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#### COVER NOTE

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From: Secretary-General of the European Commission,  
signed by Mr Jordi AYET PUIGARNAU, Director

date of receipt: 19 November 2015

To: Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of  
the European Union

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Subject: COMMISSION STAFF WORKING DOCUMENT  
Country Factsheet Germany  
Accompanying the document COMMUNICATION FROM THE  
COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE  
EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, THE COMMITTEE  
OF THE REGIONS AND THE EUROPEAN INVESTMENT BANK  
State of the Energy Union

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Delegations will find attached document SWD(2015) 225 final.

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**COMMISSION STAFF WORKING DOCUMENT**

**Country Factsheet Germany**

*Accompanying the document*

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN  
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL  
COMMITTEE, THE COMMITTEE OF THE REGIONS AND THE EUROPEAN  
INVESTMENT BANK**

**State of the Energy Union**

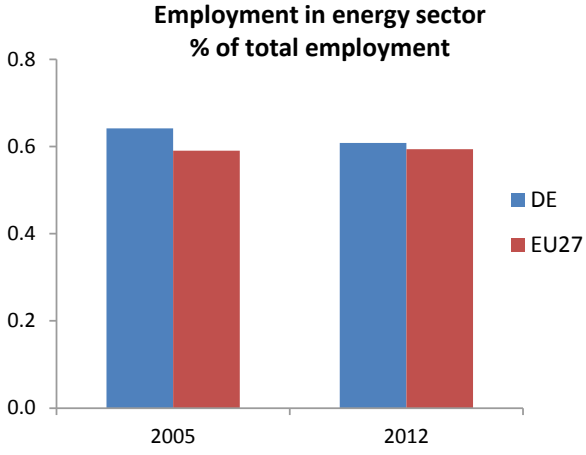
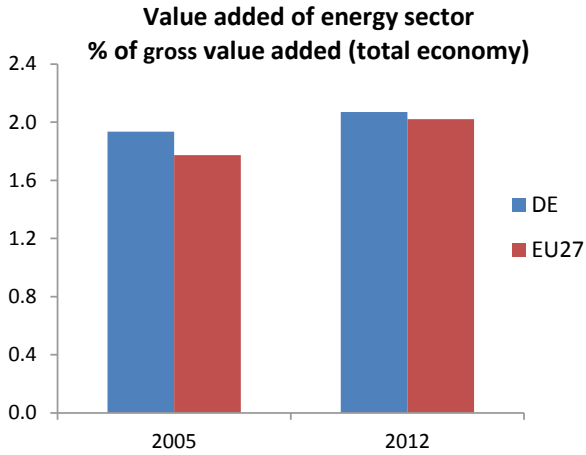
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## Macroeconomic relevance of energy

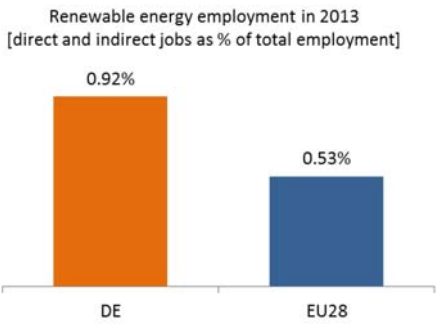
### IMPORTANCE OF THE ENERGY SECTOR

The value added of the energy sector in Germany represented about 2.1% of the total gross added value in 2012 in line with the EU average. It was 1.9% in 2005. In parallel, the share of direct employment in the energy sector in Germany is on a slight declining trend compared to 2005. At about 0.60% of the total employment, this share is still higher than the EU average.



Source: EUROSTAT – National Accounts

According to EurObserv'ER the share of direct and indirect renewable energy related employment in total employment of the economy in Germany was at about 0.92%, above the EU average of 0.53% in 2013

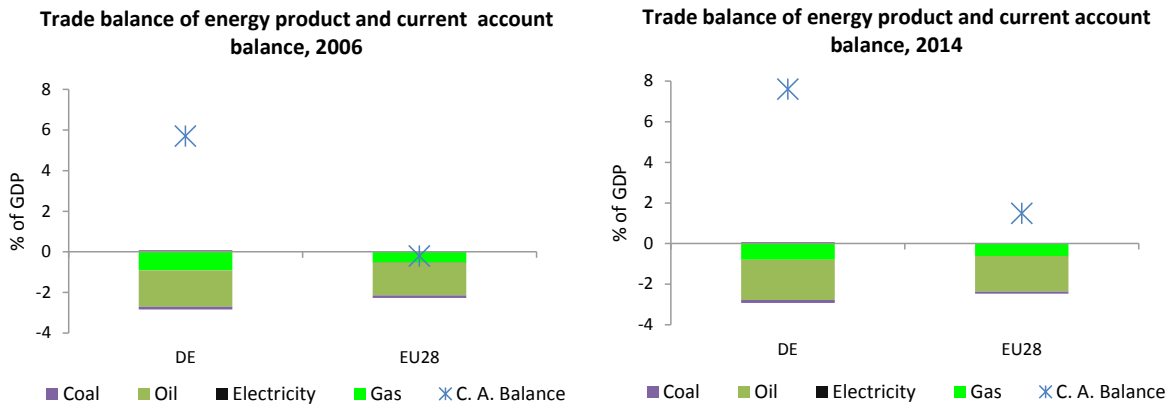


Source: European Commission, based on EurObserv'ER and EUROSTAT

### TRADE BALANCE OF ENERGY PRODUCTS

The energy trade balance of Germany has deteriorated from 2006 to 2014 from -2.8% of GDP to -2.9% of GDP. The deficit is bigger than the EU average in GDP terms. Germany is a net exporter of electricity with a stable level at about 0.07 % of GDP in 2006 and 2014. For the other energy commodities, the trade balance of Germany is negative, with the largest deficit for oil followed by gas and coal. Nonetheless, the trade deficit has started to shrink for oil and gas and to a lesser extent

for coal since 2013. This contributes to a German current account that consistently shows a very high surplus (7.4% in 2014).



