkassel	120,000	
Louis Dreyfus Company Wittenberg GmbH	Lutherstadt Wittenberg	200,000	●
MD-Biowerk GmbH	Tangermünde	33,000	
Mercuria Biofuels Brunsbüttel GmbH & Co. KG	Brunsbüttel	250,000	
Natural Energy West GmbH	Neuss	245,000	●
PME BioLiquid GmbH & Co. Betriebs KG	Wittenberge	80,000	
REG Germany AG	Borken	80,000	
REG Germany AG	Emden	100,000	●
Tecosol GmbH	Ochsenfurt	90,000	●
VERBIO Bitterfeld GmbH	Bitterfeld	195,000	●
VERBIO SchwedtGmbH	Schwedt/Oder	250,000	●
VITERRA Magdeburg GmbH	Magdeburg	250,000	
VITERRA Rostock GmbH	Rostock	200,000	
Total		**3,251,000**	

Operator/Plant	Location	Capacity (t/year)
Bioethanol		
Anklam Bioethanol GmbH	Anklam	55,000
Baltic Distillery GmbH	Dettmannsdorf	16,000
Cargill Deutschland GmbH	Barby	40,000
Clariant Produkte GmbH (Demonstrationsanlage)	Straubing	1,000
CropEnergies Bioethanol GmbH	Zeitz	315,000
eal Euro-Alkohol	Lüdinghausen	16,000
Ethatec GmbH	Weselberg	4,000
Nordbrand Nordhausen GmbH	Nordhausen	16,000
Nordzucker AG	Wanzleben-Börde	100,000
Sachsenmilch Leppersdorf GmbH	Leppersdorf	8,000
VERBIO Schwedt GmbH	Schwedt	200,000
VERBIO Zörbig GmbH	Zörbig	60,000
Total		**831,000**
Mineral oil		
Bayernoil Raffineriegesellschaft mbH	Ingolstadt/Vohburg	10,300,000
BP Lingen	Lingen (Ems)	4,700,000
Gunvor Raffinerie Ingolstadt GmbH	Ingolstadt	5,000,000
H & R Chemisch-Pharmazeutische Spezialitäten GmbH	Salzbergen	220,000
H & R Oelwerke Schindler	Hamburg	240,000
Holborn Europa Raffinerie GmbH	Hamburg	5,150,000
MiRO Mineralölraffinerie Oberrhein GmbH & Co. KG	Karlsruhe	14,900,000
Mitteldeutsches Bitumenwerk GmbH	Webau	195,000
Nynas GmbH und Co. KG	Hamburg	1,825,000
OMV Deutschland GmbH	Burghausen	3,700,000
PCK Raffinerie GmbH Schwedt	Schwedt	11,480,000
Raffinerie Heide GmbH	Heide/Holstein	4,200,000
Ruhr Oel GmbH	Gelsenkirchen	12,800,000
Shell Energy and Chemicals Park Rheinland	Wesseling	7,300,000
Shell Rheinland Raffinerie Werk Köln-Godorf	Köln	9,300,000
TotalEnergies Raffinerie Mitteldeutschland GmbH	Spergau/Leuna	12,000,000
TotalEnergies Bitumen Deutschland GmbH & Co.	Brunsbüttel-Ostermoor	570,000
Total		**103,880,000**

Note: = AGQM-Member;
Sources: VDB (with information via UFOP, FNR, AGQM, names partly abbreviated).
DBV and UFOP recommend purchasing biodiesel from the members of the Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e. V. (AGQM).

Table 10: UCO imports by the EU in 2022 (mt)

	2021	2022	2023
China	618,014	912,818	335,184
Malaysia	166,185	161,596	223,511
UK	119,819	191,535	203,703
Saudi Arabia	66,862	81,107	84,889
Russia	82,078	72,720	83,798
Thailand	,	6,929	43,928
Indonesia	56,499	37,386	43,357
Argentina	23,701	2,867	37,911
Belarus	21,193	20,418	28,427
South Africa	44	23,413	27,042
Egypt	312	3,130	22,818
UAE	20,292	13,460	22,034
Hong Kong	2,480	3,256	17,231
Israel	1,518	6,313	16,824
Viet Nam	6,378	49,247	16,524
Iran	3,628	11,709	10,959
Kuwait	6,757	8,187	10,927
Switzerland	11,870	14,145	10,574
Singapore	5,258	2,420	9,008
Japan	10,238	3,322	8,450
Lebanon	1,757	2,781	7,500
Jordan	6,130	1,747	7,253
Chile	61,387	53,577	7,079
Morocco	5,577	7,047	6,006
Peru	9,266	8,597	5,607
Iraq	2,761	3,343	5,466
Ukraine	2,717	3,004	5,386
Serbia	5,114	3,934	4,826
Latvia	1,879	3,289	3,889
Panama	2,791	3,652	2,665
Philippines	2,053	1,996	2,548
Norway	3,377	4,131	2,428
Colombia	5,372	8,654	2,272
United States	22,233	28,519	1,956
Uruguay	1,338	2,109	1,609
Guatemala	.	1,413	1,296
Qatar	1,143	1,659	1,210
Mexico	2,195	2,094	717
Australia	3,685	1,594	585
Turkey	918	2,979	273
Canada	1,614	1,462	147
extra EU	**1,436,151**	**1,789,966**	**1,387,835**
intra EU	**1,992,082**	**2,613,837**	**2,248,112**
Total	**3,428,233**	**4,403,803**	**3,635,947**

