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

BIODIESEL & CO. 2021/2022

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

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Biodiesel & Co.

Since the Coalition Agreement was signed in early December 2021, Germany has for the first time been governed by a tripartite alliance – the SDP, the Green Party and the FDP ("traffic light coalition"). The UFOP welcomed the announcement in the Coalition Agreement, aligning future political measures with the challenges of climate change and hence with the central objective of the Paris Agreement, concerning the limiting of global warming to a maximum of 1.5 degrees Celsius. The UFOP had assumed a clear position on the matter: "This ambitious target calls for a balanced and evolutionary approach to funding policy, by developing the existing legal and funding policy frameworks and measures in a way that is open to technology and raw materials, and market access is opened up primarily to innovations that serve climate protection in the short term". Instead, the new Federal Government is also focusing its decarbonisation strategy on the electrification of the building and transport sectors, questionable in terms of climate policy. This strategy is to be driven forwards with acquisition premiums for heat pumps and battery-powered vehicles, as well as the expansion of the charging column infrastructure. An integrated approach, which includes options that have been in place for years, and also relevant creating additional value throughout the commodity chain of bioenergy production and use, is not being pursued. During the year under review, the bioenergy sector as a whole had to invest a great deal of "energy", simply with a view to preserving what already exists. In the case of alternative fuels, this concerns primarily biofuels from cultivated biomass and how they are restricted by the legally prescribed, so-called capping limit and, in principle, the perspective of the internal combustion engine. Over time, this transformation process will essentially be about recognising the contribution of alternative low-carbon fuels overall to the defossilisation of the existing fleet, as at least 35 million internal combustion engine vehicles will still be registered in 2030. The new German government particularly wants to promote sector coupling in order to leverage synergy effects. This welcome approach must not only take into account the production of renewable electricity and its link, both in terms of energy and economically, to electricity, heat, mobility and industrial processes. It must also include the revenue-generating value creation effects, associated with biofuels from domestic raw material cultivation, in raw material processing (protein feed, glycerine, etc.) and application, not least as a result of the extensification of farming envisaged in the Coalition Agreement. The sector coupling approach is to be further or holistically developed with regard to biomass and its application diversity for the use of by-products, in the sense of a bioeconomy networked in the agricultural sector.

Opening balance sheet for bioenergy disappointing / REPowerEU Plan

The "opening balance sheet on climate protection", presented by the Federal Minister of Economic Affairs and Climate Action (BMWK), Dr. Robert Habeck at the start of his term of office, highlighted the deficits in the expansion of renewable energies in recent years as one of the reasons for the failure to meet climate protection targets. Consequently, emissions reductions would have to be tripled, from the current average of 15 million tonnes CO_2eq to 36 to 41 million tonnes CO_2eq per annum. The unilateral orientation of the natural gas supply towards Russian natural gas is now also having its revenge. Natural gas, favoured as a bridging solution, has had its day; the start of the war in Ukraine put the brakes firmly on climate protection. Coal-fired power plants need to be recommissioned to compensate regional and structural deficits in the energy supply and the additional demand (heat pumps, e-mobility). The fan heater sell-off is causing the utility companies some concern, because the additional electricity requirement this creates is estimated to be 8 GW. Although the immediate programme of the BMWK emphasises the fundamental cross-sector importance of biomass, it does restrict competition for material usage and carbon sequestration in the soil (sink function). Reference is made to the sustainably available biomass potential at 1,000 to 1,200 PJ (approx. 24 to 29 million tonnes of equivalent oil). The immediate programme also announces that the sustainable biomass strategy set out in the Coalition Agreement will be developed and is expected to be available in draft form in the second half of 2022. The result of a comprehensive departmental vote will then be adopted by the Federal Cabinet in spring 2023. This is the backdrop against which the UFOP recalled the pioneering role of biofuels in terms of the legally anchored sustainability certification, a process that is set to be expanded and tightened from 2022 onwards. The reference to the competition for material usage is incomprehensible. Even at historic lows in producer prices for rapeseed and grain crops, there was no additional demand for material usage. In its progress report entitled "European Bioeconomy Policy: Fact finding and future development" (COM(2022) 83 final) (*bit.ly/COM283*), the EU Commission puts the problem of the national or EU bioeconomy strategy in a nutshell: The scale of the substitution of fossil-based inputs for chemical platform products and polymers for basic materials is currently small and has tremendous potential for the future. Market access remains difficult due to the lack of a comprehensive regulatory approach and the great discrepancy between the current cost of bio-based products and consumers' willingness to pay. Appropriate funding and political pull effects are needed to cross the "valley of death", which is especially wide for innovations in the bio-economy". The question of perspectives instead of the energy-related use of renewable resources was once again discussed in detail in the June meeting of the UFOP expert commission "Biofuels and Renewable Resources". The "Renewable Carbon Initiative" (*bit.ly/novaRCI*) was presented. According to the Nova Institute in Cologne, the chemical industry's need for conversion from fossil to renewable carbon will increase globally from the current level of approx. 450 million tonnes to 1 billion tonnes of "sustainable C" in 2050. This also opens up development prospects for the biofuel industry, currently with bio-naphtha from HVO plants and rapeseed oil methyl ester as the basis for basic chemicals.

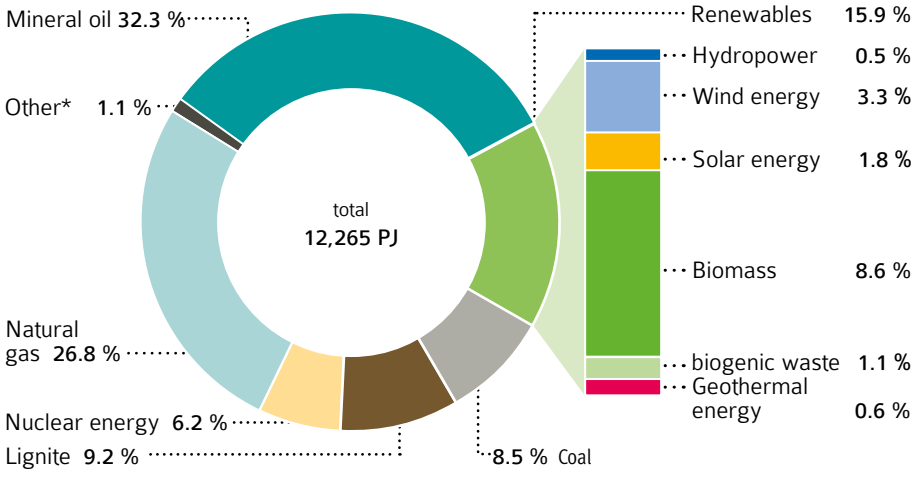
The bioeconomy strategy pursued to date has not left a trace on agriculture in this country. This is because the industry is geared to the world market for biobased raw materials. The UFOP reiterated this statement, referring to the need to align the biomass or bioeconomy strategy with the requirements and systematics of sustainability certification for biofuels as a "blueprint". This calls for a proper assessment of the raw material potential of biomass. There is concern, however, that even coordinating the definition and the geographical classi-

fication (imports?) for the concept of potential will lead to intensive and time-consuming discussions in the inter-ministerial working group (IMAG). The current intensive "supply discussion" concerning the consideration of the energy-related and/or material use or food use of cultivation-based biomass raw materials, including corn for biogas production, is a determining factor due to the war in Ukraine.

The new federal government is adopting a "top down" approach for its measures. No constructive dialogue with the associations of the bioenergy industry was initiated even when Russia began to cut gas supplies so severely that all EU member states are now called upon to close ranks over this historic challenge. Over the years, the dependence of Germany and the European Union as a whole has noticeably increased without any fallback options being developed at the pace required and urged by economists and climate scientists, as mandated by the greenhouse gas budget associated with the 1.5 degree target. Consequently, the scarce resource of natural gas has to be managed. At the end of July 2022, the Council of Energy Ministers agreed on a savings target of 15 %. However, because the decision is based on compromises and concessions to member states, such as Spain and France (wanting to save less than 15 %), there can be no question of a solidarity-based savings target. The problem differs considerably from member state to member state. President of the European Commission Ursula von der Leyen was therefore unable to push ahead with the proposal that the Commission be empowered to trigger an "EU alert" to force member states to make savings. "Saving" is where solidarity stops; the member states want to determ"ine the "how" themselves. Germany, the EU's largest economy and reliant on Russian gas, feels compelled to significantly step up its efforts to save, store and finance gas, including in the form of the gas levy introduced on October 1, 2022. "Energy poverty" affects low-income households, but with no funding framework to cushion the impact through the EU Climate and Social Fund. Member states are currently left to their own devices on this issue. The sharply rising costs for fossil energy already anticipate what, as a result of the rising CO_2 price of fossil fuels, was proposed by the EU Commission as a compensatory measure in the "fit-fo-55" raft of measures only from 2026 or was discussed in the Council and EU Parliament for the final vote in the trilogue procedure. The member states need to finance this situation themselves, in this country for example with direct aid and in the form of a financial contribution to the high gas prices to be paid by all households to which gas is supplied from October. With the exception of biomethane, bioenergy has been practically ignored as a versatile and, above all, flexible contribution to the security of the energy supply, although bioenergy accounts for more than 50% of the total contribution of renewable energies to primary energy consumption (2021) (*bit.ly/FNRpec21*).

The EU Commission presented its REPowerEU plan in mid-May 2022. (*bit.ly/REPower*). This plan envisages increasing the use of bio-methane to around 35 billion m^3 by 2030 as a substitute for Russian natural gas. For bio-methane from cultivated biomass for biofuel use, the EU capping limit of max. 7% remains unchanged. The plan calls for the additional biogas volumes to be produced primarily from agricultural waste and raw materials. However, this objective is conditional upon the member states developing appropriate national strategies and boost biogas production with concrete investment aid. At this point, the Commission's plan seemed to fizzle out. The German Biogas Association (FvB) went on to emphasise the potential in biogas production that can be mobilised at short notice. For example, the existing biogas plant fleet of more than 9,000 plants in Germany alone could increase production by 20 %, to a total of 19 terawatt-hours (TWh) of gas (approx. 1.6 million tonnes of oil equivalent) or 7 TWh of electricity, which would be equivalent to almost 4 percent of Russia's natural gas imports before the outbreak of war in Ukraine. Finally, Federal Minister for Economic Affairs Dr Robert Habeck announced that the contribution of biogas production would be expanded by temporarily suspending the plant-specific limited maximum production of biogas. With regard to the use of raw materials, the BMWK is guided by the Commission's stipulation that only waste and residual materials are permitted. This leaves corn out as the most efficient energy supplier and "storage" (silo). Whether, and if so how, other EU member states will increase biogas production was not known at the time of this report going to press.

Fig. 1: Primary energy consumption 2021

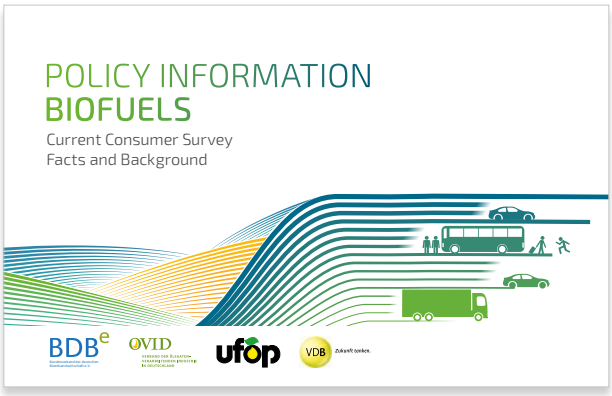


Source: FNR according to AGEB, AGEE-Stat (March 2022)
* incl. power exchange balance

Biofuels – quo vadis?

Federal Minister of Agriculture Cem Özdemir missed the opportunity not only at the beginning of his term in office, but also with the EU Commission's REPowerEU plan, to position sustainably certified bioenergy as an economic sector with prospects in terms of energy and climate policy. After all, with more than 100,000 jobs, this sector represents a considerable value-added factor for agriculture and forestry. According to the Center for Solar Energy and Hydrogen Research (ZSW), the biofuel sector is the largest economic "driver" in the

renewable energy sector in 2021, with 20,000 jobs and total value-added effects: approx. 5 billion EUR. Bioenergy is known to be the only sector which, with the transposition of the Renewable Energy Directive 2018/2001 (RED II) into national law on July 1, 2022, will have to undergo comprehensive sustainability certification starting at the cultivation site (cultivated biomass/residues) for virtually all biomass raw materials and geographic origins, and regardless of the aggregate state and end use of the bioenergy. In the period under review, the EU Commission had approved the correspondingly supplemented certification systems, including REDcert-EU (*redcert.org/en*) again and for the first time the "SURE certification system" (*sure-system.org/en*) for electricity and heat production. In December 2021, the regulations on "Requirements for sustainable production of biofuels or biomass for power generation" (Biokraft-NachVO / BioSt-NachVO) were finally published by the Federal Ministry for the Environment. It should be borne in mind at this juncture that the RED II was published in the Official Journal of the EU in December 2018. Consequently, the process of amending the certification systems to implement RED II is not yet complete. At the end of June 2022, the Implementing Regulation (2022/996) (*bit.ly/COM996*) on the "Rules for the verification of sustainability criteria and the criteria for greenhouse gas savings and low risk of indirect land use change" entered into force. The EU Commission is concretising and expanding the certification scope to include renewable fuels of non-biogenic origin (e-fuels), recyclable carbon for fuel production, and biofuels with a low risk of changes to indirect land use. The requirements for a mass balance system through to requirements for an initial "on-site audit" are set out in concrete terms. The "definitions" enshrined in Art. 2 make an important contribution to the harmonisation of implementation in voluntary certification schemes within and outside the European Union. The UFOP believes this to be fundamentally necessary if, in accordance with the RED II requirement, the Union database repeatedly demanded by UFOP is introduced in order to exclude, as far as possible, possible double accounting of sustainability certificates and cases of fraud due to incorrect declaration of the biomass raw material. This is necessary because, as a result of the capping limit for biofuels from cultivated biomass (see Annex Tab. XX), which is generally set at below 7% in the member states, the blending proportions for biofuels from residues (according to Annex IX Part A of RED II) have to be increased at the same time. In addition, it is expected that as quota obligations increase (see also aviation), the raw material demand for waste oils and fats (see import statistics Annex Tab. 19) as well as the import volume of biofuels produced from these raw materials will also increase. It should be noted in particular that Annex V of the Regulation sets out the internationally associated "Methodology for determining emission savings from soil carbon accumulation resulting from improved agricultural management practices". It describes in detail which management measures are accepted for soil cultivation, crop rotation expansion, etc., which conditions need to be taken into account regarding the determination and measurement of the carbon content in the soil, including the calculation formula. Hence, the regulation sets out the system principles for offsetting soil carbon enrichment and is clearly being implemented in parallel with so-called "carbon farming", an initiative likewise being promoted by the EU Commission. The UFOP is expecting this regulation to help set the expanded and tightened sustainability certification requirements for biofuels as a whole on a comprehensive "level-playing-field" so as to create, at the same time, fairer framework conditions in international trade and for competition. The UFOP had repeatedly emphasised this unique selling point of biofuel sustainability certification in its public relations work. Crucially, however, it must noted that the associations of the bioenergy and especially the biofuel industry are now faced with the fundamental challenge of communicating what has been achieved to the politicians themselves: "Policy information on biofuels" for the parliamentary elections. (mini image of the brochure?(https://www.ufop.de/files/1816/3638/1098/Policy_Information_2021.p). This relates not only to the certification route and proof of greenhouse gas reduction as a "unique selling point", but also to the additional ecosystem service provided by the type of raw material. In a positive sense, this is particularly true of rapeseed and rapeseed oil as by far the most important "European" source of raw materials (Tab. 21). The rapeseed oil demand of approx. 6 million tonnes corresponds to a cultivation area of 4 to 4.5 million hectares. Cultivation takes place in crop rotation on the same area every three to four years at the earliest. In the chapter headed "Complete supply with rapeseed", the UFOP reported on the overall performance of "rapeseed as a cultivated crop" in the "UFOP Cultivated Plants Magazine" (*only in German: www.ufop.de/kpm22*), which was displayed in the ICEs on selected routes to coincide with the rapeseed flowers blooming cycle. The feed protein produced by biofuel production in the EU (approx. 9 million tonnes of rapeseed meal) considerably reduces the need for imported soybean meal and hence the pressure on land in producing countries such as Argentina and Brazil. Rapeseed meal production from biodiesel production corresponds to an "unneeded" cultivation area for soy of approx. 2.4 million hectares. Rapeseed meal from biofuel production



is therefore also certified as sustainable in terms of its regional origin and has ousted soybean meal from the feeding trough in dairy farming as a "deforestation-free" protein source. Biofuel production and rapeseed cultivation for protein feed production are directly linked economically, and at the same time provide the basis for the development of the UFOP's "10 + 10 strategy". The aim of the strategy, measured against the requirements of crop rotation and regional site conditions, is to exploit the regionally site-adapted cultivation potential for rapeseed and grain legume cultivation (lupin, pea, field beans and soy) in this country and hence to provide the raw material basis for

Fig. 2: Biomass raw materials for biodiesel (FAME) + renewable diesel/HVO (1,000 MT)

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Rapeseed oil	6,300	6,300	5,850	6,300	6,000	6,200	5,600	5,900	6,000
UCO	1,570	1,950	2,200	2,400	2,600	2,980	3,330	3,230	3,700
Palm oil	2,060	2,000	2,020	2,425	2,330	2,250	2,620	2,550	1,800
Soybean oil	860	500	550	700	1,200	1,290	1,160	930	750
Animal fats	950	1,200	1,000	940	1,050	1,130	1,060	1,150	1,150
Sunflower oil	320	210	250	240	240	260	240	210	180
Other (pine oil, tall oil, free fatty acids)	310	415	304	429	607	768	602	645	714

Source: USDA/FAS GAIN-report „Biofuel Annual", 2022-07-13

www.fas.usda.gov/data/european-union-biofuels-annual-2

the supply of feed protein, in the future also for human nutrition (including rapeseed protein). Since the economy in particular determines the crop type composition in the crop rotation, linking rapeseed cultivation to biodiesel production is key to implementing this strategy. Irrespective of this, it is ultimately the development of prices and, in particular, the willingness to pay that determine whether rapeseed oil is used for energy or for human nutrition. Consequently, the food market will always win this "price competition".

