# Annual Compendium of Scottish Energy Statistics

## May 2019 Update

Authors: Paul Matthews and Iain Scherr

Contact: energystatistics@gov.scot

Scottish Government
Riaghaltas na h-Alba
gov.scot

Published : 15/05/2019

# Contents


"WHOLE SYSTEM" VIEW OF ENERGY

RENEWABLE AND LOW CARBON SOLUTIONS

INNOVATIVE LOCAL ENERGY SYSTEMS

ENERGY EFFICIENCY

CONSUMER ENGAGEMENT AND PROTECTION

SYSTEM SECURITY AND FLEXIBILITY

OIL AND GAS INDUSTRY STRENGTHS

# Introduction - Scottish Energy Statistics

The Annual Compendium of Scottish Energy Statistics (ACSES) provides an overview of energy statistics for Scotland. It has been designed in line with the targets and priorities in the Scottish Energy Strategy. ACSES replaces the Energy In Scotland publication.

All statistics presented in the report are from published sources, including publications by the UK Department for Business, Energy & Industrial Strategy (BEIS) and the Scottish Government. All references in the publication are listed in the annex.

The data in this publication is subject to revision. As such, further resources on Scottish energy statistics are available, and are updated on a quarterly basis with the latest figures. They can be found here and include:

- The **Energy Statistics Database:** An Excel workbook with all key data on Scottish Energy updated on a quarterly basis. On each page, the spreadsheet icon in the top right corner is a clickable link to the database. The tab reference where the specific data is held is also included.

- The **Energy Statistics App** is an interactive online tool which presents the key data, including an interactive version of the energy balance
- **Quarterly bulletins** with Scottish specific figures from BEIS's Energy Trends publications
- **Renewable planning data** provides data on renewable electricity projects in Scotland that are operational and in the pipeline

If you would like to be updated about forthcoming statistical publications, please register your interest on the Scottish Government ScotStat website here.

We welcome any comments or suggestions regarding this publication. Please email any feedback to: energystatistics@gov.scot

# Introduction - Scottish Energy Strategy

In December 2017, the Scottish Government published the **Scottish Energy Strategy** which sets out the **Scottish Government's vision** for the **future energy system** in Scotland. It is guided by **three core principles**:

The Strategy is built around **six energy priorities** which will guide the decisions that the Scottish Government, working with partner organisations, needs to make over the coming decades. The priorities and a description of what they entail are as follows:

**RENEWABLE AND LOW CARBON SOLUTIONS**

*We will continue to champion and explore the potential of Scotland's huge renewable energy resource, and its ability to meet our local and national heat, transport and electricity needs – helping to achieve our ambitious emissions reduction targets.*

**INNOVATIVE LOCAL ENERGY SYSTEMS**

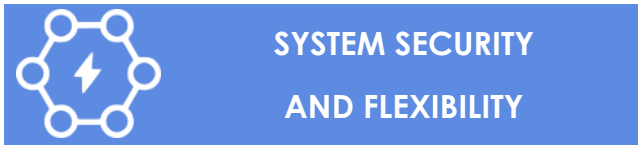
*We will empower our communities, supporting the development of innovative and integrated local energy systems and networks*

**ENERGY EFFICIENCY**

*We will continue to take direct and supporting actions to improve the use and management of energy in Scotland's homes, buildings, industrial processes and manufacturing*

# Introduction - Scottish Energy Strategy

*We will work hard to protect consumers from excessive or avoidable costs, and promote the benefits of smarter domestic energy applications and systems*




*Scotland should have the capacity, the connections, the flexibility and resilience necessary to maintain secure and reliable supplies of energy to all of our homes and businesses as our energy transition takes place*

*We will support investment, innovation and diversification across our oil and gas sector, working with industry to advance key priorities such as maximising the recovery of remaining resources, subsea engineering, decommissioning and carbon capture and storage – collaboratively addressing the challenges of today and preparing the sector and its workforce for a positive role in Scotland's future energy system.*

This document summarises the key statistics in each of these areas in order to track Scotland's progress.

# “Whole system” view of energy

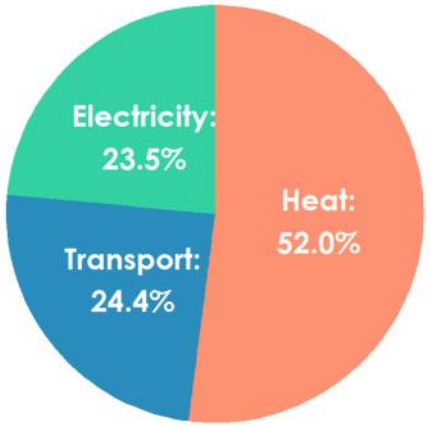
# What does the **"whole system" view** of the Scottish energy system mean?

'Energy consump by sector'

One of the core principles of the Energy Strategy is that it advocates a "whole-system" view of energy in Scotland. This means that the focus of the Scottish Government's energy policy covers **heat** and **transport**, alongside **electricity** and **energy efficiency** and the interactions between these sectors. It also considers the interaction of energy with the broader economy and society. **Heating** makes up **half** of Scotland's energy consumption and **transport** and **electricity** make up approximately a **quarter** each.

## Total final energy consumption by sector

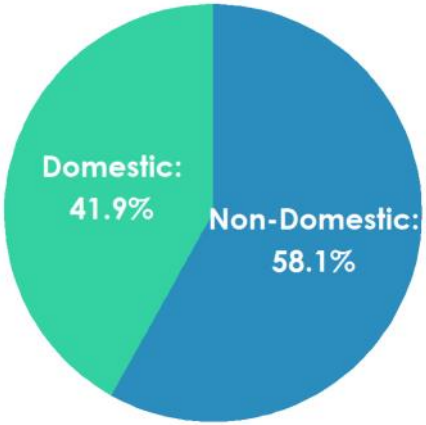
Scotland, 2016




Source: BEIS

## Total final energy consumption domestic and non-domestic

Scotland, 2016



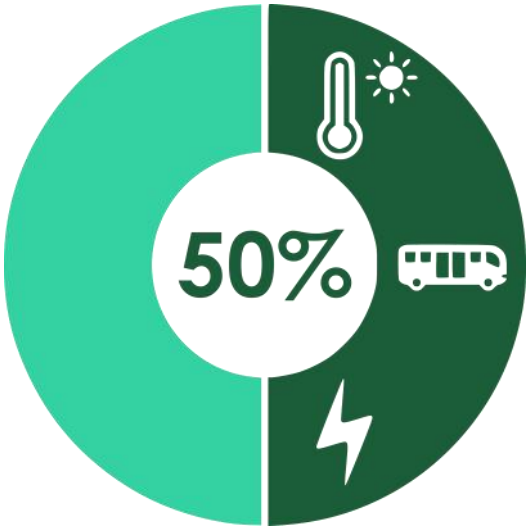

Source: BEIS

A whole-system view means that we should be considering all sectors including **domestic** and **non-domestic** (i.e. industrial and commercial) sectors. A breakdown by sector of non-transport energy consumption shows that **58.1%** of is accounted for by the **industrial** and **commercial** sectors, with **41.9%** consumed **domestically**.

Throughout this publication, the latest statistics for domestic and non-domestic sectors have been presented where possible.

# How do we **measure** Scotland's '**whole system**' energy **performance**?

In order to measure the performance of Scotland's energy system as a whole, the Energy Strategy identifies two whole-system **targets** to be achieved by 2030:




THE EQUIVALENT OF **50%** OF THE ENERGY FOR SCOTLAND'S HEAT, TRANSPORT AND ELECTRICITY CONSUMPTION TO BE SUPPLIED FROM RENEWABLE SOURCES

**Renewable energy:**

This is the amount of renewable energy generated in Scotland as a percentage of Scottish gross energy consumption. This includes renewable energy used for electricity, heat and transport. It is also one of Scotland's 81 indicators in the National Performance Framework.

AN INCREASE BY **30%** IN THE PRODUCTIVITY OF ENERGY USE ACROSS THE SCOTTISH ECONOMY

**Energy productivity:**

This puts the emphasis on curbing energy consumption while still growing the Scottish economy.

The keys to meeting these targets will be to continue to **grow Scotland's renewable capacity** and to **reduce energy consumption.**

The following section tracks progress towards these targets .

# How is Scotland performing in terms of **renewable energy**?

'Renewable energy target'

Scotland's renewable energy target is calculated by the sum of renewable electricity and heat generation and estimated biofuel use in transport in Scotland, divided by Scotland's gross electricity consumption, non-electrical heat demand and energy used for transport. Therefore, progress towards the target will come from **increasing renewable generation** and **reducing energy consumption**.

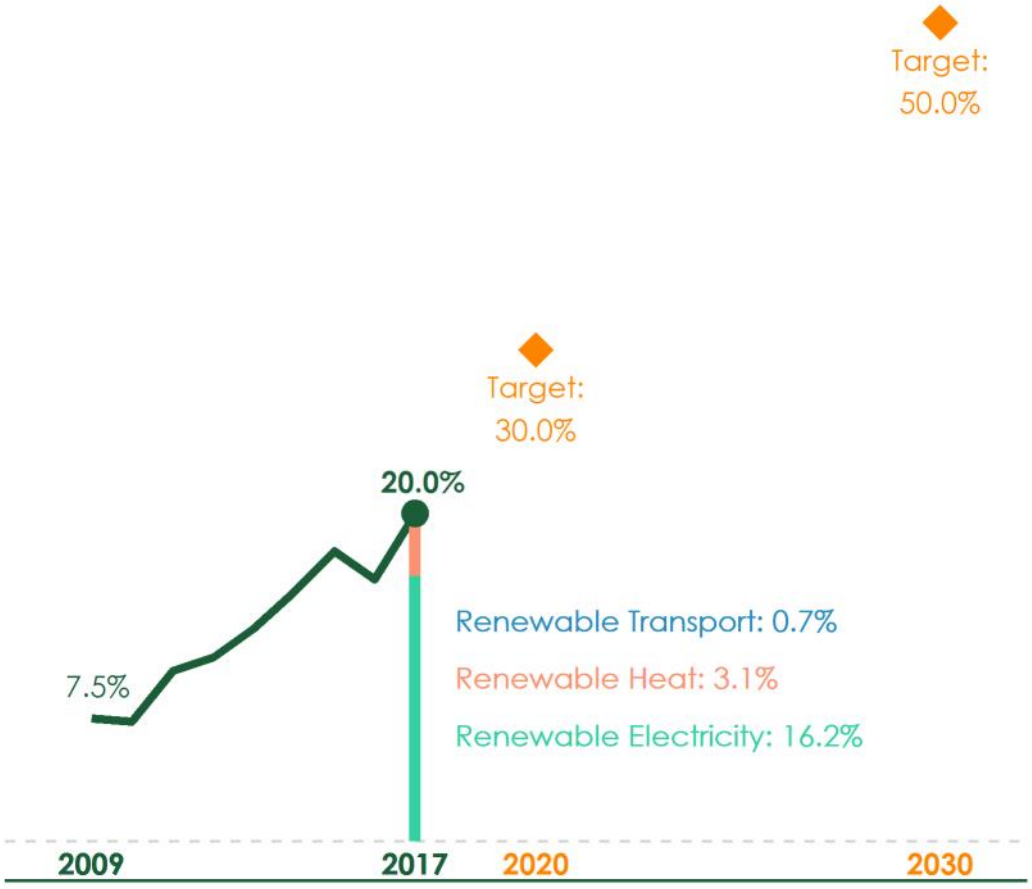
Provisional figures for **2017** indicate that **20.0%** of total Scottish energy consumption came from renewable sources; the highest level to date. It has **increased** from **16.0%** in **2016**. This is the largest single year increase on record (up by 6,420 GWh), driven by record years for both renewable electricity and heat generation. The reasons for these rises are an **increase** in **installed capacity** for renewable **electricity** and **heat** on 2016, up by 1.1 GW for electricity and 0.3 GW for heat.

The total amount of renewable energy generated in 2017 (**31,127 GWh**) is the equivalent of powering and heating approximately **1.75 million households** in Scotland, assuming average electricity and gas usage for households in Scotland.

Renewable **electricity** contributes to about four-fifths of the progress towards the overall renewable energy target, followed by renewable heat and transport.

## Share of renewable energy in gross final energy consumption

Scotland, 2009 - 2017



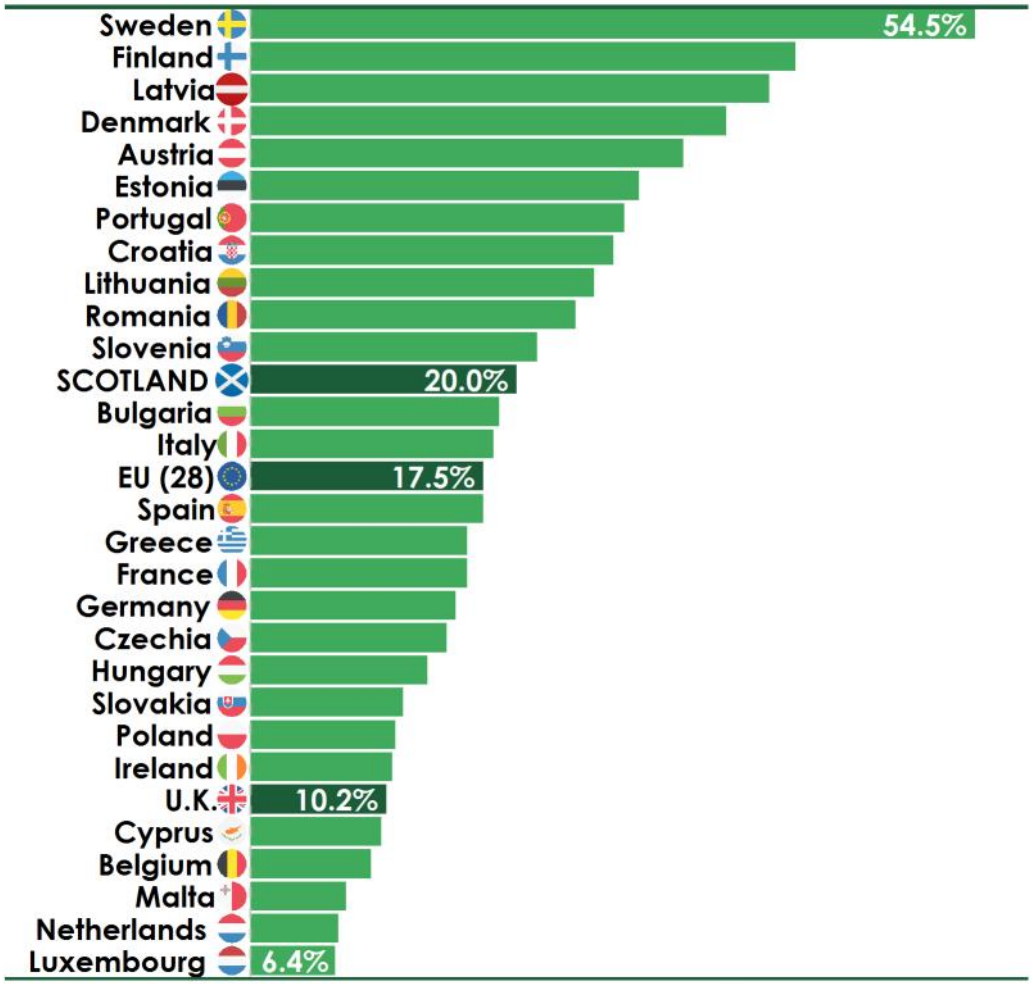

Source: BEIS, Energy Saving Trust, HMRC

# How does Scotland compare to **other countries** in terms of **renewable energy**?



## Share of renewable energy in gross final energy consumption across the EU

2017



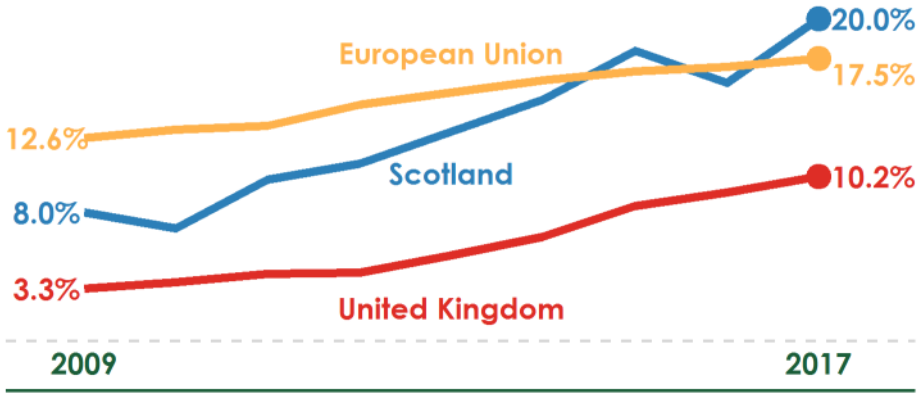

Source: Eurostat, BEIS

With **20.0%** of its energy consumption coming from renewable sources in **2017**, **Scotland** ranked **12th** compared to **EU countries** in terms of its share of renewable energy. This puts it **above** the **EU average** (**17.5%**), and **double** the **UK**'s proportion of renewable energy as a whole (**10.2%**).

Compared to **2009**, Scotland has had a **12.5 percentage point increase** in its share of renewable energy, **second** only in the **EU** to **Denmark** (15.8 percentage point increase).

## Trend of renewable energy share in gross final energy consumption

2009 - 2017




Source: Eurostat, BEIS

# How is Scotland performing in terms of **energy productivity**?



The new 2030 energy productivity target is a measure of the **combination** of **energy consumption** and the **output of the economy**. It is measured by the **gross value added** achieved in the economy from the **input of one gigawatt hour of energy**. Higher energy productivity means you get more economic activity for each unit of energy being used, in other words, squeezing more value added out of every unit of energy consumed across the economy.

The target is a **30% increase** in energy productivity by **2030** from a baseline of **2015**. This mirrors the improvement in energy productivity seen between **2005** and **2015** (energy productivity increased by **31.2%** in this period).

From 2015, however, initial progress has been slower. Provisional figures for **2017** estimate that energy productivity is **0.3%** above the 2015 baseline. This is an increase from **£0.954m GVA per GWh** consumed in **2015** to **£0.957m** in **2017**.

Between **2015** and **2017** there is an estimated **increase** of **1.5%** in **energy consumption**, mainly driven by a rise in **gas consumption** (**2.7%**). However, this is offset by the growth in the Scottish economy.

## Estimated change in energy productivity

Scotland, 2015 - 2017

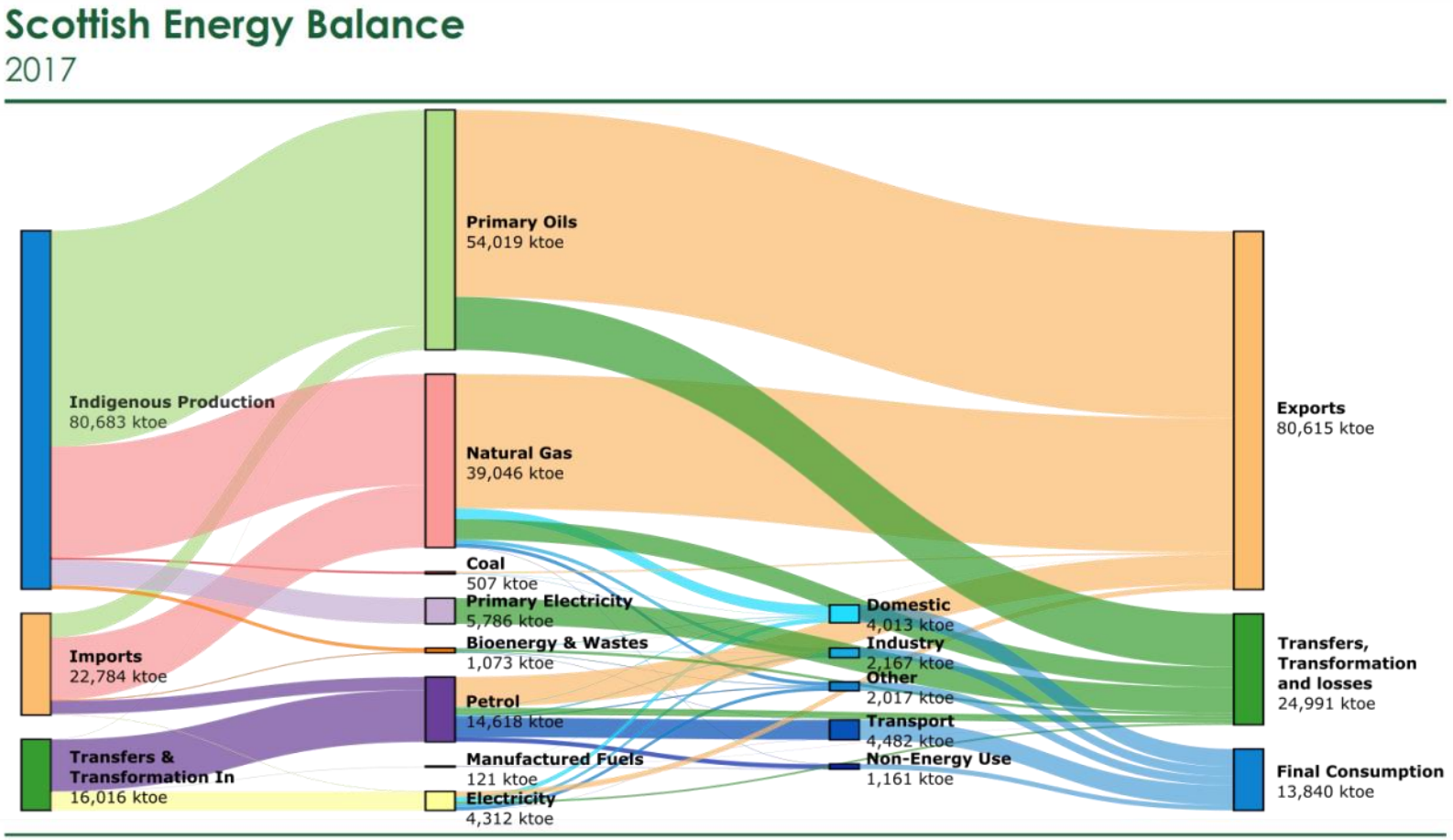
Source: BEIS, SG

# How can we **represent** all of **Scotland's energy system**?

'Energy balance'

We can represent Scotland's entire energy system as an **energy balance,** represented as a **Sankey** diagram. This provides a global picture of energy in Scotland, showing the flow from **inputs** (indigenous production and imports), to **transformation** to **outputs** (exports, losses and consumption). The widths of the bands are proportional to the size of the flow they represent.

It shows Scotland indigenously produces a vast amount of energy, and the majority of Scotland's energy is eventually exported.




Source: SG, BEIS, HMRC

An interactive version of the energy balance can be found in the [Energy Statistics App]

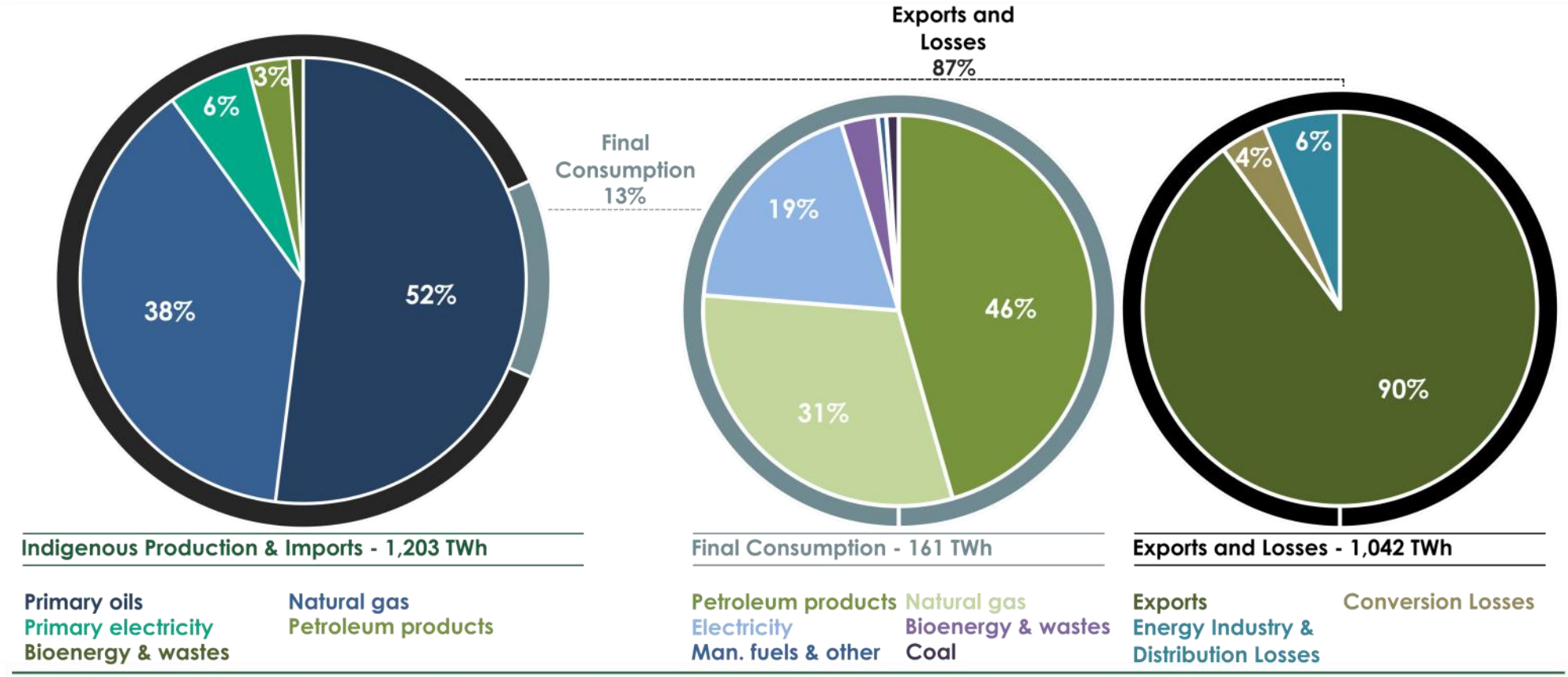
# What does **Scotland's energy balance** tell us?



In **2017**, Scotland's total input to the energy system, or primary energy, was **1,203 TWh**, of which **78.0%** of this comes from **indigenous production** and **22.0%** from **imports**. **Oil and gas** make up the vast majority (**92.8%**) of this.

## Simplified Energy Flow Chart

Scotland, 2017

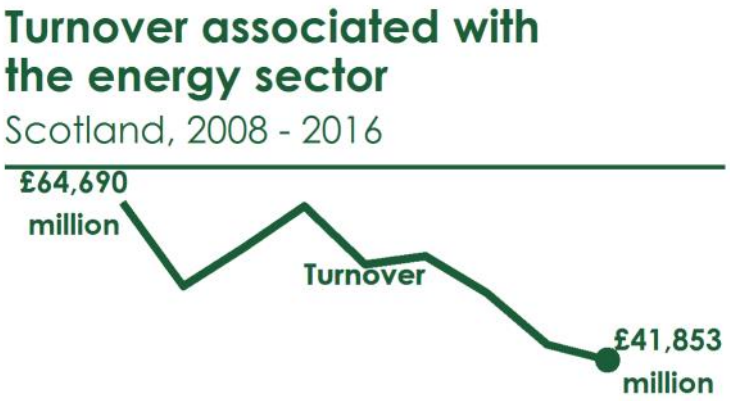


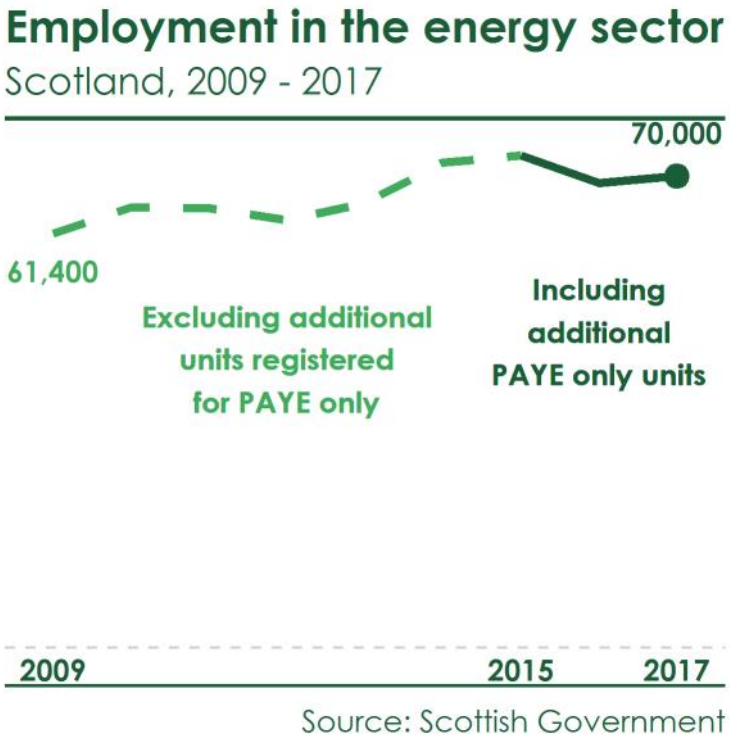

Source: SG, BEIS, HMRC

In terms of **outputs**, **77.9%** of all primary energy is **exported**, **8.7%** is lost in **transformation** and **13.4%** is accounted for by end use **consumption** in Scotland.

# How important is **energy** to Scotland's **economy**?

Scotland's **energy** (including renewables) **sector** was identified in Scotland's Economic Strategy as one of the growth sectors in which Scotland can build on existing comparative advantage and increase productivity and growth. The sector is defined using the **Standard Industrialisation Classification (SIC) 2007** codes which can be found here. As the sector has been defined this way, the figures are not directly comparable with figures on the low carbon and renewable sector or the oil and gas sector later in this document, as they have been defined differently.




In **2016**, total **turnover** in the Scottish energy sector was **£41.9 billion**, **down 5.1%** in nominal terms on **2015**. A large share of this turnover was generated by **extraction of crude petroleum and natural gas** (**30.1%**).

**Employment** in the energy sector stood at **70,000** in **2017**, **up** approximately **1,000 jobs** from **2016**. **Scotland** accounted for **22.0%** of employment in Energy across **Great Britain** as a whole. Employment in the energy sector is highly **concentrated**, with more than half (**52.9%**) of jobs located in the **North-East**: **38.6%** in **Aberdeen City** and **14.3 %** in **Aberdeenshire**.

# Renewable and Low Carbon

**"We will continue to champion and explore the potential of Scotland's huge renewable energy resource, and its ability to meet our local and national heat, transport and electricity needs – helping to achieve our ambitious emissions reduction targets"**

# What are **low carbon** solutions?

**Low carbon** solutions come from the need to **limit** Scotland's **emissions** given the increasing threat of **climate change**. By adopting low carbon means to generate power rather than relying on fossil fuels (i.e. coil, oil and gas), we can produce power with fewer greenhouse gas emissions.