Source: Eurostat

Table 11: EU production of biodiesel and HVO 2016–2023 in 1,000 t

	2016	2017	2018	2019	2020	2021	2022	2023
Belgium	235	290	252	254	213	192	155	300
Denmark	140	120	130	130	125	120	115	120
Germany	3,119	3,208	3,344	3,584	3,127	3,378	3,531	3,700
France	2,017	1,946	2,211	2,031	1,974	1,538	1,445	1,210
Italy	774	918	990	1,164	1,037	1,237	1,172	1,386
Netherlands	1,462	1,929	1,839	1,902	1,939	1,973	1,857	1,875
Austria	307	295	287	299	293	295	330	353
Poland	871	904	881	966	955	991	982	973
Portugal	337	356	363	292	262	238	256	224
Sweden	258	209	258	322	312	393	367	375
Slovakia	110	109	110	109	117	117	117	116
Spain	1,486	1,878	2,143	2,040	1,845	1,769	1,779	1,620
Czech republic	149	157	194	248	259	245	242	250
EU other	1,202	1,250	1,418	1,372	1,433	1,672	1,497	1,741
EU-27	**12,467**	**13,569**	**14,420**	**14,713**	**13,891**	**14,158**	**13,845**	**14,243**
UK	342	467	476	545	535	535	593	650

Source: S&P Global, May 2023

Table 12: Global biodiesel and HVO production 2016–2023 in 1,000 t

	2016	2017	2018	2019	2020	2021	2022	2023
EU	10,495	11,237	11,824	12,145	10,513	10,485	10,592	10,897
Canada	352	350	270	350	355	315	245	252
USA	5,222	5,315	6,186	5,744	6,044	5,458	5,396	5,658
Argentinia	2,659	2,871	2,429	2,147	1,157	1,724	1,910	831
Brazil	3,345	3,776	4,708	5,193	5,660	5,954	5,523	6,624
Colombo	448	510	555	530	530	580	650	700
Peru	0	33	99	135	164	183	183	175
China, Mainland	800	918	734	826	1,250	1,725	2,200	2,250
India	123	132	163	210	190	155	160	200
Indonesia	3,217	3,006	5,428	7,391	7,560	9,030	10,400	11,900
Malaysia	501	720	1,090	1,423	906	976	1,162	1,700
Philippines	199	194	199	213	165	165	189	204
Thailand	1,084	1,256	1,392	1,624	1,622	1,459	1,224	1,469
Rest of the world	1,266	1,439	1,625	1,800	1,785	1,793	1,771	1,833
TOTAL	**29,711**	**31,758**	**36,702**	**39,732**	**37,902**	**40,002**	**41,605**	**44,693**

Renewable Diesel/HVO	2016	2017	2018	2019	2020	2021	2022	2023
EU	2,161	2,752	2,733	3,187	3,215	3,295	3,253	3,346
USA	713	763	902	1,453	1,575	2,406	4,379	7,656
Other	826	695	646	874	1,802	1,863	1,562	1,447
TOTAL	**3,700**	**4,210**	**4,281**	**5,514**	**6,592**	**7,564**	**9,194**	**12,449**

Source: S&P Global, May 2023

Table 13: Global biodiesel and HVO consumption 2016–2023 in 1,000 t

Biodiesel consumption	2016	2017	2018	2019	2020	2021	2022	2023
EU-27	9,796	10,427	11,888	12,251	11,192	11,715	11,546	11,460
Canada	270	370	365	345	435	325	370	494
USA	6,946	6,613	6,341	6,038	6,250	5,485	5,309	6,459
Argentinia	1,033	1,173	1,099	1,071	477	438	712	581
Brazil	3,333	3,753	4,678	5,167	5,045	5,993	5,486	6,515
Colombo	506	513	552	532	502	598	686	699
Peru	294	290	291	293	251	317	325	336
China, Mainland	240	275	361	378	220	229	243	250
India	45	65	75	88	45	9	35	200
Indonesia	1,991	1,727	2,624	4,609	6,460	6,992	8,815	9,881
Malaysia	449	456	408	610	763	773	1,116	1,100
Philippines	192	180	181	192	142	168	190	200
Thailand	1,025	1,255	1,422	1,449	1,420	1,111	839	1,094
Rest of the world	1,728.1	1,723.5	2,592.3	2,885.2	2,484.4	2,193	2,336	2,519
TOTAL	**27,848**	**28,821**	**32,877**	**35,908**	**35,686**	**36,346**	**38,008**	**41,788**

HVO consumption*	2016	2017	2018	2019	2020	2021	2022	2023
EU-27	1,919	2,028	1,826	2,225	3,283	3,245	3,161	3,412
Canada	168	251	268	337	306	350	375	450
USA	1,181	1,207	1,081	1,995	2,195	3,155	4,708	8,470
Rest of the world	185	371	228	313	288	363	441	661
TOTAL	**3,453**	**3,857**	**3,403**	**4,870**	**6,072**	**7,113**	**8,685**	**12,993**

