

North of Scotland Energy Trends

July 2020



Scottish & Southern
Electricity Networks

TRANSMISSION

This publication

The Great Britain (GB) energy landscape has undergone significant change in the past decade as decarbonisation and renewable energy targets have driven a rapid growth in renewable energy generation and overall reductions in electricity and gas demand.

This publication sets out SHE Transmission’s analysis of historic energy trends in the north of Scotland and considers how these trends compare to the prevailing GB trends. We have continued to monitor energy trends in the north of Scotland which follow similar patterns reported in our August 2017 and November 2018 editions.

As the third edition in our series on energy trends in the north of Scotland, this analysis will help shape the topics which we investigate for potential inclusion in our 2020 North of Scotland Future Energy Scenarios publication.

We will begin reaching out to a large range of stakeholders as part of the refresh of our North of Scotland Future Energy Scenarios. However, if you would like to be immediately involved in the refresh then please get in touch.

About us

We are Scottish Hydro Electric Transmission (SHE Transmission), part of the SSE Group, responsible for the electricity transmission network in the north of Scotland.

We operate under the name of Scottish and Southern Electricity Networks, together with our sister companies, Scottish Hydro Electric Power Distribution (SHEPD) and Southern Electric Power Distribution (SEPD), who operate the lower voltage distribution networks in the north of Scotland and central southern England.

As the Transmission Owner (TO) we maintain and invest in the high voltage 132kV, 220kV, 275kV and 400kV electricity transmission network in the north of Scotland. Our network consists of underground and subsea cables, overhead lines on wooden poles and steel towers, and electricity substations, extending over a quarter of the UK’s land mass crossing some of its most challenging terrain.

We power our communities by providing a safe and reliable supply of electricity. We do this by taking the electricity from generators and transporting it at high voltages over long distances through our transmission network for onwards distribution to homes and businesses in villages, towns and cities.



Impact of COVID-19

The COVID-19 pandemic has impacted every part of our society and the economy. As this paper tackles historic trends, the pandemic has had no impact on the data and graphs shown within the paper. We do know that the pandemic has delayed the Scottish Government’s 2020 update to the Climate Change Plan.

We will continue to monitor the situation and include any required analyses within the refresh of our North of Scotland Future Energy Scenarios.

Key messages

Our analysis identified the key energy trends across electricity, heat and transport in the north of Scotland:

- The UK and Scottish Government policy and legislation has continued to be the lead driver in the changes in GB energy generation & demand.
- The proportion of transmission connected generation on north of Scotland's network has increased due to several large-scale generation projects coming online and represented 83% of the total generation capacity on the network in 2019, a 27% increase from 2017.
- The year-on-year increase of transmission connected generation and the gulf between electricity generated and demand on our network drives the need for bulk power transfer from the north of Scotland to the south.
- To date onshore wind continues to be the dominant generation technology, representing 48% of the generation capacity present on north of Scotland's network in 2019.
- Average residential electricity and gas consumption in the north of Scotland has fallen in line with the GB trend, largely due to energy efficiency improvements.
- With high levels of fuel poverty in areas where access to the gas grid is limited, careful consideration must be given to achieving the Net Zero targets so that more households do not fall into fuel poverty.
- Industrial and commercial electricity consumption in the north of Scotland differed slightly from GB's trend, increasing by 0.5% from 2017 to 2018 compared to the 1.9% decrease seen at a GB level.
- From 2017 to 2018, industrial and commercial gas consumption in the north of Scotland differed significantly from GB's trend increasing by 12.5% compared to GB's 0.8% decrease.
- The total number of electric vehicles (EVs) in the north of Scotland has increased to 3,671 vehicles, increasing by 95% from 2017 to 2019.
- Whilst the total number of EVs in the north of Scotland has continued to increase, further investment in charging infrastructure and access to more affordable EVs is required to encourage an increased uptake in EVs.
- Aberdeenshire continues to have the highest number of EVs in the north of Scotland with 200+ more EVs than the next leading local authority.

Network Implications

Our analysis within this paper has identified a number of differences in key trends when comparing the north of Scotland to Great Britain. 1,955MW of generation has connected to the network since 2017, with over 50% of this capacity coming from renewables.

Average residential electricity and gas consumption in the north of Scotland has fallen in line with the GB trend. Industrial and commercial electricity consumption differed slightly from GB's trend, increasing by 0.5% from 2017 to 2018 compared to the decrease seen at a GB level. Whereas industrial and commercial gas consumption in the north of Scotland differed significantly from GB's trend, increasing by 12.5% compared to GB's 0.8% decrease

Whilst the trends outlined above provide an understanding of how electricity generation and electricity and gas consumption has changed, it is important to understand the impact of these trends on our network. The below graph shows a historic view of the terra-watt-hour (TWh) of electricity generated versus demand on our network. From 2014/15 to 2019/20, electricity generated on the network increased significantly from 8.9TWh to 20TWh. Whereas demand on the network decreased from 7.9TWh in 2014/15 to 7TWh in 2020. From 2016/17 to 2019/20, electricity generated on the network increased by almost 100% whilst in the same period, generation capacity connected to the network increased by 45%. With the reduced utilisation and closures of conventional generation in other areas of Great Britain, other generation sources such as renewables have been able to increase their share of electricity generation.