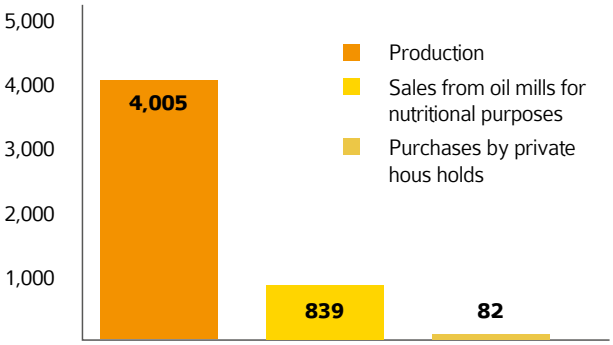
War in Ukraine is driving the food vs. fuel debate

The UFOP has repeatedly emphasised this observation in its public relations activities in view of the blocked ports in Ukraine due to the war. The supply of crude sunflower oil destined for further processing in the EU did indeed collapse, resulting in the "apparent shortage" this communicated causing stock-piling and empty shelves, even in the case of rapeseed oil. However, referring to the interchangeability of these vegetable oils, the UFOP stressed that there is no cause for concern when it comes to edible oils, especially since approx. 7.2 million tonnes of rapeseed oil are produced from a total EU harvest of some 18 million tonnes. In this country, oil mills produced a good 4.7 million tonnes of vegetable oils in 2021, including at least 4 million tonnes of rapeseed oil. Around 234,000 tonnes were produced in 2021 than in the previous year.

Of this amount, 839,000 tonnes were sold for the production of food (edible oil, mayonnaise, etc.). The majority goes into biodiesel production, and rapeseed oil is also exported. However, the Ukraine war ignited a much more intense "food vs. fuel debate" compared to 2008. This is because Ukraine is a major global exporter of wheat to African countries and, as a result of climate change and armed conflicts, the population in southern countries is particularly affected by famines. Millions

Fig. 3: Private households account for 2 % Germany's overall consumption of rapeseed oil

Production, supply and consumption of rapeseed oil in 1,000t



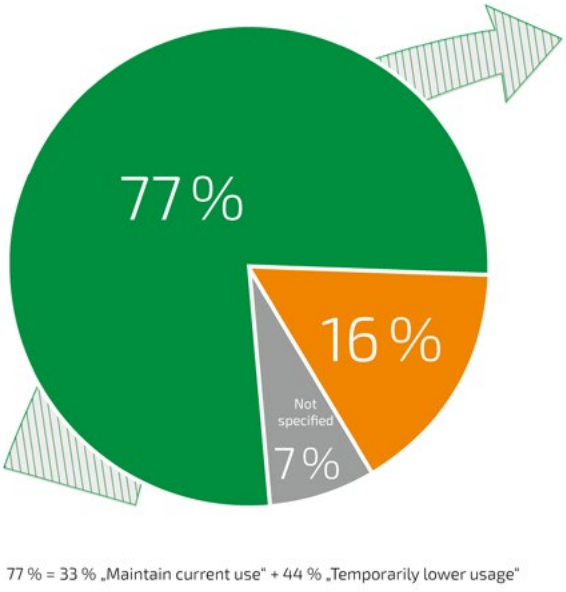
Source: BLE, AMI according to GfK consumer panel
Further information: *www.ufop.de/pm220502*

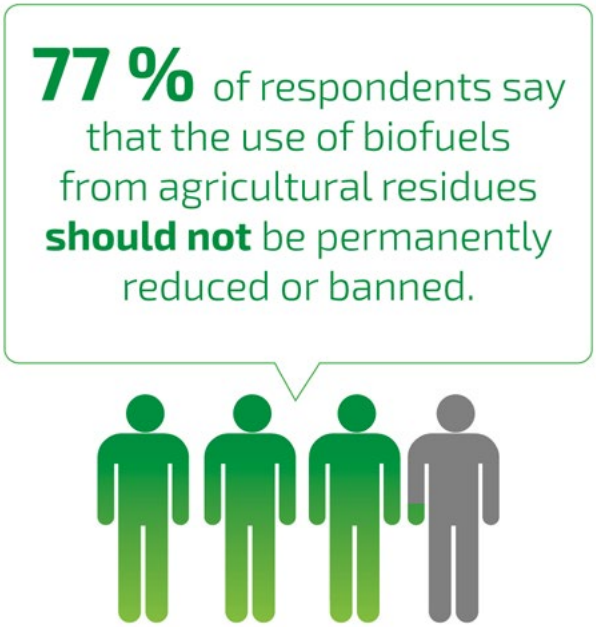
of tonnes of wheat cannot be shipped, while the next crop has to be harvested and the fields replanted. Even before the Ukraine war, sharply increased wheat prices made it difficult for international aid organisations, which in turn depend on solidarity-based financing, especially from industrialised countries in the northern hemisphere, to purchase wheat. The lack of solidarity is a long-standing fundamental problem in reducing famine and resurfaced as a consequence of the war. The president of Bread for the World, Dagmar Purin, aptly described the situation by saying: The funds required amount to 22 billion euro, and the G7 countries had pledged 4.7 billion euro; it's money we are lacking, not grain. In light of this, the national increase in aid from 0.43 billion to 0.88 billion euro promised by the German government is very welcome and

commendable. Overall, the environment in which biofuels from cultivated biomass are to continue to have merit could hardly be more complex. In view of the campaigns being pushed by certain environmental associations in the media, the UFOP also participated in the fact check prepared by the biofuel associations and sent to the press and politicians: "Biofuel as a crucial aspect of the security of supply" (see page 21). The clear objective was to objectify the public discussion. This information highlights the importance of biofuel use in Germany in terms of supply policy: In 2020, 4.5 million tonnes of biofuels, in volume terms, virtually replaced all imports of diesel fuel from Russia. Despite the negative campaigns by the environmental associations, around 77% of the population still supports the use of biofuels as a directly effective contribution to climate protection, according to the key findings of the survey commissioned by the UFOP and other biofuel associations.

Fig. 4: Survey result June 2022: Strong support for biofuels!

Question: Biofuels reduce CO_2 emissions, but in connection with the Ukraine crisis, agricultural raw materials are in particular demand. How should policy-makers react?





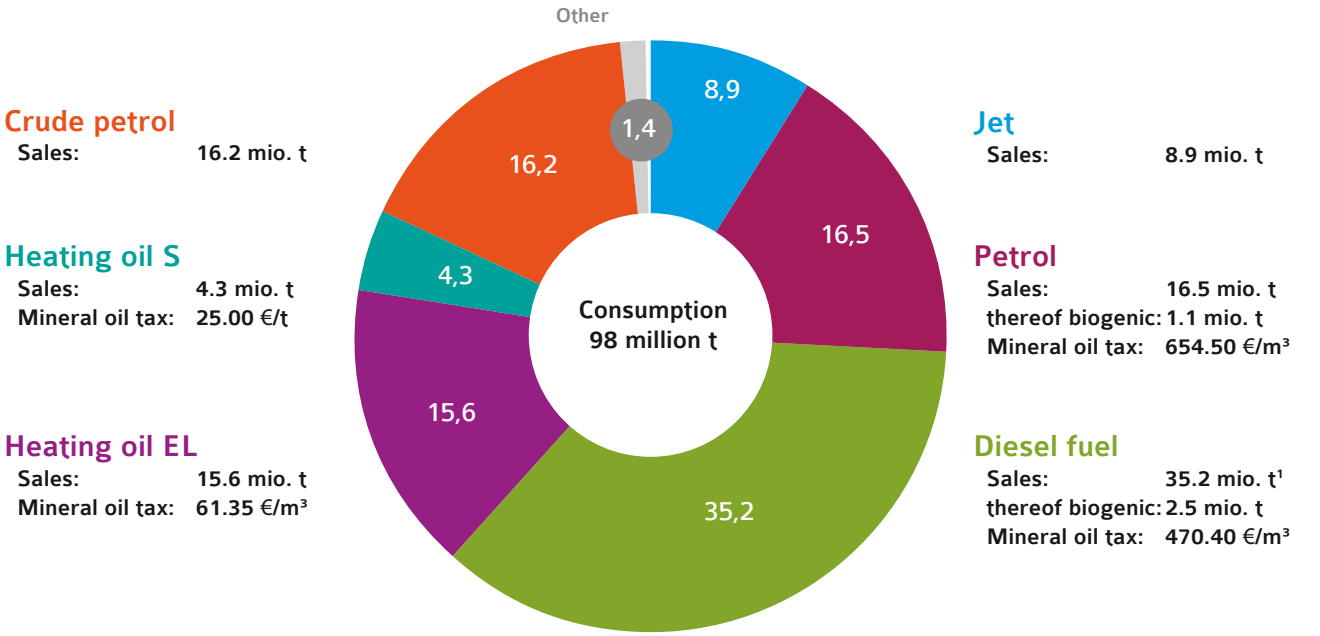
Source: KANTAR, Representative survey on biofuels 2022 (1,009 Respondents)

Federal Climate Change Act – transport sector falls short of target

The fifth "drought summer" in a row in Europe and the globally unmistakable consequences of climate change, especially in the southern hemisphere, underline the pressure for action and transformation for all sectors of the economy for a climate protection policy that is at best immediately effective. The greenhouse gas reduction targets have been made legally binding in the EU Climate Change Act with the resolution of the Council at the end of June 2021, and hence been increased from 40% to 55% for the EU 27 for the target year 2030. At national level, the stricter Federal Climate Change Act (KSG) sets a greenhouse gas reduction target of 65% by 2030 (see Fig. 12, p. 28 Annual Report 2020/2021), supplemented by the goal of climate neutrality in 2045 (EU: 2050). Fig. 5 shows the consumption of fossil fuels in Germany and hence the magnitude of the desired transformation process.

At national level, the Climate Change Act is intended to practically enforce target compliance. The sectors concerned have to comply with the greenhouse gas ceilings that are falling year on year. If the targets are exceeded, the competent Federal Ministry will need to propose additional measures for implementation immediately following review and resolution by the Federal Cabinet. To this end, the German Council of Experts on Climate Change (ERK) submitted its second audit report (*expertenrat-klima.de/en*) on the previous year's emissions data on April 13, 2022, in accordance with Section 12 of the KSG. The audit is based on the emissions report of March 15, 2022, prepared by the Federal Environment Agency (UBA) in accordance with the seven sectors as defined in the KSG. The Climate Council confirmed the calculation results and found that in 2021, the emission levels in the transport and building sectors were above the legally prescribed target. In 2021, the transport sector exceeded the specified emissions cap of 145 million tonnes of CO_2eq by 3.1 million tonnes CO_2eq. The target year 2030 envisages a maximum emission level of 85 million tonnes CO_2eq and underlines the pressure to act. With the goal of meeting the 2021 emissions cap, German Transport Minister Dr. Volker Wissing presented an "immediate programme to

Fig. 5: Mineral oil/biofuel use in Germany 2021



1) ca. 1.7 million t in agriculture and forestry

Source: en2x, TEC4Fuels, UFOP updated | July 2022

meet climate targets in transport" in July 2022. The individual measures must also be evaluated in terms of their direct contribution to greenhouse gas reduction: Establishment and expansion of refuelling and charging infrastructure for cars and commercial vehicles, promotion of efficient truck trailers, expansion of the cycle path network and public transport, promotion of digital "working from home" and raising the national GHG reduction rate by + 1 %, from 25 % to 26 % in 2030:

Fig. 6: Overview of the adjustment of the GHG reduction quota for the quota years 2025 to 2030

	2025	2026 2027	2028 2029	2030
Increase in the GHG reduction quota (%)	+0.25	je +0.50	je +0.75	+1.00

Source: *BMDV/evaluation of measures for an immediate programme pursuant to the KSG*

The UFOP believes that the arrangement and justification of the latter measure is of central importance. This also envisages the promotion of electricity-based fuels and progressive biofuels by supplementing the 10th BImSchV ("Fuel Quality Ordinance") with the fuel standard DIN EN 15940 for paraffinic fuels (E-Fuels/HVO). The scientific review concludes that increasing the GHG reduction rate by 0.25 % will result in an additional demand of 2.3 PJ (about 55,000 toe) in the 2025 quota year and 11 PJ (about 0.236 Mtoe) in 2030. Explicit reference is made in this raft of measures to the various compliance options, which include biofuels from human food and animal feed crops. However, these are limited in quantity by the national cap of 4.4 % according to the 38th BImSchV. Biofuels from residues, as well as waste oils and fats, as defined in Annex IX Parts A and B of RED II cannot replace these biofuel volumes since their availability is likewise limited, but are instead a supplement to increase the overall biogenic share in the diesel mix. The UFOP had therefore publicly suggested that diesel with higher biogenic contents such as, B30- or R33 (HVO 26 % + biodiesel 7 %) should be offered as "truck diesel" at public filling stations, in order to specifically consider heavy-duty traffic in particular in the greenhouse gas (GHG) reduction strategy. This is urgently needed because freight transport by road will continue to increase as a result of the overloaded rail network. In addition, it is an instant and above all physically effective measure in terms of climate protection. Biofuels are fully taxed and, unlike electricity for e-mobility, are not counted three-fold toward GHG quota compliance. However, they are not subject to the steadily increasing CO_2 price. Thus, with an increased biogenic content, a corresponding price advantage can be passed on to vehicle owners.

Due to an increase in the GHG quota, UFOP expects that the ramp-up in the production of synthetic fuels from renewable electricity (PtL) will have to begin in 2025. In a positive sense, the interested parties in the mineral oil industry and trade (*efuel-alliance.eu*) are required to create the corresponding production capacities (see above) by then. However, a future primarily electricity-based orientation of climate protection in transport also highlights the dilemma: the expansion of wind power and photovoltaic plants is lagging far behind the steadily growing additional energy demand of e-mobility on the road and for heat generation in buildings (heat pumps). Due to the "gas crisis", coal-fired power plants instead of gas-fired ones will have to be commissioned, and this will degrade the emission factor for electricity. The overall share of renewables in transport

fell from 7.6% to 6.8% in 2021 because sales of biodiesel/HVO fell significantly year-on-year by 0.9 million tonnes. In 2021, sales of electric passenger cars increased to approximately 0.62 million units (previous year: 0.31 million passenger cars). Some 26% of newly registered vehicles had an electric drive, half of which were fully electric. In view of the economic trend and the sharp slowdown in consumption, there are questions over whether this trend will continue. The reduction in production, along with other factors (delivery time, inflation trend), will slow the development of sales. The German government has decided that subsidies for plug-in hybrid vehicles will end at the end of 2022 and that the purchase premium for all-electric passenger cars will be reduced from the previous EUR 6,000 to EUR 4,500. Over the course of 2023, this amount is expected to decrease further to EUR 3,000.

Climate Council: Immediate programme inadequate

The report (*bit.ly/ERK_2022*) of the Council of Experts on Climate Change (ERK) on the evaluation of the measures for the emergency programme 2022 was available some six weeks after the immediate programme was presented. The following measures were rated as wholly inadequate. The Federal Ministry of Transport must immediately specify measures to ensure that the dated target is achieved. This fundamentally very stringent commitment is intended to prevent the commitments from not being met by 2030 as a result of insufficient measures. It is feared that otherwise, the remaining time corridor will see a pent up demand that can no longer be covered, according to the experts.

Federal Environment Minister Lemke wants to abolish biofuels

The future of biofuels from cultivated biomass is at stake because Germany is a key "driver" of strategy and policy change at the EU level. This explains the international interest in the initiative by German Environment Minister Steffi Lemke to gradually reduce biofuels from cultivated biomass and phase them out by 2030. The impetus is the debate about a food supply crisis triggered by the war in Ukraine and not always conducted in an appropriate manner. At the same time, prices for grain crops, oilseeds and vegetable oils temporarily reached heights not thought possible. With the harvest in the northern hemisphere, the price discussion has calmed down again as a result of the availability and price declines, but the accompanying food vs. fuel. vs. trough debate had left its mark. The BMUV had prepared a working paper with the aim of initiating the necessary departmental coordination as quickly as possible. The legal basis for the reduction to "0 %" is a corresponding authorisation in RED II. This requires an amendment in the "Ordinance on Further Provisions for the Further Development of the Greenhouse Gas Reduction Quota" (38th BImSchV). The Federal Government may adopt this amendment without the involvement or vote of the German Parliament. The bill that has become known envisages gradual reductions, starting with an abrupt drop from 4.4 % to 2.5 % in 2023 and subsequently phasing out to 0 % in 2030 (see Fig. 7).