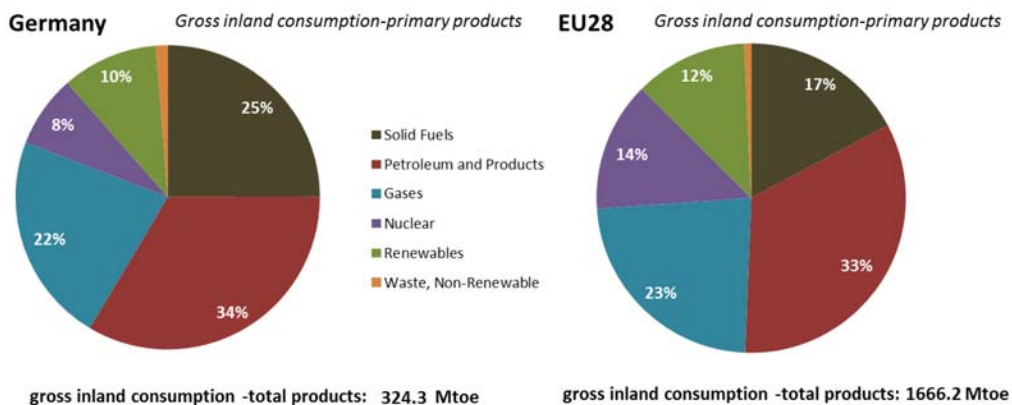
Source: EUROSTAT  
 Note: Current account balance for EU28 from European Commission (AMECO)

# 1. Energy Security, solidarity and trust

## ENERGY MIX

The energy mix of Germany is broadly similar with the one of the EU-28, with the notable difference of a higher share of "coal and other solid fuels" and a lower share of nuclear energy. Germany's energy mix is undergoing a significant transition due to the political decision to phase-out nuclear energy by 2022 and to achieve decarbonisation of the energy mix on the basis of renewable energies and energy savings. Pursuant to Germany's national targets as set out in its Energy Concept, renewable energies are to account for 18% of gross final energy consumption by 2020.

### Gross inland energy consumption in 2013

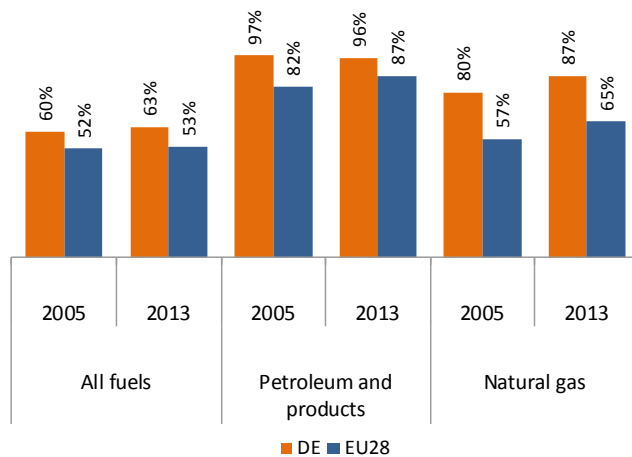


Source: European Commission, based on EUROSTAT

### IMPORT DEPENDENCY

Germany has an import dependency for all fossil fuels above the EU average. Russia is the main non-EU gas supplier for Germany<sup>1</sup>. However, the overall supplier concentration index for Germany is relatively low and below EU average. This indicator does not include imports of nuclear fuels, as these are considered domestic energy according to international statistical conventions. The energy trade deficit (expressed in % of GDP) is slightly above the EU average, to be put in context with the otherwise high trade surplus in Germany.

Import dependency 2013



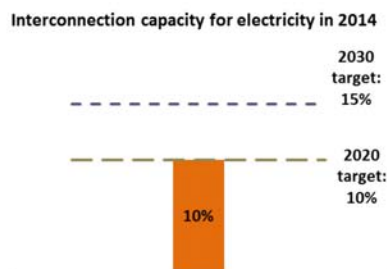
Top non-EU gas suppliers in 2013 (% in total imports)

Germany		European Union	
country	[%]	country	[%]
Russia	40.9	Russia	39.0
Norway	20.7	Norway	29.5
Not specified	6.7	Algeria	9.7
		Qatar	6.7

Source: European Commission, based on EUROSTAT (based on preliminary data provided by Germany to EUROSTAT)

## 2. A fully-integrated internal energy market

### INTERCONNECTIONS



Source: European Commission based on ENTSO-E scenario outlook and adequacy forecast 2014

Note: Reference to 2030 target is based on October 2014 European Council conclusions

The interconnection level for electricity was of 10% in 2014 for Germany.<sup>2</sup> Nevertheless, for a fully integrated internal energy market, there is a need to further increase interconnections with neighbouring countries. Moreover, internal connections to transport electricity generated from renewable energy sources in the North to the consumption centres in the South are insufficient, causing loop flows through neighbouring countries like Poland and the Czech Republic. In close cooperation with the affected neighbouring countries interim solutions and remedies have been developed. It also impacts the German economy due to the costly adjustments of bottlenecks (re-dispatch). To solve these issues, the Federal Government's

<sup>1</sup> Top non-EU suppliers table is based on EUROSTAT data. The share of imports from non-EU countries is calculated as the ratio between volumes of imports from that specific non-EU supplier and total imports (from EU and non-EU countries).

