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**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**

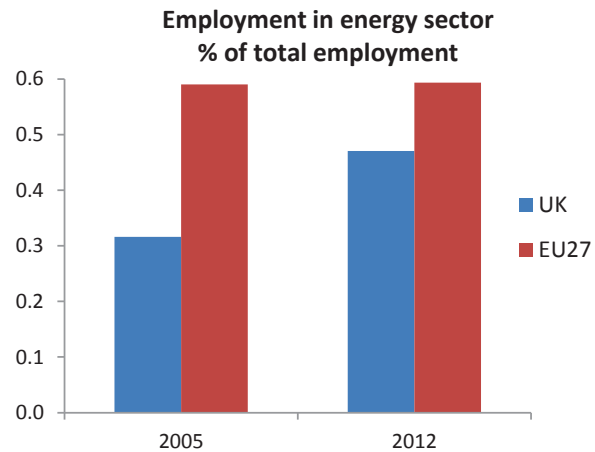
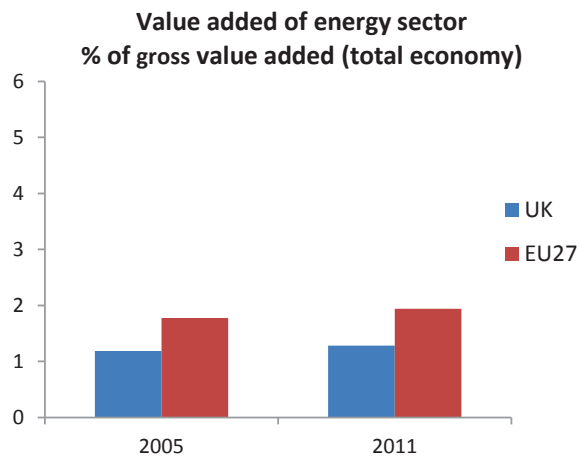
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## Macroeconomic relevance of energy

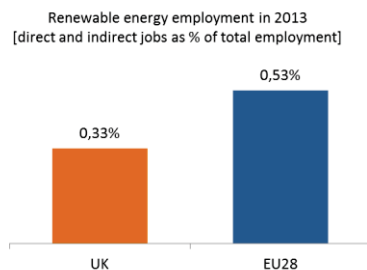
### IMPORTANCE OF THE ENERGY SECTOR

The UK energy sector has a much lower weight in the national economy than on average in the EU, both measured in terms of value added and jobs. The increase in the UK energy sector's employment has been much larger than elsewhere in the EU, leading to a strong rise in its share in total employment. Reportedly, most additional jobs are in the electricity and renewable sectors.



Source: EUROSTAT – National Accounts

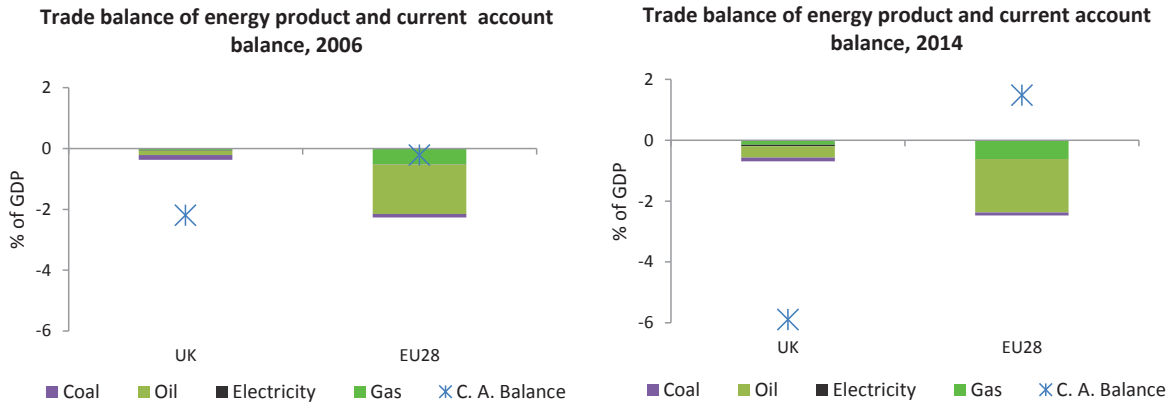
According to EurObserv'ER, in 2013, the share of direct and indirect renewable energy related employment in total employment of the economy in the United Kingdom was at about 0.33%, below the EU average of 0.53%.



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

### TRADE BALANCE OF ENERGY PRODUCTS

The UK's dependence on imported energy products is significantly smaller than for the whole EU but it is increasing from a low level, mainly reflecting the decline of UK's North Sea oil and gas exploitation. This has contributed to the widening of the UK's current account deficit over the 2006-2014 period.