The largest reduction step of 1.9% for the year 2023 is justified by the fact that the previous share of palm oil in the biofuel mix (see Fig. 10: bio-diesel/HVO total: 3.5 million tonnes, including 1.4 million tonnes from palm oil) will no longer apply from 2023. The reduction in the cap means that the petroleum companies subject to the quota are deprived of a volume basis for meeting the annually increasing GHG quota obligation. Therefore, the BMUV proposes a supplementary amendment to the Federal Immission Control Act (BImSchG) to reduce the GHG quota for the years 2023 to 2026. The GHG quota commitment of 25 % in 2030 is maintained. The following measures are also intended to ensure compliance with the GHG quota obligation: promoting electricity for vehicles by increasing the crediting factor from 3 to 4; for synthetic fuels (e-fuels) from 2 to 3; slightly increase the amount of waste-based biofuels from used cooking oils and animal fats; extend upstream emissions reductions (UER) crediting by two years to 2028 (UER: CO_2 reduction measures in oil production, e.g. flaring of associated gases). Increasing the multipliers is intended to meet the GHG quotas, climate protection is running out of time with this "arithmetic" and with the additional incentive effect for GHG quota trading in e-mobility. The biofuel associations had therefore very much welcomed the fact that the Federal Minister of Transport, with his emergency programme, is instead proposing to increase the GHG quota and maintain the existing regulation for biofuels. The UFOP had pointed out that the 4.4 % cap had not been exceeded in the past, with the exception of 2020 (Fig. 8),although this limitation is only to be taken into account by law since January 2022. The UFOP had emphasised the following positions in its rejection of a change in the capping limit: The ramp-up of e-mobility is currently necessary to reduce the dependence on imports of fossil fuels, the raw material composition of biofuels shows the efficiency competition in greenhouse gas reduction (see Fig. 10), the zenith of

Fig. 7: BMUV proposal: „Capping limit" for biofuels from cultivated biomass

Year	2022	2023	2024	2025	2026	2027	2028	2029	2030
Current upper limit	4.4 %	4.4 %	4.4 %	4.4 %	4.4 %	4.4 %	4.4 %	4.4 %	4.4 %
New upper limit	4.4 %	**2.5 %**	**2.3 %**	**2.1 %**	**1.9 %**	**1.9 %**	**1.2 %**	**1.2 %**	**0.0 %**

(% of final energy consumption road and rail)
Upper line: 38th BImSchV and lower line BMUV adaptation proposal

Source: Working paper for interdepartmental coordination (10.05.2022) of Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV)

fossil fuel consumption has been passed and will continue to fall, consequently also the biofuel demand from cultivated biomass, because this depends on the energy consumption in transport. Rather, the goal must be to make the best possible use of the biomass or cultivation potential associated with the 4.4 % capping limit for climate protection. Sustainably certified rapeseed, which is also Europe's most important source of protein, contributes to this in several ways, especially since biofuels from palm oil will be excluded from quota obligations in Germany and other EU member states from 2023. The European Parliament's Industry Committee (ITRE) adopted the position in July 2022 to also exclude soybean oil with the entry into force of the amended Renewable Energy Directive (RED III). Doubts about sustainable conditions for soybean cultivation were cited as reasons. As of June 2022, more than 2,500 fires have been recorded in the Amazon and 4,200 fires in savannah regions. However, policymakers need to be aware that these decisions will lead to displacement effects and adjustment measures. For example, Indonesia has signed an export agreement with China for more than 1 million tonnes of palm oil, while increasing the national mandate for blending biodiesel from palm oil to 40 %.

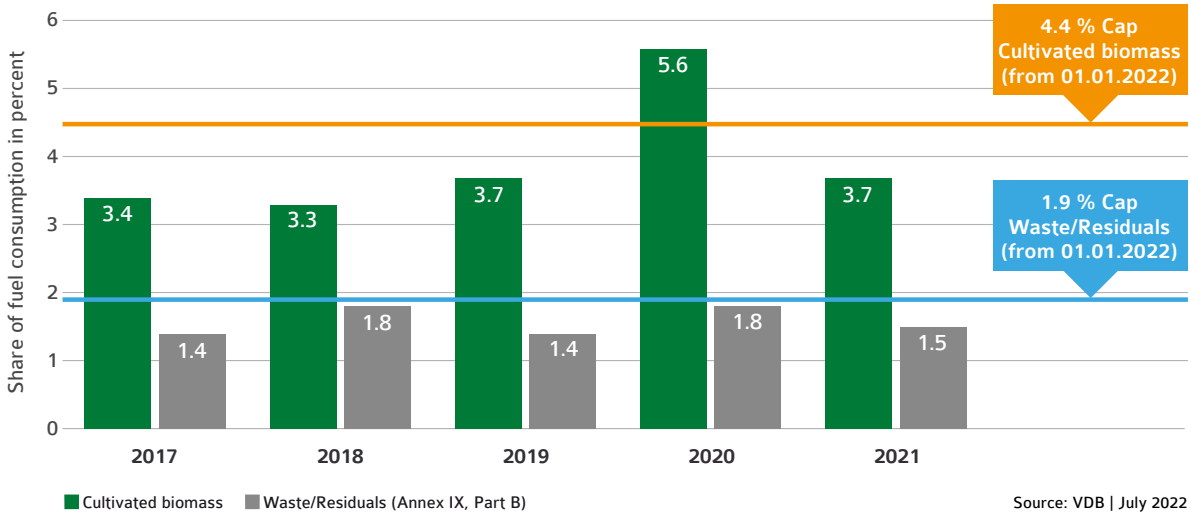
Amendment to BEHG – will biofuels be priced in the future?

In mid-July 2022, the German cabinet approved a draft bill to amend the Fuel Emissions Trading Act (BEHG). This provides for the pricing of waste in waste incineration plants and of coal, which had already been announced in 2020, and means a corresponding increase in the price of the energy (electricity and heat) generated with these fuels. However, the resolution also provides for the exemption of biofuels made from cultivated biomass from CO_2 pricing to be limited to the amount of biofuel that corresponds to the cap of 4.4 % of final energy consumption. However, in accordance with the politically intended purpose, the law serves exclusively to price fossil fuels. The reference in the draft to the cap regulated in RED II cannot therefore serve as justification. In brief, this is position of the biofuel associations, which was communicated to the politicians at federal and state level in the run-up to the parliamentary debate. The emphasis of this fundamental purpose of this law is, in the UFOP's view, also given the European emission trade (ETS 2) extended by the building and transport sector in future, of importance, because Germany leads the national conversion and the national legislation in further member states could be guided by this. Ultimately, the fear that timber, depending on its origin, for heating purposes could also be priced cannot be ruled out.

Tax concession for biofuels in agriculture – what's next?

Agriculture is also obligated under the KSG to steadily reduce GHG emissions. Farm operations offer a variety of options for conversion to renewable energy that is also self-generated and can be stored. The options include renewable electricity from on-farm photovoltaic, biogas and also wind power plants and the production of energy crops for fermentation or for the production of biofuels (biomethane/rapeseed oil fuel/biodiesel/HVO). The members of the "Industry Platform Biofuels in Agriculture and Forestry" had therefore welcomed in principle the directive of the Federal Ministry of Agriculture for the "Promotion of Energy Efficiency and CO_2 Savings in Agriculture and Horticulture". However, referring to the GHG reduction potential that can also be leveraged in the short term, they called for the funding volume to be increased and for the conversion or acquisition of agricultural machinery for biofuel use to be made more attractive. This demand is in line with the results and expert opinions of the expert discussion on "Drive systems for agricultural machinery" held in March 2022 by the German Board of Trustees for Technology and Construction in Agriculture (KTBL) on behalf of the BMEL to the extent that, in view of the power requirements, liquid alternative fuels must primarily take on the pioneering function in new and existing machinery in the short term and, at the same time, the electrification of the drives will be further developed. Due to the performance requirements in the field, biofuels

Fig. 8: Share of biofuels from cultivated biomass and waste in final energy consumption road & rail



Source: VDB | July 2022

Fig. 9: COM Proposal Energy Tax Directive – Annex I Tab. B (EUR/GJ):

	01.01.2023	final minimum rate as of 01.01.2033
a) Sustainable biomass made from cultivated biomass:	0.45	0.9
b) "Progressively sustainable" biofuels (2 G):	0.15	0.15
c) Sustainable biogas from cultivated biomass:	0.45	0.9
d) "Progressively sustainable" biogas (2 G):	0.15	0.15

with high energy density are the first choice. Against this background, the question arises as to whether the tax concession for biofuels, which expired at the end of 2021, will be extended. In response to a minor question in the Parliament, the German Federal Government (paper 20/2097) stated in this regard that the eligibility for approval under state aid law is being examined on the basis of the guidelines for state aid for climate, environmental and energy protection published by the EU Commission in February 2022. From the UFOP's point of view, in view of the EU Commission's proposal to recast the Energy Tax Directive of July 14, 2021 (*bit.ly/COM_563*), the fundamental question arises as to whether, in the event of a unanimous resolution by the Council of Finance Ministers, approval under state aid law is still required in principle, because the corresponding minimum tax rates (Tab. 9) for taxation serve as an enabling basis for national implementation.

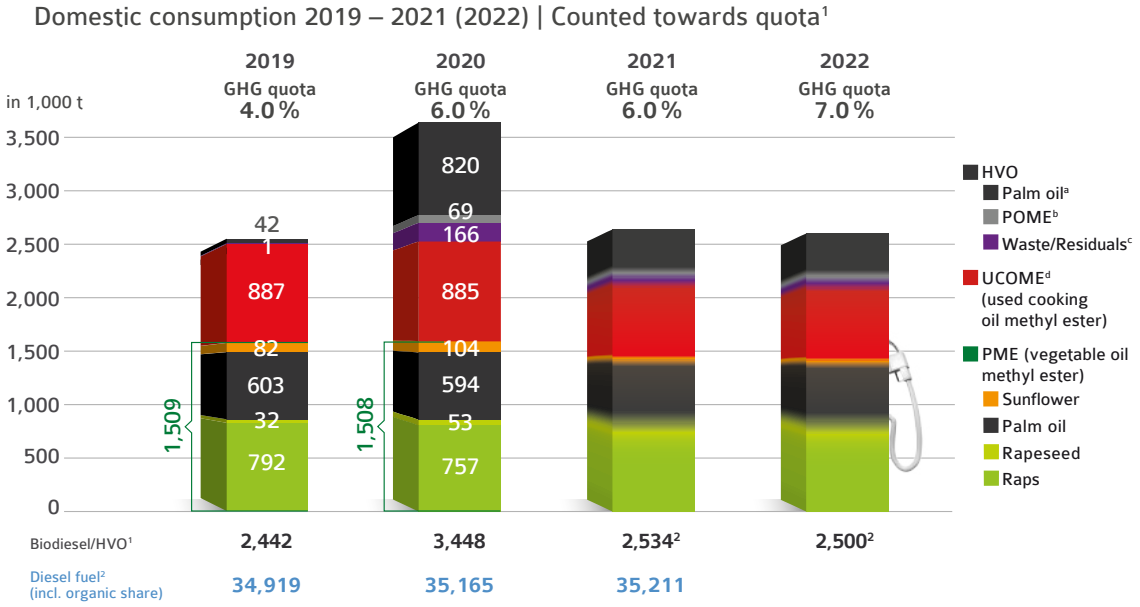
Biodiesel/HVO sales at record level in 2020 / declining in 2021

For the quota year 2020, the Directorate General of Customs had also extended the deadline for quota trading until June 15, 2020 due to the pandemic. Therefore, the Federal Agency for Agriculture and Food (BLE) could not publish the "Evaluation and Experience Report 2020" (*bit.ly/BLE_ENG*) until December 2021. The amount of biofuel blended into diesel in the 2020 quota year was approximately 3.45 million metric tonnes, up about 1 million metric tonnes from the previous record set in 2019 (Fig. 10).

For the sake of good order, it should be noted that the difference in the quantity figure between the BLE report and the quantity shown in the BAFA mineral oil statistics (Official Mineral Oil Data December 2020, Tab. 9), in German: *bit.ly/BAFA_mOil* is approximately 0.42 million t. The UFOP had referred to this, the result being that the departments concerned come to an agreement. No result was available at the time of going to press. For 2021, the UFOP estimated biodiesel or HVO sales of about 2.6 million tonnes and was only slightly off the mark compared with the actual officially registered volume of 2.534 million tonnes (BAFA) (see section Fuels *www.ufop.de/MI_EN*). The extraordinary increase in volume in 2020 can be explained by the fact that in the quota year in question, a GHG reduction of 6 % had to be demonstrated by the member states in accordance with the requirements of the EU Fuel Quality Directive, without being able to make use of the quota carryover from the previous year or the multiple crediting of renewable electricity or the UER regulation. Consequently, the 2020 GHG reduction target of 6 % in all member states had to be met exclusively with biofuels physically placed on the market. At national level, with the exception of 2020, GHG quota trading is important for meeting the GHG quota obligation, and an important economic driver is the promotion of e-mobility as a result of multiple crediting (factor 3). Here, a dynamic branch of business has developed very quickly, which can be seen in the offers for vehicle owners (BEV) on the Internet. In principle, the UFOP found that the biofuel use achieved in the 2020 commitment year, in combination with the "dynamics" in quota trading, basically confirms the feasibility of meeting the GHG quota obligation, which will gradually increase to 25 % by 2030. The prerequisite is the combinability and use of all fulfillment options through a technology- and raw material-open support approach to raw material processing, production and application of biofuels as well as synthetic fuels from renewable electricity. E-mobility will not be able to handle the energy or climate turnaround in view of the still insufficient expansion of production capacities for renewable electricity and, above all, due to the stock of old vehicles. The UFOP therefore repeatedly appealed to the new German government to drive forward all options in close cooperation on the basis of an evolutionary development. As with the Renewable Energy Sources Act, Germany has created an exemplary regulation for all member states with the GHG quota regulation, which is expressed with the 13 % GHG reduction target in the draft RED III. At best, this "blueprint" promotes GHG efficiency competition across the EU, but at the necessary price of transparency and traceability to avoid fraud. The UFOP had repeatedly stressed the importance of the Union database modelled on the BLE's "Nabisy database". Here, the EU Commission has still not managed to install the database for the reconciliation of sustainability certificates between the member states. This is an almost serious contradiction to the ambitions of the EU Commission to tighten the requirements for the proof obligations in the context of sustainability certification.

A striking feature of the BLE analysis is the 1.4 million tonnes of palm oil, of which 0.82 million tonnes was palm oil-HVO. The share of biofuels from waste oils and other residues (POME, fatty acids) was around 0.9 million tonnes. The UFOP expects increasingly intense competition for these raw materials in particular, because the airline industry will also have to switch to biokerosene from these raw materials. Airlines are under particular pressure to meet their customers' expectations when the carbon footprint becomes visible when booking a flight. However, waste must not be "produced," so certification or auditing that is effective in this sense is a mandatory requirement at all stages so that political trust is not gambled away. There is no other way to explain the request of the Green Group in the European Parliament to the EU Commission (EP letter of 12.04.2022) and its refusal to cooperate in disclosing the corresponding raw material quantities of fuels from waste oils and fats. The relevant biofuel industry is therefore well advised

Fig. 10: Sales development and raw material composition of biodiesel/HVO



Sources: 1 BLE (Federal Office for Agriculture and Food): Evaluation and Progress report 2020 (for 2021: vsl. publication in Dec. 2022) | 2 BAFA: Mineral oil statistics (projection 2022) 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

to create the necessary transparency. However, there is in principle considerable potential for improvement in the biofuel sector at EU level in terms of official statistics (production volumes, raw materials, origins, production capacities), and this needs to be exploited quickly.

World Climate Conference (COP 26) in Glasgow – adherence to Paris 1.5 degree target reaffirmed

The 26th World Climate Conference was held in Glasgow from October 31 to November 12, 2021. To be welcomed: in the final document, the parties continue to pursue the goal of limiting the increase in the earth's average temperature to 1.5 °C above pre-industrial levels. The "quality" of the related commitment of the signatory countries to the climate agreement can be seen in the "ambition gap" for 2020 of 25–28 gigatonnes (Gt) of CO_2-eq per year. This is the result of the inventory presented at the conference. Consequently, further and, above all, additional climate pledges or measures to be implemented nationally are needed to close this gap. However, it can already be seen that the increased pledges to reduce greenhouse gas emissions made by the EU as well as the USA, for example, will not be sufficient to close the gap presented earlier. An important outcome of this conference was the decision for a rulebook to define intergovernmental trading of emission rights in order to avoid double counting of climate protection measures as far as possible. However, it was conceded that emission credits from the second commitment period of the Kyoto Protocol until 2020 may also be carried over into the commitment period of the agreement starting in 2021. The BMUV estimates this volume at a maximum of 300 million t CO_2eq. For developing countries, which are particularly affected by climate change, the establishment of the so-called "Green Climate Fund" is the basis for the acceptance and financing of adaptation measures for the climate-friendly restructuring of the economy. Originally, USD 100 billion per year was envisaged for this purpose from 2020 onwards, but around USD 80–85 billion has actually been made available. The financing of climate protection measures will therefore be an important topic within the framework of the 27th conference, which will take place in Sharm el-Sheik, Egypt, from November 07 to 18, 2022. As a result of the war in Ukraine, the EU Commission's efforts to restructure relations with Africa are taking on a forward-looking significance in terms of economic and climate policy. The comprehensive regulations proposed as part of the Green Deal should also be seen against this background. These are a signal addressed to the signatory states to confirm the will of the European Union to achieve climate neutrality by 2050 at the latest as the result of a comprehensive transformation process: The European Commission's Vision 2050 "A Clean Planet for All". (*bit.ly/UBA_17_2022*)

Green Deal – „Fit-for-55" package – Council and EP on the home stretch

With the Green Deal and the "Fit-for-55" package, an unprecedented volume of proposals for amending directives and regulations in the history of the European Union was presented, (see Fig.13, p. 29 UFOP Annual Report 2020/2021) and discussed in Council working groups and EP committees, essentially even on schedule. The significance of this statement can be measured by the fact that at the same time, due to the war in Ukraine, supplementary and further important regulations to ensure energy supply security, for the military protection of the European Union and for social compensation as a result of sharply increased energy prices

were discussed and decided; and this despite individual national interests, which also question the community of values of the EU.

Trilogue negotiations between the Commission, the Council and the EP will begin in September 2022. On the "Fit-for-55" package, the European Parliament and the Council have agreed on their positions on nine proposals. The UFOP is eagerly awaiting the vote in the plenary session of the EP on the amendment of RED II (RED III). Fig. 11 provides an overview of the status of the vote; changes are still possible in the run-up to the final vote in the EP plenary.