<sup>2</sup> The table showing a 2030 15% target should be interpreted in line with the European Energy Security Strategy (COM(2014)330), when it states that "the European Commission proposes to extend the 10% interconnection target to 15% by 2030 while taking into account the cost aspects and the potential of commercial exchanges in the relevant regions". The table is without prejudice to how a 15% target would be measured and achieved.

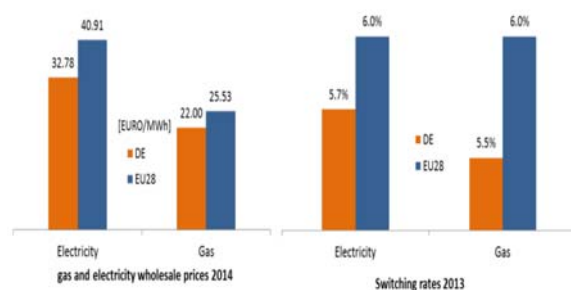
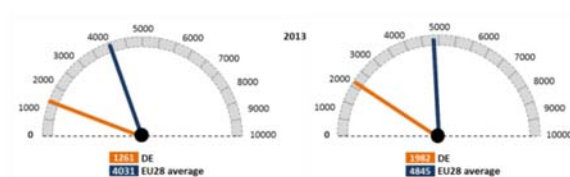
stating that "the Commission will also report regularly to the European Council with the objective of arriving at a 15% target by 2030".

coalition parties reached an agreement with regard to further measures to enhance the necessary grid expansion. More than 50 grid expansion projects are currently to be implemented. Many of these projects are significantly delayed due to local and regional resistance. Some progress has been made, e.g. as regards the South-West interconnector between Saxony-Anhalt, Thuringia and Bavaria. However, more needs to be done, in particular as regards internal connections if the share of renewable electricity increases as planned.

Regarding gas, Germany is very well interconnected and has a high degree of diversification of supply routes and sources. Most of the EU efforts in the context of Projects of Common Interests (PCIs) are made with the aim to enable gas reverse flows. In total, Germany has 32 PCIs including 21 PCI in electricity, 9 in gas and 2 in oil. Investment in gas infrastructure should increase by a total of EUR 1.9 billion between 2014 and 2019 in order to meet the targets of 260 megawatts additional compressor capacity and 423 km grid expansion until 2019, according to the Network Development Plan Gas 2014.

### ELECTRICITY AND GAS MARKETS

Market concentration index for power generation (left) and gas supply (right) (2013) (Herfindahl index – 10000 means monopoly)



Sources: ESTAT and European Commission Calculations

Sources: European Commission based on ESTAT, CEER and Platts Power Vision

Market concentration on electricity and gas generation markets is significantly below EU average. Wholesale prices are also slightly below EU average. On the retail side the gas market can be considered to be very competitive while the electricity market is reasonable competitive with the four largest companies having a market share of 45.5%. Electricity retail prices for households are among the highest in Europe due to high taxes and levies. The reform of the 2014 Renewable Energy Sources Act (EEG) is expected to stabilize costs for the renewable surcharge. Although all required legal provisions are in place, switching rates in 2013 were lower than on average in the EU while according to a European survey consumer satisfaction is well above average<sup>3</sup>.

High volumes of renewables have changed the way the electricity market in Germany operates. All new beneficiaries of the renewables support scheme (above certain thresholds) will have to sell their electricity directly in the market and will be subject to balancing deviations between production and prognosis. Nevertheless, further efforts are needed to ensure optimal market functioning with further increasing shares of renewable energies. In a White Paper of July 2015, the Federal Government advocates a further development of the electricity market, on which the necessary capacities can be remunerated via existing market mechanisms, and argues against the introduction of a market-wide capacity market. The White Paper proposes the introduction of a capacity reserve.

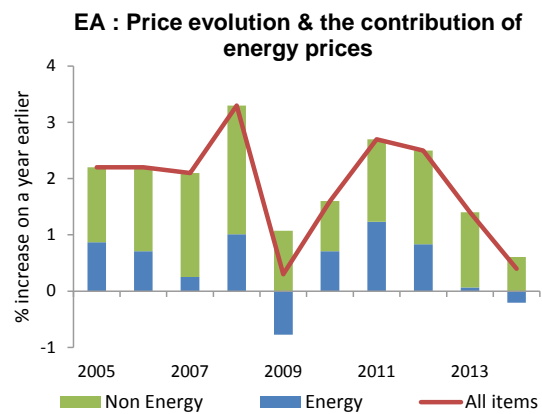
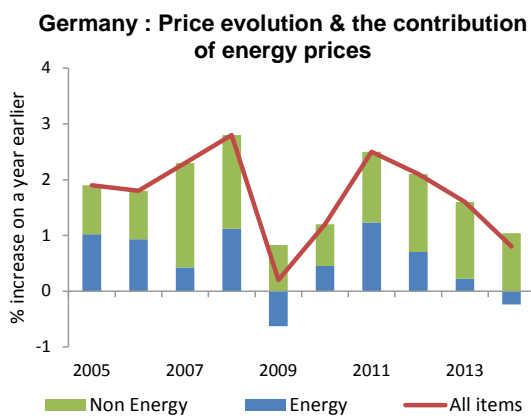
Germany's current legislative approach encourages smart metering roll-out for the following cases:

