Office for National Statistics

Statistical bulletin

UK environmental accounts: 2017

Satellite accounts to the main UK National Accounts measuring the contribution of the environment to the economy, the impact of economic activity on the environment, and society's response to environmental issues.

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Release date:
11 July 2017

Next release:
To be announced

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1 . Main points

- In 2015, UK households became the biggest users of diesel fuel for road use (DERV), overtaking the “transport, storage and communications” sector for the first time.
- The energy efficiency of the UK economy (as measured by its energy intensity) improved in 2015, the continuation of a long-term trend due largely to energy efficiency improvements in the manufacturing and “transport, storage and communications” sectors.
- Despite an overall reduction in greenhouse gas (GHG) emissions, GHG emissions from road transport increased for the second year in a row, by just over 1% between 2014 and 2015.
- In 2014, households were responsible for 45% of income generated from environmental taxes, paying just under £20 billion.
- The environmental goods and services sector (EGSS) produced an output of around £61.1 billion in 2014, growing 18.7% between 2010 and 2014.
- In 2015, UK government spent an estimated £14.7 billion on environmental protection, 1.8% of total government spending.

2 . Things you need to know about this release

The UK Environmental Accounts show how the environment contributes to the economy (for example, through the extraction of raw materials), the impact that the economy has on the environment (for example, energy consumption and air emissions) and how society responds to environmental issues (for example, through taxation and expenditure on environmental protection).

In the UK Environmental Accounts 2016, several sections on natural capital accounting were included. Estimates included previously will now be updated in two separate natural capital releases.

The UK Environmental Accounts are “satellite accounts” to the main UK National Accounts and they are compiled in accordance with the System of Environmental Economic Accounting (SEEA), which closely follows the UN System of National Accounts (SNA). This means they are comparable with economic indicators such as gross domestic product (GDP)[1].

The UK Environmental Accounts are based on a UK residency basis (as opposed to a territory basis). This means that data relating to UK residents and UK-registered businesses are included, regardless of whether they are in the UK or overseas. Data relating to foreign visitors and foreign businesses in the UK are excluded.

Full definitions for terms can be found within the Quality and methodology section.

Notes for: Things you need to know about this release

1. Estimates of the Low Carbon and Renewable Energy (LCRE) economy are not compiled in accordance with SEEA but are included here for completeness. Estimates are comparable with other business statistics.

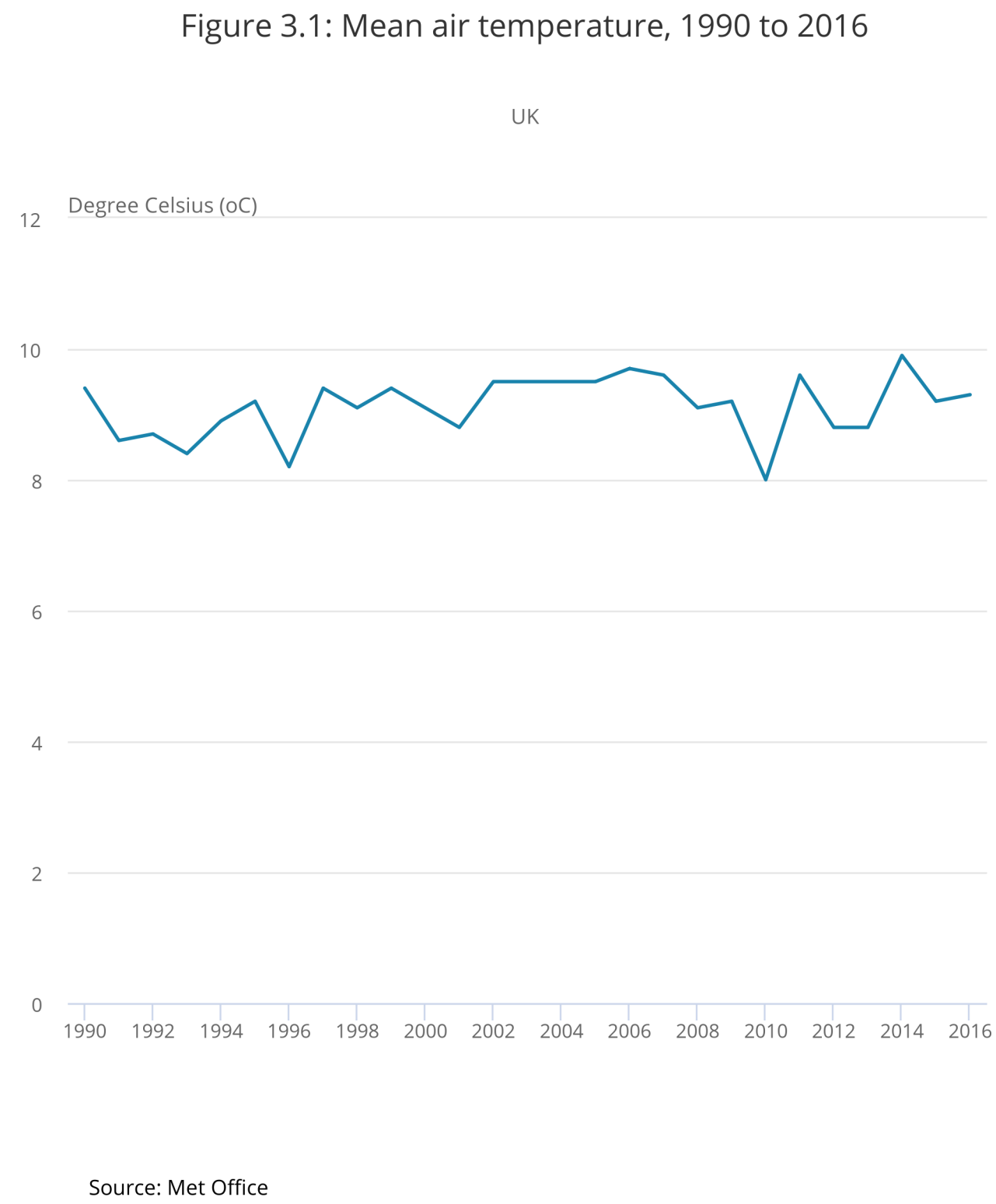
3 . Environmental accounts and the economy

Changes in mean air temperature and gross domestic product are important to consider when analysing the UK Environmental Accounts, as they help to contextualise some of the changes observed. For example, the average temperature fell in 2010 to 8.0 degrees Celsius (°C), from 9.2°C in 2009, which contributed to increases in energy consumption and greenhouse gas emissions during that year. At the same time, gross domestic product (GDP) started to recover following the economic downturn, which may also explain the increases in energy consumption and greenhouse gas emissions. Between 2014 and 2015, the average air temperature fell by 0.7°C (from a record high of 9.9°C to 9.2°C). Despite this fall, the average air temperature in 2015 was above usual levels. Values for mean air temperature and GDP between 1990 and 2016 are shown in Figures 3.1 and 3.2.

The relationships between the environment and the economy are explored further throughout this bulletin.

Figure 3.1: Mean air temperature, 1990 to 2016

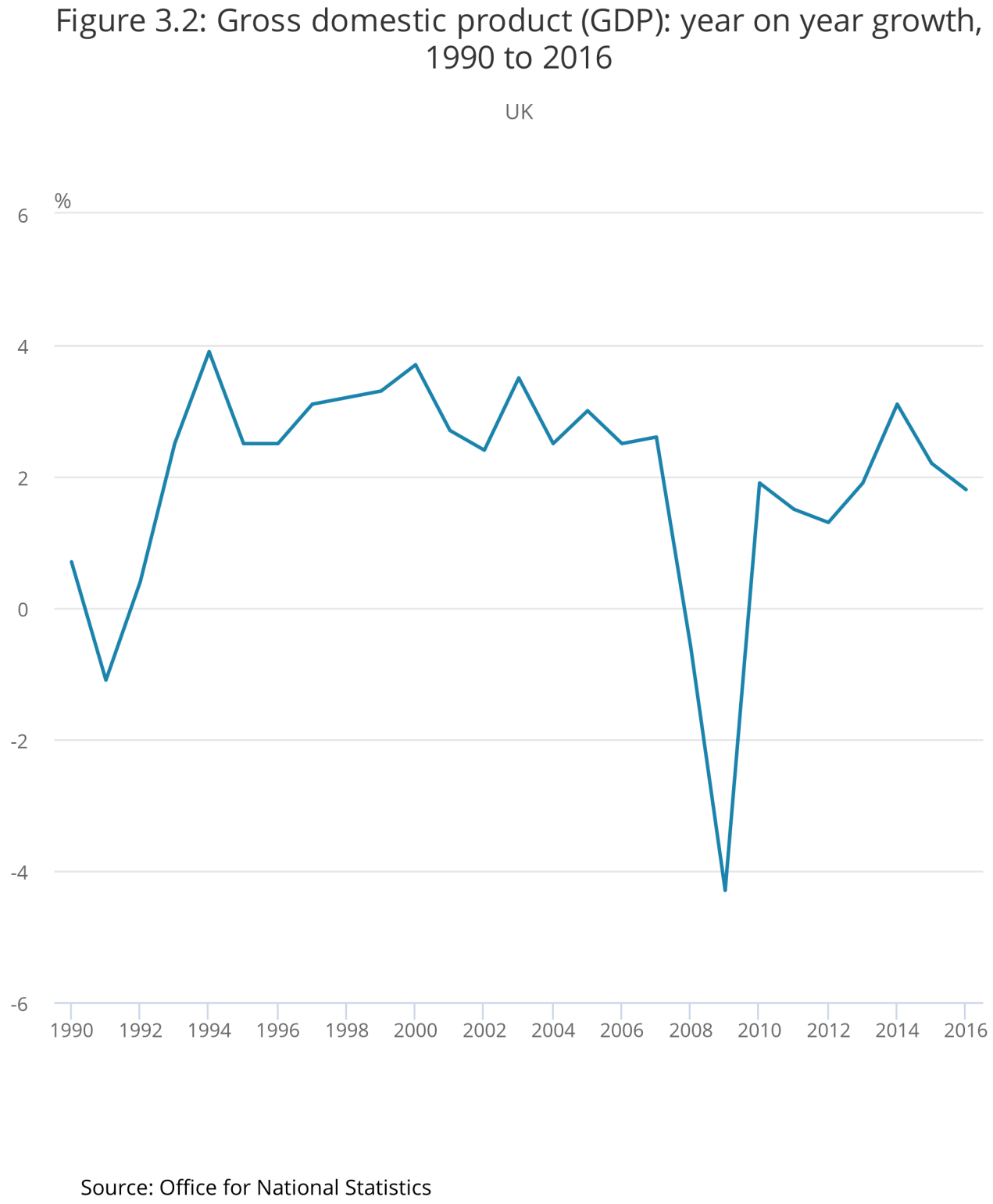
UK



Source: Met Office

Figure 3.2: Gross domestic product (GDP): year on year growth, 1990 to 2016

UK



Source: Office for National Statistics

Notes:

1. GDP year on year growth: chain volume measure, in constant prices (2013-based).

4 . Oil and gas asset accounts

Main points

- A reclassification in oil and gas reserves has resulted in expected reserves of discovered oil and gas falling, to 566 million tonnes (mt) and 333 billion cubic metres (bcm) respectively.

Things you need to know about this section

This section presents non-monetary estimates of the oil and gas reserves and resources in the UK. In the context of oil and gas reserves and resources presented in this section, reserves refer to discovered oil and gas reserves that are recoverable and commercially viable, whereas resource refers to oil and gas that are potentially valuable and for which reasonable prospects exist for eventual extraction. Full definitions for oil and gas reserves and resources can be found in the Quality and methodology section.

This year the Oil and Gas Authority has developed a new category of oil and gas reserves, known as “contingent resources”. Contingent resources are defined as “significant discoveries where development plans are under discussion”. In the past these would have been included as “probable reserves”. The apparent loss in reserves is largely due to this change in classification. Other changes in oil and gas reserves are a result of:

- changes in production during the year
- new field developments including those from recent exploration success
- revisions to established fields

The expected level of discovered reserves is the sum of proven and probable reserves.

What were oil and gas reserves and resources estimated to be in 2015?

In 2015, the expected level of discovered oil reserves was estimated at 566 million tonnes (mt), 21% lower than in 2014 (Figure 4.1). The equivalent figure for gas reserves was 18% lower than in 2014, at 333 cubic metres (bcm) (Figure 4.2). These declines were due largely to some reserves now being classified into the new contingent resources category. There has been a general downward trend in the expected level of discovered oil and gas reserves since 1995. Expected level of discovered oil reserves in 2015 was 59% below 1995 levels. The equivalent fall for gas was 78%.

Figure 4.1: Estimates of discovered and undiscovered oil reserves, 1995 to 2015

UK

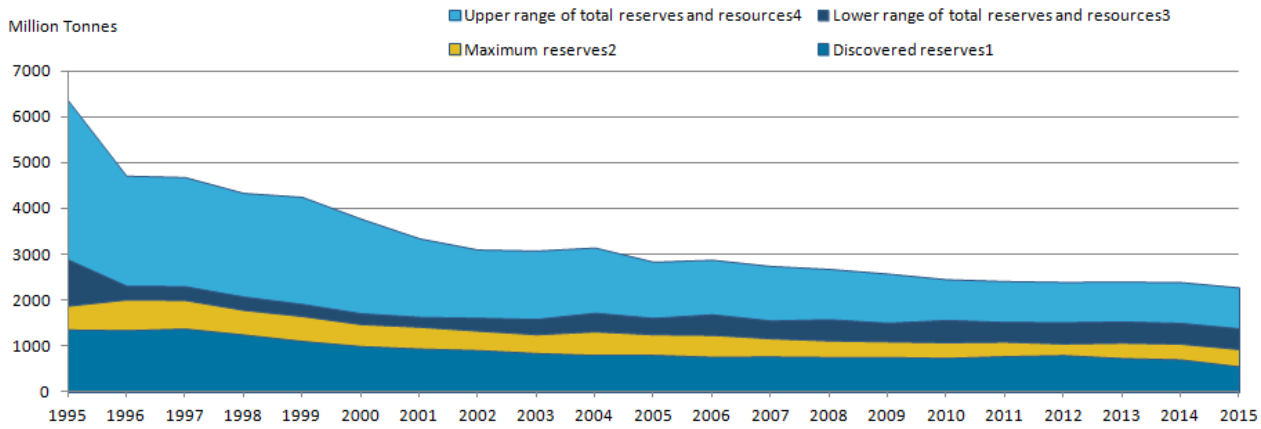
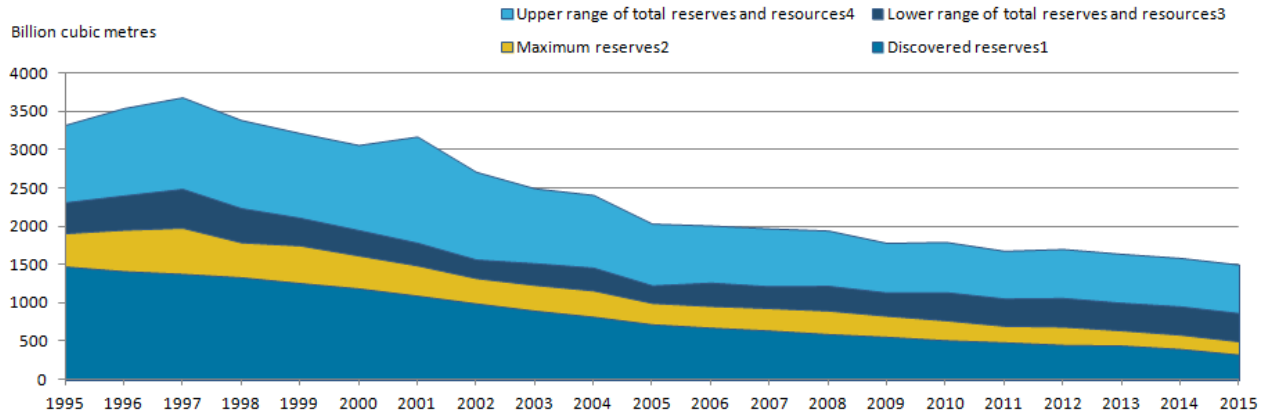


Figure 4.2: Estimates of discovered and undiscovered gas reserves, 1995 to 2015

UK



More detail can be found in the “Oil and Gas Reference Table” dataset.

