



Federal Ministry
for Economic Affairs
and Climate Action



Development of Renewable Energy Sources in Germany in the year 2024

Charts and figures based on statistical data from the Working Group on
Renewable Energy-Statistics (AGEE-Stat)

Status: February 2025



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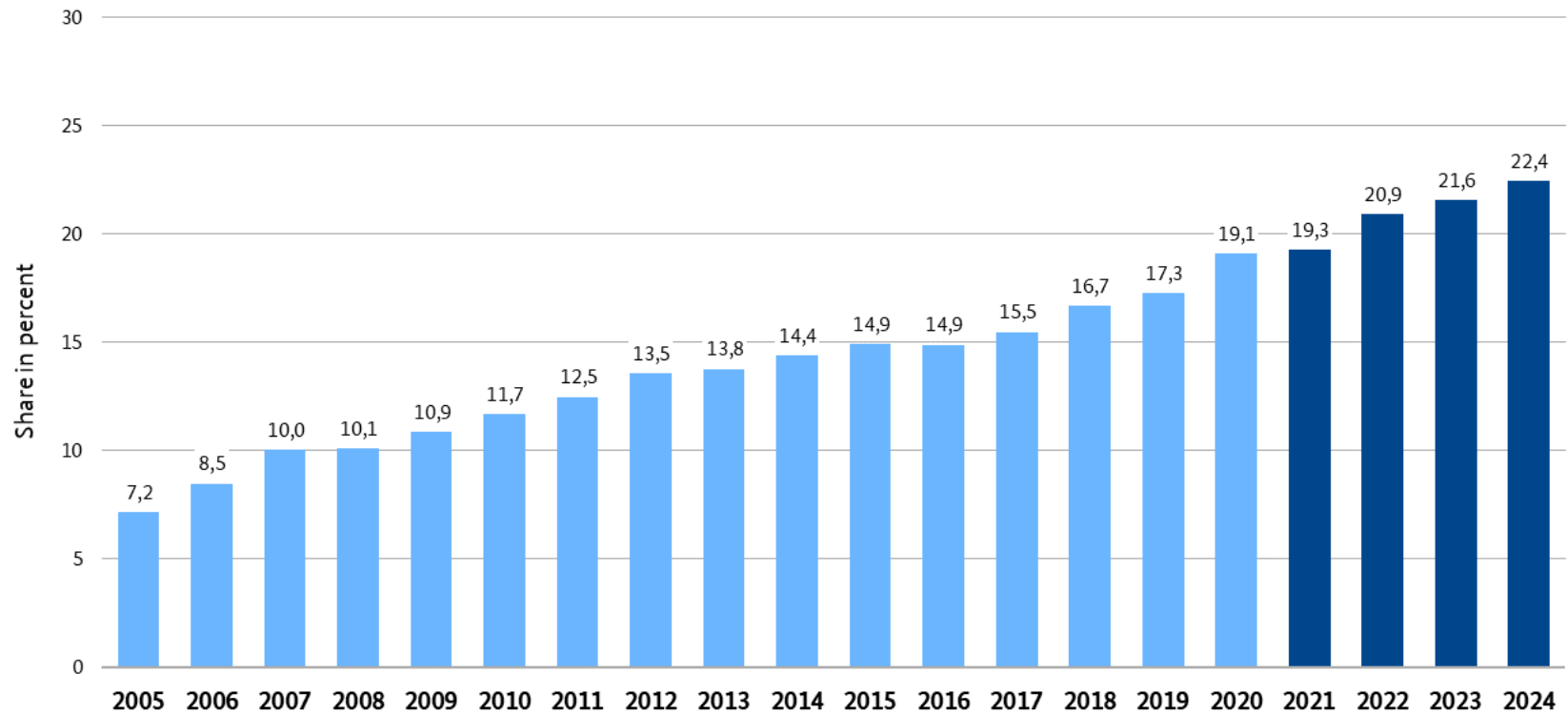
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Notes: In figures deviations in totals may occur due to rounding
The most important terms are explained in the glossary at the end of the document



Development of renewable energy share of gross final energy consumption in Germany

share according EU directive¹

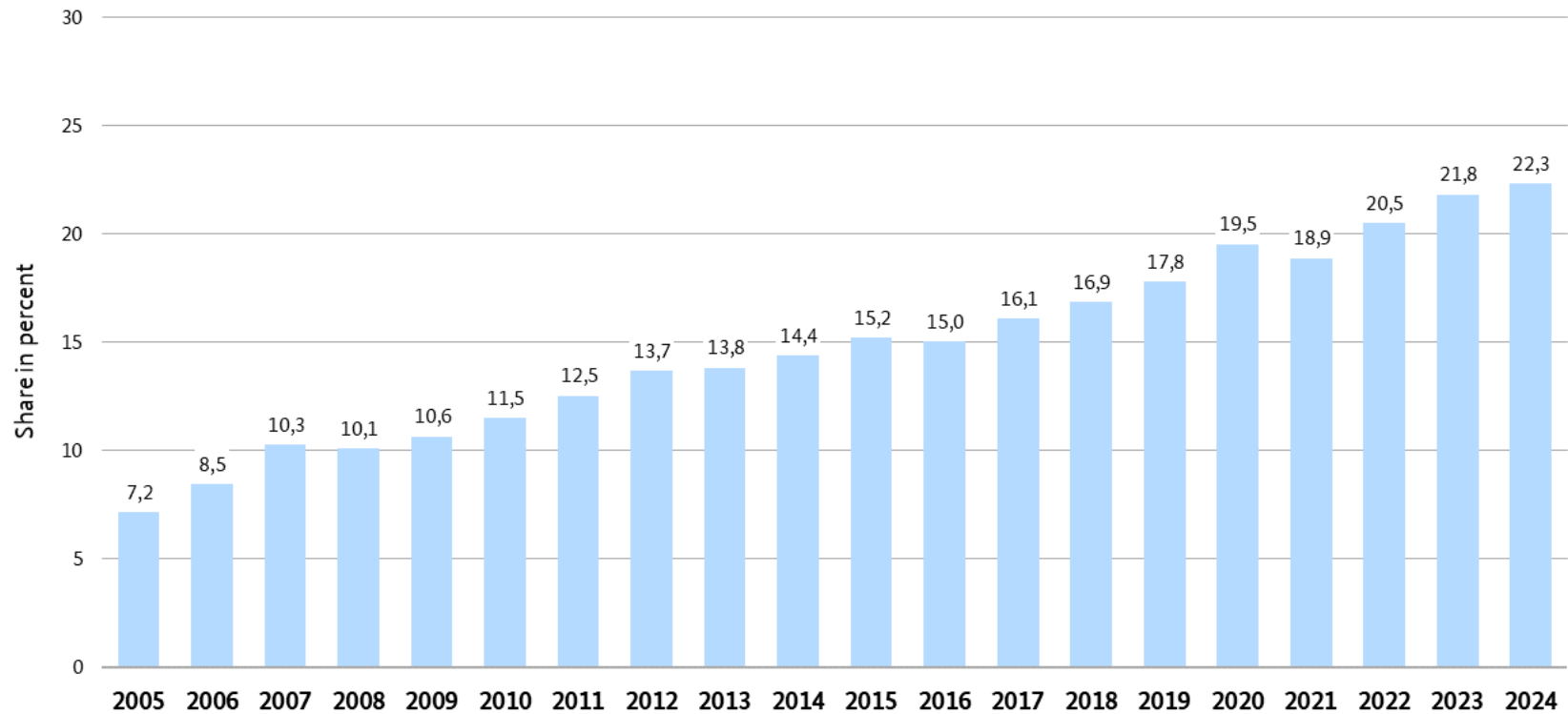


¹ until 2020 according to EU-directive 2009/28/EG, from 2021 according to EU-directive (EU) 2018/2001



Development of renewable energy share of gross final energy consumption in Germany

share calculated according to German "Energiekonzept**"



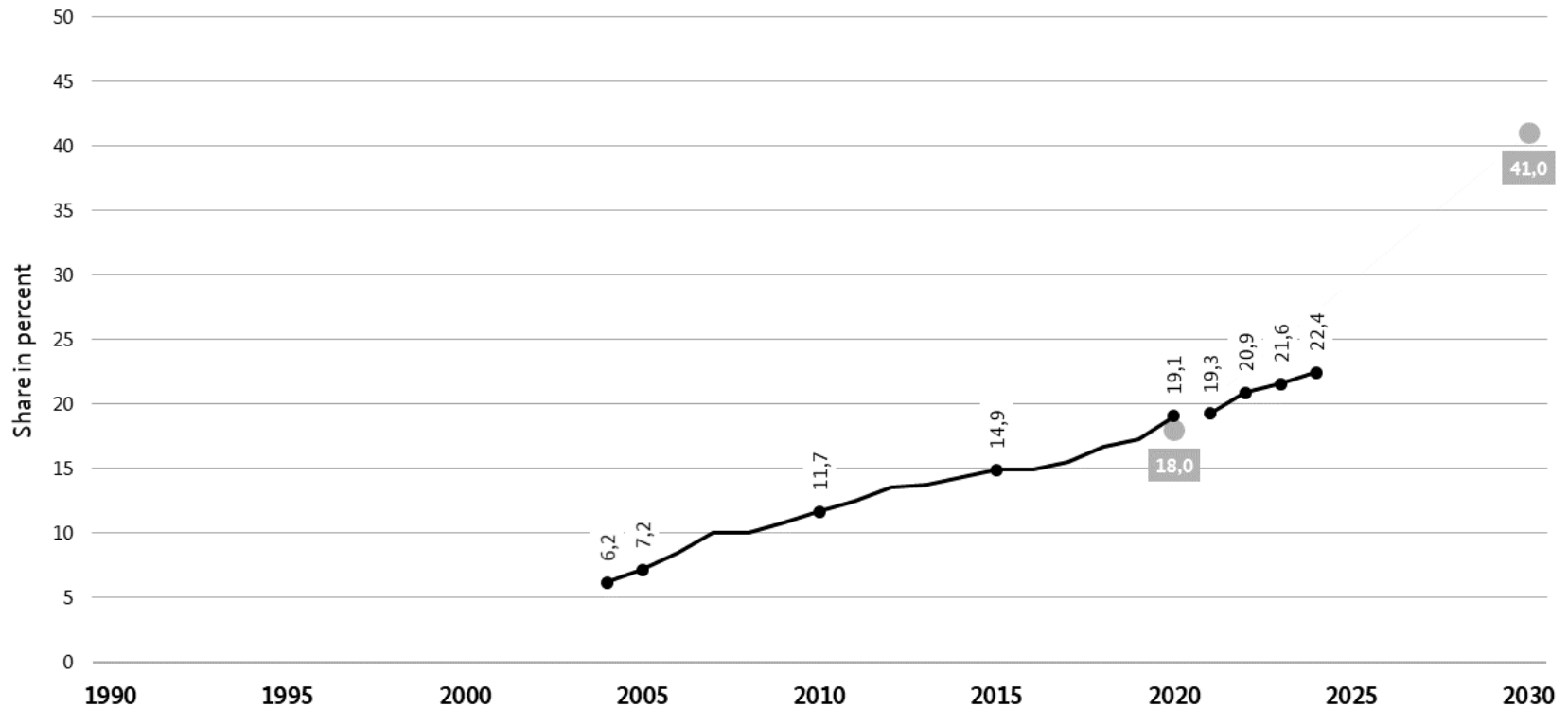
**Calculations not in accordance with RED regulations

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



Development of renewable energy share of gross final energy consumption in Germany

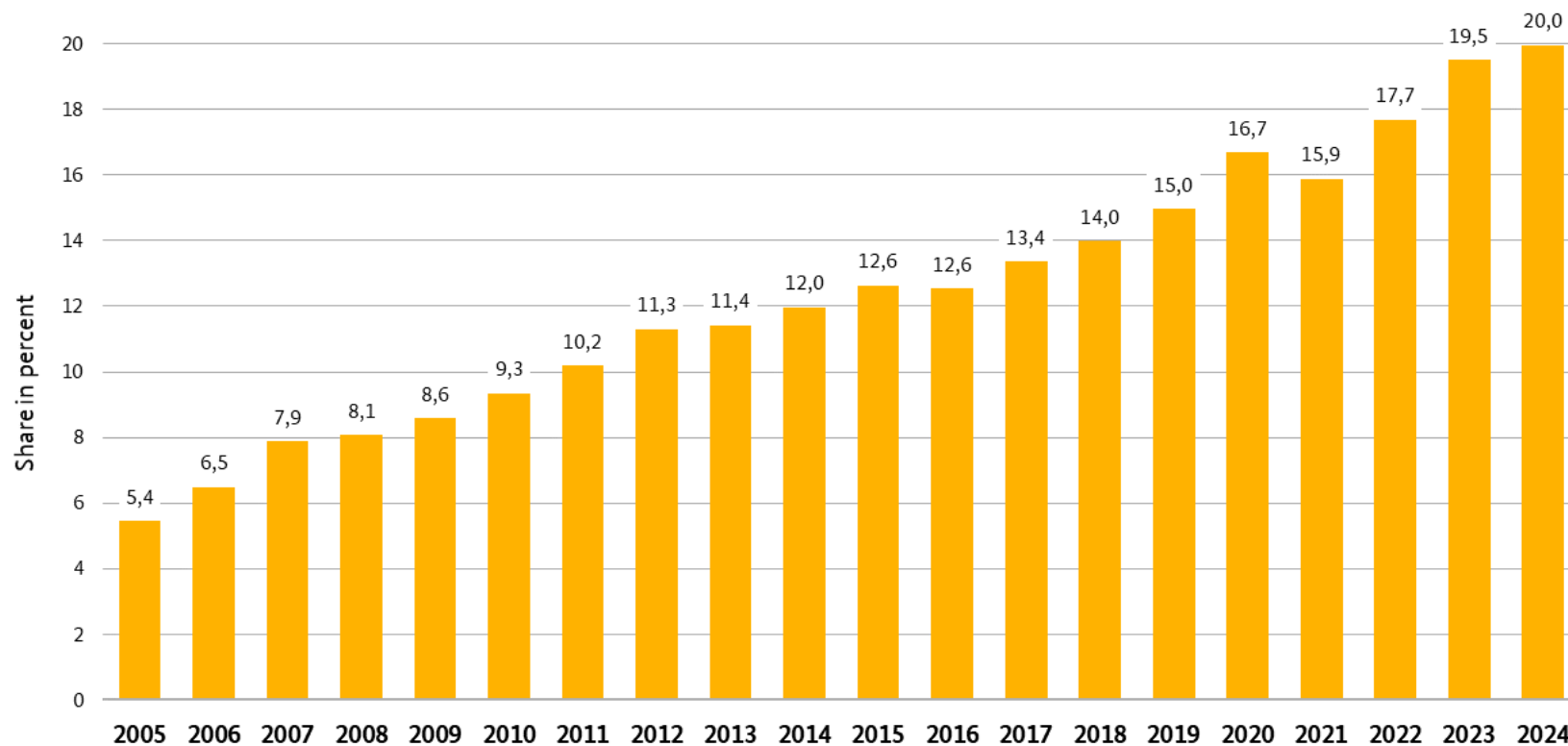
Calculation method and target values according to EU renewable energy regulation¹



¹ until 2020 according to EU-directive 2009/28/EG (RED I), from 2021 according to EU-directive (EU) 2018/2001 (RED II), target value according to German NECP (August 2024)



Development of renewable energy share of primary energy consumption in Germany

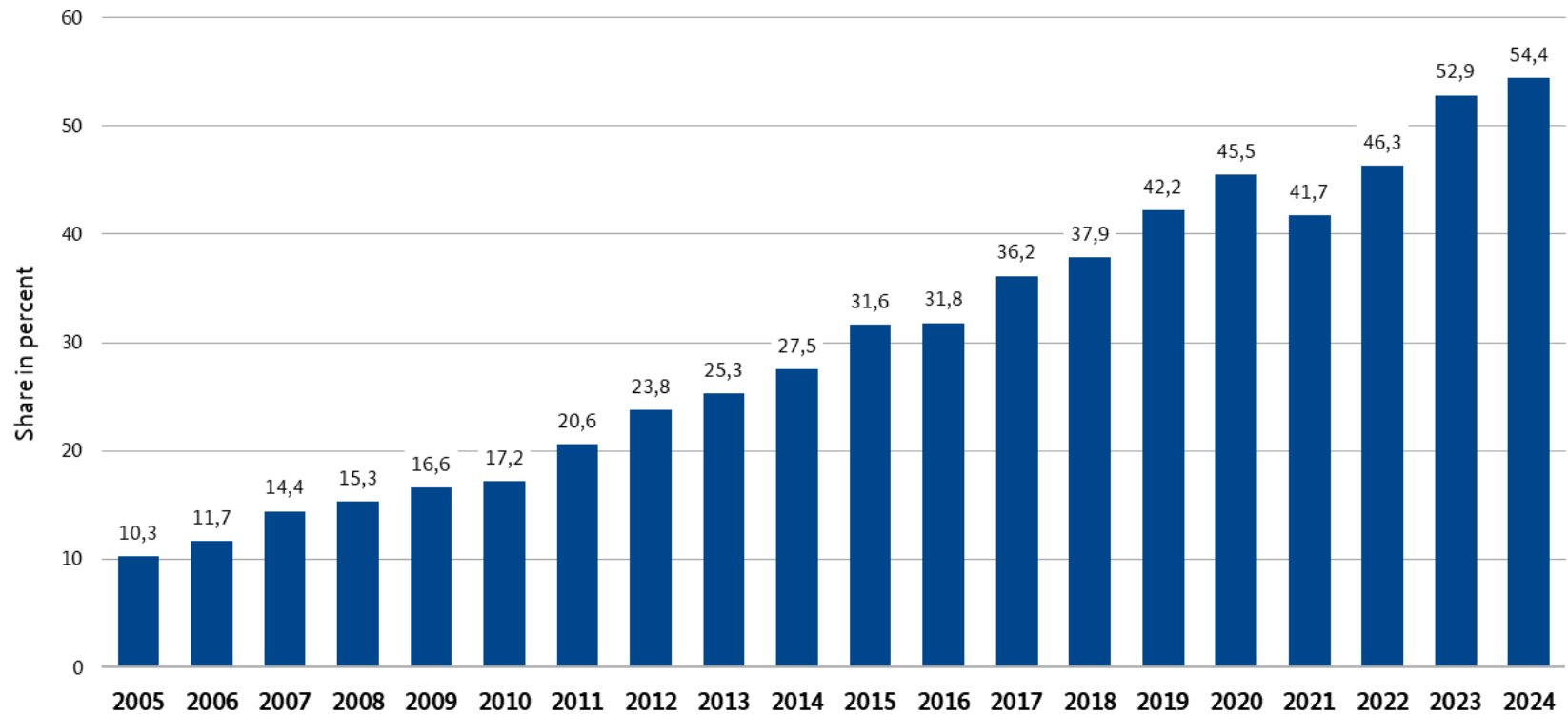


Notice: declining share in primary energy consumption due to modified calculation approach from 2012 onwards, previous years not yet revised

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



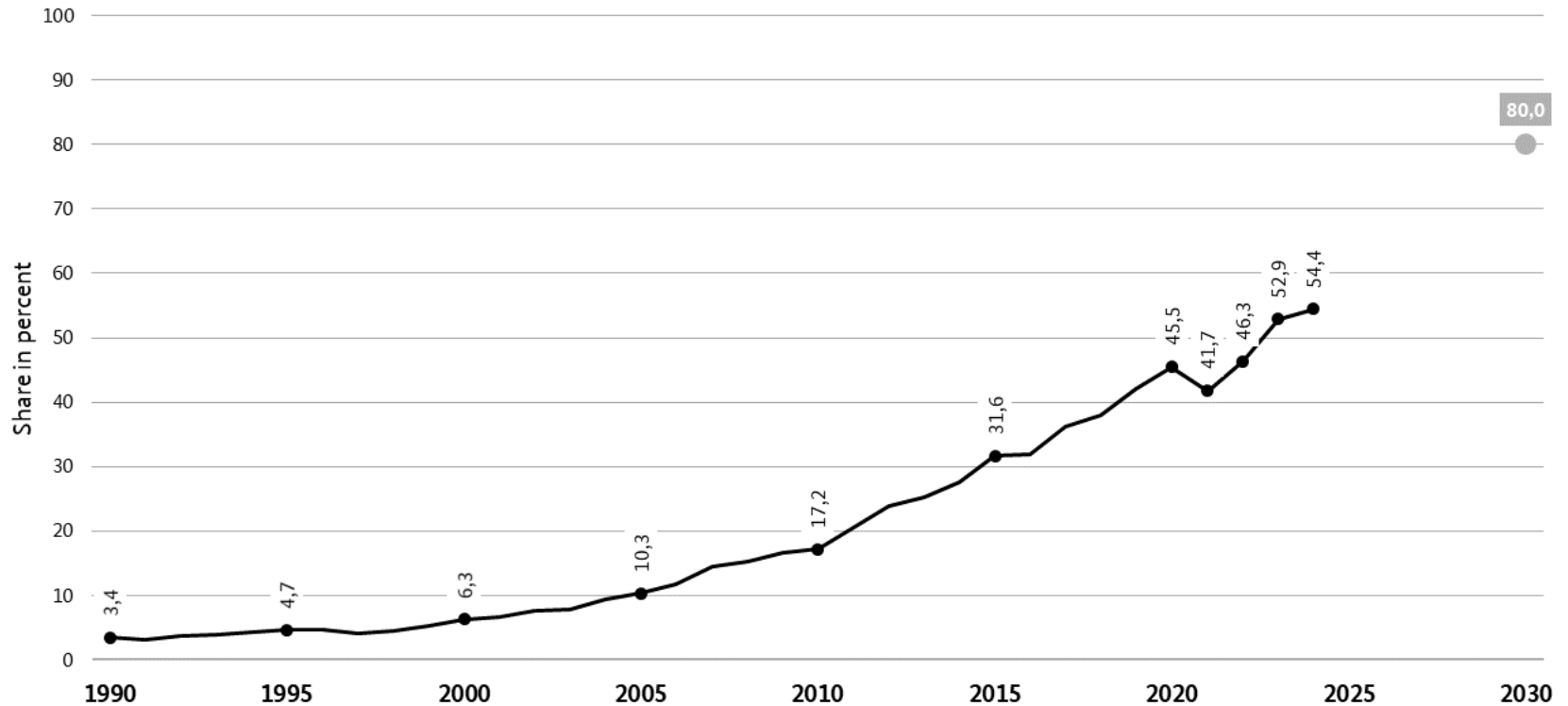
Development of renewable energy share of gross electricity consumption in Germany





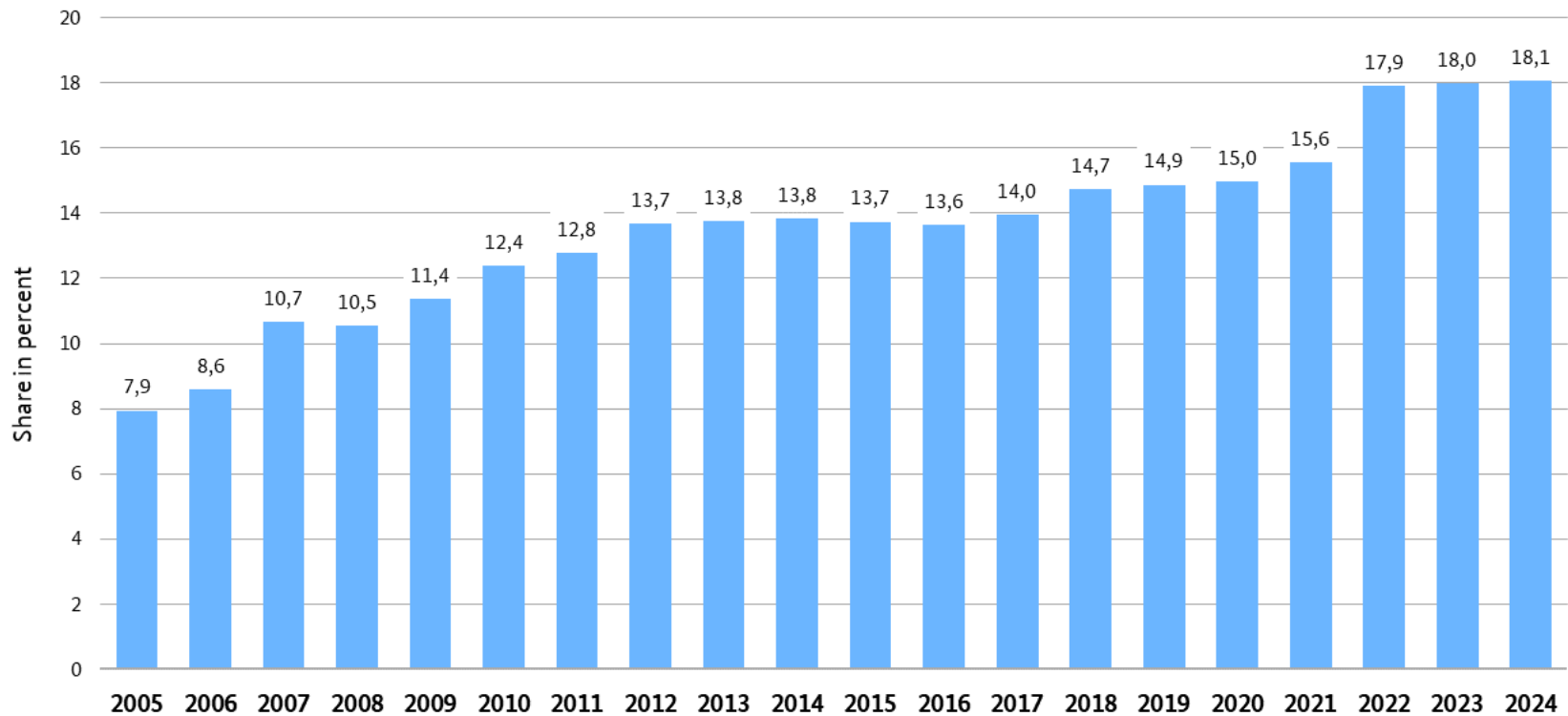
Development of renewable energy share of gross electricity consumption in Germany

targets according to new renewable energy law (EEG 2023)



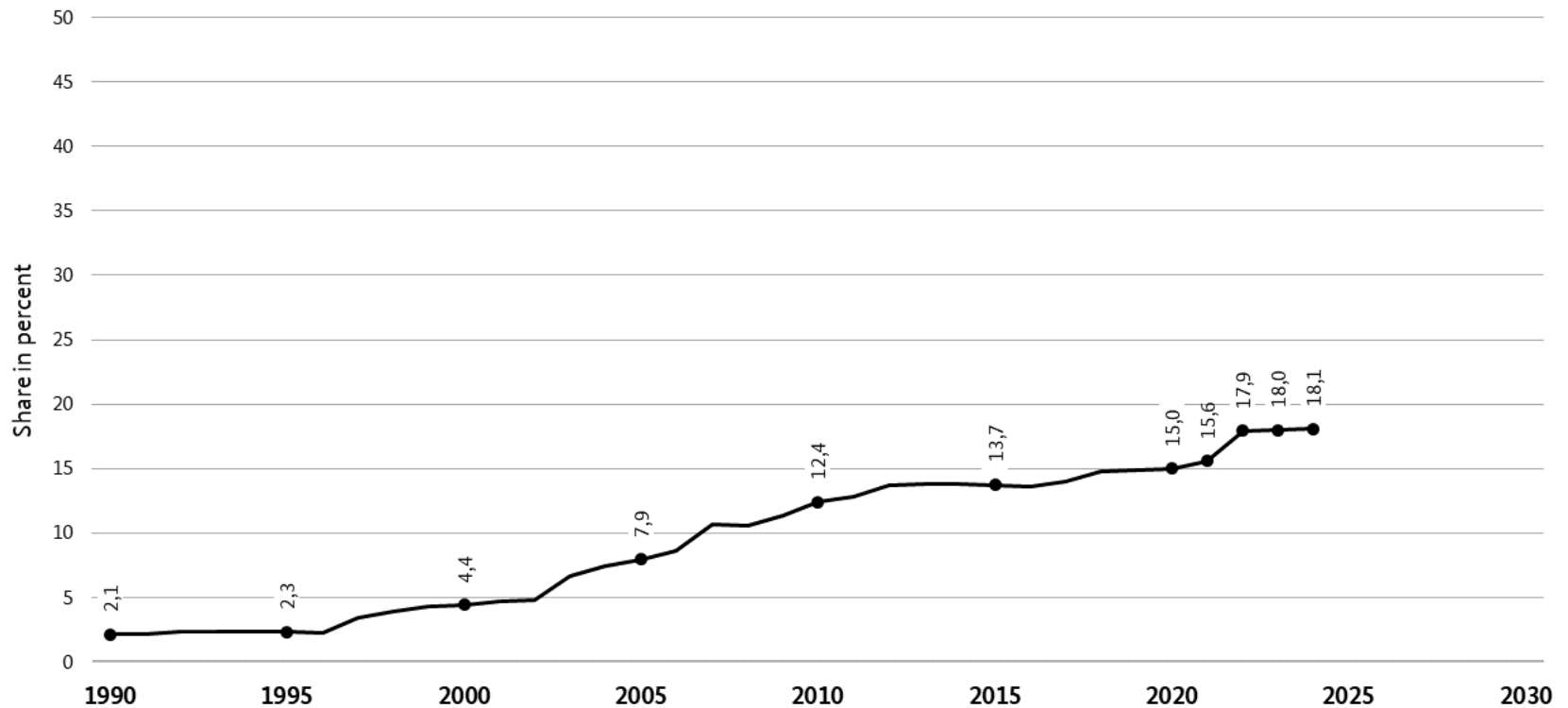


Development of renewable energy share of final energy consumption for heating and cooling in Germany