Compared to the Commission's proposal, the Committee on Industry, Research and Energy (ITRE), which is the lead committee for the European Parliament, had decided on a further increase in the renewable energy target to 45 % in 2030, an increase in the target for reducing the GHG intensity of energy used in transport from 13 % to 16 %, and the option of retaining the 7% cap for biofuels from cultivated biomass. In the run-up to the Industry Committee vote, the UFOP had advocated the retention of the so-called NUTS2 standard emission values for cultivated biomass (rapeseed, cereals, etc.). The use of these standard values facilitates at producer and collector level the implementation of sustainability certification in the form of the "self-declaration" to be submitted annually. It is hoped that this detailed decision is also the result of the trilogue procedure. With the final vote, the directives can be published in the EU Official Journal and must then be transposed into national law by the member states from 2023. It is regrettable, and this was to be expected, that the Council and the European Parliament were unable to agree on a common position on the draft revision of the Energy Tax Directive. In the Council of Finance Ministers, the principle of unanimity prevails.

Fig. 11: RED III: Comparison of the proposals of the European Commission, of the European Council and the European Parliament

Regulations	COM proposal (14.07.21)	Council Decision (27.06.22)	EP proposal (latest draft)
Share of renewable energies of total energy mix	40 %	40 %	45 %
Overall transport target	13 % GHG reduction	13 % GHG reduction	16 % GHG reduction
Share of renewable energies in transport		or 29 % by 2030	
Double crediting Annex IX Part A and B raw materials	No	Yes (only within the framework of the 29 % option)	No
Multiple counting	No	Yes (only within the framework of the 29 % option)	No
Target for „advanced biofuels" in 2030	2.2 % physical	4.4 % Double counting	2.2 % physical (possible increase if further "Annex IX Part A raw materials" are added)
Annex IX Part B / Capping limit (physical)	1.7 % with exceptions	1.7 % with exceptions	1.7 % with exception (possible increase if further "Annex IX Part B raw materials" are added are added)
Capping limit Biofuels from „cultivated biomass"	Basic quantity 2020 + 1 %	Basic quantity 2020 + 1 %	Basic quantity 2020 + 1 %
Increase of proportion of biodiesel in Diesel (EN 590)	10 % vol.	10 % vol.	7 % vol.

UFOP EXPERT COMMISSION FOR BIOFUELS AND RENEWABLE RESOURCES

Dieter Bockey, UFOP, introduced the meeting on June 15, 2022 with an overview of the supply position and prospects for the oilseed and grain crop markets in light of the war in Ukraine. Rocketing raw material prices, supply shortfalls, especially for wheat, lead in spring of 2022 to the fuel vs. food debate - also intensified by the media - and to a discussion on food security with a particular focus on African countries reliant on wheat imports from the Black Sea region. It is against this backdrop that the initiative of Steffi Lemke, Federal Minister of the Environment, to gradually lower the capping limit for biofuels from cultivated biomass (4.4% of final energy consumption in the transport sector) and the position of the biofuel associations were explained. These associations highlight the existing potentials for regulation and compensation through the use of cleaner biofuels (from waste oils, for example), GHG quota trading and crediting for "upstream emission reduction" (UER) measures. Dr. Ingo Mikulic, Shell, explained the widespread EU legislation and voiced criticism that the CO_2 fleet regulation ensuing from the tank-to-wheel approach favours battery power (0g CO_2) and abolishes combustion engines cars from 2035 at the latest. At the same time, the recast of the Renewable Energies Directive (2018/2001) – RED III – provides for the introduction of an obligation to reduce GHG emissions from 13% by 2030, without multipliers for multiple crediting. The decarbonisation of existing fleets or the fulfilment of the obligation to reduce GHG emissions would, therefore, require approval of fuels with a higher "bio content", such as R 33 and E 20 for example, such fuels having a considerable emission reduction potential that can be mobilised relatively quickly. Although E 10's "image" has been been called into question, the current increase in E 10 consumption confirms a reversal of the trend. Prof. Thomas Garbe, Volkswagen AG, reported on a collaboration between fuel and vehicle manufacturers, the aim being to coordinate readily available alternative fuels primarily for the existing fleet. The participants agreed on E 20, with "residues" as the raw material basis (Annex IX Part A RED II). Without an official mandate, a specification that the German Association of the Automotive Industry (VDA) also expressly supports in a position paper was agreed.

German Government Development Strategy

Matthias Spöttle, Federal Ministry of Transport and Digital Infrastructure (BMDV), explained the overall concept for promoting renewable fuels. The aim is to close the "gaps" in research and development mentioned in the 2030 climate protection programme. This is the reason why consideration is also being given to promoting generating plants to get the market up and running. This includes the national hydrogen strategy, focusing on the production of electricity-based kerosene. The development programme for progressive biofuels and synthetic fuels is structured around four pillars: Support policies for the development of renewable fuels, for investments in generation facilities, for the market ramp-up of PtL kerosene production and the development platform for PtL fuels. Mr Spöttle emphasised that in the case of biofuels, only projects and investments (domestic) that provide for the use of raw materials, Part A of RED II, can be supported.

Biodiesel Research/Additives

Dr. Richard Wicht, Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e.V. (AGQM) [German Association for Quality Management of Biodiesel], reported on projects initiated and supported by the AGQM for increasing the blending ratio of biodiesel:

- passenger car fleet test with B 10 in short-haul operations in vehicles not approved for this fuel blend at the highest emission levels (Euro 5/6d), examination of the possible engine oil dilution in the "city/rural/motorway" operating cycle compared to a vehicle approved for B 10 operation; tests on the chassis dynamometer with various proportions of biodiesel, including for compliance with emission standard Euro 7, laboratory tests on the miscibility of fuels and fuel and/or oil ageing;

- Shipping: testing of biodiesel of "inferior" and hence less expensive quality based on coordinated adjustment to the quality standard; Dr. Wicht referred to the release list drawn up by the biodiesel industry associations (www.ufop.de);

- examination of the long-term stability of "modern" FAME-containing fuels with differing composition and blending proportions of HVO, GtL, e-fuels, as well as B 100/P 100 in combination with a corresponding antioxidant;

- examination in fleet operations: monitoring of the engine oil quality and oil change intervals in 58 buses of Ilmenau Stadtwerke GmbH (municipal utility company).

Dr. Martin Müller, cirkel-Beratungs-GmbH, explained the study commissioned by the German Environment Agency (UBA) on the "impacts of fuel additives on exhaust after-treatment systems, emissions as well as health and the environment". (in German: *www.umweltbundesamt.de/publikationen/auswirkungen-von-additiven-fuer-kraftstoffe-auf*). The drivers

for the development and use of additives included the required functional characteristics ensuing from the advancement of engines and exhaust aftertreatment systems. The report describes the active substances or active components currently used and their functionality, the quality requirements imposed by the fuel standards and the interactions arising from additive packages with regard to emissions and exhaust gas aftertreatment systems. Health aspects, arranged in a "profile" for each product category, were also taken into consideration.

Material usage as a Perspective/Bioeconomy/ Biomass Strategy

Brought about by the foreseeable changes in the framework conditions and the uncertain prospect this entails, especially for biofuels made from cultivated biomass, the Expert Commission also addressed the challenge of advancing biofuels as "platform chemicals" for the synthesis processes involved in material usage. In the coalition agreement, the German Government announced that the biomass strategy would be geared to material usage. Michael Carus, Founder and Managing Director of the Nova Institute, therefore presented the "Renewable Carbon Initiative", which now also includes biofuel producers. The market potential, given the chemical industry's demand for renewable carbon to replace fossil components in their products (global estimate: 1 bn tonnes of carbon by 2050), is huge. A number of possible synthesis pathways were presented. Bioethanol especially can be used in a variety of ways. This explains the commitment of the bioethanol industry in particular. Similarly, a number of application options are opening up for rapeseed oil in the chemical industry (polymers, lubricants, cosmetics, etc.) - based on existing synthesis processes. The production of HVO/Bionaphta is developing a particular potential as a catalyst for the capacity expansion being observed for HVO. A discussion ensued on the issue of the competition between the recycling of biomass-based carbon sources and use as a food. The consensus was that recycling has so far not been affected by public debate on competition for use as a food. Nonetheless, just like for biofuels, general conditions for proof of sustainability would have to be created. Only then could a corresponding framework of support for market access to these products be justified. Consideration also needs to be given to suitability for recycling or cascaded utilisation of biogenic carbon. Carus stressed that the mass market is the mass-balanced "co-processing" in existing processes of the chemical industry rather than the "niche market" of biodegradable plastics. He recommended that to safeguard its businesses, the biofuels industry should take a forward-looking strategic and collaborative approach to achieve synergies through cooperation.

Dr. Hans-Jürgen Froese, Head of divison "Bioeconomy, biomass utilisation" in the Federal Ministry of Food and Agriculture (BMEL), presented the status of the implementation of the "National Bioeconomy Strategy" (NBÖS). The delay with implementation was down to various issues, he said: New appointment of the Bio-Economy Council (BÖR), definition of a governance structure, approval of the financing of the BÖR office, as well as the inter-ministerial working group extended by the federal ministries of, Economy and Climate Protection (BMWK), Environment and Consumer Protection (BMUV), Economic and Cooperation and Development (BMZ), Digitilization and Traffic (BMDV), Finance (BMF) and the Federal Foreign Office. The main responsibility remained with BMEL and BMBF, he said. The bio-economy strategy is currently being revised and is to be agreed in the IMAG by the end of the year. An implementation schedule is to be presented in quarter 1, 2023. The on-going monitoring procedure, taking into account all biomass usage options, considers not only sustainability issues and potentials, but also the effects of the bio-economy on employment, bio-diversity and climate protection. At the same time, the progress report on the bio-economy strategy of the EU, submitted by the EU Commission on 09.06.2022, will be reviewed and taken into account in further national implementation. Dr. Froese sees particular challenges in taking into account the general conditions directly affecting the bio-economy strategy: CAP reform, GAK, GreenDeal package, promotion of the circular economy etc. The "biomass strategy" announced in the Coalition Agreement includes the fundamental aspects of sustainable biomass usage, underlined Dr. Froese, referring to the current EU regulation for deforestation-free delivery chains. This regulation must not be limited to virgin forest regions, but must include other regions important for biodiversity, such as the Pantanal National Park in Brazil. The raw material potential of biomass needs to be appropriately assessed as well, he said. Dr. Froese emphasised the priority of material use in the context of cascade utilisation. Coordinating the biomass strategy would be a huge challenge, given the definition of the term "potential" or "potentials" in the interdepartmental coordination alone. He also made it clear that the food vs. fuel discussion sharpened by the Ukraine war would be followed by an appropriate consideration and prioritisation (prioritising food security). The coordination process between BMEL, BMWK and BMUV on the change to the capping limit for biofuels made from cultivated biomass should also be regarded against this backdrop. The current discussion does not have the intensity and long-term effects of the debate that ensued in 2008. Energy prices, which remain at a high level, are the reason for the equally high price of food. The presentation of a draft agreed by the ministries is expected for the first quarter of 2023; this will allow the updated "National biomass strategy" to be presented to the Federal Cabinet for resolution in the second quarter of 2023.

FACT CHECK:

Biofuel as a crucial aspect of the security of supply

The Black Sea region is vitally important to the global supply of agricultural raw materials such as wheat, corn, sunflower, rapeseed and soy. The war in Ukraine is impacting key agricultural markets; this is reflected in rising prices and affecting all sectors of the agricultural and food industries: agricultural operations, agricultural trade, processing operations such as grain or oil mills, biofuel producers, manufacturers of mixed fodder, as well as consumers. In the case of oilseed, developments in Ukraine are hitting a market already suffering from scarce supplies.

In light of this, it is important to explain the importance and the impact of sustainable biofuels for the food supply chain, energy supply security and climate protection:

Biofuels support food security

With its generation of essential by-products for human food and animal feed, the production of sustainable biofuels from oilseed and grain crops is an integral element of the food chain as a whole. This is because biofuel production delivers, measured by raw material yield per hectare, predominantly high quality domestic protein animal feed. Every litre of ethanol generates 1.8 kilograms of highly digestible dried stillage and every litre of biodiesel 1.5 kilograms of highly digestible rape meal. These by-products, then, make a significant contribution to improving self-sufficiency in food and make use of agricultural locations and, moreover, raw material qualities that would have no direct use for human nutrition.

In light of these current events, it is important to carefully review political decisions, such as the farm-to-fork strategy or other measures aimed at reducing the available cultivation and production potential in the EU, with regard to their short and medium-term impact on the supply situation for domestic agricultural raw materials.

Biofuels reduce reliance on energy imports

Together, the oilseed and grain crop sectors make an indispensable contribution to both the human food and animal feed supply chain, and also to the supply of climate-friendly bio-fuels. The current energy crisis demonstrates in no uncertain terms that Germany's reliance on fossil gas and crude oil supplies has to be drastically reduced. Biofuels currently make a notable contribution to the security of the energy supply. In 2020, bioethanol and biodiesel contributed some 4.5 million tonnes of fuel to Germany's transport sector supply, and in doing so replaced imports of fossil fuels from often unstable regions of the world and/or autocratic countries.

Instant climate protection on the roads with biofuels

In Germany, biofuels are blended with fossil fuels on the basis of the legally prescribed greenhouse gas reduction quota in order to reduce greenhouse gas emissions on the road. Compared to fossil fuels, biofuels, which are subject to the rigorous legally binding sustainability certification procedure that begins in the field, reduce greenhouse gas emissions by up to 90 percent, representing savings of over 10 million tonnes of CO_2 equivalent per annum.

Existing greenhouse gas reduction quota efficiently regulates the market

With a view to meeting the legal obligation to reduce greenhouse gases, the efficiency effect of the legal regulations deserves special merit: The biofuel industry's demand for raw materials such as rapeseed oil drops automatically if the petroleum industry gives preference to biofuels made from raw materials with a higher greenhouse gas reduction efficiency. The same applies if the price of rapeseed oil, or the biofuel produced from it, reaches a corresponding level. As a result, petroleum companies prefer to pay the penalty for failing to meet greenhouse gas reduction targets instead of using the more expensive biofuel to count towards the greenhouse gas reduction quota (GHG quota). Furthermore, in addition to the use of biofuels to meet the legal obligation, GHG quota legislation allows other options, such as the crediting of electricity used in electro-mobility, the greenhouse gas reduction contribution of which is calculated from the emission value of the electricity mix. Limiting the use of sustainable biofuels would be counterproductive in terms of their contribution to energy supply and climate production, and would result in domestic production volumes being exported abroad.

Numerous valuable by-products characterise the networked bio-economy of biofuel production

Biofuel production makes the bio-economy tangible: In Germany, the base chemicals glycerin and ethanol are now no longer obtained from fossil sources, but from sustainably certified biomass, with considerable advantages for CO_2 balance. Lecithin obtained from oilseed processing is used as a vegetable emulsifiers for bread, baked goods and margarine, but also in the pharmaceutical, cosmetic and food supplement industries and also in beverage products. Glycerin is widely used as a bio-based base chemical in pharmaceutical, detergent, body care and cosmetic applications.

Conclusions

Restrictions on the legal requirements for the production of biodiesel and bioethanol lead to an increase in imports of protein animal feeds and hence to an increase in land requirements in the exporting countries. Furthermore, without biofuels, the main pillar for meeting the ambitious targets for the transport sector enshrined in the Federal Climate Change Act would collapse. These undesirable consequences must be set against the contributions, to be assessed holistically, of sustainably certified biofuels to energy supply security and climate protection - the advantages of biofuels speak for themselves.

Further information can be found in the brochure entitled "Policy information – biofuels": *www.ufop.de/policy22*

Use of space for biofuels

In terms of global biomass demand for the various uses, raw materials account for just 2 percent of biofuel production. The amount of cultivation area required for this, meaning in Germany as well, is correspondingly low. Rapeseed, grain crop and sugar beet were grown on some 810,000 hectares for the production of biodiesel and bioethanol. This is equivalent to just 7 percent of Germany's arable land, which amounts to approximately 11.7 million hectares.

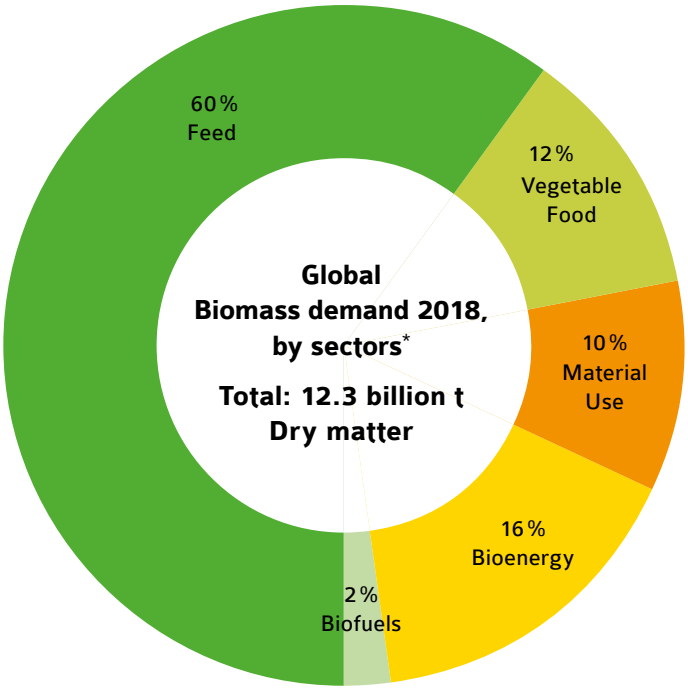
It should be noted that the production of biofuel in the processing chain of rapeseed and grain crop also generates large amounts of protein animal feed, and these help to reduce imports of soy from overseas.