5 . Fuel use, energy consumption and greenhouse gas emissions

Main points

- Changing fuel patterns have helped reduce total fuel use by almost 20% between 1990 and 2015.
- Energy intensity in the UK is lower than in 1997, due largely to energy efficiency improvements in the manufacturing, and “transport, storage and communications” sectors.
- In 2015, greenhouse gas emissions intensity fell to 50% below 1997 levels; this was due largely to a switch away from fossil fuels and improvements to processes to reduce emissions by the energy supply, water and waste sector.

Things you need to know about this section

The UK Environmental Accounts are based on a UK residency basis (as opposed to a territory basis):

- fuel use and energy consumed by UK residents and UK-registered businesses is included, regardless of whether they are in the UK or overseas; the fuel used and energy consumed by foreign visitors and foreign businesses in the UK is excluded
- emissions that UK residents and UK-registered businesses are directly responsible for, whether in the UK or overseas, are included; emissions from foreign visitors and businesses in the UK are excluded

This is in line with national accounting principles, allowing environmental impacts to be compared on a consistent basis with economic indicators such as gross domestic product (GDP).

UK figures for energy and air emissions on a territory basis are published by the Department for Business, Energy and Industrial Strategy (BEIS). The energy and emissions bridging tables illustrate the difference between these estimates. Further explanation of the differences can be found in the following articles on energy consumption and alternative approaches to reporting UK greenhouse gas emissions.

This section includes analysis by Standard Industry Classification 2007: SIC 2007. To enable a consistent time series the following SICs have been combined:

- “electricity, gas, steam and air conditioning supply” and “water supply, sewerage, waste management activities and remediation services” into “energy supply, water and waste”
- “transport and storage” and “information and communication” into “transport, storage and communications”

In this section, households include “consumer expenditure” and “activities of households as employers; undifferentiated goods and services – producing activities of households for own use”.

Fuel use continued to fall

Fuel use fell between 2014 and 2015, caused by a reduction in the use of coal in the “energy supply, water and waste” and manufacturing sectors. This was despite slightly colder temperatures in 2015 than 2014 – short-term fluctuations in fuel use tend to be linked to variations in temperature as households demand either more or less fuel depending on the weather. This fall was a continuation of a long-term trend, with total fuel use at 172.2 million tonnes of oil equivalent (Mtoe) in 2015, almost 20% below 1990 levels and 25% below its peak in 2005.

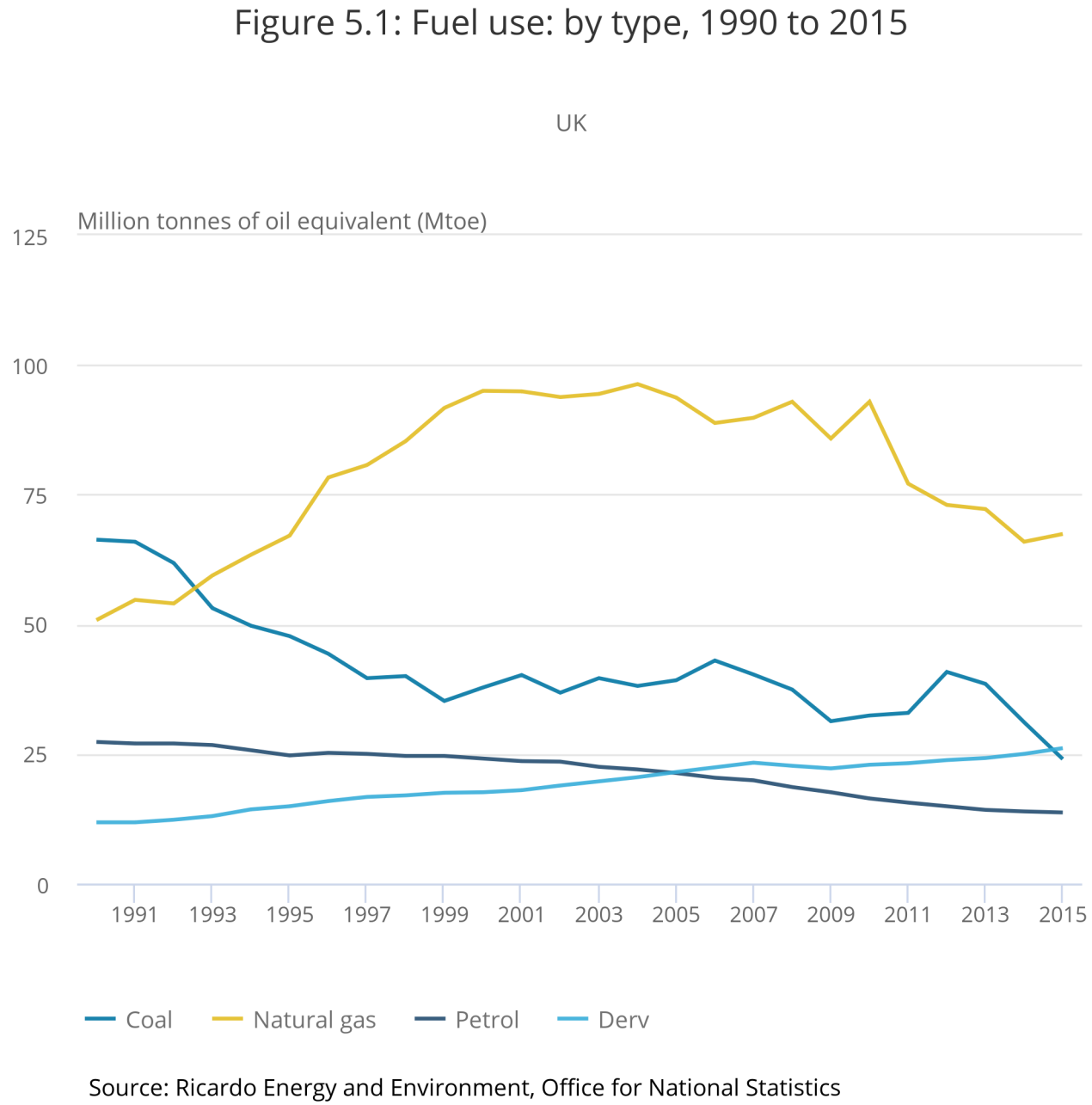
As well as a fall in fuel use, there has been a change in the types of fuels used. Natural gas surpassed coal as the most used fuel in 1993 (Figure 5.1) and has remained ahead ever since. This reflects the switch from coal to natural gas by the “energy supply, water and waste” and manufacturing sectors. After a sharp rise in the 1990s, natural gas use peaked in 2004 at 96.3 Mtoe. Since then, there has been a general fall in the use of natural gas as a fuel, despite a slight rise between 2014 and 2015. A major factor in the fall in use of natural gas is the drop in gas use for electricity generation, due to closure of some plants and the switch of others to renewable sources, such as biomass (DUKES, 2016). Fuels from renewable sources are not covered under fuel use as defined here.

Unlike coal and natural gas, DERV (fuel used in diesel-engine road vehicles) has increased steadily in use since 1997. It accounted for 15% of total fuel use in 2015, overtaking coal use for the first time. This increase reflects in part the changing pattern in fuel use from petrol to diesel, due to its greater efficiency and lower CO2 emissions. This switch can be seen across the majority of sectors, although is most prominent in households. In 2008, households overtook the “transport, storage and communications” sector as the primary user of DERV (Figure 5.2). Households’ use of DERV increased from 2.6 Mtoe in 1997 to 10.4 Mtoe in 2015, which was 40% of total DERV use. This reflects several government initiatives that encouraged the use of diesel, such as reduced vehicle tax for vehicles with lower carbon emissions as detailed in the Budget: March 2001 (page 86).

In contrast to other sectors, the use of DERV in the “transport, storage and communications” sector has been relatively stable. This may be because this sector has historically used largely DERV rather than petrol, so the potential for fuel switching was lower.

Figure 5.1: Fuel use: by type, 1990 to 2015

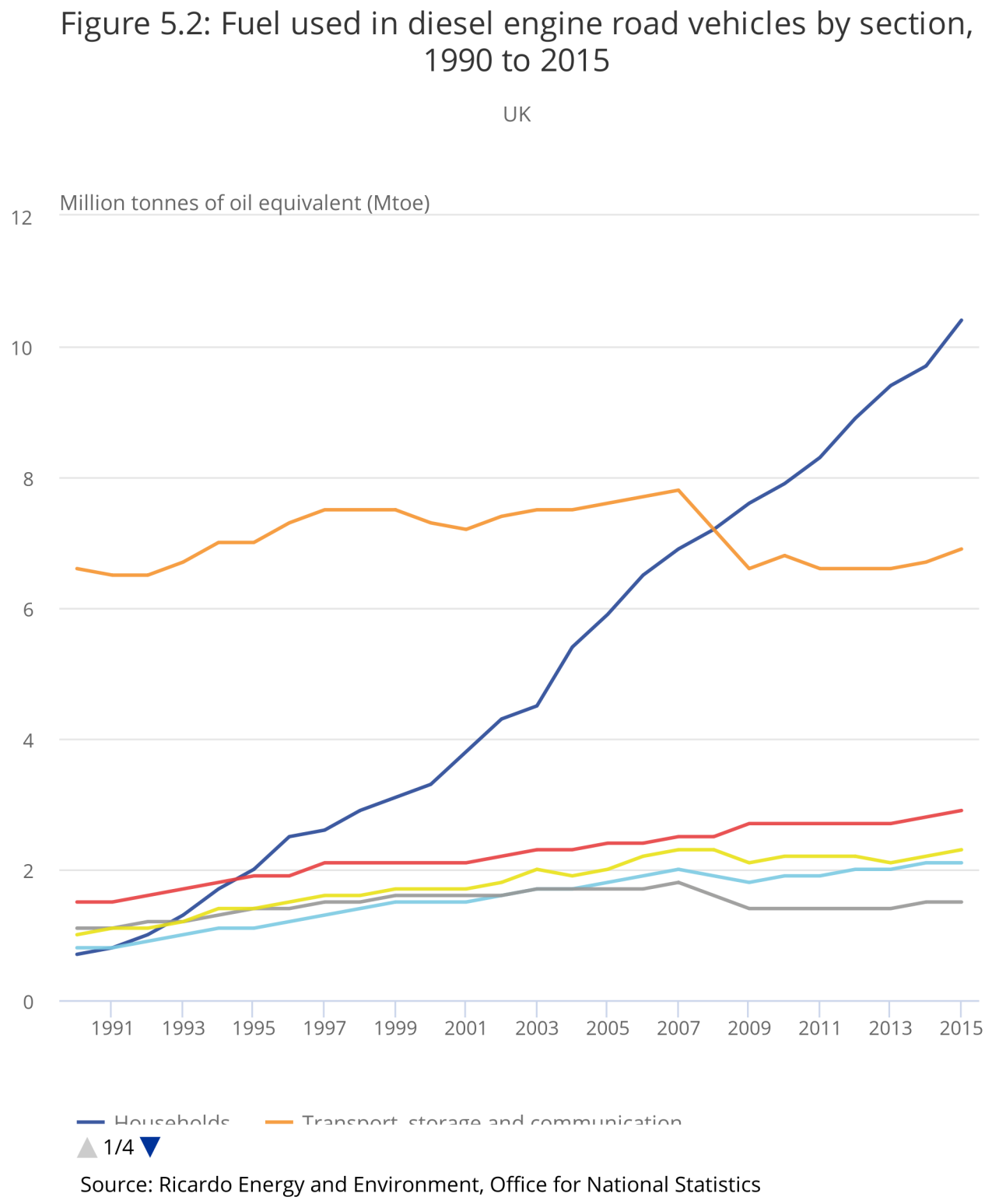
UK



Source: Ricardo Energy and Environment, Office for National Statistics

Figure 5.2: Fuel used in diesel engine road vehicles by section, 1990 to 2015

UK



Source: Ricardo Energy and Environment, Office for National Statistics

Notes:

1. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007. Sectors have been aggregated for ease of interpretation. To see full list of industries please see reference table "Fuel use by type and industry".

2. The "transport, storage and communications" category includes the "transport and storage" and "information and communication" sectors.

Further information is available in the “Fuel use by type” and “Fuel use by type and industry” datasets.

More efficient fuel use helps reduce energy consumption between 2005 and 2015

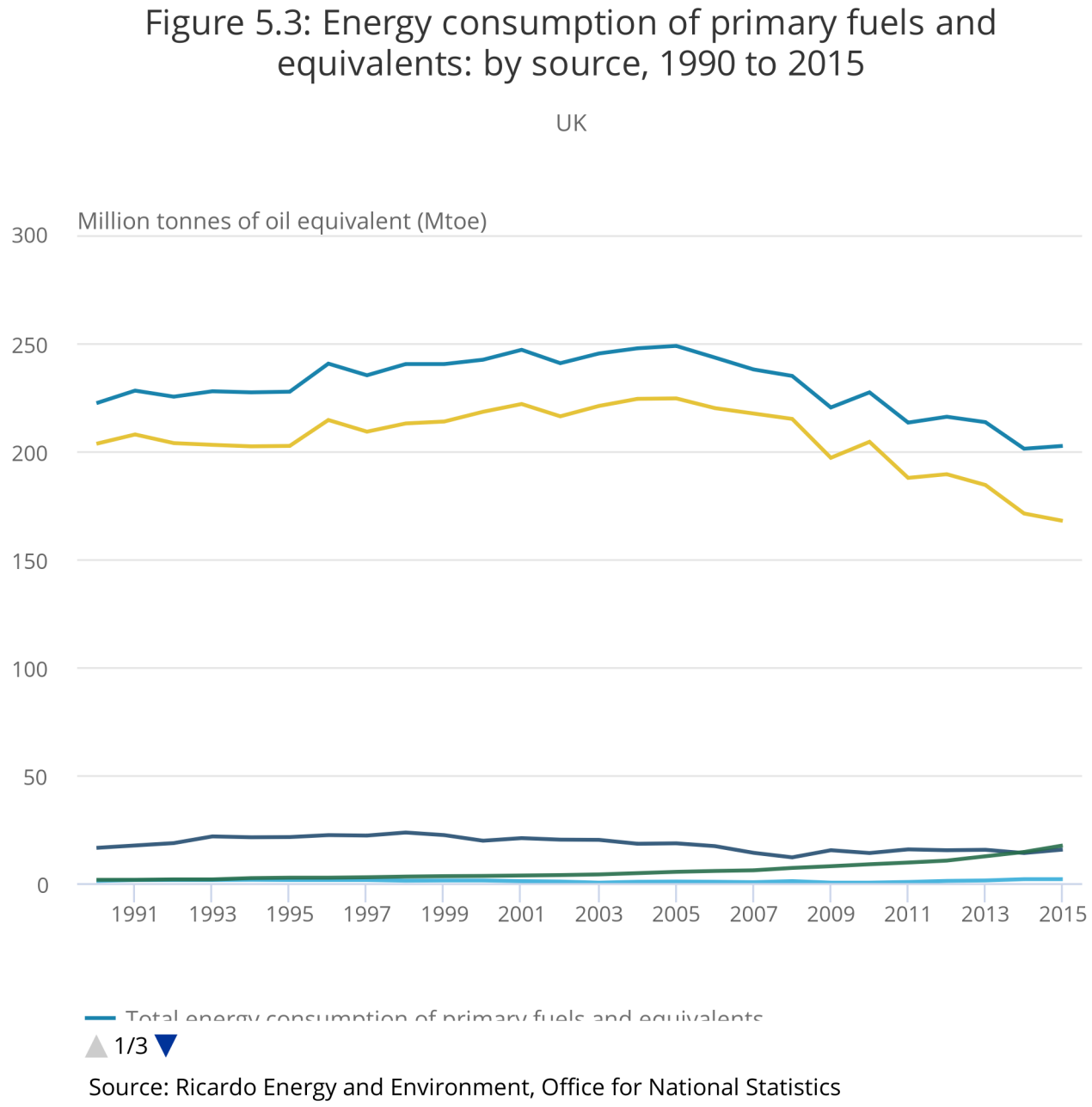
In 2015, total direct energy consumption was 202.4 Mtoe, up from 201.1 Mtoe in 2014 (Figure 5.3). This was due to an increase in household consumption as a result of colder temperatures. While 2015 was warmer than average it was still colder than 2014, which saw record high temperatures.