Low carbon solutions can be categorised into two types:

- **Renewables:** energy forms that are naturally occurring and inexhaustible, for example, wind, hydro, solar, tidal, biomass and geothermal.
- **Nuclear:** generating power via nuclear fission.

In this section, we look at how Scotland has performed in terms of utilising low carbon and renewable sources across electricity, heat and transport, and what this means for emissions and Scotland's economy.

# How is Scotland performing in terms of **renewable electricity**?

'Renewable elec target'

The Scottish Government has a target to generate the equivalent of **100%** of Scotland's own electricity demand from renewable sources by **2020**. This does not mean that Scotland will be fully dependent on renewables generation, but rather that renewables will form the key part of a wider, balanced electricity mix.

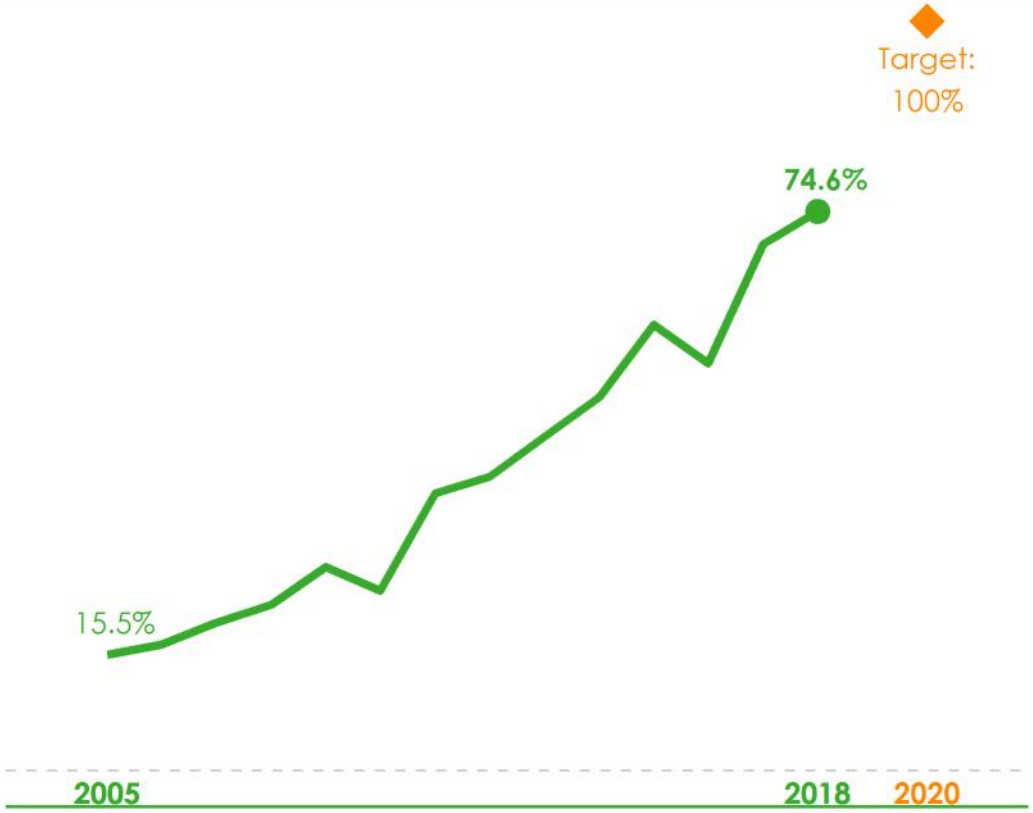
In **2018**, provisional figures indicate that the equivalent of **74.6%** of gross electricity consumption* was from renewable sources, rising from **70.3%** in **2016**. Much of this increase is due to **wind**; in the last year there was a **0.75 GW increase** in wind **capacity**, which contributed to more than a **2,100 GWh** increase in electricity **generation** via wind.

It is too early to say if Scotland is on track to meet the 100% target by 2020 as it will depend on how much renewable electricity generation increases and gross consumption decreases in the next few years. In order to meet the target, it is estimated that **14-15 GW** of installed **renewable capacity** is required. As of December 2018, Scotland has **10.9 GW** of installed **capacity** operational with **12.6 GW** in the **pipeline**. How quickly these projects become operational and the extent to which gross consumption falls in the next two years will determine if the target is reached.

* Gross electricity consumption refers to total electricity generation minus net exports

## Share of renewable electricity in gross electricity consumption

Scotland, 2005 - 2018




Source: BEIS

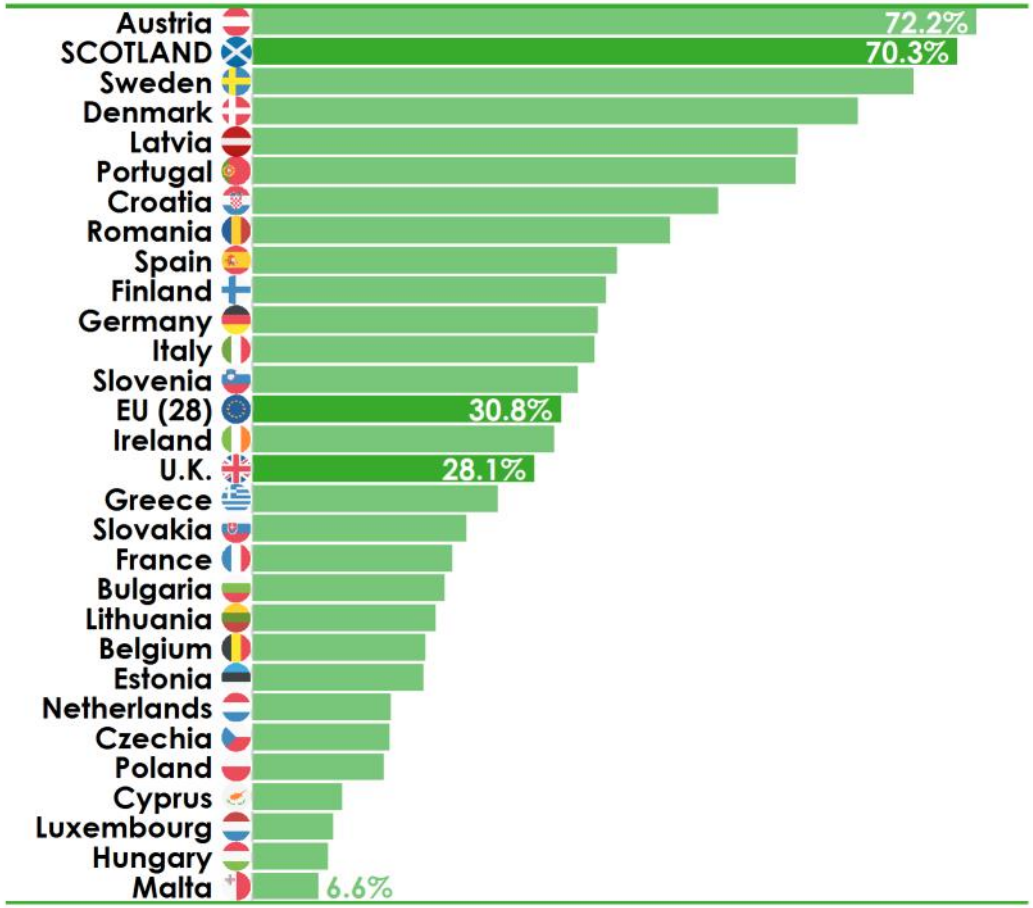
# How does Scotland compare to **other countries** in terms of **renewable electricity**?

'Renewable elec EU'

The most recent data available to compare Scotland's performance against other countries with regards to renewable electricity relates to **2017** when Scotland's proportion of renewable electricity from gross consumption was **70.3%**.

## Renewable electricity as a percentage of gross consumption for EU countries

2017



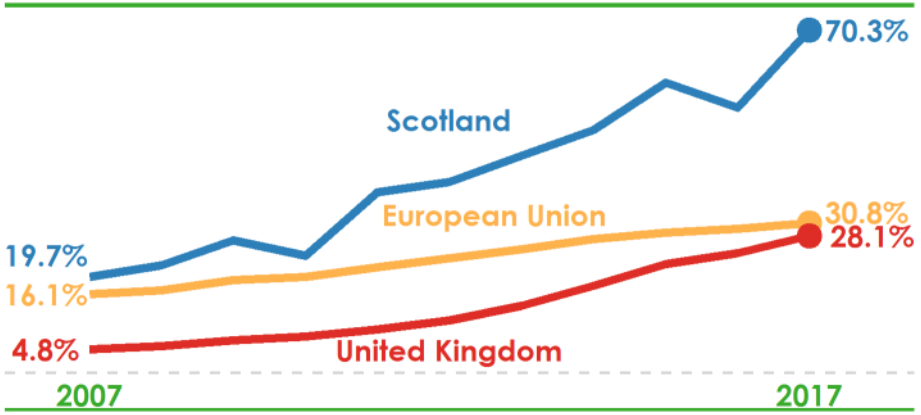

Source: Eurostat, BEIS

**Scotland performed strongly** compared to EU countries, ranking second behind Austria (72.2%). **Scotland** was significantly **higher** that the **EU** average (**30.8%**) and the **UK** figure (**28.1%**).

**Scotland** has had the **biggest increase** in the proportion of renewable electricity from **2007** to **2017** across all EU countries, rising by **50.6 percentage points**.

## Trend of renewable electricity share in gross final energy consumption

2007 - 2017




Source: Eurostat, BEIS

# How much does **renewable** and **low carbon electricity generation** make up of all of Scotland's electricity generation?

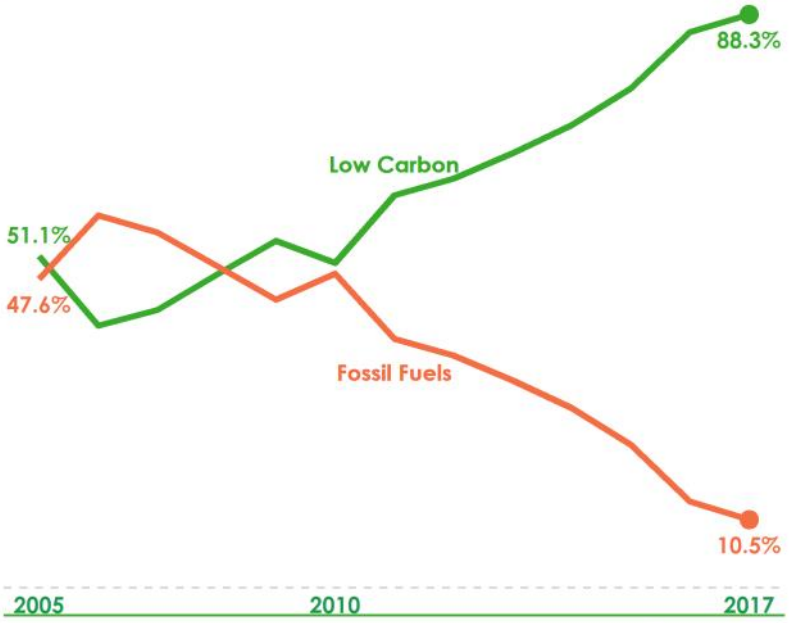
'Elec generation by fuel'

There have been significant changes to the electricity generation mix in recent years driven by privatisation and subsidy schemes introduced to encourage the development of low carbon and renewable technologies.

This has meant that the vast majority of the electricity that Scotland generates is from **low carbon** sources, **88.3%** in **2017**. This means that **fossil fuel** generation in Scotland is at its lowest level, with just one-tenth **(10.5%)** of all electricity generated from oil or gas.

**Electricity generation - low carbon versus fossil fuels**

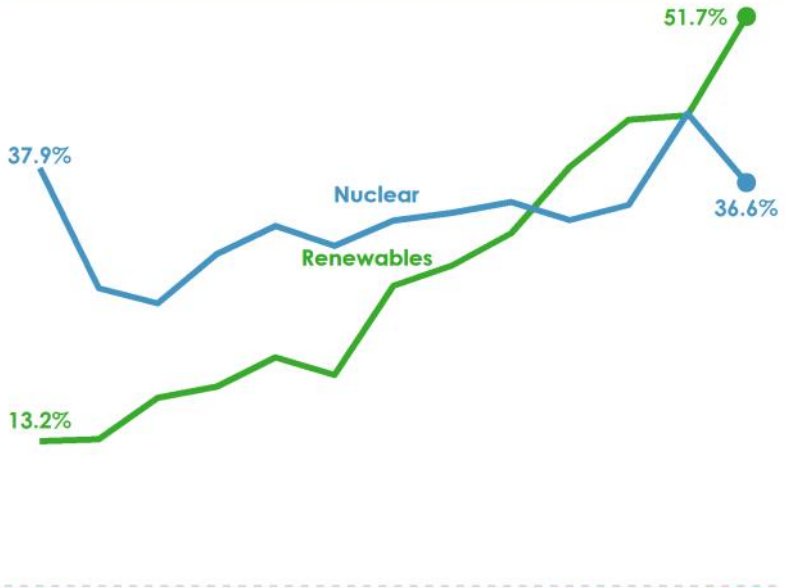
Scotland, 2005 - 2017




Source: BEIS

**Electricity generation - nuclear versus renewables**

Scotland, 2005 - 2017




Source: BEIS

The sources of electricity generation in Scotland have changed rapidly since **2010** when just **50.1%** of Scotland's generation came from **low carbon** sources and **48.4%** from **fossil fuels**.

The increase in low carbon generation witnessed in the last decade is driven by the **growth of renewables**, rising from **19.2%** of all generation in **2010** to **51.7%** in **2017**. National and international incentives, including the Renewables Obligation and the EU Renewable Energy Directive, have helped contribute towards the increase. There has been more renewable electricity generation than from nuclear for three of the last four years.

# What comprises **Scotland's electricity generation**?

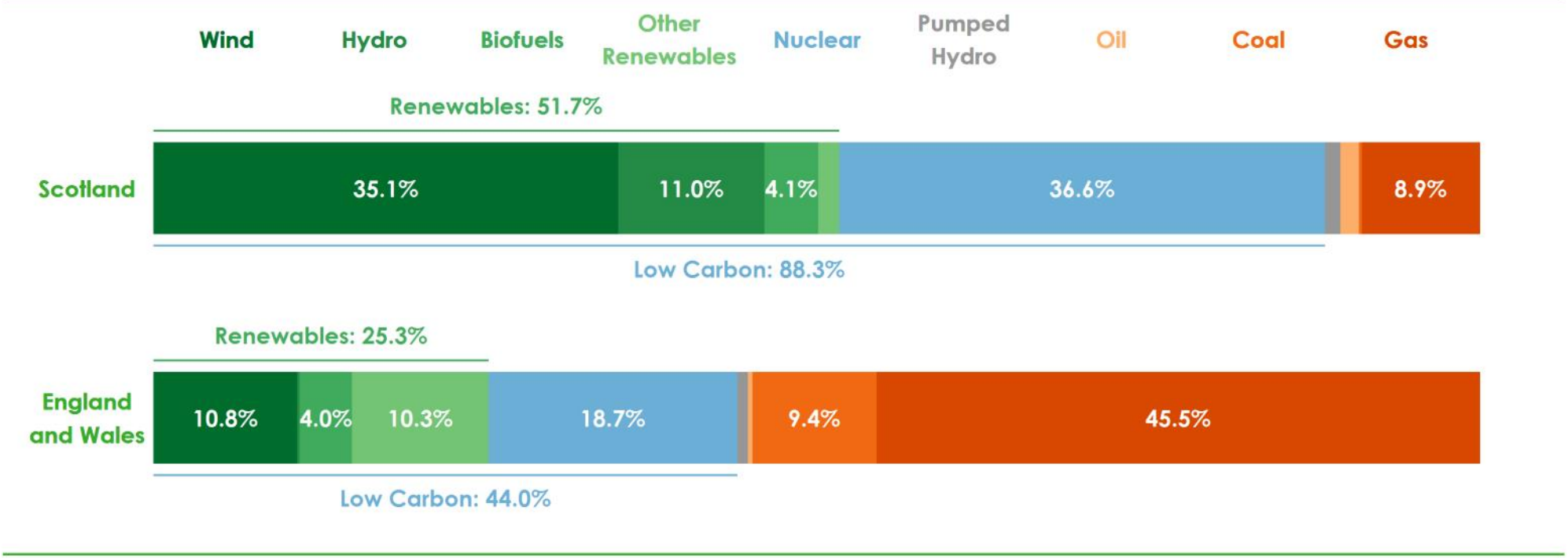
'Elec generation by fuel'

Looking at the individual technologies for electricity generation in Scotland, **nuclear (36.6%)** and **wind (35.1%)** both make up more than one-third each of Scotland's domestic generation. **Hydro** makes up **11.0%** of Scotland's electricity generation.

By contrast, **England and Wales** use a significantly **smaller proportion** of **low carbon (44.0%)** and **renewable (25.3%)** sources for electricity generation, with **gas** contributing most to electricity generation in England and Wales (**45.5%**).

## Proportion of electricity generation by fuel

2017




Source: BEIS

# Does **Scotland** also **consume electricity** from **low carbon** and **renewable** sources?

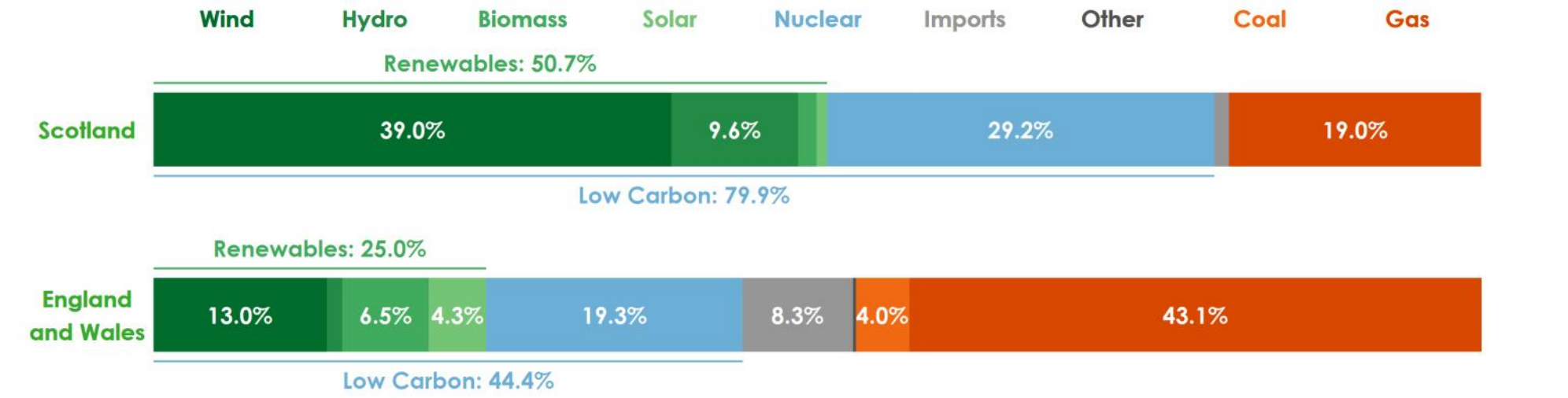
'Elec generation by fuel'

It is possible to look at the **fuel mix** which makes up **regional consumption** via the National Grid's Carbon Intensity website. Data is available at a sub-regional basis starting from May 2018. The data presented here runs until April 2019.

It shows that an estimated **79.9%** of the electricity that **Scotland consumes** comes from **low carbon sources**, with **50.7%** from **renewable** sources. Approximately two-fifths (**39.0%**) of the electricity consumed in Scotland is derived from **wind**. As with generation, consumption of electricity from **low carbon** (**44.4%**) and **renewable** (**25.0%**) sources are substantially **lower** across **England** and **Wales.**

## Proportion of electricity consumption by fuel

May 2018 - April 2019




Source: National Grid

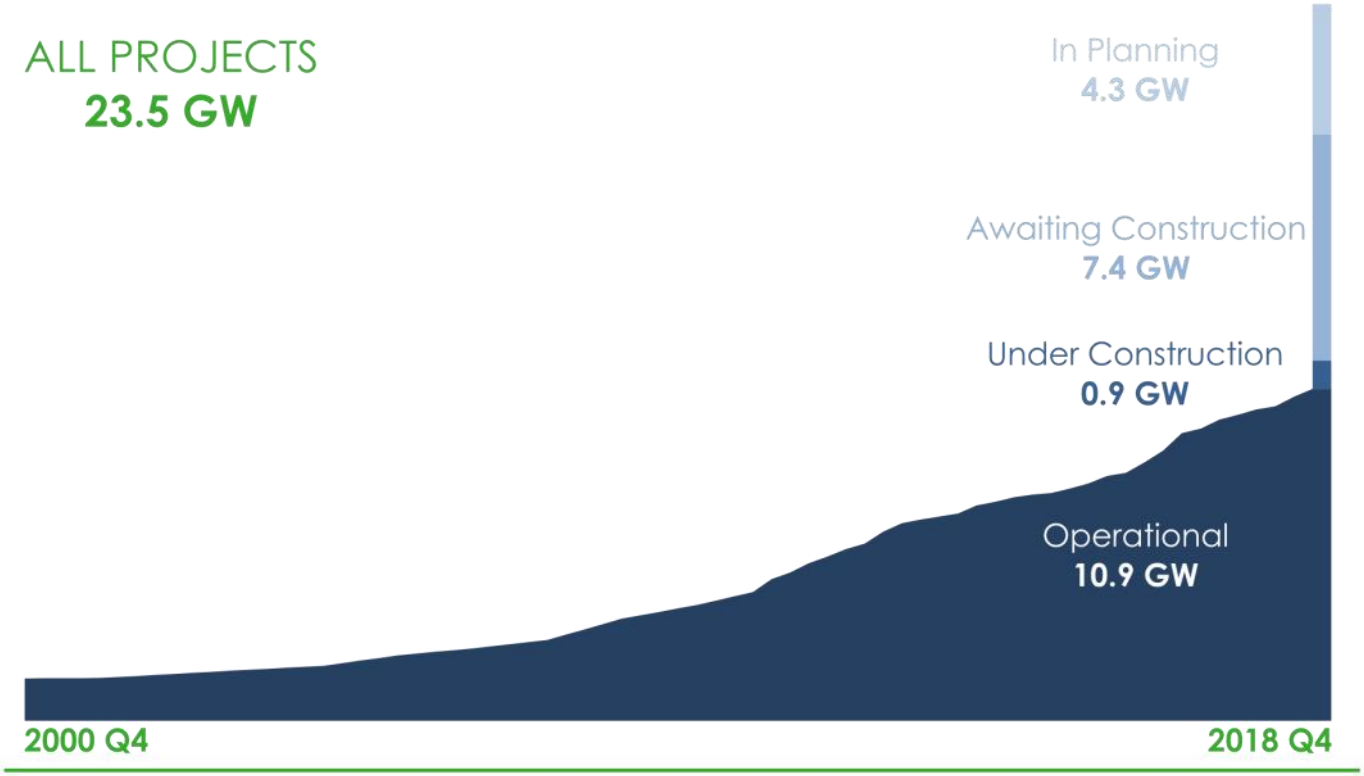
# What is Scotland's **future** for **renewable electricity generation**?



As of December 2018, Scotland had **10.9 GW** of installed renewable electricity generation **capacity operational**. A further **12.6 GW** of projects are in the **pipeline**. This is made up of **0.9 GW** of capacity **under construction**, **7.4 GW** awaiting **construction** and **4.3 GW in planning**. It is worth noting, however, that there are a number of factors which mean that projects consented in the pipeline may not progress to commissioning.

## Renewable electricity capacity in Scotland

December 2018



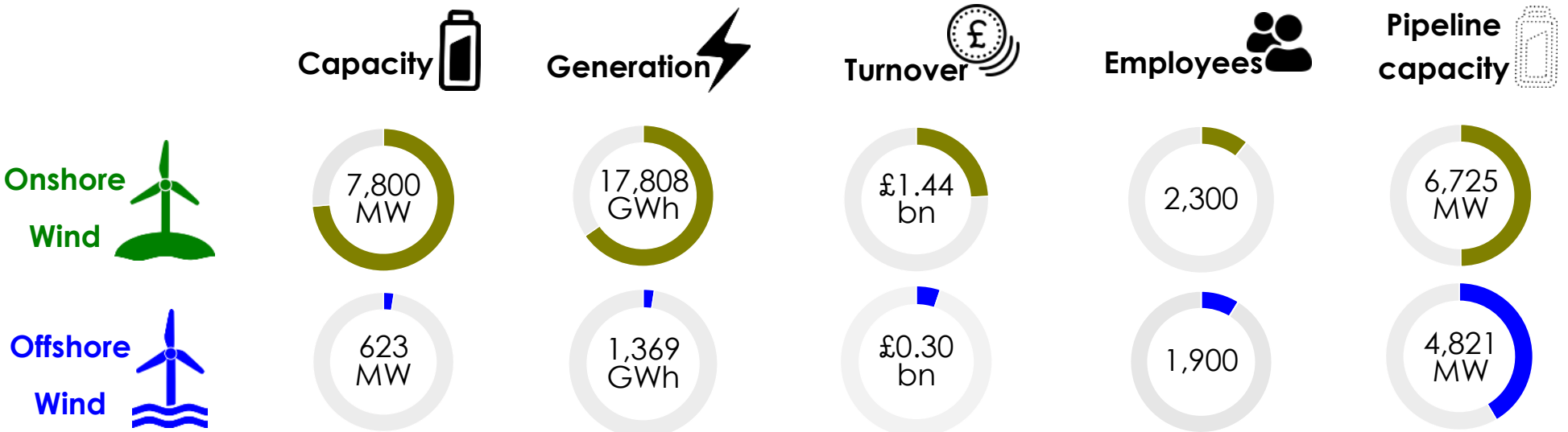

Source: BEIS

There is currently **23.5 GW** of renewable electricity capacity either already operating in the pipeline. Were all this capacity to be delivered it would more than double the level currently deployed. If all projects were operational, it is estimated that this could generate an extra **30,000 GWh** of renewable electricity.

# What **forms** of **renewable electricity** does Scotland **generate**?

In **2018**, **71.8%** of all renewable electricity generated in Scotland was from **wind**. Almost **19,200 GWh** of electricity was generated via wind, and this is the equivalent of **powering all homes in Scotland** for almost **two years**. Wind generation in Scotland has grown substantially; installed capacity and the amount of electricity generated have more than **doubled** from **2012** to **2018**. In 2017, **Scotland** in its own right would have ranked **7th** of all **EU countries** in terms of the amount of **wind generation**, comparable to Italy and Sweden. Electricity generation via wind has directly supported approximately **4,200** full-time equivalent **jobs** in Scotland and generated **£1.74 billion** in **turnover**.

Wind is also vital to Scotland's future, with **91.5%** of all **planned capacity** for renewables coming from wind. Even though the vast majority of Scotland's wind generation to date has come from **onshore** rather than offshore installations, **offshore** wind is likely to play more of a role in the **future**. There is **4.8 GW** of offshore wind projects in the pipeline compared to **0.6 GW** of installed capacity as of December 2018. In **2018**, capacity and generation from **offshore** wind more than **doubled** compared to **2017**, primarily due to the Beatrice wind farm becoming operational.




Capacity, generation and pipeline capacity figures relate to 2018, turnover and employees figures are 2017

# What **forms** of **renewable electricity** does Scotland **generate**?

| | Capacity | Generation | Turnover | Employees | Pipeline capacity |
|---|---|---|---|---|---|
| Hydro | 1,655 MW | 4,982 GWh | £0.56 bn | 1,100 | 47 MW |

**Hydro** is Scotland's second highest source of renewable electricity generation with almost **5,000 GWh** in 2018, the equivalent of powering roughly **half** of **Scotland's homes** for a year. **Scotland** accounts for **91.2%** of all hydro generation in the **UK**, and in 2017 ranked **10th** out of EU countries in terms of hydro generation. However, hydro generation in Scotland in 2018 actually **dropped** by **374 GWh** compared to 2017. While Scotland has had a long established base of hydro capacity, installed **capacity** has only **grown** by **25%** compared to **2000** (**1,320 MW** to **1,655 MW** in **2018**). Just **47 MW** of hydro **capacity** is in the **pipeline**.

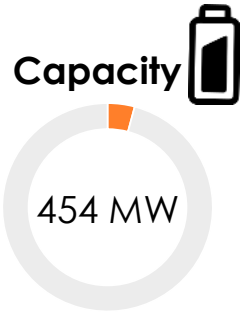
While **solar capacity** in Scotland increased rapidly in the first half of this decade (**2 MW** in **2010** to **326 MW** in **2016**), **progress** has **slowed** in recent years, rising slightly to **344 MW** in **2018**. This has generated **329 GWh** of electricity in **2018**, enough to power more than **80,000 Scottish homes** for a year. There is a further **259 MW** of solar projects in the pipeline.

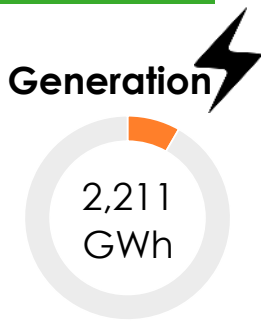
| | Capacity | Generation | Turnover | Employees | Pipeline capacity |
|---|---|---|---|---|---|
| Solar PV | 344 MW | 329 GWh | £0.04 bn | 100 | 259 MW |

Capacity, generation and pipeline capacity figures relate to 2018, turnover and employees figures are 2017

# What **forms** of **renewable electricity** does Scotland **generate**?

**Bioenergy / energy from waste**

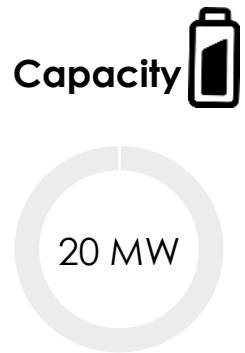


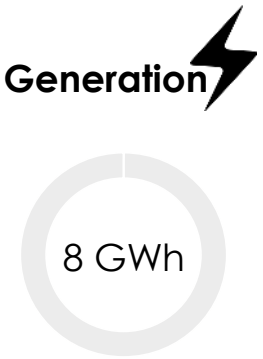



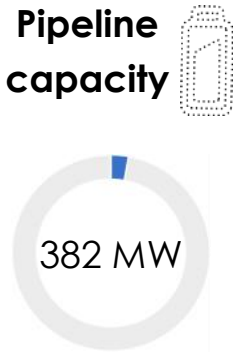
**Bioenergy** and **energy from waste** accounts for **8.3%** of all renewable electricity generated in Scotland in 2018 (**2,211 GWh**, which is the equivalent of powering approximately **544,000 households** for a year). There is **392 MW** of bioenergy projects in the **pipeline**, **214 MW** coming from biomass, **173 MW** from energy from waste.

Current capacity of **wave** and **tidal** in Scotland is relatively small (**19.9 MW** in **2018**). However, it is a technology that is developing; projects totalling **382 MW** are in the **pipeline**, including Brims Tidal Array in the Orkney Islands with 200 MW capacity alone.

