

IEA-Advanced Motor Fuels ANNUAL REPORT 2020

Germany



Germany

Drivers and Policies

In 2020, Germany's transport sector was strongly affected by the COVID-19 pandemic. However, with regard to the overall set targets to significantly reduce GHG emissions on EU and national levels (e.g. by the [European Green Deal](#), [National Climate Plan 2050 \[NCP\]](#)), the transition toward decarbonization in the transport sector is ongoing. Germany has committed to reduce its emissions in non-ETS sectors, including the transport sector, by 38% by 2030, compared to 2005 levels, as set in the [Effort Sharing Regulation \(ESR\)](#). Although Germany has already taken comprehensive climate measures, further national efforts are required to achieve the set goal of CO₂ savings.

While national and sector-wide GHG emission reduction targets for 2030 are in line with the German long-term strategy (i.e., NCP), these are not always reflected in sector-specific national contributions (i.e., EU energy efficiency target) and policies and measures (e.g., in the transport sector). These measures are specified in the [Climate Action Programme 2030](#). With the [Climate Action Plan](#), Germany sets binding target saving of at least 40-42% of GHG emission, compared to 1990, in the transport sector. This translates to 98 to 95 Mt CO₂-eq in 2030.¹ In total, the government foresees to invest more than €54 billion in climate protection by 2023.

The main public drivers regarding policy in the transport sector remain the revised [EU Renewable Energy Directive \(RED II\)](#) and the [Fuel Quality Directive \(FQD\)](#), which are implemented by the [Federal Emissions Control Act](#) (BImSchG §37) and the GHG quota. The FQD is defined by EU Member States to implement GHG reduction targets for fuels placed on the market. By 2020, target reduction is set for 6% through alternative and renewable fuels, including the crediting of up to 1.2% upstream emission reductions per [UER 2018](#). Fuel suppliers will be obliged to report GHG emissions for the fuels they have placed on the market.² Most recently, the federal government agreed on key points for the national implementation of the RED II. In addition to the gradual increase of the GHG quota to 22% in 2030, it includes the setting of the cap for biofuels from cultivated biomass at 4.4% from 2026.³ The national implementation of REDII and thus the adjustment of the GHG quota by 2030, must be completed by June 2021. The current trend shows that the GHG quota alone will not meet the actual GHG reduction requirements of -40% by 2030 in comparison to 1990. In fact, fulfillment of this quota requires a high share of renewables in the transport sector, which can only be achieved when almost all fuel options are considered.

The number of electric vehicles and plug-ins has significantly increased since 2017 (See Advanced Motor Fuels Statistics below), although the share in total number of vehicles and final energy consumption remain small. During the last few years, Germany's public debate has been focusing on electric mobility, battery-powered vehicles, PtX and hydrogen. With regard to transport in the agricultural/forestry sector, tax relief for biofuels has been extended by the European Commission ([UEBLL](#), [EEAG](#)). To decarbonize the transport sector, high priority has recently been given not only to e-mobility for short-distance traffic and passenger cars, but also to the enforcement of compressed natural gas (CNG) infrastructure along the most important middle- and long-distance road networks. The federal government strongly supports the use of liquefied natural gas (LNG) for heavy-duty transport and waterborne application. CNG/LNG is discussed as controversial in expert groups such as the federal government-convened [National Platform Future of Mobility \(NPM\)](#). The application of hydrogen as transport fuel is one of the keys within the [National Hydrogen Strategy](#) that was published in June 2020.

Believing e-mobility is essential for climate-friendly mobility, the federal government has been supporting measures since 2016.⁴ There are currently 60 electric vehicle models from German manufacturers on the market which are charged with electricity at circa 34,000 publicly accessible

¹ <https://www.bundesregierung.de/resource/blob/975226/1679914/e01d6bd855f09bf05cf7498e06d0a3ff/2019-10-09-klima-massnahmen-data.pdf?download=1>

² https://www.dbfz.de/fileadmin/user_upload/Referenzen/Statements/Hintergrundpapier_Weiterentwicklung_THG-Quote.pdf

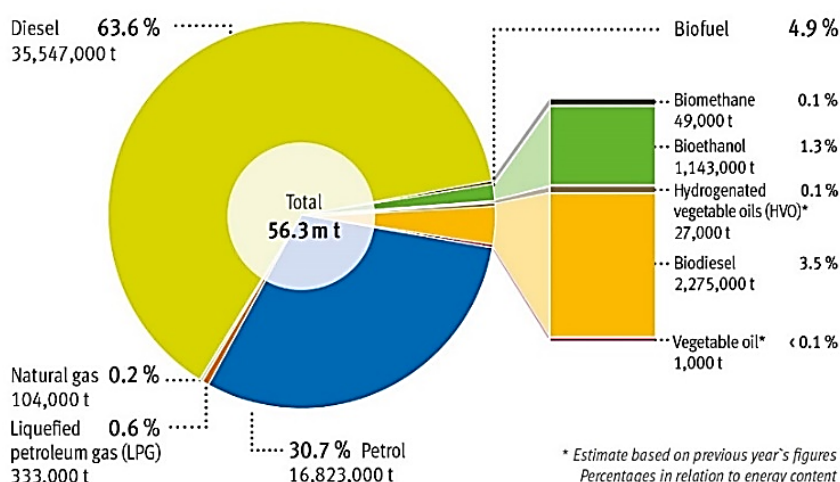
³ https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Glaeserne_Gesetze/19_Lp/thg_quote/Entwurf/thg_quote_refe_bf.pdf