Total Biodiesel/ HVO consumption worldwide (all sectors)	**33,479**	**35,324**	**39,788**	**45,038**	**45,516**	**47,978**	**51,005**	**58,990**

* HVO = Hydrogenated Vegetable Oil; all data for road transport.
Source: F.O: Licht/S&P Global, June 2024

Biofuel mandates

Table 14: National biofuel mandates 2024

	Type	minimum Total biofuel (%)	Progressive Biofuels* (%)	Biofuel in petrol (%)	Biofuel in diesel (%)	Reduction of the GHG intensity of fuels (%)
Austria	Energy	-	0.2	3.4	6.3	-7
Belgium	Energy	10.2	0.22[2]	5.7	5.7	-
Bulgaria	Volume	-	1 (in Diesel)	9	6	-
	Energy	-	0.05	-	-	
Croatia	Energy	-	0.6	-	-	-6
Cyprus	Energy	-	0.2	-	-	-6
Czech Republic	Volume	-	0.22	-	-	-6
Denmark	Energy	-	-	-	-	-3.4
Estonia	Energy	7.5[3]	0.5	-	-	-
Finland	Energy	13.5[4]	4	-	-	-
France	Energy	-	1.3 (in petrol) 0.5 (in Diesel)	9.9	9.2	-10
Germany	Energy	-	0.4	-	-	-9.25[5]
Greece	Energy	-	-	3.3	-	-
	Volume	-	0.2	-	7	
Hungary[6]	Energy	8.4	0.5	6.1 (ROZ 95)	0.2 (HVO)	-
Irland[7]	Energy	21	1 (in energy)	-	-	-6
Italy[8]	Energy	10.8	4.2	1	-	-6
Latvia	Volume	-	0.2	9.5 (ROZ 95)	6.5[9]	-
Lithuania	Energy	7.8	0.7	6.6	6.2	-
Luxembourg	Energy	7.7[10]	-	-	-	-6
Malta	Energy	-	0.2	-	-	-
Netherlands[11]	Energy	28.4	2.9	-	-	-6
Poland	Energy	9.1	0.1	5.3 (ROZ 95)[12] 3.2 (ROZ 98)	5.2	-
Portugal	Volume	11.5	0.5	-	-	-
Romania	Volume	-	-	8	6.5	-
Slovakia	Energy	8.8	0.5 (double counting)	-	-	-6
	Volume	-	-	9[13]	6.9	
Slovenia	Energy	10.6[14]	0.2	-	-	-6
Spain	Energy	11[15]	0.5	-	-	-6
Sweden		-	-	-	-	-6

[1] After double counting.
[2] Double counting at 0.95%
[3] Crop-based biofuels capped at 4.5%.
[4] Crop-based biofuels capped at 2.6%.
[5] Caps (in e/e): crop-based biofuels at 4.4%; high-ILUC Risk biofuels at 0%; Annex IX-B at 1.9%.
[6] Annex IX-B biofuels capped at 4% after double-counting.
[7] Crop-based biofuels capped at 2%.
[8] Italy has a mandate of 300kt/year for HVO.
[9] During the period from 1April till 31 October.
[10] 9.7% with multipliers. Can be lowered to 6%. Advanced biofuels must be at least 50% of the biofuels mix after double counting. Crop-based capped at 5%.
[11] Crop-based biofuels capped at 1.4%. UER cannot be counted towards the target 6% GHG intensity target.
[12] Specifica submandate for bioethanol in RON95 gasoline: 4.59%
[13] Specific submandate for ETBE: 3%
[14] Obligation for renewable energy in transport, to be achieved through the use of biofuels, renewable electricity, RCF, RFNBOs.
[15] Crop-based capped at 7%. High ILUC-risk biofuels cap (incl. palm oil, oil palm fresh fruit bunches, PFAD, palm kernel oil and palm kernel shells oil) at 3.1%.

Source: www.ePure.org (retrieved: June 2024)

Table 15: Biofuel mandates in the EU for selected member states

a) Austria

	Overall Percentage (energy content, % cal)	Biodiesel (% cal)	Bioethanol (% cal)	Advanced Biofuels (% cal)	GHG Emission Reduction (%) [1]	Cap on crop-based biofuel (% cal)	Multiple Counting
2022	5.75			0.5[2]	6		
2023				0.2	6		
2024				0.2	7		
2025				1	7.5		
2026	None	6.3	3.4	1	8	7[3]	No
2027				1	9		
2028				1	10		
2029				1	11		
2030				3.5	13		

Source: FAS Vienna based on Austrian Fuels Order 2012, (with its 2014, 2017, 2018, 2020, and 2022 amendments)

[1] To reach the GHG reduction target the following may be taken into account:
- Emission credits from upstream emission reduction (UER) projects (in 2023 only and up to a maximum of onepercent).
- electric power from renewable energy sources used for electrically powered motor vehicles may also be takeninto account (multiple counting x4 for renewable electricity in road transport).

[2] The substitution target can be reduced upon request if advanced biofuels are not available in sufficient amounts.