Despite this recent increase, as with fuel use, direct energy consumption has generally been falling for the past 10 years. In 2015, it was 19% below its peak of 248.7 Mtoe in 2005. The reduction in total energy consumption, particularly for the “energy supply, water and waste” and manufacturing sectors, reflects an increase in overall generation efficiency across the time series and a reduction in generation output since 2005 (DUKES tables 5.1, 5.1.1 and 5.1.3). This is likely due to existing plants switching to more efficient methods or fuels, a decrease in national energy demand and, since 2012, higher net imports of electricity.

Consumption of energy from renewables and waste has seen a large increase since 1990, increasing to 9% of total energy consumption in 2015 from below 1% in 1990. In 2015, the “energy supply, water and waste” sector was the biggest consumer of energy from renewables and waste, accounting for half of all renewable energy used. Households and the manufacturing sector were the next two biggest users.

Figure 5.3: Energy consumption of primary fuels and equivalents: by source, 1990 to 2015

UK



Source: Ricardo Energy and Environment, Office for National Statistics

A move towards a more service-based economy helps reduce UK energy intensity

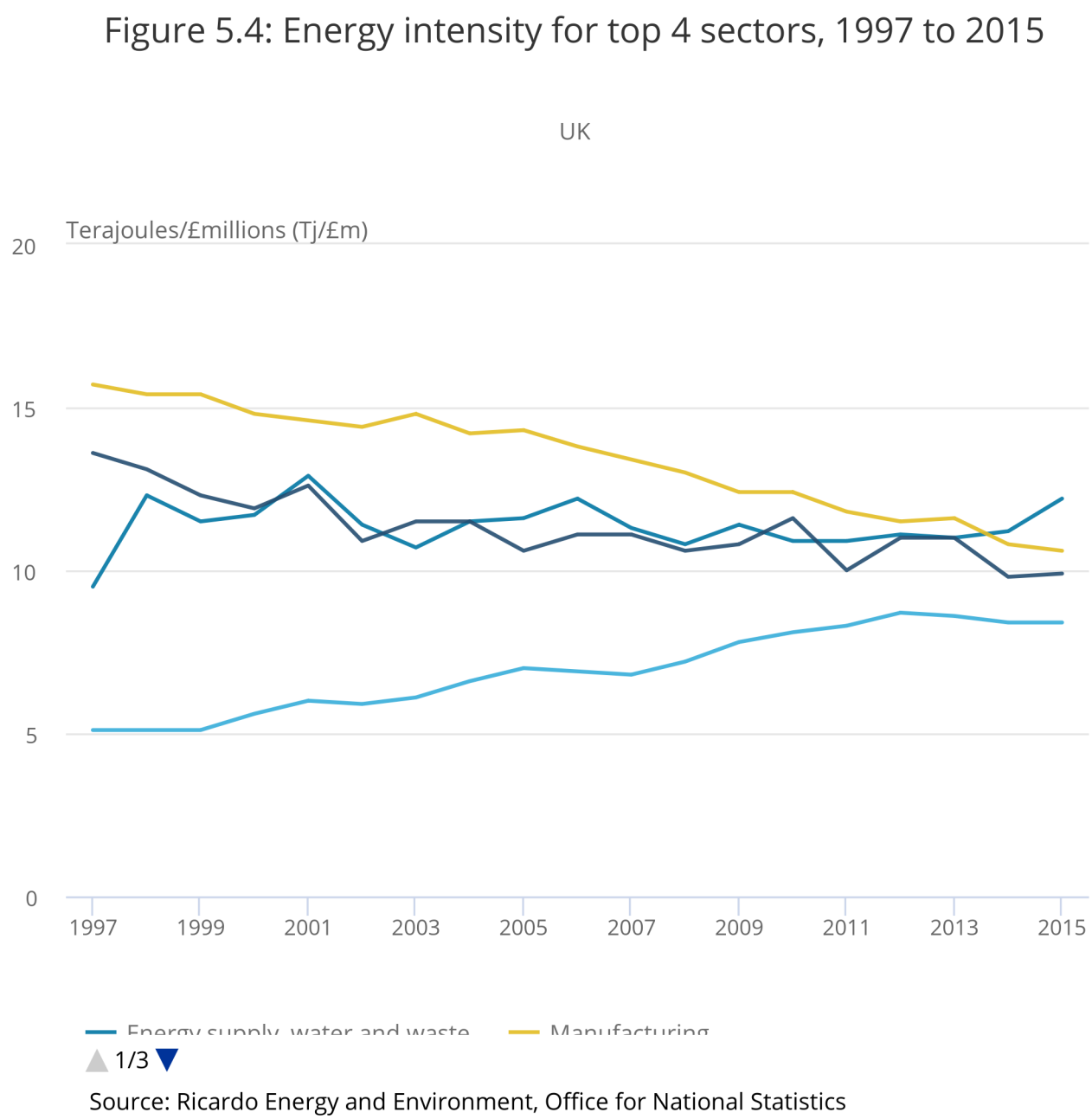
This switch towards more efficient methods or fuels can be seen in the energy intensity figures. Energy intensity, energy use (reallocated) per gross value added (GVA), fell 3% between 2014 and 2015, to 3.2 terajoules per £ million of value added. This was a continuation of a general downward trend since first figures were available in 1997.

The manufacturing and “transport, storage and communications” sectors, traditionally two of the most energy-intensive sectors, have seen declines in energy intensity between 1997 and 2015. While the “transport, storage and communications” sector has increased in size since 2005, it has also seen a fall in energy consumed. This reflects the improvement in the efficiency of vehicles. The manufacturing industry has become more energy-efficient, but has also reduced in size. This move away from manufacturing, which is traditionally an energy intensive industry, towards a more service-based economy, has contributed to the reduction in overall energy intensity.

In 2015, the combined “energy supply, water and waste” sector saw an increase in energy intensity (Figure 5.4) and became the most energy intensive sector for the first time. Over the longer-term, energy intensity for the “energy supply, water and waste” sector has been relatively stable. This would indicate that this sector has not seen the same efficiencies in processes as the manufacturing and transport industries.

Figure 5.4: Energy intensity for top 4 sectors, 1997 to 2015

UK



Source: Ricardo Energy and Environment, Office for National Statistics

Source: Ricardo Energy and Environment, Office for National Statistics

Notes:

1. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007. Not all industries (SICs) have been included.

2. Energy intensity is calculated by dividing reallocated energy consumption by Gross Value Added (GVA) in constant prices. This is the difference between output and intermediate consumption for any given industry /sector. This means the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs which are used up in production (intermediate consumption).

3. Data are in constant prices with 2013 defined as the base year.

4. The "energy supply, water and waste" category includes the "Electricity, gas, steam and air conditioning supply" and "water supply, sewerage, waste management activities and remediation services" sectors.

Further information is available in the “Energy consumption heat”, “Energy consumption renewable and waste sources” and “Energy intensity by industry” datasets.

Households are the largest consumers of energy

When considering reallocated energy consumption, where losses incurred during transformation[1] and distribution[2] are allocated to the final consumer, households accounted for 37% of all energy consumed in 2015. The manufacturing and “transport, storage and communications” sectors were the next largest consumers of energy. In total, these sectors accounted for 73.7% of all energy consumed in 2015. However, all three of these sectors have seen falls in the amount of energy consumed since 2005 (Figure 5.5).

Figure 5.5: Re-allocated energy consumption by sector, 2005 and 2015

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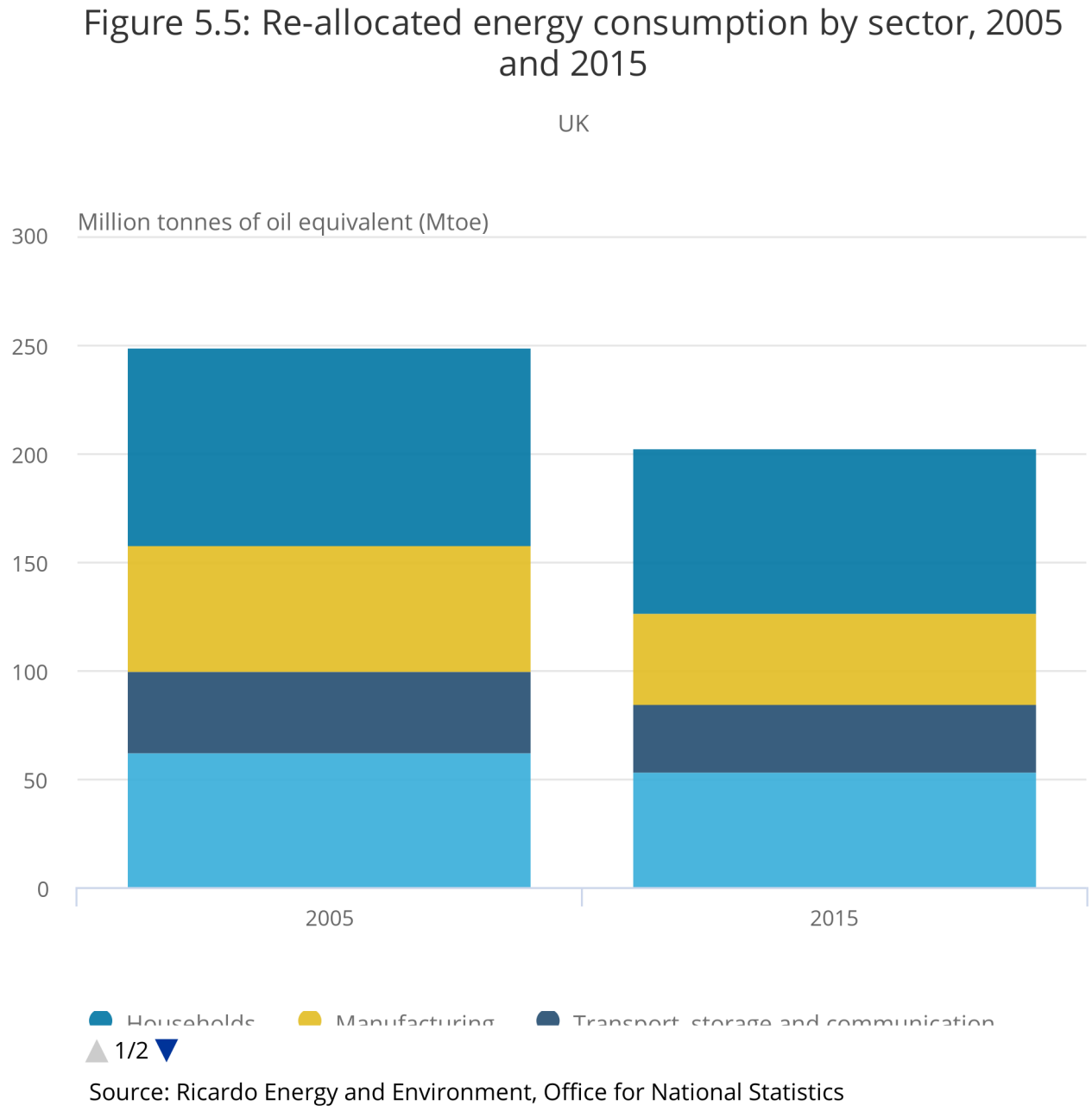


Source: Ricardo Energy and Environment, Office for National Statistics

Notes:

1. The "Household" category includes "Consumer" and "Activities of households as employers, undifferentiated goods and services-producing activities of households for own use".

2. The "transport, storage and communications" category includes the "transport and storage" and "information and communication" sectors.

3. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007.

Further information is available in the “Energy consumption by industry” dataset.

Changes in fuel use and energy consumption help reduce greenhouse gas emissions

Greenhouse gas (GHG) emissions fell 2% between 2014 and 2015 to 595.2 million tonnes of carbon dioxide equivalent (Mt CO2e); this was 29% below 1990 levels. GHG emissions are widely believed to contribute to global warming and climate change. The potential of each greenhouse gas to cause global warming is assessed in relation to a given weight of CO2 so all greenhouse gas emissions are measured as carbon dioxide equivalents (CO2e).

The fall in GHG emissions was due largely to the reduction in coal use by the “energy supply, water and waste” and manufacturing sectors. When used for electricity generation, coal produces more CO2 than natural gas per unit of electricity produced, so the switch away from coal to natural gas use in power stations has led to a reduction in CO2 emissions. As CO2 is the most dominant greenhouse gas, changes in CO2 tend to be reflected in overall GHG emissions.

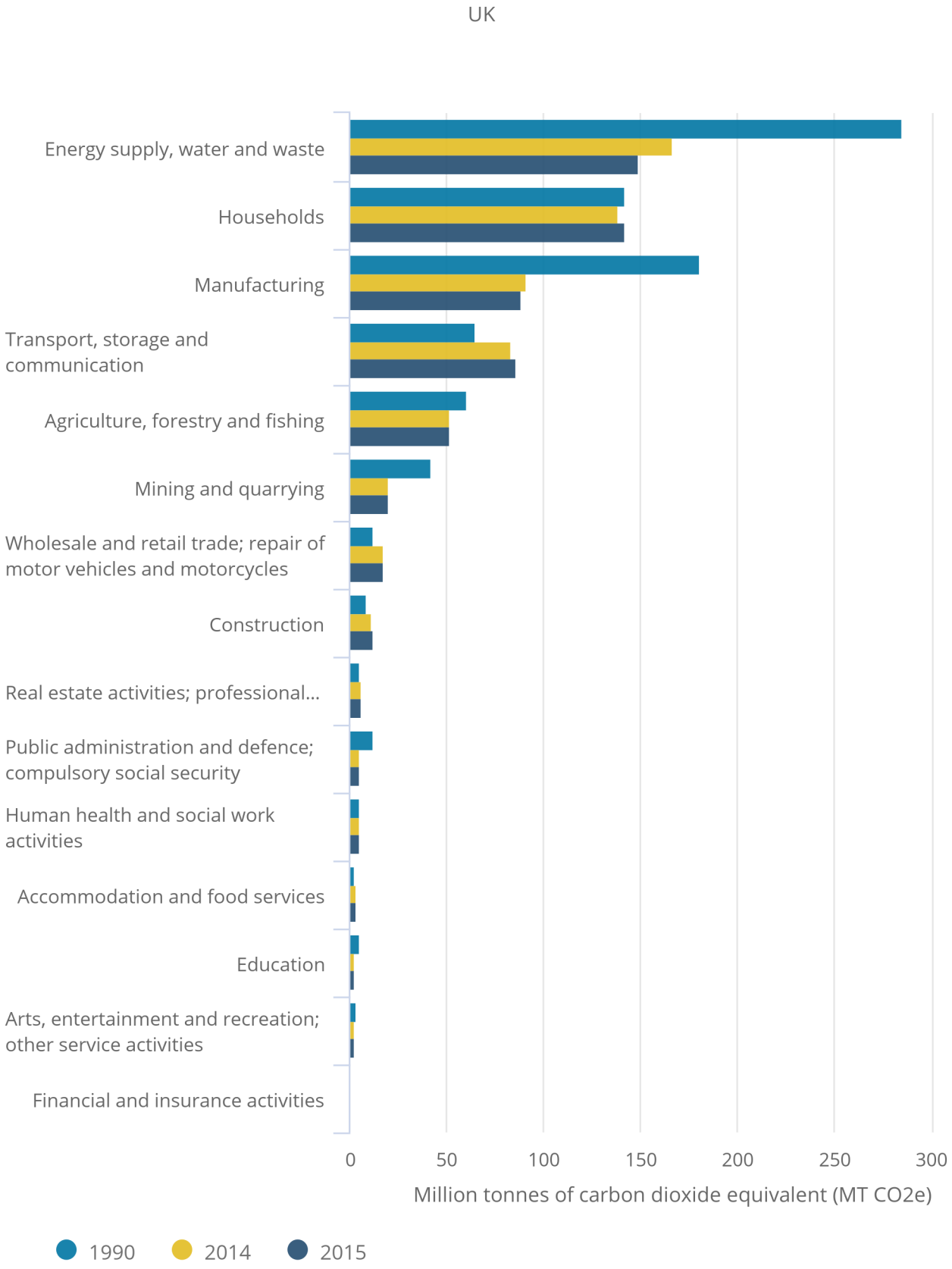
Unlike the majority of other sectors, the “transport, storage and communications” sector has seen an increase in GHG emissions (Figure 5.6). Between 2014 and 2015, this increase was due largely to increases in emissions from fuel oil used in shipping. Longer-term, an increase in aviation fuel used by aircraft has also caused a rise in GHG emissions for this sector. In the UK Environmental Accounts, emissions from international aviation and shipping relating to UK operators are included. However, these are excluded from the data compiled for United Nations Framework Convention on Climate Change (UNFCCC) purposes.