⁴ <https://www.bmwi.de/Redaktion/DE/Dossier/elektromobilitaet.html>

charging points as of January 2021.⁵ In order to make the use of electric vehicles more attractive, the federal government has decided to provide additional impetus for e-mobility. The overall package consists of temporary purchase incentives (until the end of 2025), additional funds for the expansion of the charging infrastructure, and additional efforts in the public procurement of electric vehicles and tax measures. It is expected that 1 million electric vehicles (battery and plug-in) will be on Germany's roads by 2022 (forecast by NMP).

Advanced Motor Fuels Statistics

Figure 1 shows the 2019 German fuel consumption for use in road transportation. The consumption of biofuels totaled 2.8 Mt, primarily low-level blends of biodiesel, hydrogenated vegetable oil, bioethanol and biomethane. Moreover, to a minor extent, biomethane is used for CNG. Due to lacking incentives, there is no market demand for E85 and pure biodiesel.



Source: FNR based on AGEb, BAFA, BLE, DVFG 2020⁶

Fig. 1. Fuel Consumption in the Transport Sector in Germany in 2019

Tables 1 and 2 show the 2013-20 trends for biofuels and biofuel blends. The switch at the beginning of 2015 in the biofuels quota legislation from quantitative quotas to GHG-reduction quotas, and the settlement of a compromise on the EU level on the RED in 2015 increased the average GHG reduction of biofuels and avoided 10 Mt CO₂-eq in 2019; 13 Mt CO₂-eq are expected for 2020 to meet the GHG quota of 6%.⁷ The overall savings in GHG emissions of all biofuels (pure) was 82.6% compared to fossil fuels.⁸ The increasing GHG savings of biofuels demonstrate that the physical demand for biofuels to comply with the GHG quota decreased. The 30% jump of biodiesel consumption in 2020 is caused by article 26 of REDII, where 2020 is the reference year for the future ceiling for food crop-based biofuels.⁹

⁵ https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/HandelundVertrieb/Ladesaeulenkarte/Ladesaeulenkarte_node.html

⁶ Federal Office for Economic Affairs and Export Control; BAFA et al. (Federal Statistics Office [Destatis], DVFG [German LPG Association], the Federal Ministry of Finance [or BMF], Agency for Renewable Resources [Fachagentur Nachwachsende Rohstoffe e.V., or FNR]), February 2020.

⁷ New reference values for fossil fuels according to the 38th BImSchV are in force since 2018. <https://www.fuels-of-the-future.com/presse/mehr-klimaschutz-im-verkehr-durch-biokraftstoffe-kurzfristig-erreichbar>

⁸ https://www.ble.de/SharedDocs/Downloads/DE/Klima-Energie/Nachhaltige-Biomasseherstellung/Evaluationsbericht_2019.pdf?__blob=publicationFile&v=4

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018L2001&from=EN#d1e3461-82-1>

Table 1. Trends in German Biodiesel/FAME Sales, 2013–2020, in Mt¹⁰

| Sale | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Blend | 1.741 | 1.970 | 1.978 | 1.987 | 2.183 | 2.296 | 2.301 | 3.025 |
| Pure biodiesel | 0.030 | 0.005 | 0.003 | 0.001 | n/a | n/a | n/a | n/a |
| Total | 1.772 | 1.975 | 1.981 | 1.988 | 2.183 | 2.296 | 2.301 | 3.025 |

Table 2. Trends in German Bioethanol Sales, 2013–2020, in Mt

| Sale | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| E85 | 0.014 | 0.010 | 0.007 | n/a | n/a | n/a | n/a | n/a |
| Ethanol | 1.041 | 1.082 | 1.049 | 1.047 | 1.045 | 1.077 | 1.055 | 0.972 |
| ETBE | 0.154 | 0.139 | 0.119 | 0.129 | 0.111 | 0.110 | 0.088 | 0.126 |
| Total | 1.209 | 1.231 | 1.177 | 1.176 | 1.156 | 1.187 | 1.177 | 1.098 |

Table 3 shows the number of passenger cars in Germany by fuel type for 2016-20. A total of 65.8 million vehicles, including 4.5 million motor bikes, were registered in Germany as of January 1, 2020, along with 47.7 million passenger cars, 3.3 million trucks, 2.3 million towing vehicles and 81,364 buses. At a share of 0.2%, 82,198 CNG-powered cars were registered. The number of hydrogen-powered cars increased from 374 (2019) to 507 (+35.6%). (In the tables, n/a means data not available.)