[3] Palm oil-based biofuels are excluded since July 1, 2021.

Penalties

Failing to meet the mandates is sanctioned with the following penalties:

Mandate	Penalty
Energetic	43 Euro per GJ under supplied
GHG reduction 2023	600 Euro per MT CO_2 eq for the first 5 percent and 15 Euro per MT CO_2 eq for the last percent of unmet GHG reduction target
GHG reduction 2024 and onwards	600 Euro per MT CO_2 eq of unmet GHG reduction target

Source for Table 15 and further information:
GAIN Report Biofuel Mandates in the EU by Member State - 2024
(No. E42023-0023, published 27 June 2024, author: Sabine Lieberz), see also *bit.ly/4fe0Xjc*

Table 15: Biofuel mandates in the EU for selected member states – continued

b) Belgium

	Overall Percentage (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Double Counting
Since January 1, 2023	10.5	5.7	5.7	Max 0.95%

Source: FAS USEU based on Law of July 7, 2013; Law of July 21, 2017; Law of May 4, 2018; Law of December 27, 2021

Penalties

Failing to meet the mandates is sanctioned with the following penalties: € 1,400 per 34 GJ

Source: ePure

c) Czech Republic

	Renewable energy in transport (% cal)	Advanced biofuels from annex IX-A feedstock[2]) (% cal)	Minimum GHG emission reduction[2]) (%)	Cap on Biofuels from food and feed crops [2]) (% cal)	Cap on Annex IX-B feedstock-based biofuels[2]) (% cal)	Double counting [2)]
2022–2024	-	0.22	6 of which 1 UER	7	1.7	2 x for Biofuels, bioLPG, bioCNG, bioLNG from raw materials IX.A; IX.B RED II
2025	-	1.07	6 of which 1.6 UER			
2030	9.5	1.07				

Source: FAS Prague based on
1) Act No. 165/2012 Coll., on Supported Energy Sources and on Amendments to Certain Acts (as amended)
2) Act No. 201/2012 Coll., on Air Protection (as amended)

Table 15: Biofuel mandates in the EU for selected member states – continued

d) Denmark

	Overall Percentage (% cal)	GHG emission reduction (%)	Cap on crop-based biofuels (% vol)	Advanced Biofuels[2] (Annex IX-A) (% cal)	Multiple Counting
2022–2024		3.4	Biofuels based on palm oil and soy phased out by 2022[1]	0.2	x 2 for advanced biofuels; x 4 for renewable electricity in road, x 1.5 in train; x 1.2 for aviation and maritime fuels
2025–2027		5.2	All High-ILUC-risk biofuels phased out by 2025	1	
2028–2029		6		1	
2030		7		3.5	

Source: FAS The Hague based on ePure
1) Unless certified low-ILUC-risk.
2) The use of biofuels produced from Annex IX-B feedstock is capped at 1.7 percent.

Denmark established a blending obligation requiring a minimum of 7.6 percent biofuels in 2010. Recently it was changed to a requirement to reduce emissions rising to seven percent by 2030. The mandate also covers clean electricity used in transport (Source: Policy Briefing Nordic Council of Ministers).

Crop-based biofuels:

All high-ILUC-risk biofuels should be phased out no later than 2025. Biofuels based on palm oil (and its by-products, incl. PFAD) and soy are excluded from 2022, unless certified low-ILUC-risk.

Annex IX biofuels:

With the introduction of the CO_2 reduction requirement from 2022, there is no longer an obligation on fuel suppliers to ensure a minimum share of Annex IX-A biofuels. Denmark must still meet the minimum RED II mandates for Annex IX-A biofuels.

Penalties:

Fuel suppliers failing to fulfil the GHG reduction quotas may be fined and imposed criminal liability.

[1] **Source for Table 15 and further information:**
GAIN Report Biofuel Mandates in the EU by Member State - 2024
(No. E42023-0023, published 27 June 2024, author: Sabine Lieberz), see also *bit.ly/4fe0Xjc*

Table 15: Biofuel mandates in the EU for selected member states – continued

e) Finland

	Overall Percentage (% cal)	Advanced biofuel	Cap on crop-based biofuel[1)] (% cal)	Multiple Counting
2022	12	2		
2023	**13.5**	**2**		
2024	28	4		
2025	29	4	**2.6**	
2026	29	6	**High ILUC: 0**	**No**
2027	30	6		
2028	-	8		
2029	-	9		
from 2030	-	10		

Source: FAS The Hague based on ePure
1) Applicable since July 1, 2021. Biofuels produced from Annex IX- B feedstock are not capped.

f) France

	Bioethanol (% cal)	Advanced Bioethanol (% cal)	Biodiesel (% cal)	Advanced Biodiesel (% cal)	Double Counting [1]
2022	8.6	-	8	-	Yes
2023–2027	8.6	1.2	8	0.4	Yes
2028 and onwards	**8.6**	**3.8**	**8**	**2.8**	**Yes**

Source: FAS Paris
1) Double counting for cellulosic biofuels and waste biofuels produced from the feedstocks listed in Annex IX of Directive2009/28/EC except tall oil and tall oil pitch.