Despite reducing its GHG emissions, the “energy supply, water and waste” sector still emitted the most GHG emissions in 2015, accounting for a quarter of the total. Households were the second biggest contributor to GHG emissions in 2015. This is a change since 1990, when the manufacturing sector was responsible for more GHG emissions than households.

Figure 5.6: Greenhouse gas emissions by sector, 1990, 2014 to 2015

UK

Figure 5.6: Greenhouse gas emissions by sector, 1990, 2014 to 2015



Source: Ricardo Energy and Environment, Office for National Statistics

Source: Ricardo Energy and Environment, Office for National Statistics

Notes:

1. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007.

2. The "energy supply, water and waste" category includes the "Electricity, gas, steam and air conditioning supply" and "water supply, sewerage, waste management activities and remediation services" sectors.

3. The "Household" category includes "Consumer" and "Activities of households as employers, undifferentiated goods and services-producing activities of households for own use".

4. The "transport, storage and communications" category includes the "transport and storage" and "information and communication" sectors.

Sulphur dioxide emissions 90% below 1990 levels

Reductions in the use of fossil fuels and improvements in processes in the “energy supply, water and waste” and manufacturing sectors have also resulted in a large fall in acid rain precursors (ARP) since 1990. Acid rain can have harmful effects on the environment and is caused primarily by emissions of sulphur dioxide (SO2), nitrogen oxide (NOX) and ammonia (NH3). The impact of SO2, NOX and NH3 can be observed in the progressive degradation of soils, water and forests. They also contribute to the formation of fine particles in the air that cause respiratory diseases.

The reduction in ARPs was due largely to a reduction in sulphur dioxide (SO2) emissions, which fell by over 90% between 1990 and 2015. This change can be linked to policy initiatives [3] to discourage the use of high sulphur fuels, control the sulphur content of those fuels and encourage the adoption of cleaner technologies, and in particular to the switch from coal to gas in electricity generation.

While once the most dominant ARP, this reduction has resulted in NOX and NH3 becoming the more prominent ARP emissions. However, despite a slight rise between 2014 and 2015, emissions of both of these ARPs have also generally fallen since 1990. In 2015, emissions from NOX were 60% below 1990 levels. This was due largely to a reduction in the use of petrol cars by households, reflecting the switch to diesel we saw previously. Emissions of NH3 fell by 10% between 1990 and 2015, largely due to a reduction in the emissions from manure and excreta of livestock pigs in the agriculture, forestry and fishing sector.

Greenhouse gas emissions from road transport rise

Various pollutants are emitted from road transport into the atmosphere. Greenhouse gas (GHG) emissions from road transport increased by just over 1% between 2014 and 2015, to 115.4 Mtoe. This is the second year in a row there has been a rise in GHG emissions from road transport, reversing a downward trend observed between 2007 and 2013. This increase was due largely to an increase in carbon dioxide (CO2), resulting from a rise in the number of vehicles and vehicle-kilometers. As mentioned previously, CO2 is the most prominent GHG so tends to heavily influence the movement of overall figures.

Emissions from the majority of other pollutants from road transport fell between 2014 and 2015, due largely to more stringent emissions standards. Notable exceptions from this are sulphur dioxide and nitrous oxide, which saw increases between these years. These pollutants tend to be more associated with the use of diesel rather than petrol, again reflecting the switch in fuel use.

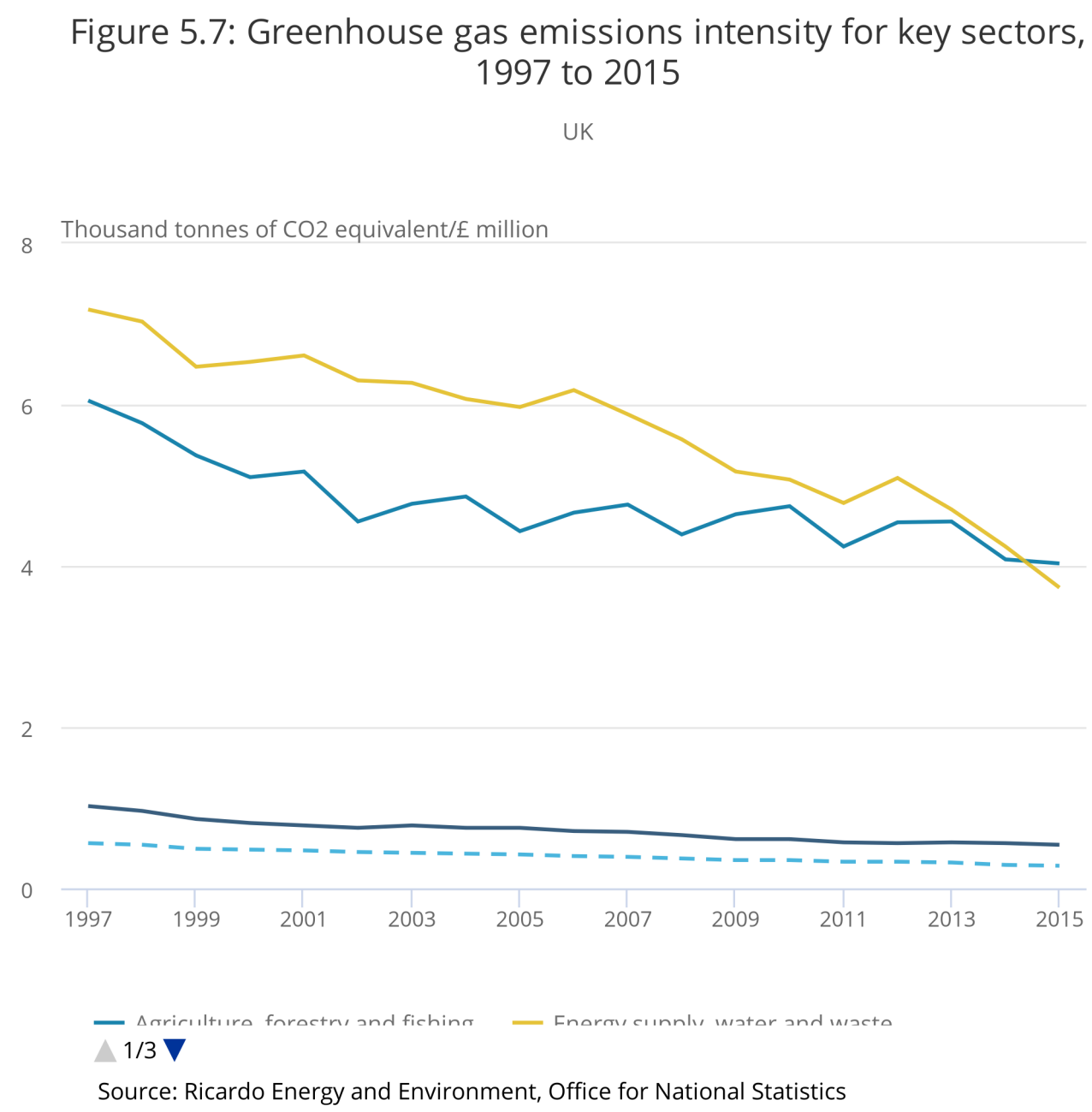
Greenhouse gas emissions intensity falls to 50% below 1997 levels

Greenhouse gas (GHG) emissions intensity, the level of emissions per unit of economic output (constant price level), fell 3% between 2014 and 2015, to half 1997 levels. It has declined from 0.60 thousand tonnes of carbon dioxide equivalent (CO2e) per £ million value added in 1997 to 0.29 thousand tones of CO2e per £ million value added in 2015 (Figure 5.7). This change was due largely to the “energy supply, water and waste” sector. This sector experienced an increase in gross value added along with a fall in GHG emissions. While this sector did not improve in energy efficiency, the switch away from fossil fuels, along with improvements to processes to reduce emissions has resulted in a fall in GHG emissions intensity. In 2015, it became less GHG intensive than the agriculture, forestry and fishing sector for the first time. However, it is worth noting that the agriculture, forestry and fishing industry only contributed 9% of all GHG emissions in 2015.

Greenhouse gas emissions intensity for the whole economy (total) is much lower than for the manufacturing and “energy supply, water and waste” sectors. This reflects the fact that the sectors that contribute the most to the UK economy tend to have low levels of GHG emissions intensity.

Figure 5.7: Greenhouse gas emissions intensity for key sectors, 1997 to 2015

UK



Source: Ricardo Energy and Environment, Office for National Statistics

Notes:

1. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007. Not all industries (SICs) have been included.

2. Greenhouse gas emissions intensity is calculated by dividing the level of greenhouse gas emissions by Gross Value Added (GVA) in constant prices. This is the difference between output and intermediate consumption for any given industry/sector. This means the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs which are used up in production (intermediate consumption).

3. Data are in constant prices with 2013 defined as the base year.

4. The "energy supply, water and waste" category includes the "Electricity, gas, steam and air conditioning supply" and "water supply, sewerage, waste management activities and remediation services" sectors.

5. All emissions intensity figures exclude consumer expenditure. Industry level greenhouse gas emissions intensity calculations cannot be summed to reach total greenhouse gas intensity because it is calculated as a ratio.

Notes for: Fuel use, energy consumption and greenhouse gas emissions

1. Transformation losses are the differences between the energy content of the input and output product arising from the transformation of one energy product to another.

2. Distribution losses are losses of energy product during transmission (for example losses of electricity in the grid) between the supplier and the user of the energy.

3. Policies include UK National Air Quality Strategy Directive on Integrated Pollution Prevention and Control (IPPC) (Directive 2008/1/EC); Directive on industrial emissions 2010/75/EU (IED); UK Pollution Prevention and Control (PPC) regulations; Large combustion plant directive (LCPD, 2001/80/EC); Limiting sulphur emissions from the combustion of certain liquid fuels by controlling the sulphur contents of certain liquid fuels (Directive 1999/32/EC); Annex VI of the MARPOL agreement for ship emissions, augmented by the Sulphur Content of Marine Fuels Directive 2005/33/EC and the introduction of Sulphur Emission Control Areas.

6 . Material flow accounts

Main points

- In 2015, the UK consumed 450.0 million tonnes of material.

- Extraction of raw materials in the UK has decreased by 35% since 1992, falling from 691.1 million tonnes to 450.0 million tonnes in 2015; however, there has been a rise in raw material extraction in the last 2 consecutive years.

- Domestic material consumption (DMC) per person has continued to fall since 2000.

Things you need to know about this section

Data on minerals and crops are not available for 2015, so estimates have been used in the calculations of the material flow accounts.

Provisional figures for 2014 have been revised and data gaps addressed, resulting in an increase in domestic extraction in the previously reported 2014 figures.

What are material flow accounts?

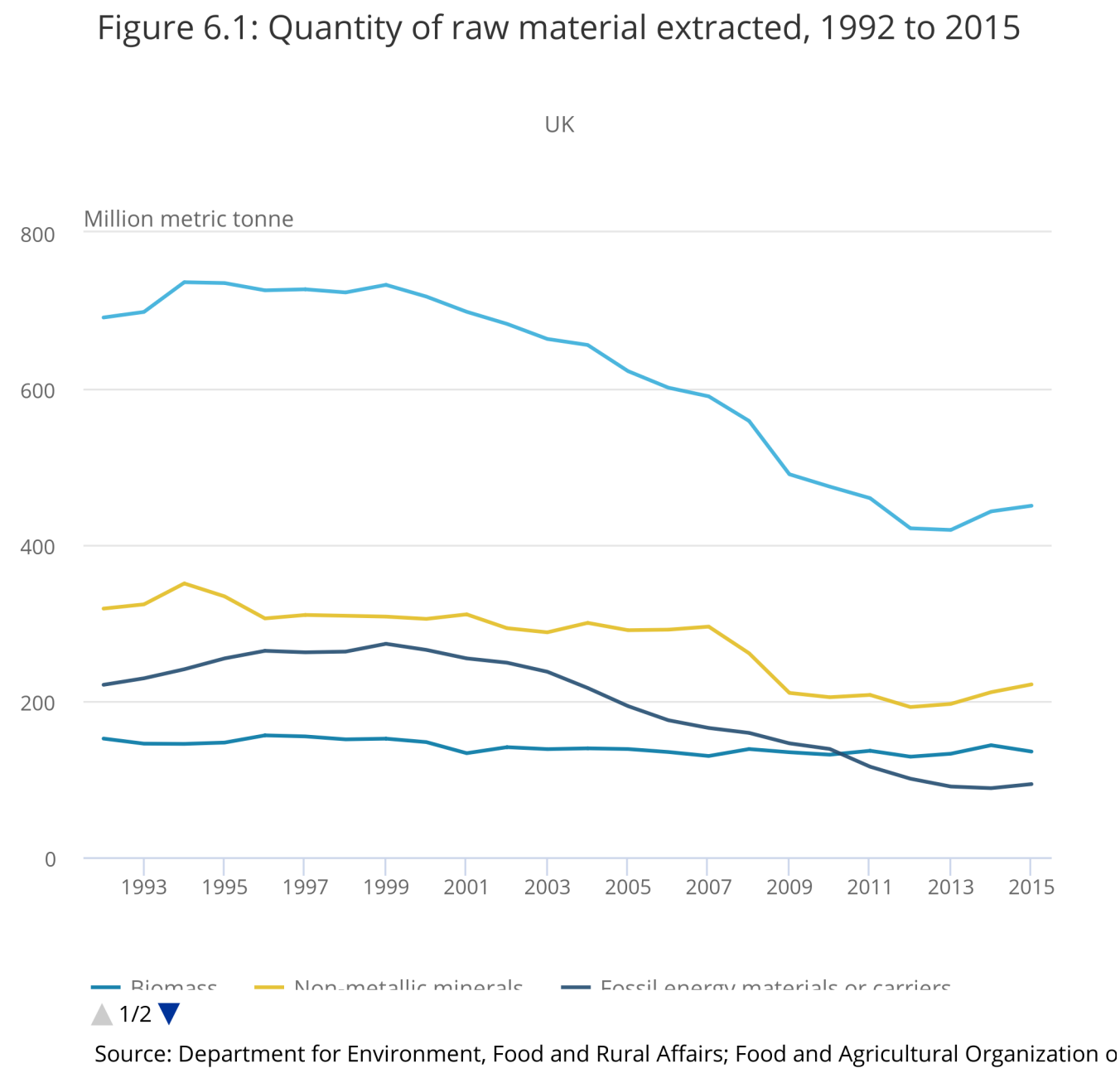
Material flow accounts estimate the physical flow of materials through our economy. This includes the amount of raw materials extracted within the UK (domestic extraction) and the import and export of materials. This information is used to calculate indicators showing the quantity of materials that are available for use and that are consumed within the economy. It also helps to understand resource productivity. For example, they shed light on the depletion of natural resources and seek to promote a sustainable and more resource-efficient economy.