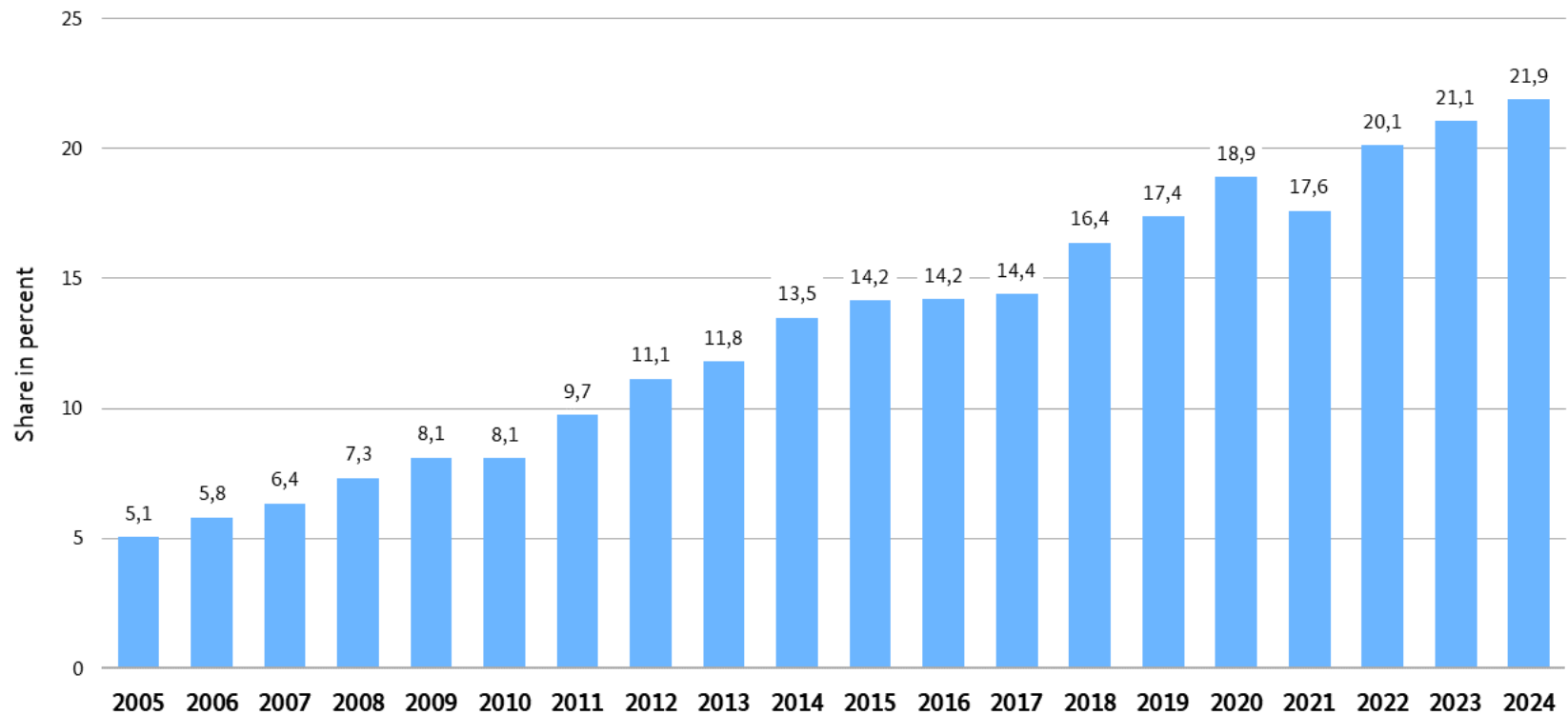


Development of renewable energy share of final energy consumption for heating and cooling in Germany



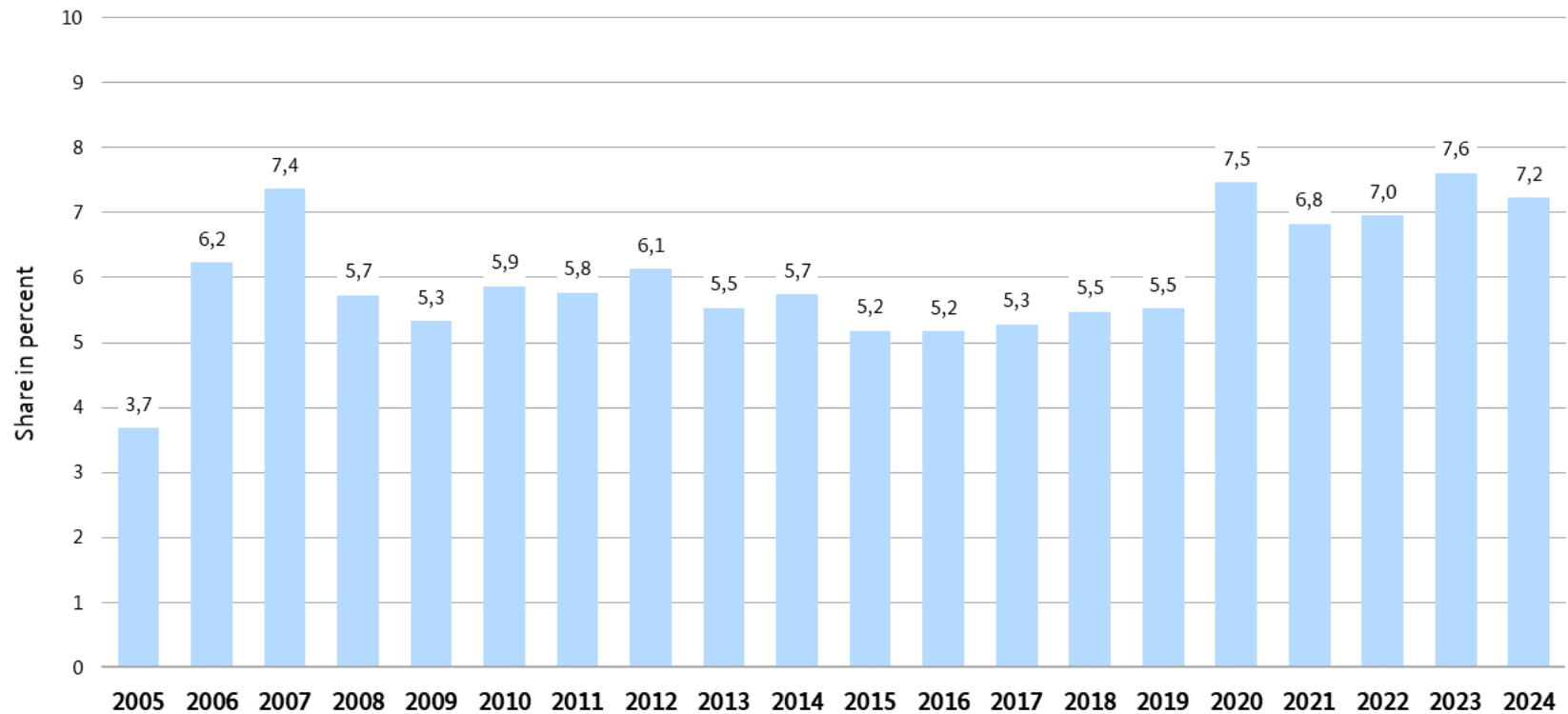


Development of the share of district heat produced from renewable energy sources in Germany



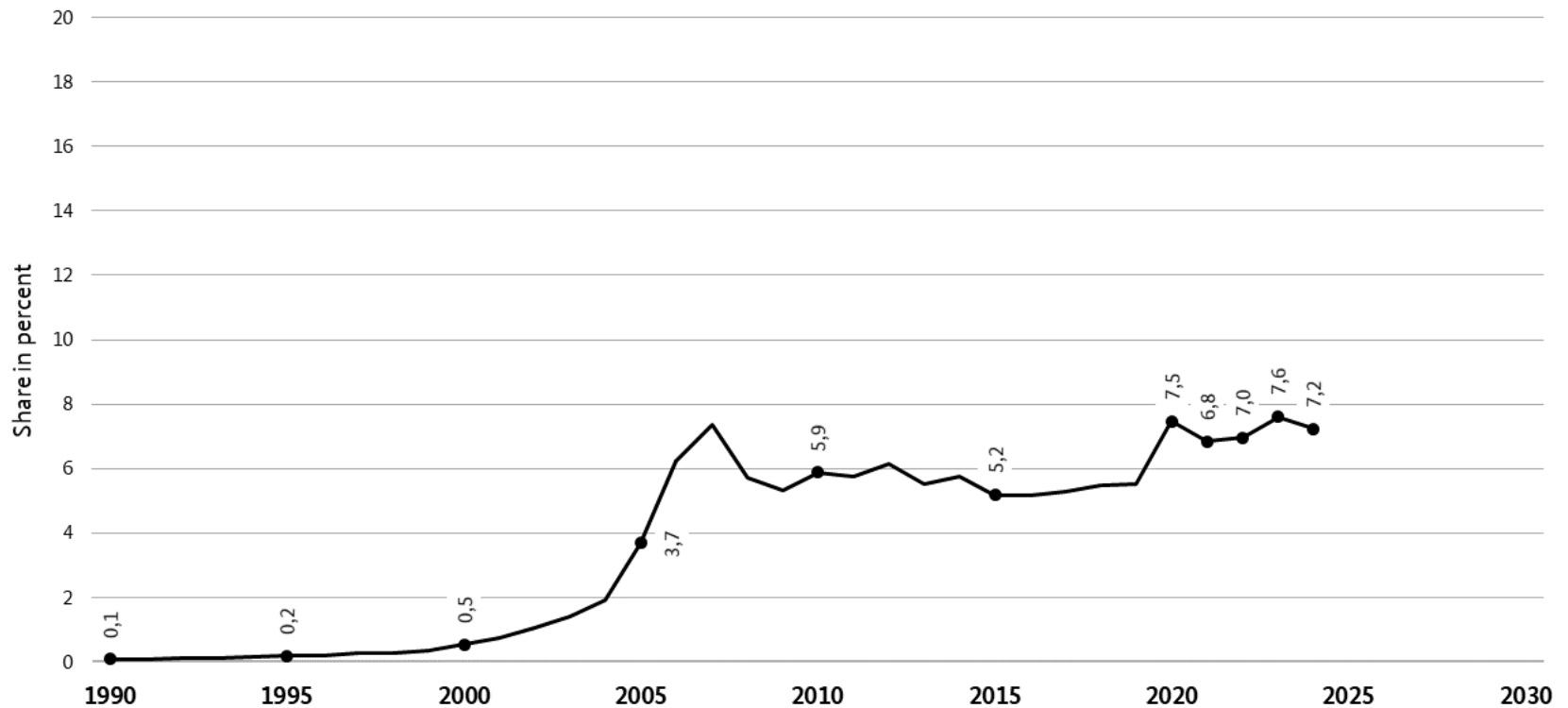


Development of renewable energy share of final energy consumption in the transport sector in Germany





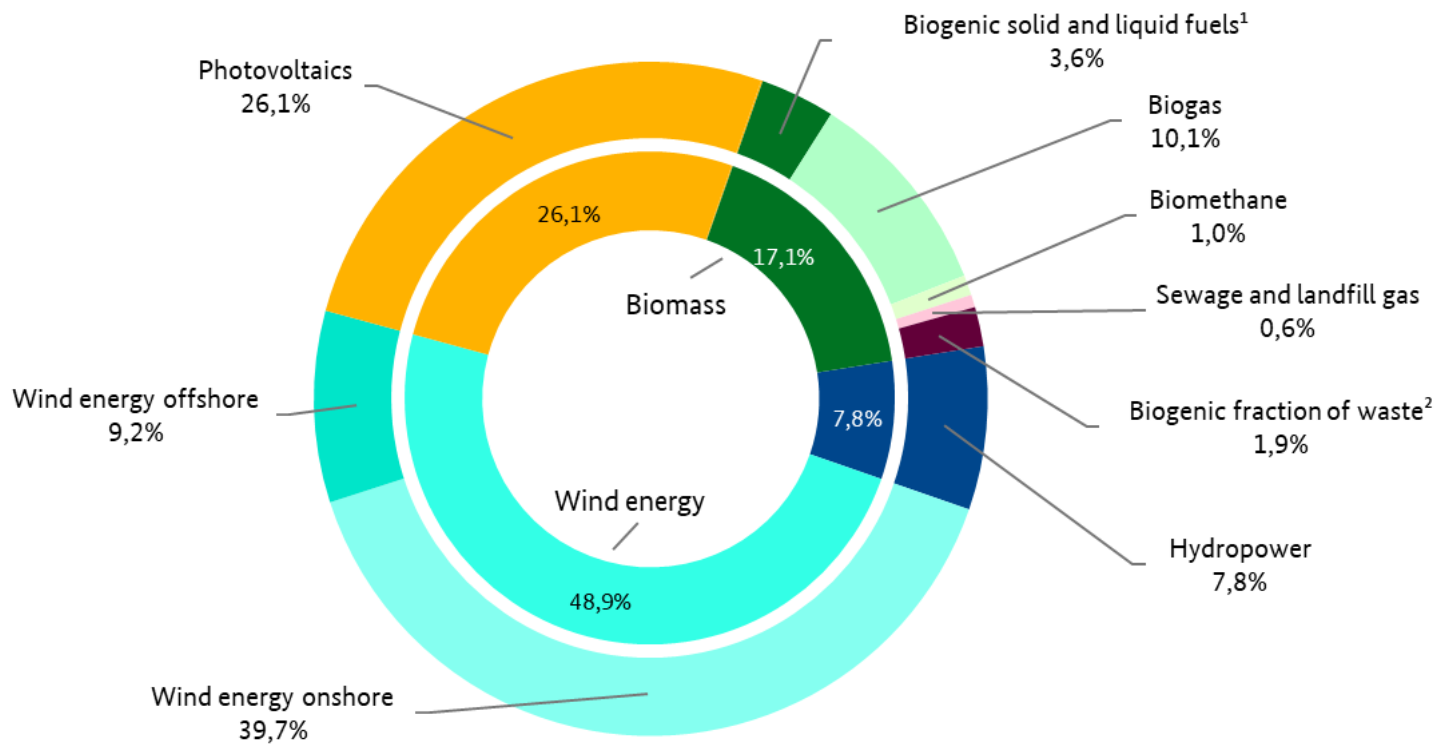
Development of renewable energy share of final energy consumption in the transport sector in Germany





Gross electricity production from renewable energy sources in Germany in the year 2024

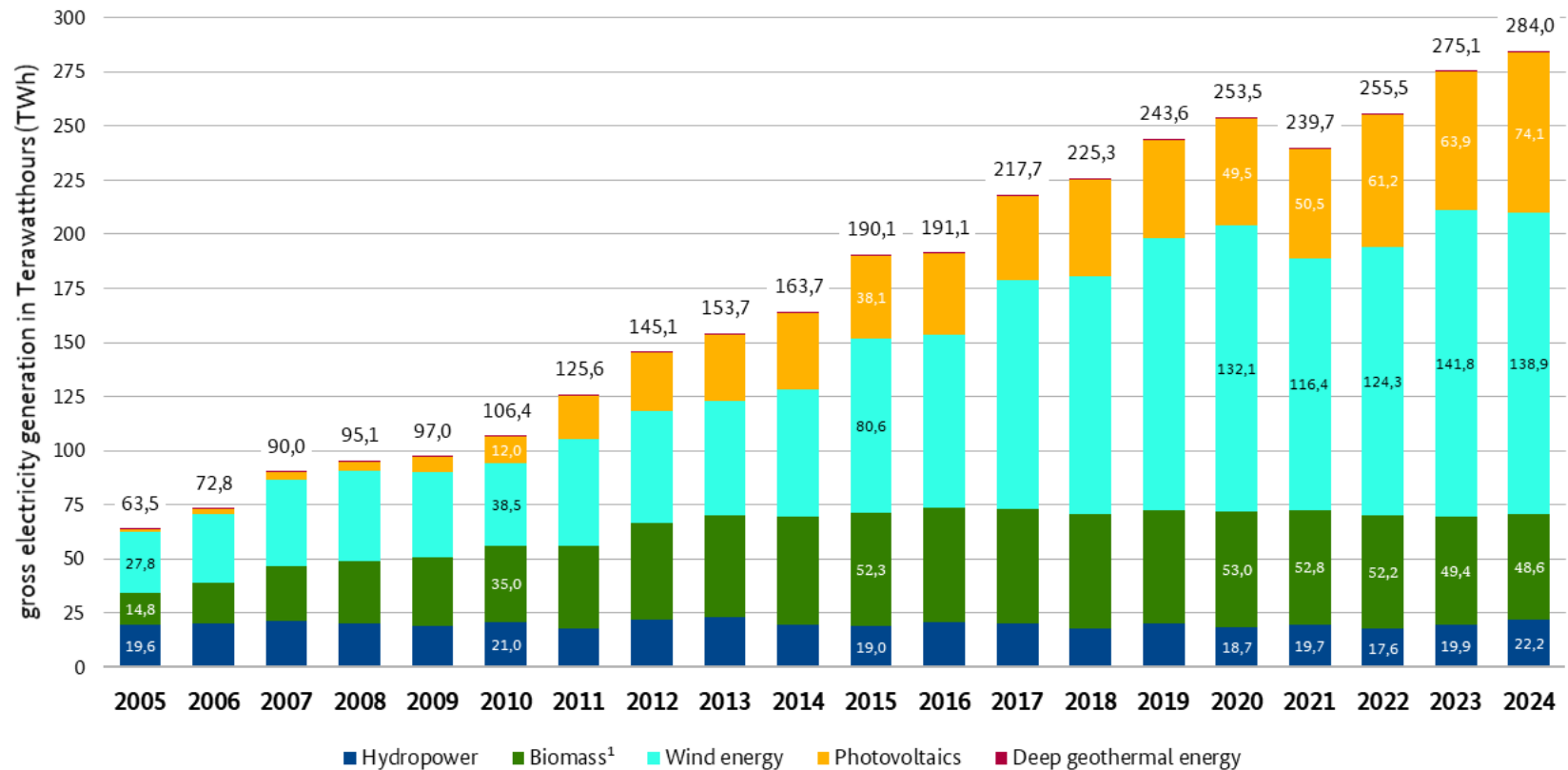
Total: 284 Terawatthours (TWh)



¹ incl. sewage sludge; ² biogenic fraction of waste in waste incineration plants estimated at 50 %
Notice: electricity production from geothermal power plants (0,1%) not shown because of very small share



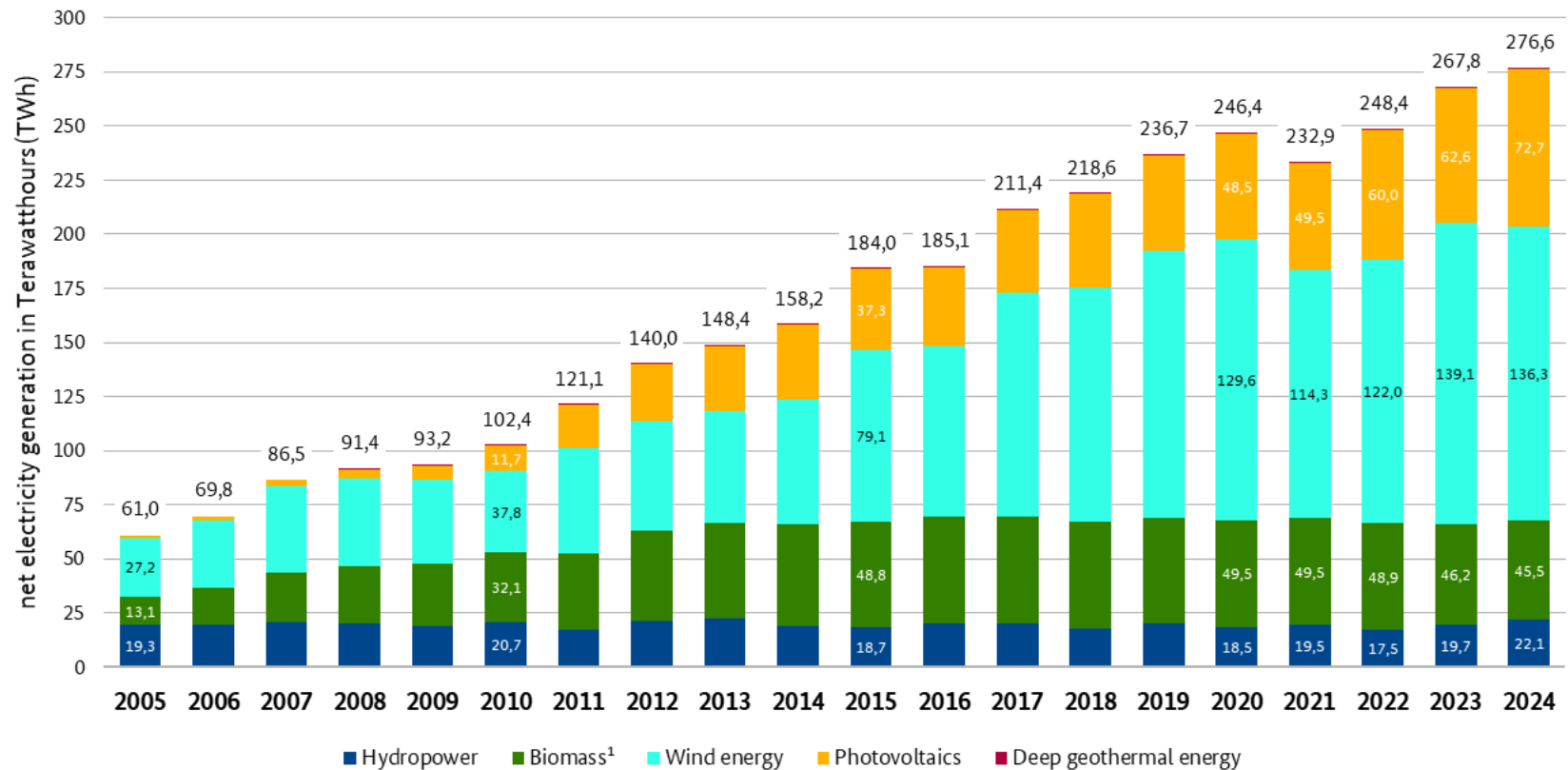
Development of gross electricity production from renewable energy sources in Germany



¹ incl. solid, liquid and gaseous biomass, sewage sludge and the biologic fraction of waste (in waste incineration plants estimated at 50 %, from 2008 only municipal waste)



Development of net electricity production from renewable energy sources in Germany

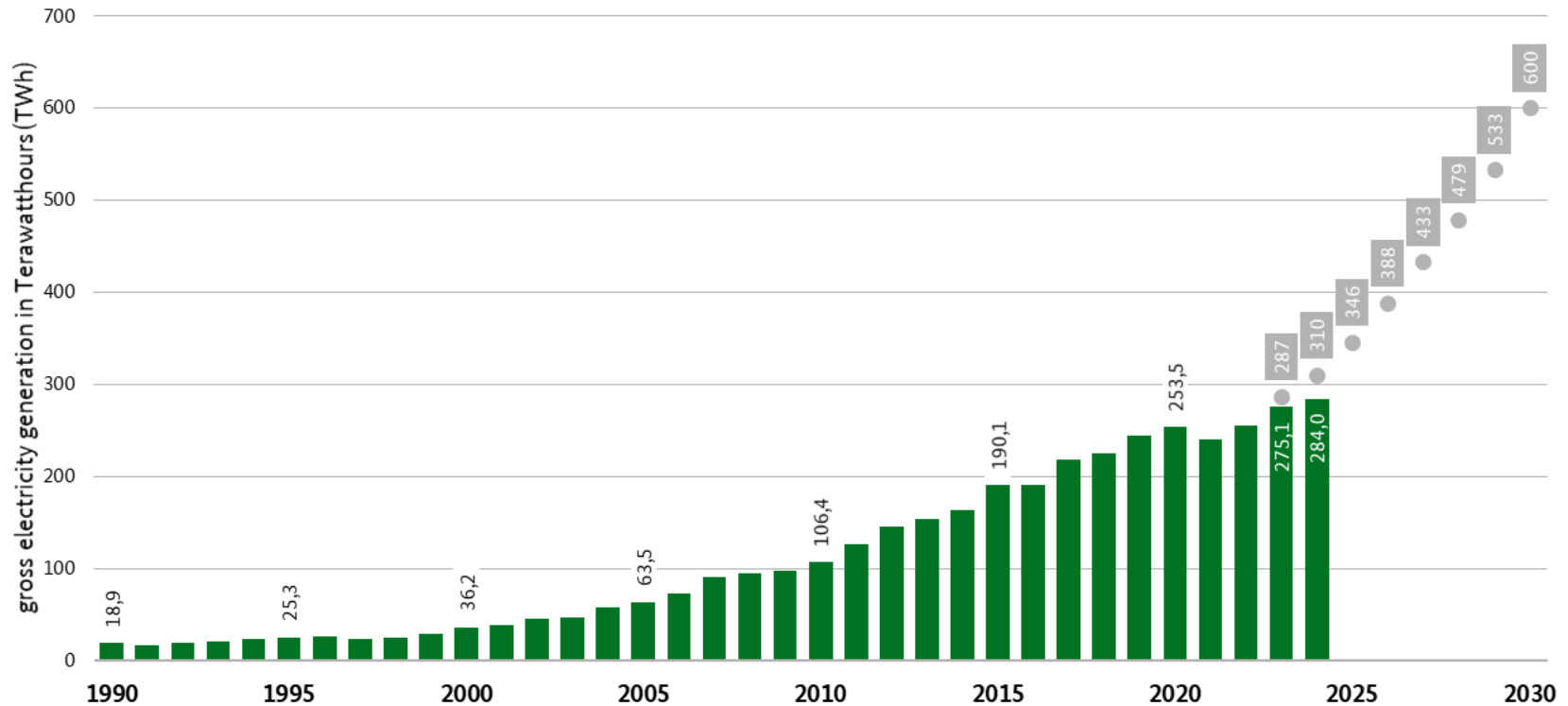


¹ incl. solid, liquid and gaseous biomass, sewage sludge and the biologic fraction of waste (in waste incineration plants estimated at 50 %, from 2008 only municipal waste)



Gross electricity production from renewable energy sources in Germany

and target values according to new renewable energy law (EEG 2023)

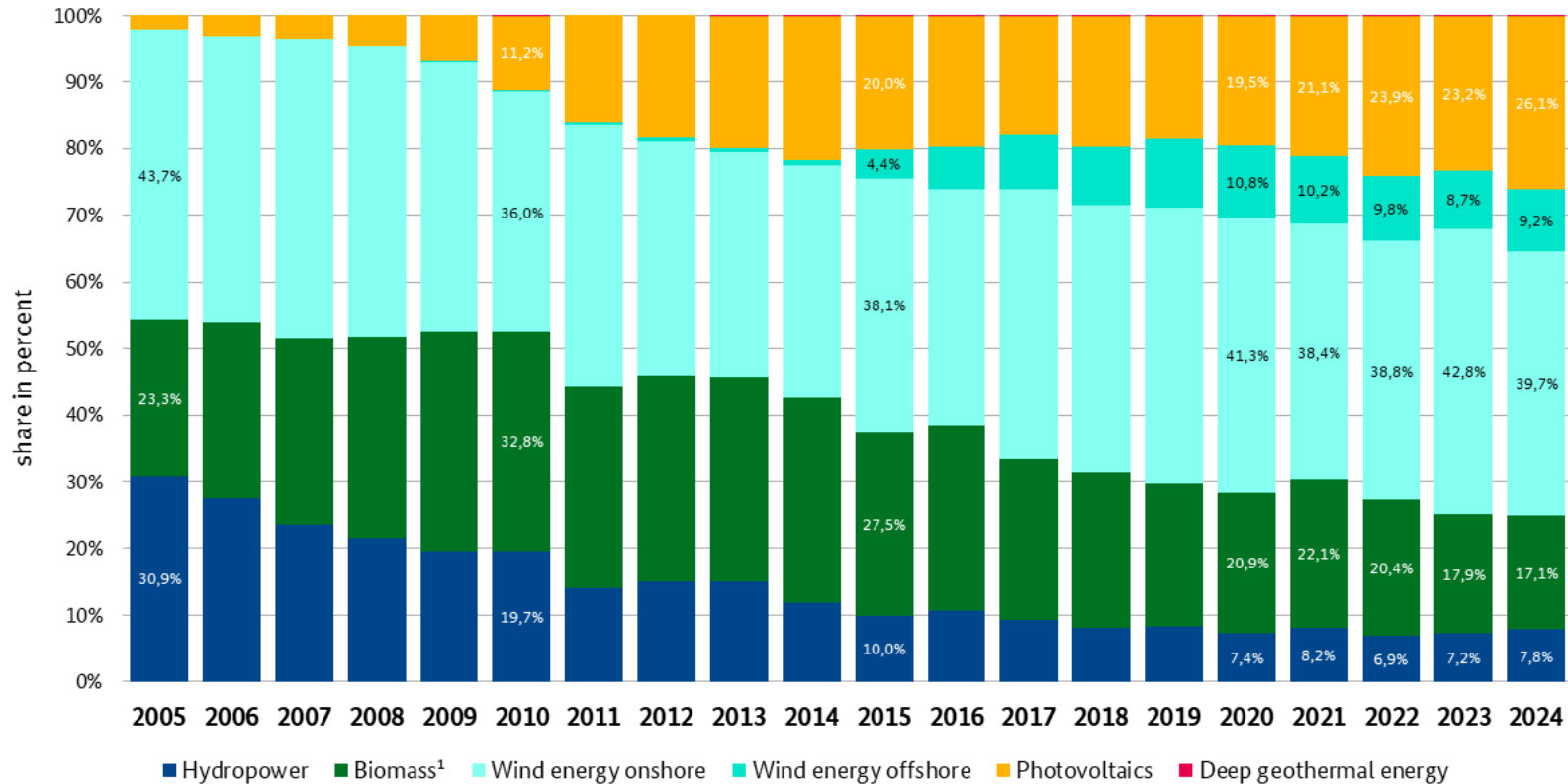


target values for the years 2021 and 2022 according to EEG 2021, target values for the years 2023 to 2030 according to EEG 2023

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



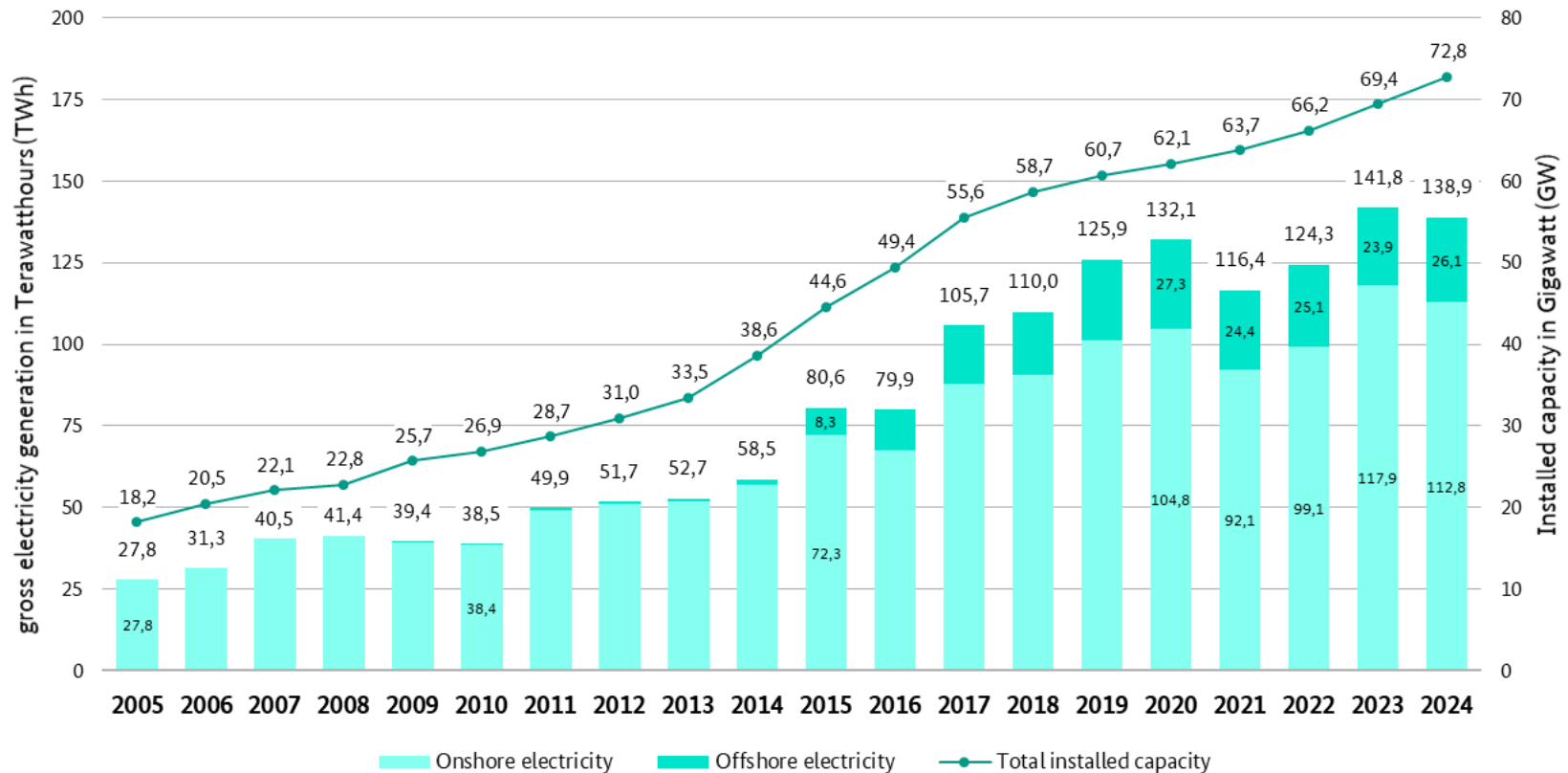
Development of shares of electricity production from renewable energy sources in Germany