Cap on certain feedstocks

Since 2019 the share of energy that can be taken into account is limited to a maximum of:

- Seven percent for conventional biofuels including biofuels produced from palm oil fatty acciddistillates
- 0.9 percent for used cooking oil and animal fats
- 0.6 percent for tall oil and tall oil pitch
- 0.2 percent for sugar plant residues and starch residues extracted from starch-rich plants (0.4percent from 2020)
- Palm oil is excluded since January 1, 2020
- Soybean oil is excluded since January 1, 2022

Table 15: Biofuel mandates in the EU for selected member states – continued

g) Germany

	GHG Emission Reduction[1] (%)	Advanced Biofuels[2] (% cal)	Cap on crop-based biofuel[2] (% cal)	Cap on UCO- and animal fat-based biofuels[2] (% cal)	Cap on feeds-tocks with high ILUC risk[2], [5] (% cal)	Multiple counting	Sustainable Aviation Fuel [1][6] % Cal
2022	7	0.2[3]			0.9		
2023	8	0.3[4]					-
2024	9.25	0.4 [4]					
2025	10.5	0.7					
2026	12	1	4.4	1.9	0	See table below	0,5
2027	14.5	1					0,5
2028	17.5	1.7					1
2029	21	1.7					1
2030	25	2.6					2

Sources: FAS Berlin based on Federal Act on Protection against Air Pollution and 38th Implementation Ordinance on the Federal Act on Protection against Air Pollution (both in German language)

1) Federal Act on Protection against Air Pollution Until 2026, emission credits from upstream emission reduction (UER) projects may be taken into account to comply with the GHG reduction mandate.
2) 38th Implementation Ordinance on the Federal Act on Protection against Air Pollution
3) Companies that put on the market 10 PJ or less of biofuels in the previous year are exempted
4) Companies that put on the market 2 PJ or less of biofuels in the previous year are exempted
5) Effectively, this means that starting in 2023, biofuels based on palm oil feedstock no longer count against the mandates.
6) Only non-biomass-derived sustainable aviation fuel (SAF) is eligible for counting against this mandate.

Multiple counting

Compliance Option	Conditions	Factor
Advanced biofuels [1] Except when produced from POMEor empty palm fruit bunches	Volumes that exceed the mandate	2
Hydrogen and PtX fuels [2]	If not derived from biomass	2
Electricity	For road e-vehicles	3

Sources: FAS Berlin based on
1) 38th Implementation Ordinance on the Federal Act on Protection against Air Pollution
2) Federal Act on Protection against Air Pollution

Penalties
Failing to meet the mandates is sanctioned with the following penalties:

Mandate	Year	Penalty
GHG reduction	Since 2022	0.60 Euro per kg CO_2 eq under allocated reduction
SAF	Since 2022	70 Euro per GJ under allocated

Source: FAS Berlin based on Federal Act on Protection against Air Pollution

Source for Table 15 and further information:
GAIN Report Biofuel Mandates in the EU by Member State - 2024
(No. E42023-0023, published 27 June 2024, author: Sabine Lieberz), see also *bit.ly/4fe0Xjc*

Table 15: Biofuel mandates in the EU for selected member states – continued

h) Hungary

	Biodiesel (% cal)	Bioethanol (% cal)	Advanced Biofuels (% cal)	Double counting
2022–2023	8.4	Min. 6.1	0.2	Biofuels derived from feedstock listed in Annex 2 of the Government Decree No. 821/2021 (in Hungarian)
2024	8.4	Min. 6.1	0.5	

Source: FAS Budapest

i) Ireland

	Overall Percentage (% vol)	Annex IX biofuels (% cal)	Multiple Counting
2022	15		x2 for Annex IX biofuels; x4 for renewable electricity in road, x1.5 in train; x1.2 for aviation and maritime fuels
2023	17	0.3	
2024	21	0.3	
2025	25	1	
2026	29	1	
2027	34	1	
2028	39	1	
2029	44	1	
2030	49	3.5	

Source: FAS London and ePure

j) Italy

	Overall Obligation (%)	Traditional Obligation (%)	Advanced Biofuels Obligation (%)	Bioethanol Obligation (%)	Advanced Biomethane Quota (%)	Advanced Biofuels Other Than Biomethane Quota (%)
2023	10	6.6	3.4	0.5	2.3	0.05
2024	10.8	6.6	4.2	1	2.9	0.05
2025	11.7	6.8	4.9	3	3.5	0.05
2026	12.6	7.1	5.5	3.4	3.9	0.05
2027	13.4	7.3	6.1	3.8	4.3	0.05
2028	14.3	7.6	6.7	4.2	4.8	0.05
2029	15.2	7.8	7.4	4.6	5.2	0.05
2030	16	8	8	5	5.7	0.00

Source: FAS Rome, based on a decree dated March 16, 2023, amended by a decree dated October 20, 2023, issued by Italy's Ministry of Environment and Energy Security