Total domestic extraction rises for second year in a row

Total domestic extraction was 450.0 metric tonnes in 2015, a 1.6% increase on 2014. This was the second year in a row there has been an increase in total domestic extraction, reversing a previous downward trend. This rise is due largely to an increase in the extraction of non-metallic minerals (Figure 6.1). However, domestic extraction per person remained stable at 6.9 tonnes.

Figure 6.1: Quantity of raw material extracted, 1992 to 2015

UK



Source: Department for Environment, Food and Rural Affairs; Food and Agricultural Organization of the United Nations; Eurostat; Kentish Cobnuts Association; British Geological Survey

Notes:

1. Metal ores are not included on the chart as the quantity extracted is small.

2. Estimated data for crops based on the Eurostat method of estimation due to unavailable 2015 data source.

This increase in total domestic extraction accompanied a fall in imports of materials of 6.2%. Imports per person fell from 4.6 tonnes in 2014 to 4.3 tonnes in 2015. Exports saw a smaller fall between years of 0.9%. This equated to 2.3 tonnes per person, down from 2.4 tonnes in 2014 (Figure 6.2). Imports and exports can fluctuate year-on-year and in general there has been an increase in imports and decrease in exports since 2000.

Consumption of materials declined by over a fifth since 2000

Direct material input (DMI) (domestic extraction plus imports) measures the total amount of materials that are available for use in the economy.

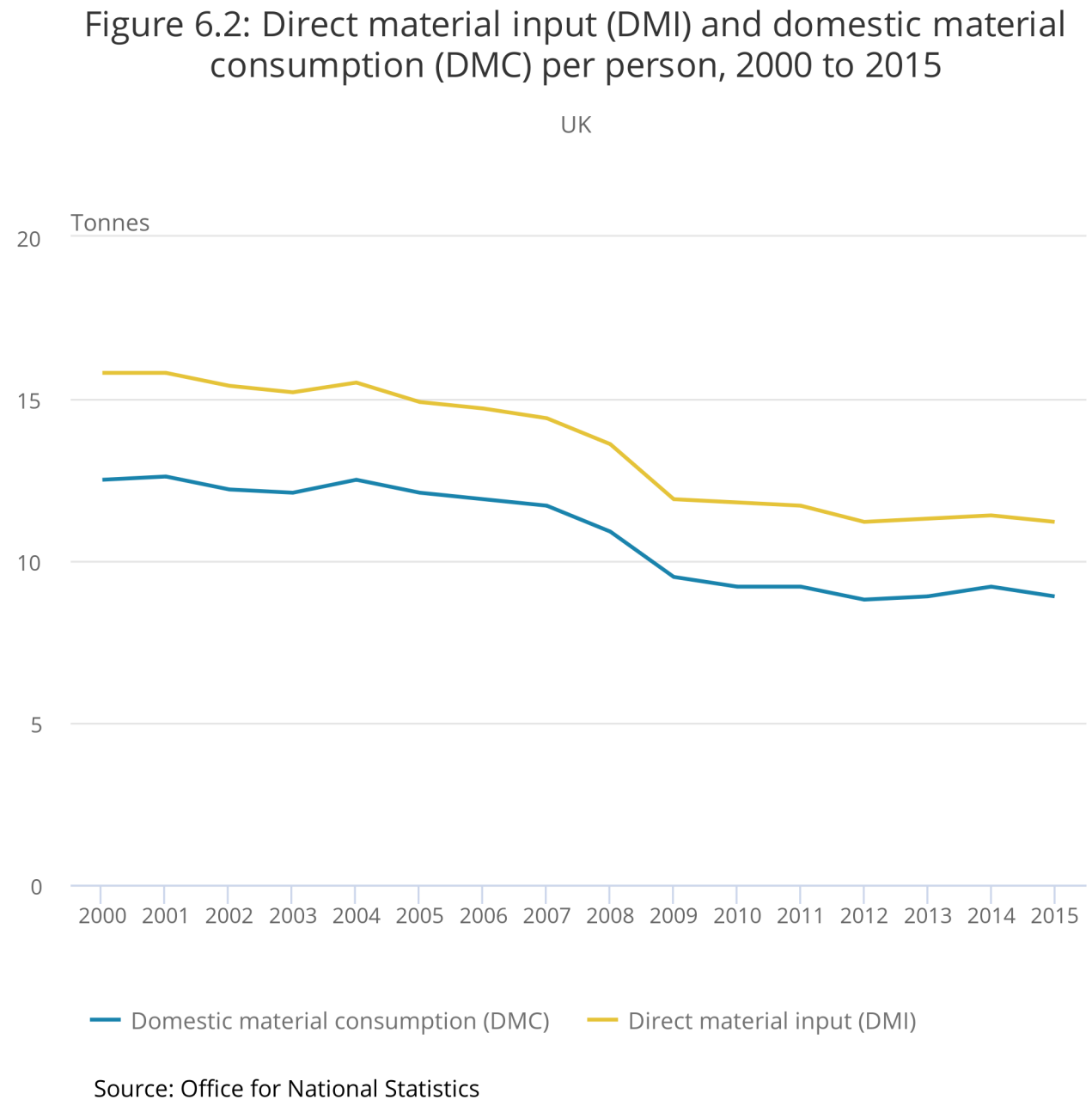
Domestic material consumption (DMC) (domestic extraction plus imports minus exports) measures the amount of materials used in the economy and is calculated by subtracting exports from DMI.

In 2015, the UK consumed 576.3 million tonnes of material. Non-metallic minerals, such as sand and gravel, accounted for 40% of this, followed by biomass (30%), fossil fuels (28%) and metal ores and other products (2%).

Between 2000 and 2015, DMI and DMC, on a per person basis, both decreased by 29% (Figure 6.2). DMI represented 15.8 tonnes per person in 2000 but declined to 11.2 tonnes per person in 2015. DMC decreased from 12.5 tonnes per person in 2000 to 8.9 tonnes per person in 2015.

Figure 6.2: Direct material input (DMI) and domestic material consumption (DMC) per person, 2000 to 2015

UK



Source: Office for National Statistics

Further information is available in the “Material flows” dataset.

7 . Environmental taxes

Main points

- Environmental taxes in the UK generated £47.6 billion in 2016, which was 7.2% of all revenue from taxes and social contributions.
- Income generation from environmental taxes has risen by 97.3% in real terms between 1997 and 2016 but has remained relatively stable when considered as a percentage of gross domestic product (GDP) (2.6% in 2016).
- Households paid on average £747 in environmental taxes in 2014.

Things you need to know about this section

Environmental taxes are designed to promote environmentally positive behaviour, reduce damaging effects on the environment and generate revenue that can potentially be used to promote further environmental protection. Data on UK environmental tax revenue are available for the years 1997 through to 2016.

For environmental taxes, data are broken down by NACE[1] activities. NACE is the European grouping for economic activity and categories are comparable to the Standard Industrial Classifications (SICs) reported elsewhere in this release.

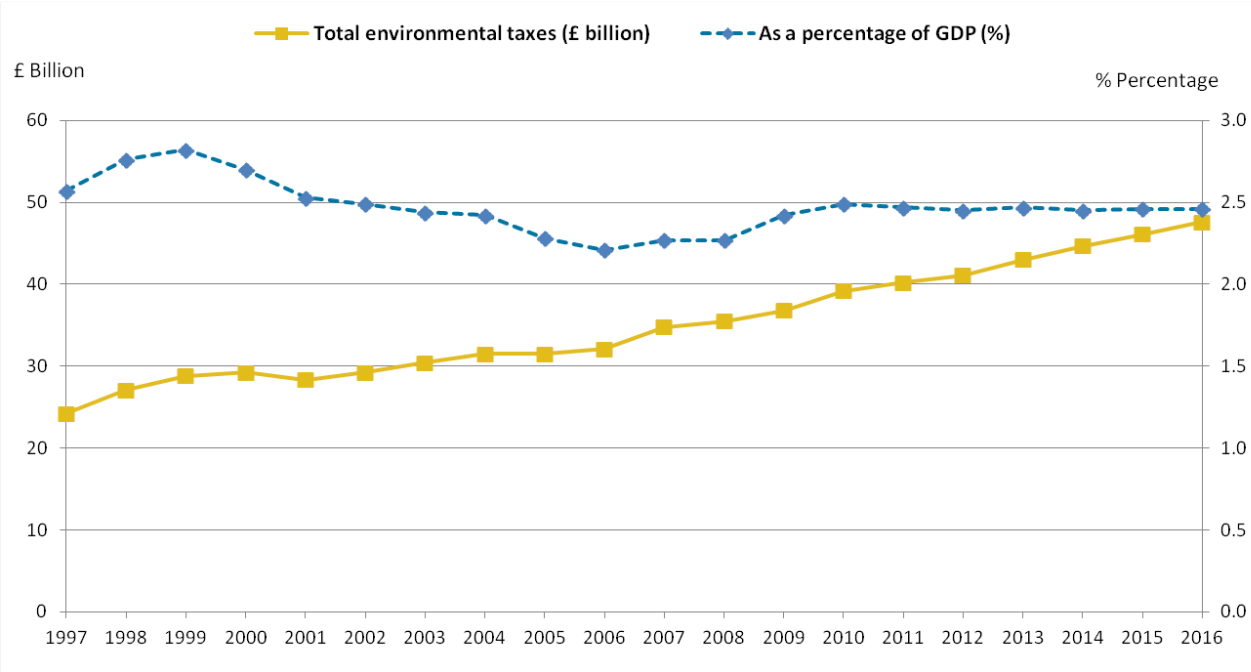
Environmental tax revenue broadly stable as a percentage of GDP

In 2016, revenue from environmentally-related taxes stood at £47.6 billion, equivalent to 2.5% of the UK's gross domestic product (GDP). Between 1997 and 2016, environmental taxes as a share of GDP have remained at a broadly consistent level of between 2.0% and 3.0% (Figure 7.1).

In 2016, environmental tax revenue was 7.2% of total taxes and social contributions (TSC). After peaking at 8.6% of TSC in 1998, environmental taxes generally fell as a percentage of TSC to reach 6.5% in 2006. In 2009, as a possible result of the fall in other government revenue following the economic downturn, the share of TSC-comprised environmental taxes rose to 7.5% and has remained relatively constant ever since.

Figure 7.1: Environmental tax revenue, as a percentage of GDP and total environmental taxes, 1997 to 2016

UK



Revenue from environmental taxes has almost doubled between 1997 and 2016

UK government revenue from environmentally-related taxes has increased by, on average, 3.7% (in current prices) per year since 1997 (Figure 7.1). Total revenue in 2016 (£47.6 billion) was almost double the revenue collected in 1997 (£24.2 billion). This increase is due largely to increases in revenue from hydrocarbon oils, which include taxes on transport fuels. There was a jump in revenue between 1997 and 1998 when the fuel escalator increased from 5% to 6%. Air Passenger Duty also doubled at this time, to £10 for flights to Europe and £20 for flights to the rest of the world.

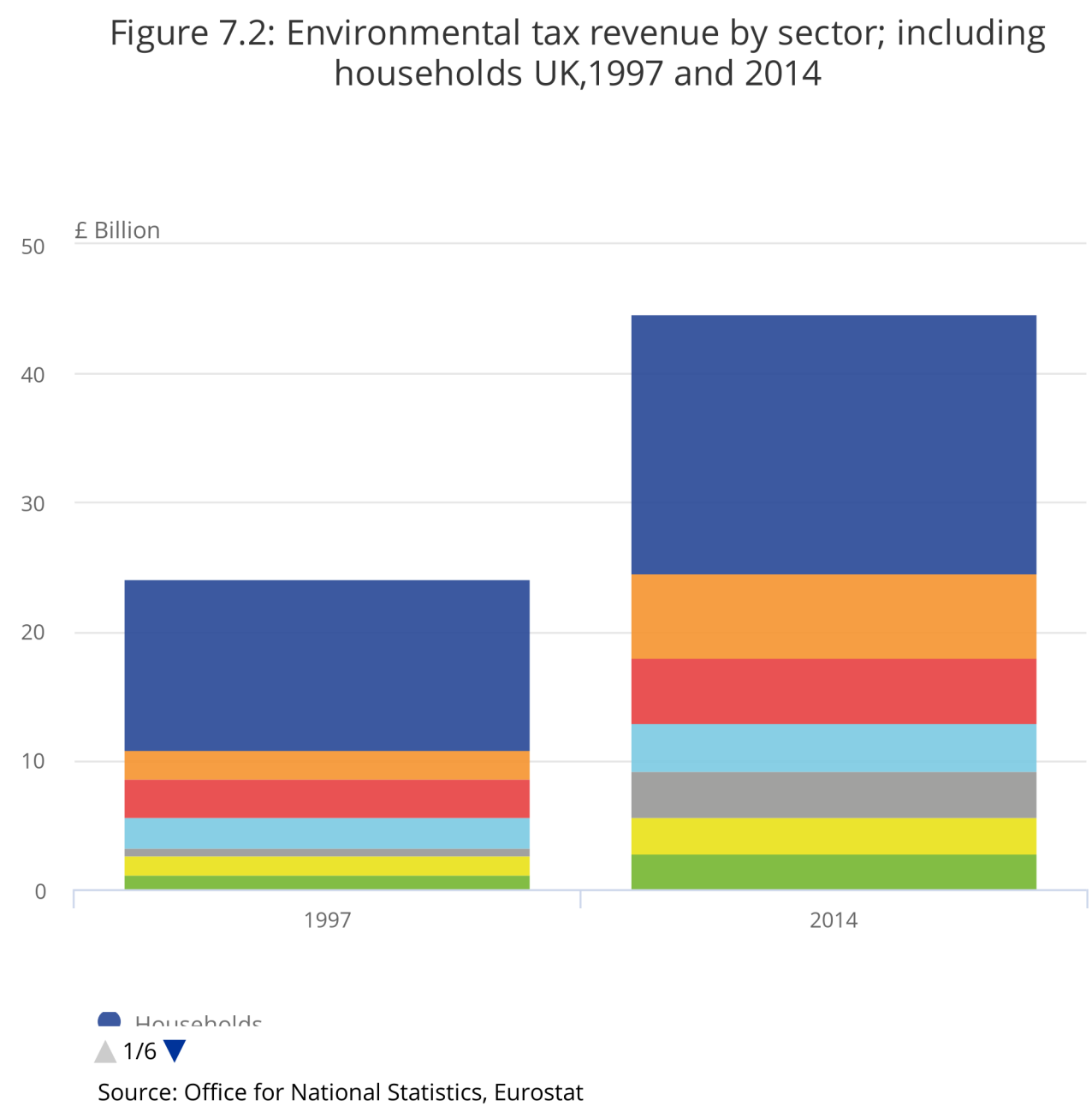
The drop in revenue in 2001 was also due to changes to taxes relating to road transport. Following national protests, fuel for road vehicles was reduced, resulting in a £1.0 billion fall in revenue. During the same year there was also a change from taxing based on engine size to fuel type and carbon dioxide emissions, further reducing tax revenue. This change in policy is reflected in statistics on fuel use (see section 5: Fuel use, energy consumption and greenhouse gas emissions) , which show a switch from petrol to DERV (fuel used in diesel-engine road vehicles).