¹ incl. solid, liquid and gaseous biomass, sewage sludge and the biologic fraction of waste (in waste incineration plants estimated at 50%, from 2008 only municipal waste)

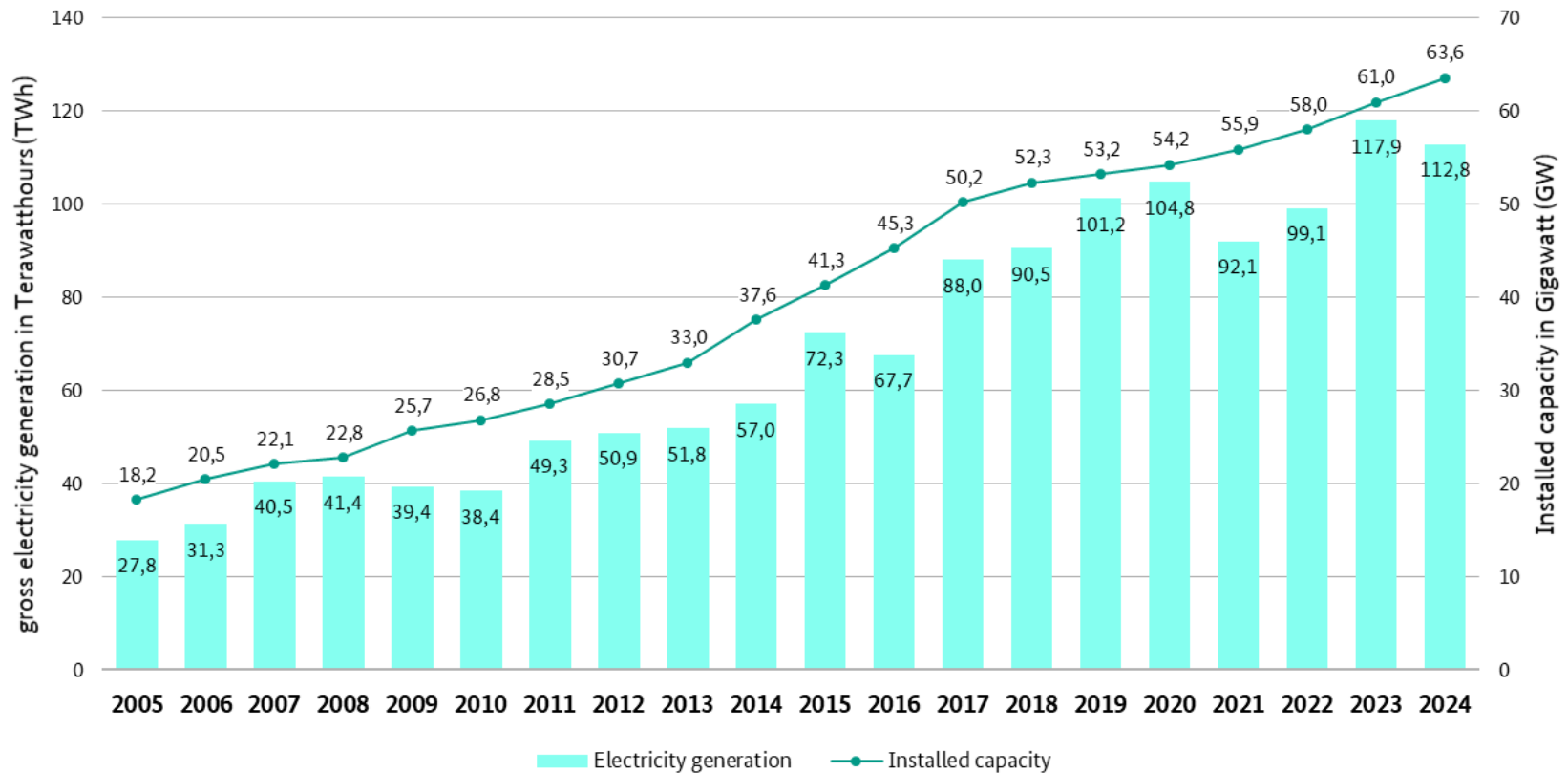


Development of gross electricity production and installed capacity of wind energy plants (onshore and offshore) in Germany



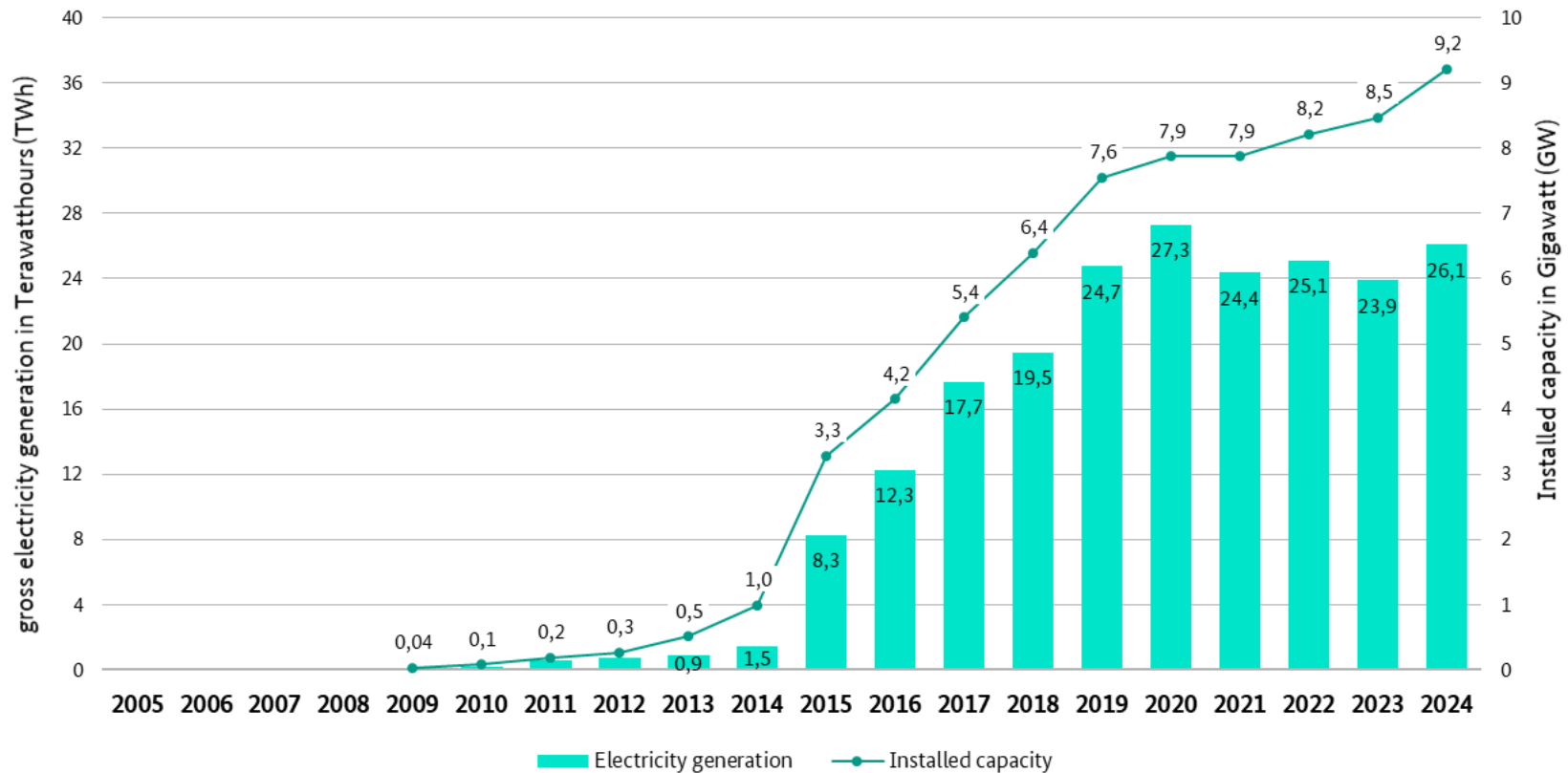


Development of gross electricity production and installed capacity of wind energy plants (onshore) in Germany



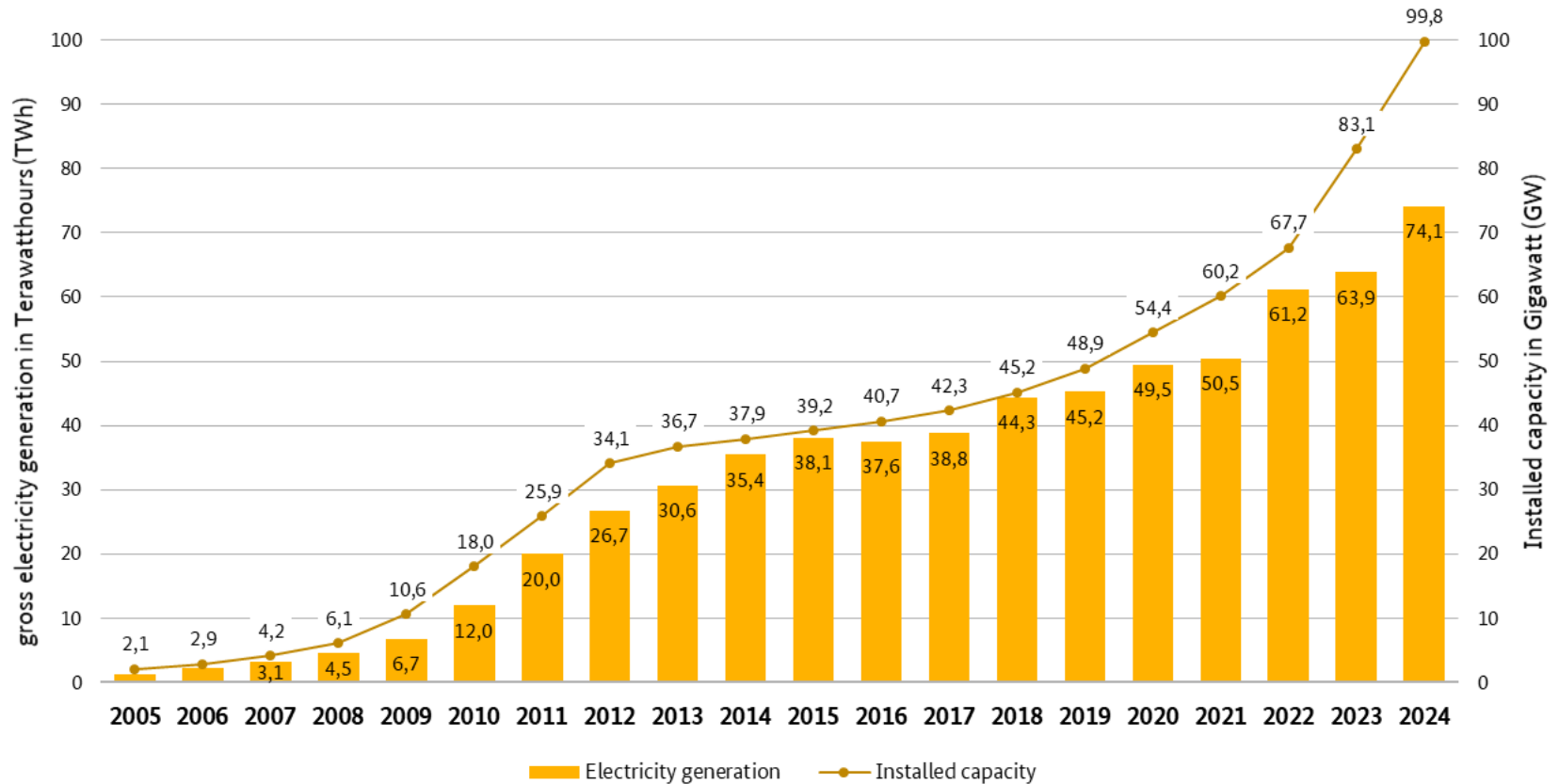


Development of gross electricity production and installed capacity of wind energy plants (offshore) in Germany



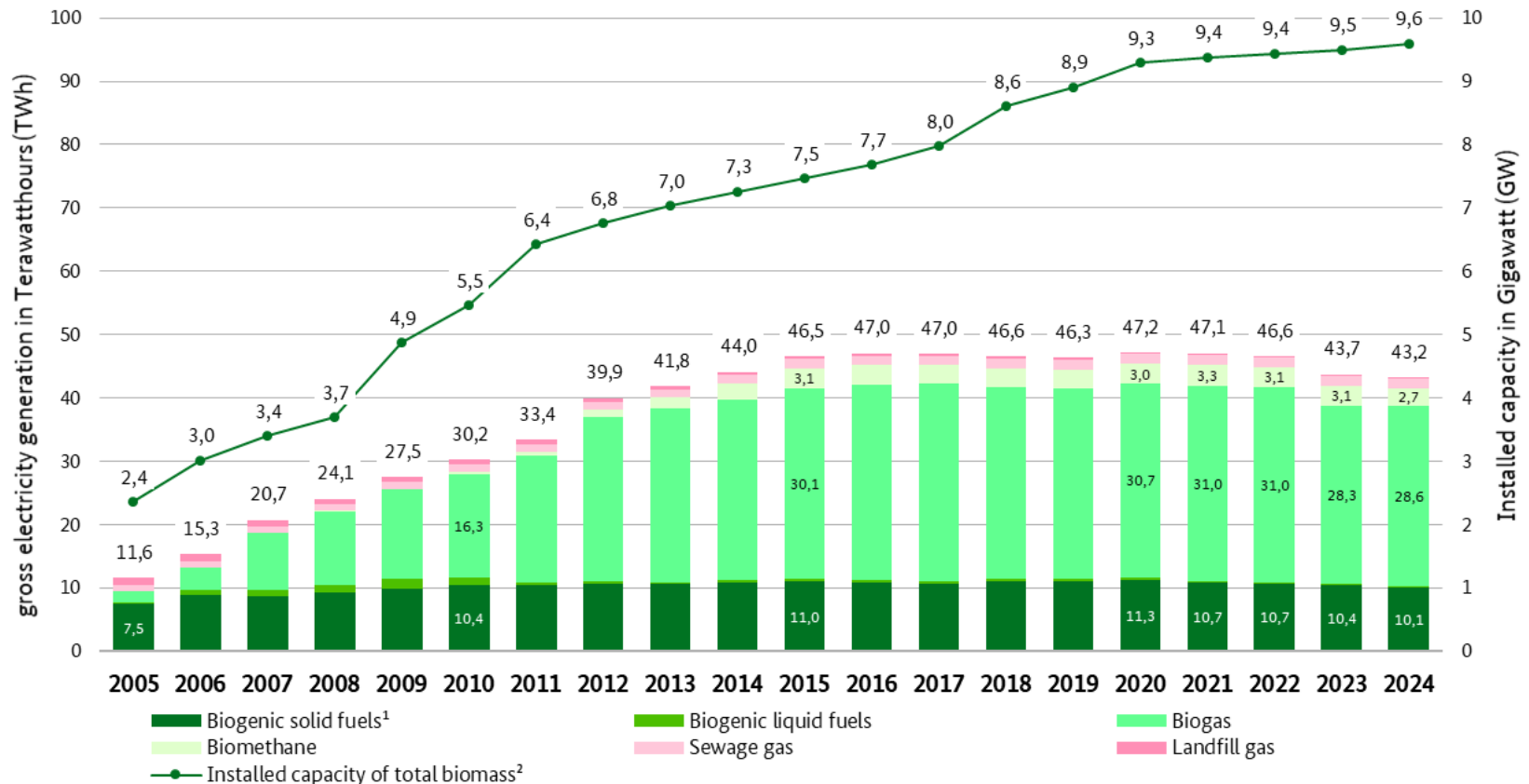


Development of gross electricity production and installed capacity of photovoltaic plants in Germany





Development of gross electricity production and installed capacity of biomass plants in Germany

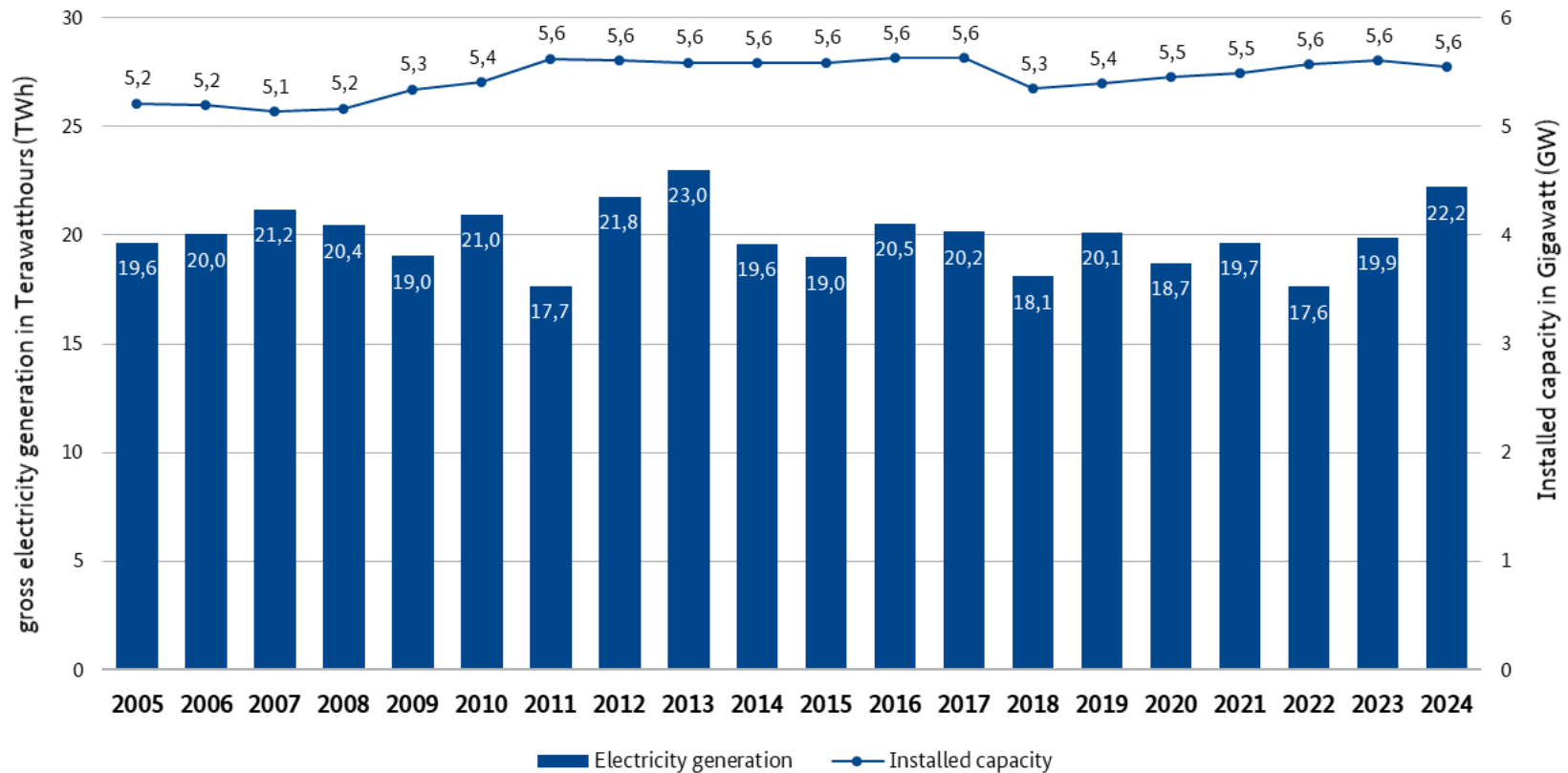


¹ incl. sewage sludge, without the biogenic fraction of waste in waste incineration plants;

² since 2013 including additional capacity for increased flexibility of electricity production



Development of gross electricity production and installed capacity of hydropower plants in Germany

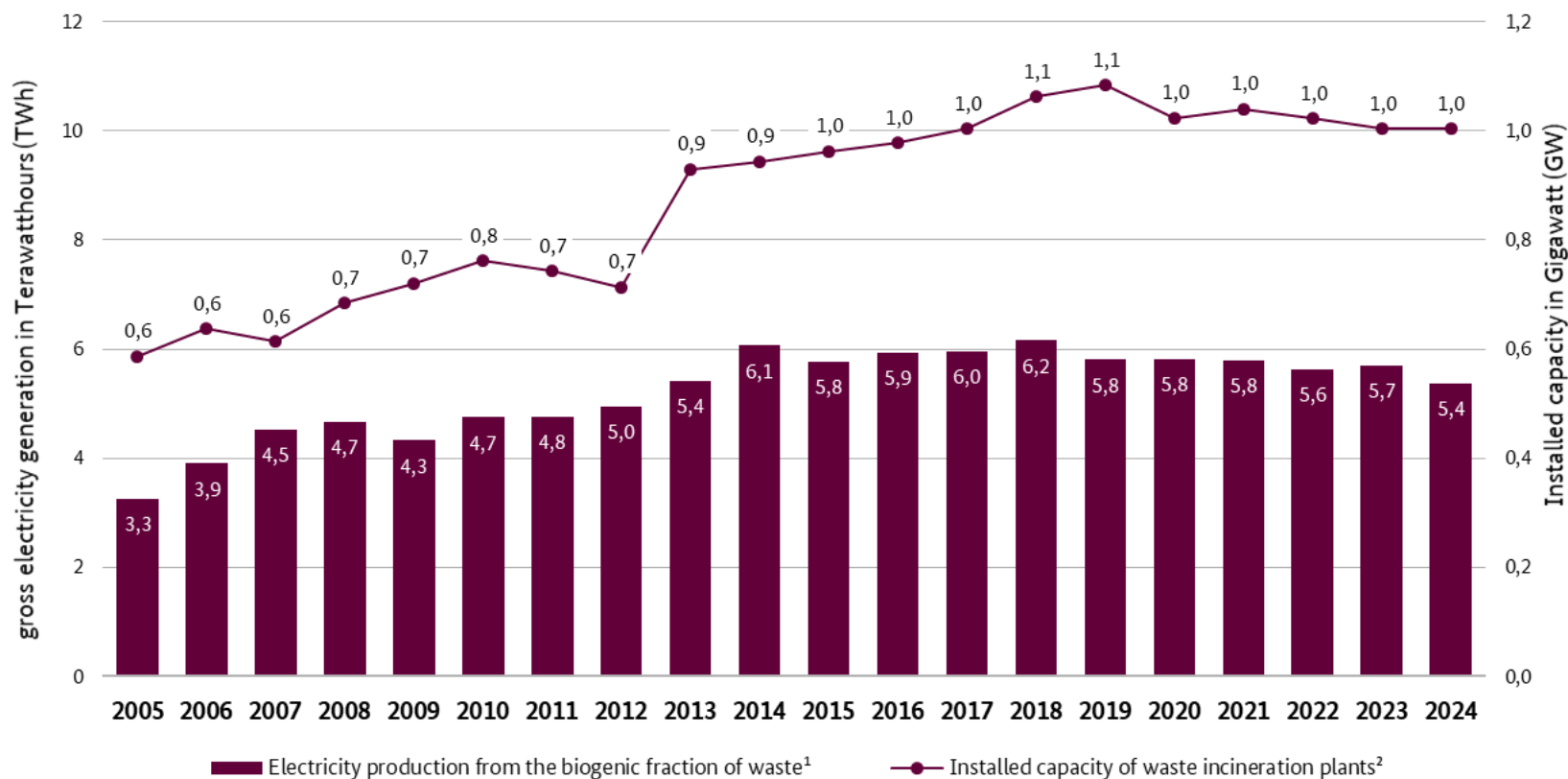


Notice: shown are the totals of river and storage power plants including pump storage power plants with natural inflow

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



Development of gross electricity production and installed capacity of waste incineration plants in Germany

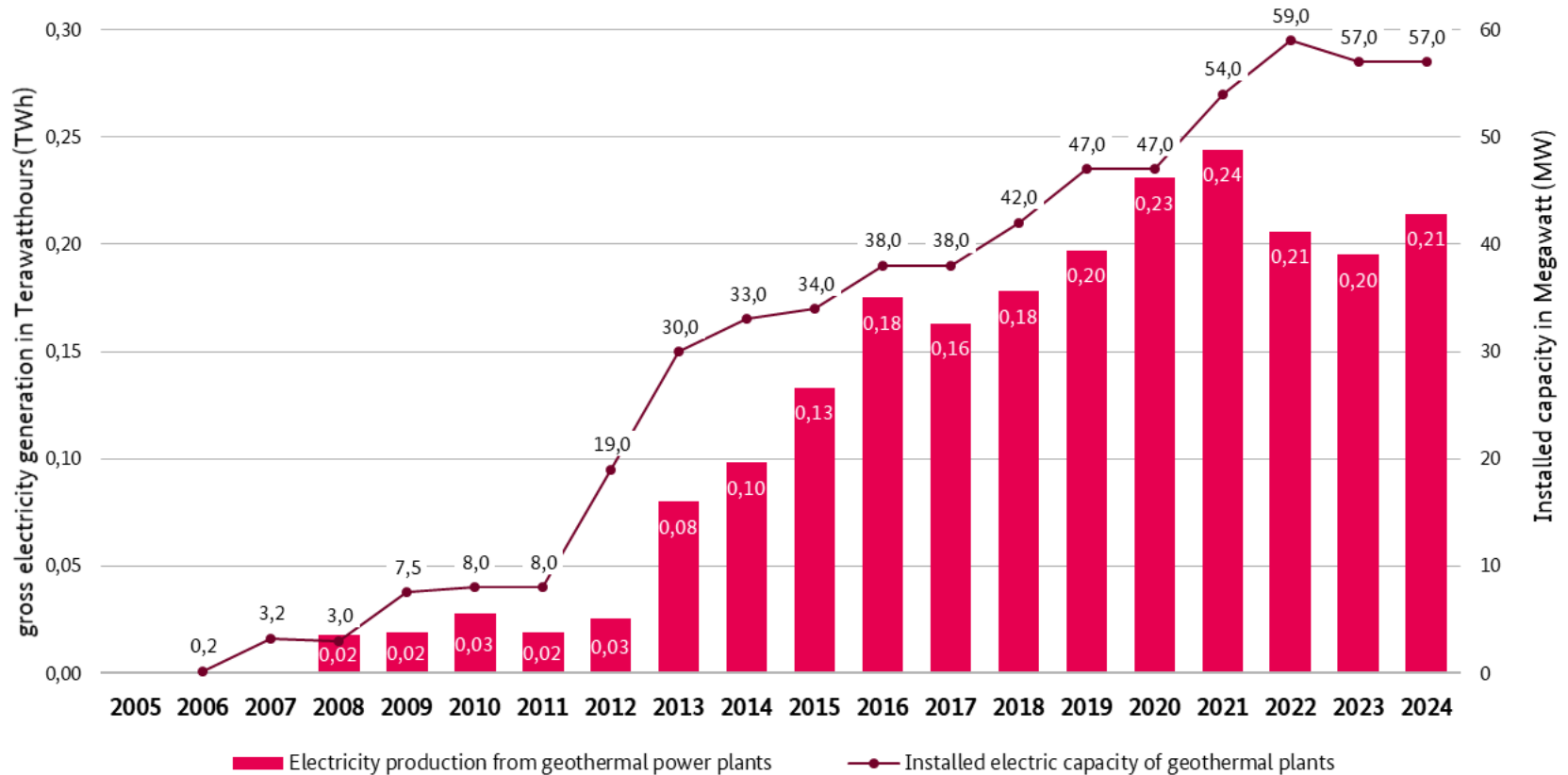


¹ biogenic fraction of waste in waste incineration plants calculated with 50%, from 2008 only municipal waste;

² calculated installed capacity of thermal combustion plants for renewable waste (renewable share assumed to be 50%)



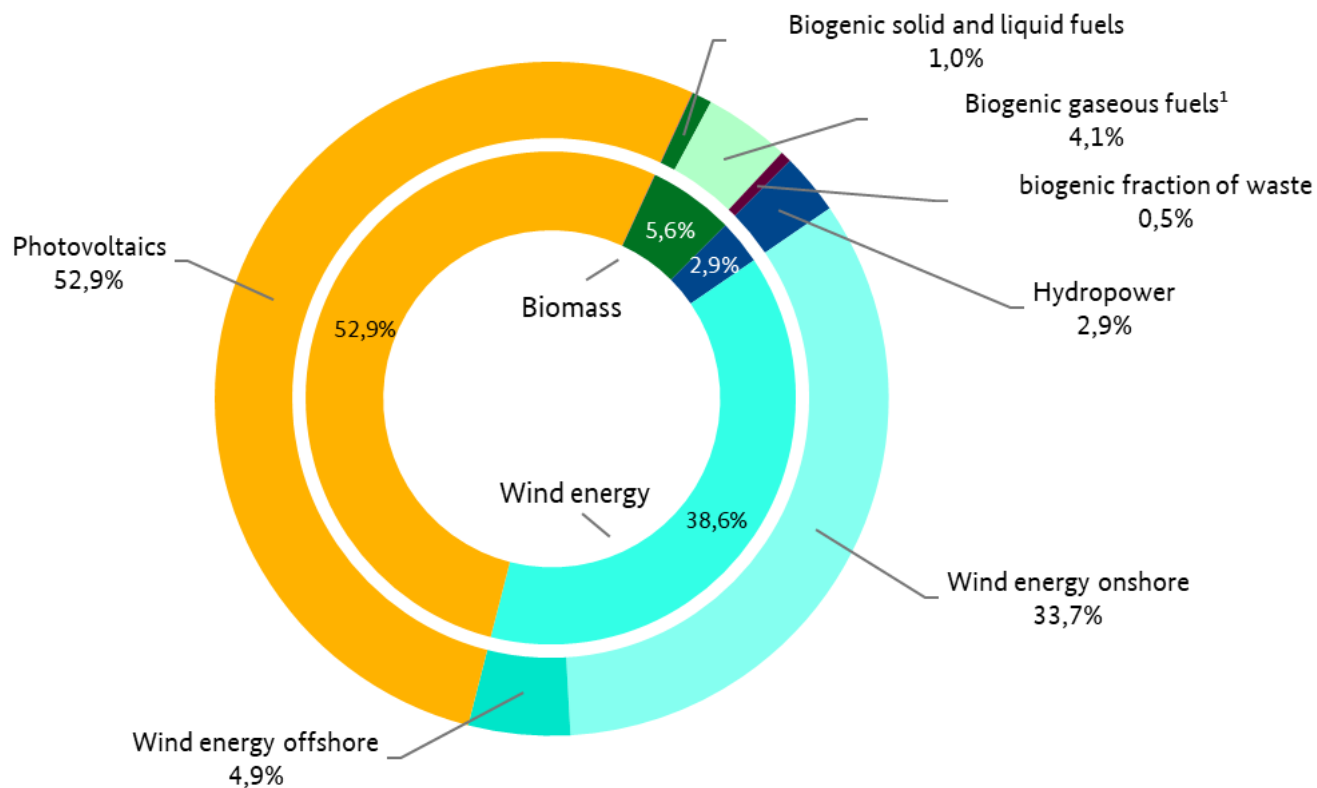
Development of gross electricity production and installed electric capacity of geothermal plants in Germany