Fig. 12: Cultivation area for biofuels in Germany

in ha	2018	2019	2020
Rapeseed for biodiesel/ vegetable oil	589,000	520,000	575,000
Plants for bioethanol	266,000	290,000	207,000
	855,000	810,000	782,000

Source: FNR

Fig. 13: Only 2 % land use for biofuels



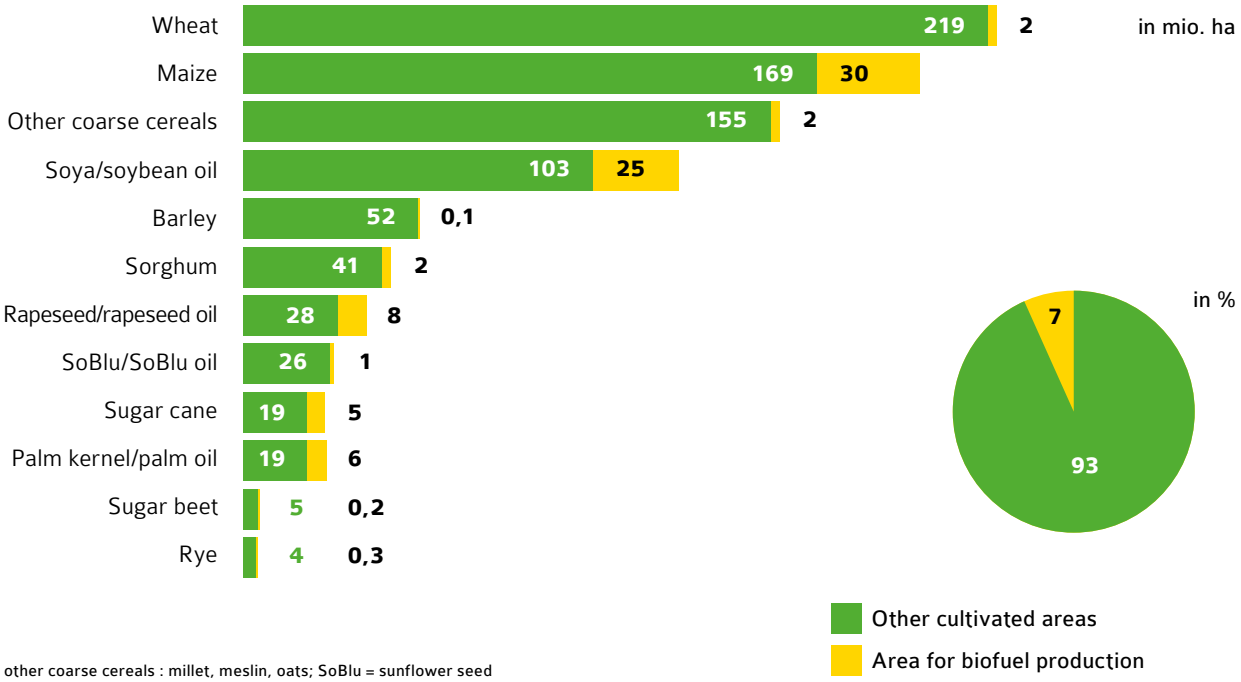
* Flagship Report of the German Advisory Council on Global Change (WBGU), November 2020, p. 196

Fig. 14: Comparison of the use of grain crops in 2019 in the EU and Germany

Purpose in % of consumption	EU	DE
Food consumption	23	18
Seeds	3	2
Industrial utilisation	11	19
of which bioethanol energy	4	12
Feed	62	57
Losses	1	3

Source: BLE 2021

Fig. 15: Shares for biofuel production in the cultivated area



other coarse cereals : millet, meslin, oats; SoBlu = sunflower seed

Source: UFOP Report on Global Supply 2021/2022, www.ufop.de/supplyreport22

Fig. 16: Role of biofuels in glycerine and disinfectants

» A valuable by-product of biodiesel production is glycerine.

» The clear, odourless liquid is now an indispensable part of pharmaceutical products, cosmetics, anti-freeze and lubricants, as well as human food.

» With an annual production of 3.4 million tonnes of biodiesel, some **340,000 tonnes of glycerine** are generated in Germany. The plant-based, domestic raw material has now almost completely replaced petroleum-based glycerine.

» Besides glycerine, bioethanol is another main ingredient of hand sanitizers.

» Bioethanol has a typical alcohol purity of 99.5 - 99.9 percent, making it an effective agent against micro-organisms and viruses - ideal for use in hospitals or for sale in pharmacies.

SUPPLIED WITH RAPESEED ALL AROUND

RAPESEED AS AN ECOSYSTEM PROVIDER FOR BIODIVERSITY, CLIMATE PROTECTION AND SUSTAINABLE MOBILITY

Droughts, forest fires, record temperature highs – and flooding: The climate is changing. For this reason, the international community committed in the Paris Agreement of 2015, and even before that with the Kyoto Protocol of 1997, to keeping the rise in average global temperatures well below 2°C – if possible to 1.5°C above the pre-industrial level. This also means that the amount of greenhouse gas still to be released into the atmosphere is limited. Projected, only another 340 gigatonnes of CO_2 globally can be released in order to significantly slow global warming. Unless climate protection measures are stepped up significantly worldwide, this CO_2 allowance will have been used up by 2029. Action, then, is needed now.

The high-emission transport sector in particular can contribute to climate protection. With a greenhouse gas reduction of approx. 13 million tonnes of CO_2 in 2020 in Germany, biofuels are already making their contribution. Yet biofuels have much greater potential, since they are a link in a diverse commodity chain: The raw material rapeseed is used to make biofuels, but also a host of other products – from concentrate for cattle, pigs and poultry all the way through to items we use every day such as toothpaste and hand sanitiser. What many people don't know: In Germany and/or in the EU, biofuels have to demonstrate a certified positive greenhouse gas balance. No matter whether grown this country or on a different continent, every stage of the process – from cultivating the raw material to producing the biofuel – isincluded in the calculation. Independently approved certifiers verify the calculations. This is done on the basis of certification systems approved by the EU Commission, such as REDcert **(www.redcert.org)**.

Therefore, the climate protection potential protection of biofuels can be calculated literally down to every gram of CO_2 saved!

Rapeseed
Latin name **BRASSICA NAPUS**

- Rich in unsaturated fatty acids
- Used as cold-pressed or refined rapeseed oil, rapeseed flour, as a mustard substitute in meat marinades and high-oleic rapeseed oil as a frying oil
- Work is underway on rapeseed protein isolates for human nutrition
- Rapeseed oil is also used as a biofuel and erucic acid-containing rapeseed varieties for technical applications
- Glycerine is used in the chemical industry
- Rapeseed meal in food for livestock farming
- Grows well in many climates and soils
- Crop rotation every 4 to 5 years
- **Domestic cultivation area 2021/22: 997,100 ha**

THE UKRAINE WAR AND ITS CONSEQUENCES: NO NEED TO STOCKPILE COOKING OIL!

The Russian invasion of Ukraine has heralded a turning point in the understanding of our foreign policy and the reliability of international relations. The consequences are being felt by every household in terms of energy supply and grocery shopping due to the devastating impact on the raw material and agricultural markets. Supply chains are only as strong as the weakest link.

In light of this year's harvest, agricultural imports from the Ukraine could, in the worst case, disappear completely: Fields cannot be cultivated and harvested, Ukrainian ports have been wholly or partially destroyed. And imports from Russia are dwindling. The prices for grain crops and oil seeds such as rapeseed and sunflower have been rising since the end of February. But how is this actually affecting cooking oil as a food? Is the stockpiling of cooking oil inevitable?

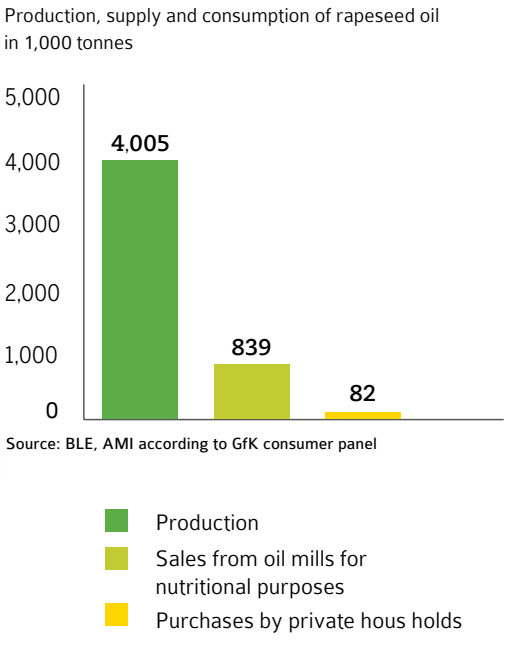
To answer this question, we should take a more detailed look at the rapeseed oil market: sunflower seed oil is in very short supply, because Ukraine is Europe's most important raw material producer by far. In terms of usage, however, rapeseed oil and sunflower oil are interchangeable. If we take a closer look at the true supply situation for rapeseed oil, the most frequently purchased cooking oil, there is no need to buy more than is usually needed, since there are no fears over a shortage of rapeseed oil in Germany.

More than enough cooking oil is growing in German fields!

Rapeseed is currently in bloom on approx. 1 million hectares. From the end of July, farms will harvest some 3.5 million tonnes of rapeseed or 1.4 million tonnes of rapeseed oil. In the EU, rapeseed is cultivated on around 6 million hectares. One complete harvest of approx. 18 million tonnes of rapeseed makes roughly 7.2 million tonnes of rapeseed oil. German oil mills process not only German rapeseed; but a total of approx. 9 million tonnes of the crop for export as well. According to data from the Federal Office of Agriculture and Food (BLE), in 2021 German oil mills produced 4.7 million tonnes of vegetable oil, including at least 4 million tonnes of rapeseed oil. Of this amount, 0.84 million tonnes were sold for the production of food (cooking oil, mayonnaise, etc.).

But how much rapeseed oil was bought in the shops? In 2021, just under 82,000 tonnes of rapeseed oil, bottled. This is just under 10 percent of the vegetable oil produced for food purposes and only 2 percent of total German rapeseed oil production – there is no need, then, to stockpile rapeseed oil.

Fig. 17: Private households account for 2% of Germany's overall consumption of rapeseed oil



With biodiesel from rapeseed for the energy mix of the future

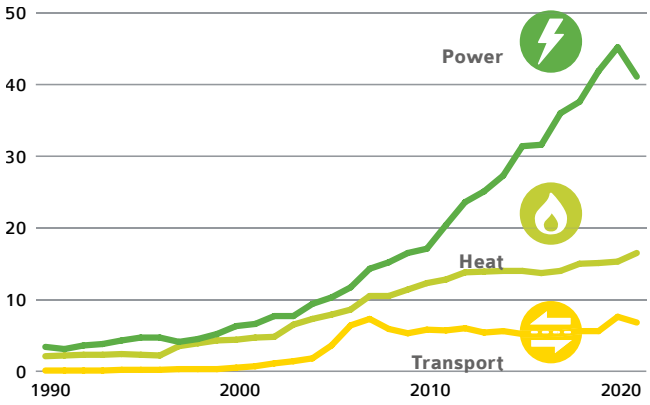
In the transport sector, there is a need to reduce greenhouse gas emissions – this is the only way to achieve the German and European climate targets. Since 1990 emissions have fallen significantly in industry and the energy sector, but not in transport. Only the coronavirus pandemic, which reduced road traffic considerably, has led to a slight decrease in greenhouse gas emissions.

The Federal Climate Change Act stipulates that traffic emissions have to be drastically reduced by the year 2030. The Act defines binding CO_2 reduction targets for the individual sectors (see table). The aim is to cut vehicle emissions from the current level of 148 million tonnes of CO_2 to 85 million tonnes over the next eight years. If an annual target is missed, the Federal Government has to adopt measures within a three month period to ensure the targets overall are met. The pressure on the sectors, then, is also increasing.

The current energy supply crisis is highlighting the heavy reliance on fossil fuel imports. Rapeseed or biofuels can contribute towards achieving the climate protection targets and reducing reliance on imports. Renewable energies in the transport sector have considerable potential for expansion (see graphic on the left). In 2021, they accounted for 6.8 percent – 5.9 percent from biofuels and 0.9 percent from electric cars.

Germany is setting ambitious targets – time is running out!

Fig. 18: Quotas of renewable energies from 1990 to 2021



Values in % | Source: German Federal Environment Agency

Fig. 19: Federal Climate Change Act (KSG) | Appendix 2 (Section 4) Permissible annual emission quantities for the years from 2020 to 2030

Annual emission quantity in m tonnes of CO_2 equivalent	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Energy sector	280		257								108
Industry	186	182	177	172	165	157	149	140	132	125	118
Transport	150	145	139	134	128	123	117	112	105	96	85
Agriculture	70	68	67	66	65	63	62	61	59	57	56
Building trade	118	113	108	102	97	92	87	82	77	72	67
Waste management and miscellaneous	9	9	8	8	7	7	6	6	6	5	4

Source: German Federal Environment Agency

Germany's most beautiful „oil fields" reduce greenhouse gas emissions and reduce reliance on energy imports

Rapeseed is an all-round raw material supplier, providing oil with the same energy density as diesel fuel and, with rapeseed meal, a protein animal feed that reduces the import of soy and hence the reliance on imports for animal feed as well. Together with native grain legumes, rapeseed therefore makes an essential contribution to the supply of human food and animal feed. In the future, these crops should be increasingly cultivated in crop rotations, because they also have a high preceding crop value if, for example, the wheat cultivated next requires less nitrogen fertiliser.

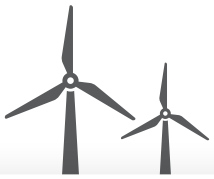
Biodiesel produced from rapeseed is the most important representative of climate-friendly biofuels. Biofuels make a notable contribution to the security of the energy supply. **In 2020, bioethanol and biodiesel contributed 4.5 million tonnes of fuel to Germany's transport sector supply, replacing imports of fossil fuels from often unstable regions of the world and/or autocratic countries.** All biofuels have to pass through a legal procedure to validate their use and contribution towards the greenhouse gas reduction targets: the sustainability certification (see P. 23 "Ecosystem services"). In Germany, all rapeseed cultivation areas are certified. Meaning that rapeseed oil as a human food and rape meal as animal feed are sustainably certified as well. This is important and commendable, because in the future the legislators will stipulate that soy imports, for example, have to come from deforestation-free areas so that they can be used as feed in this country.

In view of the time pressure of time and urgency to act, the fight against climate change and the efforts to reduce crude oil imports can succeed only if, in addition to the change of drive system to battery-electric vehicles, the fuel content of existing vehicles also becomes increasingly "green". **In 2020, biodiesel and similar fuels cut CO_2 emissions by around 13.2 m tonnes.** The Federal Government has set itself the goal of having approx. 15 million battery-powered vehicles on the road by 2030. What this means, though, is that over 30 million vehicles with a combustion engine will still be defining the streetscape. In light of the conversion costs, power requirements and service life, large commercial vehicles in particular – in agriculture too – will be powered by an internal combustion engine. The use of biodiesel made from rapeseed makes perfect sense here, since at this juncture it is possible to use diesel fuel with a higher proportion of biodiesel (B 30) or even as a clean fuel, provided the vehicle manufacturers issue a release to do so (www.ufop.de/freigaben).

There is no silver bullet when it comes to reducing greenhouse gas emissions from vehicles. But together, rail traffic and electromobility, traffic avoidance and modal shift, as well as renewable and sustainably certified biofuels can help Germany meet its climate targets and gradually reduce reliance on imports of fossil fuels. Sustainably produced biofuels, i.e., biodiesel, bioethanol and biomethane, must be part of this for one simple reason: Only they are currently available on a significant scale as an alternative to fossil fuels in road transport.

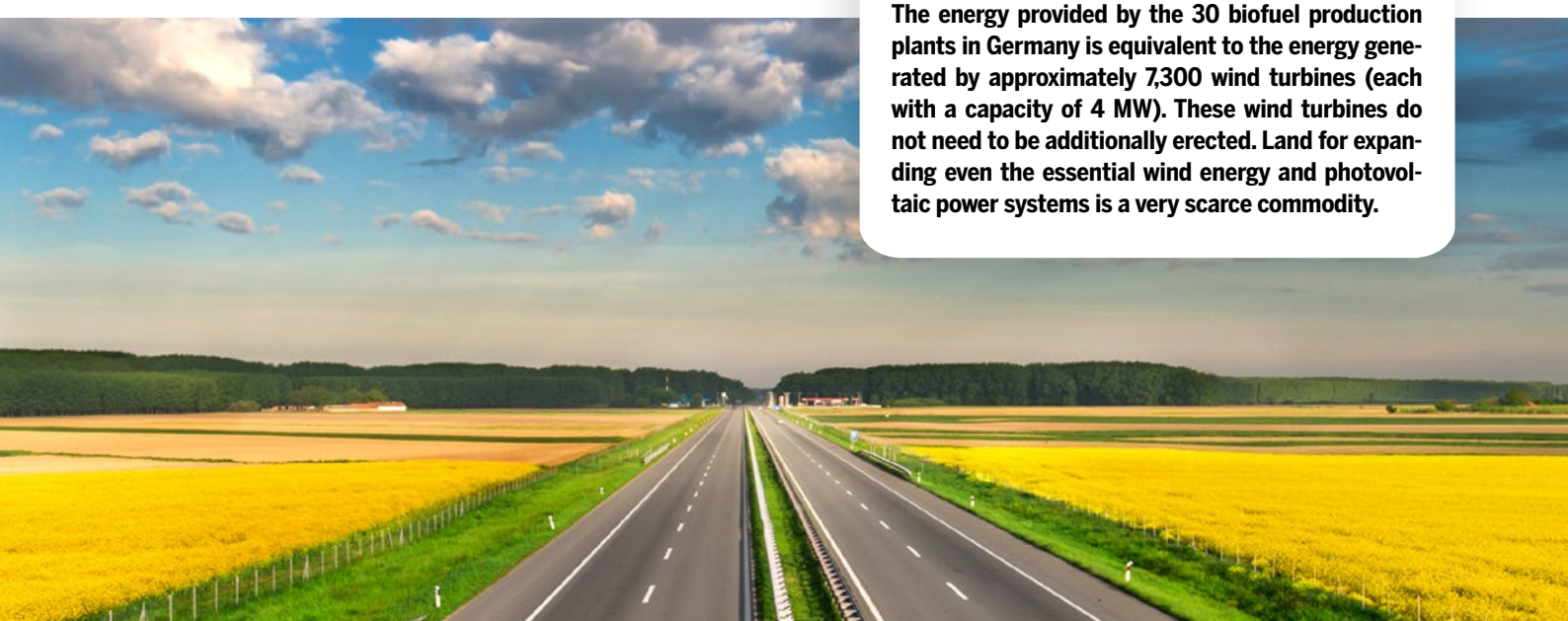
Use of land for biofuels:

Raw materials for biofuel production account for just 2 percent of the global biomass demand for the various applications. The cultivation area around the world required for this purpose is correspondingly low. The situation in Germany is a similar one: For the production of biodiesel and bioethanol, rapeseed, grain crops and sugar beet grew on some 782,000 hectares in 2020. This is equivalent to just 6.7 percent of Germany's arable land of approx. 11.7 million hectares.