Households account for almost half of all revenue from environmental taxes

Almost half of environmental taxes revenue was attributed to households in 2014 (Figure 7.2). In total, households paid just under £20 billion in environmental taxes, equating to £747 per household. The majority (64%) of this related to energy taxes, which includes taxes on transport fuels.

The remaining revenue was produced by a selection of industries, predominantly services (14.9%) and manufacturing (11.3%).

Figure 7.2: Environmental tax revenue by sector; including households UK,1997 and 2014



Source: Office for National Statistics, Eurostat

Notes:

1. For full list of NACE industries see reference table "Environmental Taxes" Table 4.

Further information is available in the “Environmental taxes” dataset.

Notes for: Environmental taxes

1. NACE categories include: Agriculture, forestry and fishing; Mining and quarrying; Manufacturing; Electricity, gas, steam and air conditioning supply; Construction; Wholesale and retail trade, repair of motor vehicles and motorcycles; Transportation and storage; Water supply, sewerage, waste management and remediation activities and Services (except wholesale and retail trade, transportation and storage). Although not classified as “industries” Households are also included in Eurostat environmental taxes reporting.

8 . Environmental goods and service sector

Main points

- The environmental goods and services sector (EGSS) contributed an estimated £29.0 billion to the UK economy in terms of value added in 2014 (1.6% of gross domestic product (GDP)).
- Water and waste management industries contributed 56.9% (£34.7 billion) of the total EGSS output in 2014.

Things you need to know about this section

- A detailed publication on the Environmental Goods and Services Sector was published in January 2017; only headline figures are presented here.
- The methodologies used to develop the EGSS estimates remain under development; the estimates reported in this publication are experimental and should be interpreted in this context. Estimates for 2015 are expected to be published at the start of 2018.

Environmental goods and services sector accounted for 1.6% of GDP in 2014

The environmental goods and services sector (EGSS) statistics indicate how much of the economy is engaged in producing goods and services for environmental protection purposes and resources management activities, relative to the wider economy and provide information on the number of jobs created. They also consider how the EGSS is changing through time.

In 2014, the EGSS contributed an estimated £29.0 billion to the UK economy (Table 8.1) in terms of gross value added (GVA) (1.6% of GDP), an output of £61.1 billion and 373,500 full-time equivalent (FTE) jobs.

Table 8.1: Estimated output, value added and employment for the EGSS, 2010 to 2014

	Total output (£ billion)	Total GVA (£ billion)	Total employment (FTE)
2010	51.5	26.1	336,900
2011	53.8	27.7	345,800
2012	57.0	28.4	352,500
2013	59.9	28.9	387,500
2014	61.1	29.0	373,500

Source: Office for National Statistics

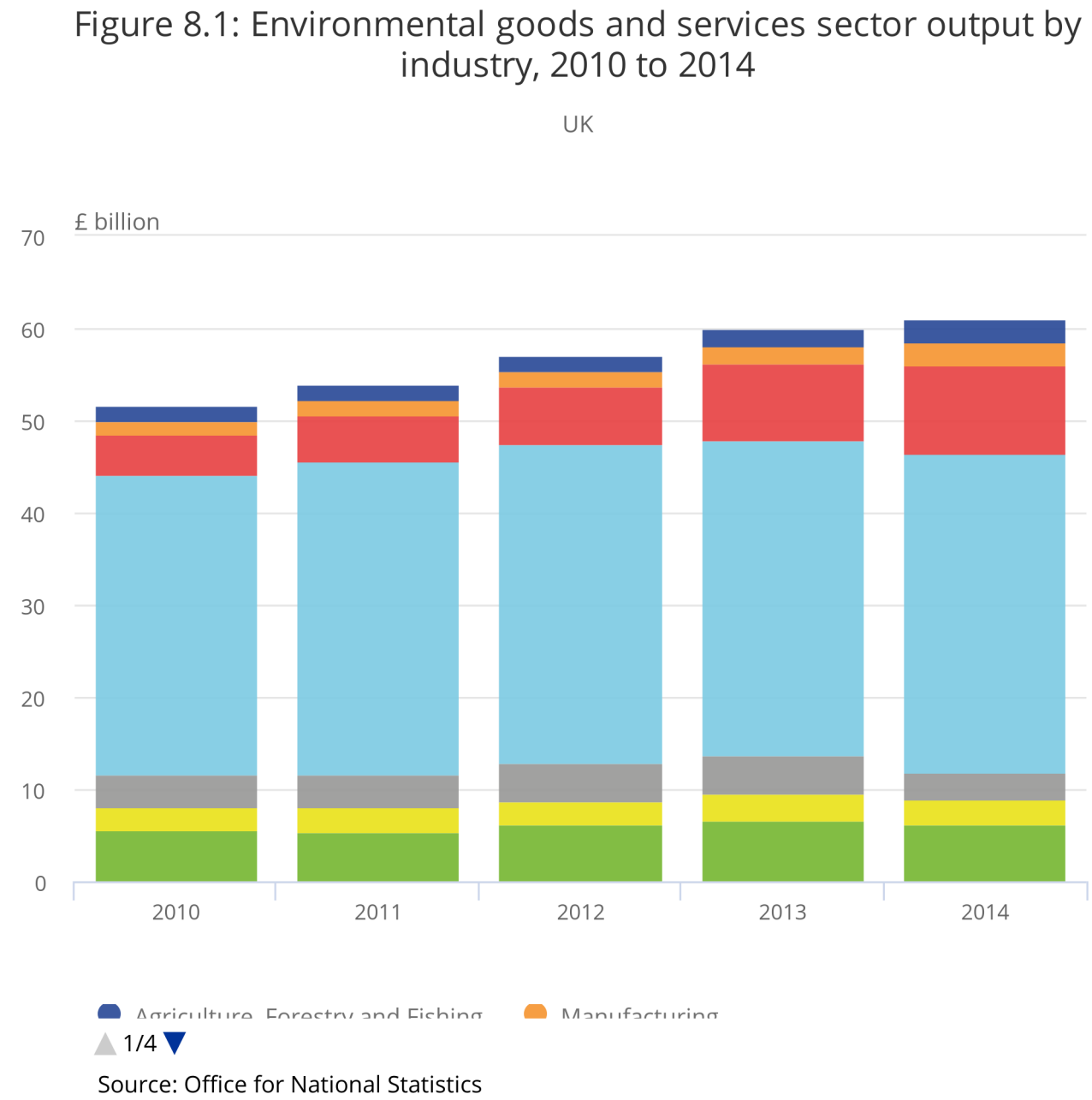
Table notes:

1. The decrease in employment between 2013 and 2014 is predominantly due to five of the EGSS activities, the method to calculate these is currently under review (see the detailed EGSS publication for more information). If these five activities are removed from the total then employment shows a growth rate of 2.5% between 2013 and 2014.

The water and waste management industries contributed the largest amount of output to the EGSS with £34.7 billion in 2014, accounting for 57% of total EGSS output (Figure 8.1). This industry includes sewerage, as well as the collection and treatment of water and waste. Electricity, gas, steam and air conditioning supply produced the second highest output, with £9.5 billion in 2014 (16%) and accounted for the majority of the increase observed between 2010 and 2014. This industry includes production of renewable energy activities, which doubled between 2010 and 2014.

Figure 8.1: Environmental goods and services sector output by industry, 2010 to 2014

UK



Source: Office for National Statistics

9 . Environmental protection expenditure

Main points

- In 2015, UK government spent an estimated £14.7 billion on environmental protection.
- Waste management activities accounted for 76.9% of government environmental protection expenditure (EPE).
- EPE as a percentage of gross domestic product (GDP) was 0.8% in 2015, unchanged since 2012.
- Industries invested the most in equipment to clean waste water produced by their activities – defined as end-of pipe capex.

Things you need to know about this section

Information on environmental protection expenditure (EPE) by industry comes from an annual EPE survey. Data are collected on capital expenditure ("integrated" and "end of pipe") and internal operating expenditure (opex) – that is, the operating costs of a company's own environmental protection equipment and services. Data are not available on external opex – payments to others for environmental protection services (including waste disposal and sewage treatment) so it is not possible to calculate total spend on environmental protection activities for 2015.

Previous statistics on EPE by industry are not comparable due to changes in methodology, (see Section 13: Quality and methodology).

As 2015 is the first year of data collection using new methodology, results may be subject to revisions once additional years of data become available.

It is important to note that a low level of environmental protection expenditure does not necessarily mean that a country or industry is not effectively protecting the environment. This is because if a country has already invested in equipment to reduce or clean waste products then the cost maintenance of these will be small compared with the cost of introducing new equipment. In addition, if a business invests in equipment that is integrated in the production process then only the additional cost over and above an equivalent less-environmentally friendly product is included. In contrast, the total cost is included for equipment that is not integrated into the production process, that is, is the last step. This means if a country has more focus on reducing and cleaning pollution as part of their production process then their expenditure is likely to be less than other countries that do not change their production processes and just focus on cleaning the pollution produced by them.

Environmental protection expenditure accounts for 1.8% of government spending in 2015

UK government data for environmental protection expenditure (EPE) comes from the annual expenditure of general government, which is broken down by the Classification of Functions of Government (COFOG).

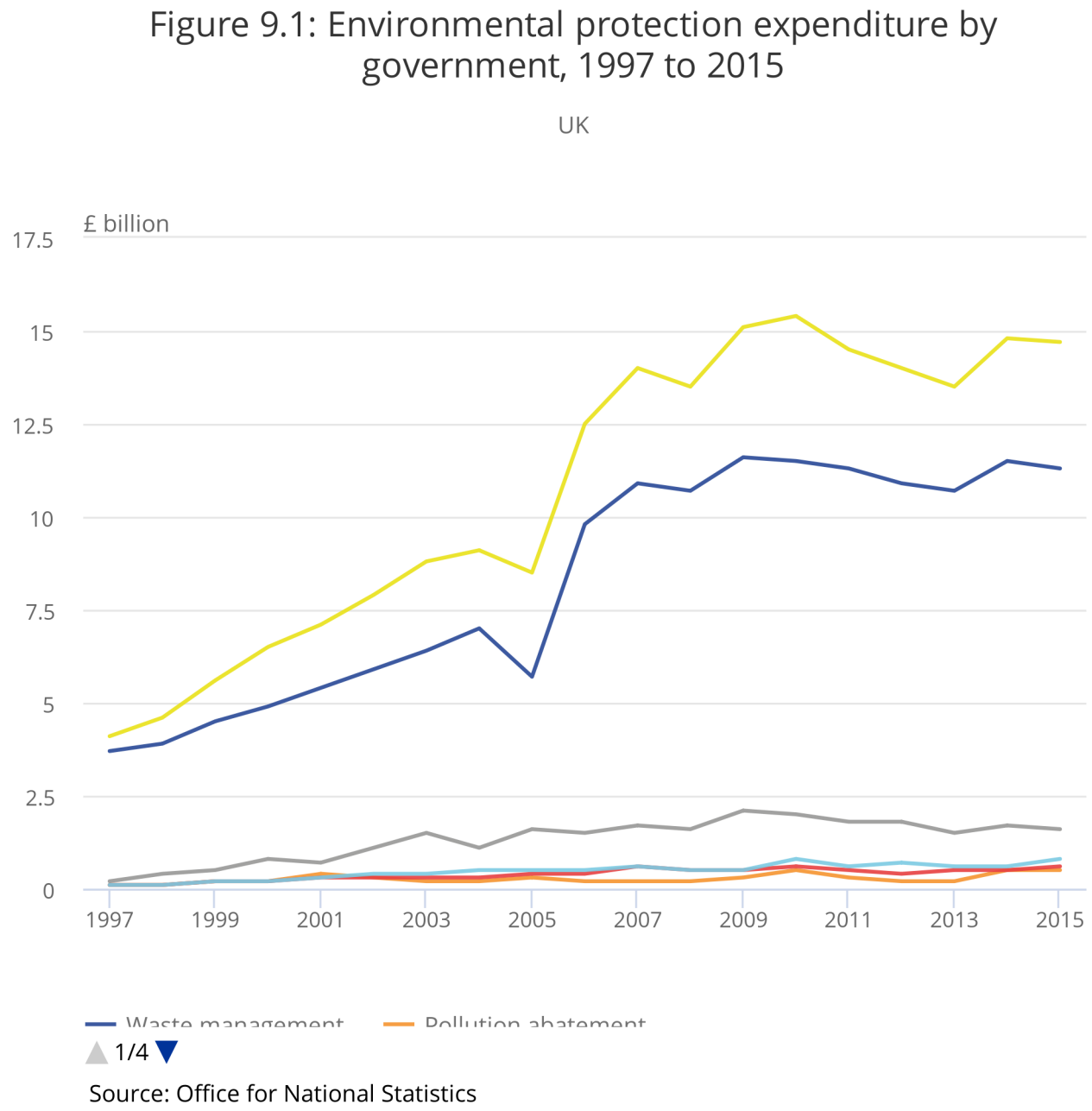
EPE by the UK government more than tripled between 1990 and 2015, from £4.1 billion to £14.7 billion (Figure 9.1). EPE as a percentage of total government spending has been relatively consistent since 2006, ranging from 1.2% to 2.2%. It stood at 1.8% in 2015.

The rise and subsequent fall of EPE by the UK government between 2004 and 2006 was a result of British Nuclear Fuels plc (BNFL), which was classified as a public corporation, being decommissioned and transferring some nuclear reactors to the Nuclear Decommissioning Authority (classified as central government).

Since 1997, waste management activities accounted for the highest overall expenditure of all EPE activities. In 2015, the government spent 76.9% of total EPE on waste management. This aligns with the environmental goods and services sector in which the largest output was generated by the water and waste management industry.

