

# IEA-Advanced Motor Fuels ANNUAL REPORT

# 2019

Germany



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### **Drivers and Policies**

Germany has committed to reduce its emissions in non-ETS sectors, including the transport sector, by 38% by 2030 compared to 2005 levels. Although Germany has already taken comprehensive climate measures, further national efforts are required to achieve the set goal of CO<sub>2</sub> savings. These have already been set out in the Federal Government's Climate Action Plan 2050<sup>1</sup> and are now specified in the Climate Action Programme 2030,<sup>2</sup> adopted by the Federal Government in October 2019.

The Climate Action Programme 2030 comprises four components for concrete CO<sub>2</sub> emissions mitigation: (1) support programs and incentives for cutting CO<sub>2</sub>; (2) carbon pricing: revenues from carbon pricing will be reinvested in measures promoting climate action or (3) will be returned to citizens, and (4) regulatory measures that will enter into force successively until 2030.<sup>3</sup> With the Climate Action Plan, Germany sets the binding target of saving at least 40 to 42% of greenhouse gas (GHG) emission compared to what was saved in 1990 in the transport sector. In total, the government plans to invest more than €54 billion (\$61 billion, US) in climate protection by 2023.

The main public driver regarding policy in the transport sector remains the revised EU Renewable Energy Directive II (RED II).<sup>4</sup> The discussion about diesel engines has been ongoing since 2015. The current trend shows that the GHG quota alone (in force since 2015) will not meet the actual GHG reduction requirements of -40% by 2030 in comparison to 1990. In fact, fulfilling 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 new infrastructure of production facilities for advanced fuels including biomass to liquid (BTL)/power to liquid (PTL) will be required from 2021 at the latest.<sup>5</sup> Further, the number of electric vehicles and plug-ins has significantly increased since 2017 (see Advanced Motor Fuels Statistics below), although the share in the total number of vehicles

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<sup>1</sup> <https://www.bmu.de/en/topics/climate-energy/climate/national-climate-policy/greenhouse-gas-neutral-germany-2050/>

<sup>2</sup> <https://www.bundesregierung.de/breg-en/issues/climate-action/klimaschutzprogramm-2030-1674080>

<sup>3</sup> <https://www.bundesregierung.de/breg-en/issues/climate-action/klimaschutzziele-finanzieren-1694724>

<sup>4</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001>

<sup>5</sup> Meisel et al. (2019). Untersuchungen zur Ausgestaltung der Biokraftstoffgesetzgebung in Deutschland. DBFZ

remains small. Exploiting synergies in combining biomass (BTx)- and electricity/power (PTx)-based technologies in context of SynBioPTx (e.g., by using bio-CO<sub>2</sub>, using PT-hydrogen for product synthesis and fuel refining) also offers new perspectives in the transport sector.<sup>6</sup>

Germany's public debate focuses mainly on electric mobility and battery-powered vehicles concerning transport in metropolitan areas, and on a speed limit for highways (German Autobahn).<sup>7</sup> Only a committed policy to support advanced motor fuels would strengthen the market perspective, which is partly reflected in the Government's Mobility and Fuels Strategy,<sup>8</sup> the Climate Action Programme<sup>9</sup> and national and European legislation.

Since January 2018, the Upstream Emissions Reductions (UER)<sup>10</sup> ordinance implementing EU legislation, has entered into force. Depending on the development of the total amount of fuel used, the average specific GHG prevention and compliance with up to 1.2% GHG avoidance through UER resulted in a constant absolute amount of biofuels in 2019.<sup>44</sup> From 2020 on, the mineral oil industry can apply UER measures to comply with legal requirements, including a reduction in GHG emissions by 6%, with a base year of 2010. Furthermore, the German Emission Control Act<sup>11</sup> bans all double-counting and excludes animal fats from the quota eligibility. However, recent regulations expand the list to include bio-based, co-refined hydrated oils that have been produced sustainably, Power to X (P2X),<sup>12</sup> and the use of electricity in electric vehicles.<sup>13</sup>

To decarbonize the transport sector, high priority has recently been given not only to electromobility for short-distance traffic and passenger cars, but also to the enforcement of CNG infrastructure along the most important middle- and long-distance road networks. In addition, the government strongly supports the use of LNG for heavy-duty transport and waterborne application. Use of CNG/LNG is discussed but controversial in expert groups like the Federal Government-convened National Platform Future of

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<sup>6</sup> Naumann, K. et al. (2019): Monitoring Biokraftstoffsektor. 4<sup>th</sup> Ed. DBFZ Rep. No. 11

<sup>7</sup> <https://www.bundestag.de/parlament/plenum/abstimmung/abstimmung?id=622;>  
<http://dip21.bundestag.de/dip21/btd/19/140/1914000.pdf>

<sup>8</sup> <https://www.bmvi.de/SharedDocs/EN/Dossier/MKS/mobility-and-fuels-strategy.html>

<sup>9</sup> [https://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Klimaschutz/klimaschutzprogramm\\_2030\\_umsetzung\\_klimaschutzplan.pdf](https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/klimaschutzprogramm_2030_umsetzung_klimaschutzplan.pdf) (Sections 3.4.3.4 ff.)