<sup>3</sup> 10th Consumer Markets Scoreboard (June 2014), [http://ec.europa.eu/consumers/consumer\\_evidence/consumer\\_scoreboards/10\\_edition/index\\_en.htm](http://ec.europa.eu/consumers/consumer_evidence/consumer_scoreboards/10_edition/index_en.htm)

(i) consumers with annual electricity consumption over 6.000 kWh, (ii) major generation facilities pursuant to the national Renewable Energy Sources Act and the Combined Heat and Power Act, and (iii) final consumers in new and renovated buildings. No separate rollout in the gas sector is foreseen. Further legal acts and technical specifications are expected to be adopted in 2015.

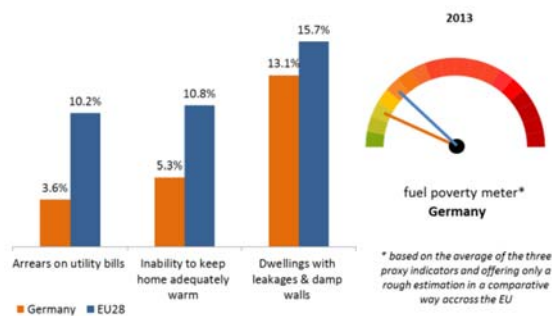
### CONTRIBUTION OF ENERGY TO CONSUMER PRICE EVOLUTION

Similarly to the rest of the Euro area, consumer price inflation has decreased in Germany since 2011 (from 2.5% to 0.8%), although at a slower pace than the Euro area average (from 2.7% to 0.4%). Energy products have contributed to the decline in inflation in 2014 due to falling oil prices.



Source: DG ECFIN based on Eurostat

### VULNERABLE CONSUMERS

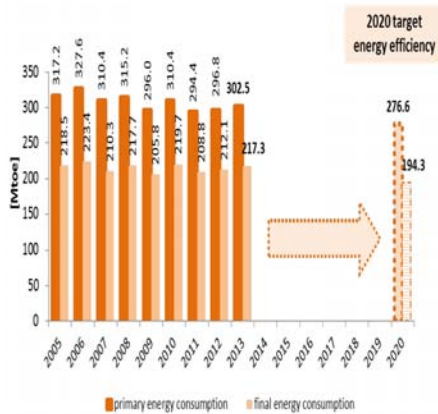


Source: European Commission, based on EUROSTAT Survey on Income and Living Conditions (SILC)

Based on the EUROSTAT Survey on Income and Living Conditions, three proxy indicators have been used to assess fuel poverty. They indicate that energy poverty is less of an issue in Germany than on average in the EU. Germany's social legislation covers the concept of vulnerable consumers; however, a specific definition of the concept of vulnerable consumers in the energy field has not been introduced in the energy legislation.

### 3. Energy Efficiency and moderation of energy demand

#### ENERGY EFFICIENCY TARGET 2020 (276.6 Mtoe primary energy and 194.3 Mtoe final energy)



In 2013, Germany notified a national target of improving its final energy intensity by 2.1% per year on average until 2020. In 2010, Germany had, in the frame of the *Energiewende*-Concept, set itself the target of reducing primary energy consumption by 20% by 2020 (compared to 2008 levels). If the trend in primary and final energy consumption observed in the period 2005-2013 will continue up to 2020, Germany would not meet its national target. Germany has adopted an Energy and Climate Package in December 2014 (with focus on measures for buildings, in industry and in transport) which will help in closing the energy efficiency and CO<sub>2</sub>-reduction gaps.

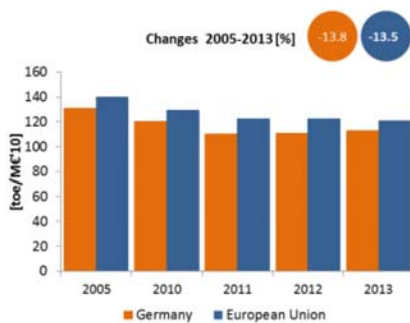
Source: European Commission, based on EUROSTAT and on national energy efficiency targets as declared by the MS under the Energy Efficiency Directive

It is however not yet evident that the identified measures will be sufficient to close the gaps; on the contrary, recent expert analysis suggests that additional investment is needed and the efforts in particular with regard to the retrofitting of buildings would need to be considerably stepped up.

#### ENERGY INTENSITY

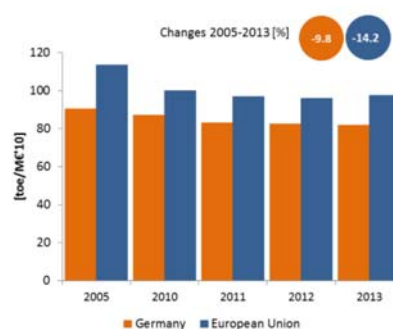
Primary energy intensity in Germany is slightly below EU average and has decreased in line with EU average over the last 13 years. Energy intensity in industry had for some time decreased more slowly than on average in the EU but remains below the EU average.