Did you know?

The energy provided by the 30 biofuel production plants in Germany is equivalent to the energy generated by approximately 7,300 wind turbines (each with a capacity of 4 MW). These wind turbines do not need to be additionally erected. Land for expanding even the essential wind energy and photovoltaic power systems is a very scarce commodity.



Biofuels and the GHG quota – how are they actually connected?

The GHG Quota Act requires companies that place fuels on the market to meet an increasing GHG reduction obligation from the current 7 percent to 25 percent in 2030. This obligation can be met by blending biofuels. These fuels must furnish proof that they emit at least 50 percent fewer greenhouse gases than fossil fuels. The GHG quota has the desired effect of companies being interested in using the biofuel with the best price-performance ratio in terms of price and GHG reduction. Consequently, biofuel producers' demand for raw materials such as rapeseed oil will drop if the petroleum industry demands biofuels from raw materials with a higher GHG reduction efficiency. The same effect occurs if rapeseed oil and the biofuel produced from it reach a corresponding level. The background to this is the "penalty" imposed on companies in the mineral oil sector should they fail to meet the greenhouse gas reduction requirement. When the price of raw materials or biofuels is high, companies prefer either to pay the penalty or exercise other options, such as crediting the electricity used in electromobility instead of using biofuels. The raw material price and the amount of the penalty "buffer" the available supply towards food usage when the price of rapeseed is high. Limiting the use of sustainable biofuels would be counterproductive in terms of their contribution to energy supply and climate protection and result in domestic production volumes of biofuels being exported abroad.

The rapeseed field – the protein source for animal feed

German oil mills process around 9 million tonnes of rapeseed per annum, approx. 3.5 to 4 million tonnes of which are domestically grown. Some 40 percent of the seed is used to produce rapeseed oil and 60 percent rape meal for animal feed. Protein feed is crucial to rearing cattle, pigs and poultry. A large portion of the demand is imported from overseas in the form of soybeans or soy meal. The rape meal occurring in the biodiesel production chain (rapeseed oil methyl ester – RME) considerably reduces this import requirement. One major advantage: The rapeseed cultivated in the European Union is GMO-free. Overall, biofuel and animal feed production in Germany can eliminate imports of about 2.4 million tonnes of soy meal. GMO-free rape meal has completely replaced soy in the feeding of dairy cattle. Numerous dairy products are labelled accordingly. The logo conveys not only the "GMO-free" ("Ohne Gentechnik") characteristic, but also to some extent the regional origin of the protein source.

Tabular Annex

TABULAR ANNEX

Biofuels

Biofuel mandates

Tables BLE Evaluation Report 2020

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	2,534	0	1,147	**3,681**

Source: BAFA, BLE
[1)] from 2012 incl. HVO

Table 2: Germany: Domestic consumption of biofuels 2016 – 2021 in 1,000 t

	2016	2017	2018	2019	2020	2021
Biodiesel admixture	2,150.3	2,215.9	2,323.3	2,301.4	3,026.0	2,534.0
Biodiesel pure fuel	.	.	.	.	.	.
Total biodiesel	**2,150.3**	**2,215.9**	**2,323.3**	**2,301.4**	**3,025.3**	**2,534.0**
Vegetable oil	3.6	.	.	.	.	.
Total biodiesel & veg oil	**2,153.9**	**2,215.9**	**2,323.3**	**2,301.4**	**3,025.3**	**2,534.0**
Diesel fuel	35,751.0	36,486.7	35,151.7	35,546.8	32,139.4	32,677.3
Share of admixture in %	5.7	5.7	6.2	6.1	8.6	7.2
Total fuels	**35,754.6**	**38,702.5**	**37,475.0**	**37,848.2**	**35,164.8**	**35,211.3**
Share biodiesel & veg oil in %	5.7	.				
Bioethanol ETBE	128.8	111.4	109.9	88.1	125.8	157.4
Bioethanol admixture	1,046.7	1,045.1	1,077.4	1,054.6	971.7	990.3
Bioethanol E 85	.	.	.	.	.	.
Total bioethanol	**1,175.4**	**1,156.5**	**1,187.4**	**1,142.7**	**1,097.5**	**1,147.7**
Petroleum fuels	17,062.3	17,139.5	16,649.7	16,823.2	15,120.4	15,366.9
Petroleum + bioethanol fuels	18,237.7	18,296.0	17,837.1	17,965.9	16,217.9	16,514.6
Share of bioethanol in %	6.4	6.3	6.7	6.4	6.8	6.9

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

Table 3: Germany: Monthly domestic consumption of biofuels 2016 – 2021 in 1,000 t

	2016	2017	2018	2019	2020	2021
Biodiesel blending						
January	174.56	160.22	182.81	182.62	221.72	172.19
February	167.74	134.45	176.12	145.13	212.69	157.71
March	194.59	206.45	203.28	172.67	221.96	182.48
April	191.14	174.91	196.00	180.57	194.34	211.29
May	184.26	178.44	204.94	185.78	242.25	204.73
June	203.36	190.17	197.08	191.11	227.75	210.05
July	194.50	205.92	225.16	220.98	288.80	232.45
August	186.81	207.11	212.19	214.37	282.56	266.71
September	172.73	200.18	190.39	204.33	303.29	260.45
October	159.06	189.94	184.91	198.19	271.76	248.84
November	160.88	193.99	173.29	204.24	229.77	197.61
December	160.68	174.14	177.17	201.44	209.55	186.54
Average	**179.19**	**184.66**	**193.61**	**191.79**	**242.20**	**210.92**
Total amount	**2,150.29**	**2,215.90**	**2,323.33**	**2,301.42**	**2,906.44**	**2,531.03**
Bioethanol						
January	93.38	88.22	104.92	95.26	102.21	101.78
February	80.02	77.26	87.45	81.95	95.53	95.42
March	89.75	90.33	98.15	82.28	84.99	84.84
April	90.30	99.86	95.30	89.45	60.84	60.80
May	98.41	105.50	106.85	103.94	89.23	89.21
June	107.85	95.47	103.01	100.48	93.68	93.60
July	112.06	106.32	104.91	99.77	112.67	112.45
August	103.16	102.98	109.72	94.37	105.04	104.84
September	96.38	96.11	92.64	96.81	92.12	92.14
October	101.30	102.59	95.94	101.45	100.67	100.69
November	99.65	91.55	93.70	100.66	86.26	86.22
December	103.20	100.33	94.75	96.28	75.84	75.84
Average	**97.95**	**96.38**	**98.95**	**95.22**	**91.59**	**91.49**
Total amount	**1,175.45**	**1,156.52**	**1,187.36**	**1,142.68**	**1,099.08**	**1,097.83**

Note: Data for 2021 provisional
Source: German Federal Office of Economics and Export Control, AMI

Table 4: Germany: Foreign trade in biodiesel 2016 – 2021 in t

	2016	2017	2018	2019	2020	2021
Import of biodiesel						
January	48,778	43,930	85,583	97,340	118,498	52,331
February	61,229	45,251	78,473	71,163	103,546	45,083
March	78,121	58,354	115,706	86,856	93,790	53,297
April	105,342	67,174	116,581	122,073	119,514	84,134
May	66,152	69,232	138,737	124,686	143,256	104,846
June	61,900	57,016	130,556	107,161	186,604	91,996
July	75,016	78,880	121,159	159,543	159,334	107,626
August	60,430	80,471	92,421	126,501	170,039	99,241
September	74,432	75,286	127,237	155,319	122,840	139,197
October	50,256	82,373	79,313	112,635	87,584	110,431
November	40,634	70,296	55,765	111,581	91,980	84,932
December	34,433	59,883	75,638	130,722	86,543	133,322
total	**756,722**	**788,145**	**1,217,168**	**1,405,579**	**1,483,527**	**1,106,436**
Biodiesel export						
January	86,117	113,367	141,104	183,590	206,446	153,829
February	105,759	121,281	156,687	193,992	195,023	148,389
March	103,757	101,721	143,594	205,928	193,790	166,852
April	102,930	152,217	172,016	169,000	183,303	188,169
May	138,783	137,679	114,487	230,393	133,350	180,744
June	121,659	148,797	166,584	163,145	260,696	181,909
July	135,787	114,460	155,086	172,055	187,574	145,502
August	130,781	127,871	191,730	192,742	218,806	171,211
September	118,485	155,532	173,519	197,228	238,532	192,182
October	178,807	165,812	181,676	193,140	166,365	186,483
November	180,361	120,172	170,864	181,609	181,040	205,646
December	139,180	149,643	176,551	177,904	247,227	198,076
total	**1,542,406**	**1,608,550**	**1,943,897**	**2,260,727**	**2,412,153**	**2,118,992**

Note: Data for 2021 provisional
Sources: Federal Statistics Office of Germany, AM

Table 5: Germany: Export of biodiesel [FAME] (2016 – 2021) in t

	2016	2017	2018	2019	2020	2021
Belgium	89,366	84,487	132,413	264,411	342,420	351,427
Bulgaria	1	1	1	1	1,200	5
Denmark	43,271	88,317	39,511	27,269	22,451	24,456
Estonia	.	24	.	.	1,890	786
Finland	8,512	12,734	9,156	2,626	525	608
France	85,006	76,339	64,945	53,701	68,473	71,429
Greece	6	2	3	1		
UK	12,553	40,003	50,565	107,890	66,997	959
Ireland	886				0	
Italy	12,954	11,698	5,410	12,829	17,848	28,637
Croatia				500	100	1,013
Latvia			50	0	242	0
Lithuania	407	1,198	660	977	1,920	103
Luxembourg		0	308	417		
Malta	.	.	.	.	.	.
Netherlands	588,598	583,289	667,121	855,472	1,032,521	909,142
Austria	71,627	97,500	185,335	171,617	137,019	123,676
Poland	229,517	236,404	242,008	239,225	261,153	238,408
Portugal		9	8	8	4	5
Romania	11,912	0	0	0	3,935	15,912
Sweden	60,176	73,089	138,524	135,833	116,794	106,267
Slovakia	939	5,595	12,486	21,271	18,411	11,416
Slovenia	165	1,651	14,988	34,917	32,719	42,480
Spain	30,865	33,388	274	350	669	69
Czech republic	98,446	88,212	61,155	56,036	26,308	32,943
Hungary	56	3,488	4,902	315	7,072	458
Cyprus	.	.	.	.	.	.
EU-27	**1,332,708**	**1,397,422**	**1,579,258**	**1,877,773**	**2,093,672**	**1,959,242**
EU-28	**1,345,263**	**1,437,428**	**1,629,823**	**1,985,666**	**2,160,671**	**.**
USA	84,933	70,053	197,401	183,243	164,049	144,045
Switzerland	45,321	70,152	97,819	83,865	79,358	74,878
Other countries	**66,889**	**30,917**	**18,854**	**7,953**	**8,075**	**1,572**
total	**1,542,406**	**1,608,550**	**1,943,897**	**2,260,727**	**2,412,153**	**2,179,737**

Note: Data for 2021 provisional
Sources: Federal Statistics Office of Germany, AMI

Table 6: Germany: Import of biodiesel [FAME] (2016 – 2021) in t

	2016	2017	2018	2019	2020	2021
Belgium	101,252	136,199	236,150	293,449	296,691	229,363
Bulgaria	3,664	20,388	33,142	24,954	25,302	12,816
Denmark	217	3,599	532	1,001	785	76
Estonia	.	.	.	23	.	.
Finland	.	.	.	.	1,992	18,020
France	8,774	14,283	9,678	21,749	73,519	77,287
Greece	.	.	.	.	.	.
UK	954	608	709	5,992	354	5
Italy	.	3,003	827	33	177	1,017
Lithuania	.	.	536	.	.	
Netherlands	286,324	300,959	618,523	713,134	701,379	519,415
Austria	95,174	92,837	90,538	80,537	84,274	31,452
Poland	93,602	70,498	88,955	94,316	138,690	116,362
Romania	.	.	.	25	3,440	8,213
Sweden	168	140	1	9	2	15
Slovakia	15,604	6,549	959	1,464	2,278	249
Slovenia	1,190	1,929	1,341		0	0
Spain	10	.	1,001	27	.	.
Czech republic	12,384	2,460	922	12,987	7,551	22,753
Hungary	50	193	.	.	.	114
Cyprus	.	.	.	.	.	
EU-27	**618,415**	**653,038**	**1,083,104**	**1,243,706**	**1,336,081**	**1,037,150**
EU-28	**619,369**	**653,647**	**1,083,813**	**1,249,650**	**1,336,434**	
Malaysia	129,042	124,458	128,109	153,182	139,309	64,654
Morocco	.	.	.	.	4,723	.
Canada	.	.	.	.	968	1152
Norway	547	1024	593	522	509	390
Other countries	**7,764**	**9,016**	**4,653**	**2,225**	**1,583**	**3,337**
total	**756,722**	**788,145**	**1,217,168**	**1,405,579**	**1,483,526**	**1,106,683**

Note: Data for 2021 provisional
Sources: Federal Statistics Office of Germany, AMI

Table 7: Preliminary statistical data on the fulfilment of the greenhouse gas quota 2016 – 2021

	2016	2017	2018	2019	2020	2021
Quotas placed on the quantities placed on the market (Quantities in million litres)						
Diesel fuel	41,794	42,372	41,746	41,701	37,503	37,344
Petroleum fuels	23,126	22,935	23,105	23,432	20,981	20,583
For the fulfilment of the Greenhouse gas reduction quantity required in t CO_{2eq}						
Reference value	197,616,061	198,806,042	224,409,745	225,553,789	207,894,599	203,473,710
Target value	6,916,562 (-3.5 %)	7,952,240 (-4.0 %)	215,433,356 (-4.0 %)	216,531,638 (-4.0 %)	195,420,923 (-6.0 %)	191,265,288 (-6.0%)
Actual emissions	-	-	214,592,554	215,545,804	194,488,052	188,709,711
Quantities for greenhouse gas mitigation eligible for consideration (in million litres)						
Replacing diesel fuel:						
Blending	2,474	2,458	2,659	2,778	4,058	3,140
Petroleum fuels complementary:						
Blending (incl. E85)	1,441	1,436	1,467	1,468	1,408	1,462
Pure fuels (FAME+PÖL+HVO)	3	4	4	3	11	12
Biogas in GWh (compressed and liquefied)	373	449	389	341	717	983
Natural gas (CNG+LNG+ synth. methane) in GWh	-	-	830	845	944	1,870
Liquefied petroleum gas (LPG+ Bio-LPG) in tons	-	-	423,473	397,025	341,047	361,263
Electricity in GWh	-	-	2	59	115	199
Hydrogen in tonnes	-	-	2	2	82	82
Achieved emission reduction of the fuels, in t CO_{2eq}						
Blending	7,206,150	7,552,170	9,329,327	9,485,954	12,763,118	10,659,934
Pure biofuels (incl. biomethane and bio LPG)	107,577	131,491	127,950	110,136	245,984	346,417
Liquefied petroleum gas (LPG)	-	-	399,335	374,394	321,608	340,671
Natural gas (NG, LNG and synth. methane)	-	-	73,571	71,517	70,515	134,706
Hydrogen	-	-	12	11	518	1,147
Power	-	-	197	5,730	13,636	24,895
Reductions from UER	-	-	-	-	784,852	1,828,241
Carried forward from the previous year	639,296	1,045,710	798,500	854,050	-	990,398
total	**7,953,023**	**8,729,371**	**-**	**10,901,792**	**14,200,231**	**15,247,464**

Continued on the next page.