<sup>10</sup> <https://www.gesetze-im-internet.de/uerv/UERV.pdf>

<sup>11</sup> [https://www.gesetze-im-internet.de/bimschv\\_38\\_2017/BJNR389200017.html;](https://www.gesetze-im-internet.de/bimschv_38_2017/BJNR389200017.html;)  
<https://www.buzer.de/gesetz/12898/v219254-2019-05-25.htm>

<sup>12</sup> <https://www.gesetze-im-internet.de/biokraft-nachv/BJNR318200009.html>

<sup>13</sup> <https://www.gesetze-im-internet.de/emog/BJNR089800015.html>

Mobility (NPM).<sup>14,15</sup> Application of hydrogen as transport fuel is one of the keys within the National Hydrogen Strategy now drafted to begin during 2020. Since 2009, Germany has funded eMobility with around €5 billion (\$5.4 billion US) and is working to make electromobility more attractive.<sup>16</sup>

By the end of 2020, the Federal Ministry of Transport and Digital Infrastructure (BMVI) will support the establishment of at least 15,000 publicly accessible charging stations with a total of €300 million (\$331 million US) by the charging infrastructure funding program. Since August 2019, around 10,000 additional normal and quick charging points have been funded by BMVI. The overall coordination of the needs-based charging infrastructure is carried out using the location tool (German “StandortTool”<sup>17</sup>) developed in 2018. As of December 2019, around 23,840 public and partially public charging points for energy companies, car park and parking lot operators, supermarkets and hotels have been recorded.<sup>18</sup> That is an increase of over 50% within one year. The share of fast charging stations is around 12%.

### ***Advanced Motor Fuels Statistics***

Figure 1 shows 2018 German fuel consumption for use in road transportation. The consumption of biofuels totaled 3.5 Mt — primarily low-level blends of biodiesel, hydrogenated vegetable oil, bioethanol and biomethane. Moreover, to a minor extent, biomethane is used for CNG. Lacking incentives, there is no market demand for E85 and pure biodiesel.

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<sup>14</sup> <https://www.plattform-zukunft-mobilitaet.de>

<sup>15</sup> [https://www.plattform-zukunft-mobilitaet.de/wp-content/uploads/2019/10/NPM\\_Bericht\\_AG-5\\_Roadmap-LNG-CNG\\_rz01-1.pdf](https://www.plattform-zukunft-mobilitaet.de/wp-content/uploads/2019/10/NPM_Bericht_AG-5_Roadmap-LNG-CNG_rz01-1.pdf)

<sup>16</sup> <https://www.bmvi.de/SharedDocs/EN/Dossier/Electric-Mobility-Sector/electric-mobility-sector.html>

<sup>17</sup> <https://www.standorttool.de/>

<sup>18</sup> <https://www.bdew.de/energie/elektromobilitaet-dossier/energiwirtschaft-baut-ladeinfrastruktur-auf/>

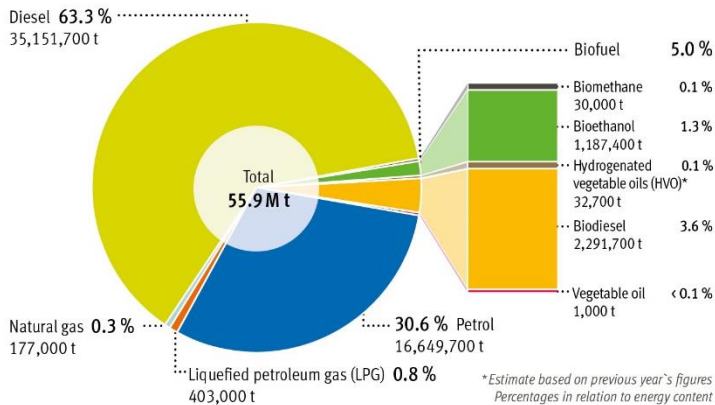


Fig. 1 Fuel Consumption in the Transport Sector in Germany in 2018  
Source: FNR on the basis of BAFA, Destatis, DVFG, BDEW, BLE 2019<sup>19</sup>

Tables 1 and 2 show the 2012-2019 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, have increased the average GHG reduction of biofuels on the German market to 84% and avoided an estimated 9.5 million tons CO<sub>2</sub>-eq. in 2018.<sup>20</sup> Table 3 shows the number of passenger cars in Germany by fuel type for 2015- 2019. (In the tables, n/a means data not available.)

A total of 64.8 million vehicles, including 4.4 million motor bikes, were registered in Germany as of January 1, 2019,<sup>21</sup> along with 47.1 million passenger cars, 3.1 million trucks, 2.2 million towing vehicles, 80,500 buses, and 303,607 other vehicles.

<sup>19</sup> 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 Nachhaltigende Rohstoffe e.V., or FNR]), February 2019.