Primary energy intensity of the economy



Source: European Commission based on EUROSTAT and European Commission/AMECO

Final energy intensity in industry



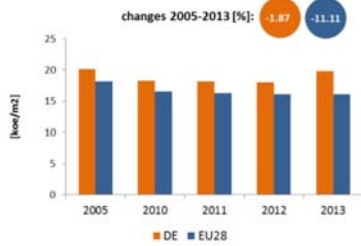
Source: European Commission based on EUROSTAT and European Commission/AMECO

Energy consumption by households is slightly above EU average and in 2013 the energy consumption per m<sup>2</sup> has even increased, in total as well as in relative terms compared to the EU average and the years before. The specific energy intensity of passenger transport has improved, but remains above EU average. The specific energy intensity for freight transport improved significantly and is now well below EU average.

Final energy consumption per m<sup>2</sup> in Specific energy intensity for passenger cars and freight

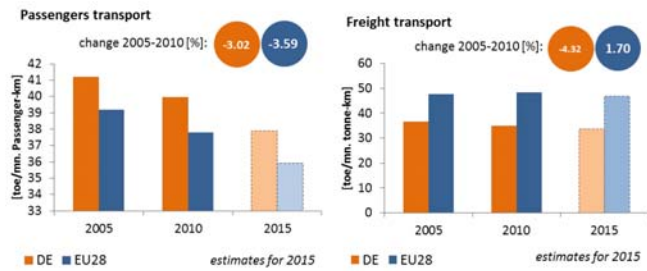


residential sector, climate corrected



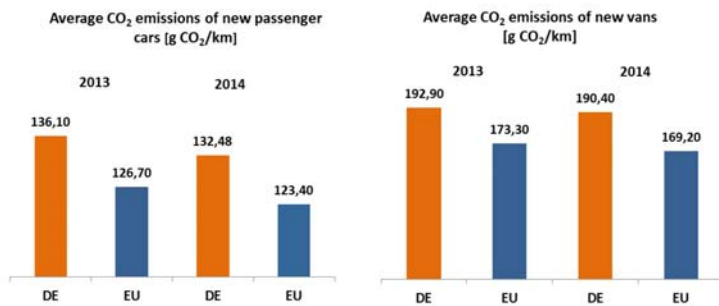
Source: European Commission based on Odyssee database

transport<sup>4</sup>



Source: PRIMES model background data and estimations based on EU Commission and EU MS inputs

The graph below shows the fleet average CO<sub>2</sub> emissions of new passenger cars and vans, respectively, sold and registered in Germany compared to the European Union fleet average.

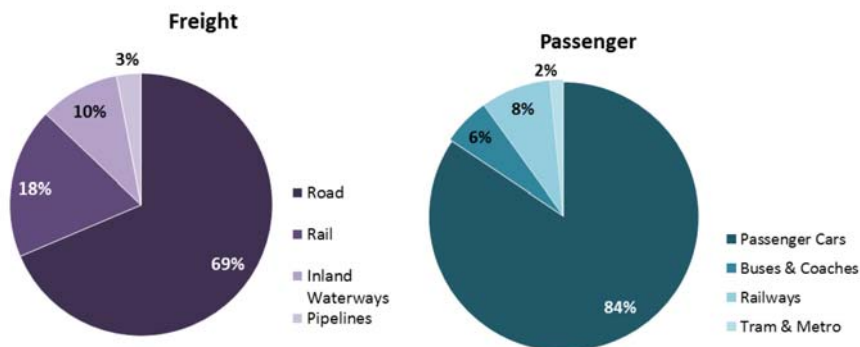


Source: European Environmental Agency. 2014 values are provisional. 2013 EU average refers to EU-27. Note: The graph does not take into account differences in Member States' vehicle fleet compositions.

EU legislation sets mandatory CO<sub>2</sub> emission reduction targets for new cars and vans registered in the EU. By 2021, the fleet average to be achieved by all new cars is 95 grams of CO<sub>2</sub> per kilometre. For new vans, the fleet average is set at 147 g/km by 2020. These targets need to be achieved on fleet average per manufacturer.

Regarding transport performance, in EU-28 the inland freight modal shares are 71% by road, 17% by rail, 7% by inland waterways and 5% by pipelines. The respective inland passenger modal shares are 82% by private car, 9% by buses and coaches, 7% by railways and 2% by tram and metro.

Modal shares Germany

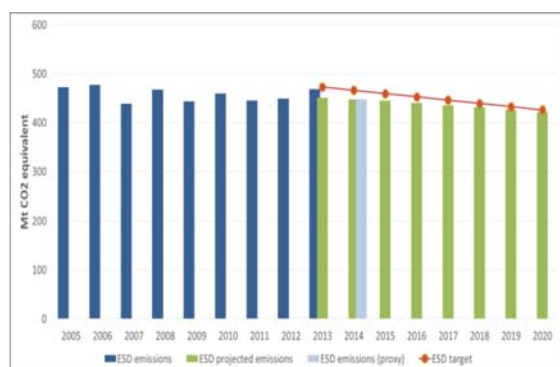


Source: Eurostat and EU transport in figures 2015. Data refers to 2013. Modal shares based on tonne-kilometres for freight sector and passenger-kilometres for passenger sector, freight data based on activity within country territory. Estimates are made when data is missing.

## 4. Decarbonisation of the economy

<sup>4</sup> Statistics on energy demand for passengers and freight transport are not available and model estimates have been used instead. These issues should be borne in mind when comparing energy intensity in freight or passenger transport between Member States, which should be regarded as merely indicative.