Installed capacity for renewables-based electricity generation in Germany in the year 2024

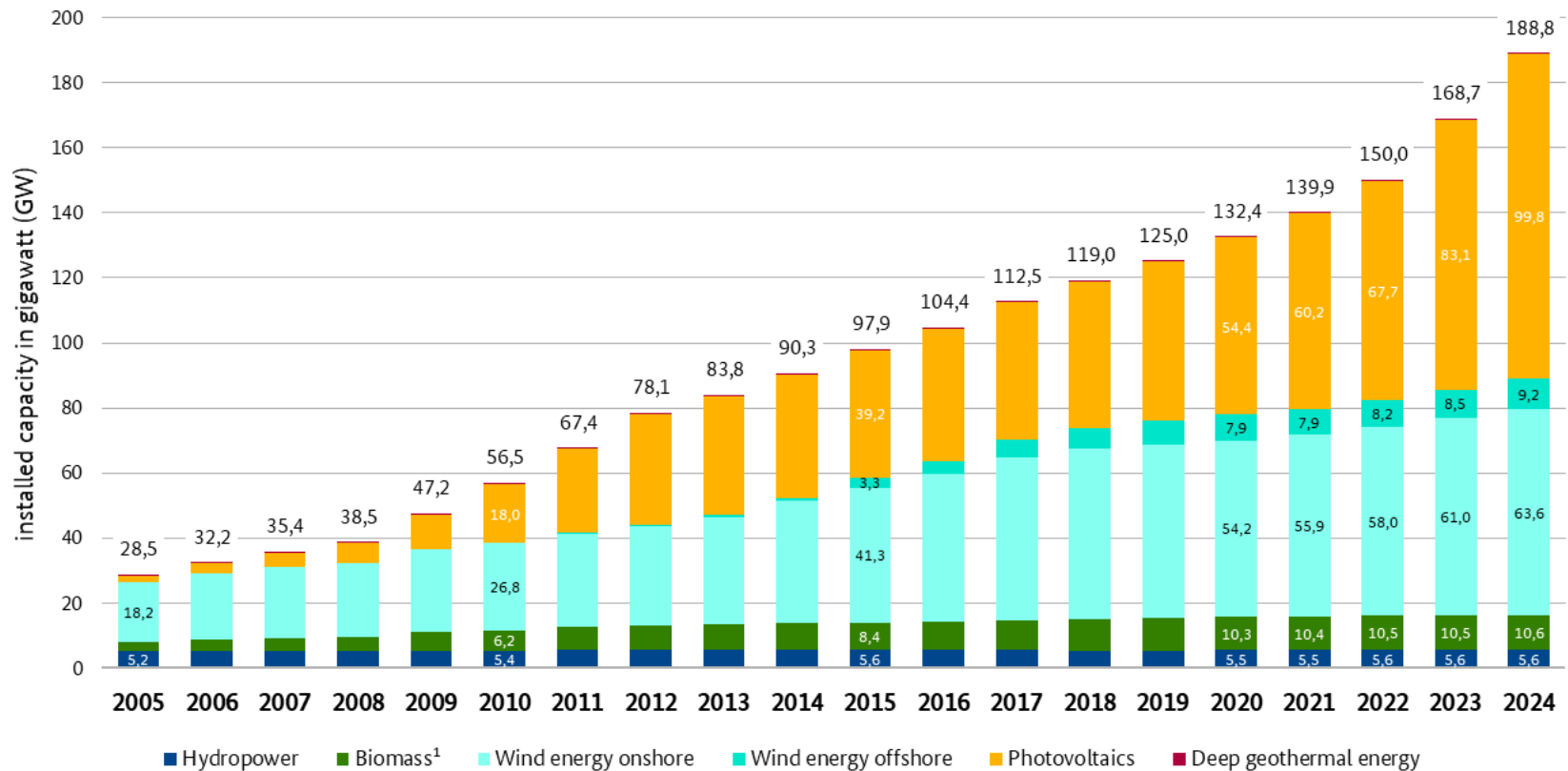
Total: 188,8 Gigawatt (GW)



¹ Biogas, biomethane, landfill gas and sewage gas
Notice: geothermal power plants are not shown here because of their very small share (0,03%).



Development of installed capacity for renewables-based electricity generation in Germany

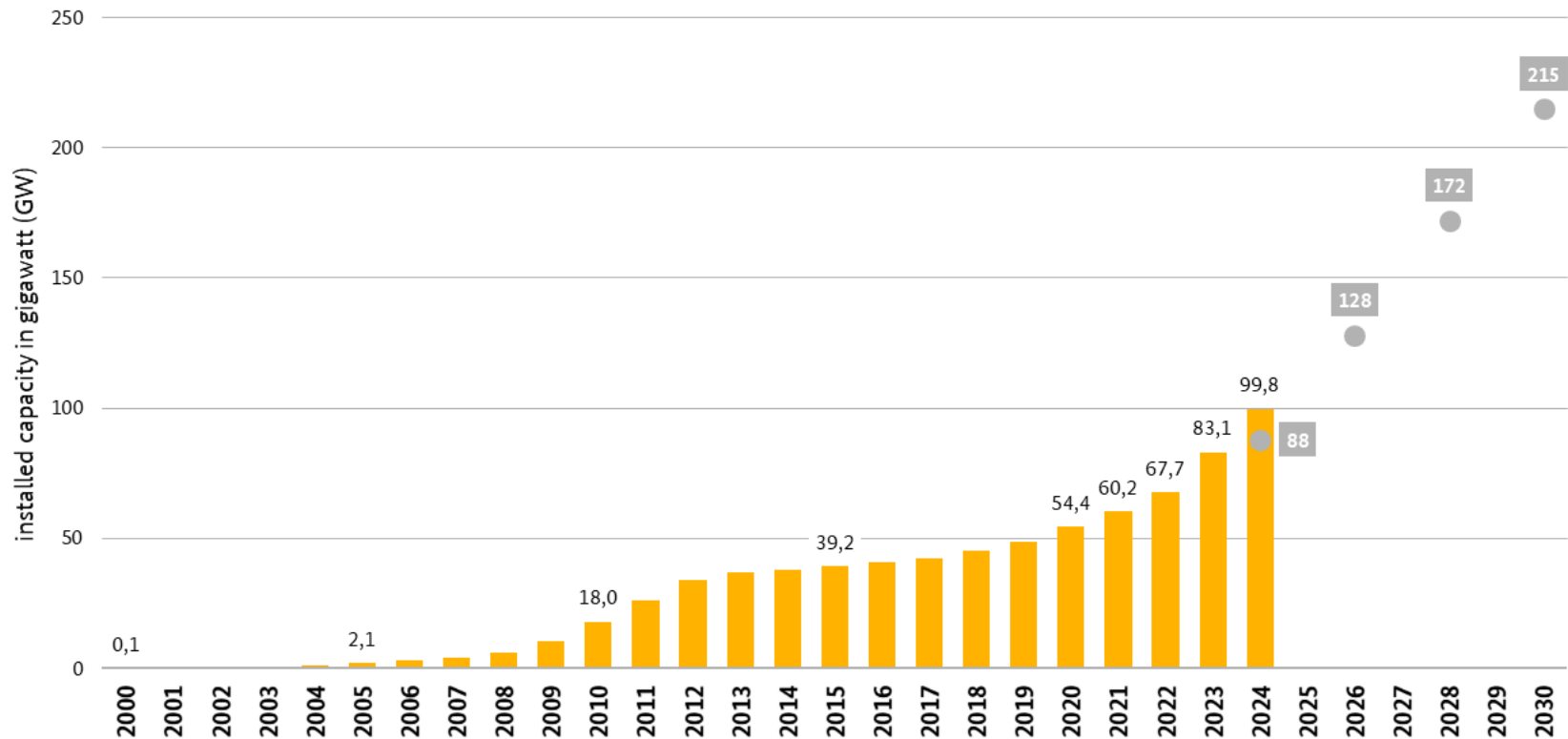


¹ incl. solid and liquid biomass, biogas, biomethane, sewage gas and landfill gas and the biogenic fraction of waste



Development of installed capacity of photovoltaic plants in Germany

as well as targets according to new renewable energy legislation (EEG 2023)



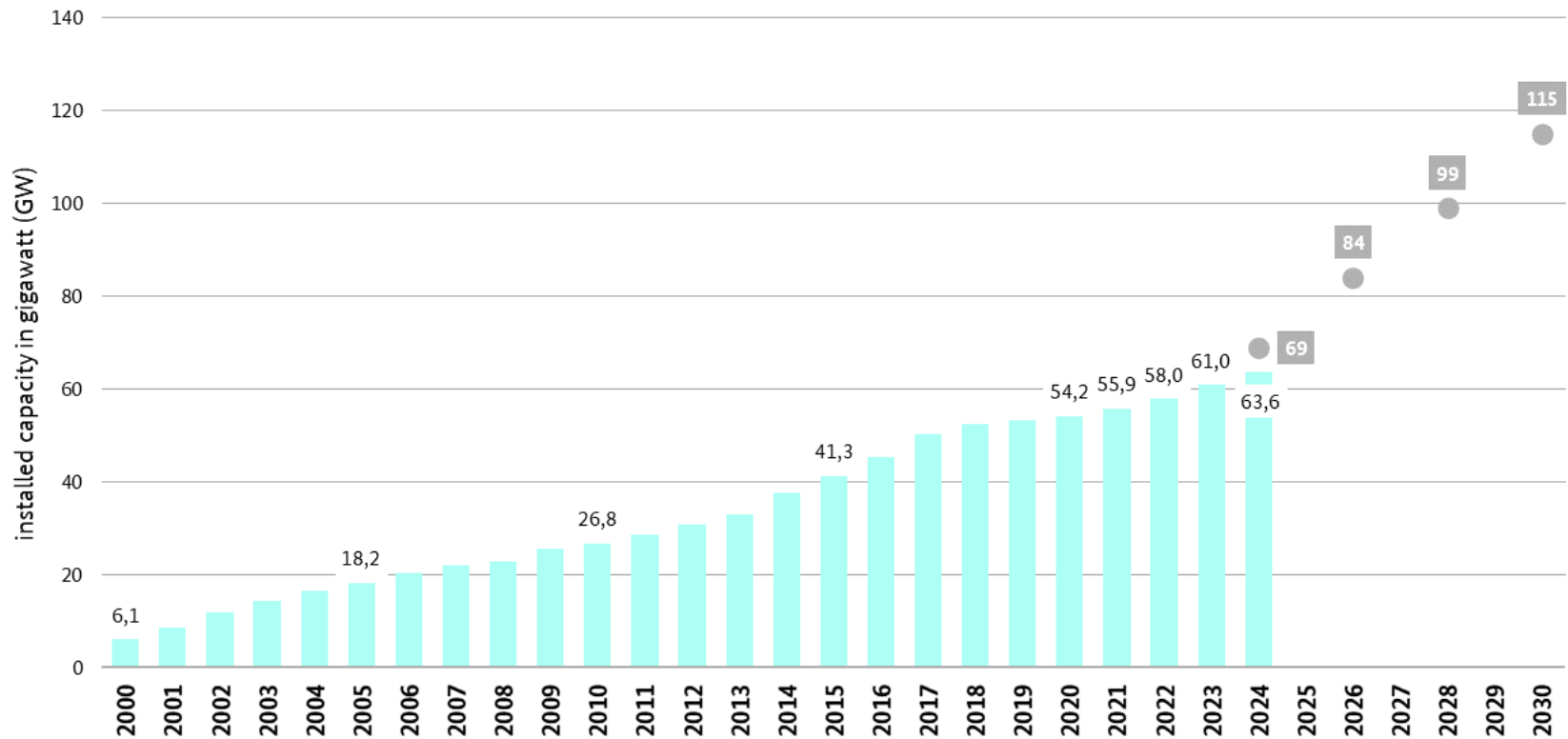
target values for the years 2024 to 2030 according to EEG 2023

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



Development of installed capacity of onshore windpower in Germany

as well as targets according to new renewable energy legislation (EEG 2023)



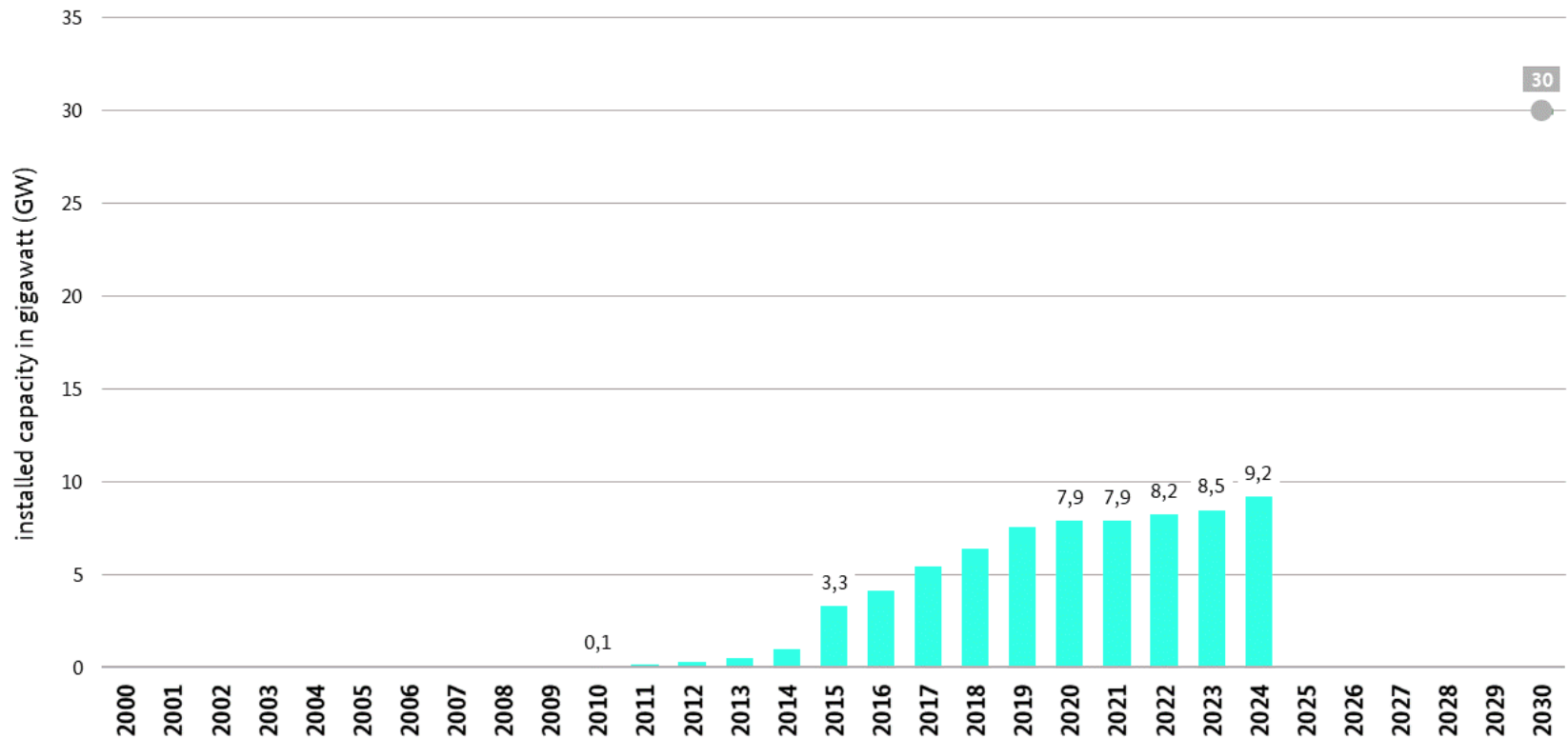
target values for the years 2024 to 2030 according to EEG 2023

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



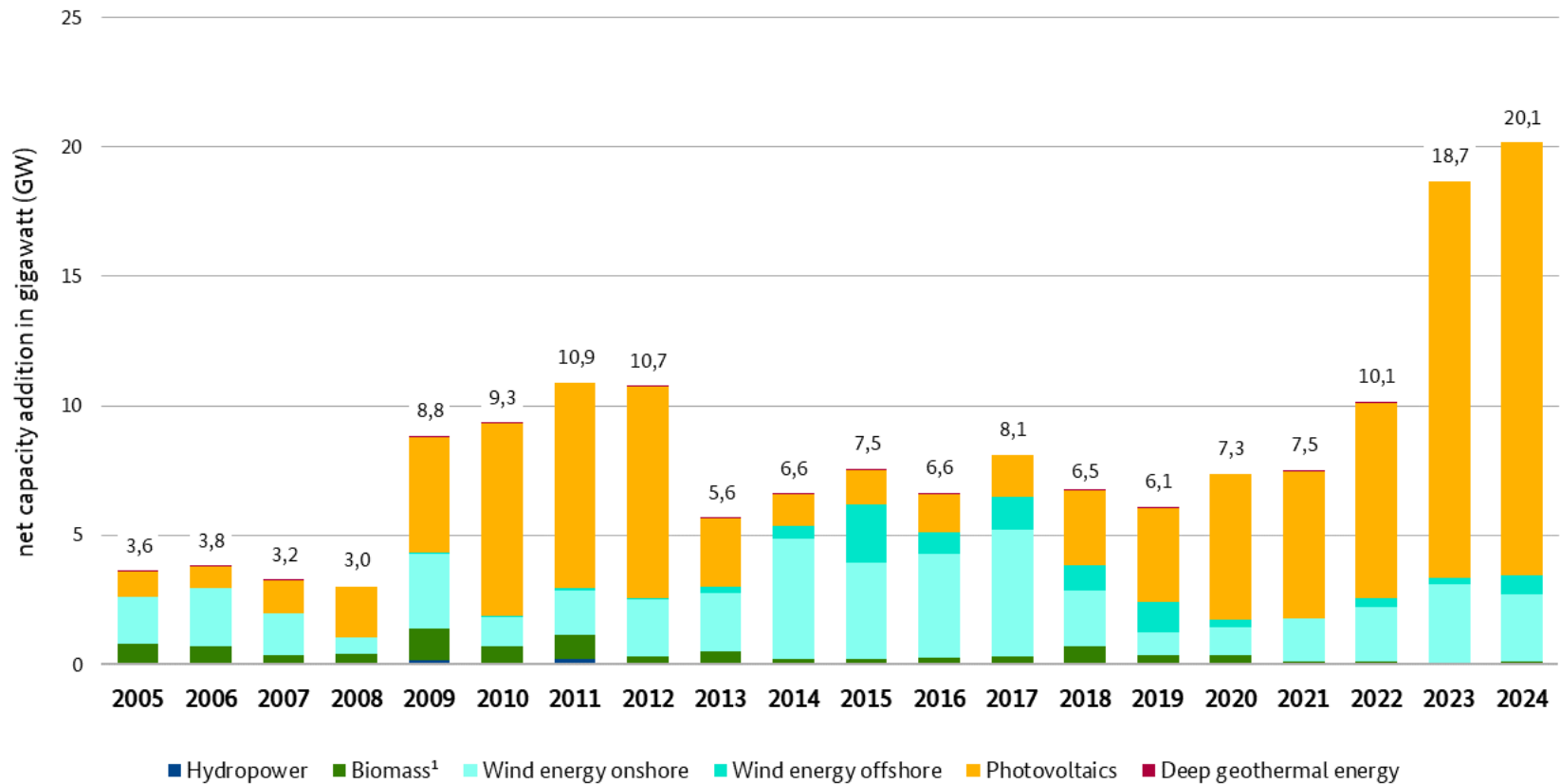
Development of installed capacity of offshore windpower in Germany

as well as target according to offshore support legislation (WindSeeG)





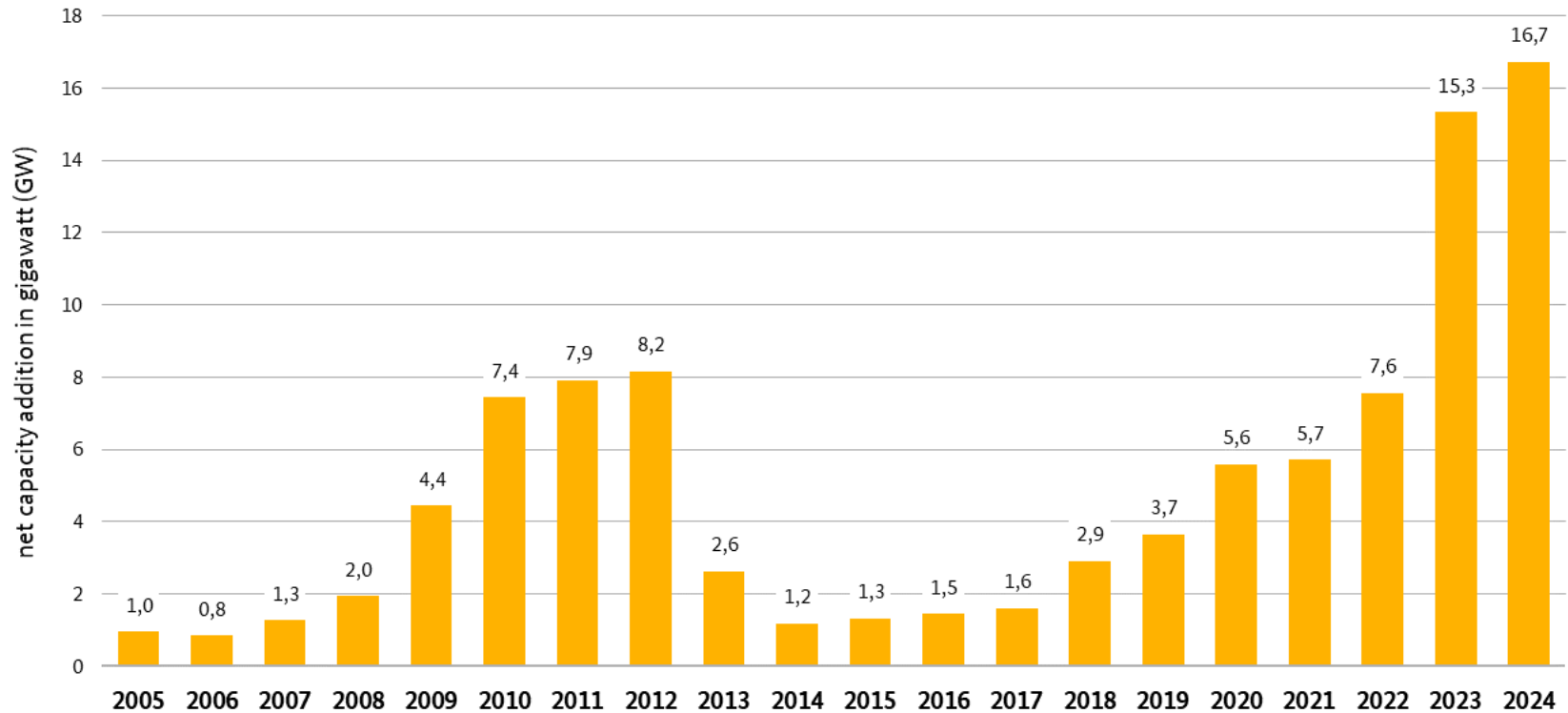
Development of net capacity addition of renewable power in Germany



¹ incl. solid and liquid biomass, biogas, biomethane, sewage gas and landfill gas and the biogenic fraction of waste

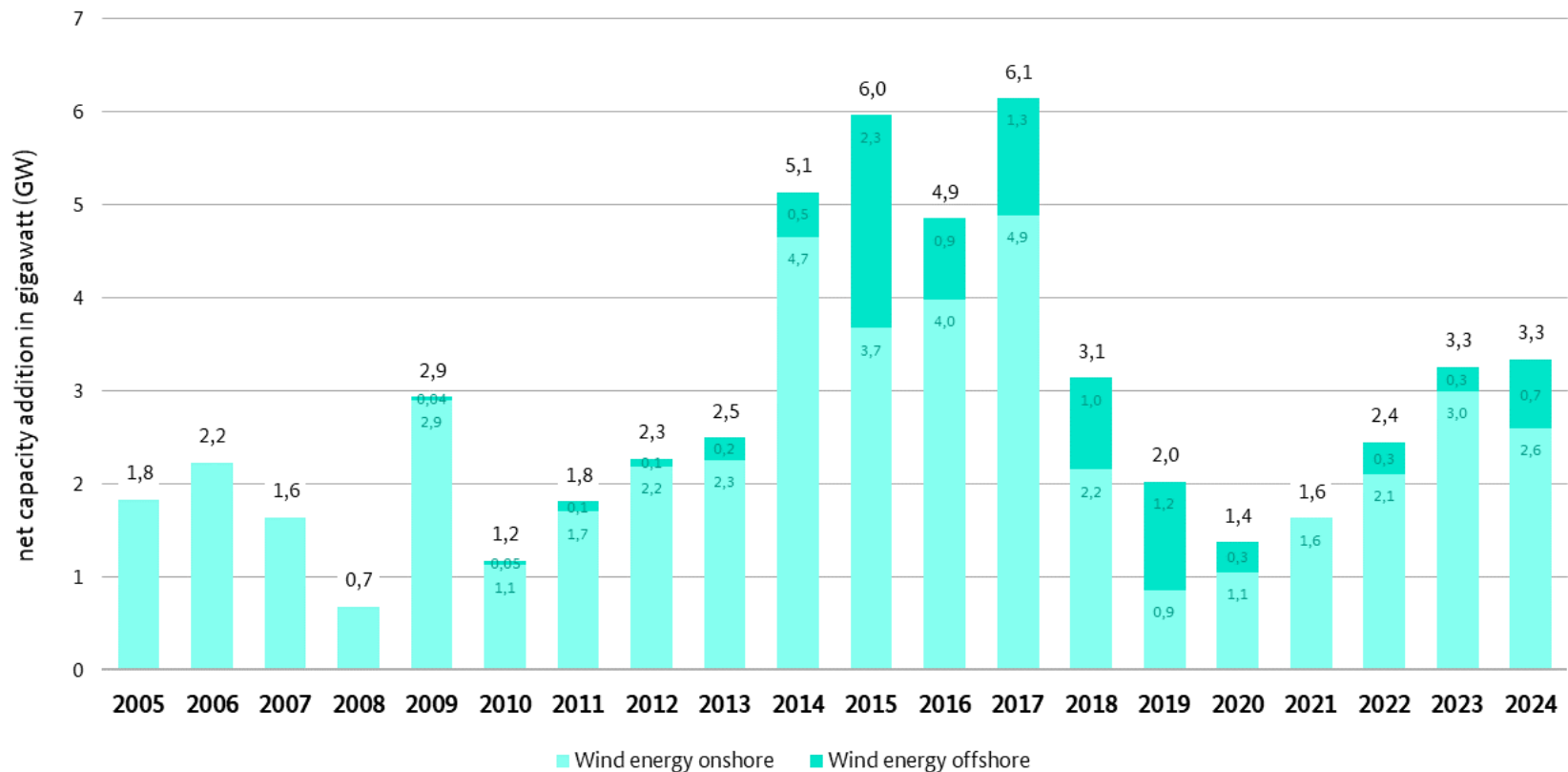


Development of net capacity addition of photovoltaic power in Germany





Development of net capacity addition of windpower in Germany



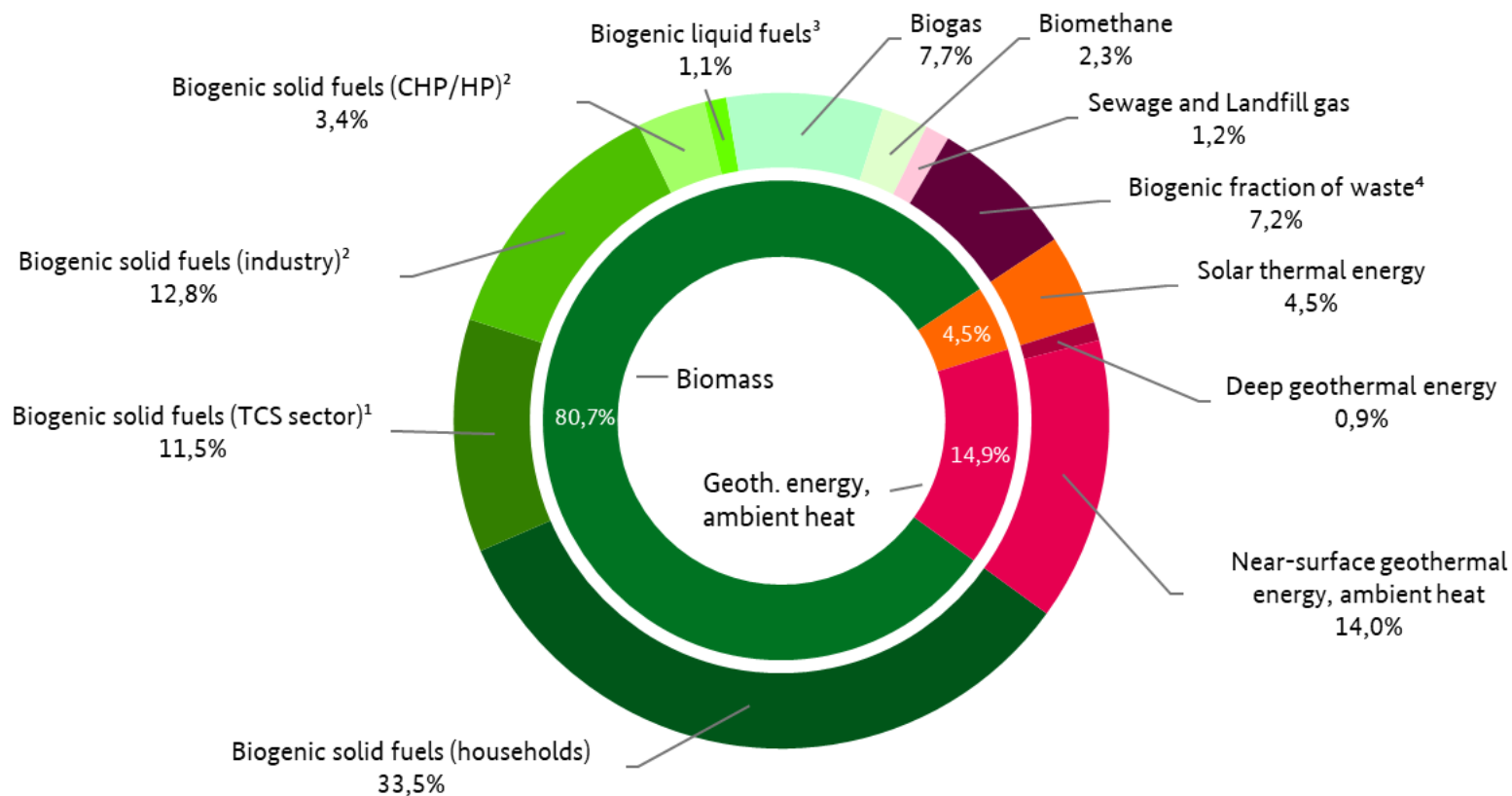
first offshore windpower plants installed in 2009