**Wave/ Tidal**




Capacity, generation and pipeline capacity figures relate to 2018

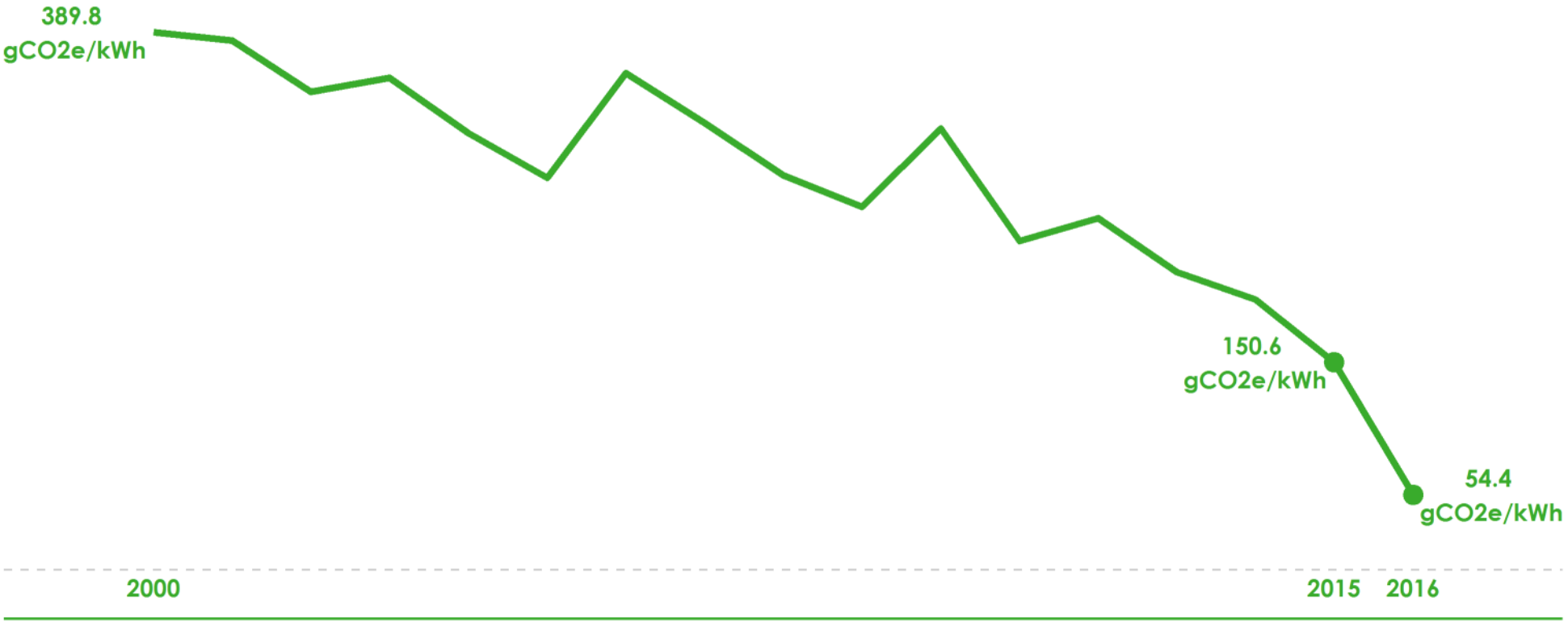
# How does Scotland's **low carbon generation** impact **grid emissions**?



The shift towards **low carbon** electricity generation has had a profound impact on **emissions**. The average greenhouse gas emissions per kilowatt hour of electricity generated in Scotland in **2016** was estimated to be **54.4 gCO2e/kWh**, a sizeable drop from **150.6 gCO2e/kWh** in **2015**. This has been driven by both the **increase** in **zero-carbon renewable generation** and the **closure** of Scotland's last **coal power station** at Longannet in early 2016.

## Average greenhouse gas emissions per kilowatt hour of electricity

Scotland, 2000 - 2016




Source: BEIS

# How has Scotland's renewable electricity generation **reduced** our **carbon footprint**?



Since **2000**, Scottish renewables have **displaced** an estimated **124 million tonnes** of **CO2** across the GB system, assuming that the same amount of electricity would be generated by fossil fuels.

In **2017** alone, Scottish renewable electricity has displaced an estimated **11.6 million tonnes of CO2.**

The estimated amount of CO2 displaced has dropped from its **peak** of **13.6 million tonnes** of CO2 in **2015** because in recent years coal power stations have closed, and renewables have tended to displace more gas rather than coal. This has had the effect of reducing the carbon intensity of the remaining fossil fuel fleet across Britain and therefore the level of displaced emissions.

For context, the latest figures for greenhouse gas emissions (2016) for Scotland as a whole is 38.6 million tonnes of CO2.

## Million tonnes of CO2 emissions displaced by renewables

Scotland, 2000 - 2017

Source: BEIS

## Share of renewable heat in non-electrical heat demand

Scotland, 2008 - 2017

Source: BEIS, EST

Approximately **4,800 GWh** of renewable heat was generated in Scotland in 2017. This is the equivalent of supplying over **350,000 Scottish homes** with gas for the year.

The 2009 Renewable Heat Action Plan set a target of delivering **11%** of Scotland's projected 2020 non-electrical heat demand from renewable sources. In **2017**, the equivalent of **5.9%** of non-electrical heat demand was met from renewable sources. It is estimated that between **8,100 - 9,300 GWh** renewable heat generation is required to **meet** the **11%** renewable heat **target**.

The share of renewable heat is up from **4.7%** in **2016** and makes it a record year for renewable heat (5.3% in 2015 was the previous peak). The majority of this increase this year is due to **increased generation** from existing **large commercial sites**.

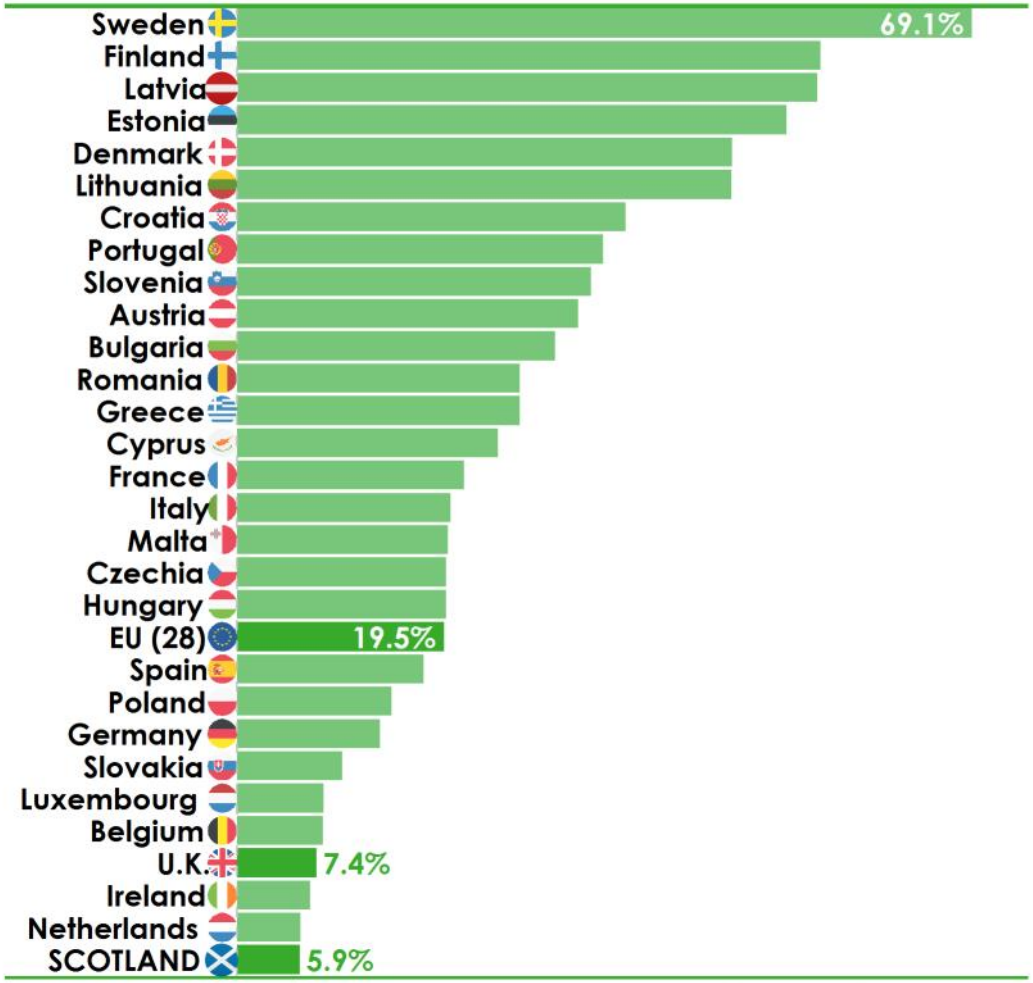
Most of this increase is made up of a rise in the generation of renewable heat by **biomass**. This also makes up more than four-fifths of all renewable heat generated. Thermal energy from waste and heat pumps each make up less than 10% of renewable heat output.

# How does Scotland compare to **other countries** in terms of **renewable heat**?

'Renewable heat EU'

## Renewable heat as a percentage of gross consumption for EU countries

2017



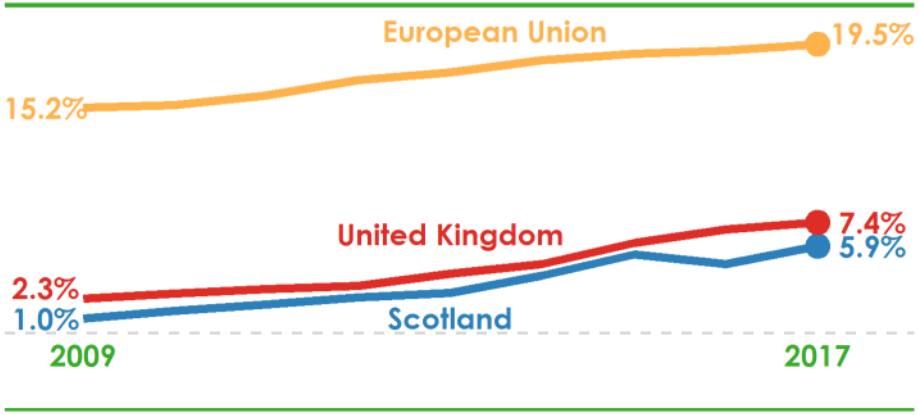

Source: Eurostat, BEIS

Comparisons of renewable heat can be made with EU countries, and these comparisons refer to **non-electrical** renewable heating and cooling.

In contrast to renewable electricity where Scotland performs strongly relative to Europe, it is the **lowest of all countries** for **renewable heat**. It is below the **UK** share as a whole of **7.5%** and well below the **EU** average of **19.5%**.

## Trend of renewable heat share in gross final energy consumption

2009 - 2017




Source: Eurostat, BEIS

# How is Scotland performing in terms of **renewables** in **transport?**

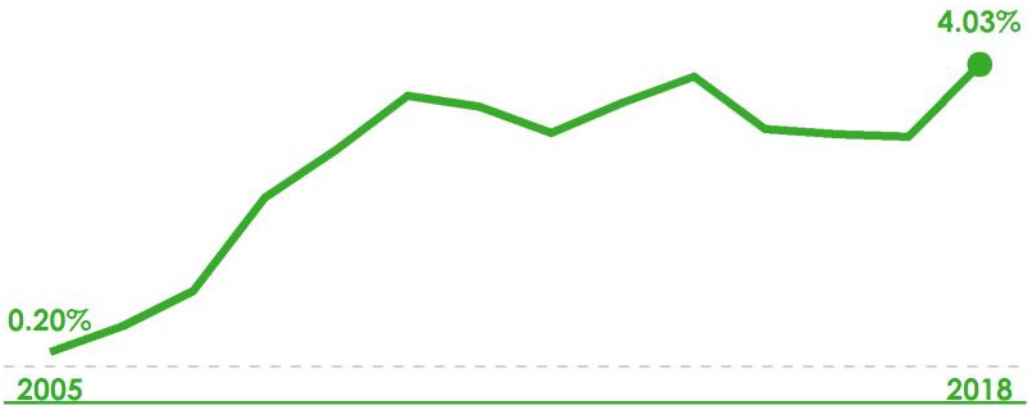


Data for **biofuels** in petrol and diesel consumption is **not available** separately for **Scotland**, so for the purposes of calculating the renewable energy target for Scotland the **UK proportion** of biofuels is assumed.

In **2018**, biofuels had a **4.0%** share of road fuels in the UK. This has risen to its **highest level**, up from **3.1%** in **2017**. It still remains some way off the **9.75%** share of renewable fuels by 2020 which was an ambition under the UK Renewable Transport Fuel Obligation (RTFO).

## Share of biofuels in transport petrol and diesel consumption

United Kingdom, 2005 - 2018



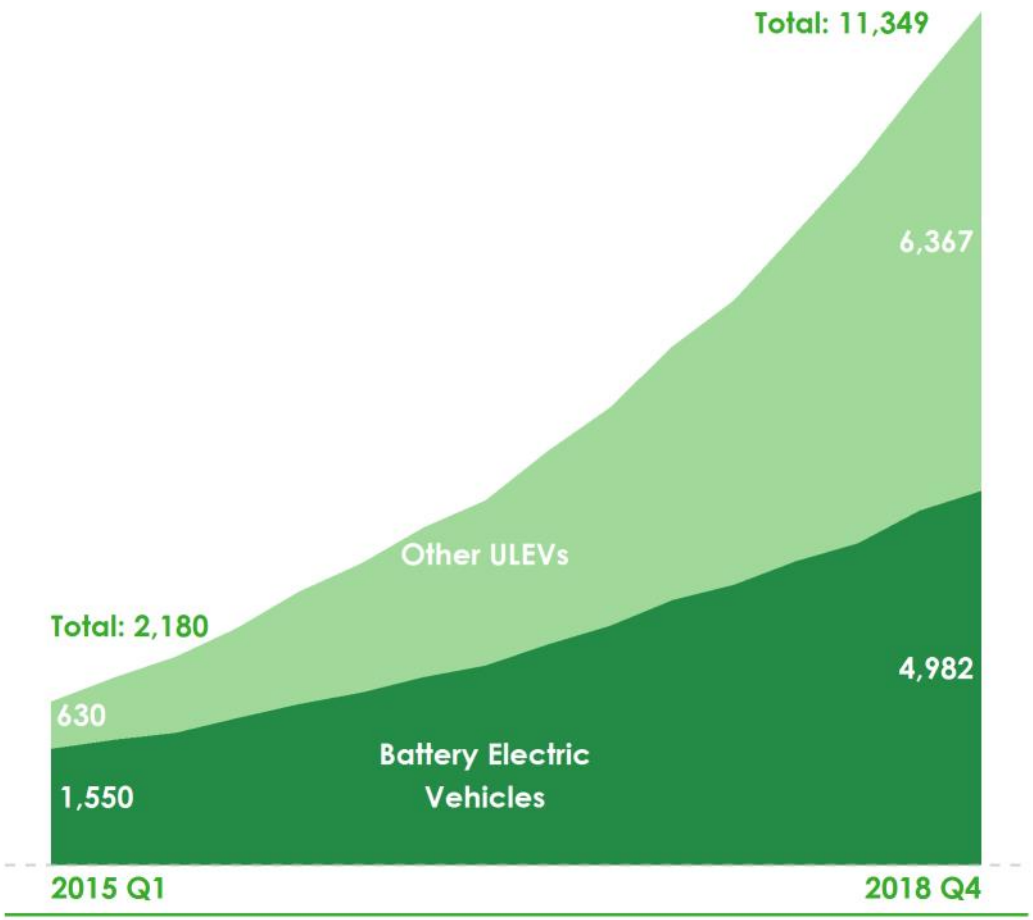

Source: BEIS, HMRC

# How many people in Scotland have **electric vehicles**?

'ULEVs'

## Number of ultra low emission vehicles licenced

Scotland, 2015 Q1 - 2018 Q4




Source: DfT

The Scottish Government has announced its intention phase out the need for new petrol and diesel cars and vans by 2032, and has supported moves to **ultra-low emission vehicles** (ULEVs). This term refers to electric, plug-in hybrid, hydrogen fuel-cell vehicles and all vehicles with tail-pipe emissions below 75 g/km of CO2.

As of December 2018, there were **11,349** ULEVs licenced in Scotland, of which 4,982 are battery electric vehicles.

Even though ULEVs only make up **0.4%** of all vehicles licenced in Scotland, **growth** has been **rapid**: compared to twelve months prior, an **extra 3,850 ULEVs** have been licenced, of which approximately 1,250 are battery electric vehicles. Growth of ULEVs has been greater among plug-in hybrids than electric battery vehicles.

The growth of ULEVs can be further illustrated by looking at the proportion of ULEVs **registered for the first time**. This has risen from **0.2%** of all newly registered vehicles in the **first quarter** of **2014** to **2.1%** in **Q4 2018**.

Recorded consumption across the ChargePlace Scotland, Scotland's public EV charging network, is **5.6 GWh** in **2018**, up from **3.5 GWh** in **2017**.

# How does the **low carbon** and **renewable energy** sector **benefit** the Scottish **economy**?

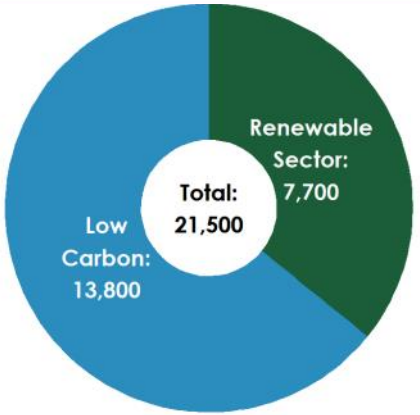


In 2017, the low carbon and renewable energy (LCRE)* sector has **directly** supported **21,500** full-time equivalent **jobs** in Scotland. This represents around **10%** of employment in the **UK** LCRE sector. Most of this is made up of staff employed in **energy efficiency** (**10,100** full-time equivalent staff) and **low carbon electricity** (**8,300**).

Additionally, the LCRE sector in Scotland is estimated to **indirectly** support a further **25,000** FTE jobs in the wider economy; this refers to jobs in the supply chain involved in low carbon activities. This means that the low carbon and renewable energy economy supported an estimated **46,500** jobs.

## Full time equivalent jobs directly supported by the LCRE sector

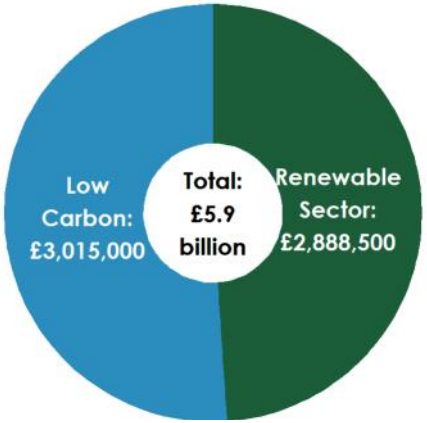
Scotland, 2017




Source: ONS

## Turnover directly supported by the LCRE sector

Scotland, 2017




Source: ONS

In 2017, the Scottish low carbon and renewable energy economy directly generated **£5.9 billion**; representing around **2.4%** of all non-financial **turnover** in **Scotland**. In comparison, the **UK** figure was **1.2%**. Including indirect activity, the low carbon and renewable energy sector generated a **turnover** of **£11.1 billion** in **2017**.

The **renewable energy** part of the LCRE sector is particularly important in Scotland where it accounts for approximately **49%** of **Scotland's low-carbon turnover**. In contrast, renewable energy accounts for around **34%** of LCRE turnover in the **UK** as a whole.

* The 'renewable' sector includes renewable electricity, heat and energy from waste and biomass. The 'low carbon' sector includes nuclear electricity, energy efficient products, low carbon financial and advisory services, low emissions vehicles, infrastructure, fuel cells and energy storage

# So, how is Scotland performing in terms of **renewables** and **low carbon**?

Scotland's main **strengths** with its **renewable** and **low carbon** ambitions come in terms of **electricity**.

- In terms of Scotland's target to generate the equivalent of **100%** of Scotland's **electricity demand** from **renewable** sources by 2020, steady progress has been made and progress stands at **74.6%** in 2018.
- The extent to which progress will continue will depend on the bolstering of Scotland's **renewable electricity capacity**. There are **10.9 GW** of renewable electricity projects **operational** at the moment with a further **12.6 GW** in the **pipeline**.
- Nearly **90%** of all of the electricity that Scotland generated is **low carbon**, with **renewables** making up over **half** of this.
- The vast **majority** of Scotland's renewable electricity **generation** has come from and will continue to come from **wind**.

Scotland's **heat** and **transport demand** is still primarily made up from **fossil fuels**, however progress has been made in terms of renewable heat generation and the growth of electric vehicles:

- **2017** was a record year for renewable heat generation in Scotland, with **5.9%** of its non-electrical heat demand from renewable sources. This was an increase from **4.7%** in **2016**.
- **11,349** Ultra Low Emission Vehicles (**ULEVs**) were licenced in Scotland in **December 2018**, up more than 3,800 from 2017.

# Innovative Local Energy Systems

**"We will empower our communities, supporting the development of innovative and integrated local energy systems and networks"**

# What are **innovative local energy systems**?

Scotland has a history of developing local energy systems, especially in rural communities and the islands. An advantage of this is that it moves away from centralised generation, which can be problematic for more remote locations. It also has benefits for the communities themselves in terms of skills and financial benefits.

The Scottish Government has a number of initiatives designed to encourage businesses and communities to invest in local and small scale renewables, for example, the Community and Renewable Energy Scheme (CARES), Resource Efficient Scotland and the Home Energy Scotland Loan.

This section looks at Scotland's progress to date on three specific initiatives:

- **Community and locally owned renewables:** this refers to installed electrical and heat capacity owned by community groups, local authorities, housing associations and other Scottish public bodies, charities, further and higher education establishments, local businesses and Scottish farms and estates.
- **Combined heat and power** (CHP)**:** schemes that capture heat from the electricity generation process that would otherwise have been wasted and use the heat for productive purposes
- **District and communal heating:** refers to a distribution system of insulated pipes that takes heat from a central source and delivers it to a number of domestic or non-domestic buildings

# How is Scotland performing in terms of **community** and **locally-owned renewables**?



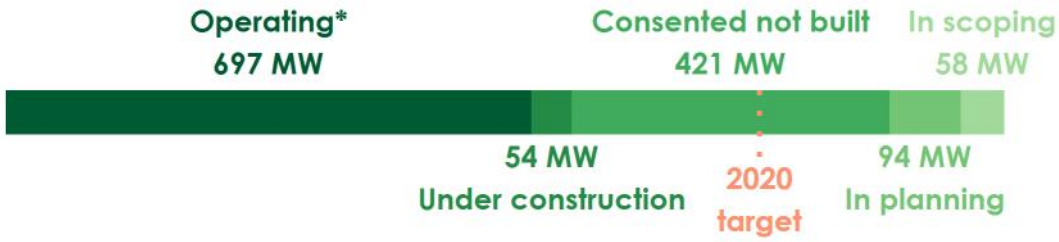
**Targets** were set for community and locally-owned renewables with the aim of having **1 GW** of capacity by **2020** and **2 GW** by **2030**.

As of June **2018**, **697 MW** of community and locally owned capacity is operational. This has more than tripled from June **2012** when capacity was **204 MW**.

Projects totalling more than **627 MW** are in the pipeline, including **54 MW under construction** and a further **421 MW consented** but not built. The combination of all of this capacity would take Scotland beyond its 2020 target.

## Community and locally owned renewable energy capacity in different stages of development

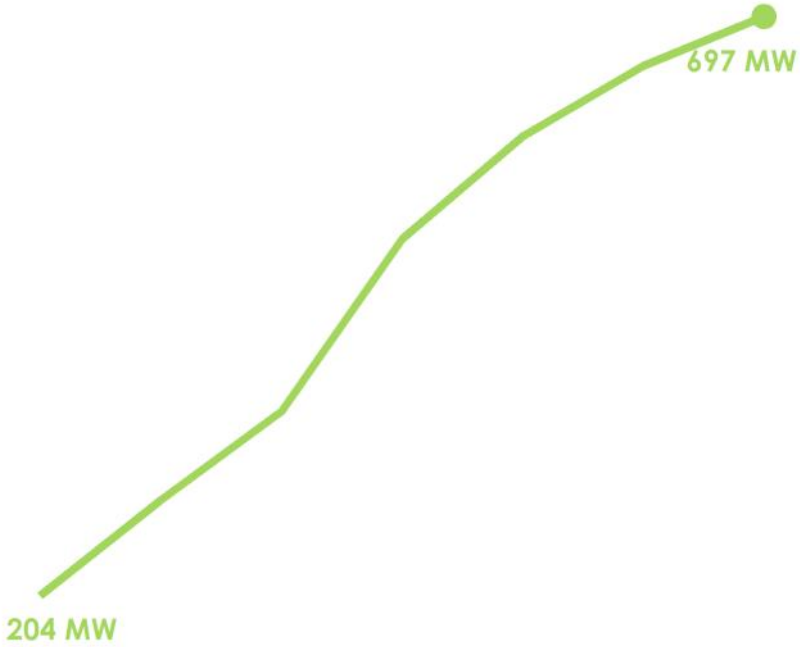
Scotland, 2018




Source: EST

## Capacity of operating locally owned renewable energy initiatives

Scotland, 2012 - 2018




Source: EST

# What are the **community** and **locally-owned renewables used** in Scotland?

The majority of operational community and locally-owned renewable capacity in Scotland in June **2018** was from **wind** turbines (**319 MW**), followed by **biomass** (**185 MW**). These two technologies account for almost three quarters of overall operational capacity in June 2018.

## Capacity of operational community and locally owned renewable installations by technology

Scotland, June 2018

Source: EST

## Capacity of operational community and locally owned renewable installations by type of output

Scotland, June 2018

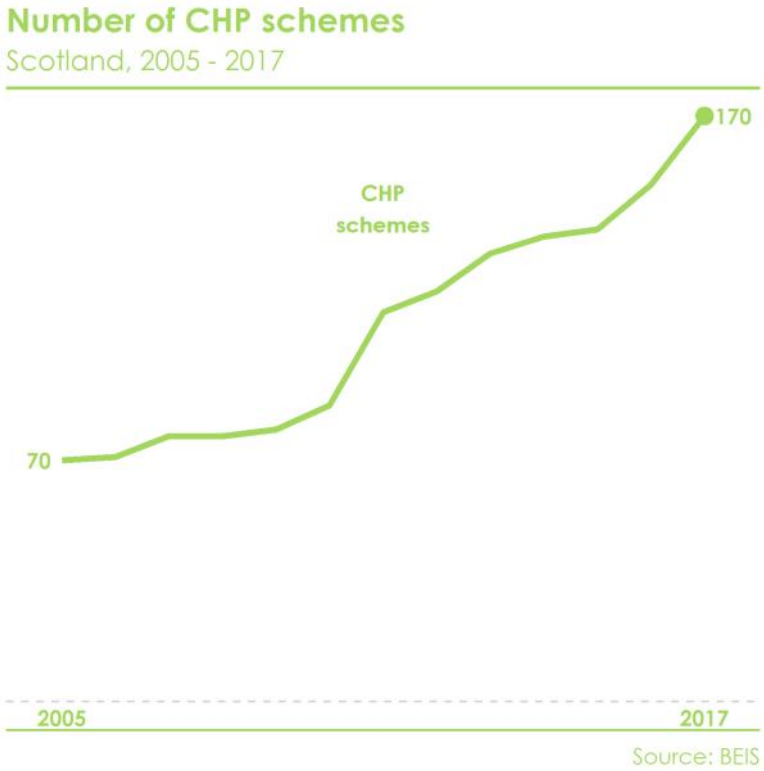
Source: EST

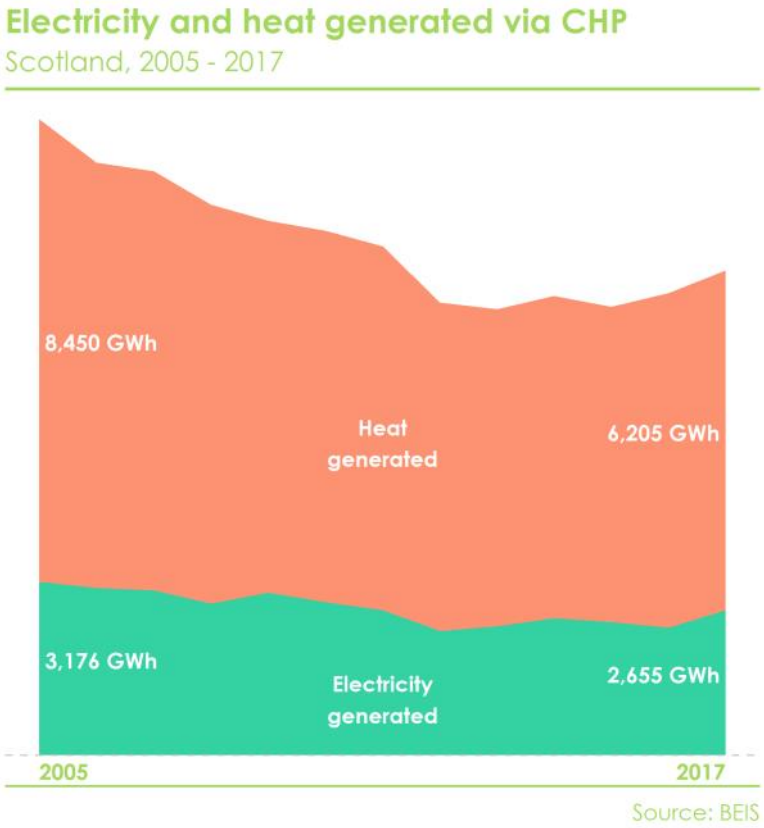
The **697 MW** of total operational capacity is split between **432 MW** (62.0%) of **electrical capacity** and **256 MW** (36.7%) of **thermal** (heat) **capacity**.

Over the course of a year, community and locally owned renewable energy installations identified here could be expected to produce **1,755 GWh** of renewable energy - **1,051 GWh** of **electricity** and **656 GWh** of **heat**. This is enough to **power** over **258,000** Scottish **homes** and **heat** almost **48,000** Scottish homes **for a year**.

# How is Scotland performing in terms of **combined heat and power**?

In **2017**, Scotland had **170** separate **combined heat and power schemes**, and this has steadily **risen** from **70** in **2005**. In total, Scotland's combined heat and power schemes generated **6,205 GWh** of **heat** in 2017 which would have been wasted otherwise, a small increase on last year. The heat generated is the equivalent of heating approximately **452,000 homes** in **Scotland** using the estimate for the average domestic gas consumption per household.




While the number of CHP **schemes** in Scotland have **increased**, the amount of **heat generated** has **dropped** by more than **2,200 GWh** from its peak in **2005**. This mirrors the UK wide trend of larger industrial based schemes that generate high amounts of heat ending and the growth of smaller non-industrial schemes.