<sup>20</sup> New reference values for fossil fuels according to the 38<sup>th</sup> BImSchV are in force since 2018. [https://www.ble.de/SharedDocs/Downloads/EN/Climate-Energy/EvaluationAndProgressReports2018.pdf?\\_\\_blob=publicationFile&v=2](https://www.ble.de/SharedDocs/Downloads/EN/Climate-Energy/EvaluationAndProgressReports2018.pdf?__blob=publicationFile&v=2)

<sup>21</sup> [https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/b\\_jahresbilanz.html](https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/b_jahresbilanz.html)

Table 1 Trends in German Biodiesel/FAME Sales, 2012 – 2019, in mt

Sale	2012	2013	2014	2015	2016	2017	2018	2019
Blend	1.928	1.741	1.970	1.978	1.987	2.183	2.296	2.314
Pure biodiesel	0.131	0.030	0.005	0.003	0.001	n/a	n/a	n/a
Total	2.059	1.772	1.975	1.981	1.988	2.183	2.296	2.314

Table 2 Trends in German Bioethanol Sales, 2012 – 2019, in mt

Sale	2012	2013	2014	2015	2016	2017	2018	2019
E85	0.021	0.014	0.010	0.007	n/a	n/a	n/a	n/a
Ethanol	1.090	1.041	1.082	1.049	1.047	1.045	1.077	1.076
ETBE	0.142	0.154	0.139	0.119	0.129	0.111	0.110	0.088
Total	1.253	1.209	1.231	1.177	1.176	1.156	1.187	1.177

Table 3 Number of Passenger Cars in Germany by Fuel Type on 2015 – 2019

Year	Gasoline	Diesel	LPG	CNG	EV	Hybrid	Plug-in
2015	29,837,614	13,861,404	494,148	81,423	18,948	107,754	X
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

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 2019<sup>22</sup>

## Research and Demonstration Focus

Public funding for alternative motor fuels on the national scale is supported by the BMVI<sup>23</sup> (infrastructure, e-mobility, LNG, CNG, jet fuel, “National Strategy to Extend the Infrastructure for Alternative Fuels”; €300 million [\$325 million US] will be made available by 2020), and the Federal Ministry of Education and Research (BMBF)<sup>24</sup> (P2X and SynErgie; “Kopernikus Projects”<sup>25</sup>). In addition, the Ministry of Economic Affairs and Energy (BMWi),<sup>26</sup> focusing on E-Fuels in the “Energiewende im Verkehr”

<sup>22</sup> KBA (Kraftfahrt-Bundesamt; Federal Motor Transport Authority), 2020, [https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/Jahresbilanz/2019\\_b\\_barometer.html?nn=2084378](https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/Jahresbilanz/2019_b_barometer.html?nn=2084378) and [https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/b\\_jahresbilanz.html?nn=644526](https://www.kba.de/DE/Statistik/Fahrzeuge/Bestand/b_jahresbilanz.html?nn=644526)

<sup>23</sup> <https://www.bmvi.de/EN>

<sup>24</sup> <https://www.bmbf.de/en>; [www.bmbf.de/foerderungen/bekanntmachung-2292.html](https://www.bmbf.de/foerderungen/bekanntmachung-2292.html)

<sup>25</sup> <https://www.kopernikus-projekte.de/en/home>

<sup>26</sup> <https://www.bmwi.de/Navigation/EN/Home/home.html>

program, includes a total funding of €87 million (\$96.2 million US). As a central measure, “real laboratories of energy transition” were established; in 2022, a roadmap will be presented.<sup>27</sup> Under the Renewable Resources Funding Scheme of the BMEL,<sup>28</sup> 23 R&D projects related to biofuels received funding of €11 million (\$12 million US) in 2019. Due to an adverse European framework for biomass-based fuels, increased funding is not envisaged.

#### **Outlook**

Germany is currently approving different measures for supporting the future market uptake of synthetic fuels on the basis of renewable energy (i.e., P2X). Such instruments comprise quota for the implementation of P2X products, but also direct promotion of production and corresponding regulations on EU level.<sup>29</sup> Further R&D activities (e.g., reducing GHG emissions of biofuels to make them compatible with the RED II, following the ESR<sup>30</sup> approach) are needed to meet persistent challenges for the near future.

#### **Additional Information Sources**

- Bundesverband der deutschen Bioethanolwirtschaft, [www.bdbe.de](http://www.bdbe.de)
- Bundesverband Regenerative Kraft, [www.brm-ev.de/en](http://www.brm-ev.de/en)
- Verband der Deutschen Biokraftstoffindustrie, [biokraftstoffverband.de](http://biokraftstoffverband.de)

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<sup>27</sup> <https://www.energieforschung.de/forschung-und-innovation/energiewende-im-verkehr>

<sup>28</sup> <https://www.bmel.de/EN>

<sup>29</sup> <https://dipbt.bundestag.de/doc/btd/19/168/1916829.pdf>

<sup>30</sup> [https://ec.europa.eu/clima/policies/effort/regulation\\_en](https://ec.europa.eu/clima/policies/effort/regulation_en)