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025



Final energy consumption from renewable energy sources for heating and cooling in Germany in 2024

Total: 197,2 terawatthours (TWh)

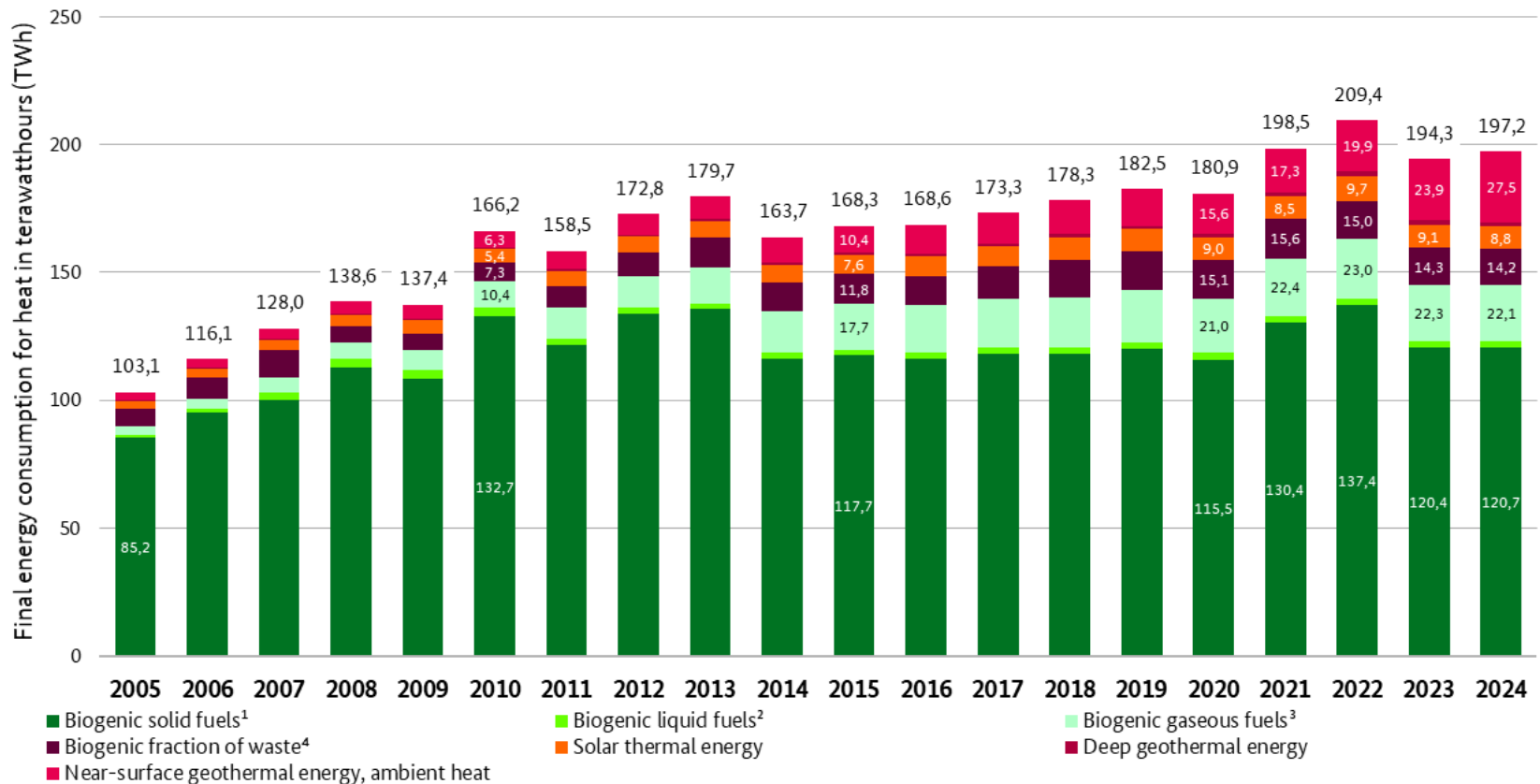


¹ TCS corresponds to trade, commercial and service sector; ² incl. sewage sludge and charcoal; ³ incl. biofuels used in agriculture, forestry, construction and military;

⁴ biogenic fraction of waste in waste incineration plants estimated at 50 %



Development of final energy consumption from renewable energy sources for heating and cooling in Germany

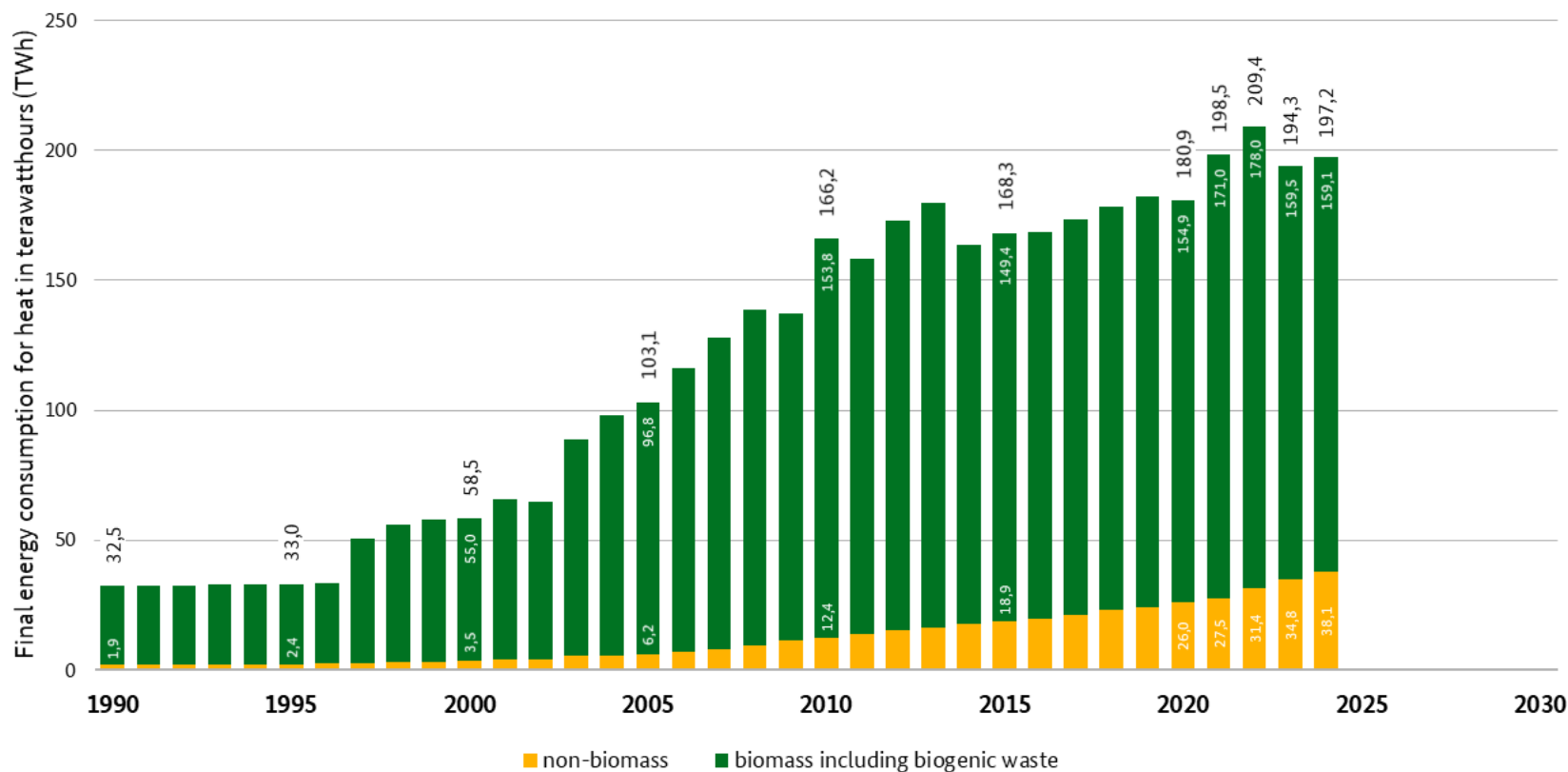


¹ incl. sewage sludge and charcoal; ² incl. biofuels used in agric., forestry, constr. and military; since 2010 incl. blended bioethanol

³ biogas, biomethane, sewage gas and landfill gas; ⁴ biogenic fr. of waste in waste incineration plants est. at 50 %,

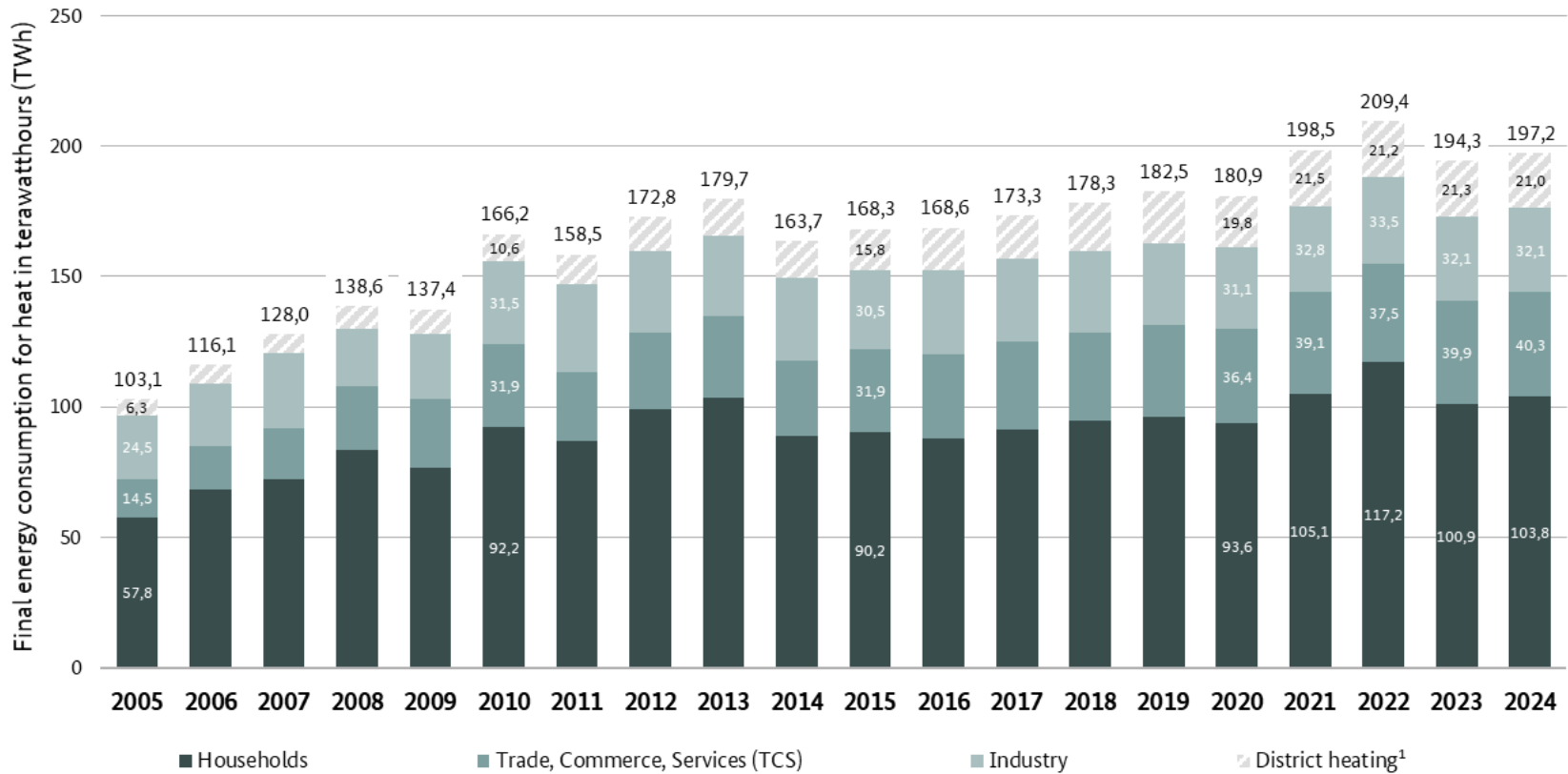


Development of final energy consumption from renewable energy sources for heating and cooling in Germany





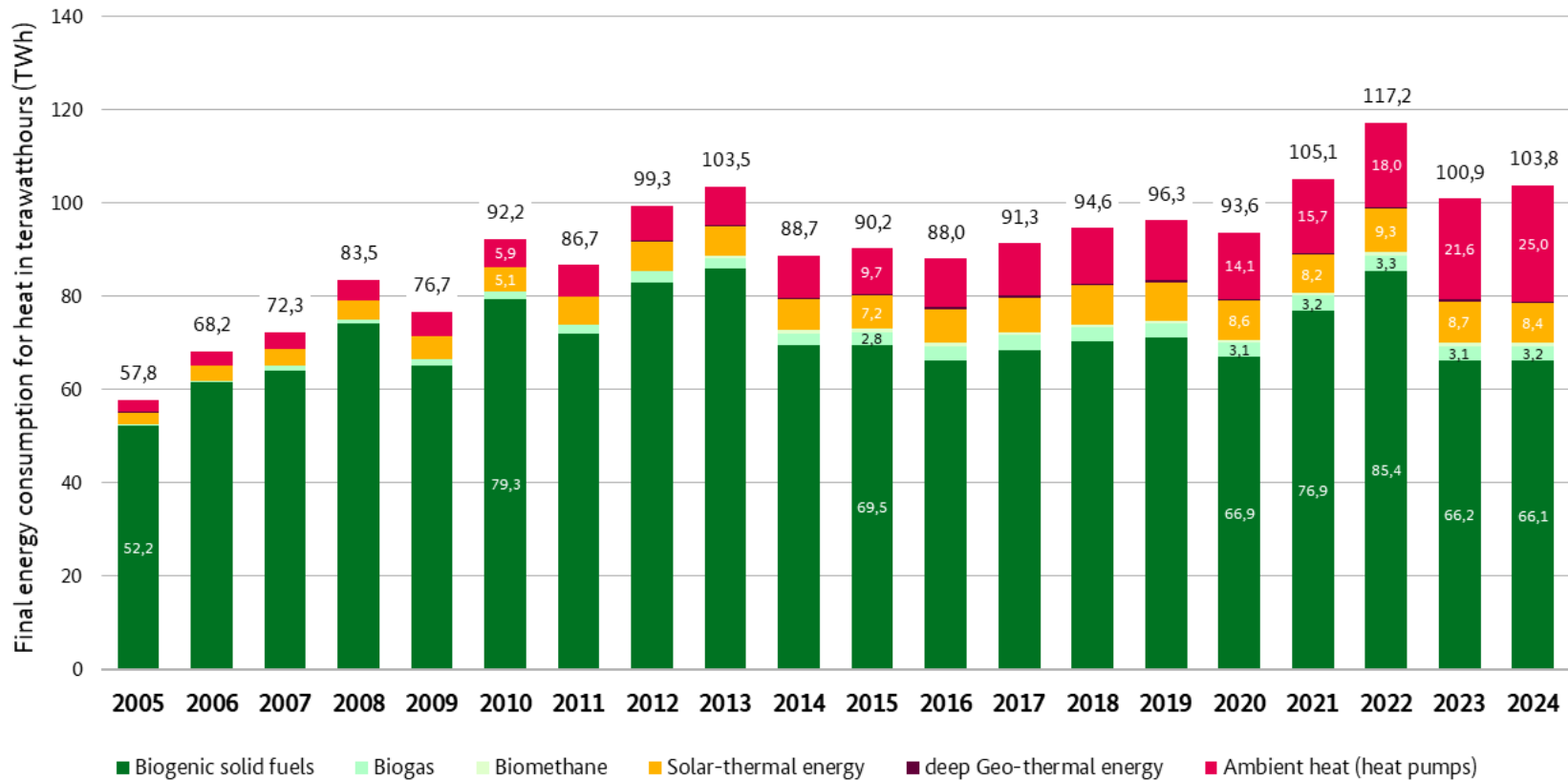
Development of final energy consumption from renewable energy sources for heating and cooling in different sectors and district heating in Germany



¹ district heat not attributable to any specific enduse sector

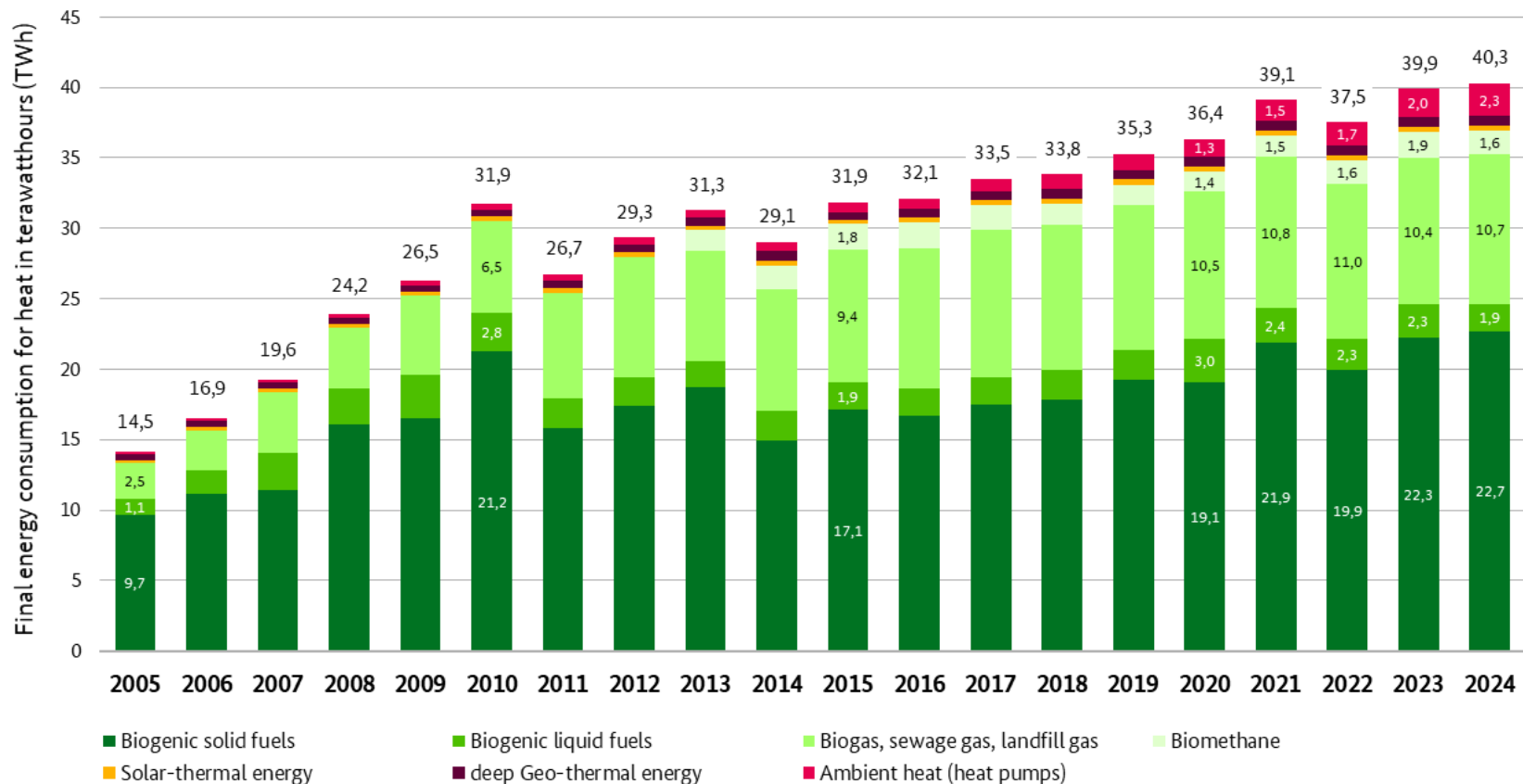


Development of final energy consumption from renewable energy sources for heating and cooling in the household sector in Germany



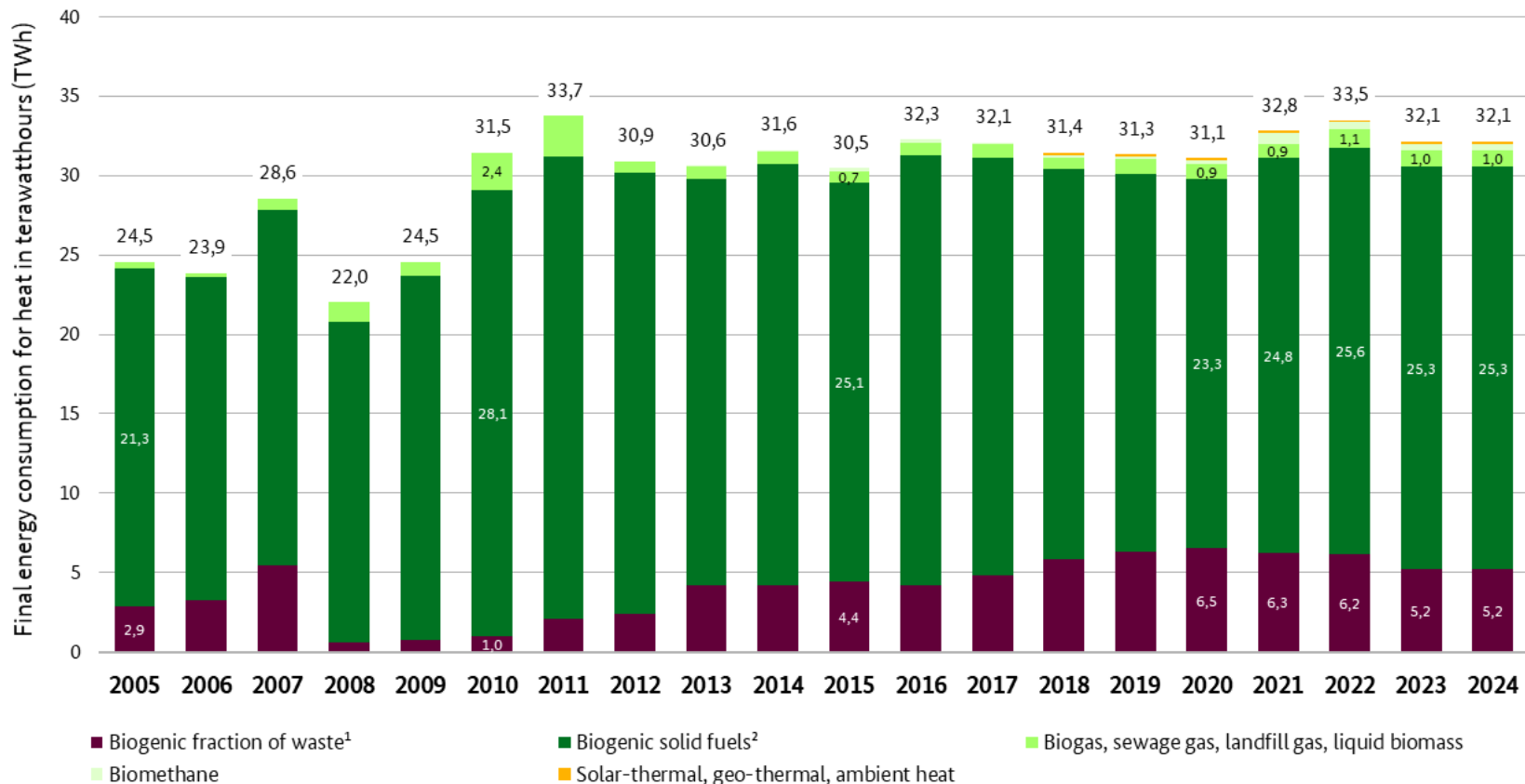


Development of final energy consumption from renewable energy sources for heating and cooling in the trade, commerce & service (TCS) sector in Germany





Development of final energy consumption from renewable energy sources for heating and cooling in the industry in Germany

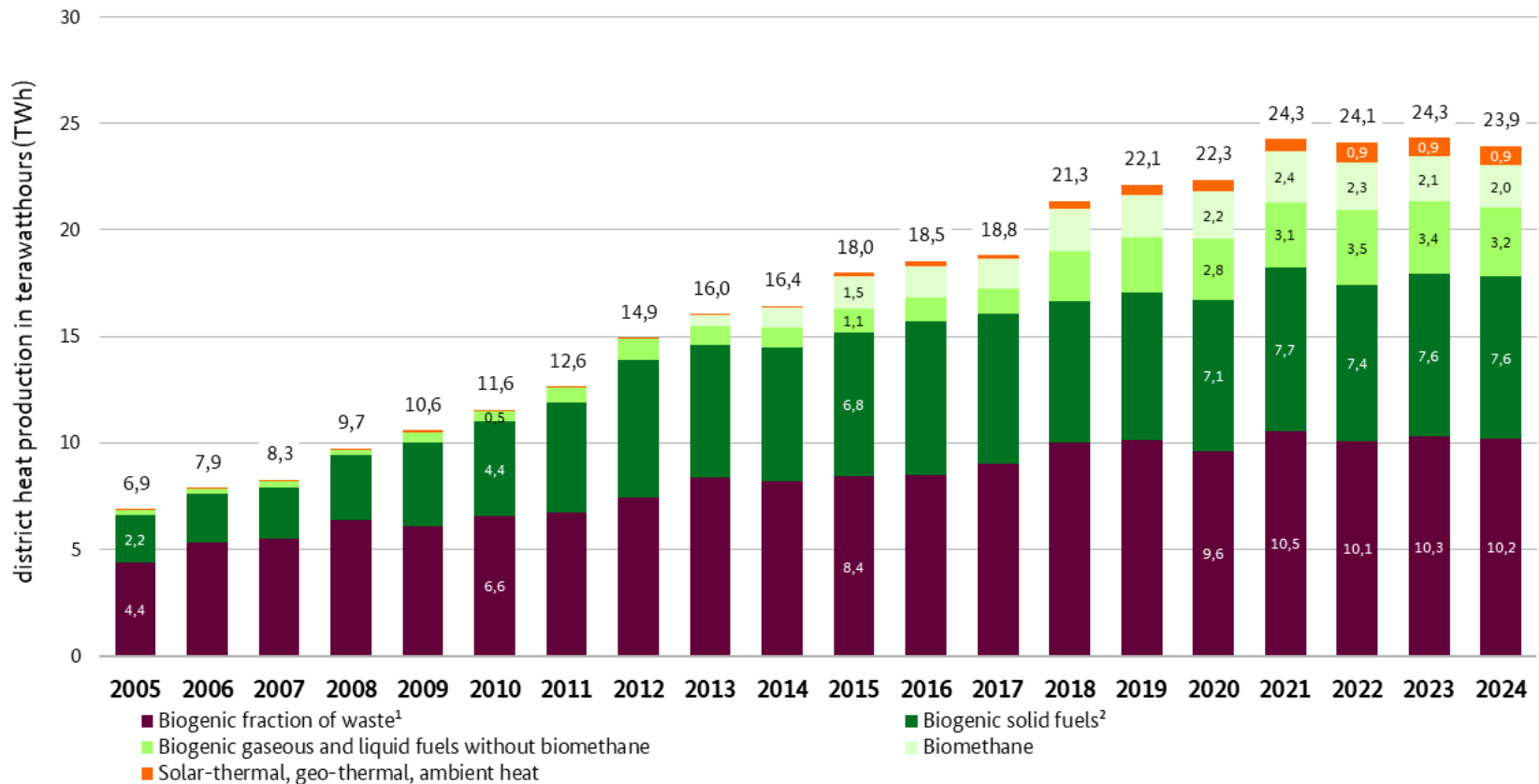


¹ biogenic fr. of waste in waste incineration plants est. at 50 %, from 2008 only municipal waste;

² inkl. sewage sludge



Development of district heat production from renewable energy sources in Germany

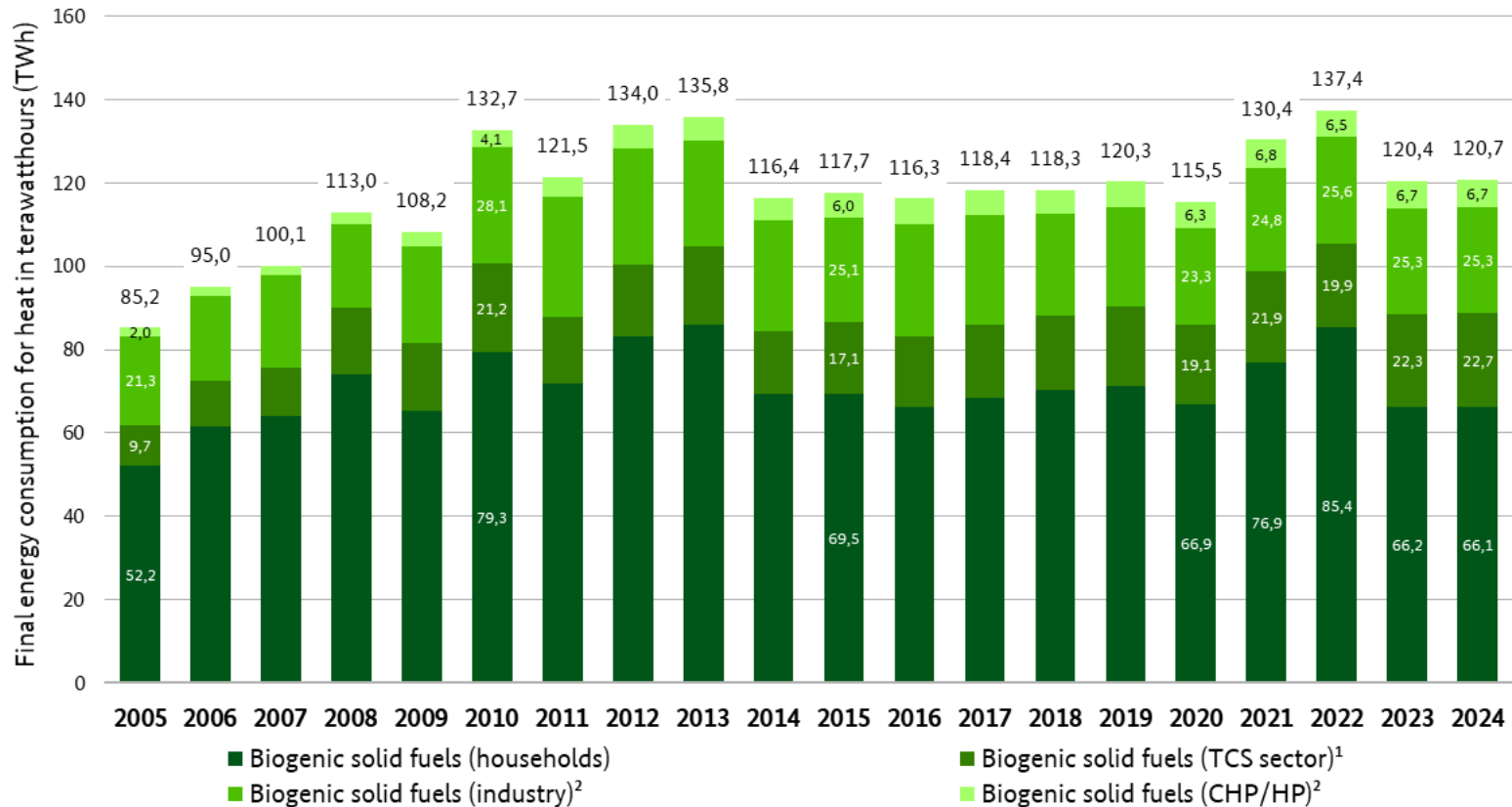


¹ biogenic fr. of waste in waste incineration plants est. at 50 %, from 2008 only municipal waste;