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

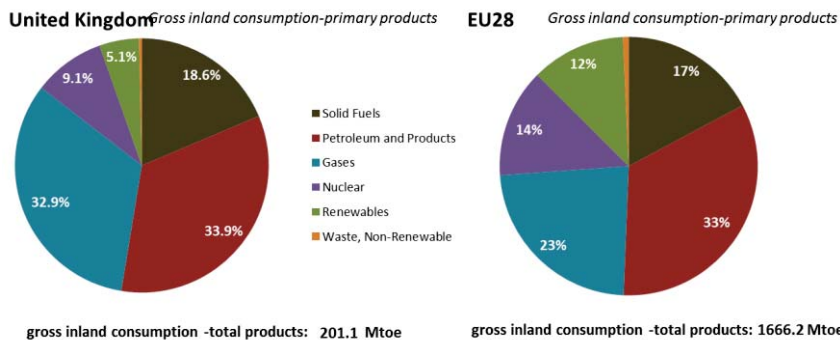
## 1. Energy Security, solidarity and trust

### ENERGY MIX

The energy mix of the United Kingdom is different from that of the whole EU28 insofar as the share of gas is higher and the shares of renewable energy and nuclear are considerably smaller. It has similar shares of petroleum and coal to that for the whole EU-28. Since 1995, the share of renewable energy has increased by more than the EU average (from less than 1% to 5% of gross inland energy consumption), while the share of nuclear decreased by 1 percentage point. The biggest decrease however was in terms of the share of petroleum products (4 percentage points).

The share of nuclear energy in the UK's energy mix is set to increase, as industry is planning to develop approximately 16GW of new nuclear power. This will replace the current generation of nuclear reactors which produce around 18% of the UK's electricity and are set to be decommissioned by 2030.

Gross inland energy consumption in 2013

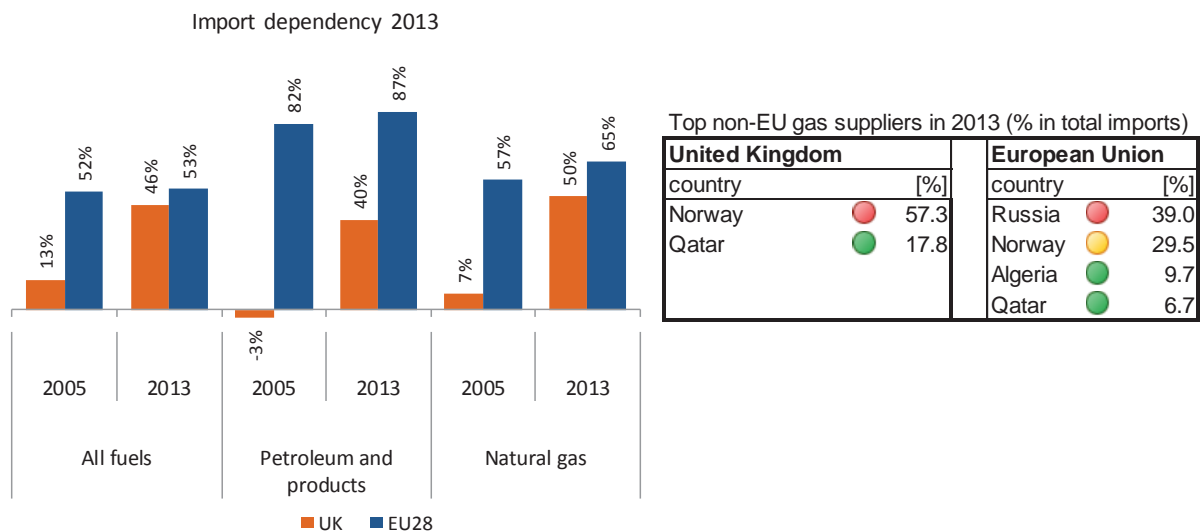


Source: European Commission, based on EUROSTAT

### IMPORT DEPENDENCY

The UK's import dependency is below that of the EU as a whole. However, it has increased significantly over the last few years. In particular, the UK changed from being a net exporter of petroleum products in 2005 to importing 40% of its consumption in 2013. It also went from

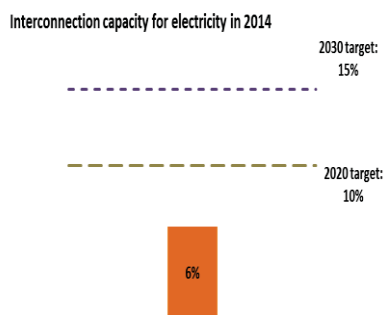
importing only 7% of its gas needs to importing 50% of them by 2013<sup>1</sup>. However, gas import sources are well diversified, in particular relative to other EU countries. The UK also benefits from diverse and extensive gas import infrastructure. In total, the UK has 25% of the EU’s LNG import capacity. Overall, the energy supplier concentration index is low for the UK, showing well balanced import sources and energy mix.