Figure 9.1: Environmental protection expenditure by government, 1997 to 2015

UK

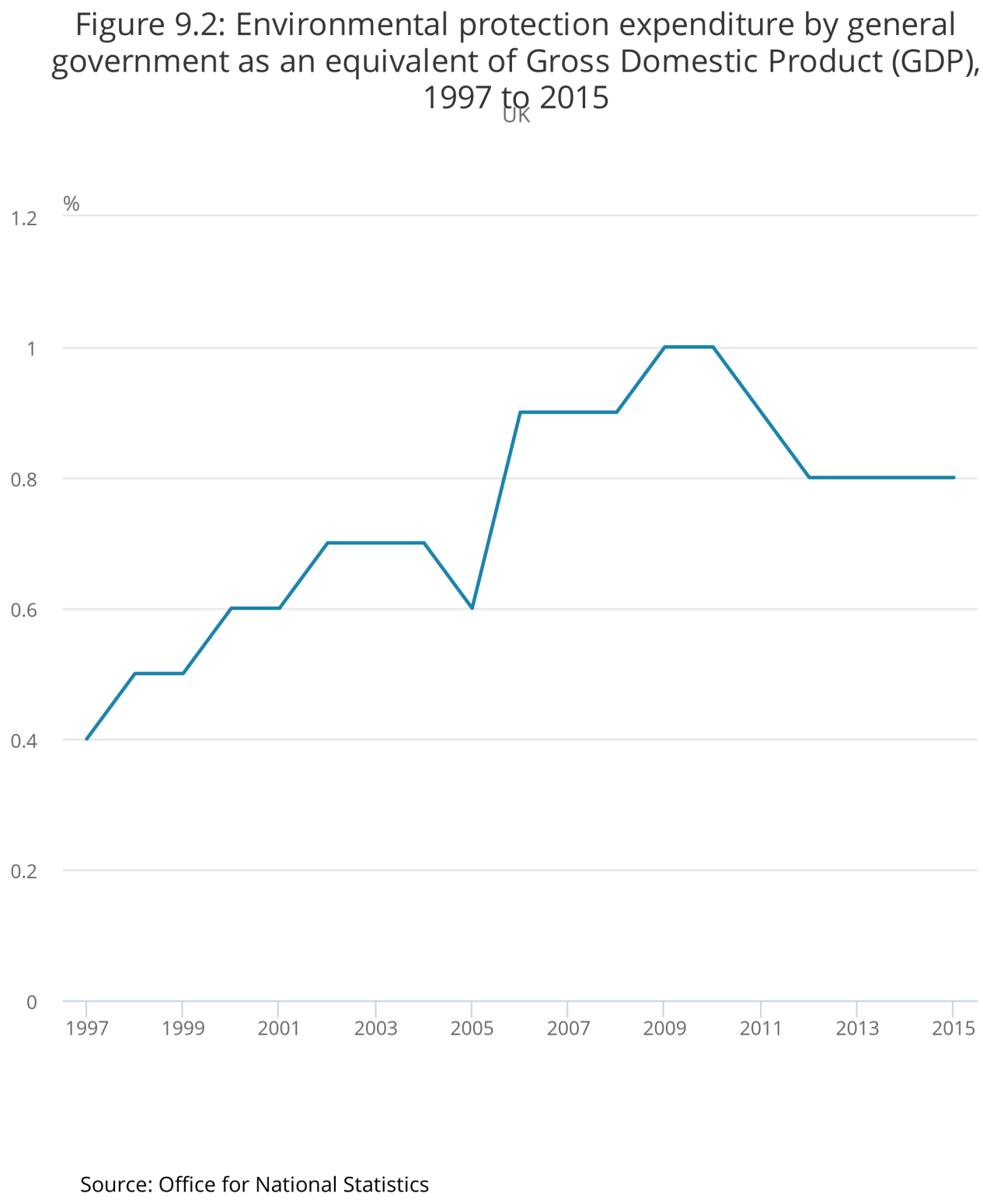


Source: Office for National Statistics

EPE as a percentage of GDP showed a generally positive trend between 1997 and 2010 (Figure 9.2). The decrease and subsequent increase between 2004 and 2006 is attributed to the decommissioning of BNFL as explained previously. Between 2008 and 2009, EPE increased as GDP fell as a result of the economic downturn. The largest fall in EPE as a percentage of GDP occurred between 2010 and 2012, driven by a fall in EPE (mainly waste) and an increase in GDP. Since 2012, EPE as a percentage of GDP has remained unchanged at 0.8%.

Figure 9.2: Environmental protection expenditure by general government as an equivalent of Gross Domestic Product (GDP), 1997 to 2015

UK



Source: Office for National Statistics

Industries spent £1.2 billion on purchasing end of pipe equipment in 2015

In 2015, UK businesses spent an estimated £2.4 billion on in-house environmental protection operating expenditure (opex) and an estimated £1.6 billion on environmental protection capital expenditure (capex) (Table 9.1).

End of pipe capex accounted for 74.4% of total environmental protection capex. This reflects that companies spend more on buying equipment to clean the waste and emissions from their processes than on equipment to replace less energy-efficient parts of the production process. However, it is important to remember that for end of pipe equipment the total cost is included, while for integrated equipment only the additional cost over and above an equivalent less-environmentally friendly product is included. If there is no cheaper alternative and the environmental benefits are the same across all options then this will not be captured because the company has not made a conscious decision to buy the equipment specifically for the environmental protection aspect.

Table 9.1: Summary of environmental protection expenditure, 2015

£ million

	Opex	Capex	
	In-house	End of pipe	Integrated
Total	2,415,200	1,159,600	398,000
Protection of ambient air and climate	294,500	143,500	122,300
Wastewater management	665,900	635,600	32,700
Waste management	936,300	58,300	16,600
Other	518,500	322,200	226,500

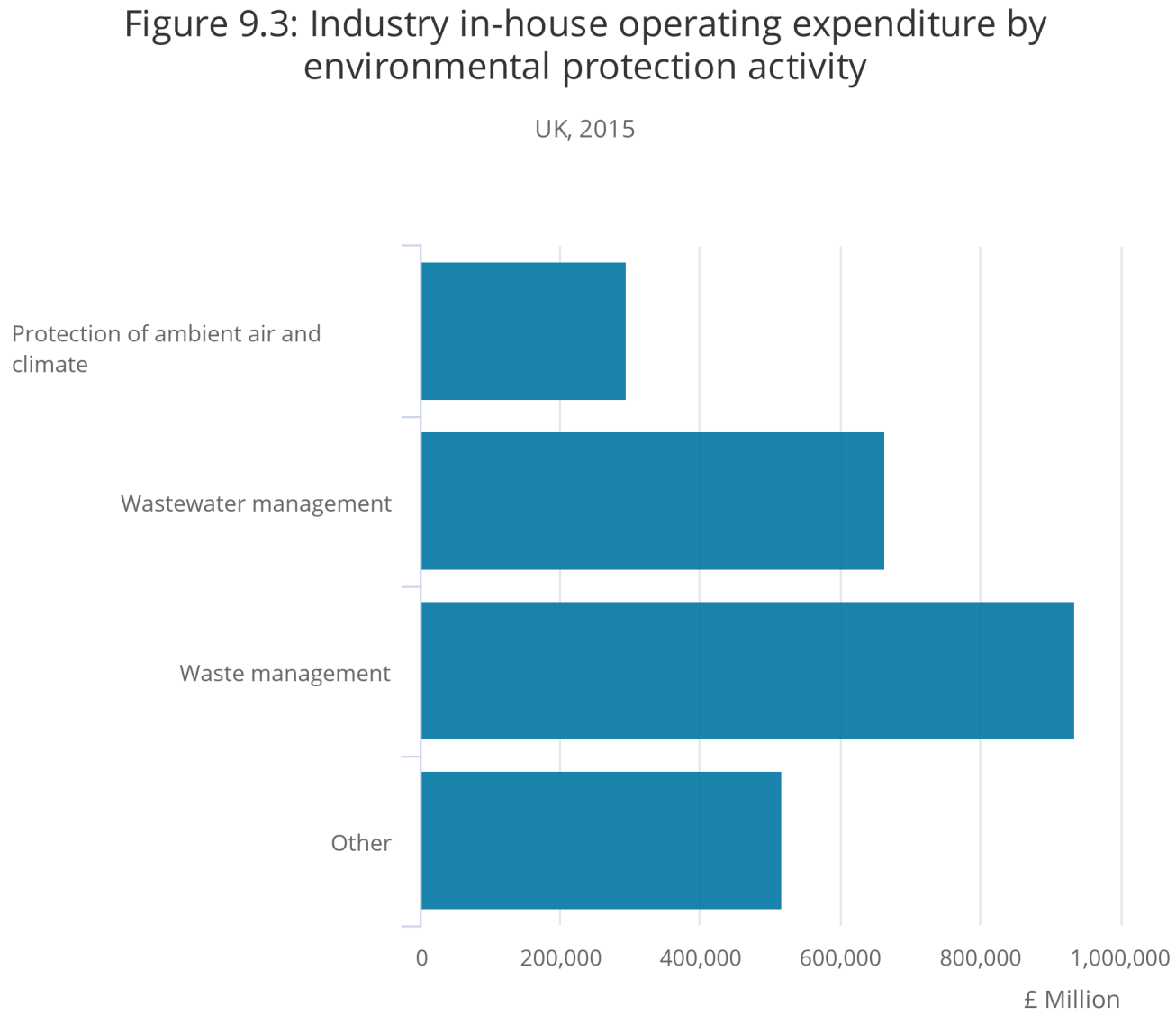
Source: Office for National Statistics

In 2015, the largest amount of in-house opex was spent in the waste management domain whilst the largest amount of capex was in the wastewater management domain. These were also the areas that the government spent the most on environmental protection (see previous).

In 2015, the largest amount of in-house operating expenditure was attributed to the waste management domain (£0.9 billion) whilst the smallest was observed in the protection of ambient air and climate domain (£0.3 billion) (Figure 9.3). This could potentially reflect that more companies undertake activities to reduce the amount of solid waste being produced or that these activities are more costly than other pollution reduction and remediation activities.

Figure 9.3: Industry in-house operating expenditure by environmental protection activity

UK, 2015



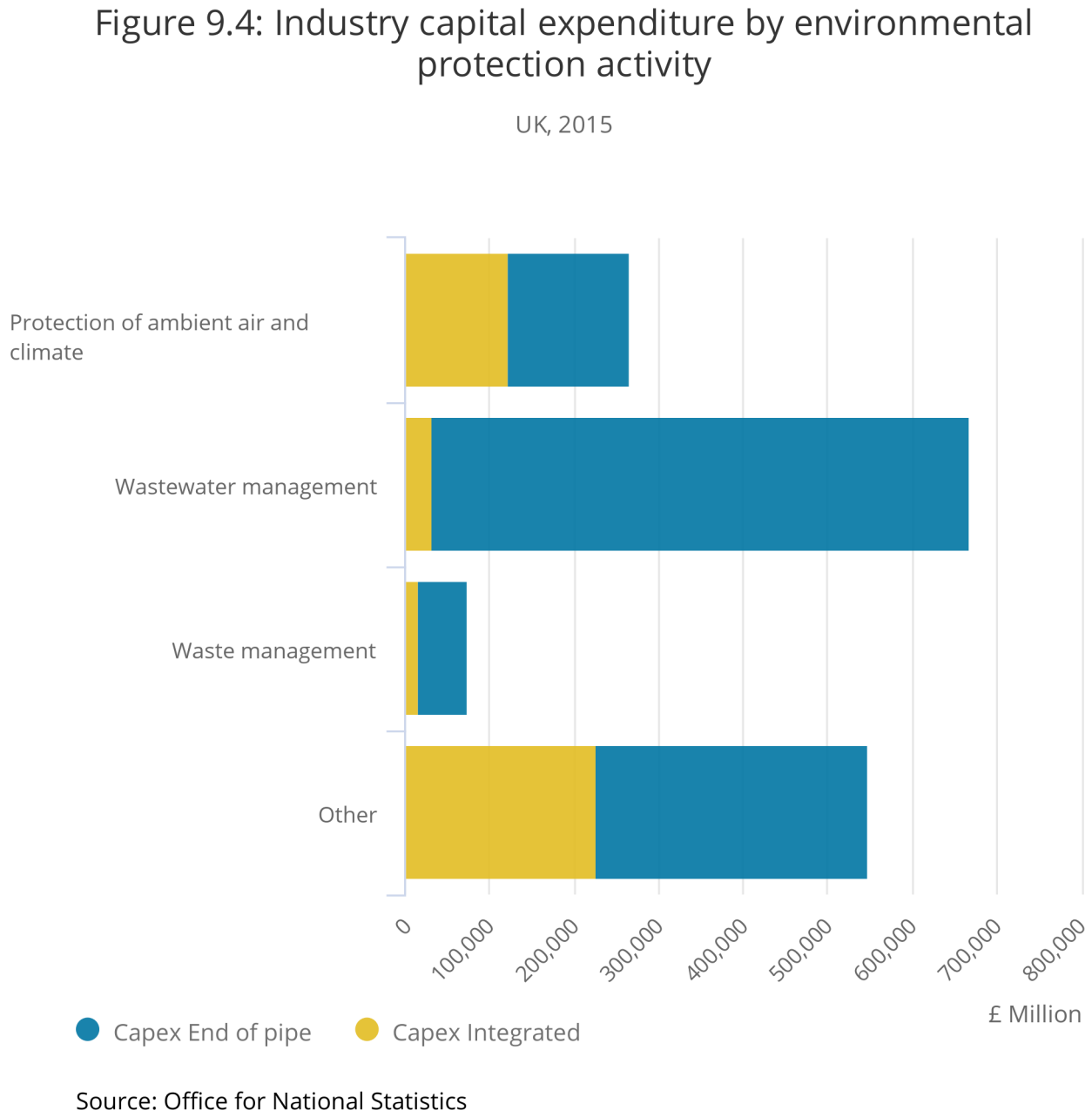
Source: Office for National Statistics

Source: Office for National Statistics

The ratio of end of pipe to integrated capex varies across the environmental protection domains (Figure 9.4), which reflects the different measures that are taken to tackle each type of pollution. In order to reduce and clean air pollution, industries spend roughly the same amount on the additional cost of integrated environmentally-friendly equipment as they do on end of pipe equipment. In contrast, the majority of expenditure on wastewater management activities is on end of pipe equipment. This suggests that industries focus on cleaning the wastewater produced rather than reducing the amount of wastewater generated during the production process.

Figure 9.4: Industry capital expenditure by environmental protection activity

UK, 2015



Source: Office for National Statistics

10 . Low carbon and renewable energy (LCRE) economy

Main points

- Low carbon and renewable energy (LCRE) activities generated £43.1 billion turnover in 2015, accounting for 1.3% of total UK non-financial turnover.
- In 2015, an estimated 234,000 full-time equivalent (FTE) employees were working directly in LCRE activities in the UK, accounting for 1.0% of total UK non-financial employees.
- Sectors active in renewable energy generated £14.9 billion in turnover in 2015; this was 35% of all LCRE turnover.

Things you need to know about this section

The Low Carbon and Renewable Energy (LCRE) Economy Survey was designed to provide greater detail on the low carbon and renewable energy economy in the UK. The survey was dispatched for the second time in 2016, for the reporting year 2015, to a sample of around 14,000 businesses. The survey collects information on turnover, imports, exports, employment, as well as acquisitions and disposals of capital assets, for 17 low carbon sectors. For analysis purposes, these 17[1] sectors can then be aggregated into six groups[2]. All results are broken down to UK country level.

A detailed publication on the LCRE economy was published in April 2017.

Turnover for the LCRE economy was £43.1 billion in 2015

In 2015, businesses active in the low carbon and renewable energy (LCRE) economy generated £43.1 billion in turnover (Table 10.1), accounting for 1.3% of total UK non-financial turnover. LCRE activities resulted in the employment of an estimated 234,000 full-time equivalent[3] (FTE) employees in 2015; around 1 in 100 of total UK FTE employees in the non-financial business economy.