Oil and gas is the sector which accounts for most of Scotland's CHP capacity (248 MW, 44.5%).

# How is Scotland performing in terms of **district and communal heat networks**?

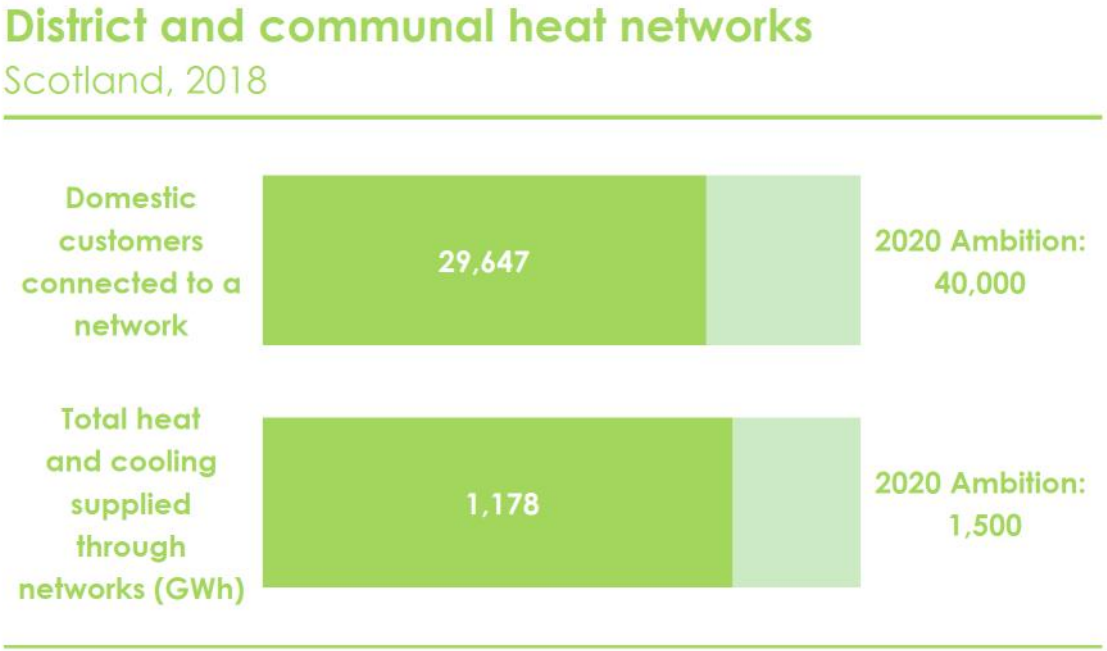
The Heat Policy Statement published in 2015 set out two **ambitions** relating to district and communal heating in Scotland:

- To achieve **1.5 TWh** of Scotland's heat demand to be delivered by district or communal heating by **2020**
- To have **40,000** homes connected by **2020.**

Estimates suggest that there were **almost 30,000** homes connected to **district or communal heating networks** in Scotland at the end of **2018** meaning that Scotland is approximately three quarters of the way towards reaching 40,000 homes connected to heat networks. In terms of new connections, the data up to end of December 2018 included 35 additional networks compared to December 2017. Together these 'new' networks supplied approximately **1,250 more homes** than **2017**.

An estimated **1.18 TWh** of heat and cooling demand is supplied via **heat networks**, equivalent to 79% of the 1.5 TWh ambition.

It is worth noting that the collection of this data is still quite new, and will continue to improve in quality in time. There are issues with some networks not providing supply figures and others giving figures which appear to be unreasonable. While efforts have been made to correct these figures, the data should be treated as broad estimates at this stage. As a consequence, the figures quoted for district heat networks in Energy In Scotland last year are not directly comparable with the figures quoted in ACSES.



# So, how is Scotland performing in terms of **local energy systems**?

Scotland has made progress on a number of innovative local energy systems

Scotland has **0.7 GW** of installed **capacity** of **community and locally owned renewables** in **2017**, well on its way to the 1 GW target by 2020. Projects totalling more than **0.6 GW** are in the **pipeline**.

Scotland has **170 combined heat and power schemes** in operation in **2017**, rising from **70** in **2005**. These have generated more than **6,200 GWh** of **heat** that would have been wasted otherwise. This is the equivalent of heating more than **450,000** Scottish **homes** for a year.

There are approximately **30,000** Scottish **homes** connected to **district or communal heat networks** in **2018**, supplying an estimated **1.18 TWh** of heat and cooling demand.

# Energy Efficiency

**"We will continue to take direct and supporting actions to improve the use and management of energy in Scotland's homes, buildings, industrial processes and manufacturing"**

# What do we mean by **energy efficiency**?

Energy use underpins activity across all sectors in Scotland - business, domestic and public. It is also responsible for the major share of Scotland's greenhouse gas emissions, which contribute to climate change. By maximising the output from Scotland's energy inputs, energy efficiency offers a way to curb energy consumption without limiting growth and hence to reduce emissions whilst still growing the Scottish economy.

The following section looks at two key metrics for energy efficiency:

- **Reducing consumption**, and this is in terms of electricity, heat and transport, and across the domestic and non-domestic sectors.
- Specific measures designed to **retain heat** in buildings, for example insulation and other methods to improve the efficiency of buildings.

# How much **energy** does Scotland **consume** and how has it changed?

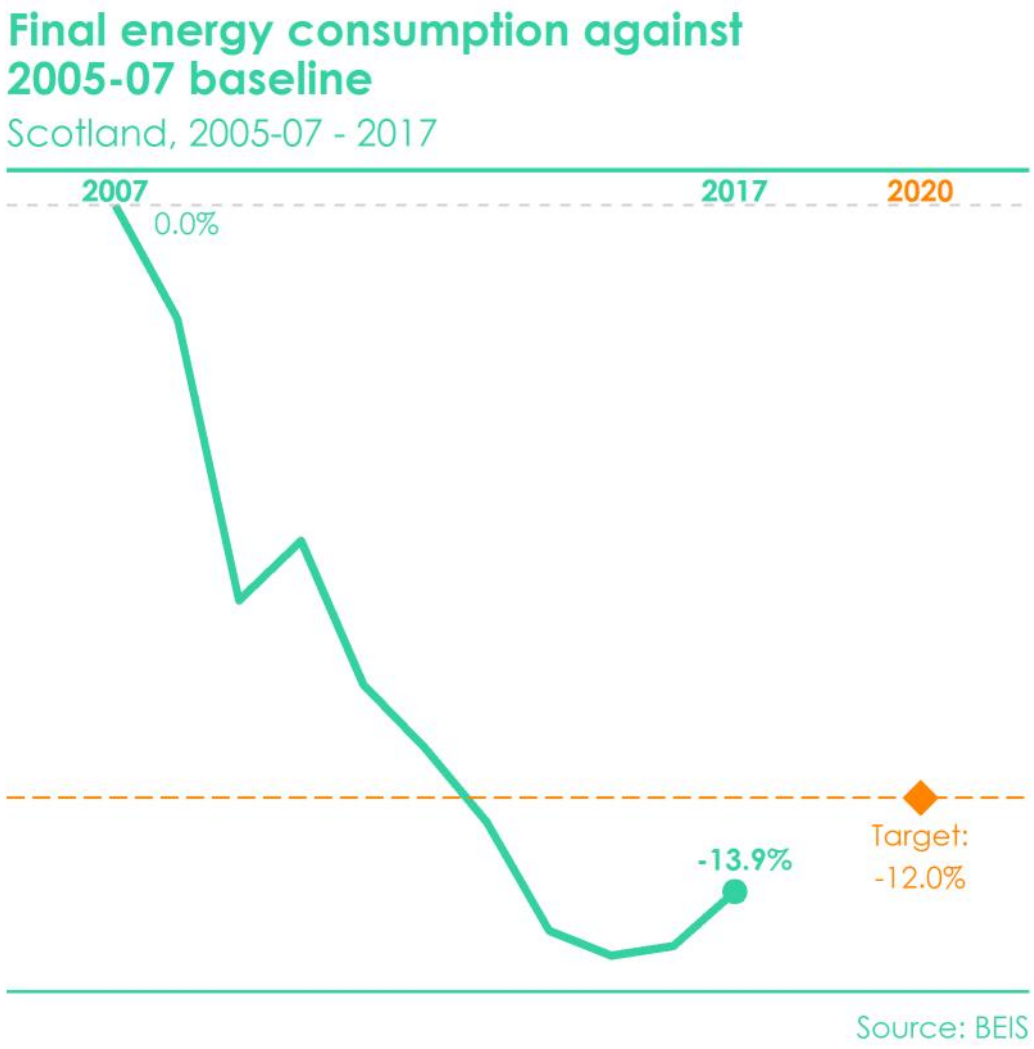
'Energy consumption target'

The previous **energy consumption target** published in the Conserve and Save: Energy Efficiency Action Plan in October 2010 was to reduce Scottish final energy consumption by **12%** by **2020** from a 2005 to 2007 baseline (167,032 GWh). Scotland met the target in **2013**, seven years early.

**2015** saw Scotland's lowest level of energy consumption to date, **15.2%** below the baseline (**141,688 GWh**). Energy efficiency, the impact of the economic cycles, prevalent energy price rises and weather patterns have all played a role in reducing overall energy consumption by about 25,000 GWh.

However, consumption has **increased** in the last two years. According to provisional figures for **2017**, consumption is at its highest level since 2013, **13.9%** below the baseline (**143,823 GWh**). This increase is driven by an **increase** in **gas consumption** (2.7% up on 2015).

This section takes a closer look at consumption patterns over time in different sectors.

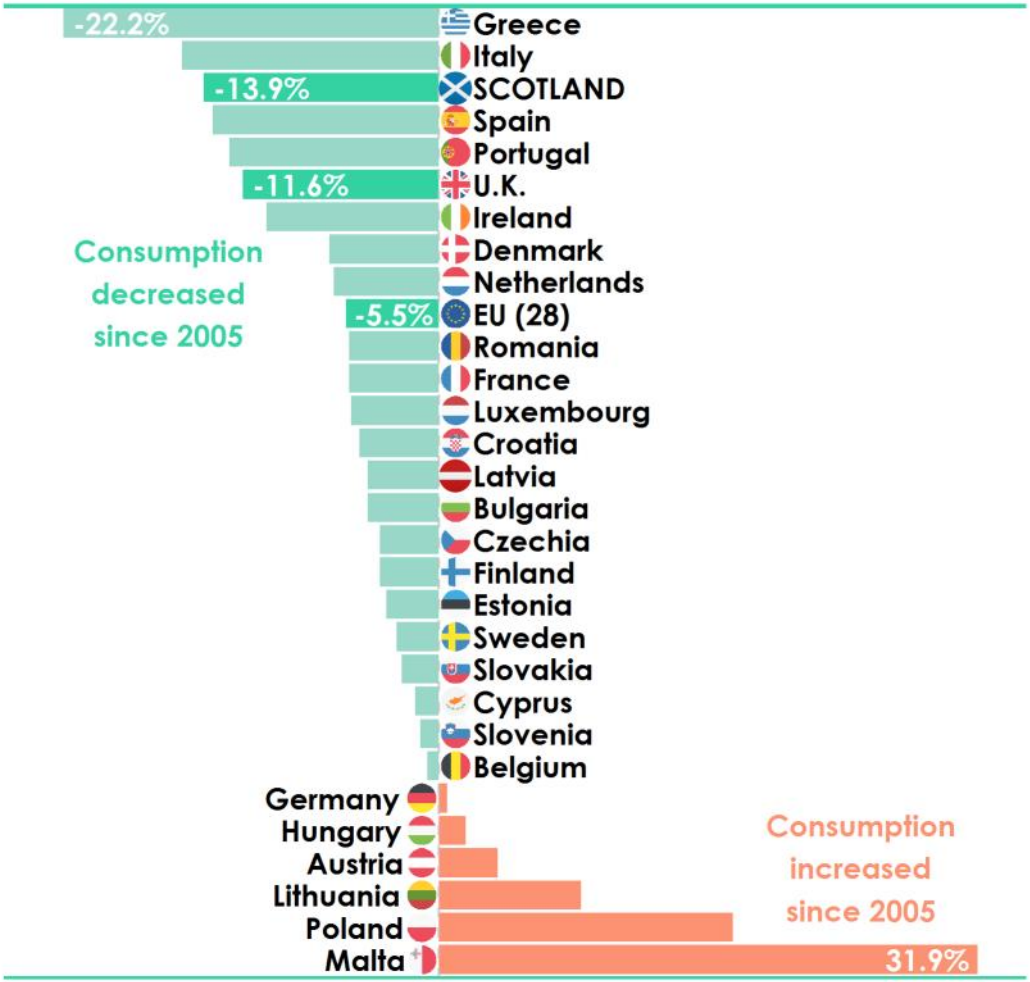


# How does Scotland compare to **other countries** in terms of **reduction** of **energy consumption**?



## Change in final energy consumption across EU countries against 2005-07 baseline

2017




Source: Eurostat, BEIS

The reduction of Scotland's energy consumption can be compared with the how energy consumption has changed in the UK and EU countries. These figures use the same methodology as the Scottish figures where comparisons are made against an averaged baseline of total final energy consumption over the years 2005 - 2007.

**Scotland's** 13.9% decrease in energy consumption ranks **3rd** across all EU countries, behind Greece and Italy. It is ahead of both the **UK** (**11.6%** reduction) and the **EU** average (**5.5%** reduction).

Like Scotland, **energy consumption increased** across **Europe** in recent years as well. Just **four** of the **28 EU countries decreased** their **energy consumption** between 2016 and 2017. The UK was one of these countries, dropping from 10.9% below the baseline in 2016 to 11.6% below in 2017.

# How has Scotland's **energy consumption** changed by **sector**?

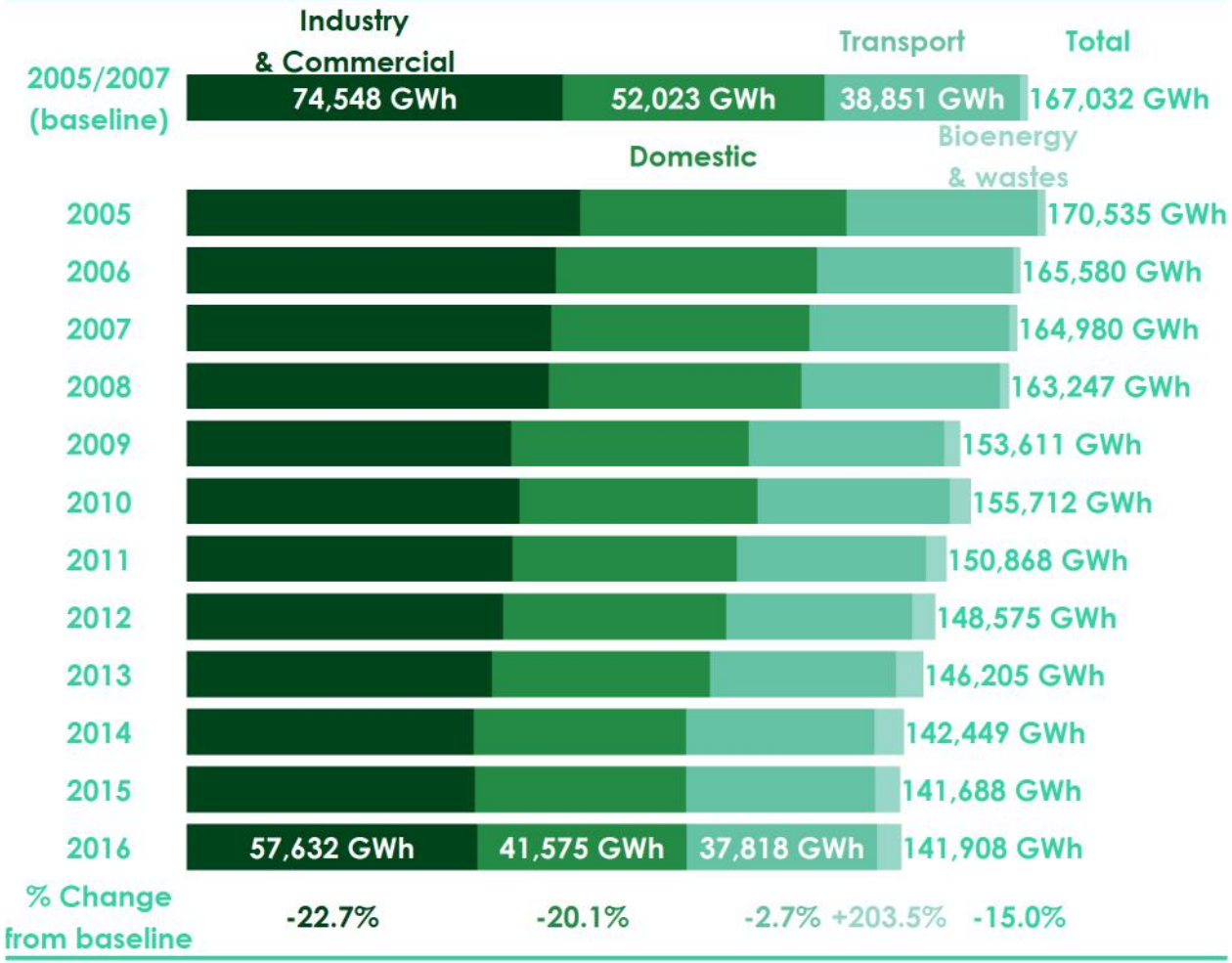


It is possible to break down the reduction of Scotland's total energy consumption by **sector**, although the most recent data for this refers to **2016** when consumption was **15.0%** lower than the baseline.

**Domestic** consumption of electricity and heat has dropped by **20.1%** to **41,575 GWh**. **Non-domestic** consumption has decreased by **22.7%** against the baseline. Energy consumption in **transport** has not reduced by the same degree dropping by **2.7%**.

## Total final energy consumption by consuming sector

Scotland, 2005 - 2016



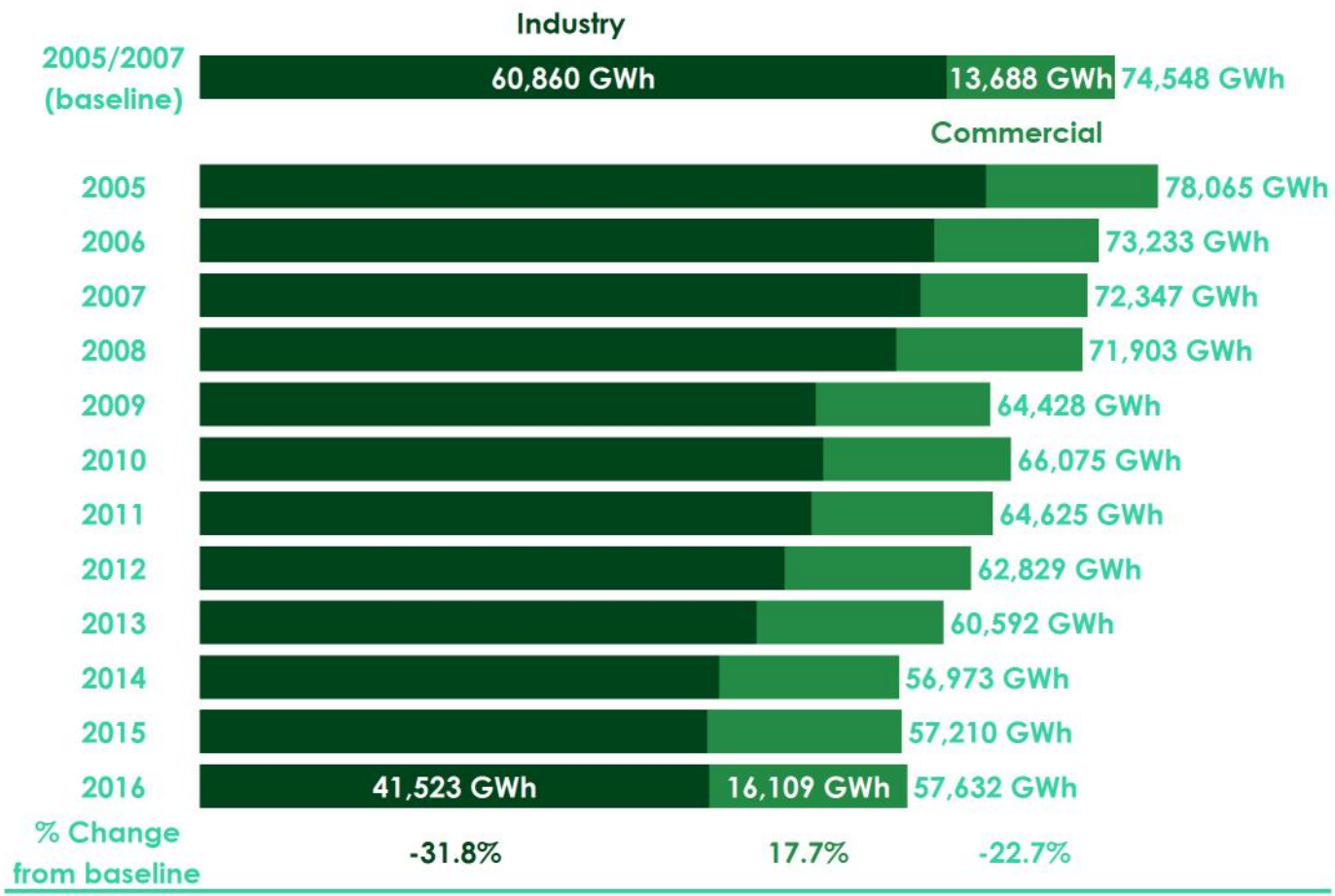

Source: BEIS

# How has Scotland's **energy consumption** changed in the **non-domestic sector**?



## Total final energy consumption industry & commercial estimates

Scotland, 2005 - 2016




Source: BEIS

An estimate has been made of the split between industrial and commercial energy consumption based on a comparison with GB wide figures

These estimates suggest that **industrial** consumption in Scotland has **dropped** by **31.8%** but **commercial** consumption has actually **risen** by **17.7%** compared to the 2005-07 baseline.

This has changed the **profile** of **non-domestic consumption**. For the **2005-07** baseline, **industry** made up an estimated **81.6%** of all **non-domestic consumption**. This has dropped to **72.0%** in **2016**.

# How has Scotland's **electricity consumption changed**?

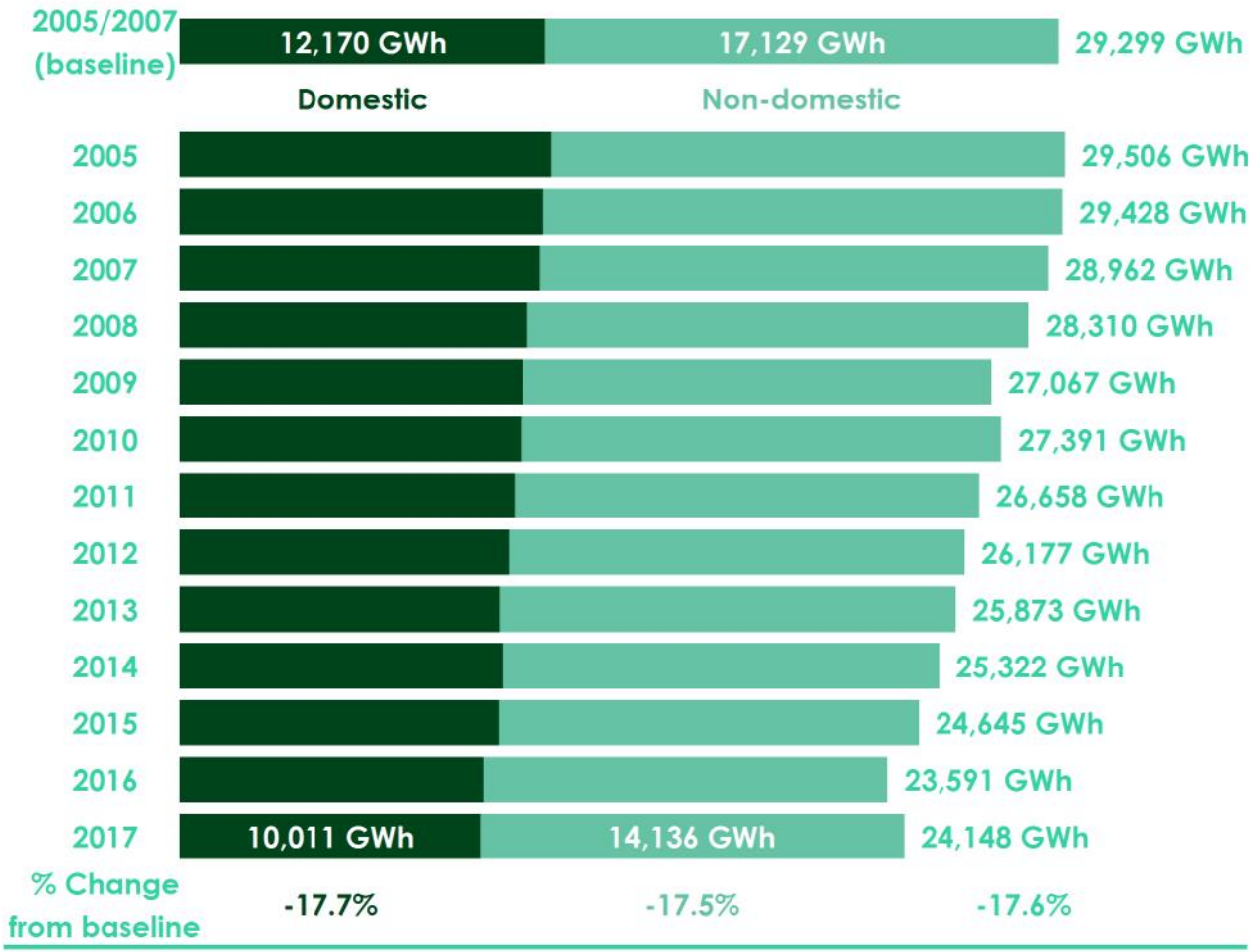
'Elec consump'

**Electricity consumption** has been steadily **dropping** since the 2005-07 baseline, declining by **17.7%** in the **domestic** sector and **17.5%** for **non-domestic**. The difference in electricity used in 2005-07 and 2017 (5,151 GWh) the equivalent of half of the electricity used by Scottish households in 2017.

In **2017**, electricity consumption **increased** on the previous year for the first time since **2010**. This increase is concentrated in the **non-domestic sector**, where consumption increased by **4.8%**.

## Total electricity consumption by sector

Scotland, 2005 - 2017




Source: BEIS

## Non-electrical heat demand by sector

Scotland, 2005 - 2016

Source: BEIS

Reducing heat demand is a key priority identified in the Scottish Government Heat Policy Statement published in 2015.

Non-electrical **heat demand** follows a similar pattern to electricity; consumption has steadily **declined** since the 2005-07 baseline, dropping by **17.3%** in the **domestic** sector and by **19.5%** in the **industrial and commercial** sector. This decline may be a result of improved energy efficiency and rising temperatures.

Like with electricity, heat demand **increased** in **2016** compared to 2015, by over **1,100 GWh**. This was almost all concentrated in the **industrial and commercial** sectors, with heat demand **rising** by **2.0%**.

# How has Scotland's **consumption** of **gas changed**?

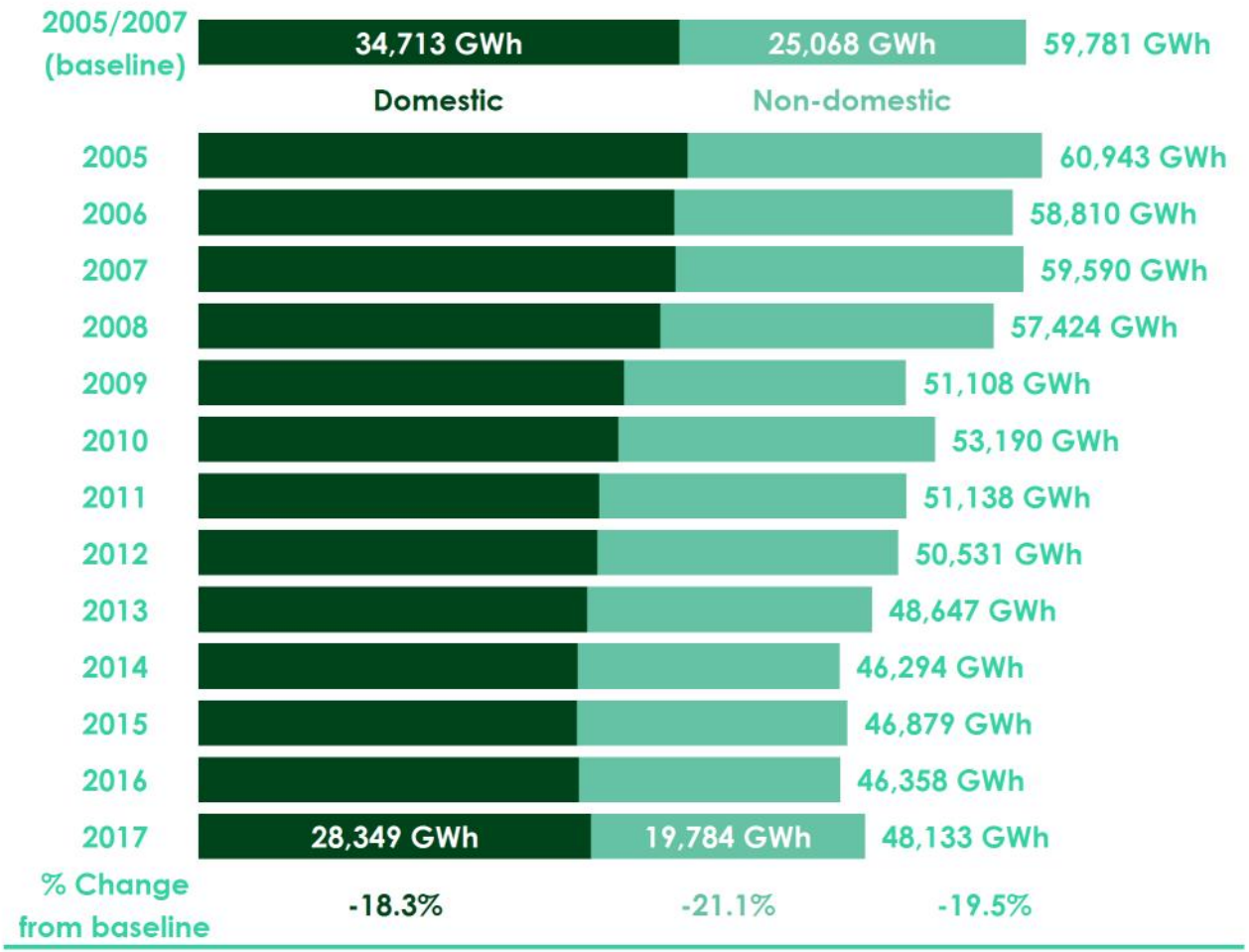


Looking at **gas** consumption specifically, consumption has dropped by **19.5%** overall since the **2005-07 baseline**. The difference in gas consumption between 2005 and 2017 is the equivalent of the **annual gas use** of **933,000 Scottish homes.**

Despite the longer term decrease in gas consumption, it has **increased** in **2017** to its highest level since 2013. Gas consumption rose in the last year in both the **domestic** (**3.2%** increase) and **non-domestic** sectors (**4.7%**).