Source: European Commission, based on 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 stating that "the Commission will also report regularly to the European Council with the objective of arriving at a 15% target by 2030"

The level of electricity interconnection was 6% in 2014 for the UK which, although low by EU standards, reflects the particular challenges facing island markets. As a consequence of this level of interconnection and the structural price difference with the continent, the existing interconnections are highly congested. To address this, a number of electricity infrastructure Projects of Common Interest (PCIs) involving the UK were selected, which will improve interconnection with Belgium, France, Ireland and Norway. If all are implemented according to schedule, they will allow the UK to achieve the 10% interconnection target for 2020. Further efforts would be needed to achieve the 2030 target of 15%; however the need for this objective will be established on a case-by-case basis and considered alongside costs and the potential for commercial exchanges.

The British gas system is well interconnected with Belgium (two-way physical flows), the Netherlands as well as with Northern Ireland and Ireland to the west (export only). A number of gas PCIs were identified, with the aim to allow bidirectional flows between Great

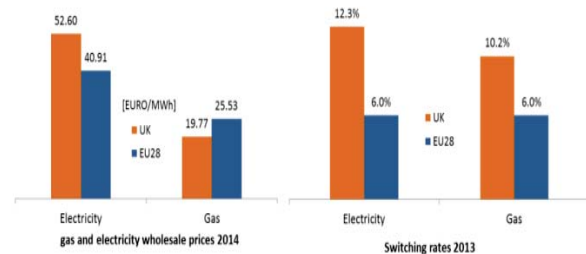
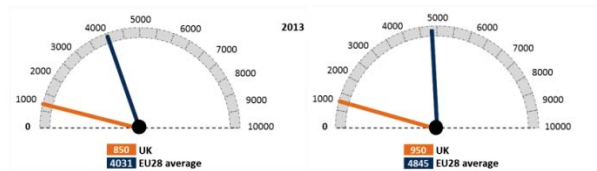
<sup>1</sup> Top non-EU gas suppliers table is based on EUROSTAT data. The share of imports from non-EU countries is calculated as the ratio between volumes of imports from that specific non-EU supplier and total imports (from EU and non-EU countries).

Britain, Northern Ireland and Ireland.

Overall 26 PCIs involving the UK have been identified, of which 21 for electricity, 4 for gas and one for smart grids.

## 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

Concentration of the electricity generation market in the UK is low, especially relative to the EU average. However, in response to concerns specifically about market liquidity, Ofgem obliged the six largest vertically-integrated suppliers to publish prices at which they will buy and sell a range of forward power products. It also requires the eight largest generating companies to follow certain specific rules when trading with small independent suppliers.

Gas market concentration in the UK is also low, with the largest market share of physical and traded activity below 8%. The wholesale gas market includes both over-the-counter and exchange based trading (ICE and ICE Exendx).

Wholesale electricity prices are above the EU average while wholesale gas prices are below the EU average. At retail level, six major suppliers share 90-95% of the market. The price paid by domestic customers for electricity and gas, including all taxes and levies, is below the EU28 average. This is due, at least in part, to a 5% VAT rate for domestic energy supplies.

The government has committed to replacing all gas and electricity meters with smart meters in domestic households in Great Britain by the end of 2020. Roll-out is underway with over 1.5 million smart and advanced meters installed as of March 2015).

Both markets have above average scores for choice of providers and actual switching rates<sup>2</sup>. However the ability of consumers to understand and choose the most appropriate tariff has been a concern in the UK. The UK Competition and Markets Authority is currently investigating energy markets (electricity and gas, wholesale and retail; a final report should be available by mid-2016).

According to an EU-wide survey, both the UK's electricity and gas markets have very poor scores in terms of overall consumer satisfaction. In 2014, Ofgem introduced a number of measures to enhance price transparency for customers to address concerns regarding the ability of customers to understand and choose the most appropriate tariff. As a result, suppliers can offer no more than 4 tariffs for electricity and gas (8 in total) and must inform customers how much money they could save if they switched to the supplier's most advantageous tariff.

<sup>2</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)

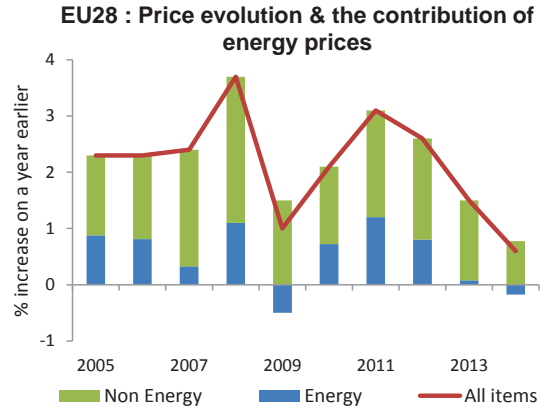
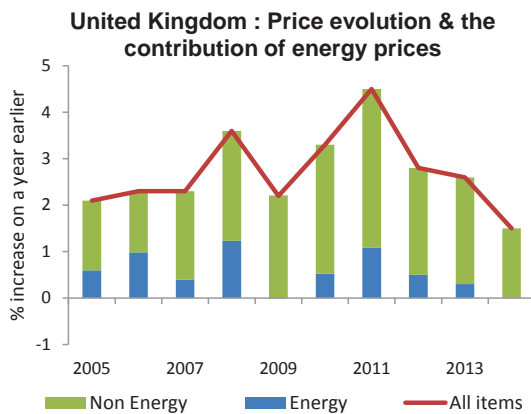
### Electricity Market Reform in the UK