### NON-ETS GHG EMISSION REDUCTION TARGET 2020 (-14% by 2020 as compared to 2005 in the non-ETS sector)



Source: European Commission based on EEA. Based on preliminary inventory data.

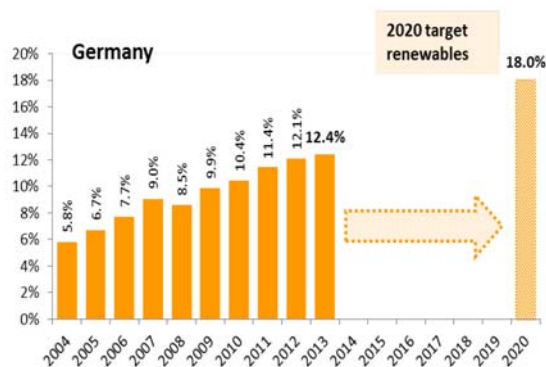
ESD (Effort Sharing Decision) emissions are the emissions not covered by the EU ETS

Germany has decreased its non-ETS GHG emissions by 10% between 2005 and 2014 (based on 2014 approximated data).

According to its latest projections, Germany is on track to reach its 2020 target, with about 1 percentage point margin as compared to 2005.

Non-ETS Emissions (vs. 2005)	Projections/proxy	target
Projections with existing measures 2020	-15%	-14%
Proxy 2014	-10%	-6%

### RENEWABLE ENERGY SHARE TARGET 2020 (18%)



Source: European Commission based on EUROSTAT

Germany is on track to reach its 18% target in 2020, with a renewable energy share of 12.4% in 2013. Germany has the long term objectives of a share of renewables in gross final energy consumption of 30% by 2030 and 60% by 2050 (with a share of 80% in gross electricity consumption). The reform of the 2014 Renewable Energy Sources Act (EEG) allows for better control of expansion of renewables. It promotes market integration of renewables consistent with EU State aid rules. The pilot auctioning scheme will allow gathering experience with more market-based setting of support levels. However, additional efforts might still be needed to achieve long term goals in renewable heat capacity, and to improve regulatory certainty for wind, PV and bioenergy.

### GREENHOUSE GAS EMISSION INDICATORS

- In Germany the share of emissions from the power sector is higher than the EU average, partially due to the importance of coal in its energy mix. On 1 July 2015 the Federal Government's coalition parties reached an agreement with regard to the closure of lignite fired power stations, which will result in additional emission reductions.
- Carbon intensity of the economy is only slightly higher than EU average.
- GHG emissions per capita are among the highest in the EU, and about 27% higher than the EU average, but have decreased from 15.7 t CO<sub>2</sub> equivalents in 1990 to 11.6 t CO<sub>2</sub> equivalents in 2013.
- The proceeds from the auctioning of ETS allowances (EUR 750 million in 2014) are used or planned to be used fully for energy and climate related purposes, through their redirection to the Climate and Energy fund.

Largest Sectors of GHG Emissions in 2012(*)	Germany
Energy/power industry	40%
Transport	17%
Industry	20%
Agriculture (incl. forestry & fishery)	8%
Residential & Commercial	14%
Waste & others	1%

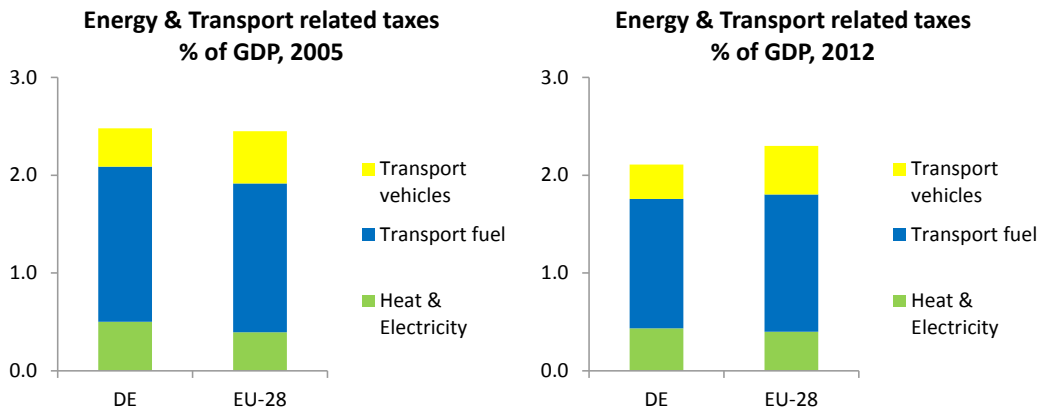
Source: European Commission based on EEA  
 (\*) Sectoral breakdown for 2013 data not available.

GHG Emissions	Germany	EU Average
EU ETS auctioning revenues in 2014 (EUR millions)	750	3205
Share of ETS emissions in 2013	51%	42%
GHG emissions/capita in 2013 (tCO <sub>2</sub> equivalent)	11.6	8.5
Carbon intensity of the economy in 2013 (tCO <sub>2</sub> equivalent/EUR millions)	355	328

Source: European Commission based on EEA

### ENERGY & TRANSPORT TAXATION

Energy and transport related taxes as a share of GDP in Germany amounted to 2.1% in 2012, which is lower than the EU-average (2.3%). Germany was at the EU average in 2005 (2.5% of GDP). This evolution came from a stronger decrease in taxation of transport fuel in relation to GDP than the EU average from 2005 to 2012.