## Total gas consumption by sector

Scotland, 2005 - 2017



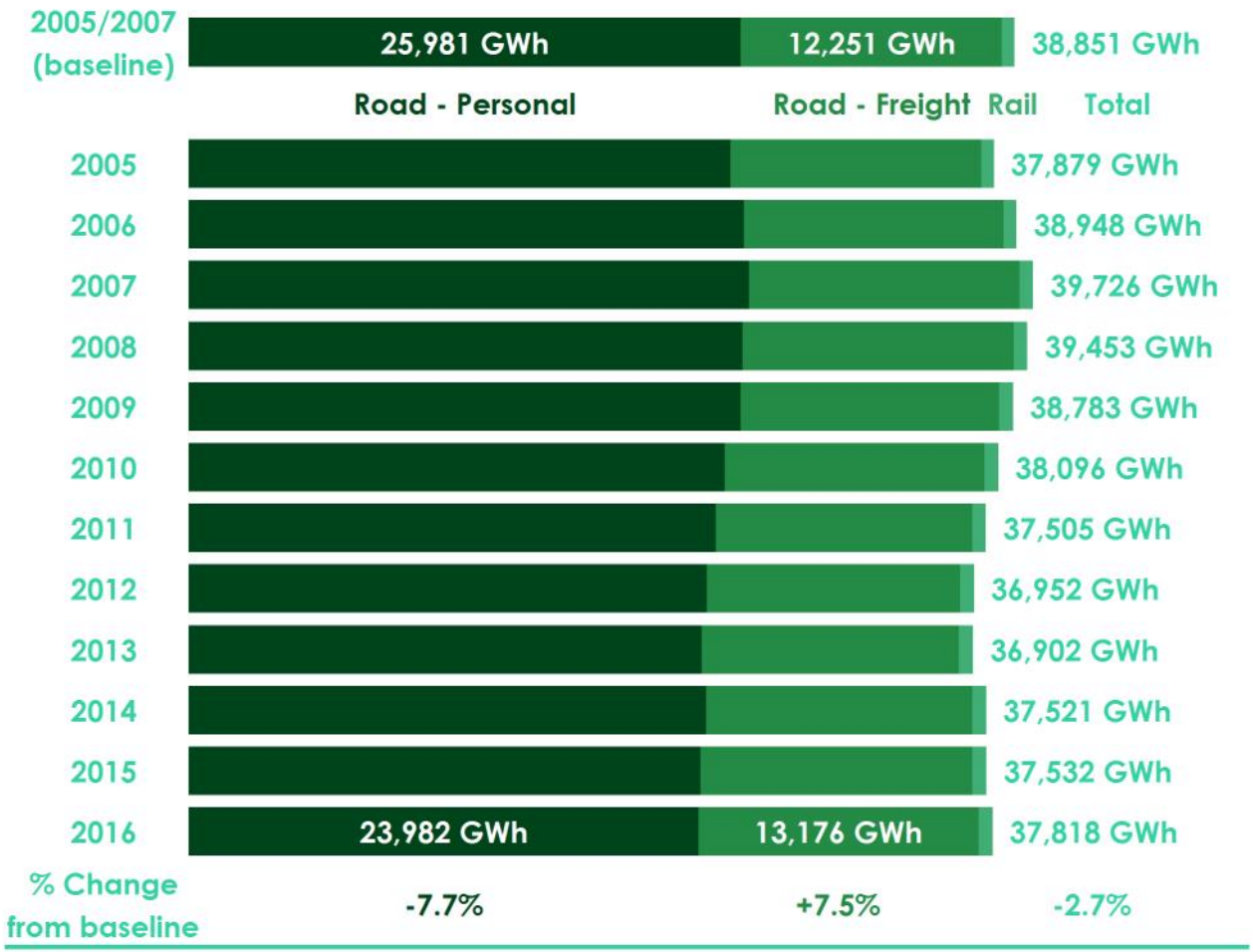

Source: BEIS

# How has Scotland's **consumption** in the **transport** sector **changed**?

'Transport energy consump'

## Road and rail energy consumption

Scotland, 2005 - 2016




Source: ONS, BEIS

While consumption in all other sectors has declined since the 2005-07 baseline, it has remained **similar** in the transport sector, **dropping** by just **2.7%** to **37,818 GWh** in **2016**. The **composition** of Scottish transport energy consumption has changed in this time, however:

- Consumption of fuel for **personal road transport** (buses, cars, motorcycles) has **decreased** by **7.7%**. Conversely **freight** has **increased** by **7.5%**.
- Consumption from **diesel** cars has **increased** by **57.0%**, whereas consumption from **petrol** vehicles has **dropped** by **34.4%**
- Energy consumption from **buses** has **decreased** by **17.5%** but **rail** has **risen** by **6.7%**

# How **energy efficient** are **dwellings** in Scotland?



Energy efficiency levels in the Scottish housing stock are monitored using the Scottish House Condition Survey (SHCS) using the Standard Assessment Procedure (SAP) and expressed as an Energy Efficiency Rating (EER). These ratings are banded from A to G, where A is a very efficient dwelling and G denotes a low energy efficiency dwelling.

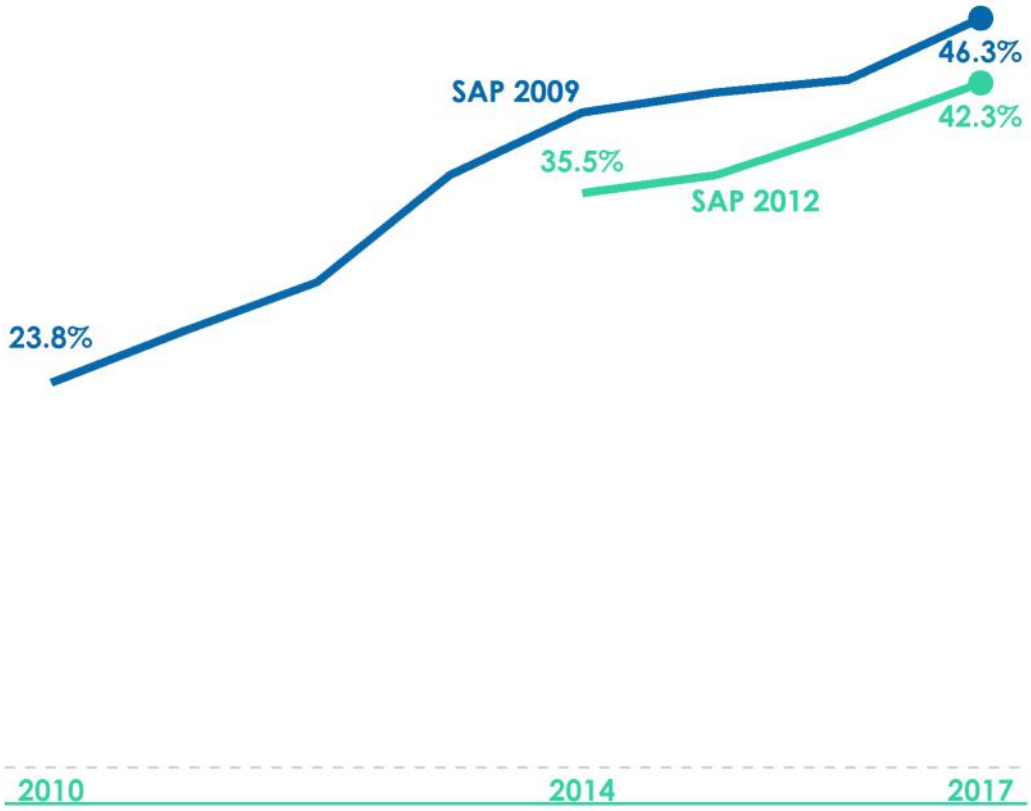
The Scottish Government's Energy Efficient Scotland: Routemap sets an ambition for 'every Scottish home to achieve **at least a band C** in its Energy Performance Certificate (EPC) by 2040 (where technically feasible and cost effective).

The SHCS data shows that in **2017** more than four in ten (**42.3%**) Scottish homes were rated at least **EPC band C** under SAP 2012. This is compared to about three in ten (30.1%) dwellings in England as per the 2017 English Housing Survey.

Under SAP 2009 which allows trends over a longer period to be examined, the proportion of homes that are **EPC band C** or better has almost doubled from **23.9%** in **2010** to **46.3%** in **2017**, showing that the energy efficiency of dwellings in Scotland is improving.

**Proportion of domestic properties rated EPC band C or above**

Scotland, 2010 - 2017

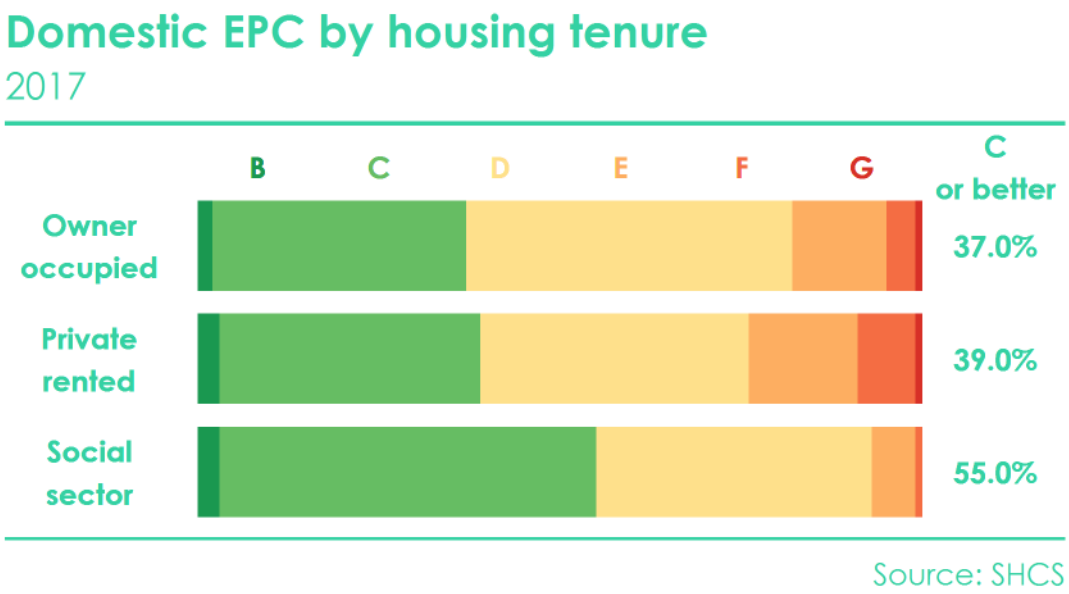



Source: SHCS

# How **energy efficient** are different types of **dwellings** in Scotland?

'Domestic EPCs'

The Energy Efficient Scotland Routemap sets further aims for energy efficiency of domestic properties based on housing **tenure**, which are as follows:




**Maximise** the number of **social rented** homes achieving **EPC B** by **2032**

Social rented dwellings are among the most energy efficient in the Scottish stock, likely to be a result of the characteristics of social sector dwellings – in particular a greater proportion of newer flats which tend to retain heat better than older dwellings and houses – and the improvements mandated under the Scottish Housing Quality Standard (SHQS).

In **2017**, just **3%** of social rented homes are at **EPC band B**, however **55%** are at least **band C**, and this has risen from **49%** in **2015**.

All **owner occupied** homes to reach **EPC C** by **2040** (where technically feasible and cost effective)

In **2017**, **37%** of owner occupied homes were at least **EPC band C**, rising from **33%** in **2015**.

**All private rented** homes to **EPC E** by **2022**, to **EPC D** by **2025**, and to **EPC C** by **2030** (where technically feasible and cost effective)

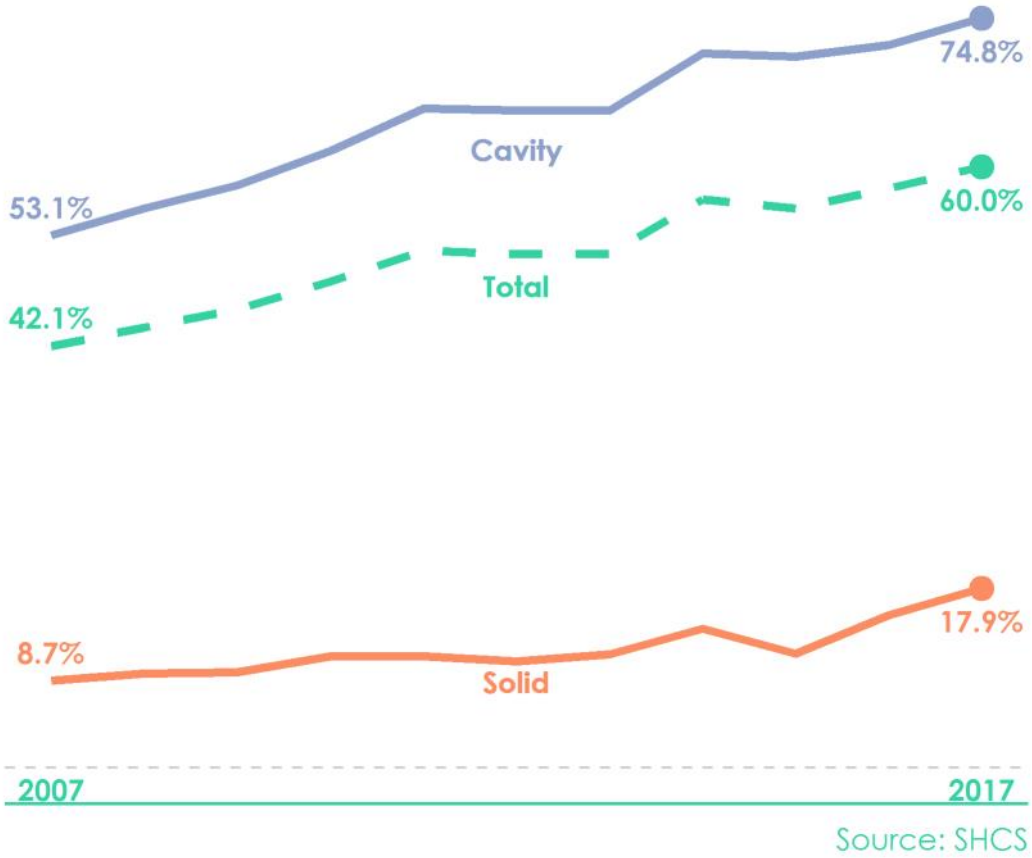
More than nine in ten (**91%**) private rented dwellings are at least **EPC band E**, **76%** are at least **band D** and **39%** at least **band C** in **2017**. There have been no significant improvements in the EPC ratings of private rented homes in recent years. However, according to BEIS analysis using the National Energy Efficiency Data Framework, private renters in Scotland have had the greatest **decrease** in median **gas consumption** from **2011** to **2016**, dropping by **15.4%** compared to 8.8% for socially rented homes and 7.7% for owner occupied homes.

# What impact does **wall insulation** have on energy efficiency?



## Proportion of eligible homes with wall insulation

Scotland, 2007 - 2017




Source: SHCS

In 2017, six out of every ten dwellings (**60.0%**) had some form of **wall insulation**, and this has steadily **increased** each year since 2012. There is a big difference between cavity and solid wall dwellings, however; **74.8%** of cavity wall dwellings have **cavity wall insulation** whereas just **17.9%** of solid wall dwellings have **solid wall insulation**.

We can look at the **impact** of wall insulation in terms of energy consumption and cost savings using BEIS' impact of measures analysis. It looks at savings between the years 2014 and 2016 where wall insulation has been installed in 2015. **Cavity wall insulation** saved Scottish homes an average of **1,100 kWh** or **7.5%** of **energy consumption** and **solid wall insulation** saved **1,600 kWh** or **13.0%** of **energy consumption**.

Cavity wall insulation **reduced** energy consumption by **7.5%** in 2015.

Solid wall insulation **reduced** energy consumption by **13.0%** in 2015.

# What impact does **loft insulation** have on energy efficiency?



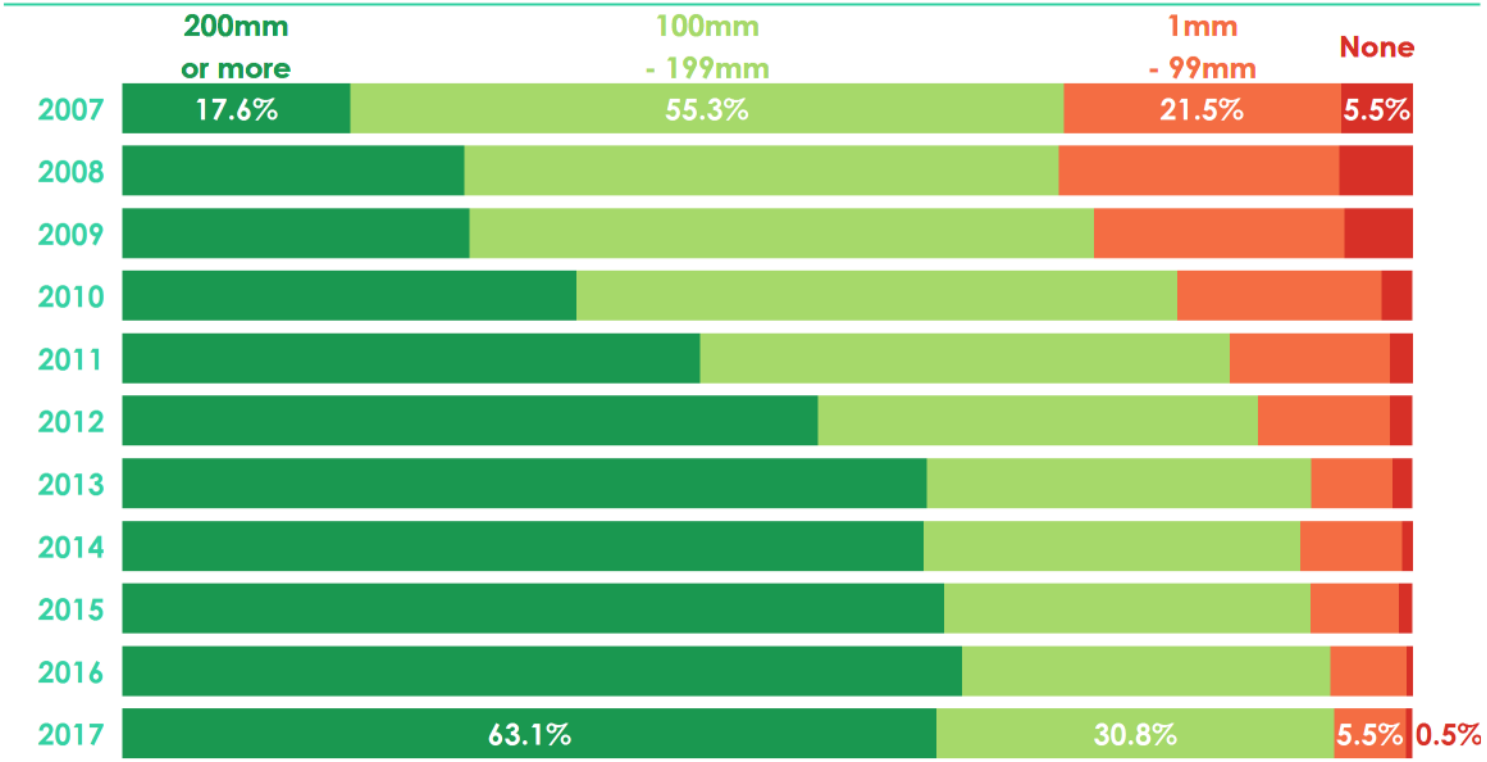
Loft insulation has improved rapidly over the last few years. In **2017**, **93.9%** of Scottish homes were **insulated** to **100mm or more**, up from **72.9%** in **2007**.

Almost two-thirds (**63.1%**) of dwellings have loft **insulation** of **200mm or more**, a substantial rise from **17.6%** in **2007**.

The **impact** of loft insulation in terms of energy saving is not as great as wall insulation; the average **saving** in 2015 for Scottish homes was **300 kWh**, or **2.2%** of energy consumption.

## Proportion of homes with loft insulation, by thickness

Scotland, 2007 - 2017



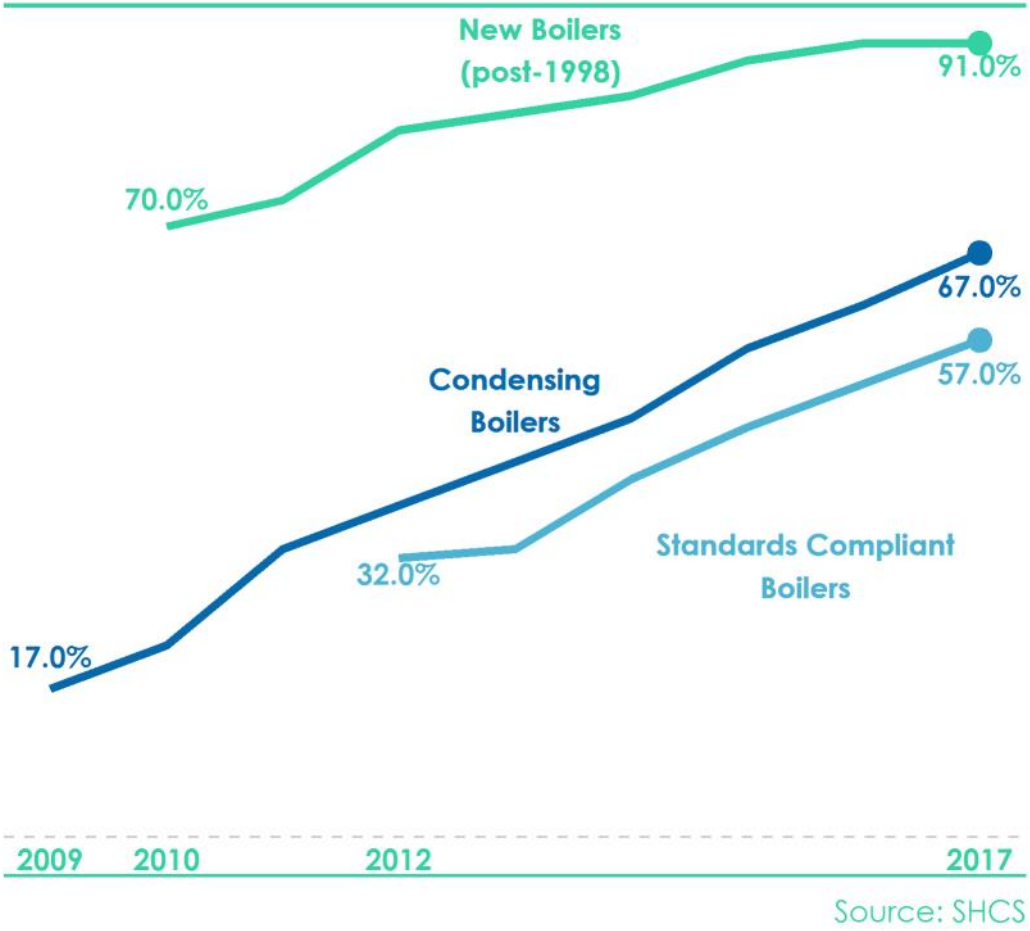

Source: SHCS

Loft insulation **reduced** energy consumption by **2.2%** in 2015.

# What impact do **boilers** have on energy efficiency?

## Proportion of homes with boiler improvements

Scotland, 2009 - 2017




Source: SHCS

Boilers in Scottish homes have been improving rapidly as well. In **2017**, **67%** had a condensing boiler, up just **7%** on **2007**. Almost six in ten dwellings (**57%**) had a **standards compliant** boiler, rising from **32%** in **2012**.

Average **savings** for installation of condensing boilers in Scottish homes are **1,200 kWh** or **7.5%** of energy consumption.

Boiler improvements **reduced** energy consumption by **7.5%** in 2015.

# How **energy efficient** are **non-domestic properties** in Scotland?

'Non-domestic EPC'

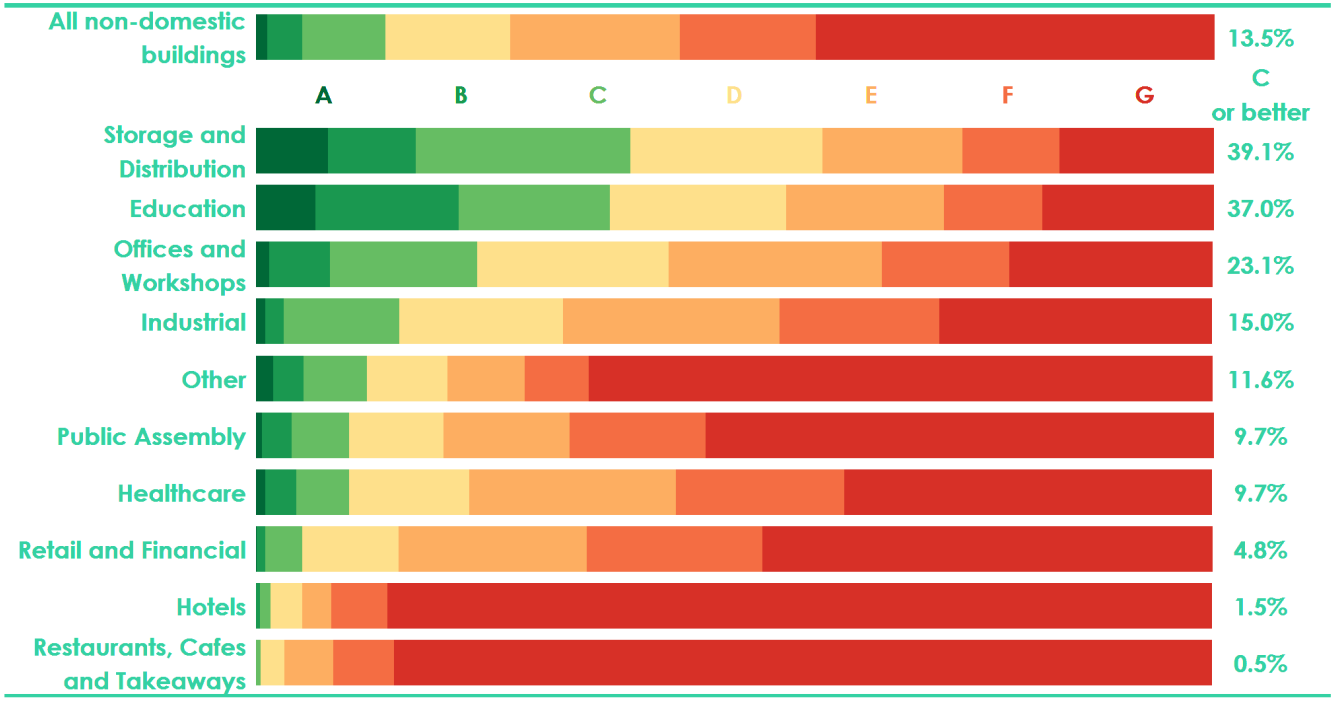
The Energy Efficient Scotland: Routemap sets an objective for non-domestic buildings to be assessed for energy efficiency and improved to the extent this is technically feasible and cost effective by 2040.

The Scottish Government published an analysis of non-domestic EPCs in the Scottish Government's Non-Domestic Energy Efficiency Baseline for the first time in December 2018. It shows that just **13.5%** of **non-domestic** buildings have an **EPC** rating of **C or above**. More than half (**55.9%**) of **non-domestic** properties are **EPC bands F or G**, the least efficient properties.

There are big differences between the energy efficiency of different types of non-domestic properties in Scotland - **storage and distribution** and **education** buildings tend to be the **most energy efficient** (**39.1%** and **37.0%** respectively at EPC band C or above), whereas **hotels** (**1.5%**) and **restaurants**, **cafes** and **takeaways** (**0.5%**) tend to be the **least efficient**.

## Average energy efficiency levels of non-domestic properties, by type

2017




Source: SHCS

EPC ratings for **industrial** buildings are similar to the non-domestic sector as a whole, with **15.0%** at least at **band C**.

# So, how is Scotland performing in terms of **energy efficiency**?

**Scotland's energy consumption** has **reduced** in the last **10-15 years**. Scottish electricity and heat demand has reduced significantly, and this is across the domestic and non-domestic sectors. Energy consumption in transport has not decreased at the same rate.

In recent years though **consumption** has been **increasing**, mainly driven by a **rise** in **gas demand**. Overall energy consumption is still below the 12% reduction which was the previous target for 2020.

Overall decreases in energy consumption have been aided by **improvements** in the **energy efficiency** of buildings. A growing number of homes have **good energy efficiency ratings** (EPCs of at least band C), and Scottish dwellings increasingly **installing** specific energy efficiency measures such as **wall** and **loft insulation** and **improved boilers** which have been shown to **reduce energy consumption**. Further work is required to improve the energy efficiency of non-domestic buildings.

# Consumer Engagement and Protection

**"We will work hard to protect consumers from excessive or avoidable costs, and promote the benefits of smarter domestic energy applications and systems"**

# What is **consumer engagement** and **protection**?

Consumer engagement and protection is about placing the **emphasis** on the Scottish **consumer** and ensuring that they have a **fair deal**. To this end, it is important that consumers are informed, engaged and empowered, and that all consumers have equal access to make changes to the way they consume energy if they so desire.