The UK has undertaken a reform of its electricity market, with the intention to deliver low carbon energy and reliable supplies, while minimising costs to consumers. The UK's Electricity Market Reform (EMR) has introduced two key mechanisms to provide incentives for the necessary investment required in energy infrastructure:

- Contracts for Difference (CFD) are aimed at providing long-term price stabilisation to low carbon plants, allowing investment to come forward at a lower cost of capital and therefore at a lower cost to consumers.
- The Capacity Market is aimed at providing a regular retainer payment to reliable forms of capacity (both demand and supply side), in return for such capacity being available when the system is tight.

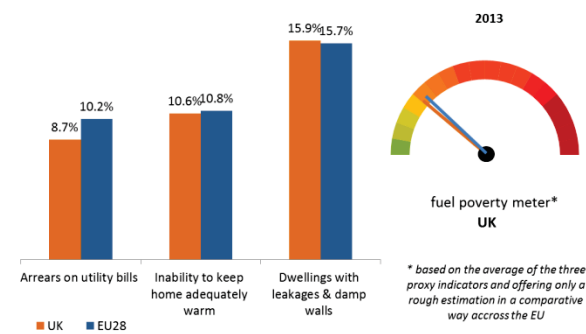
### CONTRIBUTION OF ENERGY TO CONSUMER PRICE EVOLUTION

The contribution of the energy component to the increase of consumer prices in the UK has been similar than that for the EU as a whole.



Source: DG ECFIN based on Eurostat

### VULNERABLE CONSUMERS

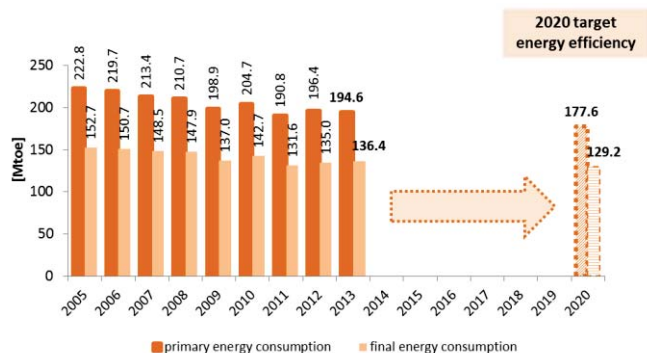


Source: European Commission, based on on EUROSTAT SILC survey

Based on a EUROSTAT survey on income and living conditions, three proxy indicators are used to consider fuel poverty. They indicate that fuel poverty in the UK is in line with the EU average. The UK is among the few EU countries with a clear fuel poverty definition and related strategy and programmes to deal with it. There are a number of measures targeted at vulnerable customers through the benefits system and a universal Winter fuel payment to older people. Also, suppliers must take all reasonable steps to avoid disconnecting certain categories of vulnerable customers in winter time.

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

#### ENERGY EFFICIENCY TARGET 2020 (177.6 Mtoe primary energy and 129.2 Mtoe final energy)



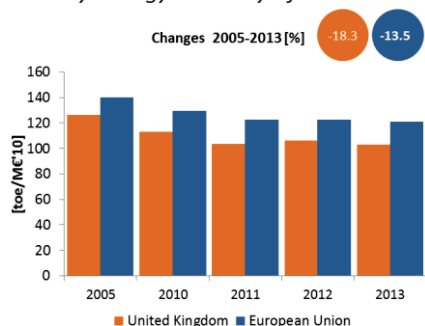
The UK's 2020 energy efficiency target for primary energy consumption amounts to 177.6 Mtoe, (129.2 Mtoe expressed in final energy consumption). Primary energy consumption has been decreasing significantly since 2005. While the UK is (currently) on track to reach its 2020 energy efficiency target, the level of ambition will need to be fully maintained. Given the ongoing review of energy efficiency policy and programmes, this will need to be carefully managed

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

#### ENERGY INTENSITY

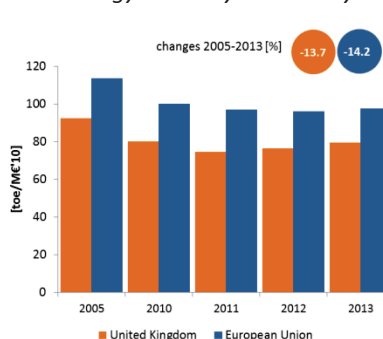
The primary energy intensity of the UK's economy has decreased since 2005 at a slightly faster rate than the EU average. It remains well below the EU average. The energy intensity reduction of UK industry has been in line with the EU average.