Table 10.1: low carbon and renewable energy economy, UK, 2014 and 2015

		Percentage of total UK non-financial business economy activity
	2015	2015
Turnover (£ thousands)	43,087,000	1.3
Employees (FTE)	234,000	1.0
Imports (£ thousands)	4,688,000	0.9
Exports (£ thousands)	4,113,500	0.9
Acquisitions (£ thousands)	5,658,000	3.1
Disposals (£ thousands)	405,000	1.3

Source: Office for National Statistics, Low Carbon and Renewable Energy Economy Survey

Table notes:

1. All variables are rounded to the nearest £500,000 apart from number of employees which is rounded to the nearest 500.

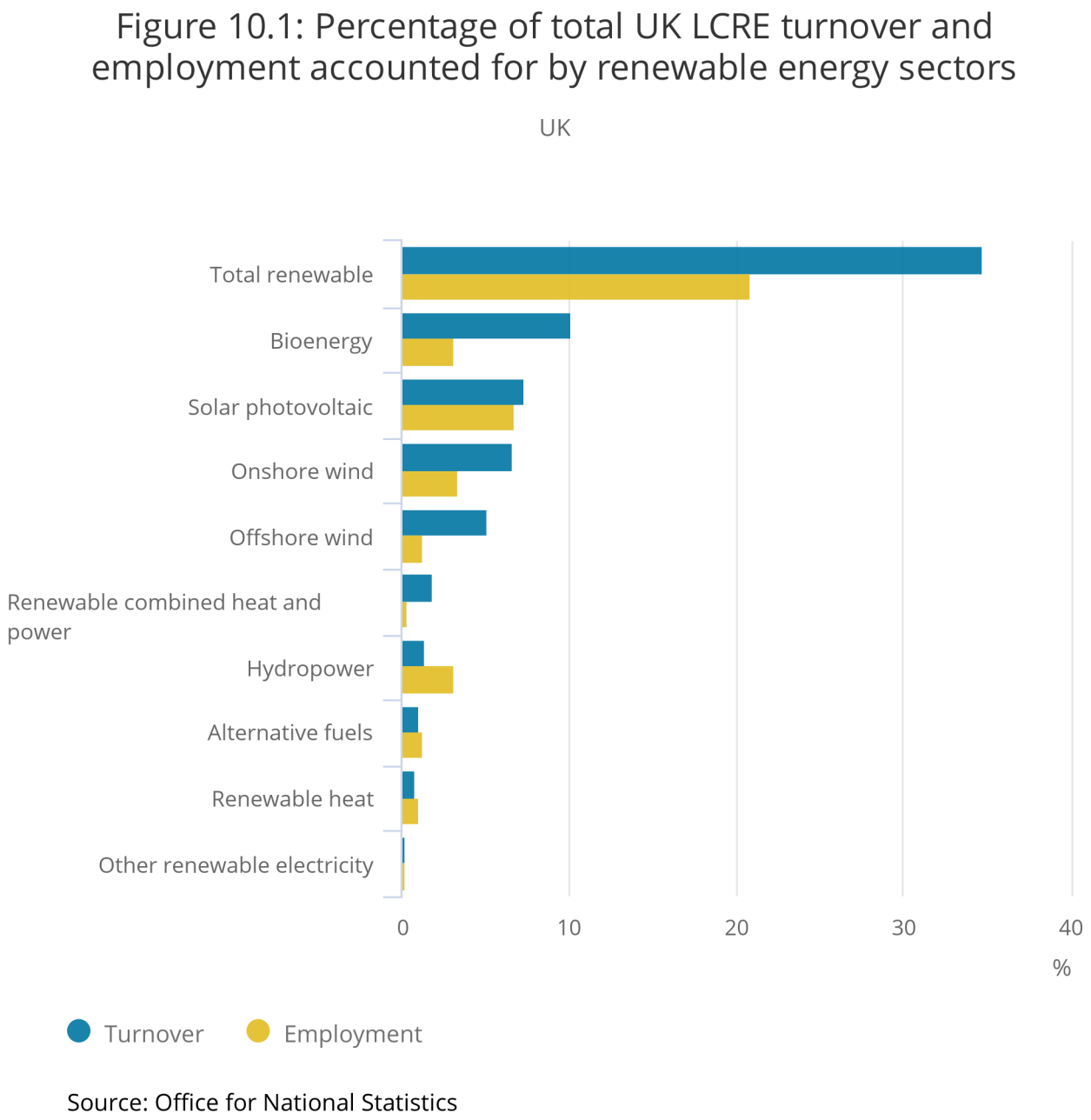
2. The disposals estimate should be treated with caution due to the high coefficient of variation.

3. Estimates for 2014 can be found in the detailed publication.

Nine of the LCRE sectors[4] can be grouped together to represent renewable energy activities. In 2015, the renewable energy group accounted for around a third of all UK LCRE turnover, with the bioenergy sector accounting for the greatest proportion of this. The renewable energy sectors contributed around one in five of UK LCRE FTE employees. The proportion is lower than for turnover, reflecting the fact that electricity and heat production does not require as many employees as other low carbon activities, such as the manufacture of energy-efficient products.

Figure 10.1: Percentage of total UK LCRE turnover and employment accounted for by renewable energy sectors

UK



Source: Office for National Statistics

Notes for: Low carbon and renewable energy (LCRE) economy

1. The low carbon sectors are: offshore wind, onshore wind, solar photovoltaic, hydropower, other renewable energy, bioenergy, alternative fuels, renewable heat, renewable combined heat and power, energy efficient lighting, energy efficient products, energy monitoring, saving or control systems, low carbon financial and advisory services, low emission vehicles and infrastructure, carbon capture and storage, nuclear power, fuel cells and energy storage systems.

2. The low carbon groups are: low carbon electricity, low carbon heat, energy from waste and biomass, energy efficient products, low carbon servicers and low emission vehicles (which combines the low emission vehicles and infrastructure with fuel cells and energy storage sectors).

3. One FTE employee may be thought of as one person per year. For example, a person who normally spends 30% of their time on LCRE activities would be considered as a 0.3 FTE employee.

4. Bioenergy, solar photovoltaic, onshore wind, offshore wind, renewable combined heat and power, hydropower, alternative fuels, renewable heat, and other renewable electricity.

11 . What’s changed in this release

Revised data

Since the publication of UK Environmental Accounts 2016, there have been revisions and updates to some of the accounts. These are largely due to revisions in data sources and improvements to methodology.

Atmospheric emissions and energy consumption

Revisions to atmospheric emissions and energy data are primarily due to:

- revisions to the core energy statistics presented in the Digest of UK Energy Statistics (DUKES)
- revisions to the inventory methodologies and emission factors based on new evidence
- revisions to other datasets or to the additional details used to generate the detailed industry splits from the core UK inventory categories (for example, sharing road transport among the industry sectors)
- the adoption of methodologies to reflect inclusion of newly compiled sources

Updates, particularly those involving revised methodologies, may affect the whole time series, so estimates of emissions for a given year may differ from estimates of emissions for the same year reported previously.

Material flows

Revisions to the material flows accounts have led to large revisions to the previously reported 2014 figures. This is primarily due to more up-to-date data becoming available.

12 . Links to other related statistics

Natural capital accounts

Natural capital is simply the natural wealth of the UK, for example, woodland, mountains or natural coastal areas. Natural capital accounts monitor any changes to these natural assets and the benefits we receive from them over time.

The Department for Environment, Food and Rural Affairs and Office for National Statistics (Defra-ONS) have a project to develop natural capital accounts for the UK. Full details about the project can be found in the 2015 Natural Capital Accounting Project Roadmap. By 2020 it is envisaged the accounts will be part of the UK Environmental Accounts and integrated as far as possible.

Annually the ONS and Defra publish UK level accounts and more detailed habitat accounts for the eight board habitats:

- UK Habitat Ecosystem Accounts, to be published on 25 July 2017; this release will contain updated woodland, farmland and freshwater habitat accounts and improved estimates for valuing the role vegetation has in removing pollution from the atmosphere
- UK Natural Capital Accounts, to be published in November 2017; this release will contain monetary oil and gas estimates and timber estimates

For more information about natural capital accounting and to view all publications please visit the Natural Capital section of the ONS website. If you have any questions please contact us by emailing environment.accounts@ons.gov.uk.

UK energy data (territory basis)

UK energy data on a territory basis are published by the Department for Business, Energy and Industrial Strategy (BEIS). The energy bridging table shows the differences between the two estimates. Further information on the relationship between UK Environmental Accounts measures and those released by BEIS can be found in the energy bridging table and methodology article.

UK air emissions statistics (territory basis)

UK air emissions data on a territory basis, which are reported to the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Economic Commission for Europe (UNECE), are calculated by the Department for Business, Energy and Industrial Strategy (BEIS). These include emissions that occur within the UK's territorial boundaries. Tables that illustrate the differences between UK Environmental Accounts estimates and UNFCCC and UNECE estimates can be found in the Emissions bridging table. A further explanation of the difference is also available.

Waste statistics

Each year a large amount of resources are lost to waste, both in terms of materials and energy. Waste is defined by the European statistical office (Eurostat) as "any substance or object which the holder disposes of or is required to dispose of". The latest statistics on UK waste generation and recycling are available in UK Digest of waste and resource statistics.

European figures

European data are available on a range of environmental accounts topics from Eurostat.

13 . Quality and methodology

The following Quality and Methodology Information reports contain important information on:

- the strengths and limitations of the data and how it compares with related data
- uses and users of the data
- how the output was created
- the quality of the output including the accuracy of the data

Environmental Accounts on Environmental Taxes Quality and Methodology Information

Environmental Accounts on Air Emissions Quality and Methodology Information

Environmental Accounts on Material Flows Quality and Methodology Information

Environmental Accounts on Energy Quality and Methodology Information

Definitions

Oil and gas accounts

Table 13.1: Definitions of oil and gas reserves and resources

Deposit Type	Definition
Discovered - Proven reserve	Virtually certain to be technically and commercially producible i.e. have a better than 90% chance of being produced
Discovered - Probable reserve	Not yet proven, but have a more than 50% chance of being produced
Possible reserves	Cannot be regarded as probable, but which are estimated to have a significant – but less than 50% – chance of being technically and commercially producible
Contingent resources	Significant discoveries where development plans are under discussion. Includes future planned developments where development plans are under discussion that have not been approved, and "Potential Additional Resources" (PARS) which are discovered resources that are not currently technically or commercially producible.
Undiscovered resources	Provide a broad indication of the level of oil resources which are expected to exist. However, they are subject to higher levels of uncertainty than reserves and PAR's.

Source: Office for National Statistics

Oil is defined as both oil and the liquids that can be obtained from gas fields. Shale oil is not included in these estimates.

Gas estimates include gas expected to be available for sale from dry gas fields, gas condensate fields, oil fields with associated gas and a small amount from coal bed methane projects. Shale gas is not included in these estimates. These reserves include onshore and offshore discoveries but not flared gas or gas consumed in production operations.

The expected level of discovered reserves is the sum of proven and probable reserves.

Fuel use, energy consumption and greenhouse gas emissions

Fuel use refers to the consumption of combustible fuels. It includes fuels used for non-energy purposes, such as to produce chemicals or other fuels, but excludes combustible renewable and waste fuels [1].

Energy consumption is defined as the use of energy for power generation, industrial processes and heating and transport. Unlike fuel use, energy consumption in the UK Environmental Accounts includes other sources of energy that are not from combustible fuels (such as nuclear and primary renewable electricity).

In this release, "direct use of energy" refers to the energy content of fuel for energy at the point of use, allocated to the original purchasers and consumers of fuels. Whereas, for "reallocated use of energy" the losses incurred during transformation[2] and distribution[3] are allocated to the final consumer of the energy rather than incorporating it all in the electricity generation industry.

Greenhouse gas emissions include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydro-fluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3). These gases are widely believed to contribute to global warming and climate change. The potential of each greenhouse gas to cause global warming is assessed in relation to a given weight of CO2 so all greenhouse gas emissions are measured as carbon dioxide equivalents (CO2e).

Acid rain precursors (ARP) include sulphur dioxide (SO2), nitrogen oxide (NOX) and ammonia (NH3). For comparability, all figures relating to ARPs are weighted according to their acidifying potential, and presented as sulphur dioxide equivalents (SO2e).

Material flows

In Eurostat's Economy-Wide Material Flow Accounts Compilation Guide 2013 a distinction is made between "used" and "unused" domestic extraction. "Used" refers to an input for use in any economy (for example, where a material acquires the status of a product) and "unused" flows refer to materials that are extracted from the environment without the intention of using them. Only domestically extracted items that are "used" are included within the UK's material flow accounts.

The residual biomass from primary crop harvest, such as straw and leaves, is often subject to further economic use. A large fraction of crop residues is used as bedding material in livestock husbandry, but may also be used as animal feed, for energy production, or as industrial raw material.

Fodder crops consist of beets, cabbage, maize and turnips for fodder, as well as hay and silage from grass.

The quantity of grazed biomass used is estimated according to demand for animal feed that cannot be met by fodder crops and the area of grazing land available.

The physical trade balance (imports minus exports) is defined in reverse to the monetary trade balance (exports minus imports). Physical estimates can differ quite significantly to monetary estimates.

Environmental taxes

An environmental tax is defined as a tax on a physical unit (for example, a litre of petrol or a passenger flight) that has a proven negative impact on the environment.

Environmental goods and services (EGSS)

The main variables in environmental goods and services, which give an indication of the relative economic size and contribution of the EGSS to the whole economy, are:

- output – the value of goods and services produced
- gross value added – output less intermediate consumption
- employment – measured in full-time equivalents; one full-time equivalent (FTE) employee may be thought of as one person per year, for example, a person who normally spends 30% of their time on an EGSS activity would be considered as 0.3 FTE employee

Environmental protection expenditure (EPE)

What is EPE?

Environmental protection expenditure (EPE) includes all activities and actions that have as their main purpose the prevention, reduction and elimination of pollution or any other degradation of the environment. Examples of EPE include sewerage, waste management, treatment of exhaust gases and protection of natural landscapes. The EPE accounts aim to assess the actual expenditure on environmental protection incurred by the total economy. Environmental protection activities are defined by the Classification of Environmental Protection Activity. Information is captured on the producers and users of environmental protection services from general government [4], non-profit institutions serving households, corporations and households.

Measuring environmental protection expenditure by industry

Information on environmental protection expenditure (EPE) by industry comes from an annual EPE survey. Prior to 2015, the EPE survey was commissioned by the Department for Environment, Food and Rural Affairs (Defra). Under Defra, data were collected in 1994 (pilot), 1997, and then annually between 1999 and 2013. Defra have published the results for these years. In 2016, the survey was migrated to the Office for National Statistics (ONS) and was despatched in September 2016 to collect data for 2015. As a result of the migration no data were collected for 2014.

Results presented in this bulletin are not comparable with previous data due to differences in the methodology between Defra and ONS[5]. As 2015 is the first year of data collection using the new methodology, results may be subject to revisions once additional years of data become available. ONS sampled around 3,000 businesses from four Standard Industrial Classification (SIC) sections: mining and quarrying (Section B), manufacturing (Section C), energy production[6] (Section D), and water supply (Section E36). The survey collected estimates for operating expenditure (opex) and capital expenditure (capex).

In 2015, the survey collected information on internal opex – that is, the operating costs of a company's own environmental protection equipment and services. However, information was not collected for external opex – payments to others for environmental protection services (including waste disposal and sewage treatment). Because of this is it is not possible to calculate total spend on environmental protection activities for 2015.

The 2015 survey captured both types of capex: "end of pipe" and "integrated". End of pipe capex is defined as expenditure on equipment used to treat, handle, measure or dispose of emissions and wastes outside of the production line or as the final step in the production process. Actions and activities that are beneficial to the environment and would have been taken irrespective of the environmental protection considerations are not included; for example, health and safety measures.

Integrated capex relates to new or adaptation of existing methods, technologies, processes, and equipment in order to prevent or reduce the amount of pollution created within the production process. For something to be considered as integrated capex for environmental protection, the company must have made a conscious decision to buy a more expensive product that would protect that environment more than a cheaper alternative. If the equipment is standard technology and there is not a cheaper, less environmentally beneficial alternative available to the company then the cost of this would not be included. Only the additional cost of the more expensive product compared with a cheaper, less environmentally friendly alternative is captured.

Low carbon and renewable energy

The low carbon economy is defined as economic activities that deliver goods and services that generate significantly lower emissions of greenhouse gases; predominantly carbon dioxide.

Notes for: Quality and methodology

1. These are excluded as they are not associated with a net loss of energy from the environment in the same way as fossil fuels.

2. Transformation losses are the differences between the energy content of the input and output product arising from the transformation of one energy product to another.

3. Distribution losses are losses of energy product during transmission (for example losses of electricity in the grid) between the supplier and the user of the energy.

4. General government consists of the central government and local government.

5. The 2013 EPE commissioned by Defra sampled 1,166 companies and had a response rate of 21% (247 returns). In contrast, the 2015 EPE survey despatched by ONS sampled around 3,000 businesses and achieved a response rate of 79% (2,390 returns). In 2013, only a sub-section of manufacturing divisions were sampled and the remainder were modelled, whilst in 2015 all were sampled. A number of questions were removed when the survey migrated to ONS, in addition the layout and wording of the form was changed.

6. Electricity, gas, steam and air conditioning supply.