Table 15: Biofuel mandates in the EU for selected member states – continued

k) The Netherlands

	Overall Percentage (% cal)	Of which advanced Annex IX-A biofuels (% cal)	Cap on conventional crop-based biofuel (% cal)	Multiple counting
2022	17.9	1.8	1.4 0 for Biofuels made from palm and soy, except for certified low-ILUC-risk feedstock	Annex IX A and B: x 1.6 Electricity: x 4 Gaseous fuels: x 2 Maritime: x 0.8 Aviation: x 1.2
2023	18.9	2.4		
2024	**28.4**	**2.9**		
2025	28.4	3.6		
2026	28.4	4.2		
2027	28.4	4.9		
2028	28.4	5.6		
2029	28.4	6.3		
2030	29	7		

Source: FAS The Hague based on ePURE

l) Polen

	Overall Percentage (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Double counting
2023	8.9	5.2	3.2	Yes
2024	**9.1**	**5.2**	**3.2**	
2025	9.2	5.2	4.59	

Source: FAS Warsaw based on the Polish Act on Bio-components and Liquid Biofuels as amended by the Polish Parliament in January 2024.

m) Portugal

	Overall Percentage (% cal)	Biodiesel (% cal)	Bioethanol/ ETBE (% cal)	Advanced Biofuels (% cal)	Cap on conventional crop-based biofuel (% cal)	Double counting
2022	11	-	-	0.2	7[1)]	Yes
2023	11.5			0.7		
2024	**11.5**			**0.7**		
2025–2026	13			2		
2027–2028	14			4		
2029–2030	16			7		

Sources: FAS Madrid based on Consumption mandates: Decree-Law 117/2010, Decree-Law 69/2016, Law 42/2016, Budget Law for 2018 and 2019 and Decree-Law 8/2021 as amended by Rectification Declaration 9-A/2021, Decree-Law 84/2022, and Decree-Law 23/2023. Double counting: Decree-Law 117/2010 and Annex III in Implementing Order 8/2012

1) Food-based biofuels are capped at 2020 levels up to one percent higher, but with a maximum cap of seven percent for each MS.

Source for Table 15 and further information:
GAIN Report Biofuel Mandates in the EU by Member State - 2024
(No. E42023-0023, published 27 June 2024, author: Sabine Lieberz), see also *bit.ly/4fe0Xjc*

Table 15: Biofuel mandates in the EU for selected member states – continued

n) Spain

	Overall Percentage (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Advanced Biofuels (% cal)	Cap on crop-based biofuels (% cal)	Double counting
2022	10	-	-	0.2	7	
2023	10.5	-	-	0.3	3.5	
2024	**11**	**-**	**-**	**0.5**	**3.1**	**Yes**
2025	11.5	-	-	1	2.6	
2026–2029	12	-	-	1.25	2.6	
2030	14	-	-	3.5	2.6	

Source: FAS Madrid based on Royal Decree-Law 4/2013 , Royal Decree 1085/2015, Royal Decree 376/2022, and Ministerial Order TED 1342/2022. Note: Resolution of 29 of September 2021 established a 3.1 percent cap on high ILUC-risk biofuels as of 2022.

Penalties

Those failing to meet the mandates are sanctioned with the following penalties:

Year	Penalty
Since 2022	1,623 Euros per missing certificate (each certificate equals one Ktoe.)

Source: FAS Madrid based on Resolution of 17 of December of 2021 by the Ministry for Ecological Transition and Demographic Challenge.

o) Sweden

	GHG Reduction Target	
	Gasoline (%)	Diesel (%)
2022	7.8	30.5
2023	7.8	30.5
2024-2026	**Frozen at 6**	**Frozen at 6**
2027 onwards	-	-

Source: FAS The Hague based on ePURE

A change in government led to the cutting of mandate obligation rates significantly. The Swedish Parliament approved a government proposal for a sharp reduction in the greenhouse quota in road transport from January 1, 2024, and an abolishment of the quota from 2027.

Crop-based biofuels:

- No explicit targets or active measures to limit crop-based biofuels.
- High-ILUC-risk biofuels cannot be counted towards the GHG-reduction quota except if certified as low-ILUC-risk, but they may be used in high-blend biofuels not included in the reduction quota for petrol and diesel.

Tables BLE Evaluation Report 2022

Table 16: Germany: Biofuel feedstocks in terajoules (TJ) [1]

Fuel type	Bioethanol			Biodiesel (FAME)		
Quota year	2020	2021	2022	2020	2021	2022
Feedstock						
Waste/Residual	1,661	1,748	1,230	32,975	28,881	41,162
Ethiopian mustard				73	51	147
Cereal whole plant						
Fodder beets						
Grass/arable grass						
Barley	1,034	977	655			
Maize	17,367	14,721	16,526			
Palm oil				22,216	28,520	9,267
Rapeseed				28,274	22,084	22,259
Rye	2,111	4,077	1,001			
Soy				1,994	4,612	8,679
Sunflowers				3,897	629	1,138
Triticale	1,301	1,401	2,532			
Wheat	3,562	3,890	4,456			
Sugar cane	2,062	2,967	4,131			
Sugar beet	429	877	423			
Total	**29,528**	**30,656**	**30,954**	**89,429**	**84,776**	**82,652**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding

Table 17: Germany: Biofuel feedstocks in 1,000 t[1,2]