This section focuses on the following areas:

- **Energy prices**
- **Fuel poverty**
- **Consumer choice** and **switching**
- **Monitoring energy usage** and **smart metering**

# How have **electricity prices** for Scottish consumers changed?

'Electricity bill prices'

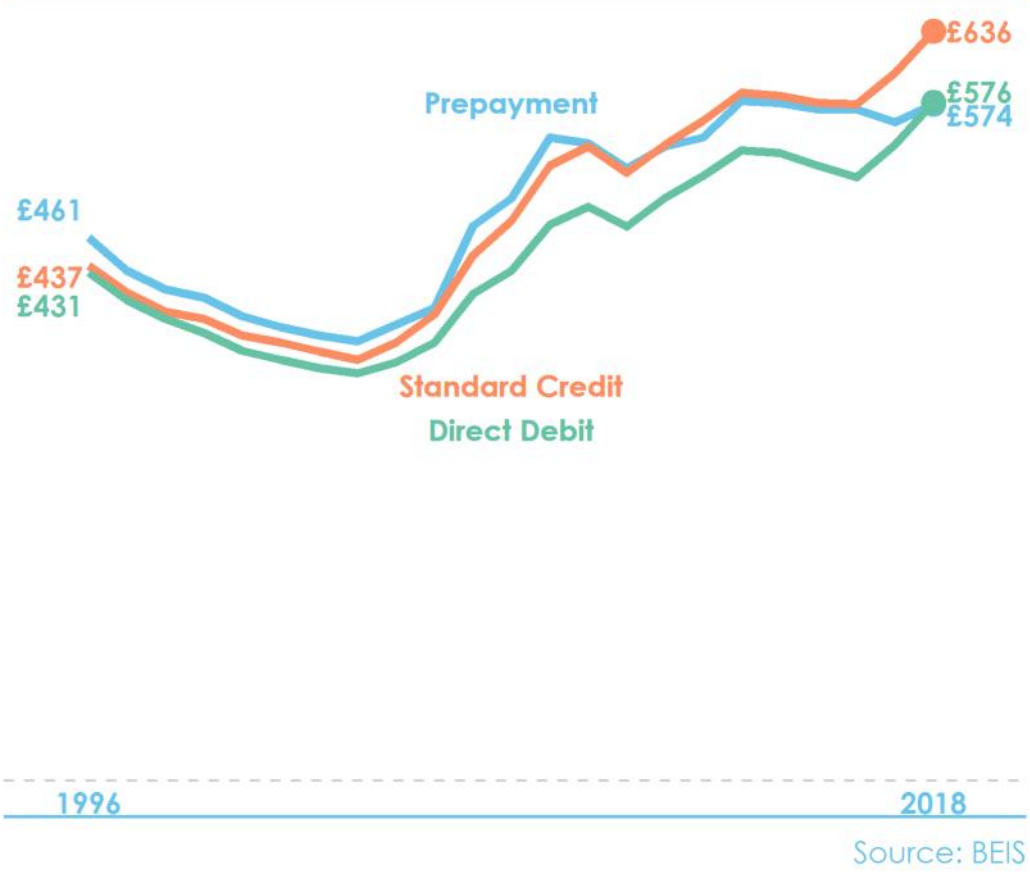
Electricity prices have risen by more than 50% in real teams for all Scottish consumers compared to the early 2000s, with standard credit customer prices increasing by 78.2% from its lowest point in 2003. Prices had **stabilised** recent years, however, in **2018** they **increased** in real terms for all consumers compared to 2017. This is even with the introduction of a **price cap** on energy bills at the start of 2018 for certain groups of customers. Based on real terms, average annual prices increased **most** for **direct debit** customers (**6.6%** increase) and **standard credit** customers (**5.8%** increase). Prices for **prepayment** customers did not increase as much in 2018 (**2.7%**); this may be a result of Ofgem's prepayment price cap that came into force in April 2017.

There are substantial differences in electricity prices between North and South Scotland* – overall, **North Scotland** residents are paying on average **8.3%** a year **more** than **South Scotland** residents. This is likely to be a result of greater costs distributing electricity to remote parts of Northern Scotland.

Prices in Scotland as a whole though are very **similar** to prices for **customers** in **England** and **Wales** across all customer types.

## Average annual domestic standard electricity bills in Scotland (based on 2010 prices)

Scotland, 1996 - 2018




Source: BEIS

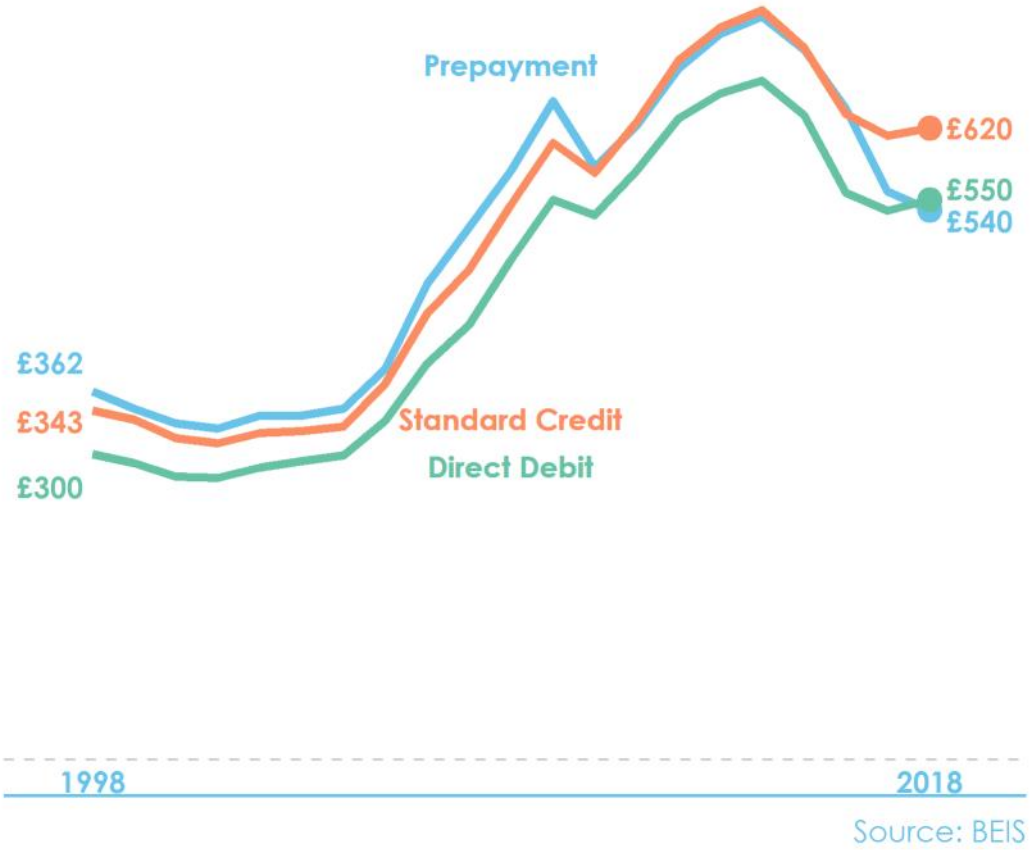
*North and South Scotland refer to the Public Electricity Suppliers (PES) regions. South Scotland includes the central belt

# How have **gas prices** for Scottish consumers changed?



## Average annual domestic standard gas bills in Scotland (based on 2010 prices)

Scotland, 1998 - 2018




Source: BEIS

Like with electricity, average domestic gas prices have **increased** in real terms compared to their **lowest point** in **2001; prepayment** customers' bills have increased by **66.2%** and **direct debit** and **standard credit** customers' bills have almost **doubled**. The cost of gas rose at a faster rate than electricity.

Gas prices have, however, largely **stabilised** in 2018 for all customer types after three successive years of price drops. There are small differences depending on customer type; **direct debit** and **standard credit** customers have had slight **increases** of **2.0%** and **1.1%** respectively, whereas **prepayment** bills have dropped by **3.2%**.

Regional differences in gas prices are very small. **Scottish** customers pay slightly **less** for gas on average than **GB** as a whole, and **North Scotland** customers pay slightly **more** than **South Scotland** customers.

# How many households in Scotland are in **fuel poverty**?

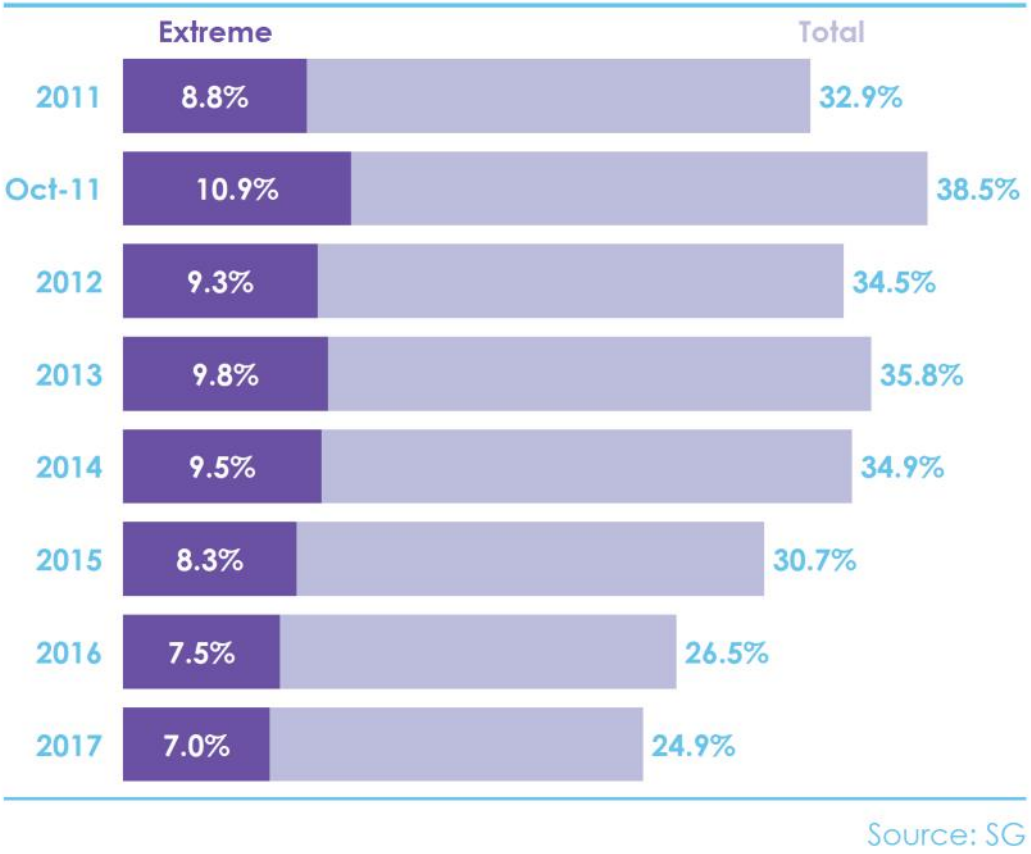
Fuel poverty is the inability to heat a home to an acceptable standard at a reasonable cost. Under the current definition of fuel poverty a household is in **fuel poverty** if, in order to maintain a satisfactory heating regime, it would be required to spend more than **10%** of its **income** on **fuel use**. **Extreme fuel poverty** is defined as a household spending more than **20%**. The fuel poverty definition differs in England and Wales so it is not possible to make comparisons with Scotland.

In **2017**, **24.9%** of all households in Scotland (approximately 613,000) were living in **fuel poverty**, of which **7.0%** (approximately 174,000) were living in **extreme fuel poverty**. The fuel poverty rate in 2017 is the lowest rate recorded since 2005/06.

Households who have **gas** as their primary fuel type are significantly less likely to be in fuel poverty. Just **19%** of gas households are in fuel poverty, whereas half (**52%**) of households that use **electric** heating are fuel poor.

## Rates of fuel poverty and extreme fuel poverty

Scotland, 2011 - 2017



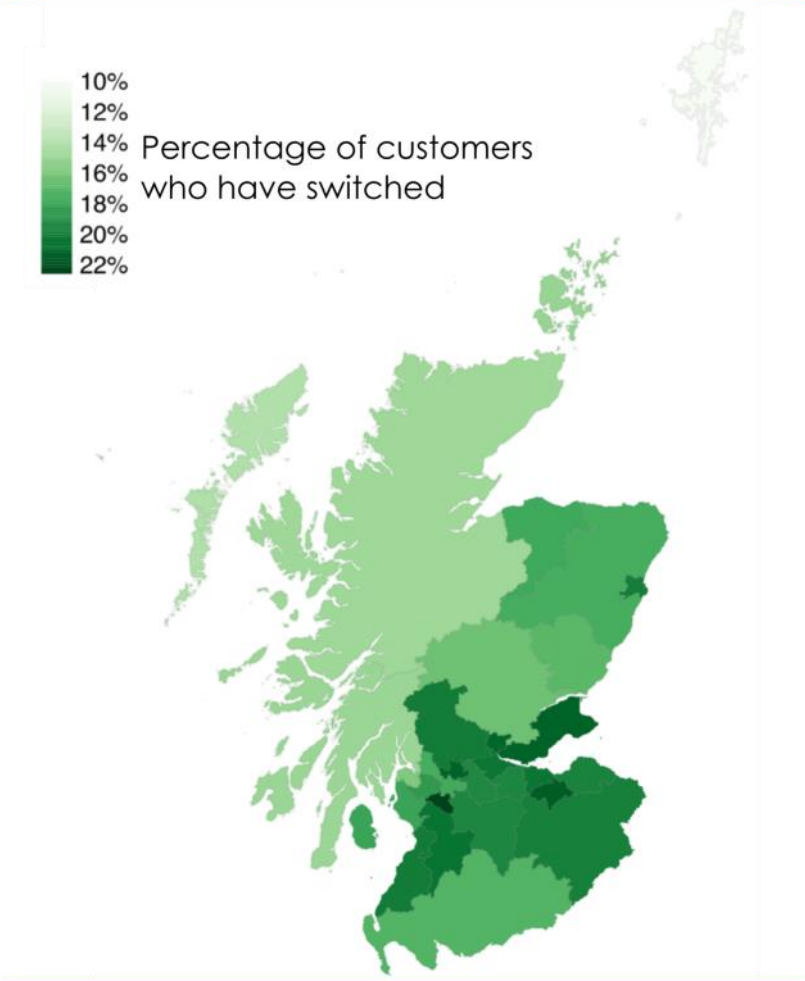

Source: SG

Energy efficiency of homes is closely linked with fuel poverty; just **13%** of households with an **EPC band** of **B or C** are fuel poor, compared to **26%** at **band D**, **46%** at **band E** and **69%** at **bands F or G**. The Energy Efficient Scotland Routemap sets the aim for all homes with households in fuel poverty to reach EPC C by 2030 and EPC B by 2040 (where technically feasible and cost effective).

# How **engaged** are Scottish consumers with their **energy supplier**?

## Consumers that have switched electricity supplier, by local authority

Scotland, 2018




Source: Electralink

Fostering the idea that consumers have choice with their suppliers and take a proactive approach with energy is a key aspect of consumer engagement. Not all customers are in a position to do this.

**Switching** is a key aspect of this. According to data from Citizen's Advice Scotland and Electralink, **18.6%** of Scottish consumers switched their **electricity** supplier in **2018**. There are big regional differences, with a greater proportion of people living in local authorities in the **South of Scotland** switching their electricity supplier. East Renfrewshire has the highest proportion of customers who have switched (22.4%), while Shetland has the lowest (9.9%).

Scottish consumers are, however, **less likely** to switch their energy supplier than consumers across the **rest of Britain**. According to Ofgem's 2018 Consumer Engagement Survey, **48%** of Scottish consumers say they have **never switched** their **electricity** supplier and **53%** say they have never switched their **gas** supplier. This is compared to **36%** and **39%** respectively for **Britain** as a whole. This suggests that while there may be a pocket of consumers in Scotland that are engaged enough with energy to switch, there is a large proportion that may not be.

The main **reason** given by consumers for **not switching** supplier or tariff in the last twelve months is a view that the **existing supplier** is **satisfactory** (**37%**), followed by a belief they get **good service** from their existing provider (**15%**). Both reasons are significantly higher among Scottish consumers than British consumers as a whole (32% and 6% respectively).

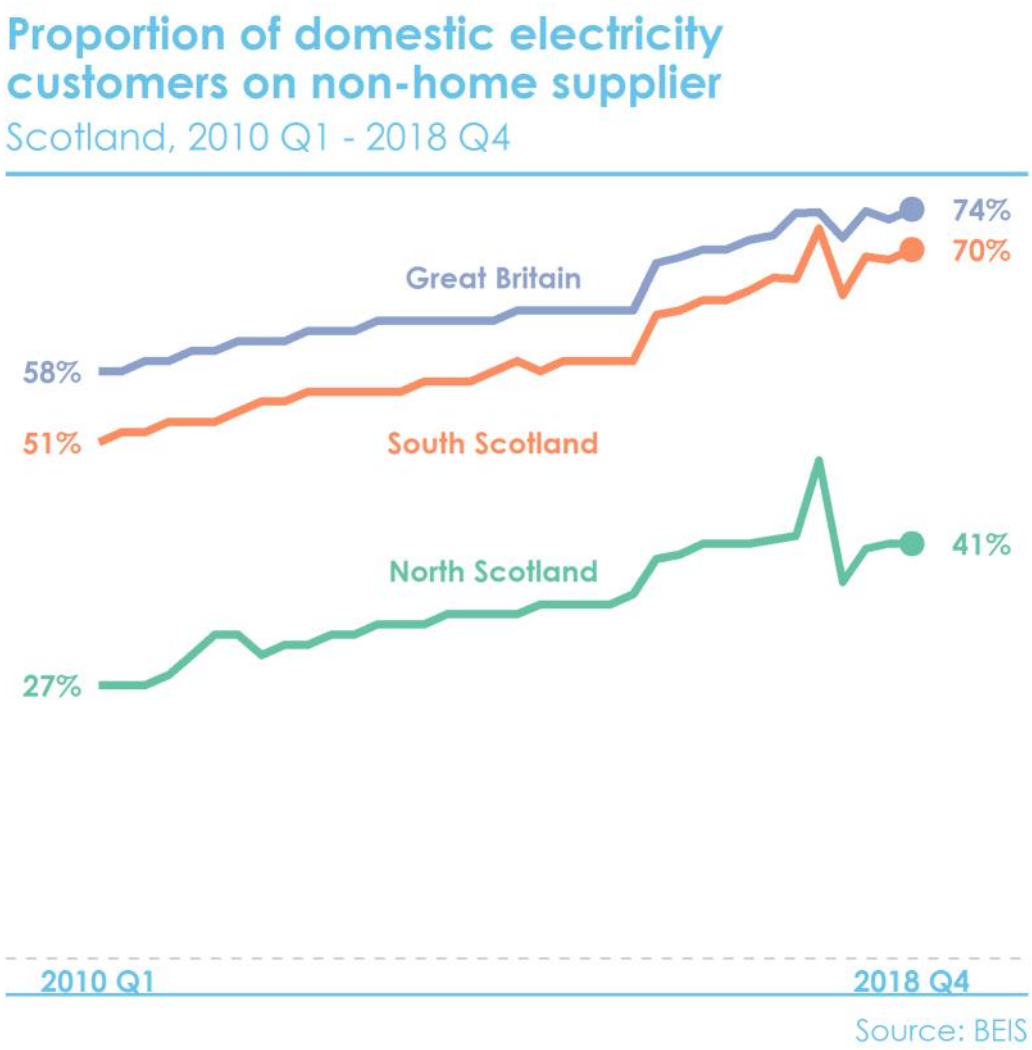
# How **engaged** are Scottish consumers with their **electricity supplier**?

'Non-home supplier elec'

Further insight into how the Scottish public engage with energy comes from examining those that are with their **'home' supplier** and those that are not. Home suppliers are the **former incumbent** suppliers – for electricity it is **Scottish Power** for **South Scotland** and **SSE** for **North Scotland**. While this does not exactly tell us about switching, it does suggest the level of engagement and proactivity the Scottish public have with their energy suppliers.

For **electricity** there is a divide between North and South Scotland – the majority (**59%**) of people in **North Scotland** are with their **home** supplier, whereas most in **South Scotland** are **not** (**70%**). The majority (74%) in Great Britain as a whole are not with their home supplier, similar to South Scotland. There has been a steady **movement away** from **home suppliers** over time in both North and South Scotland, suggesting that over time customers may have been more engaged to proactively move away from their home supplier.

**Direct debit** customers in Scotland are most likely to choose a **different supplier** than their home supplier, whereas **standard credit** customers are more likely than average to **stick** with their **home supplier**.

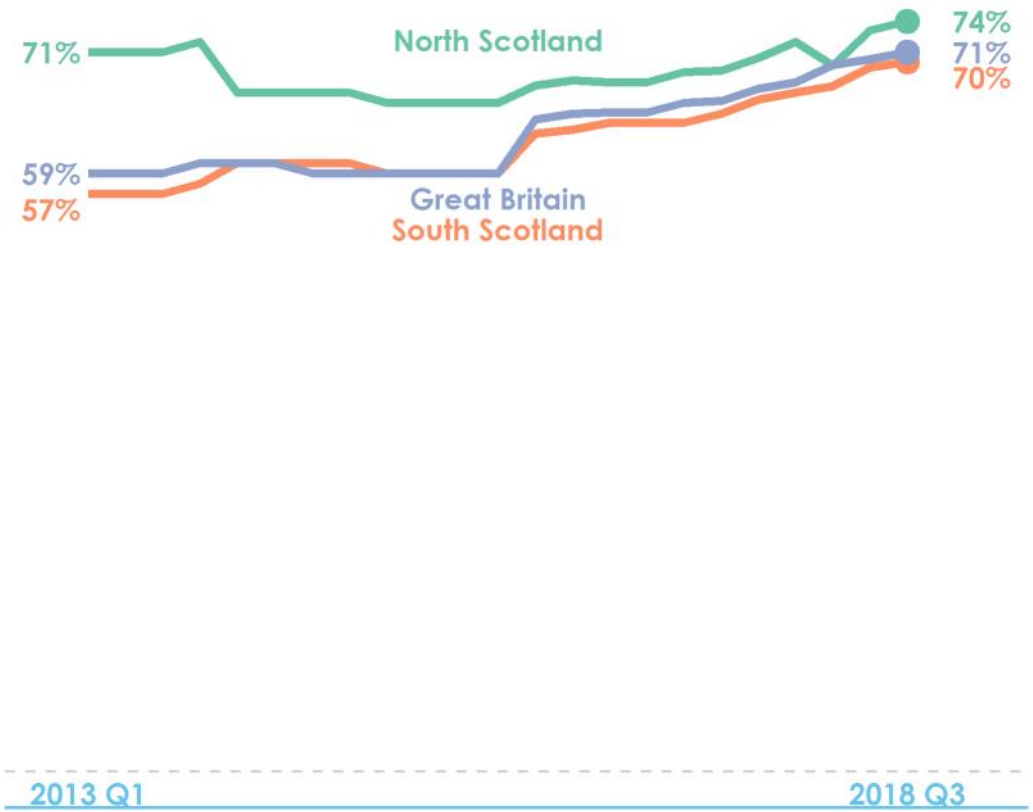


# How **engaged** are Scottish consumers with their **gas supplier**?



## Proportion of domestic gas customers on non-home supplier

Scotland, 2013 Q1 - 2018 Q3




Source: BEIS

Unlike electricity, when the gas sector was privatised in the 1980s there was only one gas supplier across the whole of Britain - British Gas. Over the past three decades greater competition has been introduced and there has been a trend for consumers to change to alternative suppliers. This trend is seen in both north and south Scotland, and in the rest of GB. More than seven in ten customers in both **North** (**75%**) and **South** (**71%**) Scotland are **not with** their **home provider**. This has remained fairly stable for the last few years for North Scotland customers, whereas the proportion of South Scotland customers not with their home supplier has steadily risen from 57% in March 2013. Again, **credit customers** in Scotland are most likely to be with their **home** suppliers.

# How much do Scottish consumers **monitor** their **energy use**?

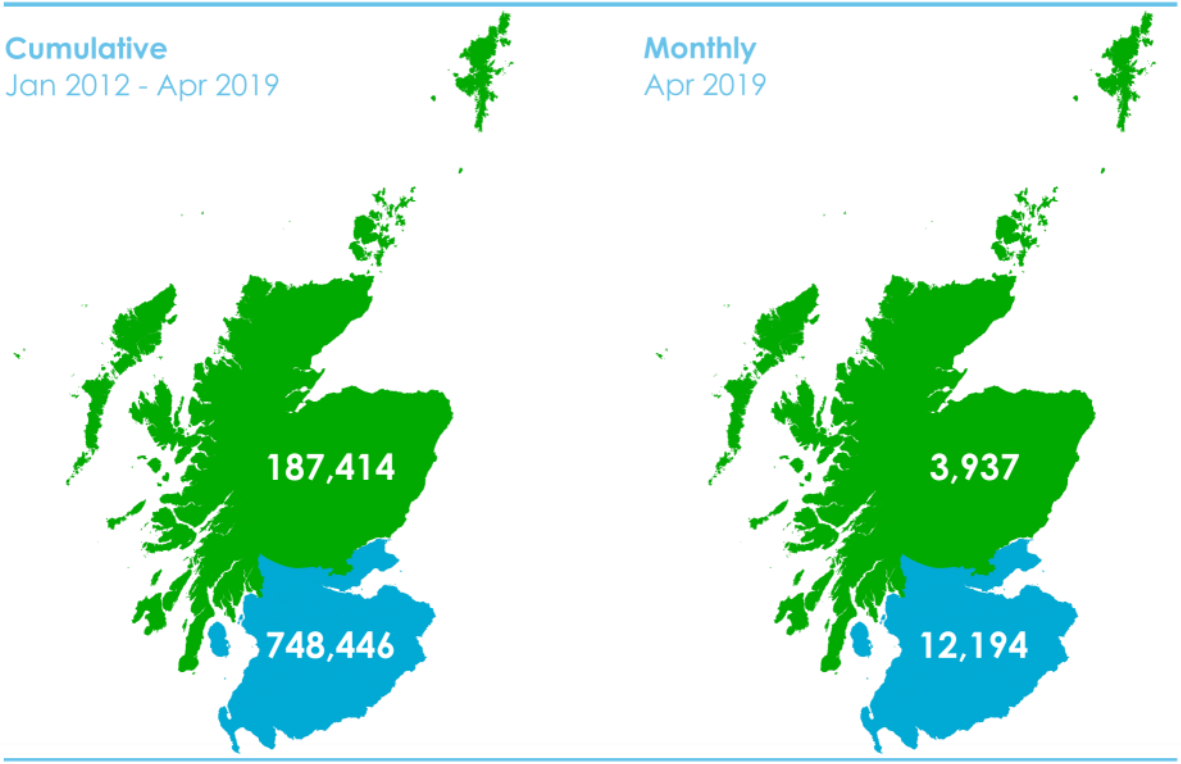
Scottish consumers have been **increasingly monitoring** their **energy usage** in the last ten years. According to the SHCS, the proportion that say they **closely monitor** their energy usage has **increased** from **44%** in **2008** to **54%** in **2017**. This includes **17%** who report they monitor it **very closely**. Those who say that they **do not monitor** their usage at all has dropped from **31%** to **24%** in the same period.

The UK Government has required supply companies to offer **smart meters** to their customers to enable them to monitor their energy usage. As of the end of April 2019, almost **936,000** smart meters have been installed in Scotland, including more than **66,000** in **2019** to date. Eight in ten (**80.0%**) of all of Scotland's smart meters are installed in homes in **South Scotland**.

There is evidence to suggest that having a smart meter can make consumers **more aware** of their **energy use** and make energy saving changes as a consequence. According to Ofgem's Consumer Engagement Survey, of Scottish consumers that have a smart meter, almost seven in ten say they **use less energy** (69%), **turn lights off more** (67%) and **keep a thermostat at a lower temperature** and six in ten say they **use certain appliances** or devices **less often** (61%).

## Smart meter installations

Scotland




Source: Electralink

# So, how is Scotland performing in terms of **consumer engagement** and **protection**?

The environment for the Scottish energy consumer continues to change:

- **Electricity** and **gas prices** have **risen** substantially in real terms from the **early 2000s**. There is some evidence of **prices stabilising** for Scottish consumers, and this may be as a result of the introduction of a price cap.

- With this backdrop, the number of Scottish households in **fuel poverty** continues to **drop**, with one quarter of households deemed as fuel poor.

- Scottish consumers demonstrate engagement with their energy supplier, with almost **one fifth** of Scottish consumers having **switched** their electricity supplier in **2018**. An increasing number of Scottish consumers are not with their home supplier for their region for electricity and gas. However, the Scottish consumer seems to be **less likely to switch** their energy supplier than those in the **rest of Britain**.

- Geography seems to play a role in the differences in experiences of Scottish consumers. Those in **North Scotland** are **paying more** for their electricity and gas than consumers in **South Scotland**. **North Scotland** electricity customers are more likely to **stick** with their **home supplier** than in **South Scotland**.

- The Scottish consumer is **more proactive** than they used to be in terms of **monitoring** their **energy usage** with more than half saying that they monitor it closely. Smart metering continues to be rolled out across Scotland for this purpose with almost **920,000 smart meters installed** in the last seven years.

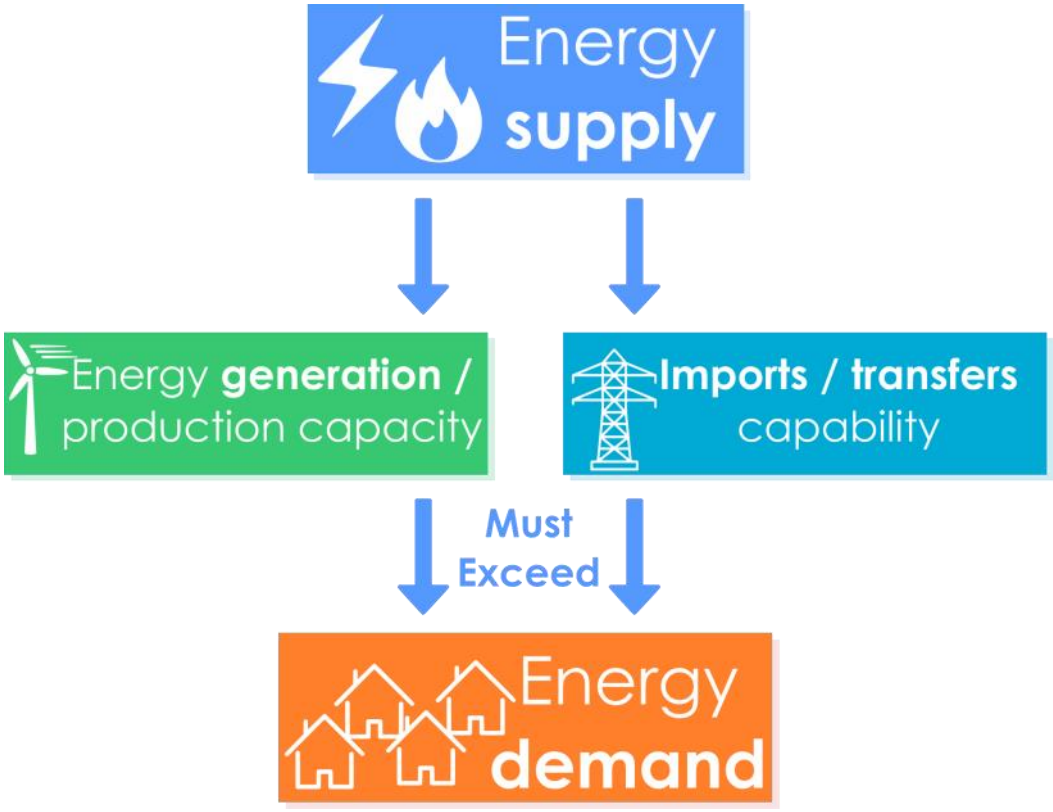
# System Security and Flexibility

**"Scotland should have the capacity, the connections, the flexibility and resilience necessary to maintain secure and reliable supplies of energy to all of our homes and businesses as our energy transition takes place"**

# What does **system security** and **flexibility** mean?

System **security** is having confidence in being able to **meet energy demand at all times** for both electricity and gas. Supply capability is a combination of domestic generation capability or production capacity and the capability of the networks to securely transfer energy into Scotland. In order for the system to remain secure, supply capability must be greater than demand.