##### Primary energy intensity of the economy



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

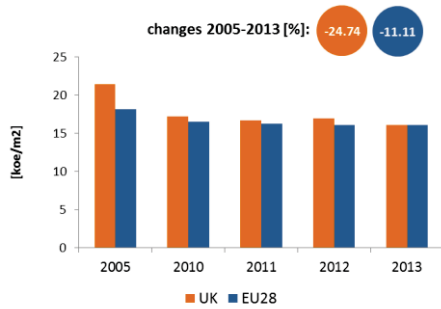
##### Final energy intensity in industry



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

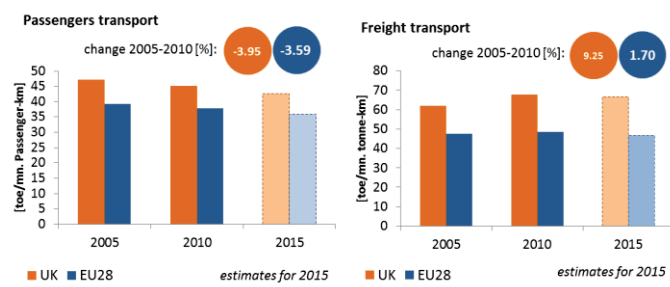
Relative energy consumption by households was at the same level as the EU average in 2013 and decreased at a faster pace since 2005. The specific energy intensity of passenger cars remains slightly above the EU average, while the specific energy intensity for freight transport increased between 2005-2010, (i.e. from the same unit of energy fewer tonnes of goods are transported and/or transported over shorter distances or the load factors of goods in freight vehicles are lower).

Final energy consumption per m<sup>2</sup> in residential sector, climate corrected



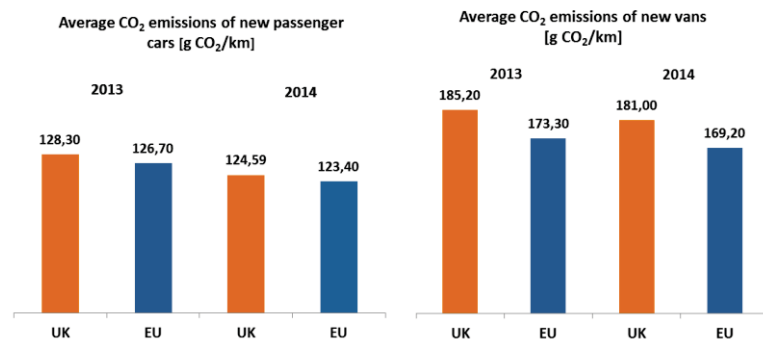
Source: European Commission based on Odyssee database

Specific energy intensity for passenger cars and freight transport<sup>3</sup>



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

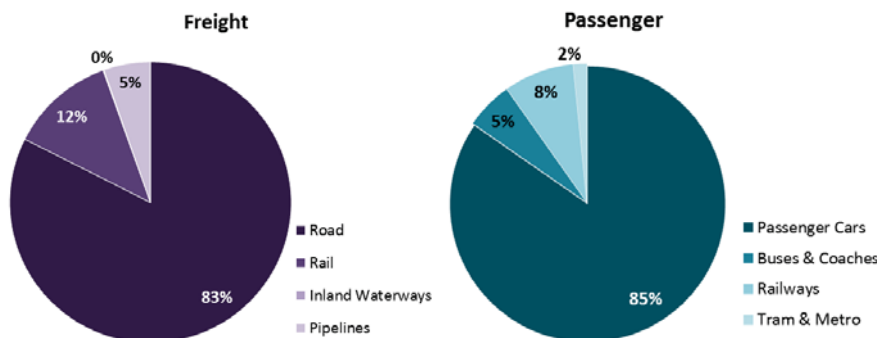
EU legislation sets mandatory CO<sub>2</sub> emission reduction targets for new cars and vans. By 2021, the fleet average to be achieved by all new cars is 95 grams of CO<sub>2</sub> per kilometre. For new vans, the fleet average is set at 147 g/km by 2020.



Source: European Environmental Agency. 2014 values are provisional. 2013 EU average refers to EU-27.

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 UK



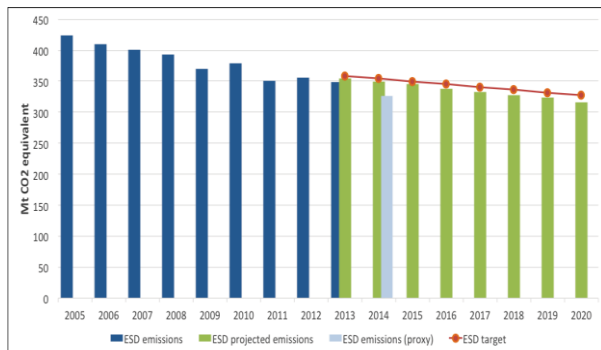
Source: Eurostat and EU transport in figures 2015. Data refers to 2013. Modal shares based on tonne-kilometres for freight sector and passenger-kilometres for passenger sector, freight data based on activity within country territory. Estimates are made when data is missing.