Fuel type	Bioethanol			Biodiesel (FAME)		
Quota year	2020	2021	2022	2020	2021	2022
Feedstock						
Waste/Residual	63	66	46	882	772	1,101
Ethiopian mustard				2	1	4
Cereal whole plant						
Fodder beets						
Grass/arable grass						
Barley	39	37	25			
Maize	656	556	624			
Palm oil				594	763	248
Rapeseed				757	591	596
Rye	80	154	38			
Silage maize						
Soy				53	123	232
Sunflowers				104	17	30
Triticale	49	53	96			
Wheat	135	147	168			
Sugar cane	78	112	156			
Sugar beet	16	33	16			
Total	**1,116**	**1,158**	**1,170**	**2,393**	**2,267**	**2,212**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding
[2] The conversion into tonnage was made on the basis of the quantity data

Biomethan			HVO			Vegetable oil			
2020	2021	2022	2020	2021	2022	2020	2021	2022	Quota year
									Feedstock
1,885	2,750	4,678	9,230	6,659	16,801				Waste/Residual
									Ethiopian mustard
10	45	21							Cereal whole plant
2	1								Fodder beets
10	14	4							Grass/arable grass
									Barley
643	610	82							Maize
			36,065	13,066	4,049	28	8	1	Palm oil
			10			26	30	34	Rapeseed
	26								Rye
									Soy
			694		142			3	Sunflowers
									Triticale
									Wheat
									Sugar cane
27	32	<0.5							Sugar beet
2,577	**3,477**	**4,786**	**45,999**	**19,725**	**20,991**	**54**	**38**	**38**	**Total**

Biomethan			HVO			Vegetable oil			
2020	2021	2022	2020	2021	2022	2020	2021	2022	Quota year
									Feedstock
38	55	94	212	153	385				Waste/Residual
									Ethiopian mustard
0.2	1	<0.5							Cereal whole plant
0.04	0.01								Fodder beets
0.2	0.3	0.3							Grass/arable grass
									Barley
13	12	2							Maize
			827	300	93	0.8	0.2	<0.5	Palm oil
						0.7	1	1	Rapeseed
	1								Rye
									Silage maize
									Soy
			16		3				Sunflowers
									Triticale
									Wheat
									Sugar cane
1	1	<0.5							Sugar beet
52	**70**	**96**	**1,055**	**453**	**482**	**1**	**1**	**1**	**Total**

Table 18: Germany: Biofuel feedstocks by origin in terajoules[1]

Region	Africa			Asia			Australia		
Quota year	2020	2021	2022	2020	2021	2022	2020	2021	2022
Feedstock									
Waste/Residual	648	644	864	17,842	15,428	30,485	14	30	122
Ethiopian mustard									
Barley									
Cereal whole plant									
Fodder beets									
Grass/arable grass									
Maize									
Palm oil				52,975	38,936	12,667			
Rapeseed				110	11	11	4,214	3,115	6,173
Rye									
Silage maize									
Soy									<0.5
Sunflowers							2		
Triticale									
Wheat									
Sugar cane									
Sugar beet									
Total	**648**	**644**	**864**	**70,927**	**54,376**	**43,163**	**4,229**	**3,144**	**6,297**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding

Table 19: Germany: Biofuel feedstocks by origin in 1,000 t[1,2]

Region	Africa			Asia			Australia		
Quota year	2020	2021	2022	2020	2021	2022	2020	2021	2022
Feedstock									
Waste/Residual	17	17	23	451	393	764	0.4	1	3
Ethiopian mustard									
Barley									
Cereal whole plant									
Fodder beets									
Grass/arable grass									
Maize									<0.5
Palm oil				1,285	992	323			
Rapeseed				3	0.3	<0.5	113	83	165
Rye									
Silage maize									
Soy									<0.5
Sunflowers							0,04		
Triticale									
Wheat									
Sugar cane									
Sugar beet									
Total	**17**	**17**	**23**	**1,739**	**1,385**	**1,087**	**113**	**84**	**168**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding
[2] The conversion into tonnage was made on the basis of the quantities stated in the certificates

Europe			Central America			North America			South America			
2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022	Quota year
												Feedstock
24,812	22,271	30,175	15	28	26	1,681	777	1,239	749	924	1,605	Waste/Residual
						27	1	6	46	50	141	Eth. mustard
1,034	977	655										Barley
10	45	21										Cereal wh. plant
2	1	1										Fodder beets
10	14	4										(arable) Grass
18,007	15,200	15,772				0.4	54	53	2	76	782	Maize
			4,842	2,571	550				492	87	123	Palm oil
22,160	17,255	15,905				1,827	1,604	182		129	23	Rapeseed
2,111	4,103	1,001										Rye
643												Silage maize
70	299	331	2					4	1,922	4,313	8,343	Soy
4,589	629	1,284					0.1					Sunflowers
1,301	1,401	2,532										Triticale
3,562	3,890	4,456										Wheat
			688	539	1,641				1,375	2,428	2,491	Sugar cane
456	908	423										Sugar beet
78,126	**66,992**	**72,559**	**5,547**	**3,138**	**2,217**	**3,535**	**2,436**	**1,483**	**4,586**	**8,007**	**13,508**	**Total**