	2016	2017	2018	2019	2020	2021
Quantities in t CO_{2eq}, eligible for the commitment year						
Overfulfilment	1,047,315	798,580	855,171	991,136	933,857	2,423,513
Obligation not fulfilled in the year						
Existing or legally established levy pursuant to § 37c para. 2 BImSchG in euros	648,000	10,081,000	6,594,000	2,425,000	-	-

The figures are rounded values. These statistics reflect the situation as of 01.11.2021. 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. May differ from the calculated savings.
Status: 07/2022
Source: zoll.de

Table 8: Statistical data on the fulfilment of the progressive quota – quota year 2020*

Key figures of the 2020 advanced quota (FQ) in GJ (gigajoules)	
Total energy in the reference value from the GHG quota	1,981,472,977
Quota (0.05 % of the reference value energy)	990,706
Quantities considered for the calculation of the FQ in GJ	
Diesel fuel	-
Petroleum fuel	-
Biodiesel	1,202,000
HVO (incl. co processed HVO + biogenic oils)	4,433,586
Bioethanol and ETBE	-
Biomethanol and MTBE	9,111
Biomethane (compressed + liquefied)	1,468,827
Biogenic liquefied petroleum gas (Bio-LPG)	-
Hydrogen	-
Synthetic methane	-
Quota transfer from previous year	X
total	**7,113,524**
Quantities eligible for the commitment year 2021 in GJ	
Overachievement 2020	6,123,095
Obligation not fulfilled in 2020	
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 01.06.2022.
Due to subsequent notifications and corrections, the figures may still change.
Source: zoll.de

Table 9: Freezing and waiving of blending mandates in Europe 03/2022

Country	Measure	Status	Impact
Finland	2022 and 2023 blending mandates lowered by 7.5 percentage points	Legislation finalised	Up to 350 million litres/y less HVO demand in 2022–2023
Sweden	Emission reduction obligation frozen at 2022 level in 2023	Parliament to vote on government proposal by 15 June	Up to 200 million litres less HVO and 70 million litres less ethanol consumption in 2023
Norway	Overall obligation decreased but advanced obligation increased + potential shift to GHG based mandate	Unclear	Shift from crop to waste based biofuels, but no significant decrease in total biofuels
Germany	Rather than current cap on crop-bades biofuels at 4.4 %, new cap at 2.5 % in 2023 and phased down to 0 % by 2030. Potentially GHG mandate reduction for 2023–2026. Higher multipliers for EVs and hydrogen, delayed UER phase-out and lifting of cap on UCO/animal fats	Working paper released by Federal Ministry yesterday. State Ministries expressed support	Shift from crop to waste based biofuels; Up to 700 million litres less fuel ethanol, 500 million litres less FAME and 100 million litres less HVO in 2023
Belgium	Scrapping of crop-based biofuel contribution towards blending obligation	Government to file proposal soon, after that parliamentary approval uncertain	Shift from crop to waste based biofuels ans up to 200 million litres less ethanol demnad in 2023
Croatia	Waiving of penalties for non-compliance with blending obligation	Legislation finalised	Up to 150 million litres/year less FAME demand in 2022–2023
Czechia	Suspended calorific blending obligations	Legislation finalised	Modest impact as GHG emission reduction obligation still applies
Latvia	Waiving biofuel blending mandates until end 2023	Final decision expected on 1 July	Up to 40 million litres less Fame and 15 million litres less ethanol in 2023

Source: Stratas Advisors

Table 10: Development of EU policy on GHG mitigation in the transport sector between 2018 and „state of play" EP 2022 (03/2022)

Incentive	Current framework (2018)	EC proposal (2021)	EP draft amendment (2022)
Renewable Energy target (2030)	32 %	40 %	45 %
Fuel emission reduction (2030)	6 % (road and rail)	13 % (all transport fuels)	20 % (all transport fuels)
Annex IXA (2030)	1.75 cal% (road and rail)	2.20 cal% (all transport and fuels)	5 cal% (all transport fuels)
Hydrogen-based fuels (2030)	No obligation	2.60 cal% (all transport fuels, only RFNBOs)	5 cal% (all transport fuels, RFNBOs and low carbon hydrogen)
Emission standards	37.5 % reduction cars and 31 % reduction vans (2030); no date for ban on ICE sales	55 % reduction cars and 50 % reduction vans (2030); ban on ICE car and van sales (2035)	55 % reduction cars and 50 % reduction vans (2030); ban on ICE car and van sales (2035)
EU ETS	Road and shipping fully exempt; intra EEA aviation included bit receiving free allowances	Road and shipping fully included from 2026; free allowances for intra EEA aviation phased out by 2027	Shipping included from 2025; Road include from 2025 but waiver for private road transport until 2029; free allowances for intra EEA aviation phased out by 2026

Status: 01/2022
Source: Stratas Advisors

Table 11: (Bio-)fuel production capacities 2022 in Germany

Operator/Plant	Location	Capacity (t/year)	
Biodiesel			
ADM Hamburg AG -Werk Hamburg-	Hamburg	not available	●
ADM Mainz GmbH	Mainz	not available	●
Bioeton Deutschland GmbH	Kyritz	80,000	
Biowerk Sohland GmbH	Sohland	100,000	●
BKK Biodiesel GmbH	Rudolstadt	4,000	●
Bunge Deutschland GmbH	Mannheim	100,000	●
Cargill GmbH	Frankfurt/Main	350,000	●
ecoMotion GmbH	Sternberg	100,000	●
ecoMotion GmbH	Lünen	50,000	●
ecoMotion GmbH	Malchin	12,000	●
gbf german biofuels gmbh	Falkenhagen	132,000	●
Gulf Biodiesel Halle GmbH	Halle (Saale)	58,000	
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	
Mercuria Biofuels Brunsbüttel GmbH & Co. KG	Brunsbüttel	250,000	●

Operator/Plant	Location	Capacity (t/year)	
Natural Energy West GmbH	Neuss	245,000	●
north oil and fats GmbH	Hamburg	18,000	
PME BioLiquid GmbH & Co. Betriebs KG	Wittenberge	120,000	
REG Germany AG	Borken	70,000	●
REG Germany AG	Emden	100,000	
Tecosol GmbH	Ochsenfurt	75,000	●
VERBIO Bitterfeld GmbH	Bitterfeld	195,000	●
VERBIO Schwedt GmbH	Schwedt/Oder	250,000	●
VITERRA Magdeburg GmbH	Magdeburg	180,000	
VITERRA Rostock GmbH	Rostock	200,000	
Total (without ADM)		**3,109,000**	
Bioethanol			
Anklam Bioethanol GmbH	Anklam	55,000	
Clariant Produkte (Deutschland) GmbH	Straubing	1,000	
CropEnergies Bioethanol GmbH	Zeitz	315,000	
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		**739,000**	
Biomethan			
VERBIO Biomethan Zörbig	Zörbig	19,000	
VERBIO Biomethan Schwedt	Schwedt	36,000	
VERBIO Biomethan Pinnow	Pinnow	5,000	
Total		**60,000**	
Mineral oil			
Bayernoil Raffineriegesellschaft mbH	Ingolstadt/Vohburg	10,300,000	
BP Lingen	Lingen (Ems)	4,700,000	
Buna SOW Leuna Olefinverbund GmbH	Böhlen	k.A.	
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 12: UCO imports by the EU in 2021 (mt)

	2020	2021	Y/Y
China	276,199	623,910	+126%
Malaysia	312,631	237,561	–24%
Indonesia	114,684	184,417	+61%
UK	154,831	135,161	–13%
Russia	99,587	88,593	–11%
Chile	35,059	72,401	+107%
Saudi Arabia	65,037	65,281	±0%
United States	104,451	36,649	–65%
Japan	44,892	31,628	–30%
Argentina	32,963	24,904	–24%
Belarus	22,722	21,372	–6%
UAE	9,976	19,981	+100%
Switzerland	13,108	13,850	+6%
Peru	6,910	10,239	+48%
Kuwait	5,615	6,849	+22%
Viet Nam	8,973	6,379	–29%
South Korea	23,968	6,345	–74%
Norway	7,795	6,061	–22%
Jordan	2,902	5,992	+106%
Colombia	7,784	5,703	–27%
Morocco	4,307	5,508	+28%
Serbia	5,600	5,456	–3%
Singapore	7,373	5,386	–27%
Australia	116	4,176	+3,500%
Iran	185	3,628	+1,861%
India	1,866	3,023	+62%
Taiwan	7,780	2,800	–64%
Ukraine	1,428	2,789	+95%
Panama	2,792	2,767	–1%
Iraq	1,020	2,762	+171%
Hong Kong	6,353	2,674	–58%
Philippines	700	2,631	+276%
Uruguay	226	2,330	+931%
New Zealand	3,357	2,200	–34%
Mexico	208	2,022	+872%
Lebanon	3,411	1,780	–48%
Canada	1,175	1,638	+39%
Turkey	970	1,571	+62%
Israel	158	1,519	+861%
Egypt	21,176	1,430	–93%
North Macedonia	925	1,347	+46%
Bosnia	1,045	1,295	+24%
Bahrain	2,630	1,253	–52%
Tunisia	1,764	1,172	–34%
Qatar	1,759	1,144	–35%
Albania	385	1,020	+165%
Others/undefined	282,110	69,351	–75%
Extra EU-27	**1,710,906**	**1,737,948**	**+2%**

Source: Eurostat

Table 13: EU production of biodiesel and HVO 2014 – 2021 in 1,000 t

	2014	2015	2016	2017	2018	2019	2020	2021
Belgium	446	248	235	290	252	254	214	170
Denmark	200	140	140	120	130	130	125	120
Germany	3,352	3,085	3,119	3,208	3,344	3,584	3,127	3,530
France	2,171	2,386	2,224	2,250	2,560	2,497	2,274	1,345
Italy	683	735	742	882	952	1,118	1,256	925
Netherlands	1,720	1,629	1,462	1,929	1,839	1,902	1,939	1,720
Austria	292	340	307	295	287	299	293	275
Poland	692	759	871	904	881	966	955	991
Portugal	335	363	337	356	363	292	262	238
Sweden	231	264	258	209	258	322	312	280
Slovakia	101	125	110	109	110	109	117	117
Spain	1,188	1,175	1,486	1,878	2,143	2,040	1,450	1,500
Czech republic	219	168	149	157	197	251	262	246
EU other	1,081	1,214	1,216	1,502	1,613	1,743	1,751	1,758
EU-27	**12,711**	**12,631**	**12,656**	**14,089**	**14,929**	**15,507**	**14,337**	**13,215**
UK	143	149	342	467	476	510	500	500

Source: F.O.Licht/S&P Global, June 2022

Table 14: Global biodiesel and HVO production 2014 – 2021 in 1,000 t

	2014	2015	2016	2017	2018	2019	2020	2021
Biodiesel production								
EU	10,790	10,531	10,495	11,337	12,196	12,320	11,122	9,920
Canada	300	260	352	350	270	350	311	315
U.S.A.	4,260	4,108	5,222	5,315	6,186	5,744	6,044	5,458
Argentinia	2,584	1,811	2,659	2,871	2,429	2,147	1,157	1,724
Brazil	3,010	3,465	3,345	3,776	4,708	5,193	5,660	5,954
Colombo	519	513	448	510	555	530	530	580
Peru	2	1	0	33	99	135	100	60
China, Mainland	997	693	800	918	734	826	1,250	1,500
India	114	119	123	132	163	210	190	155
Indonesia	3,162	1,425	3,217	3,006	5,428	7,391	7,800	8,200
Malaysia	418	654	512	900	968	1,400	1,225	1,000
Philippines	151	180	199	194	199	213	165	158
Thailand	1,032	1,089	1,084	1,256	1,392	1,624	1,622	1,459
Rest of the world	1,022	1,103	1,266	1,440	1,625	1,800	1,792	1,790
TOTAL	**28,360**	**25,952**	**29,722**	**32,039**	**36,952**	**39,884**	**38,969**	**38,273**

Renewable Diesel/HVO	2014	2015	2016	2017	2018	2019	2020	2021
EU	1,921	2,100	2,161	2,752	2,733	3,187	3,215	3,295
USA	470	522	713	763	902	1,453	1,575	2,406
Other	898	1,047	961	916	728	1,052	1,311	1,650
TOTAL	**3,289**	**3,669**	**3,835**	**4,431**	**4,363**	**5,692**	**6,101**	**7,351**

Source: F.O.Licht/S&P Global, June 2022

Table 15: Global biodiesel and HVO consumption 2014 – 2021 in 1,000 t

Biodiesel consumption	2014	2015	2016	2017	2018	2019	2020	2021
EU-27	10,657	10,211	10,018	10,411	12,151	12,364	11,106	11,219
Canada	334	334	342	378	367	360	334	351
U.S.A.	4,719	4,977	6,946	6,613	6,341	6,038	6,250	5,485
Argentinia	970	1,014	1,033	1,173	1,099	1,071	478	438
Brazil	2,880	3,368	3,333	3,753	4,678	5,167	5,045	5,993
Colombo	519	523	506	513	552	533	500	600
Peru	257	278	294	290	291	293	251	317
China, Mainland	300	208	240	275	360	380	220	225
India	30	35	45	65	75	88	45	45
Indonesia	1,299	585	2,306	1,999	2,900	5,510	7,300	7,400
Malaysia	352	453	449	456	471	656	585	634
Philippines	143	177	192	180	181	192	142	154
Thailand	1,075	1,135	1,025	1,255	1,422	1,449	1,420	1,455
Rest of the world	3,207	1,734	1,743	1,790	2,597	2,885	2,484	2,200
TOTAL	**26,742**	**25,031**	**28,472**	**29,152**	**33,485**	**36,986**	**36,159**	**36,516**

HVO consumption*	2014	2015	2016	2017	2018	2019	2020	2021
EU-27	1,739	2,016	2,069	2,412	2,230	2,619	3,912	3,479
Canada	154	151	168	251	268	337	306	315
U.S.A.	868	1,017	1,181	1,208	1,081	1,995	2,245	3,287
Indonesia	0	0	0	0	0	0	0	100
Thailand	15	15	15	15	15	15	15	15
Rest of the world	184	126	171	371	214	298	273	260
TOTAL	**2,960**	**3,325**	**3,604**	**4,257**	**3,808**	**5,264**	**6,751**	**7,456**

Total Biodiesel/ HVO consumption worldwide (all sectors)	**32,349**	**29,876**	**34,101**	**35,380**	**39,960**	**45,233**	**45,562**	**46,982**

* HVO = Hydrogenated Vegetable Oil; all data for road transport.
Source: F.O: Licht/S&P Global, June 2022

Biofuel mandates

Table 16: National biofuel mandates 2022

	Type	minimum Total biofuel (%)	Progressive Biofuels* (%)	Biofuel in petrol (%)	Biofuel in diesel (%)	Reduction of the GHG intensity of fuels (%)
Austria	Energy	5.75[2]	0.5	3.4	6.3	-6
Belgium	Energy	10.2	0.113	6.5	6.5	-6
Bulgaria*	Volume	-	1 (in Diesel)	9	6	-6
	Energy	-	0.05	-	-	-6
Croatia*	Energy	8.81	-	0.1	8.71	-6
Cyprus*	Energy	7.3	-	-	-	-6
Czech Republic	Volume	-	0.22	4.1	6	-6
Denmark	Energy	-	-	-	-	-6[4]
Estonia	Energy	7.5[5]	0.5	-	-	-6
Finland	Energy	19.5[6]	2	-	-	-6
France	Energy	-	1.6 (in petrol) 1 (in Diesel)	9.2[7]	8.4[7]	-10
Germany	Energy	-	0.2	-	-	-7[8]
Greece*	Energy	-	-	3.3	-	-6
	Volume	-	0.2	-	7	
Hungary	Energy	8.4	0.2	6.1 (RON 95)	0.2	-6
Irland	Volume	13	-	-	-	-6
Italy	Energy	10	2	-	-	-6
Latvia*	Volume	-	-	9.5 (RON 95) 5 (RON 98)	6.5-7 (ex. in winter)	-6
Lithuania	Energy	6.8	0.2	10[9]	7	-6
Luxembourg*	Energy	7.7[10]	-	-	-	-6
Malta*	Energy	10	0.1	-	-	-6
Netherlands	Energy	17.9	1.8	-	-	-6[11]
Poland	Energy	8.8	-	3.2	5.0	-6
Portugal*	Volume	11	0.5	-	-	-10
Romania	Volume	-	-	8	6.5	-6
Slovakia	Energy	8.2	0.3 (counted individually)	-	-	-6
	Volume	-	-	9	6.9	-6
Slovenia*	Energy	10[12]	-	-	-	-6
Spain	Energy	10[13]	0.2	-	-	-
Sweden		-	-	-	-	-7.8 for petrol -30.5 for Diesel
UK	Volume	12.6[14]	0.9	-	-	-

*For these countries, the data refer to the year 2021

Source: www.ePure.org (retrieved: 16.06.22)

1. After double counting
2. Biofuels from palm oil are excluded since 1 July 2021
3. Double counting at 0.95%.
4. Minimum 3.4% must be achieved with fuels only. Palm and soybean oil biofuels are excluded
5. Plant-based biofuels are limited to 4.5
6. Double counting of advanced biofuels is no longer possible
7. Palm and soybean oil biofuels excluded
8. Caps (in e/e): crop-based biofuels at 4.4%; biofuels with high ILUC risk at 0.9%; UER at 0.9%.
9. Optional for 98 octane petrol
10. 9.7% after double counting. Advanced biofuels must make up at least 50% of the biofuel blend after double counting. Plant-based biofuels are limited to 5%.
11. UER can no longer be used to comply with Art. 7a of the FQD.
12. According to a draft regulation
13. Cap for biofuels with high ILUC risk (incl. palm oil, fresh fruit bunches from oil palms, PFAD, palm kernel oil and palm kernel shell oil) at 3.1
14. Upper limit for cereals at 3.67%.