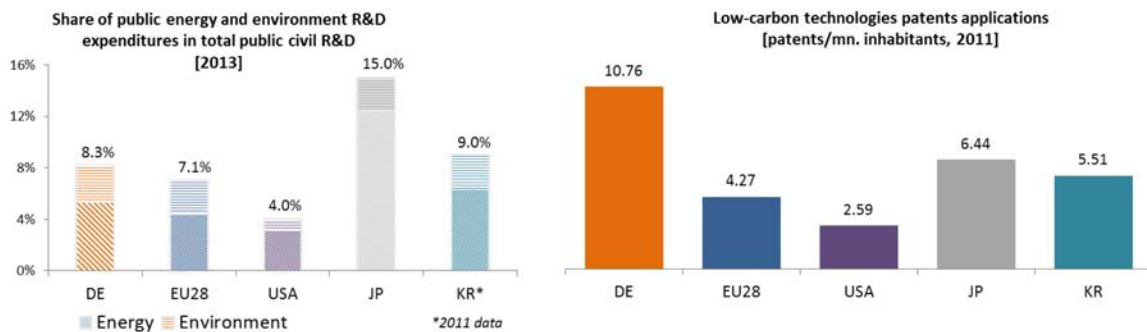


Source: Eurostat

## 5. Research, innovation and competitiveness

### RESEARCH AND INNOVATION

Germany performs above EU average in terms of research and innovation. This is particularly striking in terms of innovation, where it stands at much higher levels than any of the major competitors. Areas of highest priority are research and development in renewable technologies (photovoltaic, wind energy), energy efficiency measures in the building sector and in industry, crafts, trade and services and measures in energy storage and smart grids respectively. Germany is open to increase cooperation in Research and Development with other EU Member States in different energy technology areas. Germany is also open to support Carbon Capture and Storage (CCS) development in cooperation with other EU Member States.



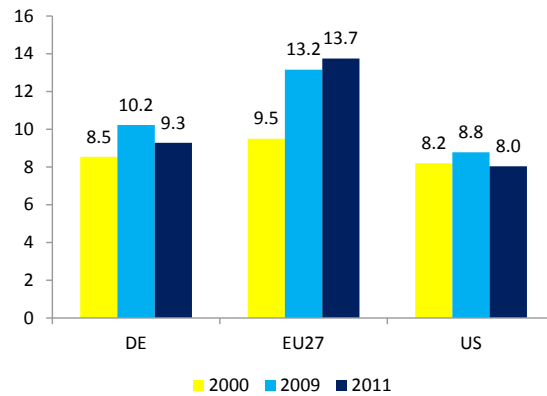
Source: European Commission based on EUROSTAT

## COMPETITIVENESS

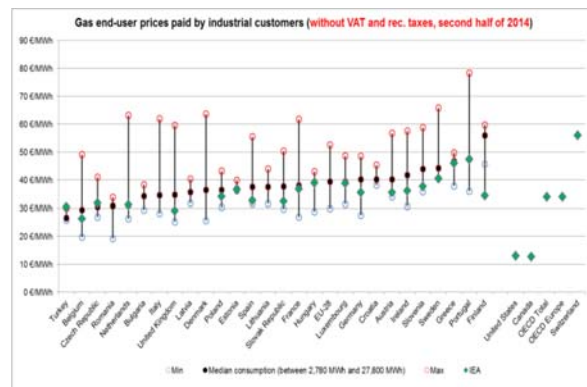
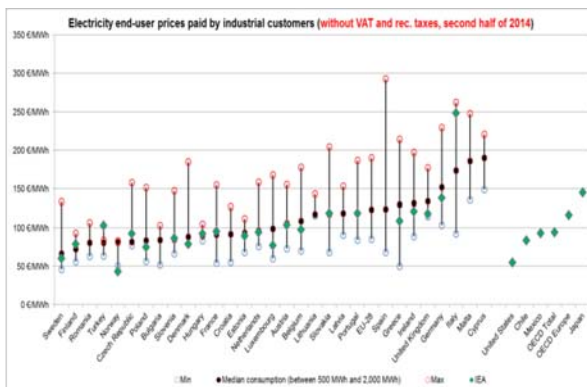
Energy prices have remained quite stable, although on an increasing trend in Germany over the past ten years. The energy intensity<sup>5</sup> of Germany's manufacturing sector is significantly lower than in the EU, and the US. Therefore, the real unit energy costs, that is the amount of money spent on energy sources needed to obtain one unit of value added, have remained much lower in Germany than in the EU27. However, it is higher than in the US due to higher real energy prices in Germany.

When looking in particular at Eurostat data for industrial consumers of gas and electricity, it can be noted that prices in Germany are above EU average and above OECD average for electricity as well.

Real unit energy costs (% of value added)



Source: European Commission



Source: European Commission based on EUROSTAT and IEA

## 6. Post-2020 Energy and Climate policy Strategy

### COMPREHENSIVE MEDIUM TO LONG-TERM STRATEGY (post-2020) FOR CLIMATE AND ENERGY

- Germany has adopted in 2010 the Energy Concept (Government Decision), a comprehensive strategy covering both medium (2030) and long (2050) term strategies. The Energy Concept contains specific targets and pathways until 2050 for greenhouse gas reductions, renewable energy and energy efficiency/savings. Germany intends to reduce GHG emissions by 40% by 2020 and by 80-95% by 2050 on 1990 levels.
- In 2014, Germany adopted the "Climate Action Programme 2020". The Programme contains around 100 measures in all relevant sectors and includes a mandate to develop a "Climate

<sup>5</sup> The energy intensity presented here is derived from Use Tables of WIOD, see "Energy Economic Developments in Europe SWD(2014)19".