Europe			Central America			North America			South America			
2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022	Quota year
												Feedstock
665	590	775	0.4	1	1	41	20	44	20	25	46	Waste/Residual
						1	0.01	<0.5	1	1	4	Eth. mustard
39	37	25										Barley
0.2	1	<0.5										Cereal wh. plant
0.04	0.01											Fodder beets
0.2	0.3	<0.5										(arable) Grass
669	564	595				0.01	2	2	0.1	3	30	Maize
			125	69	15				13	2	3	Palm oil
593	462	426				49	43	5		3	1	Rapeseed
80	155	38										Rye
												Silage maize
2	8	9	0.04					<0.5	51	115	223	Soy
120	17	34					0.002					Sunflowers
49	53	96										Triticale
135	147	168										Wheat
			26	20	62				52	92	94	Sugar cane
17	34	16										Sugar beet
2,368	**2,067**	**2,181**	**152**	**90**	**77**	**91**	**65**	**51**	**137**	**242**	**400**	**Total**

Table 20: Germany: Total biofuel feedstocks[1]

	[TJ]			[kt]		
	2020	2021	2022	2020	2021	2022
Feedstock						
Waste/Residual	45,761	40,102	64,516	1,195	1,047	1,655
Ethiopian mustard	73	51	147	2	2	4
Barley	1,034	977	655	39	37	25
Cereal whole plant	10	45	21	0.2	1	<0.5
Fodder beets	2	1		0.04	0.01	
Grass/arable grass	10	14	4	0.2	0.3	<0.5
Maize	17,367	15,331	16,608	656	568	626
Palm oil	58,308	41,594	13,340	1,423	1,063	341
Rapeseed	28,310	22,113	22,293	757	592	597
Rye	2,111	4,103	1,001	80	155	38
Silage maize	643			13		
Soy	1,994	4,612	8,679	53	123	232
Sunflowers	4,591	629	1,284	120	17	34
Triticale	1,301	1,401	2,532	49	53	96
Wheat	3,562	3,890	4,456	135	147	168
Sugar cane	2,062	2,967	4,131	78	112	156
Sugar beet	456	908	423	17	34	16
Total	**167,597**	**138,737**	**140,090**	**4,617**	**3,950**	**3,988**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding

Table 21: Biofuels whose feedstock originates from Germany [TJ]*

Biofuel type	Bioethanol			Bio-LNG		Biomethan			CP-HVO
Quota year	2020	2021	2022	2021	2022	2020	2021	2022	2020
Feedstock									
Waste/Residual	303	305	31	48	16	1,858	2,484	4,249	
Barley	884	856	568						
Cereal whole plant						10	44	21	
Fodder beet						2	1		
Grass/arable grass									
Maize	109	119	216				610	82	
Rapeseed									4
Rye	537	1,348	488				26		
Silage maize/whole plant						643			
Sunflowers									
Triticale	145	237	441						
Wheat	117	449	723						
Sugar beet	392	771	419			27	32	<0.5	
Total	**2,487**	**4,086**	**2,886**	**48**	**16**	**2,540**	**3,196**	**3,196**	**4**

Source: BLE (report online at *www.ufop.de/ble*)
* Differences in totals are due to rounding

Table 22: Germany: Emissions and emission savings of biofuels[1]

	Emissions [t CO_{2eq} / TJ]			Savings [%][2]		
	2020	2021	2022	2020	2021	2022
Biofuel type						
Bioethanol	7.44	9.18	9.39	92.02	90.21	89.94
Bio-LNG	13.70	6.79	–7.33	85.44	92.78	107.79
Biomethan	8.94	5.86	–25.47	90.50	93.77	127.07
Biomethanol	33.50	33.50	33.48	64.09	64.09	64.12
Btl-FTD		20.07	19.14		78.49	79.49
FAME	17.97	16.86	14.93	81.11	82.33	84.31
HVO	19.82	16.02	12.24	79.15	83.15	87.13
CP-HVO	17.69			81.40		
Vegetable oil	31.60	31.73	33.06	66.78	66.70	65.24
Weighted average of all biofuels	**16.46**	**14.77**	**11.98**	**82.63**	**84.45**	**87.35**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding
[2] Savings compared to fossil fuel benchmark 94.1 g CO_{2eq}/MJ

Biodiesel (FAME)			HVO		Plant oil			Total			Biofuel type
2020	2021	2022	2021	2022	2020	2021	2022	2020	2021	2022	Quota year
											Feedstock
7,759	7,683	8,711	10	11				9,920	10,531	13,017	Waste/Residual
								884	856	568	Barley
								10	44	21	Cereal whole plant
								2	1	1	Fodder beet
										2	(arable) Grass
								109	729	298	Maize
11,396	9,380	5,036			26	30	28	11,426	9,409	5,065	Rapeseed
								537	1,374	488	Rye
								643			Silage maize/whole plant
	2	8							2	8	Sunflowers
								145	237	441	Triticale
								117	449	723	Wheat
								419	803	419	Sugar beet
19,155	**17,065**	**13,755**	**10**	**11**	**26**	**30**	**28**	**24,212**	**24,435**	**21,050**	**Total**

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