<sup>3</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.



## 4. Decarbonisation of the economy

### NON-ETS GHG EMISSION REDUCTION TARGET 2020 (-16% by 2020 as compared to 2005 in the non-ETS sector)



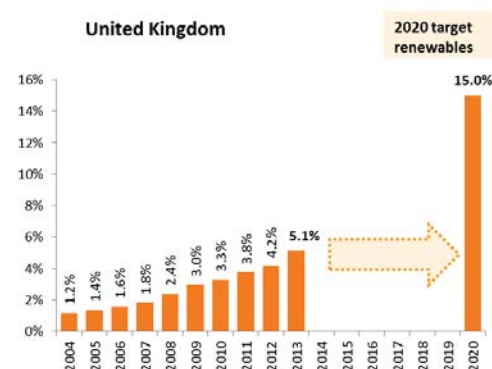
The UK has decreased its emissions by 16% between 2005 and approximated 2014 data. According to own UK 2015 projections, it will over achieve its 2020 target by a 3% margin.

Non-ETS Emissions (vs. 2005)	Projections/proxy	target
Projections with existing measures 2020	-19%	-16%
Proxy 2014	-16%	-9%

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

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

### RENEWABLE ENERGY SHARE TARGET 2020 (15%)



Source: European Commission based on EUROSTAT

The UK has made progress towards achieving its renewable energy target of 15% by 2020. In 2013, its share of renewable energy reached 5.1% of final energy consumption, compared with an interim target for 2013/2014 of 5.4%.

In the last 2 years, the UK has achieved remarkable progress in terms of the share of renewables in electricity generation, with significant deployment of offshore wind. Therefore, more recent provisional data for 2014 suggest a better outcome due to this large increase in the amount of renewable energy produced.

With the actual share of renewables in electricity generation reaching 17.8% share in 2014, the UK is ahead of its planned RES-E growth.

### GREENHOUSE GAS EMISSION INDICATORS

- In 2012, greenhouse gas emissions from buildings accounted for 37% of all UK greenhouse gas emissions. In 2014, the UK has put in place several measures to encourage energy efficiency and renewable energy deployment in buildings.
- In 2014, the revenues from the auctioning of ETS allowances amounted to € 401.5 million. Whilst the auction revenues are not earmarked for specific purposes, UK Government spending on energy and climate policies, including funding international climate change initiatives, was in excess of the auction revenues raised.

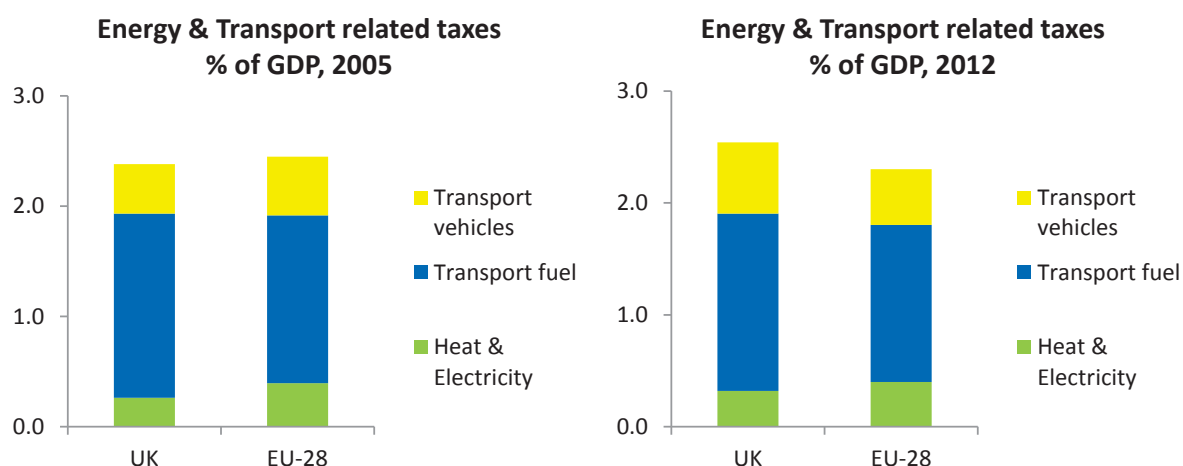
Largest Sectors of GHG Emissions in 2012(*)	UK	EU Average
Energy/power industry	34%	33%
Transport	20%	20%
Industry	16%	19%
Agriculture (incl. forestry & fishery)	10%	12%
Residential & Commercial	16%	13%
Waste	4%	3%

GHG Emissions	UK	EU
EU ETS auctioning revenues in 2014 (€ millions)	401.5	3205
Share of ETS emissions in 2013	39%	42%
GHG emissions/capita (tCO <sub>2</sub> equivalent) in 2013	9.01	8.5
Carbon intensity of the economy in 2013 (tCO <sub>2</sub> equivalent/(€ millions )	305	328

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

### ENERGY AND TRANSPORT TAXATION

Energy and transport taxes as a share of GDP in the UK have reached slightly above the EU average. This increase resulted from the combination of, on the one hand, a modest increase in the GDP shares of both taxes on heat and electricity and in particular on transport vehicles and, on the other hand, a modest decrease in the GDP share of taxes on transport fuels.