*Protection Plan 2050*” by 2016, which will address all sectors and greenhouse gas emissions. It will describe the next specific reduction steps in view of the European targets and the outcome of the Paris Climate Change Conference in 2015 and will support them with measures developed in a broad-based dialogue process.

- A number of legislative measures were adopted in the past years to implement the *Energiewende* including amendments to the *Renewable Energy Act* (EEG), the promotion of energy efficiency in buildings, accelerated electricity grid expansion, support for heat-power cogeneration, and the gradual phase-out of nuclear power until the year 2022.
- Germany has put in place a systematic, annual process of monitoring the development of its energy system. The monitoring also includes evaluation of the draft government report by an independent panel of energy policy experts. It also addresses all three dimensions of energy policy, including prices/ costs/ competitiveness.
- The government also announced to publish an *“Energy Efficiency Strategy for Buildings”* which will – together with the *“Strategy for climate-friendly building and living”* – give further details on how to achieve the long-term goal of having an almost carbon-neutral building stock by 2050.
- In 2013 the Federal German Government launched the *“Mobility and Fuels Strategy”*, which is the key platform of discussion for sustainable mobility. The strategy is an important instrument for the implementation of the *“Energiewende”* in the transport sector as it identifies the fuel options, the corresponding drivetrain technologies as well as the necessary infrastructure which are most likely to contribute to an increase in efficiency and a reduction of CO2 emissions. As a next step, Germany will release an update of the strategy to present options of how to organize the deployment of alternative fuels infrastructure.

### NATIONAL TARGETS, especially for 2030

Objective, 2030-2050	Targets	Comments
GHG reduction	Yes	-55% by 2030, -80 to -95 % by 2050 (vs 1990 levels)
Renewable energy share	Yes	30% by 2030, 60% by 2050; sub-targets
Energy Efficiency / savings	Yes	No specific headline target for energy efficiency in 2030; 2050 target on the reduction of primary energy consumption by 50% vs. 2008 levels

## 7. Regional cooperation

Regional cooperation on infrastructure development is necessary to optimise the identification of regional infrastructure priorities and to coordinate cross-border investments. As a centrally located country in Europe, Germany is a member of all electricity, gas and oil Regional Groups which have been established under the trans-European energy networks (TEN-E) Regulation.

Germany will be also part of the regional initiative on the promotion of the North Sea Offshore Grid, which aims at delivering cost-reduction to the offshore energy system. It is also part of the Baltic Energy Market Interconnection Plan (BEMIP), which aims at further reinforcing the regional energy cooperation in the Baltic Sea region both in gas and electricity.

Germany is a member of the Pentalateral Energy Forum. It was created in 2005 by Energy Ministers from Benelux, Germany and France in order to promote collaboration on cross-border exchange of electricity. It is an inter-governmental initiative, assisted by an independent secretariat, whose mission consists of improving control of the cross-border network and harmonising allocation methods using information exchange between regulators and network managers in participating countries. In July 2014, Germany set up a regular round-table discussion with neighbouring Member

States and the Commission on regional cooperation for promoting security of electricity supply and renewable energy. As an outcome of these discussions, a declaration on no-regrets to fully exploit the benefits of the internal market for security of electricity supply was signed by the participants on 8 June 2015.

## 8. Cohesion policy contribution

The EU Cohesion policy provides for investment possibilities to implement energy policy objectives in Germany which will be complemented by national public and private co-financing, aiming at optimal leverage. It also ensures integrated territorial solutions to challenges by supporting capacity building, technical assistance and territorial cooperation, including the Baltic Sea Region, Danube Region and Alpine Region macro-regional strategies in which some of the German *Länder* take part.

*Internal Energy Market:* Over 2014-2020, EU Cohesion Policy will invest some EUR 60 million in research and development / innovative pilot projects on smart electricity distribution grids in Germany. These investments are expected to contribute to around 1 000 additional users connected to smart grids.

*Energy efficiency:* Over 2014-2020, EU Cohesion Policy will invest some EUR 1 505 million in energy efficiency improvements in public buildings and in enterprises, as well as in high-efficiency cogeneration and district heating in Germany. A further estimated EUR 555 million will be invested in supporting the move towards an energy-efficient, decarbonised transport sector. These investments are expected to contribute to a decrease of around 232 634 000 kWh per year of decreased primary energy consumption of public buildings.

*Decarbonisation:* Overall, the EU Cohesion Policy investments in Germany over 2014-2020 are expected to contribute to an estimated annual decrease of GHG of around 412 000 tonnes of CO<sub>2</sub>eq. Over 2014-2020, EU Cohesion Policy will invest some EUR 102 million in renewable energy in Germany. These investments are expected to contribute to around 100 MW of additional capacity of renewable energy production.

*Research, Innovation and Competitiveness:* Over 2014-2020, EU Cohesion Policy will invest significantly in R&I and in competitiveness of small and medium sized enterprises in Germany. This will be based on the regional strategies for smart specialisation. For Germany, many strategies include a focus on low-carbon technologies. At this stage, at least EUR 247 million is foreseen for investments in R&I and adoption of low-carbon technologies in Germany, but this might increase further in line with the evolving content of the smart specialisation strategy.