**Flexibility** is about having **resources** which can be called on quickly in **response** to **changing conditions** by either an increase or decrease in their generation, production, demand or storage of energy.




This section focuses on the following areas:

- **Britain's security of supply** as a whole
- Scotland's **security** and **flexibility** for electricity, including:
  - Scotland's **energy demand**
  - Scotland's **total electricity capacity**
  - How **supply** and **demand compare**
  - The extent to which Scotland can **meet demand** via its **own generation**
  - **Imports** and **exports**
- Scotland's **security** of supply for **gas**

# How is Scotland performing in terms of **system security** and **flexibility**?

As electricity and gas networks operate across Britain as a whole, Scotland's security of supply in its own right is interconnected with the bigger picture of security of supply across **Britain**. This means that to have confidence that the Scottish system is secure, we first need to have confidence that the wider GB system is secure.

**Security of supply** in **Britain** is **strong**:

- The National Grid's Winter Outlook Report published in October 2018 forecast there would be sufficient generation and interconnector imports to meet both electrical and gas demand throughout winter 2018/19.
- In the electricity market, the **loss of load expectation** for winter 2018/19 was **0.001 hours** according to National Grid. This refers to the average number of hours in a year when it is expected that the market alone will not deliver sufficient supplies of electricity to meet demand, and the Electricity System Operator will have to intervene to balance the system. This is well below the reliability standard of **three hours** per year.
- **Gas deficit emergency measures** have not been needed to be deployed this century. This means that the gas market has always been capable of delivering sufficient supplies
- According to Ofgem, there was **one gas deficit warning** issued in **2018**, in reaction to the need to rebalance the system on the 1st March 2018, when the "Beast from the East" weather front hit the UK. This was the first gas warning since 2010. The market responded with reduced demand and increased supply of gas ensuring that the system remained secure.

The Energy Strategy looks at system security and flexibility **within Scotland** itself. Attempting to localise security and flexibility to Scotland raises its own issues; it is not correct to say that if Britain as a whole is secure that Scotland will be secure. For Scotland to be fully secure, **domestic generation** and energy **transferred** to and from the rest of Britain must **exceed** Scotland's **demand**.

# What does Scotland's **energy demand** look like?

'Energy daily demand'

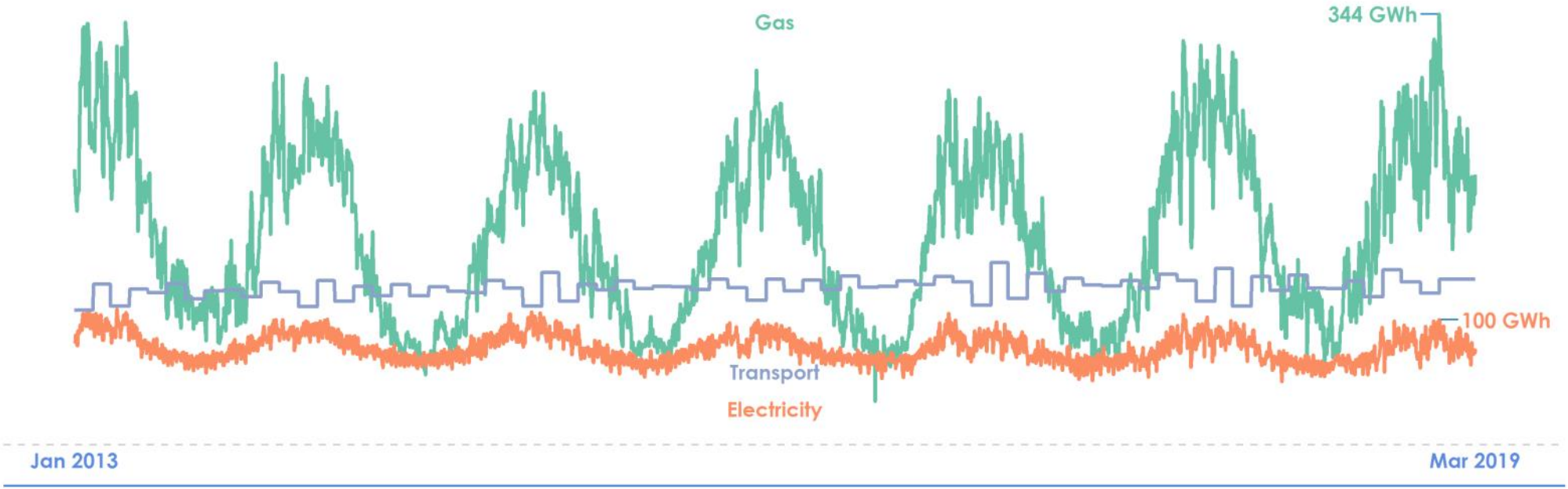
For energy supplies to remain secure, the system must be able to meet **demand** at **peak times**. Hence **seasonality** is key as demand is **higher** in the **winter** than the **summer**. The chart below illustrates this, showing Scotland's energy use on a daily basis from 2013. It shows that **seasonal variations** in the demand for **electricity** are much **smaller** than they are for **gas**.

During the winter of 2018/19 **the peak daily demand** for gas was **344 GWh** (on 31st January 2019). This was almost **six times greater** than the minimum gas demand in summer 2018 (**58 GWh** on 28th July 2018).

In 2018/19, **peak electricity daily demand** (**100 GWh** on the 1st February 2019) was **double** that of **minimum** demand (**51 GWh** on the 20th May 2018).

## Energy use in Scotland per day

Scotland, Jan 2013 - Mar 2019

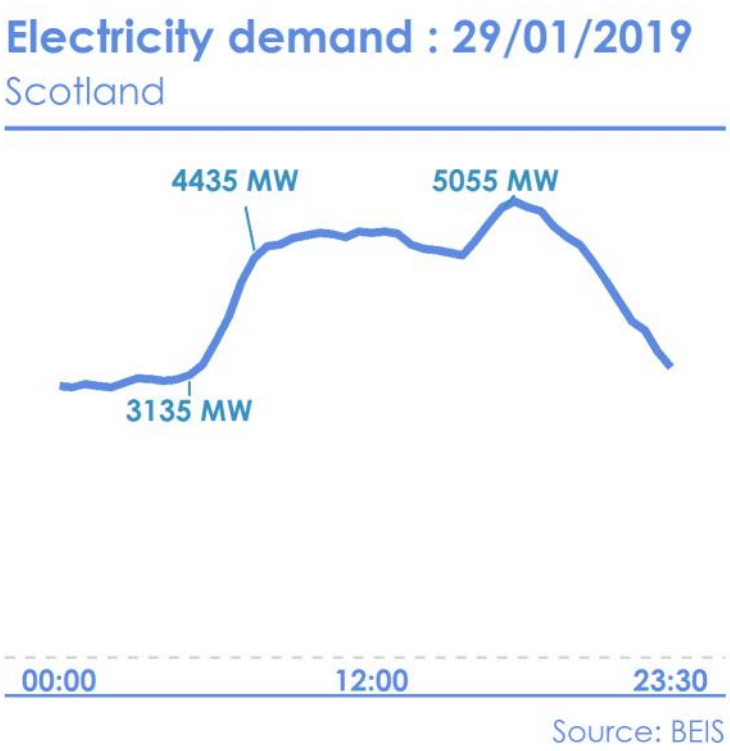


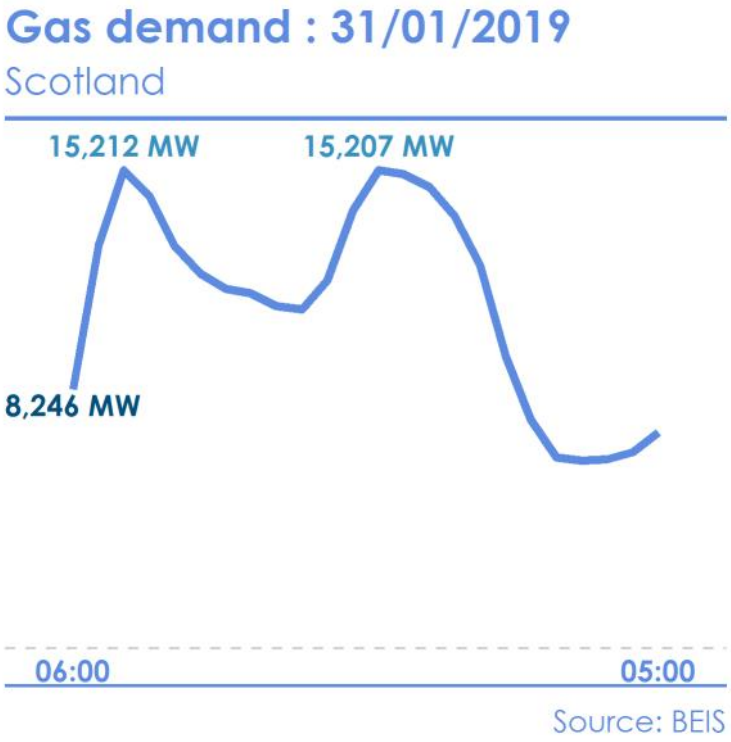

Source: University of Sheffield, National Grid, BEIS

# What does Scotland's **peak demand** for **electricity** and **gas** look like?

The gas and electricity systems must also be able to cope with the **peak instantaneous demand**. This is particularly important for electricity where the system needs to balance generation and demand exactly on a second-by-second basis.

The chart on the right shows electricity demand in half hourly increments for **29th January 2019**, the day in the **winter** of **2018/19** with **peak electricity demand**. The system had to react to a sharp increase in the morning (the 'morning pickup') from **3.1 GW** at **05:00** to **4.4 GW** at **07:30**. It coped with a demand of over **4.5 GW** for a twelve hour period from **08:00** to **20:00**, peaking at **5.0 GW** at **17:30**.




For the day of **peak demand** for **gas** (**31st January 2019**) in the chart on the left, the system dealt with a sharper increase in gas demand in the morning - up from **8.2 GW** to **15.2 GW** between **06:00** and **08:00**. 15.2 GW was the peak demand for gas over the winter of 2018/19. It reached **15.2 GW** again at **18:00** on this day.

# What electricity **capacity** does Scotland have available?

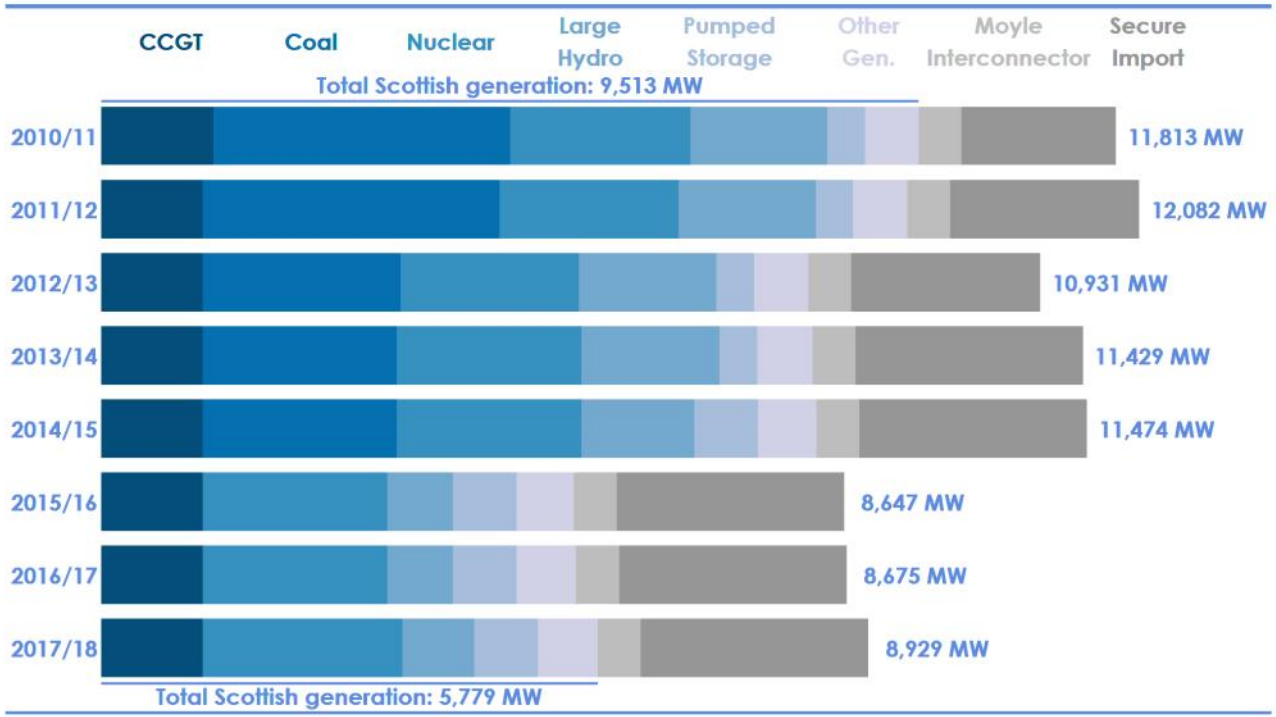
'Elec capacity and peak demand'

From a security of supply perspective it is important to look at the supply capability of the system which can be relied on at times of high demand. As such, the analysis here **excludes** **intermittent renewable generators** including **wind** and **solar**.

Discounting these, Scotland had a maximum supply capacity of **8.9 GW** available in **2017/18**. This breaks down as **5.8 GW** of non-intermittent generation in Scotland and **3.1 GW** of import capability. The main sources of domestic generation capacity are: more than **2.3 GW** from **nuclear** (from Hunterston B and Torness), almost **1.2 GW** from **gas** (Peterhead), **0.8 GW** of **large hydro** plants and **0.7 GW** of **pumped hydro** (Cruachan and Foyers). The **secure import capability** consists of **0.5 GW** of capacity available on the **Moyle interconnector** from Northern Ireland and more than **2.6 GW** of on transmission networks from **England and Wales**. This import capacity refers to what could still be safely imported following major faults on the electricity system. The 2017/18 supply capacity of **8.9 GW** is a big **drop** in **electricity supply capacity** since the **closure** of the **coal power stations** at Longannet in 2016 and Cockenzie in 2011. Maximum supply capacity was **12.1 GW** in **2011/12**.

## Total maximum non-intermittent supply capacity by source

2010/11 - 2017/18




Source: BEIS, National Grid

However, from a security of supply perspective the important comparison is with the level of **peak demand** which is explored on the next page.

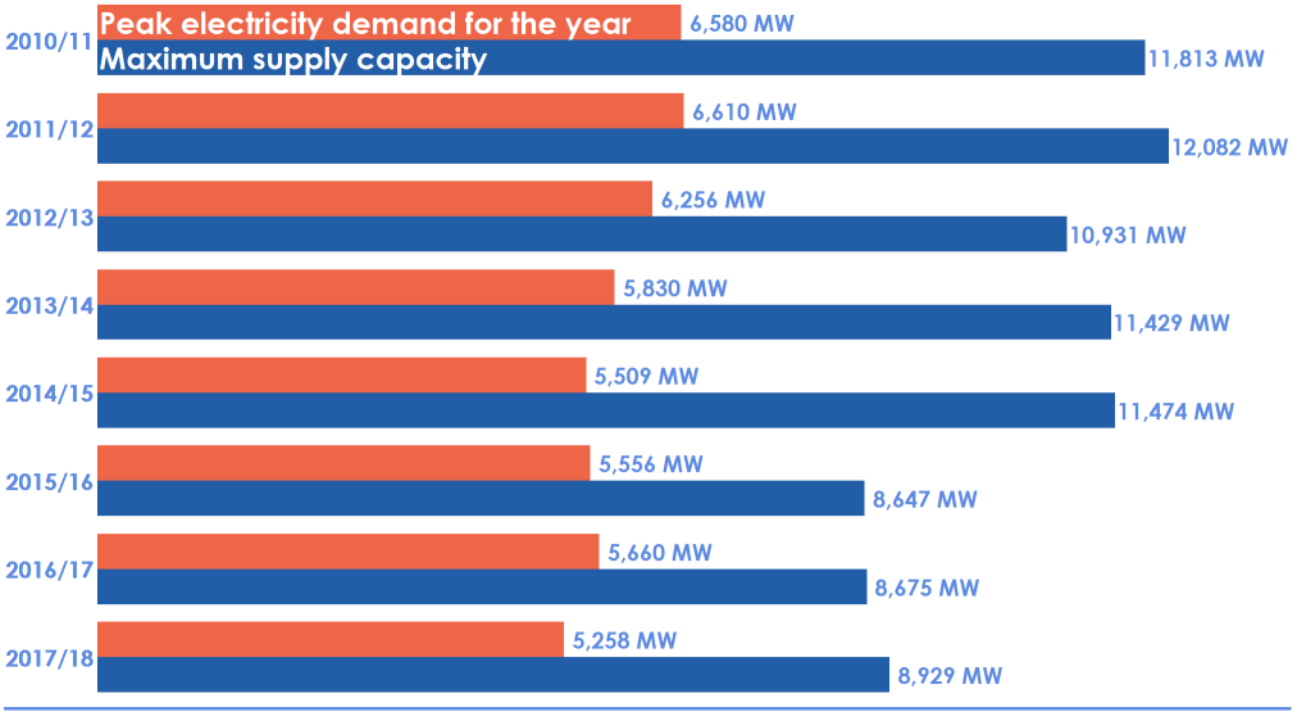
# How does **capacity** relate to **peak demand**?



In the chart, the **maximum supply capacity** has been plotted against the **peak demand** for each year. Scotland's electricity system has remained **secure** in each year in terms of having confidence that we can meet peak demand. Even though Scotland's **maximum supply capacity** has been reduced to **less than 9 GW** for the last three years, this has still been sufficient to cope with **peak demand**, which was **5.3 GW** in **2017/18**.

## Maximum supply capacity and peak electricity demand

2010/11 - 2017/18



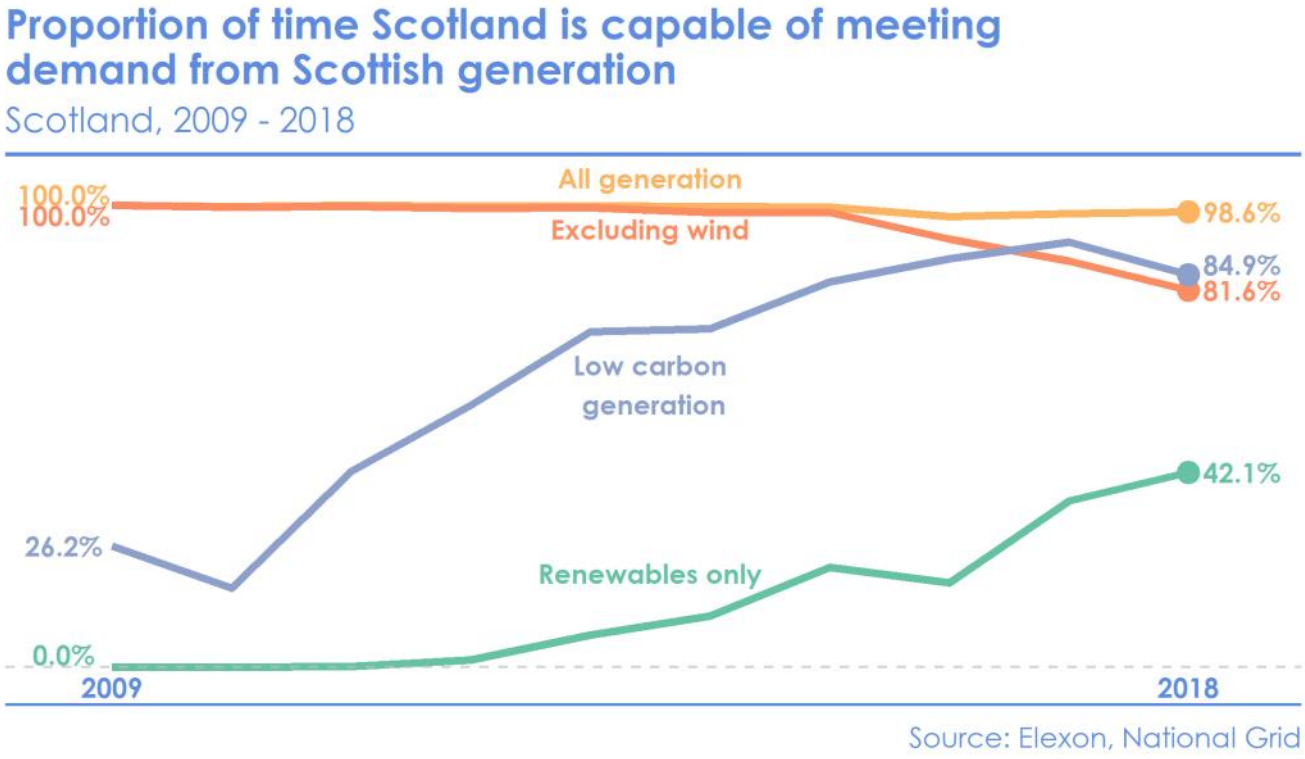

Source: BEIS

# Can we meet Scotland's electricity **demand** via our **own generation**?

Another way we can understand how Scottish and GB-wide security of supply interact is to consider what proportion of the time **Scotland** is able to meet its **electrical demand** from its **own generation**. The chart below shows the proportion of time (based on half hour settlement periods) across the year where **Scottish generation exceeds** estimated **demand**. It shows that for the last ten years, Scotland has almost always met its own electricity demand via its own generation; in **2018**, this was **98.6%** of the time. During the remaining 1.4% of the year - approximately 120 hours, we had the ability to **import** electricity into Scotland. This is an important role for the electricity transmission network.

**Excluding wind**, **Scottish generation met demand** an estimated **81.6%** of the time in 2018. This has fallen from **98.4%** in **2015** after which Longannet closed. These figures suggest that there is at least **some wind** generation for the **vast majority** of the time. Analysis suggests that in **2018**, there was sufficient **wind** across Scotland to generate **at least 200 MW** per half hour for **94.1%** of the time.

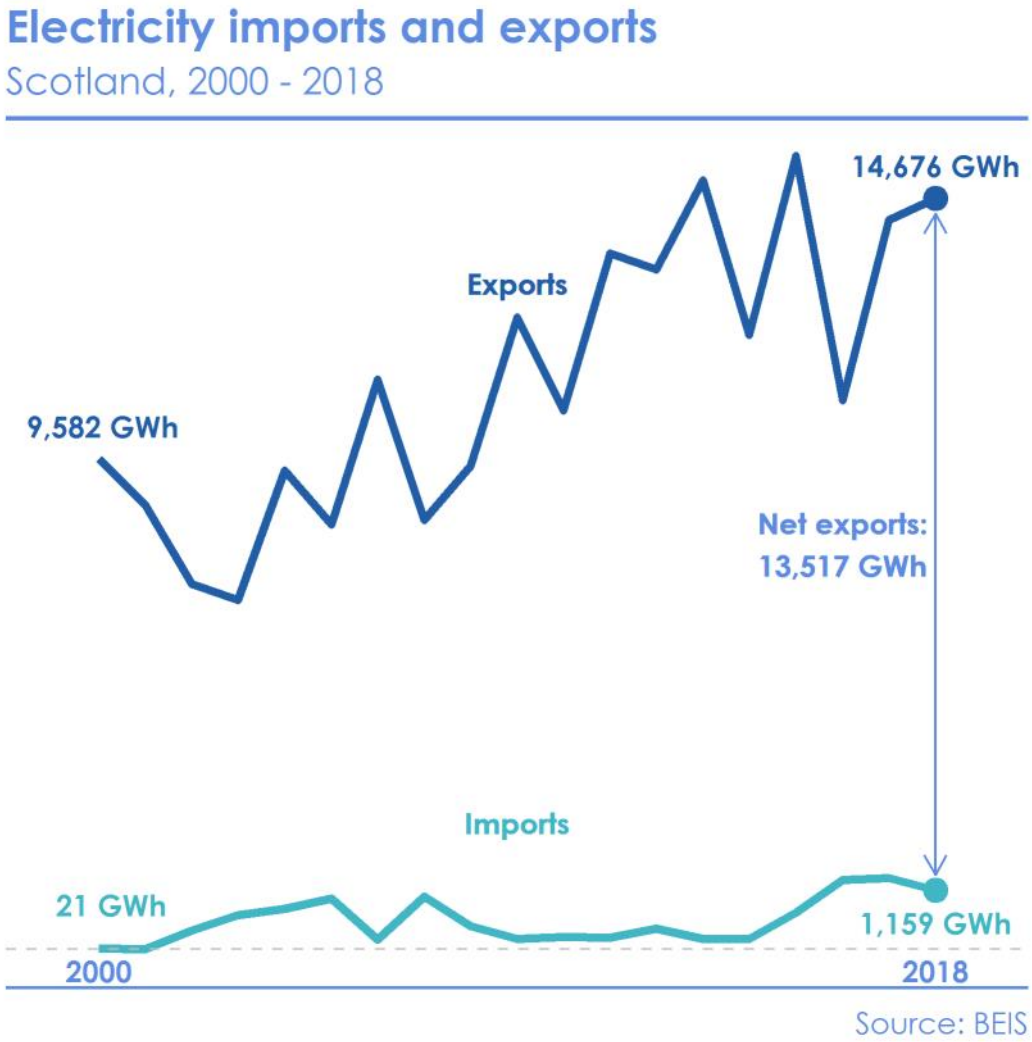
For **84.9%** of the time in **2018**, Scotland **met its own demand** with its **domestic low carbon generation only** (renewables and nuclear), **down** from its peak of **92.0%** in **2017**. This is likely to be related to outages in Hunterston nuclear power station in 2018.




Scotland's rapid rise in renewable electricity generation means that **renewables** alone **met electricity demand** for an estimated **42.1%** of the time in **2018**. This is compared to just **0.1%** in **2011**.

# What about **imports** and **exports**?

'Elec import & export'




The electricity transmission network links Scotland to England and Wales and the Moyle undersea cable links Scotland to Northern Ireland. Throughout the year when **Scottish** electricity **generation exceeds** Scottish **demand** electricity is **exported**. Likewise when **demand exceeds generation** electricity is **imported**.

The fact that Scotland's own supply is secure, and its abundant generation of electricity via wind means that Scotland has long been a **net exporter** of electricity. In **2018**, Scotland **exported 14,676 GWh**, equivalent to powering every household in Scotland for 18 months. This had an estimated wholesale market value of **£853 million** based on wholesale electricity prices across 2018.

In recent years, **imports** have **increased** as well, rising from approximately **200 GWh** in **2014** to almost **1,400 GWh** in **2017**. This is possibly a consequence of the closure of the coal-fired power station at Longannet in 2016, which has meant that there has been a potential need for Scotland to have non-intermittent electricity generation available

# What about Scotland's **security of supply** for **gas**?

For **gas**, demand is **secured** at a **GB level**. GB supplies come from a mixture of North Sea gas fields and imported supplies from pipelines within continental Europe, or from liquefied natural gas from international markets.

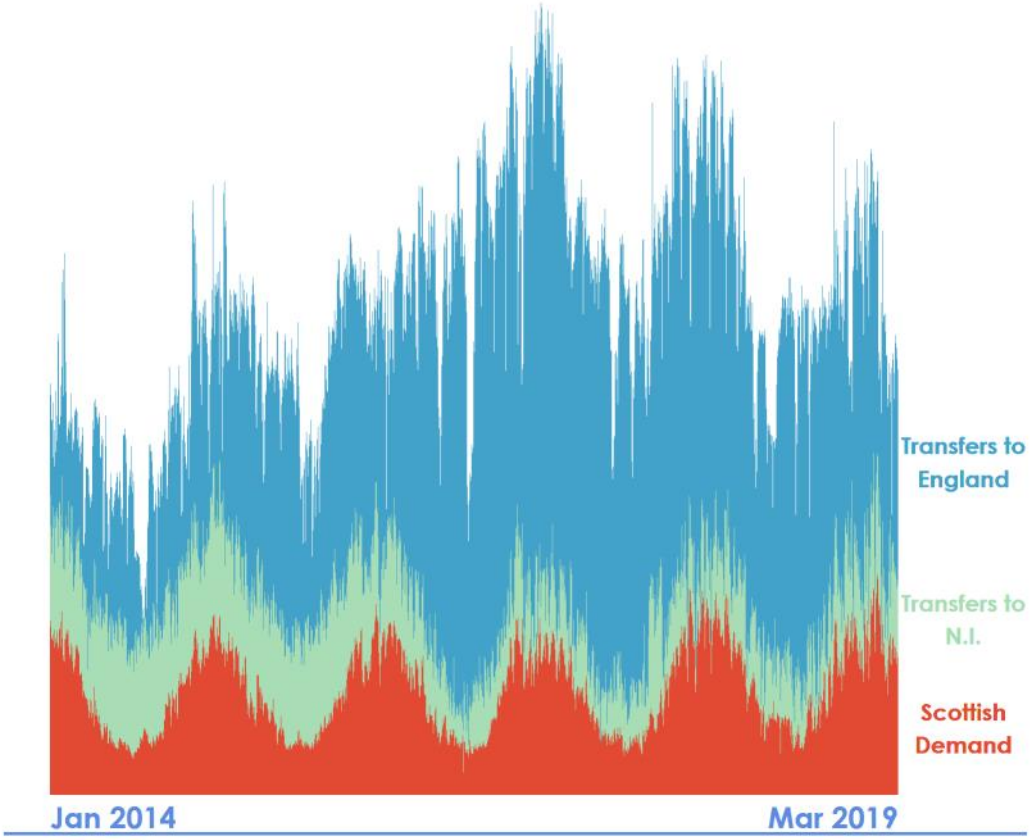
**Gas** physically **consumed** in **Scotland** currently comes entirely from gas that flows into the **St Fergus gas terminal** in Aberdeenshire - approximately **186 TWh** in **2018**. This is more than ample to account for Scotland's gas demand, which comprises less than a quarter (**22.7%**) of all of St Fergus' gas.

In **2018**, Scotland's daily **gas demand ranged** from **8.1%** of gas that flowed through St. Fergus on **28th July** to **43.5%** on the **1st March** - the day when the "Beast from the East" weather front hit the UK.

Imports and domestic supply that are distributed from **St Fergus** accounts for approximately **one third** of **all** of **UK's gas**.

## Gas distribution from St Fergus gas terminal

Scotland, Jan 2014 - Mar 2019




Source: National Grid

# So, how is Scotland performing in terms of **security** and **flexibility of supply**?

**Scotland's electricity** and **gas** supply forms part of the wider **British system**. The Scottish energy system is deemed to be secure when we have high confidence that we can meet energy demand at all times. In other words, **domestic generation capacity** and **secure import capability** must **exceed peak demand** levels.

One way of looking at this is the extent to which **demand** is **met** at **peak times**. Analysis of operational data shows that the Scottish gas and electricity systems are able to deal with the variation in demand, meeting greater **gas** and **electricity demand in the winter** and **rapid changes** in demand **throughout the day**.