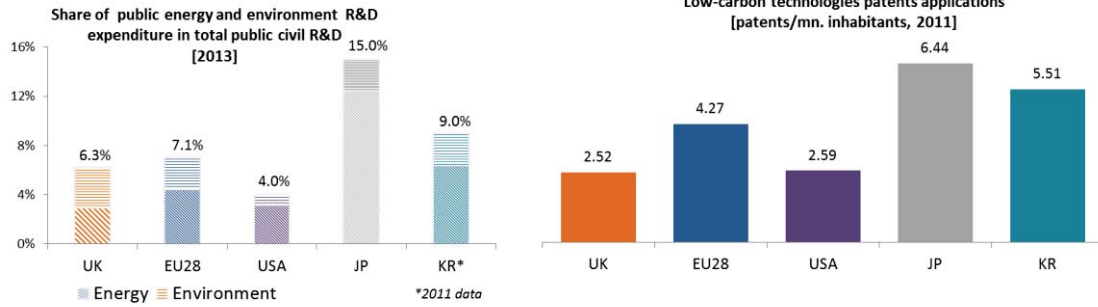


Source: Eurostat

## 5. Research, innovation and competitiveness

### RESEARCH AND INNOVATION

The UK is near the EU average, above the US and below Japan and South Korea in terms of the share of public support allocated to research and innovation in the field of energy and environment. In terms of intensity of low-carbon technologies patents, the UK stands close to the US, but below the EU average and main worldwide partners.



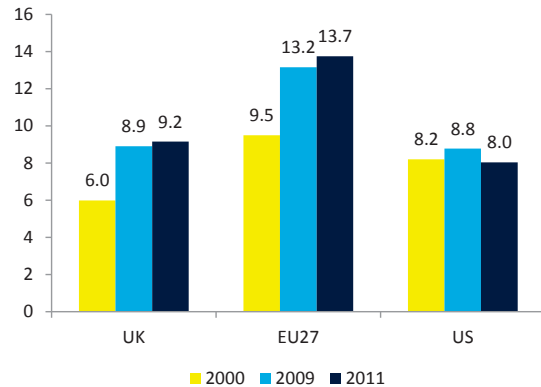
Source: European Commission based on EUROSTAT

The UK is currently supporting development of CCS technologies through a £125m R&D programme. The Government is also aiding the development of the UK's first full scale CCS project(s) through its CCS Commercialisation Competition under which it is making available to the winning bid(s), a £1bn capital grant and operational support through a contract for difference.

**COMPETITIVENESS**

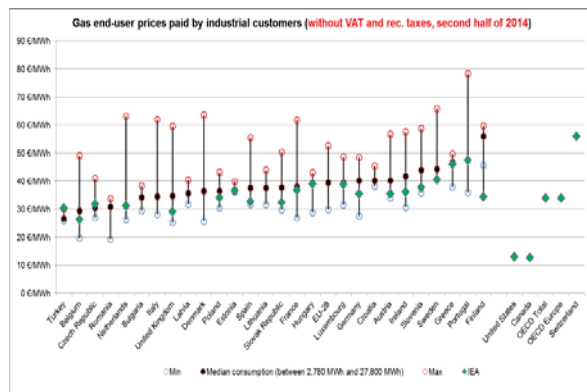
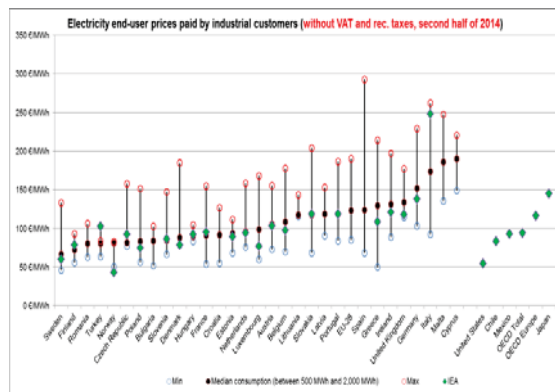
Real unit energy costs<sup>4</sup> in the UK have increased to slightly above the US level, but have remained well below the EU average. The energy intensity<sup>5</sup> of the UK's manufacturing sector is slightly lower than in the EU, which is itself lower than the US.

**Real unit energy costs (% of value added)**



In the UK, the gas prices for industrial customers are below the EU average but still above those in the US and Canada. The electricity prices for industrial consumers are slightly above the EU average as well as those from major EU trade partners.