² inkl. sewage sludge;



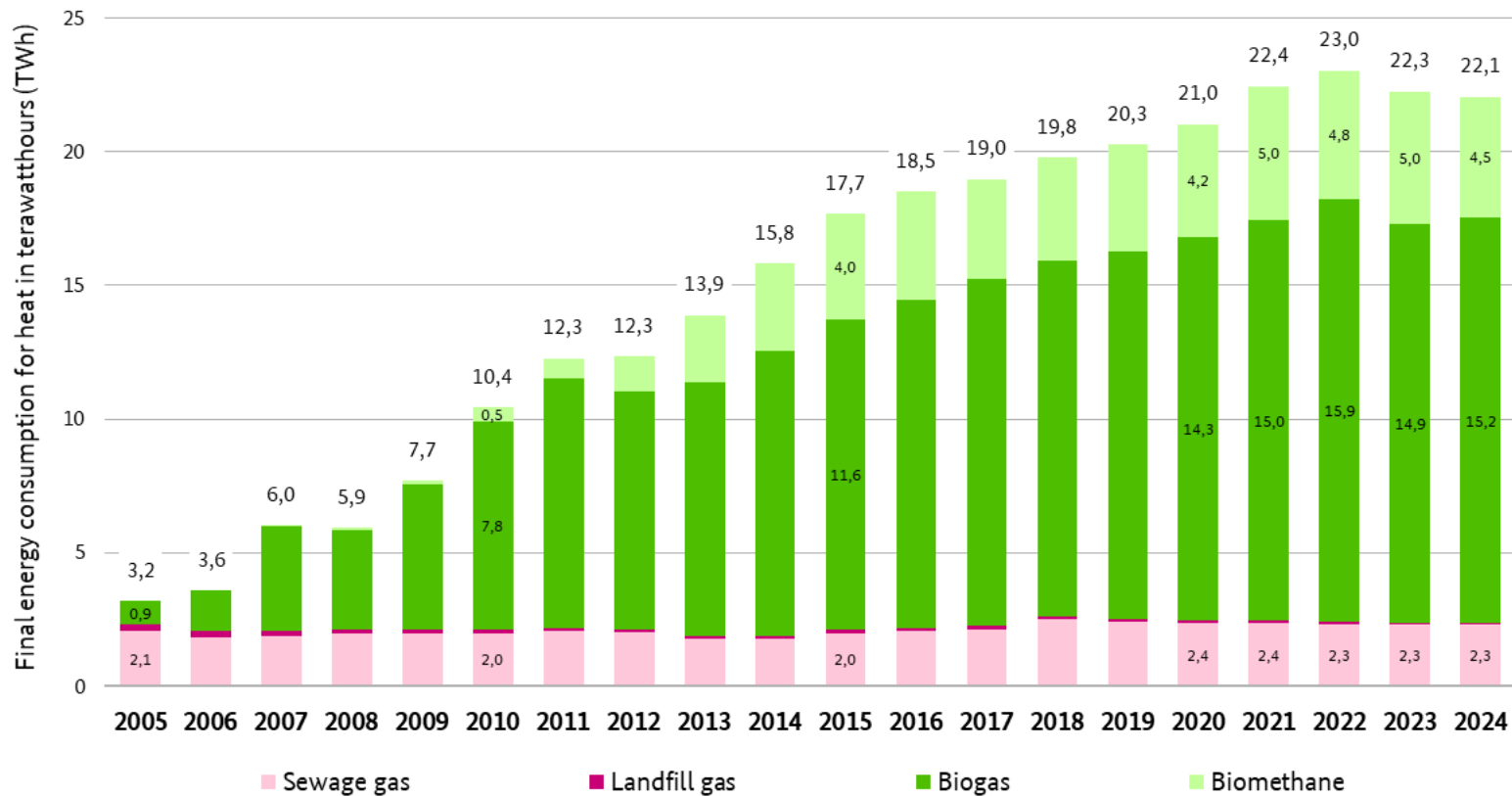
Development of final energy consumption from solid biomass for heating and cooling in Germany



¹ TCS corresponds to trade, commercial and service sector; ² incl. sewage sludge and charcoal

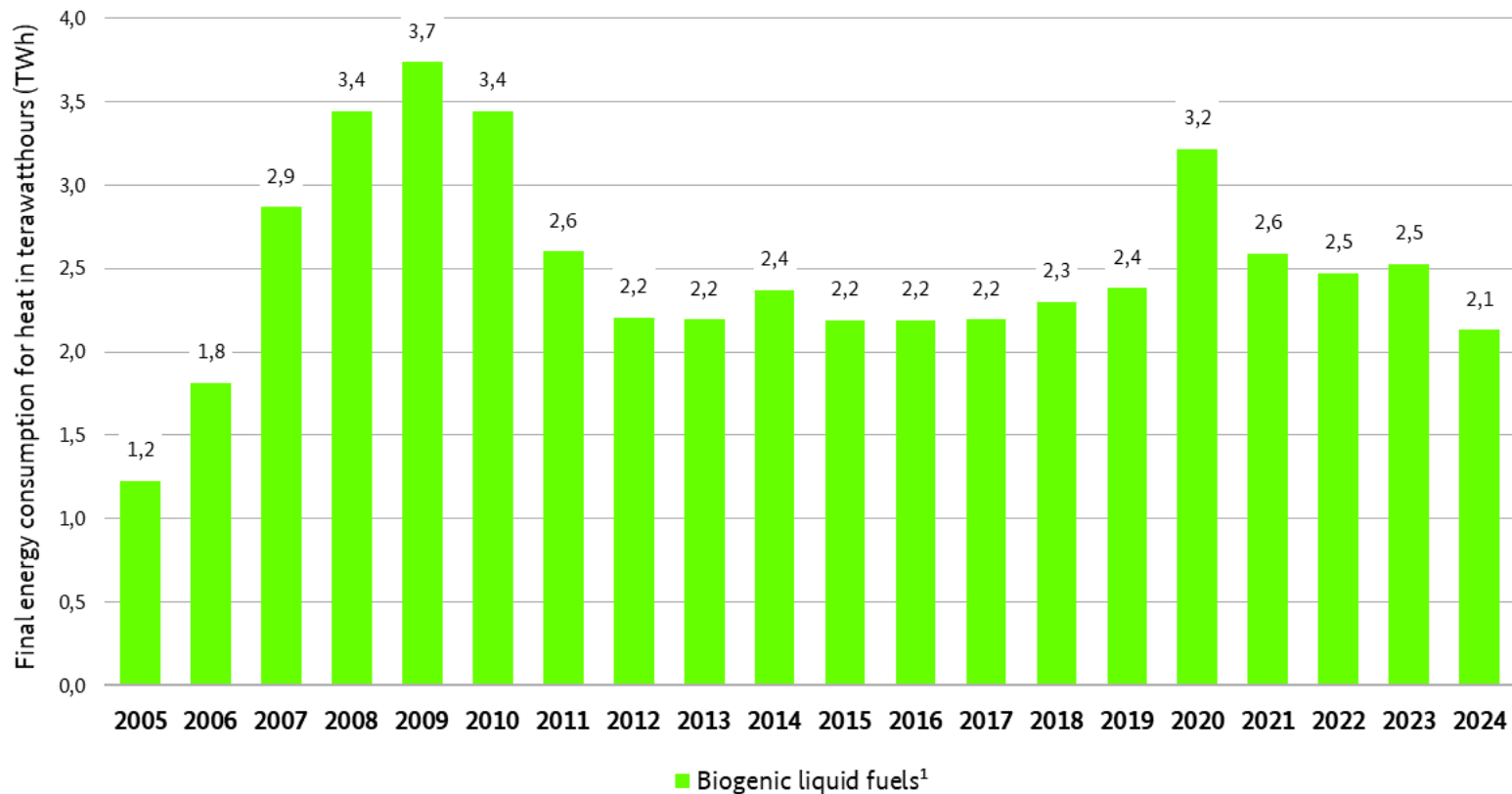


Development of final energy consumption from gaseous biomass for heating and cooling in Germany





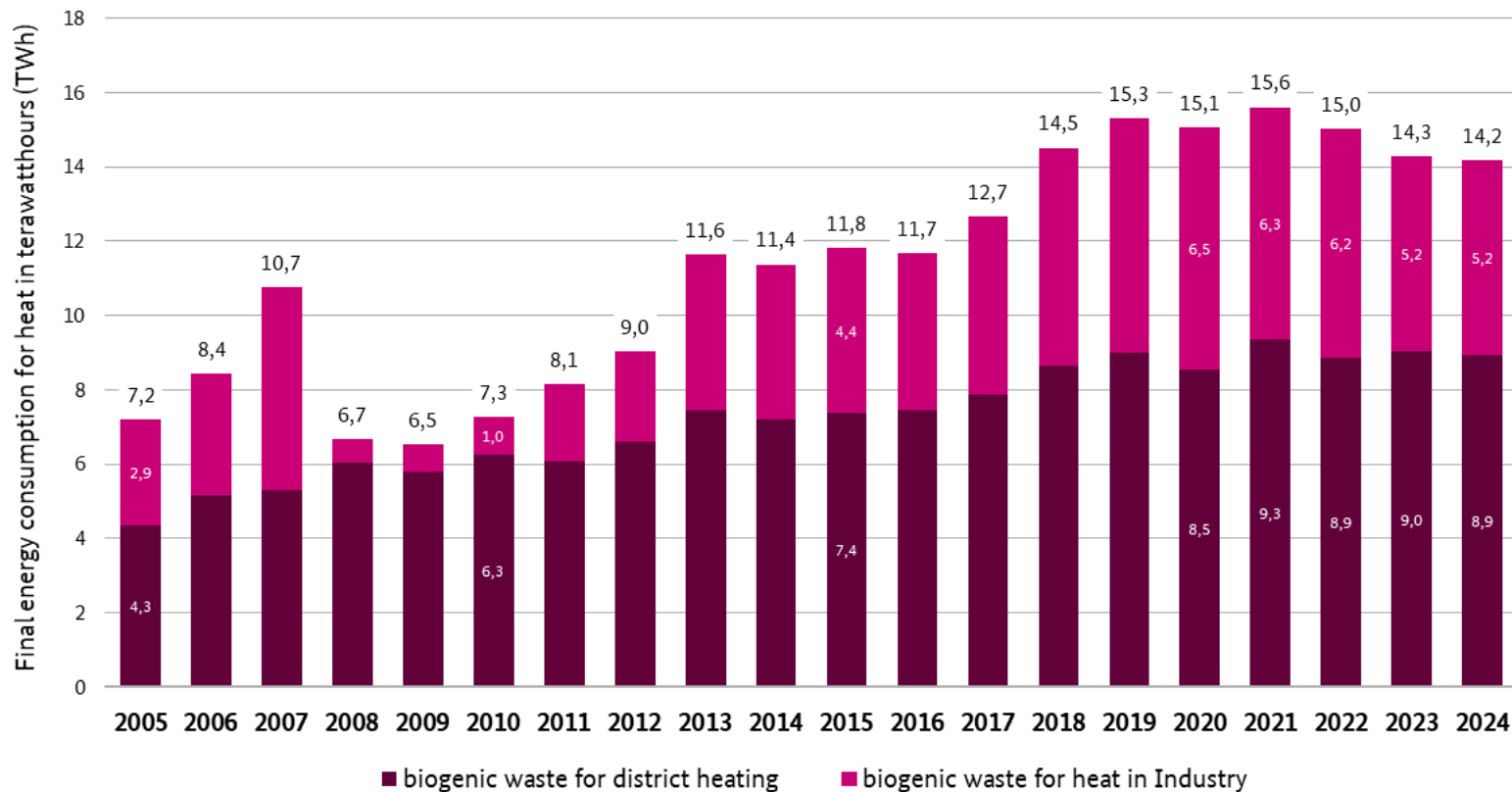
Development of final energy consumption from liquid biomass for heating and cooling in Germany



¹ incl. biofuels used in agriculture, forestry, construction and military



Development of final energy consumption from biogenic waste for heating and cooling in Germany

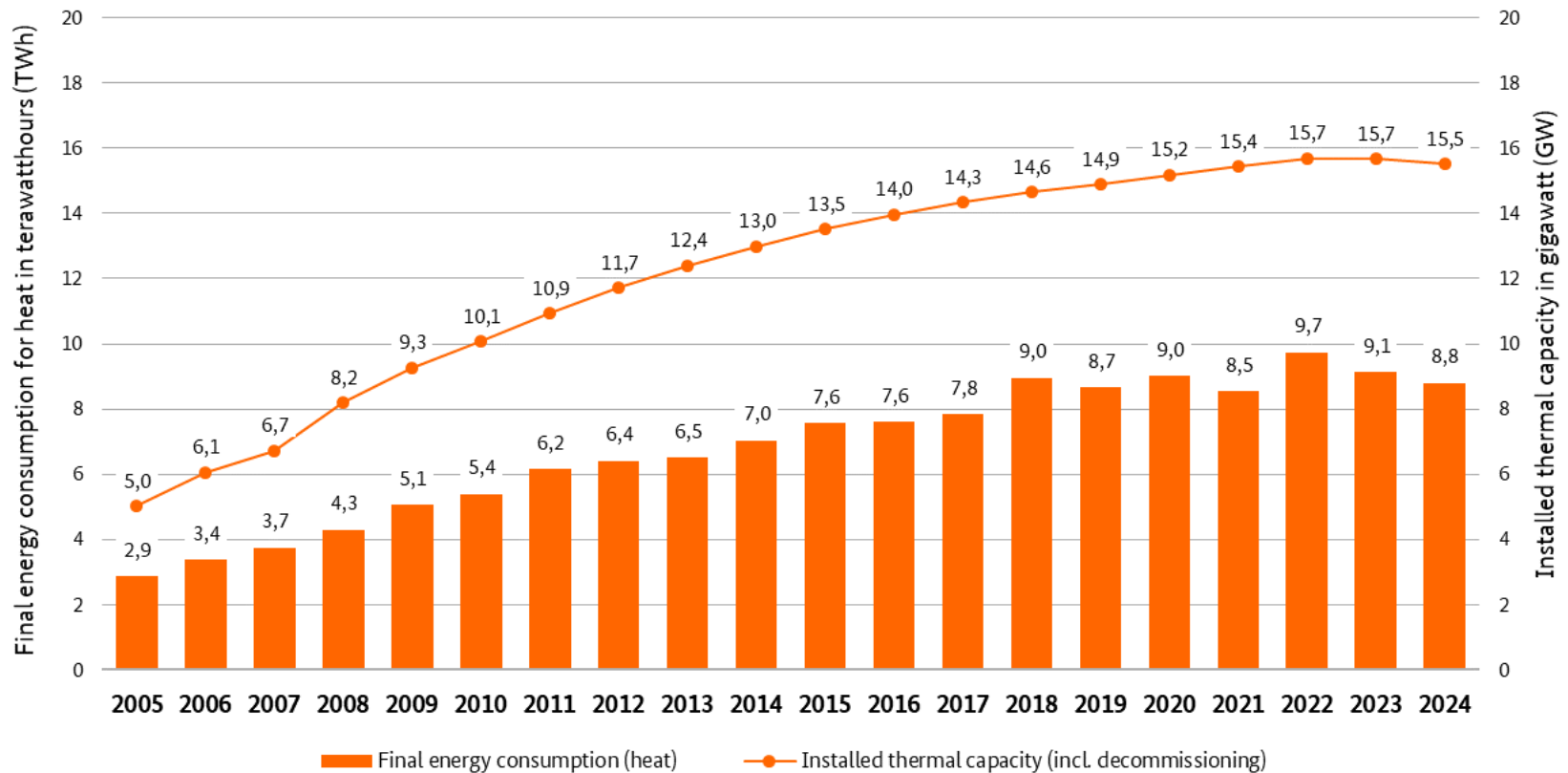


Notice: biogenic fraction of waste in waste incineration plants estimated at 50 %, since 2008 municipal waste only; decrease 2008 due to first-time inclusion of newly available data (statistical adjustment)

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025

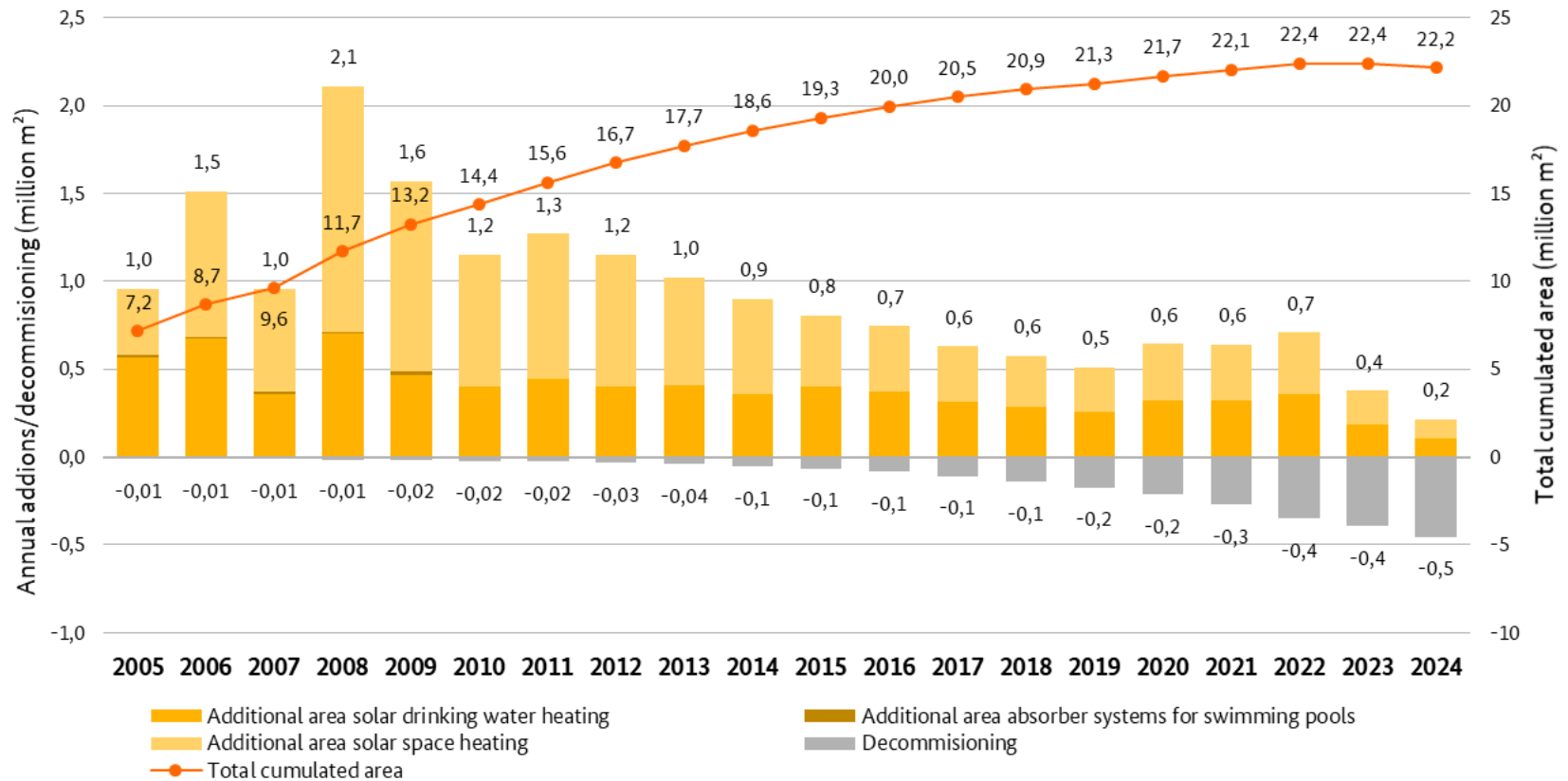


Development of final energy consumption from solar thermal energy for heating and cooling and thermal plant capacity in Germany





Additions and Decommisioning of solar thermal plants in Germany

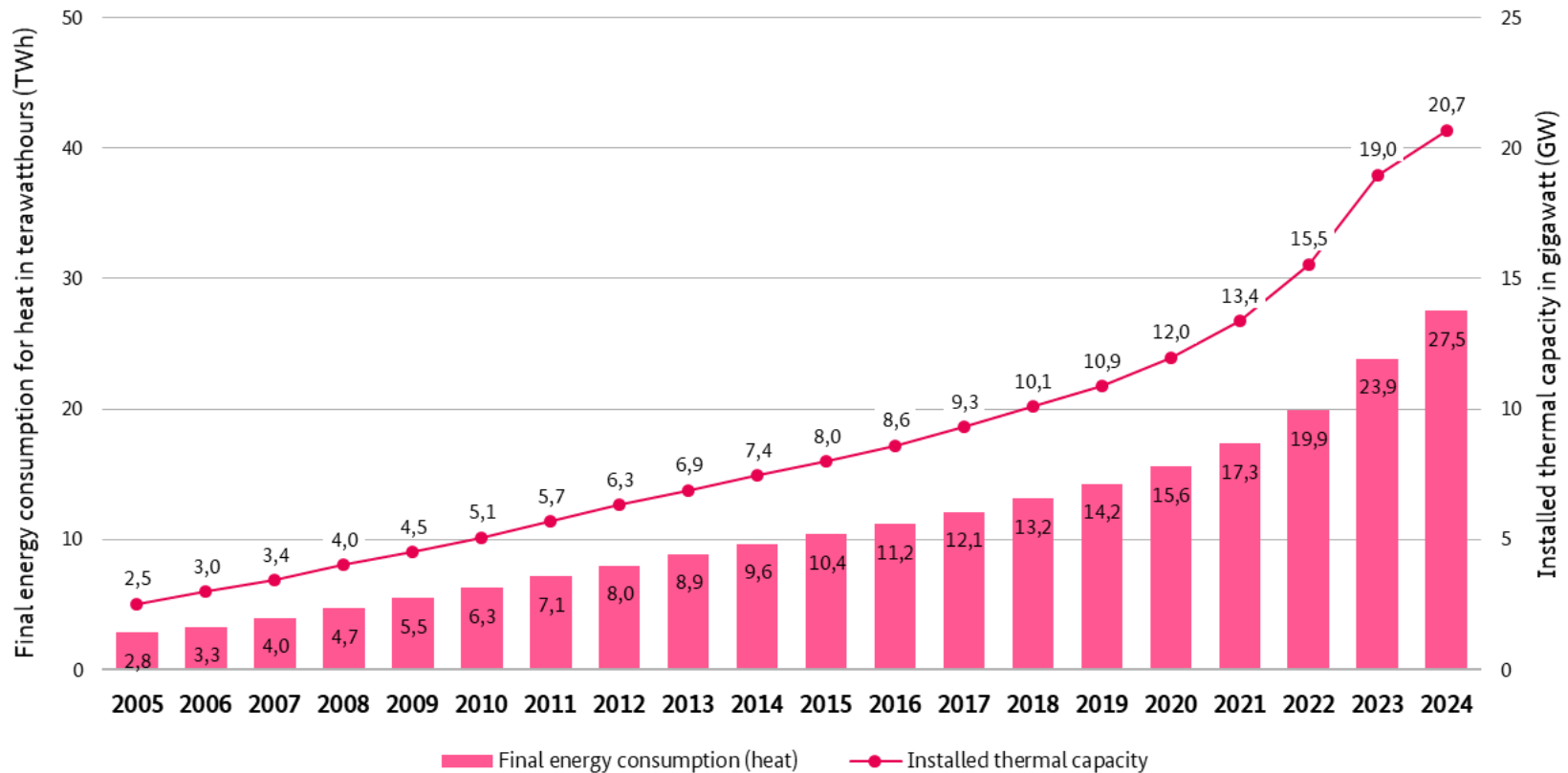


Notice: the figure comprises combined solar thermal systems as well as solar thermal support for heating and service water heating; in all categories decommissioning of systems is taken into account

Source: Working Group on Renewable Energy-Statistics (AGEE-Stat); as of February 2025

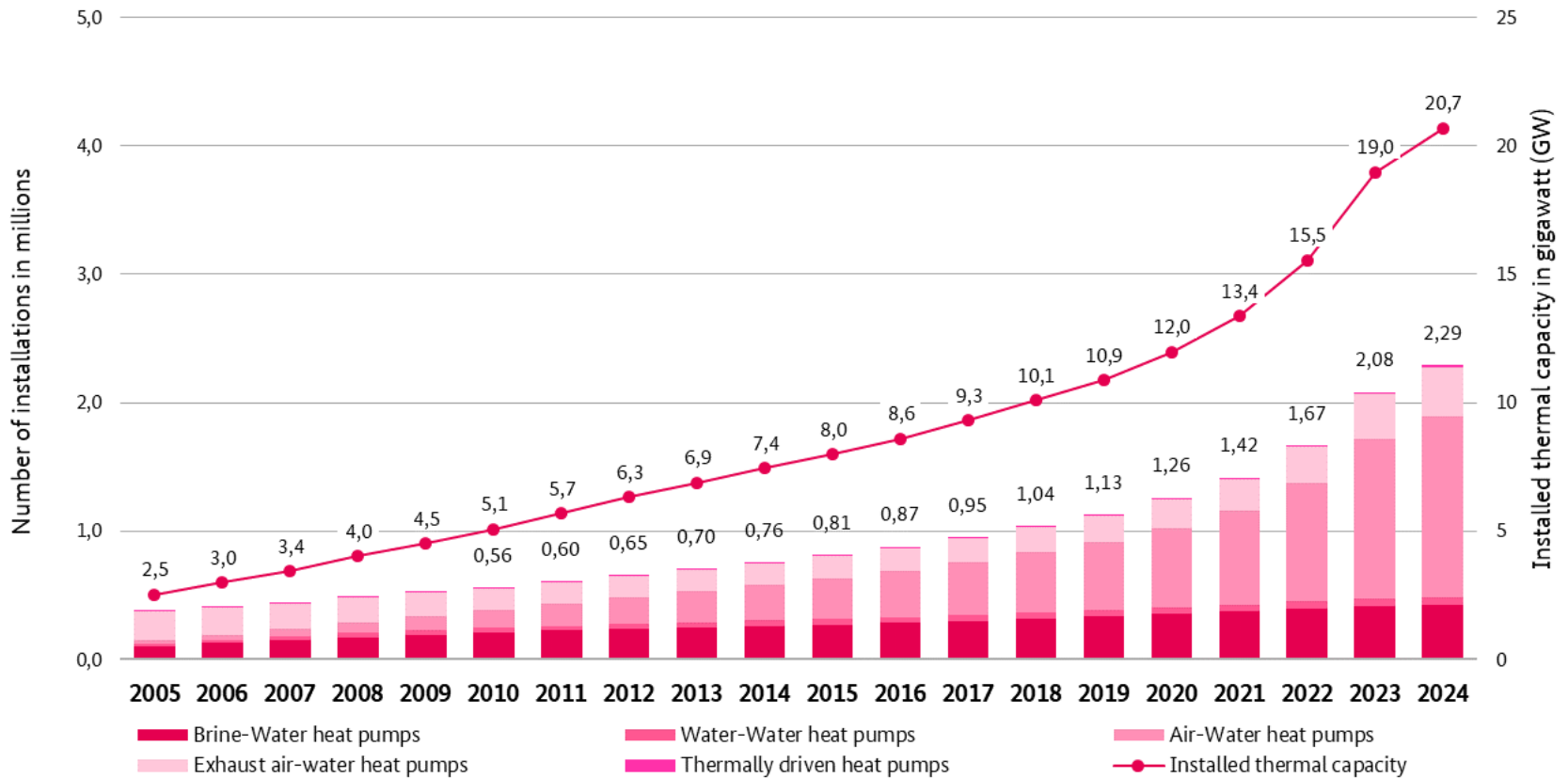


Development of final energy consumption from near-surface geothermal energy and ambient heat for heating and cooling and thermal capacity of heat pumps in Germany