Table 17: Current biofuel mandates in the EU for selected member states[1]

a) Austria

	Total quota (energy content, % cal.)	Biodiesel (% cal)	Bioethanol (% cal)	GHG emission reduction (%) **	Double Counting*
2021	5.75 plus 0.5 advanced biofuels	6.3	3.4	6	No
2022	**5.75 plus 0.5 advanced biofuels**	**6.3**	**3.4**	**6**	**No**

Source: Fuel Ordinance 2012, amendment 2020

*Double counting: wastes and residues from agricultural and forestry production including fisheries and aquaculture, processing residues, cellulosic non-food materials or ligno-cellulosic materials.
** Incl. UER and e-mobility

b) Belgium

	Total share	Biodiesel (% energy content)	Bioethanol (% energy content)	Double counting
From 1 January 2021	9.55	6.5	6.5	max. 0.6 %
From 1 January 2022	**10.2**	**6.5**	**6.6**	**max. 0.95 %**

Source: Amendment from 27.2.2021

c) Croatia

	Total quota (% cal)	Biodiesel	Bioethanol	Double counting
2019	7.85	6.61	0.98	for advanced and waste-based biofuels
2020	**8.81**	**7.49**	**1.00**	
2030	14			

Source: See GAIN Report

[1] **Source for Table 65 (pages 120 – 125) and further information:**
GAIN Report Biofuel Mandates in the EU by Member State and United Kingdom – 2022
(Nr. E42022-0044, published 05.07.2022, Author: Sabine Lieberz), see also https://bit.ly/3BHiu1K

Table 17: Biofuel mandates in the EU for selected member states – continued

d) Czech republic

	Obligation to reduce of total greenhouse gas emissions by (%)	Biodiesel (% vol.)	Bioethanol (% vol.)	Double counting
2020	6	6	4.1	Yes
2022	**6**	**6**	**4.1**	**Yes**

e) Denmark

	Total quota (% cal)	Advanced biofuels (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Double counting
Since 2020	**7.6**	**0.9***			

Source: Stratas
* The extended mandate for advanced biofuels excludes UCO and animal fats.

f) Finland

	Total quota (% cal)	Biodiesel	Bioethanol	Double Counting
Since 2019	**30**			

Source: Stratas.
The Finnish Parliament passed a law that sets a gradually increased biofuel target until 30% is reached in 2029. In addition, Finland passed a law requiring an advanced biofuel share of 2% in 2023 and an increase to 10% in 2030. (Source: IEA Country Report).

g) France

	Bioethanol (target, % cal)	Advanced bioethanol (% en.)	Biodiesel (target, % cal)	Advanced biodiesel (% en.)	Double Counting
2023–2027	8,6	1,2	8	0,4	Yes
From 2028	**8,6**	**3,8**	**8**	**2,8**	**Yes**

Source: Amendment of 27.2.2021

Table 17: Biofuel mandates in the EU for selected member states – continued

i) Germany

	GHG quota (CO_2- reduction for fuels)	Biofuels from food and feed crops (Upper limit, energetic)	Waste-based biofuels from UCO and animal fats (upper limit, energetic)	Advanced biofuels (minimum share, energetic)[1]
2021	6%	Max. 4.4%	Max 1.9%	0.05%
2022	7%			0.2%
2023	8%			0.3%
2024	9.25%			0.4%
2025	10.5%			0.7%
2026	12%			1.0%
2027	14.5%			1.0%
2028	17.5%			1.7%
2029	21%			1.7%
2030	25%			2.6%

GHG quota:
- Electricity for e-vehicles triple counting
- 1) double counting for amounts over the minimum

1) Exclusion of iLUC raw materials/palm oil:
from 2022: 0.9% (energ.)
from 2023: 0.0%

Year	Penalty payment for undercutting
Since 2015	0.47 EUR per kg CO_2 equivalent
From 2022	0.60 EUR per kg CO_2 equivalent

Source: Federal law (in German: https://www.buzer.de/gesetz/15016/index.htm)

j) Greece

	Total quota (% cal)	Biodiesel	Bioethanol	Double counting
2021	10	7	3.3	No
2022	**10**	**7**	**3.3**	**No**

k) Hungary

	Biodiesel (% cal)	Bioethanol (% cal)	Advanced biofuels (%, en.)	Double counting
1.1.2020–31.12.2020	8.2	6.1		No
2022	**8.4**	**6.1**	**0.2**	

Source:
Government Decree No. 343/2010 on requirements and certification of sustainable biofuel production (overruled in 2017)
Government Decree No. 279/2017 on sustainability requirements and certification of biofuels
Double counting: §2 (4) of CXVII/2010 Act on promoting the use of renewable energy and the reduction of greenhouse gas emission of energy used in transport
Hungary's National Renewable Energy Action Plan.

Table 17: Biofuel mandates in the EU for selected member states – continuede

l) Ireland

	Total share (% vol of fossil fuels to be added)	Corresponds to % vol of total fuel consumption	Double counting
2019	11.11	10	UCO, Cat. 1 Tallow, used bleached earth (SBE), waste water from palm oil mills (POME), whey permeate Including advanced biofuels
Ab 2020	**12.359**	**11**	

Further information:
http://www.nora.ie/biofuels-obligation-scheme.141.html
Section 44C(3)(b) of the NATIONAL OIL RESERVES AGENCY ACT 2007
http://revisedacts.lawreform.ie/eli/2007/act/7/revised/en/html#SEC44C.

m) Italy

	Biofuels Total (% by energy content)	Progressive biofuels required to reach the targets. (% by energy content)	
		% of "progressive" biomethane	% of other "advanced" biofuels
2021	10	2.0	0.5
2022	10	2.5	0.6
2023	**10**	**3.0**	**0.5**

n) Netherlands

	Total quota (% cal)	Including advanced biofuels (% cal)	Upper limit for biofuels recovered from agricultural raw materials (% cal)	Double counting
2020	16.4	1.0	5	Yes
2021	17.5	1.2	5	
2022	16.4	1.7	1.2	Yes
2023	**17.4**	**2.3**	**1.2**	

Source: Dutch Emission Authority.

o) Poland

	Total quota (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Double counting
2020	8.5			
2021	**8.7**			
2022	8.8			Yes
2023	8.9			
2024	9.1			

Source: FAS Warsaw.

Table 17: Biofuel mandates in the EU for selected member states – continued

p) Portugal

	Total quota (% cal)	Biodiesel (% cal)	Bioethanol / ETBE (% cal)	Advances biofuels	Double counting
2020	10		-		Yes
Since 2021	**11**			**0.5**	

Sources: Consumption targets: Decree-Law 117/2010, Decree-Law 69/2016, Law 42/2016 , Budget Law for 2018 und 2019. Double counting: Decree-Law 117/2010 and Annex III in Implementing Order 8/2012.

Cap for cultivated biomass: from 2021: 3.1 % energetic

q) Romania

	Total quota (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Double counting
2020	10	6.5	8.0	Yes
Since 2021	**10**	**6.5**	**8.0**	

Sources: Government Decisions 1121/2013 and 931/2017.

r) Slovakia

	Total quota* (% cal)	Biodiesel (% Vol.)	Bioethanol (% Vol.)	2. Generation Biokraftstoffe (% cal)	Double counting
2020	7.6	minimum 6.9	minimum 6.9	**0.5**	Yes
2021	**8**				
2022–2024	8.2			0.75	
2025–2030					

Source: Act no. 309/2009 amended by Act no. 309/2018 on Support of Renewable Energy Resources.
* with minimum E9 and B6.9

s) Slovenia

	Total quota (% cal)	Advanced biofuels (% en.)*	GHG reduction	Double counting
2020	10		6	Yes
2021	10		6	
2022	**10.1**	**0.2**	**6**	**Yes**

Source: FAS Vienna

* Biodiesel and bioethanol: no specific targets

t) Spain

	Total quota (% cal)	Biodiesel (% cal)	Bioethanol (% cal)	Double counting
2020	8.5	-	-	Yes
2021	9.5			
2022	**10**			

Table 17: Biofuel mandates in the EU for selected member states – continued

u) Sweden

The main support programme for renewable fuels for transport is a biofuel mandate scheme. In addition, biofuels for transport purposes are exempt from Swedish energy tax (depending on biofuel type and blending) and the CO_2 tax (all biofuels). On 1 July 2018, the Swedish government introduced a system, that aims to gradually reduce greenhouse gas emissions by blending biofuels with petrol and diesel. diesel. This reduction is to be reinforced over time with specific control stations, with the aim of reducing greenhouse gas emissions of the transport sector by 70 per cent by 2030 compared to 2010 (Source: FAS The Hague based on the of the EurObserver country report and the IEA country report).

v) United Kingdom

	Total quota (% cal)	Development Fuel target (% cal)	Double counting
2020	10.637	0.166	Specific waste/residual-material (defined by system administrator), alongside energy crops and renewable fuels of a non-biological origin; development fuels.
2021	10.679	0.556	
2022	10.714	0.893	
2023 – 2031	Rising every year in 0.25 percent volume steps until:	Rising every year in 0.23 percent volume steps up to:	
2032	10.959	3.196	

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Table 18: Deutschland: Germany: Biofuel feedstocks in terajoules (TJ) [1]

Fuel type	Bioethanol			Biodiesel (FAME)		
Quota year	2018	2019	2020	2018	2019	2020
Feedstock						
Waste/Residual		698	1,661	41,144	33,139	32,975
Ethiopian mustard				52	98	73
Cereal whole plant	1,326	424	1,034			
Fodder beets						
Grass/arable grass						
Barley	1,326	424	1,034			
Maize	15,484	19,623	17,367			
Palm oil				17,790	22,523	22,216
Rapeseed				25,105	29,600	28,274
Rye	1,439	1,148	2,111			
Silage maize				675		
Soy				1,898	1,215	1,994
Sunflowers					3,073	3,897
Triticale	1,956	1,493	1,301			
Wheat	8,622	5,394	3,562			
Sugar cane	498	1,426	2,062			
Sugar beet	1,042	603	429			
Total	**30,785**	**30,808**	**29,528**	**86,663**	**89,646**	**89,429**

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

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

Fuel type	Bioethanol			Biodiesel (FAME)		
Quota year	2018	2019	2020	2018	2019	2020
Feedstock						
Waste/Residual	16	26	63	1,101	887	882
Ethiopian mustard				1	3	2
Cereal whole plant	50	16	39			
Fodder beets						
Grass/arable grass						
Barley						
Maize	585	741	656			
Palm oil				476	603	594
Rapeseed				672	792	757
Rye	54	43	80			
Silage maize						
Soy				18	32	53
Sunflowers				51	82	104
Triticale	74	56	49			
Wheat	326	204	135			
Sugar cane	19	54	78			
Sugar beet	39	23	16			
Total	**1,163**	**1,164**	**1,116**	**2,319**	**2,399**	**2,393**

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			
2018	2019	2020	2018	2019	2020	2018	2019	2020	Quota year
									Feedstock
1,329	736	1,885	77	24	9,228				Waste/Residual
									Ethiopian mustard
									Cereal whole plant
		10							Fodder beets
		2							Grass/arable grass
		10							Barley
									Maize
			1,106	1,812	34,665	5	19	28	Palm oil
						19	18	26	Rapeseed
									Rye
80	491	643							Silage maize
									Soy
									Sunflowers
									Triticale
									Wheat
									Sugar cane
		27							Sugar beet
1,408	**1,227**	**2,577**	**1,184**	**1,836**	**43,893**	**24**	**37**	**54**	**Total**

Biomethan			HVO			Vegetable oil			
2018	2019	2020	2018	2019	2020	2018	2019	2020	Quota year
									Feedstock
27	15	38	2	1	212				Waste/Residual
									Ethiopian mustard
									Cereal whole plant
		0.2							Fodder beets
		0.04							Grass/arable grass
		0.2							Barley
									Maize
			25	42	795	0.1	1	0.8	Palm oil
						1	0.5	0.7	Rapeseed
									Rye
2	10	13							Silage maize
									Soy
									Sunflowers
									Triticale
									Wheat
									Sugar cane
									Sugar beet
29	**25**	**52**	**27**	**43**	**1,007**	**1**	**1**	**1**	**Total**

Table 20: Germany: Biofuel feedstocks by origin in terajoules[1]

Region	Africa			Asia			Australia		
Quota year	2018	2019	2020	2018	2019	2020	2018	2019	2020
Feedstock									
Waste/Residual	391	174	648	12,180	13,122	17,842	84	18	14
Ethiopian mustard									
Cereal whole plant									
Fodder beets									
Grass/arable grass									
Barley									
Maize	9								
Palm oil				17,867	21,409	52,975			
Rapeseed				17	71	110	3,104	5,014	4,214
Rye									
Silage maize									
Soy							10		
Sunflowers									2
Triticale									
Wheat									
Sugar cane									
Sugar beet									
Total	400	174	648	30,065	34,603	70,927	3,198	5,031	4,229

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

Table 21: Germany: Biofuel feedstocks by origin in 1,000 t[1,2]

Region	Africa			Asia			Australia		
Quota year	2018	2019	2020	2018	2019	2020	2018	2019	2020
Feedstock									
Waste/Residual	10	5	17	326	351	451	2	0	0
Ethiopian mustard									
Cereal whole plant									
Fodder beets									
Grass/arable grass									
Barley									
Maize	0.3								
Palm oil				474	566	1,285			
Rapeseed				1	2	3	83	134	113
Rye									
Silage maize									
Soy							0.3		
Sunflowers									0
Triticale									
Wheat									
Sugar cane									
Sugar beet									
Total	11	5	17	800	919	1,739	86	135	113

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			
2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020	Quota year
												Feedstock
27,096	19,924	25,312	14	11	15	2,682	969	1,681	523	379	749	Waste/Residual
							9	27	52	89	46	Eth. mustard
1,326	424	1,034										Cereal wh. plant
		10										Fodder beets
		2										(arable) grass
		10										Barley
15,475	19,607	17,364					15	0			2	Maize
			1,029	2,970	4,842				5	39	492	Palm oil
22,002	24,533	22,160						1,827				Rapeseed
1,439	1,148	2,111										Rye
80	491	643										Silage maize
19	27	70			2				646	1,188	1,922	Soy
1,898	3,073	4,589										Sunflowers
1,956	1,493	1,301										Triticale
8,622	5,394	3,562										Wheat
			247	350	688				251	1,076	1,375	Sugar cane
1,042	603	456										Sugar beet
80,954	**76,716**	**78,626**	**1,290**	**3,331**	**5,547**	**2,682**	**993**	**3,535**	**1,477**	**2,771**	**4,586**	**Total**

Europe			Central America			North America			South America			
2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020	Quota year
												Feedstock
721	536	665	0		0	72	26	41	14	10	20	Waste/Residual
							0	1	1	2	1	Eth. mustard
50	16	39										Cereal wh. plant
		0.2										Fodder beets
		0.04										(arable) grass
		0.2										Barley
585	741	656		79			1	0.01			0.1	Maize
			28		125				0.1	1	13	Palm oil
589	656	593						49				Rapeseed
54	43	80										Rye
2	10	13										Silage maize
1	1	2			0.04				17	32	51	Soy
51	82	120										Sunflowers
74	56	49										Triticale
326	204	135		13								Wheat
			9		26				9	41	52	Sugar cane
39	23	17		93								Sugar beet
2,490	**2,368**	**2,369**	**37**	**185**	**152**	**72**	**27**	**91**	**42**	**86**	**137**	**Total**

Table 22: Germany: Total biofuel feedstocks[1]

	[TJ]			[kt]		
	2018	2019	2020	2018	2019	2020
Feedstock						
Waste/Residual	42,971	34,598	46,262	1,145	928	1,195
Ethiopian mustard	52	98	73	1	3	2
Cereal whole plant	1,326	424	1,034	50	16	39
Fodder beets			10			0.2
Grass/arable grass			2			0.04
Barley			10			0.2
Maize	15,484	19,623	17,367	585	741	656
Palm oil	18,901	24,418	58,308	502	646	1,423
Rapeseed	25,124	29,618	28,310	672	793	757
Rye	1,439	1,148	2,111	54	43	80
Silage maize	80	491	643	2	10	13
Soy	675	1,215	1,994	18	32	53
Sunflowers	1,898	3,073	4,591	51	82	120
Triticale	1,956	1,493	1,301	74	56	49
Wheat	8,622	5,394	3,562	326	204	135
Sugar cane	498	1,426	2,062	19	54	78
Sugar beet	1,042	603	456	39	23	17
Total	**120,066**	**123,619**	**168,098**	**3,538**	**3,632**	**4,617**

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

Table 23: Biofuels whose feedstock originates from Germany [TJ]*

Biofuel type	Bioethanol			Biomethan			CP-HVO
Quota year	2018	2019	2020	2018	2019	2020	2020
Feedstock							
Waste/Residual	124	220	303	1,316	736	1,858	
Barley	1,234	367	884				
Cereal whole plant						10	
Fodder beet						2	
Grass/arable grass							
Maize	247	264	109				
Rapeseed							4
Rye	432	470	537				
Silage maize/whole plant				80	491	643	
Sunflowers							
Triticale	459	271	145				
Wheat	1,519	392	117				
Sugar beet	585	468	392			27	
Total	**4,601**	**2,452**	**2,487**	**1,396**	**1,227**	**2,540**	**4**

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

Table 24: Germany: Emissions and emission savings of biofuels[1]

	Emissions [t CO_{2eq} / TJ]			Savings [%][2]		
	2018	2019	2020	2018	2019	2020
Biofuel type						
Bioethanol	12.69	11.04	7.44	86.40	88.16	92.02
Bio-LNG			13.70			85.44
Biomethan	9.19	10.12	8.94	90.23	89.24	90.50
Biomethanol			33.50			64.09
Btl-FTD	8.30			91.27		
FAME	16.26	18.37	17.97	82.90	80.68	81.11
HVO	21.93	19.45	19.82	76.94	79.55	79.15
CP-HVO		20.43	17.69		78.52	81.40
Vegetable oil	30.18	25.90	31.60	68.26	72.77	66.78
Weighted average of all biofuels	**15.32**	**16.48**	**16.46**	**83.81**	**82.59**	**82.63**

Source: BLE (report online at *www.ufop.de/ble*)
[1] Differences in totals are due to rounding
[2] Savings compared to fossil fuel benchmark 83.8 g CO_{2eq}/MJ

Biodiesel (FAME)			Plant oil			Total		
2018	2019	2020	2018	2019	2020	2018	2019	2020
8,186	6,275	7,759				9,626	7,231	9,920
						1,234	367	884
								10
								2
						147	264	109
12,187	13,812	11,396	19	18	26	12,206	13,830	11,426
						432	470	537
						80	491	643
4						4		
						459	271	145
						1,519	392	117
						585	468	419
20,377	**20,087**	**19,155**	**19**	**18**	**26**	**26,392**	**23,784**	**24,212**

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