Source: European Commission



Source: European Commission based on EUROSTAT and IEA

<sup>4</sup> This indicator measures the amount of money spent on energy sources needed to obtain one unit of value added.  
<sup>5</sup> The energy intensity presented here is derived from Use Tables of WIOD, see "Energy Economic Developments in Europe SWD(2014)19".

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

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

- The Climate Change Act 2008 provides a long-term framework for the UK's energy and climate policy. It includes GHG emission reduction targets for 2050 (80% cuts from 1990 levels) and requires the government to set binding 5-year carbon budgets. These set the trajectory to the 2050 target. The act also requires the UK to lay out policies and plans to meet the carbon budgets, which currently run to 2027.
- The 2011 "Carbon Plan - Delivering our Low Carbon Future" publication sets out how the UK will achieve this decarbonisation. The Carbon Plan will be updated after the UK sets the fifth carbon budget (2028-2032) in 2016
- The UK Energy Efficiency Strategy, published in 2012 and updated in December 2013, sets out key energy efficiency policies for the next two decades but does not include targets beyond 2020.
- The 2012 Energy Security Strategy identifies cross-cutting risks to UK energy security, and sets out all the actions the UK is taking to maintain the UK's energy supply.
- The CCS Roadmap of April 2012 aims to create the right conditions for deployment of CCS in the UK by, inter alia, developing a supportive regulatory framework and launching a CCS Commercialisation programme, alongside the Electricity Market Reform to ensure adequate support for all low carbon technologies. A policy scoping document published in August 2014 seeks views on a possible phase 2 of CCS deployment in the UK (including a focus on CCS on industrial applications).
- Industry has set out plans to develop approximately 16GW of new nuclear power. This will replace the current generation of nuclear reactors which produce around 18% of the UK's electricity and are set to be decommissioned by 2030. This will provide a reliable and low carbon base load alternative to fossil fuels.

### NATIONAL TARGETS, especially for 2030

Objective, 2030-2050	Targets	Comments
GHG reduction	Yes (for period 2023-2027 and 2050)	Legally binding target to reduce the GHG emissions by at least 80% below base year levels by 2050, to be achieved through action in the UK and abroad. The fourth carbon budget requires emissions to be reduced by 50% below 1990 levels in the period 2023–27.
Renewable energy	No	No specific 2030 RES target (but UK "committed" to increasing renewables in its energy mix)
Energy Efficiency / savings	No	No specific 2030 energy efficiency target (but energy efficiency policies for the next two decades laid out in 2012 Energy Efficiency Strategy).

## 7. Regional cooperation

Regional cooperation on infrastructure development is necessary to optimise the identification of regional infrastructure priorities and to coordinate cross-border investments. The UK is a member of three Regional Groups which have been established under the TEN-E Regulation: Northern Seas Offshore Grid, North South Electricity Interconnections in Western Europe, and North South Gas Interconnections in Western Europe.

The UK is also part of the regional initiative on the promotion of the North Sea Offshore Grid, which aims to maximise the cost-effective development of renewable resources in the Northern Seas, and of the North Sea Basin Task Force which seeks to facilitate CO<sub>2</sub> transport and storage infrastructure development in, around and under the North Sea.

### 8. Cohesion policy contribution

The EU Cohesion policy provides for important investment possibilities to implement energy policy objectives in the United Kingdom 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.

*Internal energy market:* Over 2014-2020, EU Cohesion Policy will invest some EUR 3 million in smart energy storage and transmission systems, as well as around EUR 84 million in smart electricity distribution grids in the United Kingdom.

*Energy efficiency:* Over 2014-2020, EU Cohesion Policy will invest around EUR 407 million in energy efficiency improvements in public and residential buildings and in enterprises, as well as in high-efficiency cogeneration and district heating in the United Kingdom. A further estimated EUR 418 million will be invested in supporting the move towards an energy-efficient, decarbonised transport sector. These investments are expected to contribute to around 15 000 households with improved energy consumption classification and a decrease of around 5 547 000 million kWh per year of decreased primary energy consumption of public buildings, as well as to around 15 km of new railway lines, 20 km of reconstructed or upgraded railway lines and 5 km of new or improved tram and metro lines.

*Decarbonisation:* Overall, the EU Cohesion Policy investments in the United Kingdom over 2014-2020 are expected to contribute to an estimated annual decrease of GHG of around 646 000 tonnes of CO<sub>2</sub>eq. Over 2014-2020, EU Cohesion Policy will invest some EUR 421 million in renewable energy in the United Kingdom. These investments are expected to contribute to around 200 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 SME competitiveness in the United Kingdom. This will be based on nation-based strategies for smart specialisation. For the United Kingdom, the strategies include a focus on research into technology and engineering drawing on strengths in renewable energy technology, energy efficiency, bioenergy, transport, and carbon capture and storage. At this stage, at least EUR 270 million is foreseen for investments in R&I and adoption of low-carbon technologies in the United Kingdom, but this might increase further in line with the evolving content of the smart specialisation strategy.