Scotland had **8.9 GW** of secure **non-intermittent** electricity supply capacity available in the winter of **2017/18**. This excludes wind and solar but includes **3.1 GW** secure import capability from England/Wales and Northern Ireland. This capacity is sufficient to meet Scotland's **peak demand** which was **5.3 GW** in **2017/18**.

In fact, Scotland's **own electricity generation** is **sufficient** to **meet demand** almost all of the time (**98.6%**), and can do so with **low carbon generation only** the majority of the time (**81.6%**). Scotland's ability to meet its electricity demand via renewable sources is alone is quickly improving as Scotland's renewable fleet continues to grow.

As a result of **Scotland** generating more electricity than it consumes, it is a **net exporter** of **electricity**.

Scottish supply of **gas** is secured via the gas that flows into **St Fergus gas terminal**, which accounts for about a **quarter** of **Scotland's gas demand**.

# Oil and Gas Strengths

**"We will support investment, innovation and diversification across our oil and gas sector, working with industry to advance key priorities such as maximising the recovery of remaining resources"**

# Why are **oil** and **gas** still **important** to Scotland?

While there is increasingly a move to renewable and low carbon alternatives for energy supply in Scotland, fossil fuels still play a role. North Sea oil and gas production are highly regulated, with some of the most advanced and comparatively least-polluting production methods in the world. Maintaining domestic oil and gas production can lead to lower net global emissions than under a scenario where Scotland depends more on imports.

Oil and gas is likely to have continued importance in Scotland's energy mix. The National Grid Future Energy Scenarios suggest that oil and gas will still be a factor in the UK's energy supply in the short-term, albeit with reduced importance. According to the estimates by the Oil & Gas Authority (OGA), the industry regulator, up to 20 billion barrels of oil and gas could still be recovered from the UK continental shelf (UKCS), which could sustain production for at least another 20 years.

This section looks at statistics that show the significance of oil and gas to Scotland in terms of:

- **Production**
- **Consumption**
- **Exports** and **value** to the **Scottish economy**.

# How **important** is **oil** and **gas** in Scotland's energy system?

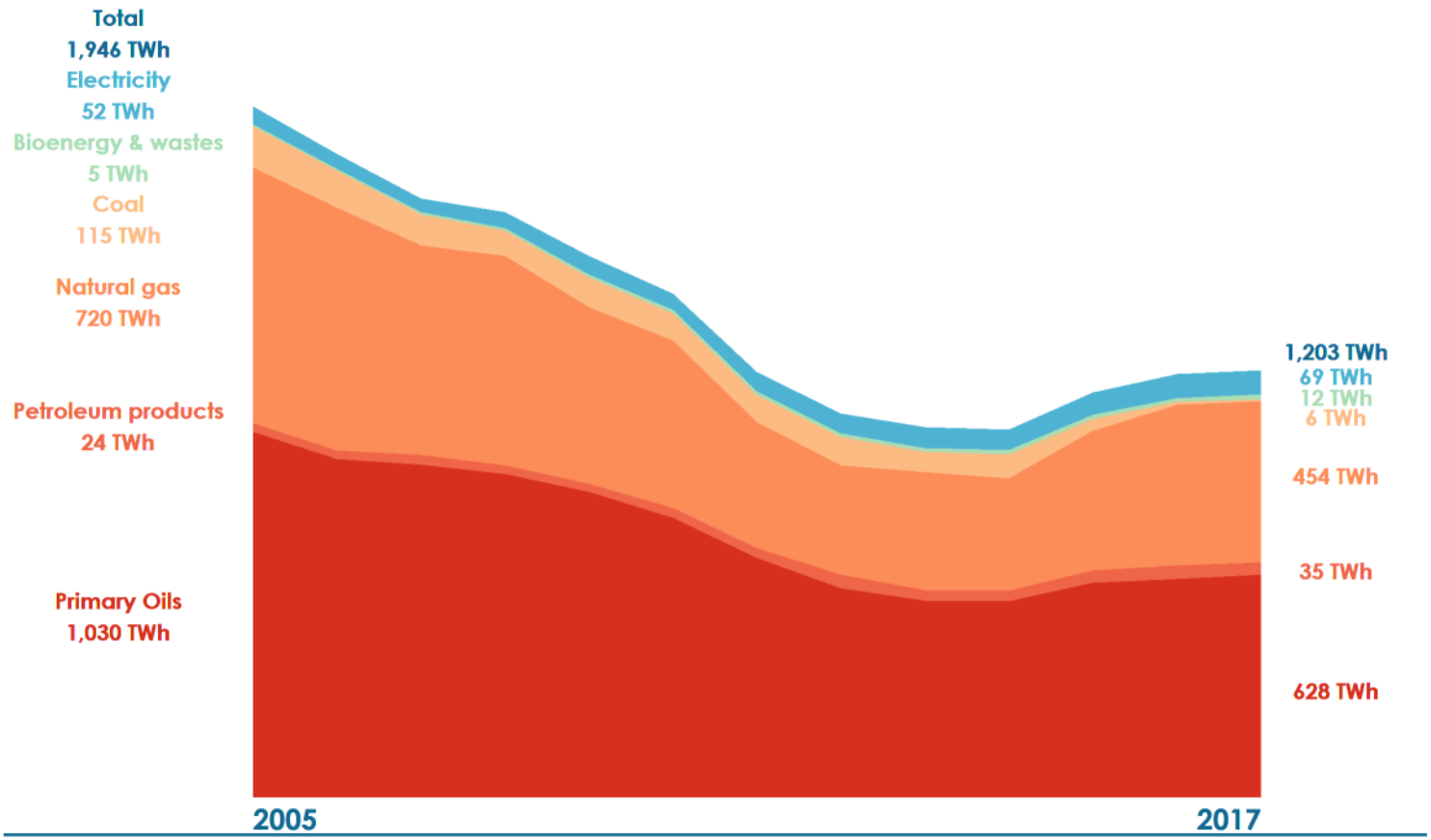
'Primary energy oil and gas'

Oil and gas remains an integral part of Scotland's energy system. The chart looks at the **primary energy** entering the Scottish energy system; this refers to the all the energy produced within Scotland plus all the energy imported into Scotland.

**Oil** accounts for more than half of primary energy (**52.2%**), with **gas** making up **37.7%** and **petroleum products** making up **2.9%** in **2017**. This makes up a total of **92.8%** of Scotland's primary energy (encompassing all of Scotland's indigenous production and imports). This matches 2016 as the highest percentage of oil and gas as a proportion of Scotland's primary energy, which may be explained by the fall in coal as a source of primary energy in the last two years.

## Distribution of primary energy (indigenous production and imports)

Scotland, 2005 - 2017



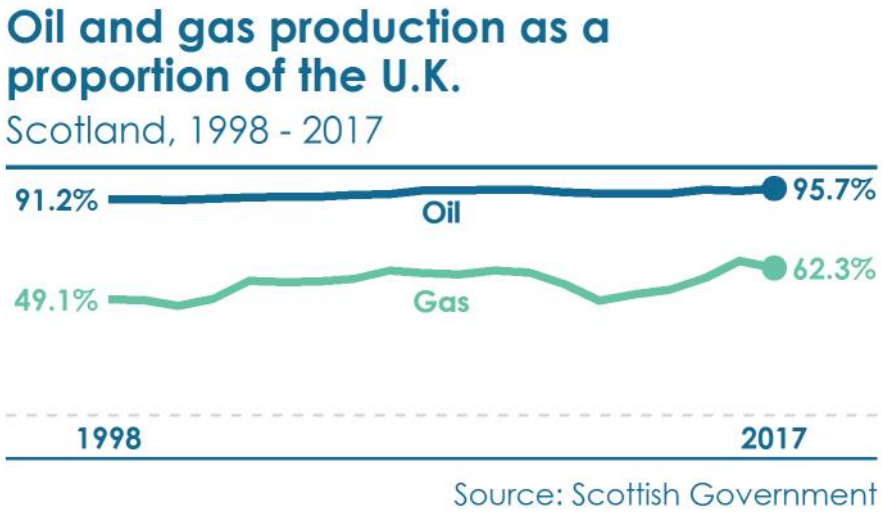

Source: BEIS, SG, HMRC

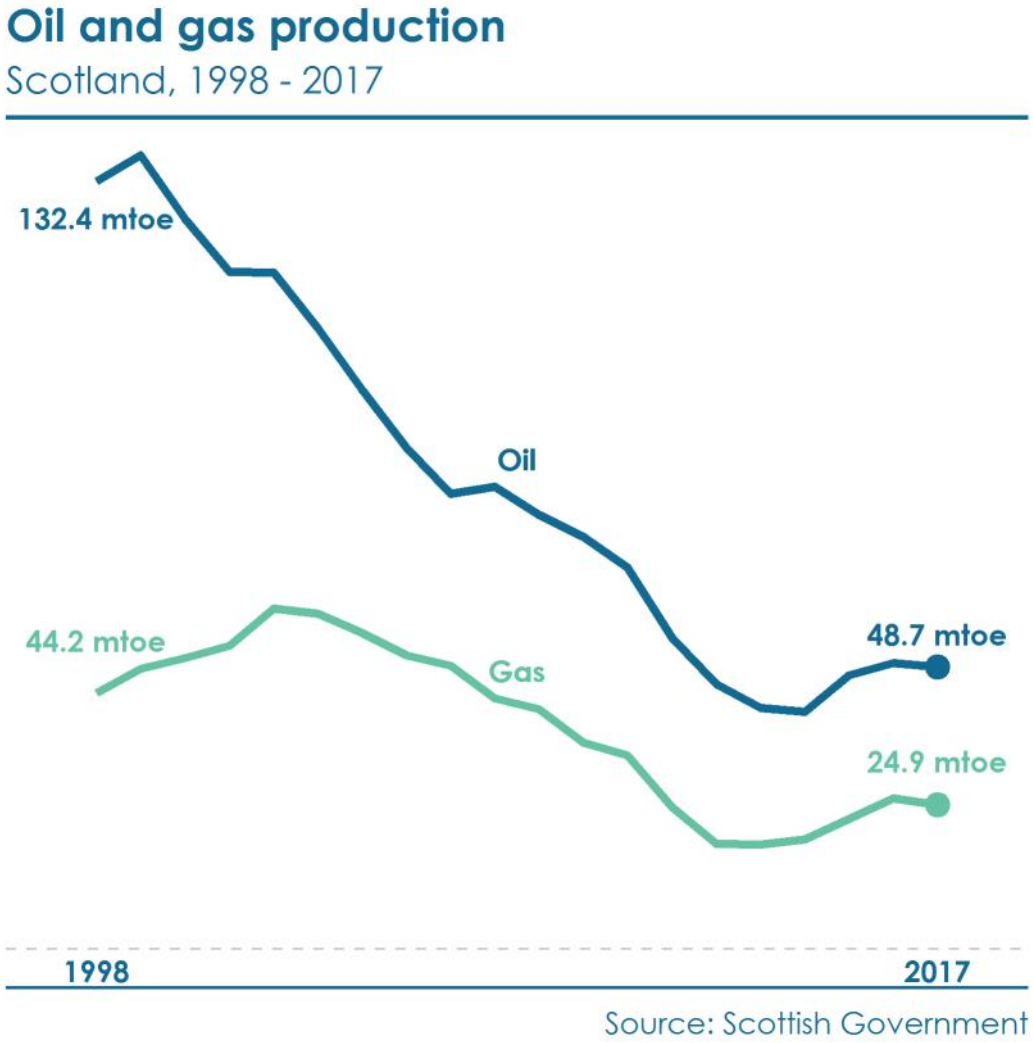
# How much **oil** and **gas** does **Scotland produce**?



In **2017**, Scotland (including Scottish adjacent waters) is estimated to have **produced 48.7** million tonnes of oil equivalent (**mtoe**) of crude **oil** and natural gas liquids (NGLs) (equivalent to **567 TWh**). While this is approximately a third of what it was in 1999, it is an **increase** of almost 8 mtoe since **2014**. **Scotland** accounts for **95.7%** of total **UK** crude oil and NGLs **production**.

Scotland produced **24.9 mtoe** of natural **gas** in **2017** (equivalent to **290 TWh**), accounting for **62.3%** of total **UK** gas production. This is the equivalent of **six times Scotland's gas consumption**.



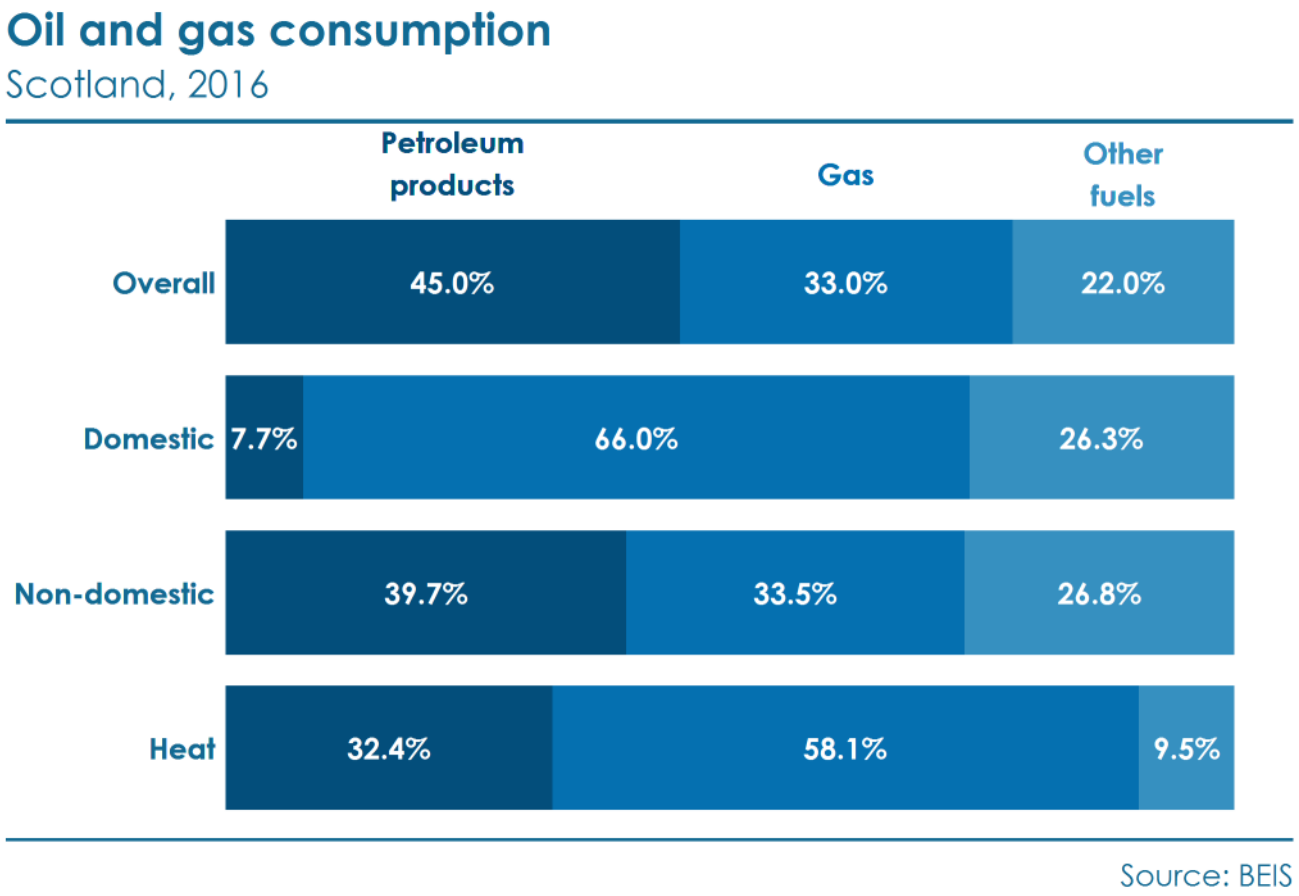
# How much **oil** and **gas** does **Scotland consume**?



Of the contribution oil and gas makes to primary energy in Scotland, just **11.0%** of it was **consumed domestically** in **2017**. This has dropped from **13.3%** in **2012**.

Even with the growth of renewables in recent years, oil and gas continue to make up the majority of Scotland's energy consumption:

- **Oil and petroleum** make up **45.0%** of all Scottish consumption and **gas** makes up a third (**33.0%**). Just **22.0%** of all Scottish consumption comes from **other fuels**. This means that **oil and gas** make up **78.0%** of **all Scottish consumption**, comparable to **74.8%** for the **UK** as a whole.
- In the **domestic** sector, **gas** makes up two-thirds of all consumption (**66.0%**) in Scotland alone.
- Oil and gas make up **almost all** of Scotland's **transport** consumption, and **90.5%** of its **heat** demand.




Source: BEIS

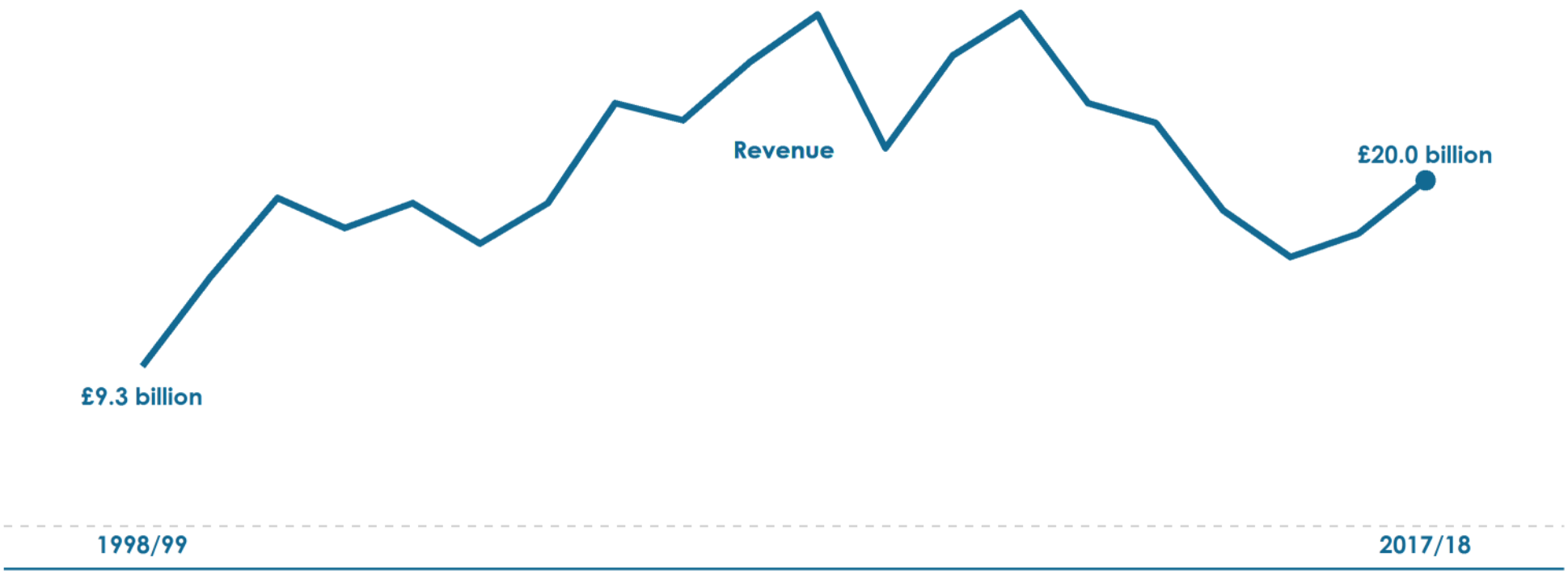
# What is the value of **sales** of **oil** and **gas** from Scotland?



**Sales** of oil and gas produced in Scotland are estimated to have been worth **£20.0 billion** in the **2017/18** financial year, **87.0%** of the **UK** total. This is the second year in a row that sales income has increased, following four successive years where it declined. It has **risen £3.1 billion** on **2016/17**.

## Oil and gas sales revenue

Scotland, 1998/99 - 2017/18




Source: Scottish Government

# How much does Scotland make from **oil** and **gas exports**?



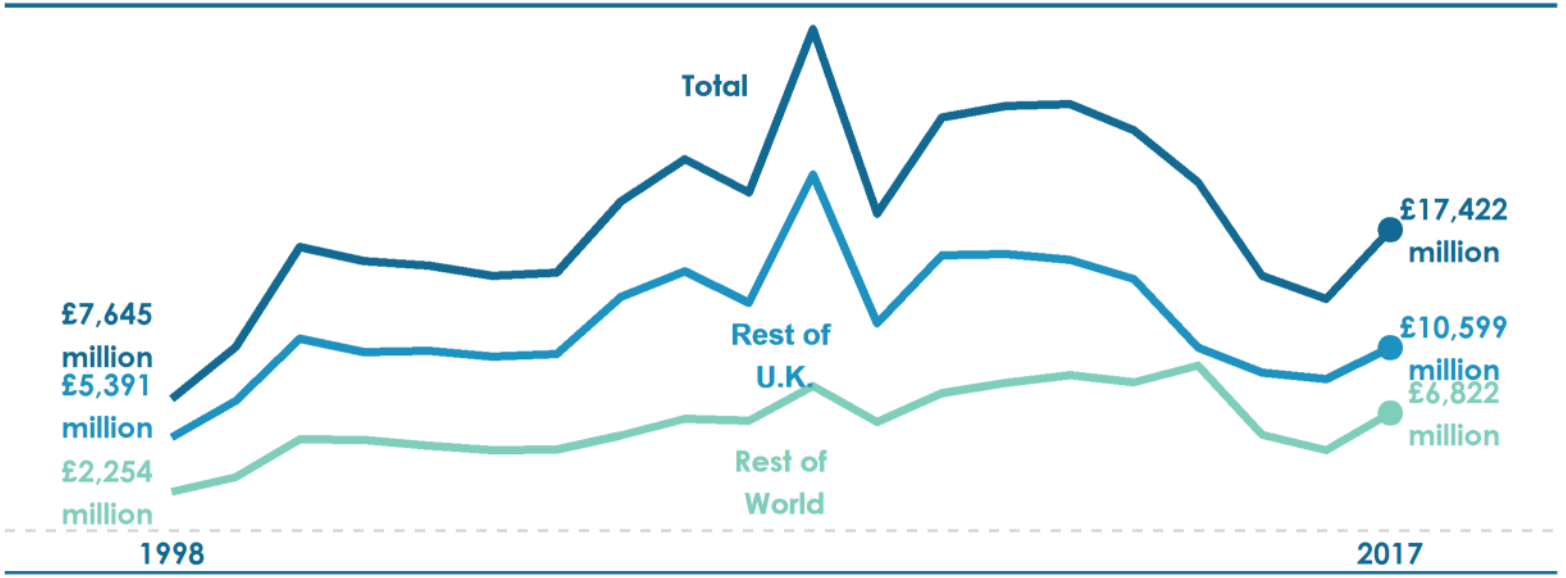
In **2017**, **82.3%** of all primary **oil** and **gas** energy in Scotland was **exported**.

Turnover of Scottish offshore oil and gas exports stand at **£17.4 billion** in turnover in **2017**, of which **£10.6 billion** is exported to the **rest of the UK** and **£6.8 billion** exported to the **rest of the world**. The value of exports **increased** by **£4 billion** from **2016**. 2017 is the first year the value of exports increased since 2012, likely to be a consequence of **production stabilising** and **prices rising**.

Value of exports falls exports is still someway off its **peak** of **£29 million** in **2008**.

## International sales from oil and gas supply chain

Scotland, 1998 - 2017




Source: Scottish Government

# What is the oil and gas industry worth to Scotland's **economy**?

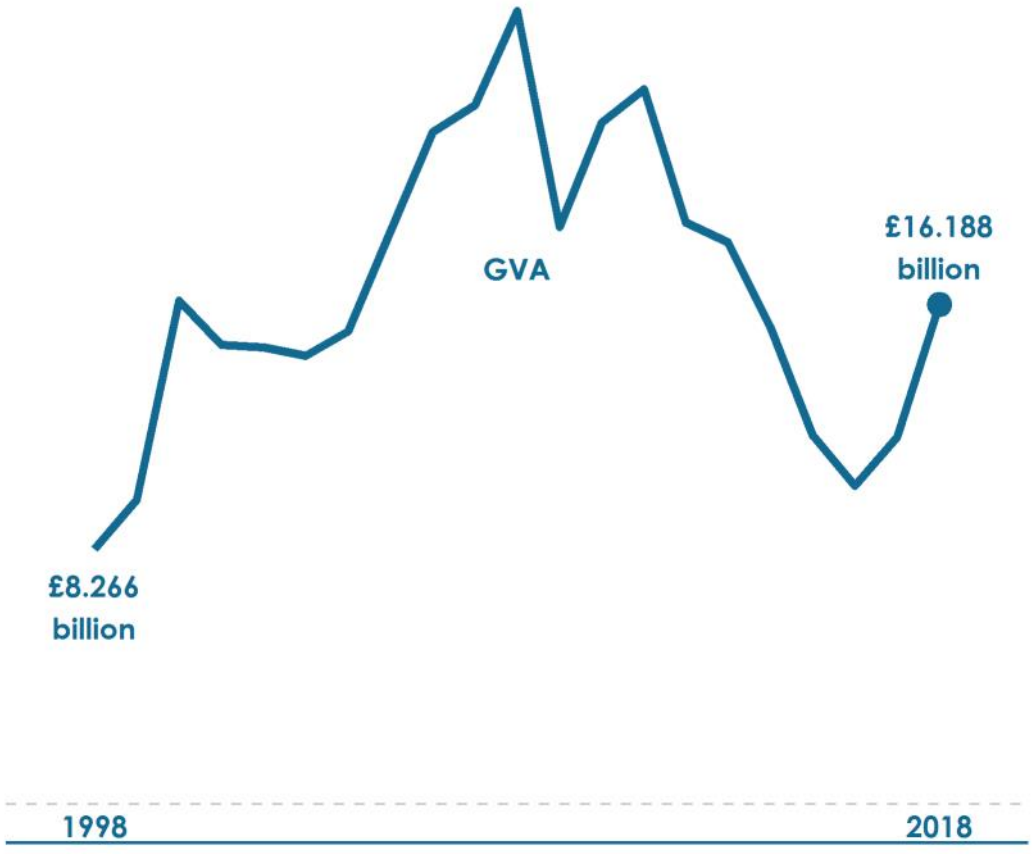


The chart shows the **gross value added** (GVA) associated with the offshore **oil and gas production** which is estimated to occur in the Scottish portion of the UKCS. In **2018**, the extraction of oil and gas is estimated to have been worth **£16.2 billion** in **GVA** to the **Scottish economy**. The contribution of oil and gas to the Scottish economy has increased for the second consecutive year, **up** by **£4.3 billion** on 2017 to its highest level since 2013. This is likely a consequence of **increased prices**.

Oil and gas production is equivalent to **9.1%** of total **Scottish GDP** (including a geographical share of UK Extra Regio activity) in 2017, it's highest share of GDP since 2014.

## GVA associated with oil and gas production

Scotland, 1998 - 2018




Source: SG

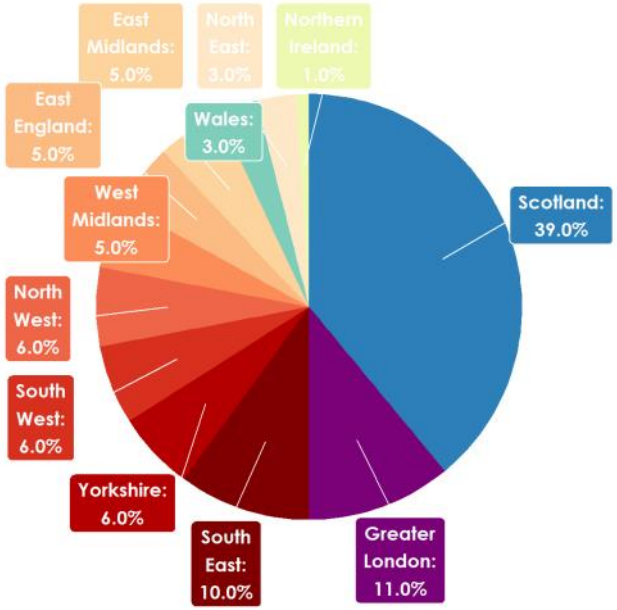
# How many **jobs** does the **oil** and **gas** sector support?

The oil and gas sector still has an important role to play in Scotland in terms of employment; even though jobs in oil and gas have been declining. In **2017**, an estimated **109,200 jobs** in **Scotland** were **supported** by the **offshore oil** and **gas** industry, **down** by approximately **10,000** from **2016**. It still is the main sector in Scotland for employment relating to energy.

## Oil and gas employment
Scotland, 2015 - 2017

Source: Oil and gas UK

## Oil and gas employment by region
2017




Source: Oil and Gas UK

Scotland still makes up by far the biggest proportion of employment in oil and gas in the **UK** with approximately **39%** of the entire workforce.

# So, how is Scotland performing in terms of **oil** and **gas**?

Oil and gas is still significant to Scotland.

It makes up almost **93%** of **Scotland's primary energy**, that is its indigenous production and imports. Scotland's production of oil and gas has remained relatively stable this decade so far and Scotland accounts for the **vast majority** of **UK's oil and gas production**.

Oil and gas are still **predominantly used** in Scottish energy **consumption**, especially in **heat** and **transport**.

The oil and gas industry in Scotland contributes **more than £16 billion** to the Scottish **economy** in **2018** and **supports** almost **110,000 jobs**.

More than four-fifths of Scotland's oil and gas is **exported**, and this was **worth £17.4 billion** in **2017**.

# Picture credits

- Whole System - AR1500 turbine, used in the world's flagship tidal stream project, MeyGen, in Scotland's Pentland Firth (Credit: Highlands and Islands Enterprise)
- Renewables and Low Carbon - Whitelee Wind Farm
- Energy Efficiency - Isle of Eigg Straw Bale Build – isleofeigg - https://www.flickr.com/photos/isleofeigg/4031432667/
- Consumer Engagement and Protection – Iain Scherr
- Innovative Local Energy - https://commons.wikimedia.org/wiki/File:Hydro-electric_Dam_(3288329922).jpg
- System Security and Flexibility - Surf 'n' Turf hydrogen electrolyser, Orkney (Credit: Colin Keldie)
- Oil and Gas—Decommissioning of Buchan Alpha oil production vessel at Dales Voe, Lerwick Harbour (Credit: Highlands and Islands Enterprise)
- Page 16: Highlands and Islands Enterprise
- Page 33: Highlands and Islands Enterprise & Department for Transport
- Page 35: Highlands and Islands Enterprise
- Page 40: Highlands and Islands Enterprise
- Page 42: Green Energy Futures (https://www.flickr.com/photos/greenenergyfutures/46260957781)
- Page 59: U.S. Air Force via Joint Base Charleston (https://www.jbcharleston.jb.mil/News/Features/Display/Article/238916/cut-back-household-electricity-during-energy-awareness-month/)
- Page 80: Highlands and Islands Enterprise
- Page 88: Highlands and Islands Enterprise
- https://creativecommons.org/