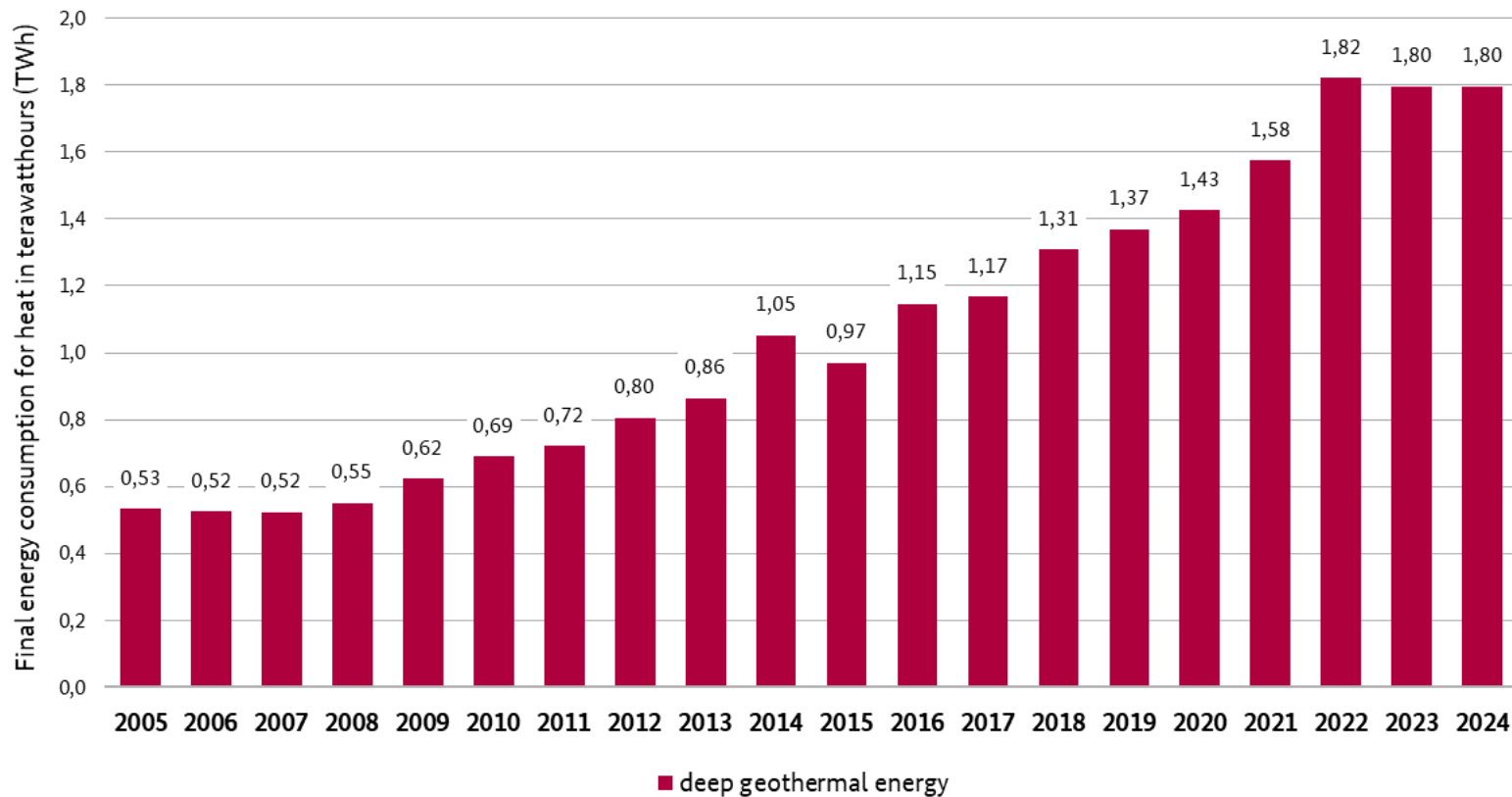


Development of heat pumps in Germany





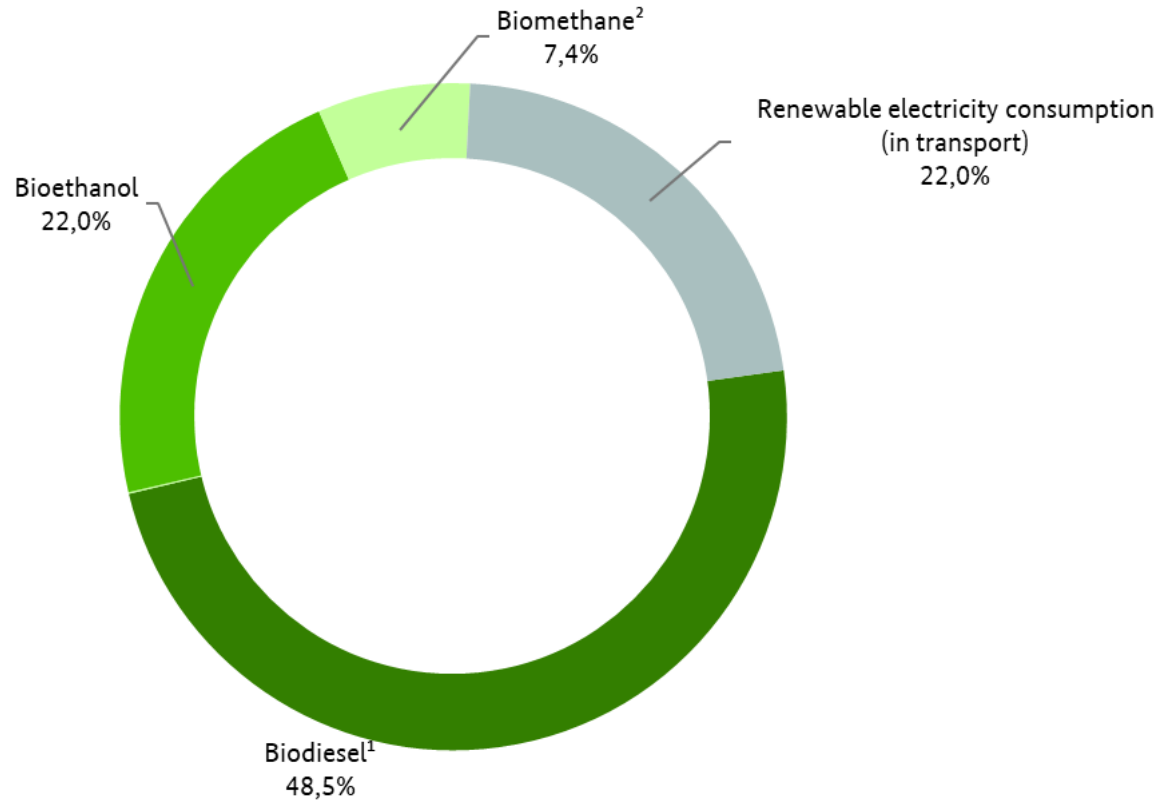
Development of final energy consumption from deep geothermal sources for heating and cooling in Germany





Final energy consumption from renewable sources in the transport sector in Germany in the year 2024

Total: 42 terawatthours (TWh)

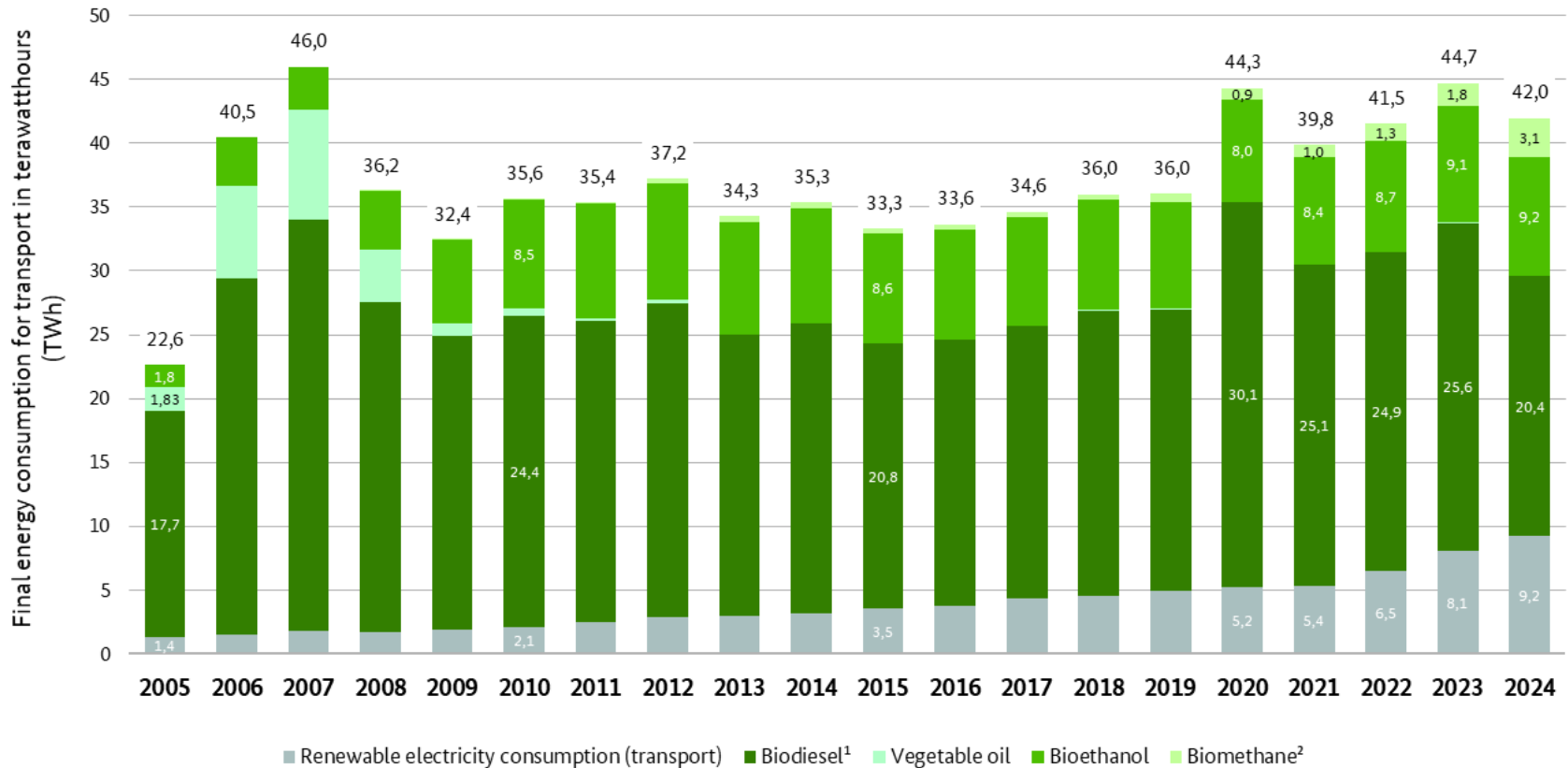


¹ consumption of biodiesel (including HVO) in the transport sector (excluding consumption in agriculture, forestry, construction and military)

² based on heating value, from 2023 incl. Bio-LNG



Development of final energy consumption from renewable sources in the transport sector in Germany

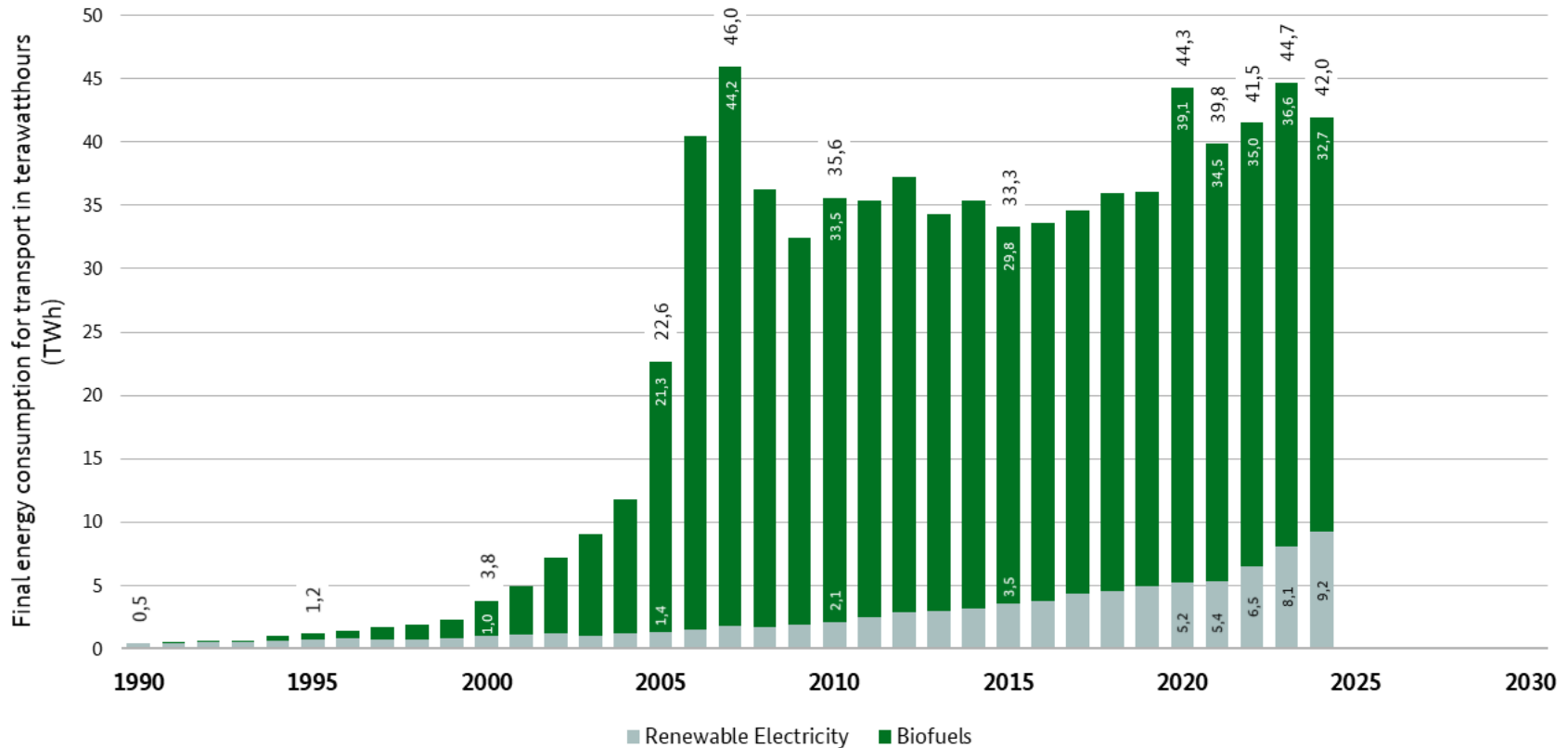


¹ consumption of biodiesel (including HVO) in the transport sector (excluding consumption in agriculture, forestry, construction and military)

² based on heating value, from 2023 incl. Bio-LNG

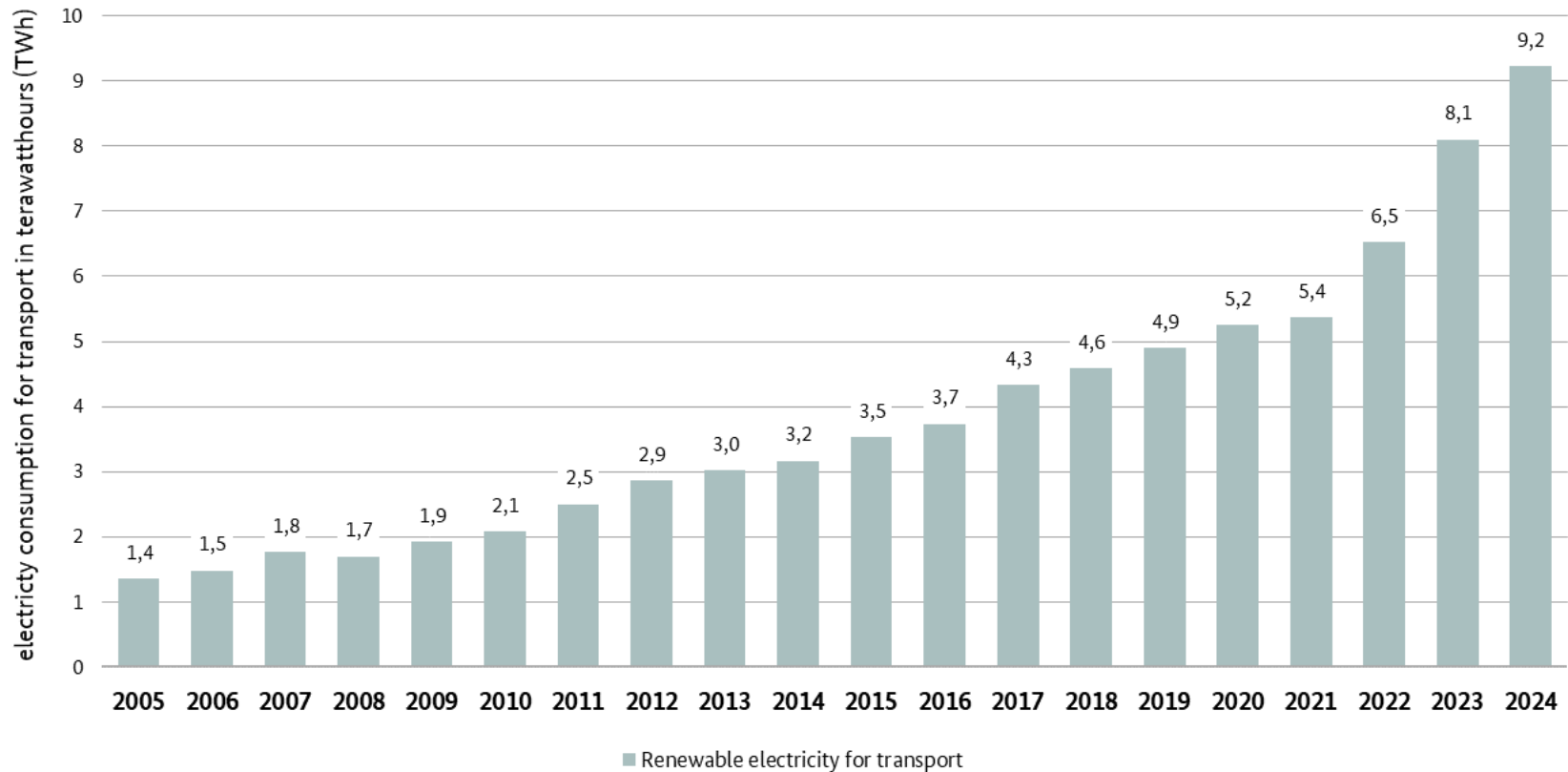


Development of final energy consumption from renewable sources in the transport sector in Germany



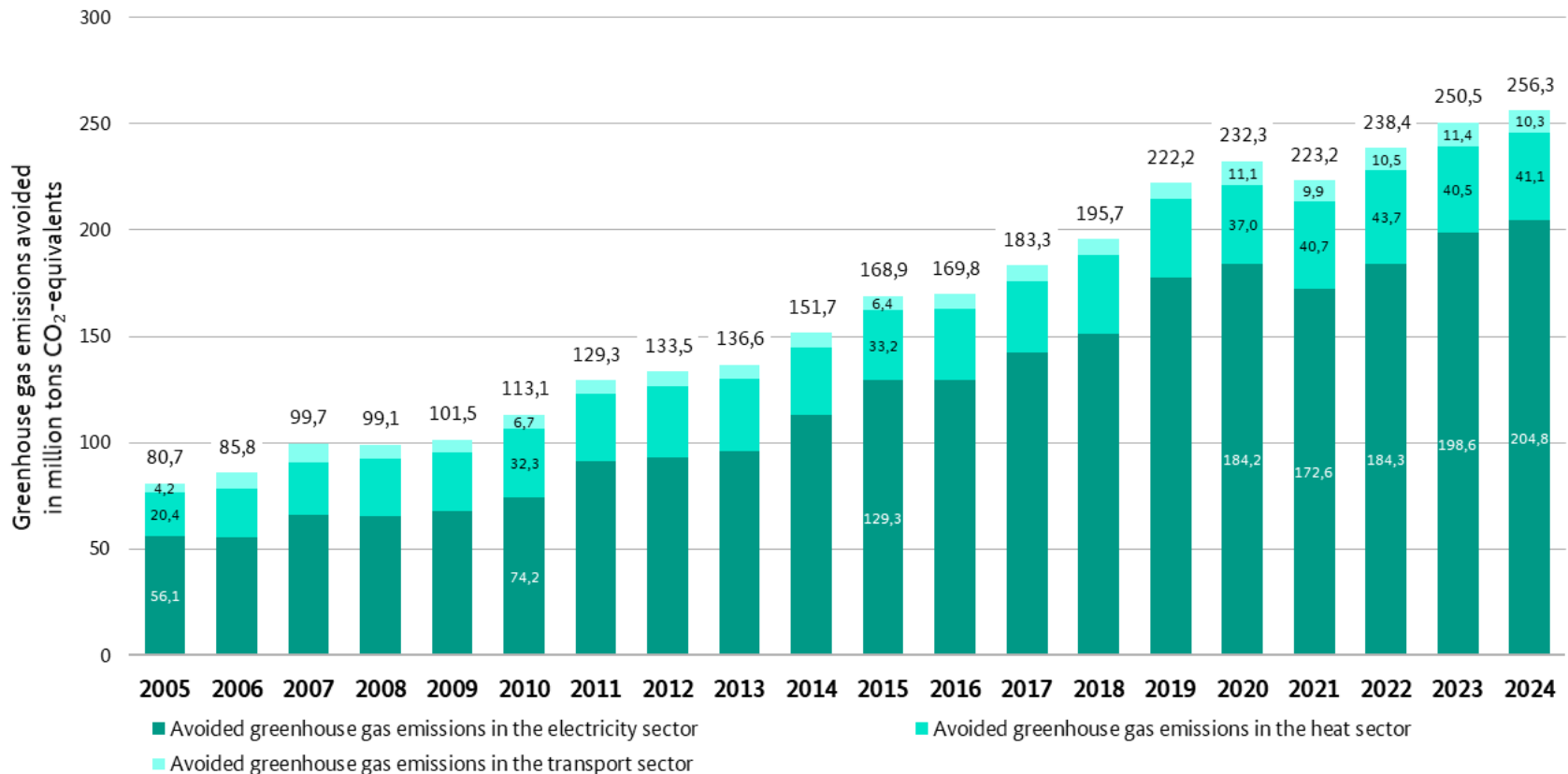


Development of the use of renewable electricity in the transport sector in Germany



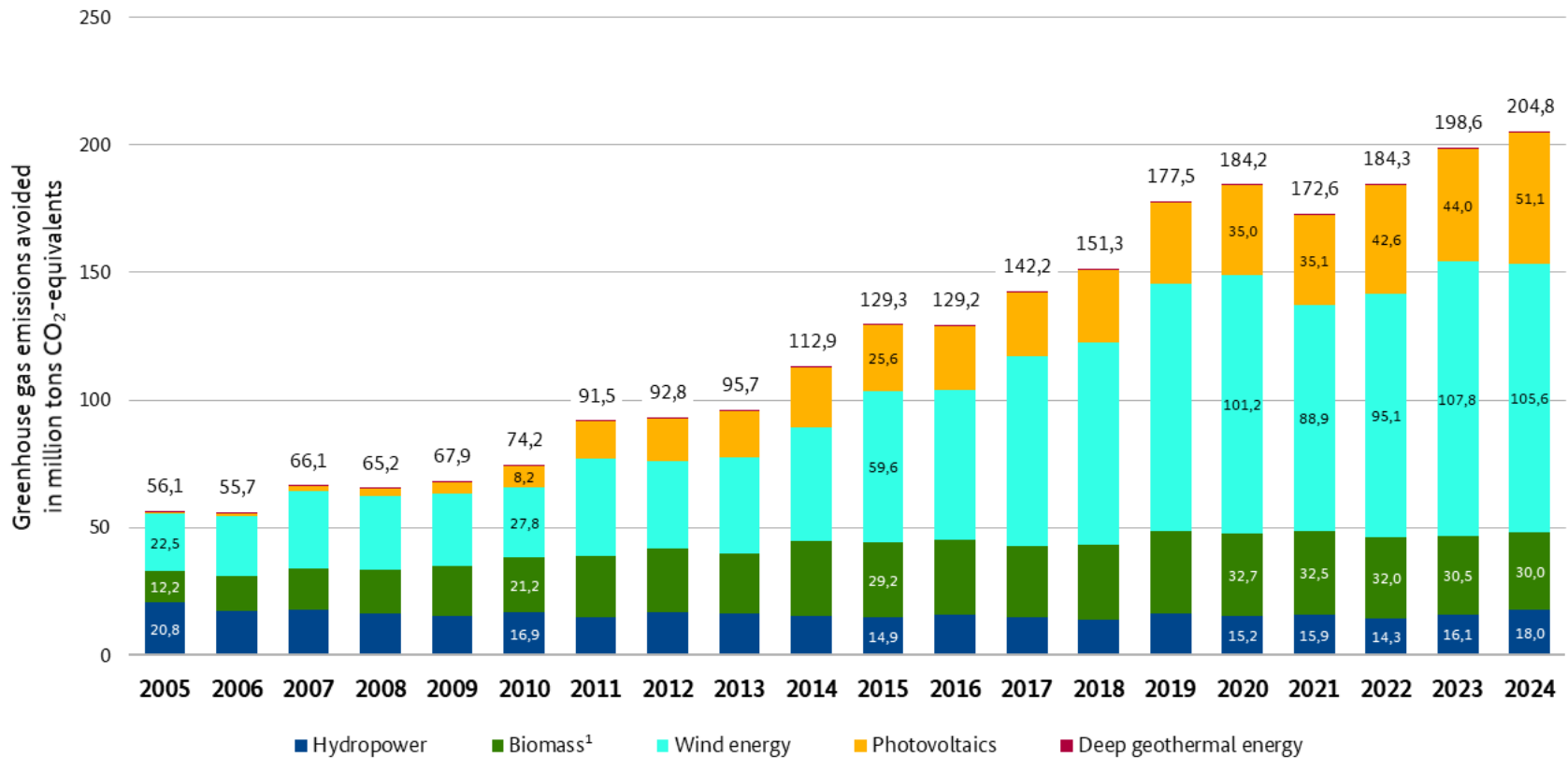


Development of greenhouse gas emissions avoided through the use of renewable energy sources in Germany by sectors





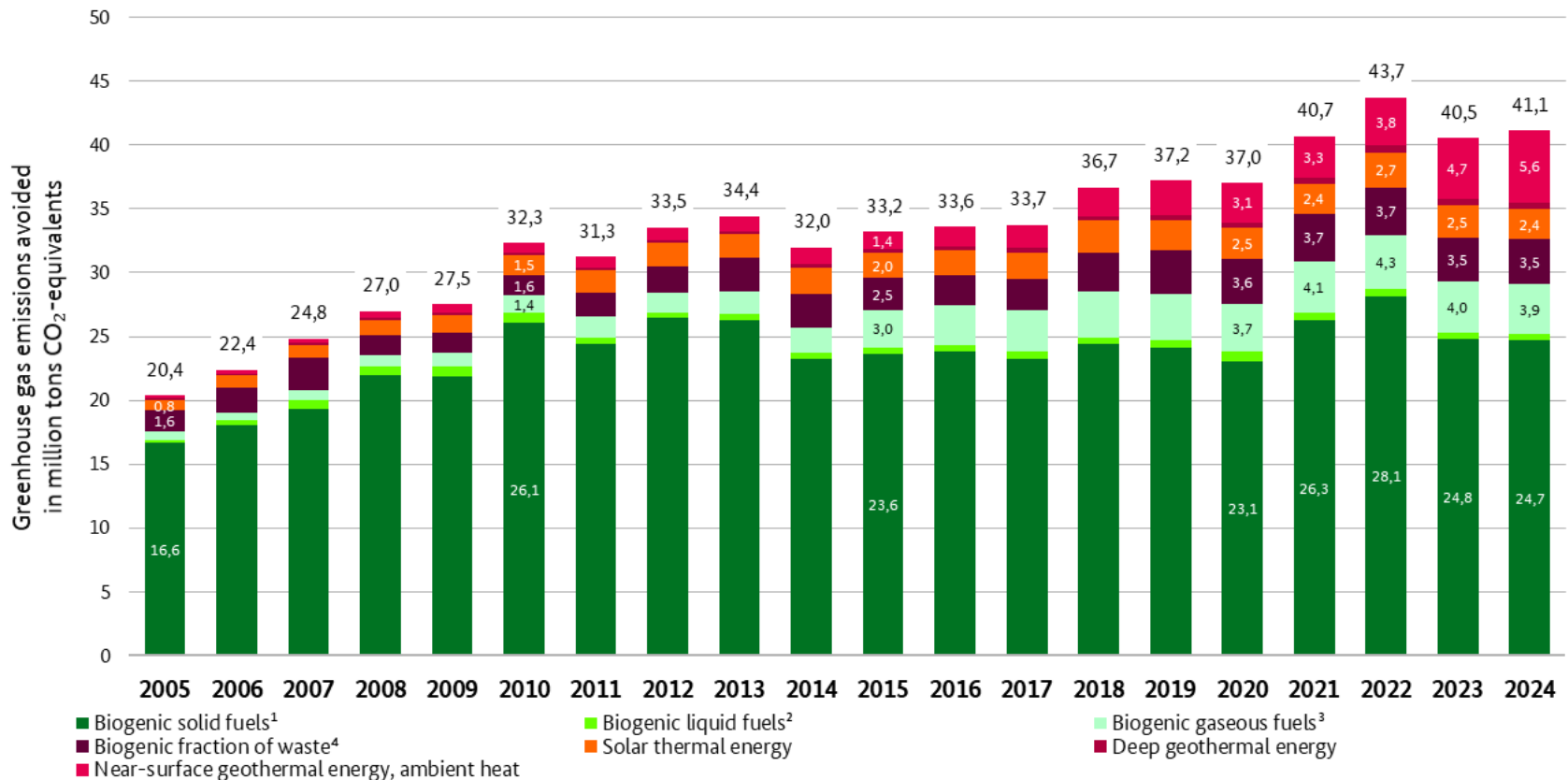
Development of greenhouse gas emissions avoided through the use of renewable energy sources in the electricity sector in Germany



¹ incl. solid, liquid and gaseous biomass, sewage sludge and the biologic fraction of waste (in waste incineration plants estimated at 50 %, from 2008 only municipal waste)



Development of greenhouse gas emissions avoided through the use of renewable energy sources in the heating sector in Germany

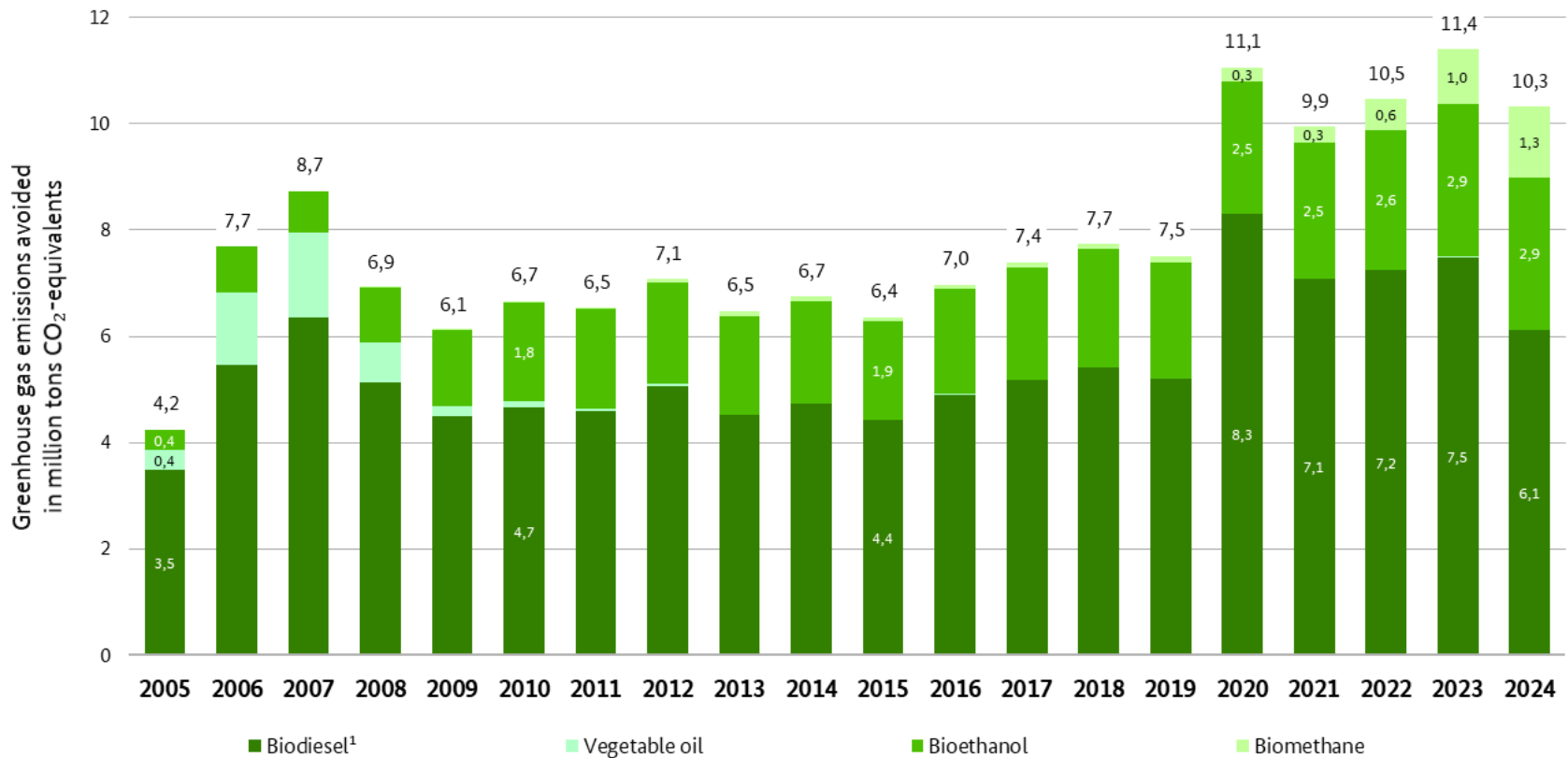


¹ incl. sewage sludge, without charcoal; ² incl. biofuels used in agric., forestry, constr. and military;