Table 3. Number of Passenger Cars in Germany by Fuel Type on January 1, 2016–2020

| Year | Gasoline | Diesel | LPG | CNG | EV | Hybrid | Plug-in |
|------|------------|------------|---------|--------|---------|---------|---------|
| 2016 | 29,825,223 | 14,532,426 | 475,711 | 80,300 | 25,502 | 130,365 | X |
| 2017 | 29,978,635 | 15,089,392 | 448,025 | 77,187 | 34,022 | 165,405 | 20,975 |
| 2018 | 30,451,268 | 15,225,296 | 421,283 | 75,459 | 53,861 | 236,710 | 44,419 |
| 2019 | 31,031,021 | 15,153,364 | 395,592 | 80,776 | 83,175 | 341,411 | 66,997 |
| 2020 | 31,464,680 | 15,111,382 | 371,472 | 82,198 | 136,617 | 539,383 | 102,175 |

LPG = liquefied petroleum gas according to European fuel quality standard EN 589.

CNG = compressed natural gas according to German fuel quality standard DIN 51624.

EV = electric vehicle.

X = values not comparable

Source: KBA 2020¹¹

Research and Demonstration Focus

Since 2009, the federal government has made circa €3 billion (\$3.62 billion US) available for research and development. Public funding for alternative motor fuels on the national scale is supported by the Federal Ministries of Transport and Digital Infrastructure (BMVI) in the areas of National Innovation Programme hydrogen and fuel cell technology, [NIPII](#), infrastructure, e-mobility, LNG, CNG, and jet fuel, and by Education and Research ([BMBF](#)) such as P2X and SynErgie, and “Kopernikus Projects”. In this context, BMVI has launched a new supporting program for renewable fuels, with €1.5 billion (\$1.81 billion US) available for 2021-24, consisting of resources from the Energy and Climate Fund (EKF) and the National Hydrogen Strategy.¹² The [Ministry of Economic Affairs and Energy \(BMWi\)](#), focuses on eFuels in the “Energiewende im Verkehr” program, including a total funding of €130 million (\$157 million US). As a central measure, “real laboratories of energy transition” were established; in 2022, a roadmap will be presented.¹³ Under the Renewable Resources Funding Scheme of the [BMEL](#), 10 R&D projects related to biofuels and active in 2020 have received funding of €3 million (\$3.6 million US). Due to an adverse European framework for biomass-based fuels, increased funding is not anticipated.

¹⁰ Bafa March 2021, Official Mineral Oil Data December 2020)

https://www.bafa.de/SiteGlobals/Forms/Suche/Infothek/Infothek_Formular.html?nn=8064038&submit=Senden&resuItsPerPage=100&documentType=_type_statistic&templateQueryString=Amtliche+Daten+Mineral%C3%B6l+daten&sortOrder=dateOfIssue_dt+desc

¹¹ https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/Jahresbilanz/b_jahresbilanz_inhalt.html?nn=2601598

¹² <https://www.bmvi.de/SharedDocs/DE/Artikel/G/neues-foerderkonzept-erneuerbare-kraftstoffe.html>

¹³ <https://www.energieforschung.de/forschung-und-innovation/energiewende-im-verkehr>

Outlook

Renewable fuels are important for achieving the future climate targets in transport. Those are required, especially for shipping and aviation, but also for road transport. Electric mobility is in the fast lane, but reaching climate and energy targets will not be possible without the use of all available options, including hydrogen, eFuels, market-introduced biofuels and advanced biofuels. Further R&D activities, such as reducing the GHG emissions of biofuels to make them compatible with the RED II limits, also following the [ESR](#) approach, are needed to meet persistent challenges for the near future.

Additional Information Sources

- Bundesverband der deutschen Bioethanolwirtschaft, www.bdbe.de
- Bundesverband Regenerative Mobilität, www.brm-ev.de/en
- Verband der Deutschen Biokraftstoffindustrie, www.biokraftstoffverband.de
- Deutsches Biomasse Forschungszentrum, www.dbfz.de¹⁴

Major changes

- Increase of GHG Quota to 6%; to be increased to 22% by 2030
- Political agreement on the national implementation of RED II
- National Hydrogen Strategy published in June 2020
- New national supporting programs launched, e.g. renewable fuel program (BMVI).

Benefits of participation in AMF

Access to global information and expertise with regard to advanced transport fuels; exchange of experience on implementation of AMF solutions.

¹⁴ <https://www.dbfz.de/pressemediathek/publikationsreihen-des-dbfz/dbfz-reports/dbfz-report-nr-11/>