³ biogas, biomethane, sewage gas and landfill gas; ⁴ biogenic fr. of waste in waste incineration plants est. at 50%, from 2008 only municipal waste



Development of greenhouse gas emissions avoided through the use of renewable energy sources in the transport sector in Germany



¹ cons. of biodiesel (incl. HVO) in the transport sector (excl. cons. in agriculture, forestry, constr. and military)

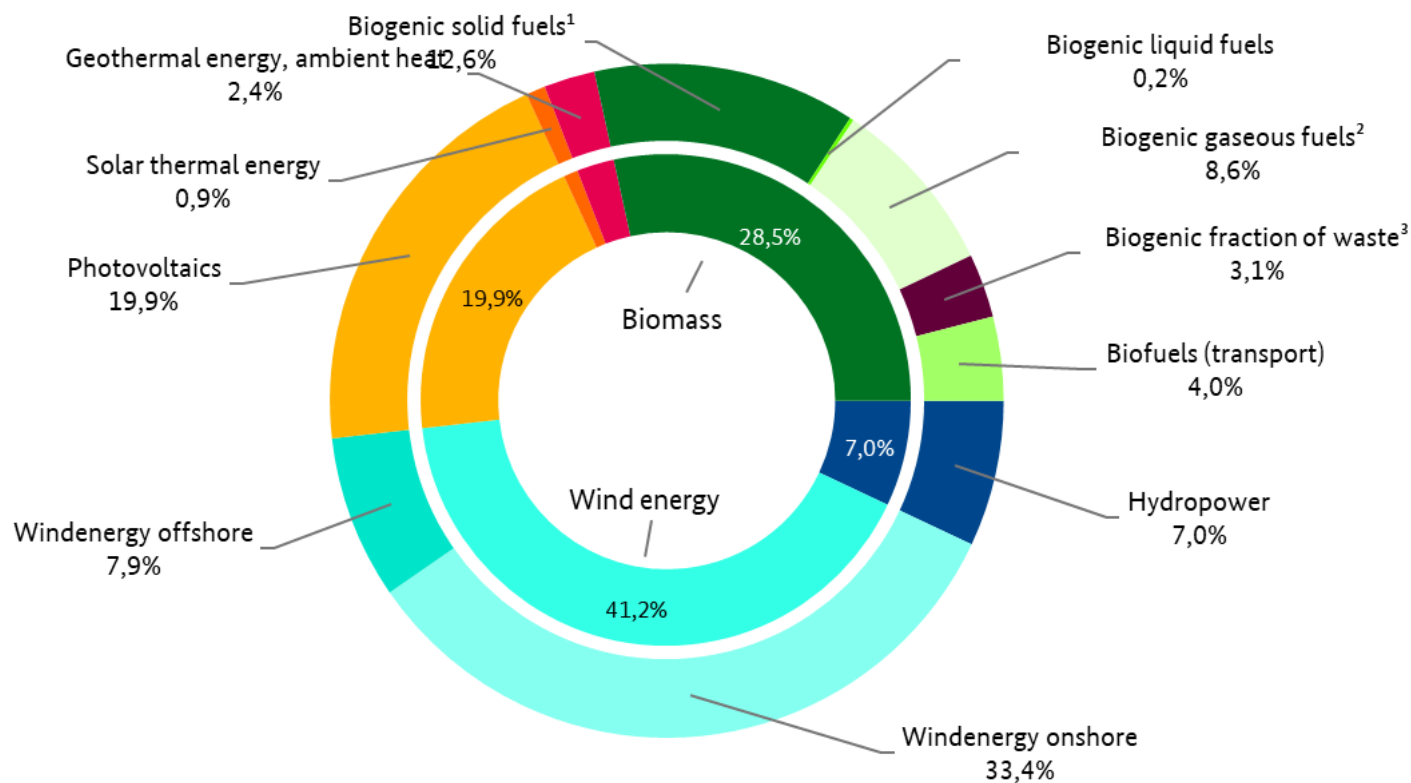
Notice: based on preliminary date of BLE for the year 2022, as well as fossil base-values from § 3 and § 10 of 38. BImSchV

Source: AGEE-Stat based on data of the German Environment Agency (UBA); as of February 2025



Greenhouse gas emissions avoided through the use of renewable energy sources in the year 2024

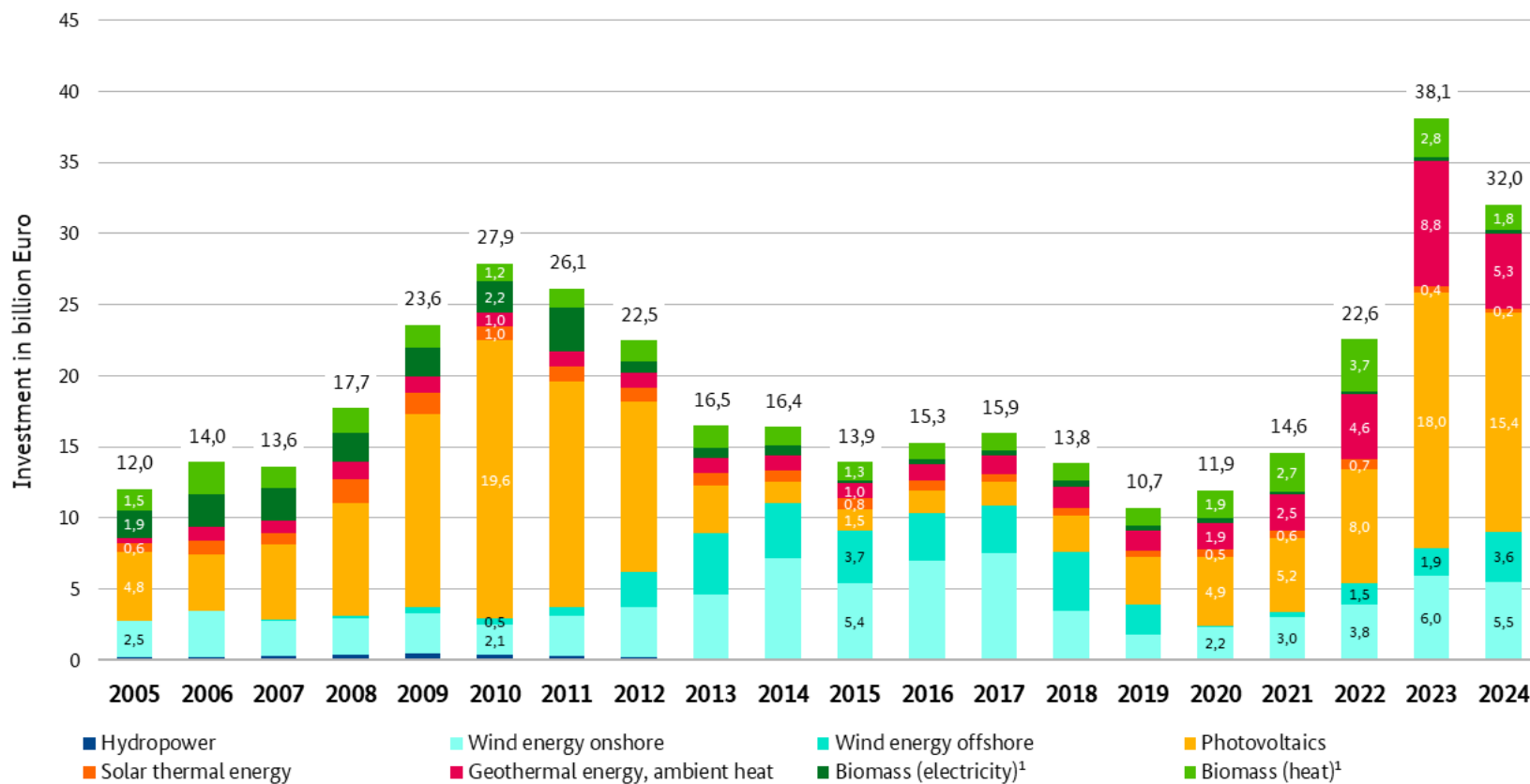
Total: 256,3 million tons CO₂-equivalents



¹ incl. sewage sludge, without charcoal; ² biogas, biomethane, sewage gas and landfill gas; ³ biogenic fraction of waste in waste incineration plants estimated at 50 %



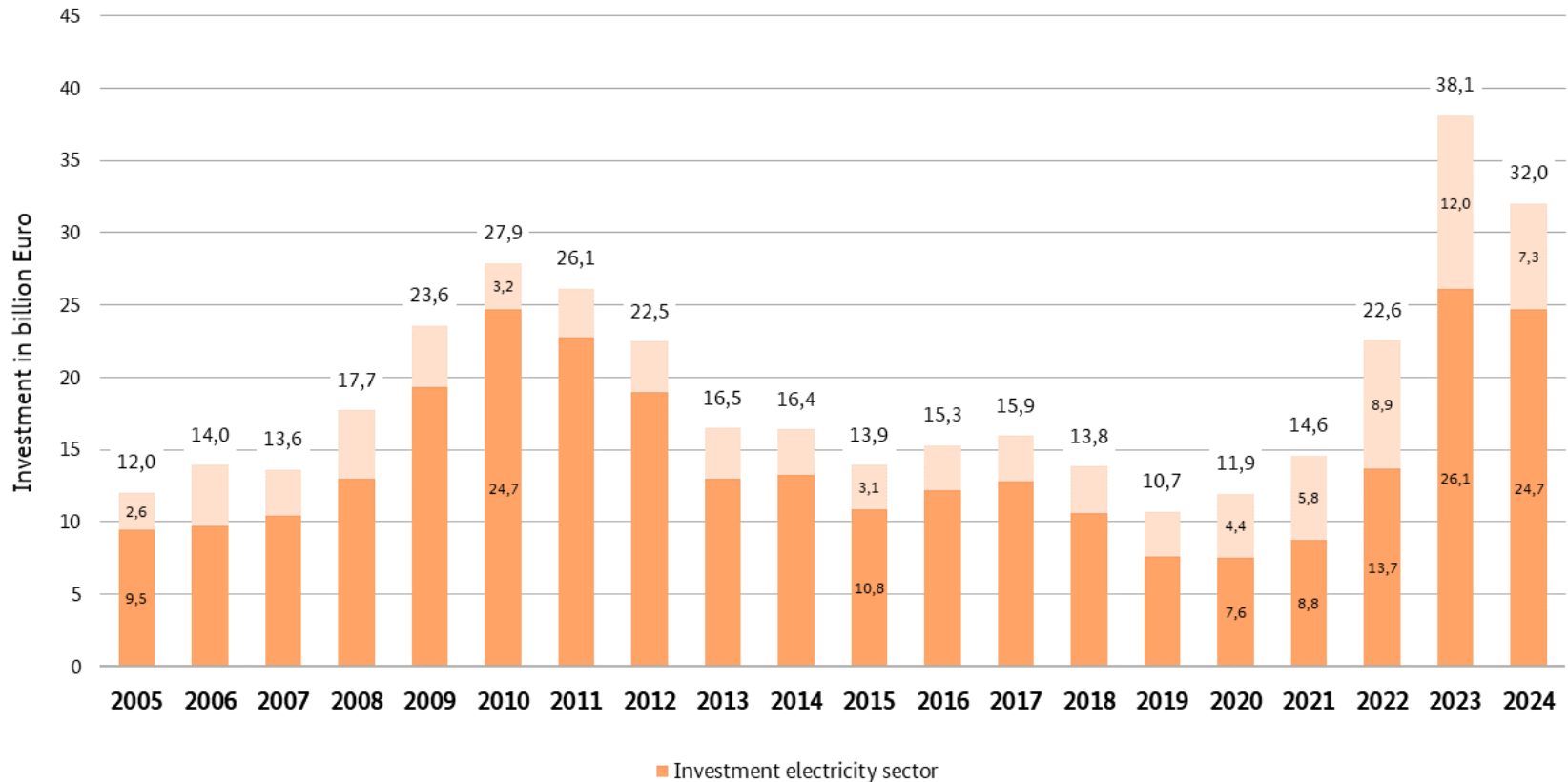
Development of investment in construction of renewable energy plants in Germany



¹ Solid, liquid and gaseous biomass



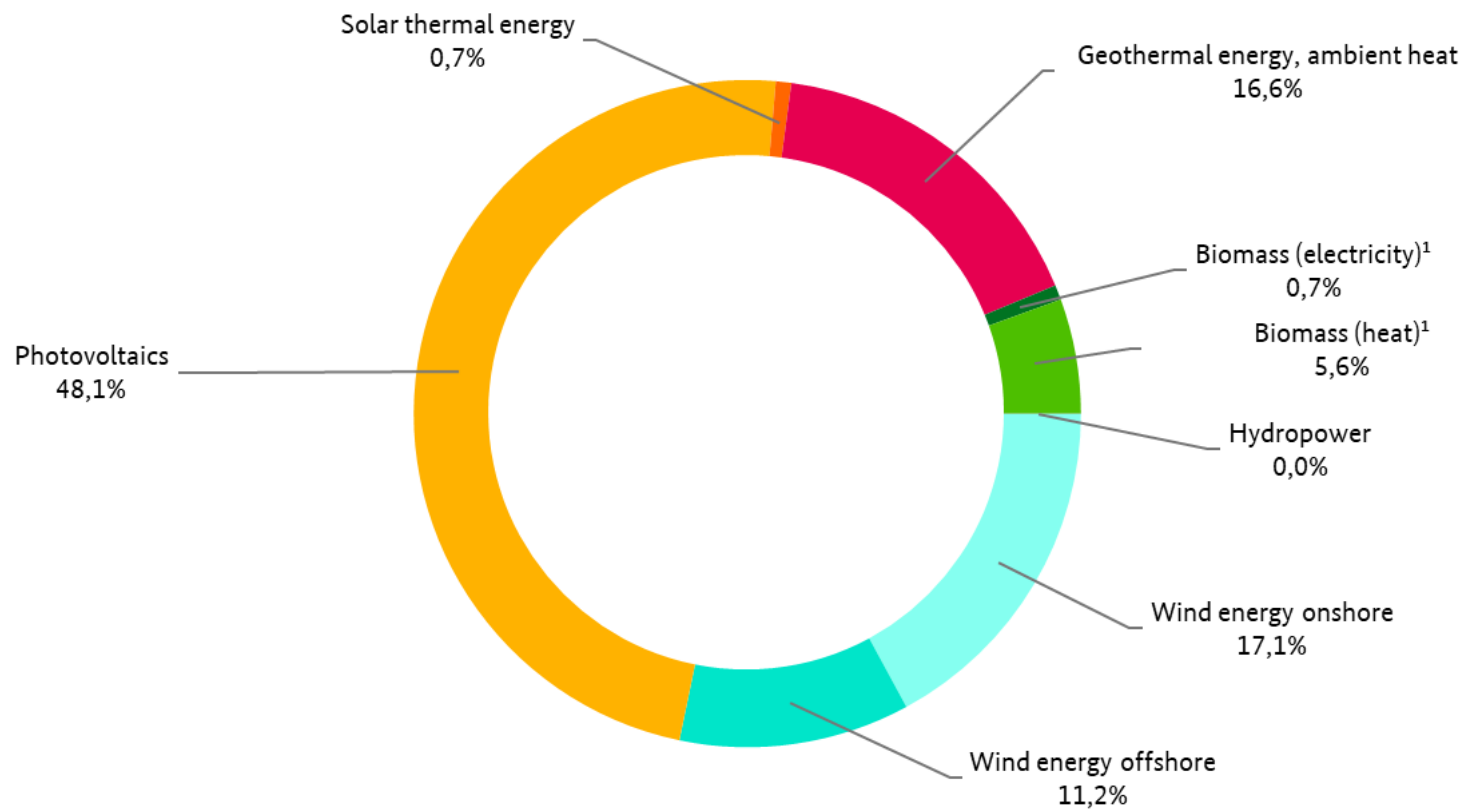
Development of investment in construction of renewable energy plants in Germany (by electricity and heat)





Investment in construction of renewable energy plants in Germany in the year 2024

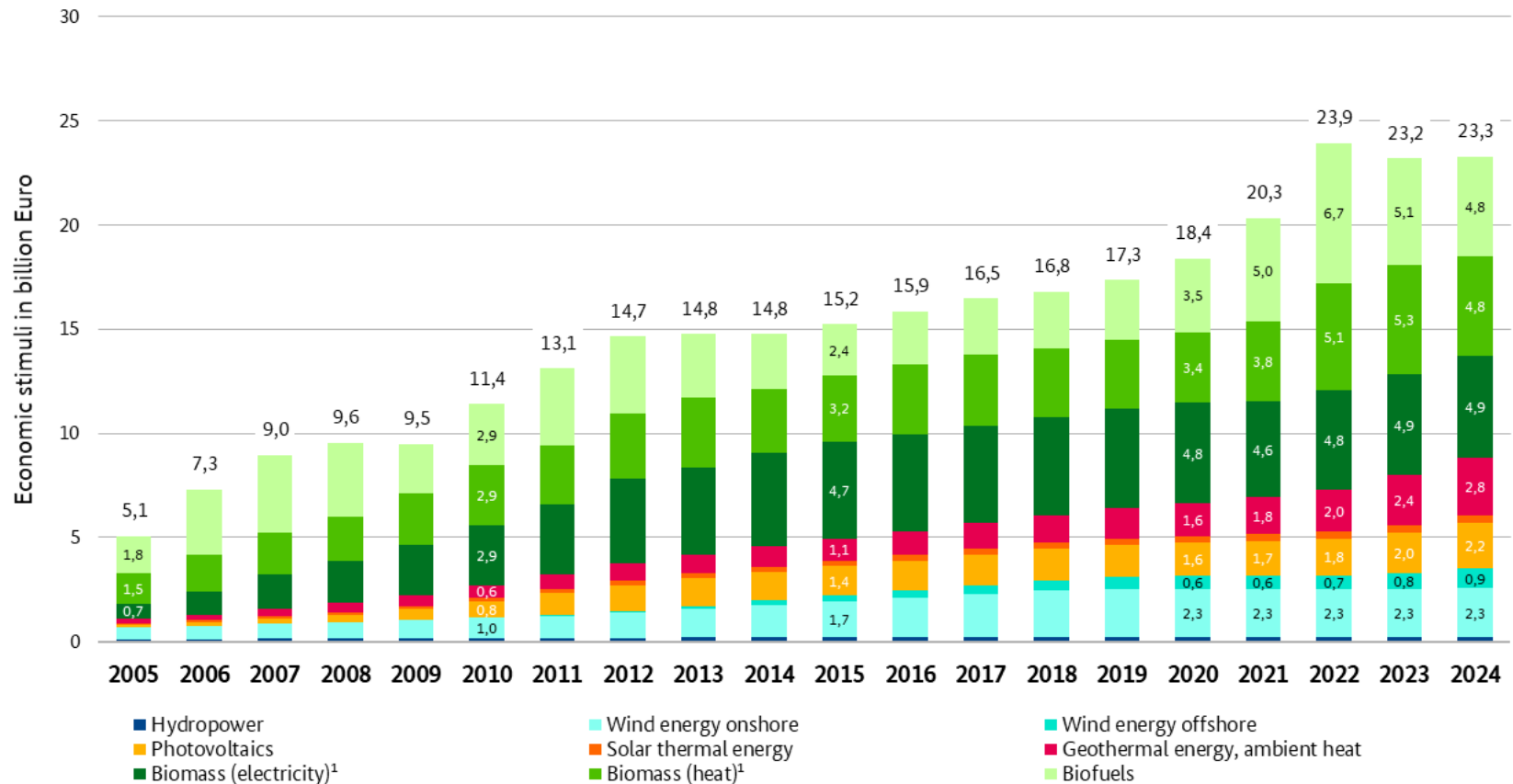
Total investment: 32 billion Euro



¹ Solid, liquid and gaseous biomass



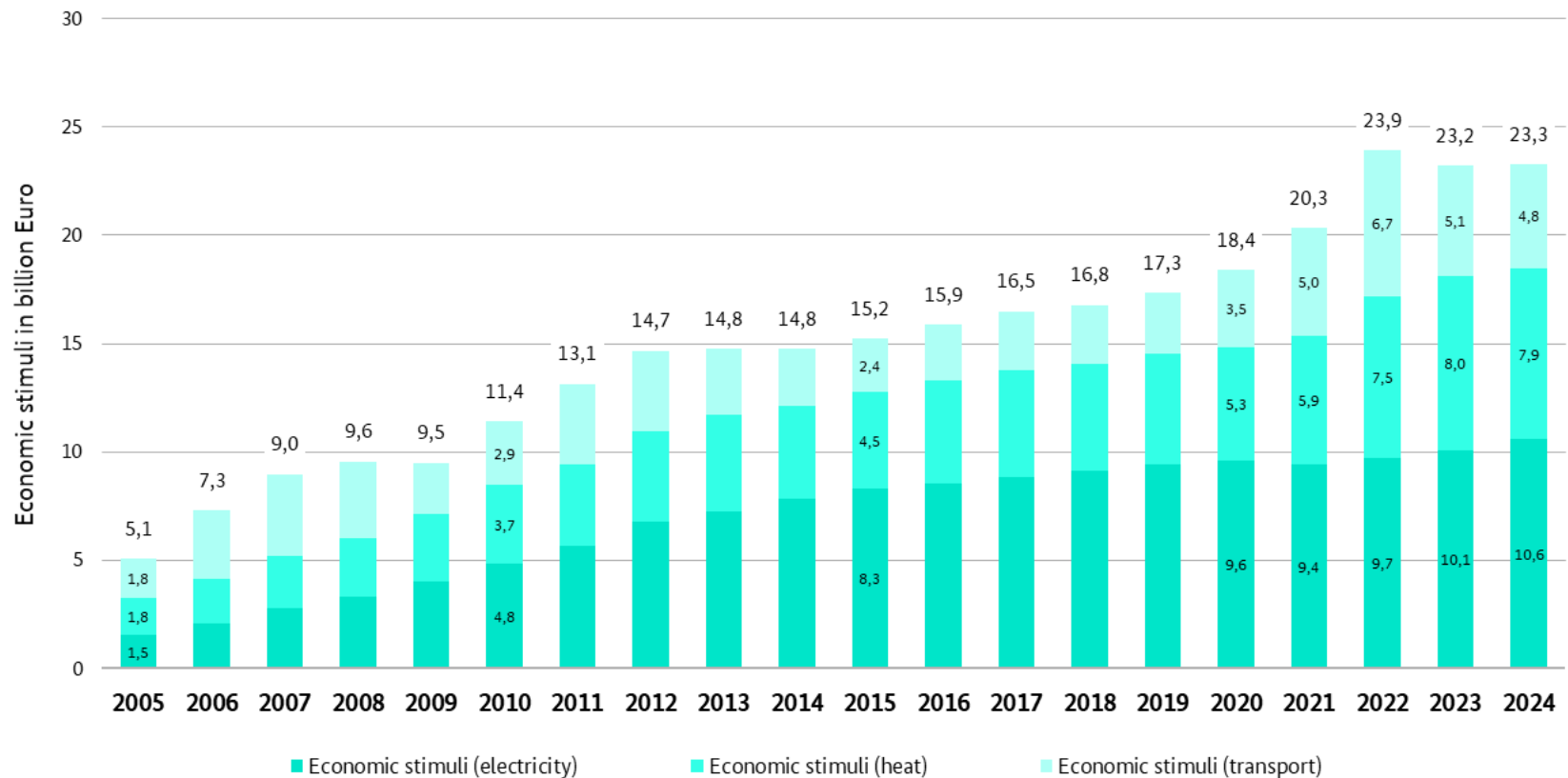
Development of economic stimuli from the operation of renewable energy plants in Germany



¹ Solid, liquid and gaseous biomass



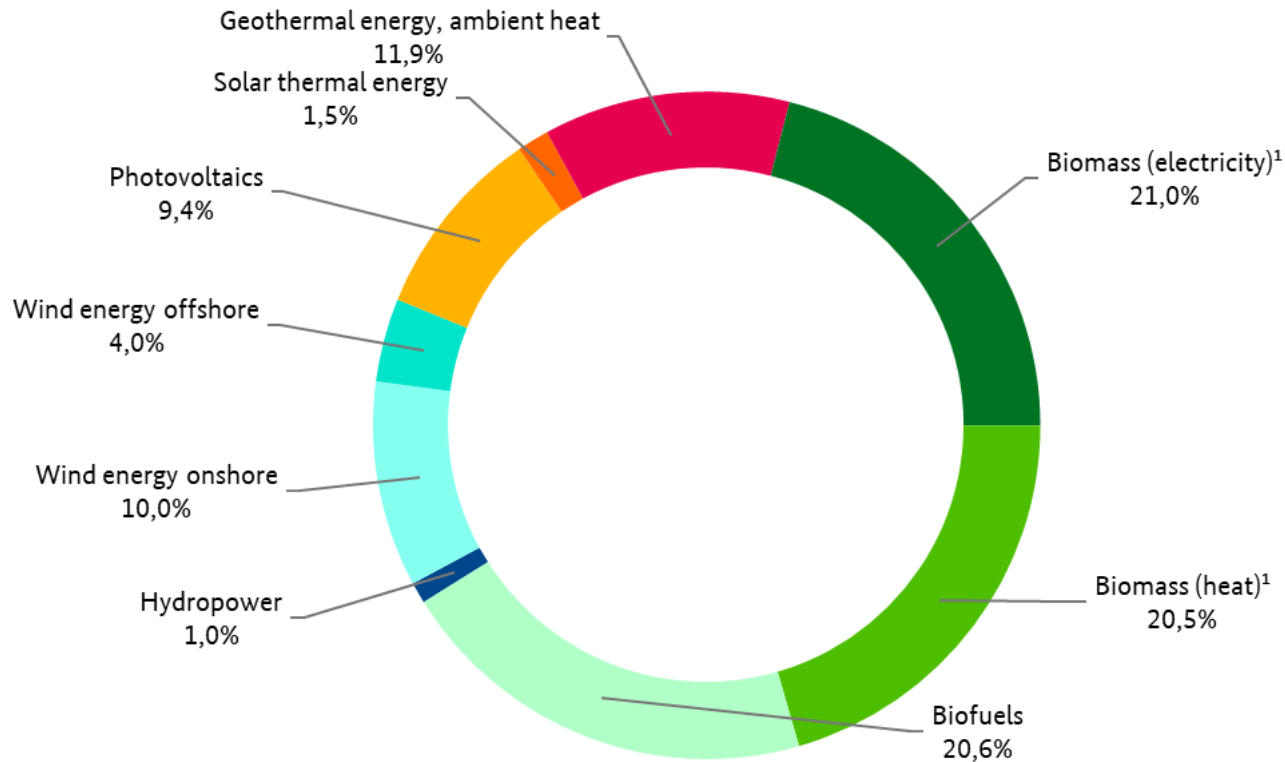
Development of economic stimuli from the operation of renewable energy plants in Germany (by electricity, heat and transport)





Economic stimuli from the operation of renewable energy plants in Germany in the year 2024

Total: 23,3 billion Euro



¹ Solid, liquid and gaseous biomass



Glossary (I)

Final energy

Final energy is the portion of primary energy that reaches the consumer after deducting transmission and conversion losses and is then available for other purposes. Final energy forms include district heating, electricity, hydrocarbons such as petrol, kerosene, fuel oil or wood, and various gases such as natural gas, biogas and hydrogen.

Final energy consumption (FEC)

Final energy consumption is the direct use of energy sources in individual consumption sectors for (FEC) energy services or the generation of useful energy.

Gross electricity consumption

Gross electricity consumption corresponds to the sum of total electricity generated in Germany (wind, water, sun, coal, oil, gas etc.), plus electricity imports and minus electricity exports. Net electricity consumption is gross electricity consumption minus grid and transmission losses.

Gross final energy consumption (GFEC)

Gross final energy consumption refers to the final energy consumption of the final consumer, plus the losses incurred in the generating units and during transport. The gross final energy consumption for renewable energy is the final energy consumption for households, transport, industry, skilled trades, commerce and services, plus on-site consumption in the conversion sector as well as line and flare losses.



Glossary (II)

Primary energy consumption
(PEC)

Primary energy consumption (PEC) is the net total of domestic production and fuel exports minus marine bunkers and changes in stock.

Renewable energy sources

Energy sources which, on a human time scale, are available for an infinite period of time. Nearly all renewable energy sources are ultimately fueled by the sun. The sun will eventually burn out and so is not, strictly speaking, a renewable energy source. However, present knowledge indicates that the sun is likely to continue in existence for more than 1 billion years, which is virtually unlimited from our human perspective. The three original sources are solar radiation, geothermal energy and tidal energy. These can be harnessed either directly or indirectly in the form of biomass, wind, hydropower, ambient heat and wave energy.

Renewable Energy Sources Act
(EEG)

The 2000 Act on Granting Priority to Renewable Energy Sources (shortened to: Renewable Energy Sources Act – EEG) regulates the grid operators' obligation to purchase electricity generated from renewable sources before all other sources, the (declining) feed-in tariffs for the individual generation methods, and the procedure for allocating the resulting additional costs among all electricity customers. It has been amended several times. The last amendment took place in 2016.

Note: For detailed information please refer to the brochure „Renewable Energy Sources in Figures“.



Sources

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- Federal Ministry of Food and Agriculture (BMEL)
- Federal Ministry for Economic Affairs and Climate Action (BMWK)
- Federal Network Agency (BNetzA)
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- German Heat Pump Association e.V. (BWP)
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- German Energy Pellet Association e.V. (DEPV)
- German Institute for Economic Research (DIW)
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- UL International GmbH, DEWI (UL)
- Information platform of the German Transmission System Operators (ÜNB)
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