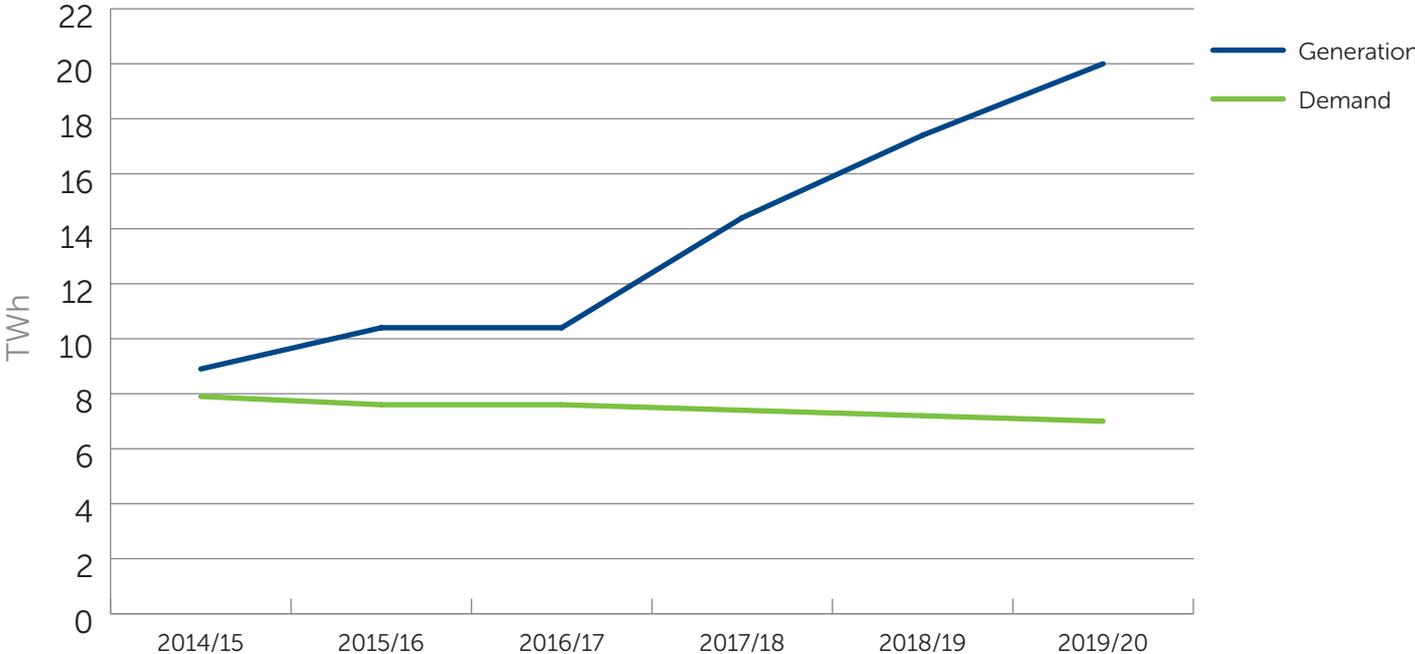
The difference between the electricity generated and demand on our network is substantial. In 2019/20, electricity generated on our system represented 2.85 times the level of demand. Furthermore in 2017/18, approximately 75% of our grid supply points (where distribution meets transmission) were exporting electricity onto the transmission network at some point throughout the year.

With large amounts of surplus electricity on the transmission network, this electricity needs to be transported south to the major demand centres via the transmission network.

Achieving net-zero greenhouse gases by 2050 as presented by the Committee on Climate Change will require a mix of different technologies and policies; the need for extensive electrification, particularly of transport and heating, supported by a major expansion of renewables and other low carbon power generation. Electrification of transport and heat may increase the level of demand on our network in the north of Scotland. However, we could also see further increases in generation connecting to the transmission network from opportunities such as the ScotWind offshore wind leasing round and potential changes in the Contracts for Difference (CfD) technology categorisation.

Future additions of large scale generation and potential increases in the number of exporting grid supply points will require the transmission network to be capable of bulk power transfers to major demand centres in Great Britain.

Figure 1 Historic view of electricity generated and demand in the north of Scotland



Source: SHE Transmission plc

Electricity Generation

The network in the north of Scotland has continued to see an increase in renewable energy generation, driven by UK and Scottish Government policy support for decarbonisation.

In 2019, 7,716MW of total generation capacity was present on the SSEN network in the north of Scotland. This is significantly more than what was present on our network pre-RIIO-T1 (3,918 MW). Since 2017, 1,955MW of generation has connected to the network. In 2018, more than 1000MW of renewable generation was connected to the network, over half of which is accounted for by offshore wind projects.

Currently, the largest generation technology on our network is onshore wind, which represented 48% of the generation capacity present on the network in 2019. Together with offshore wind, wind energy accounts for 57% of the generation capacity connected to the network. Due to new development opportunities such as the ScotWind offshore wind leasing round and potential changes in the Contracts for Difference (CfD) technology categorisation, it is expected that onshore and offshore wind and solar PV connection requests will increase.

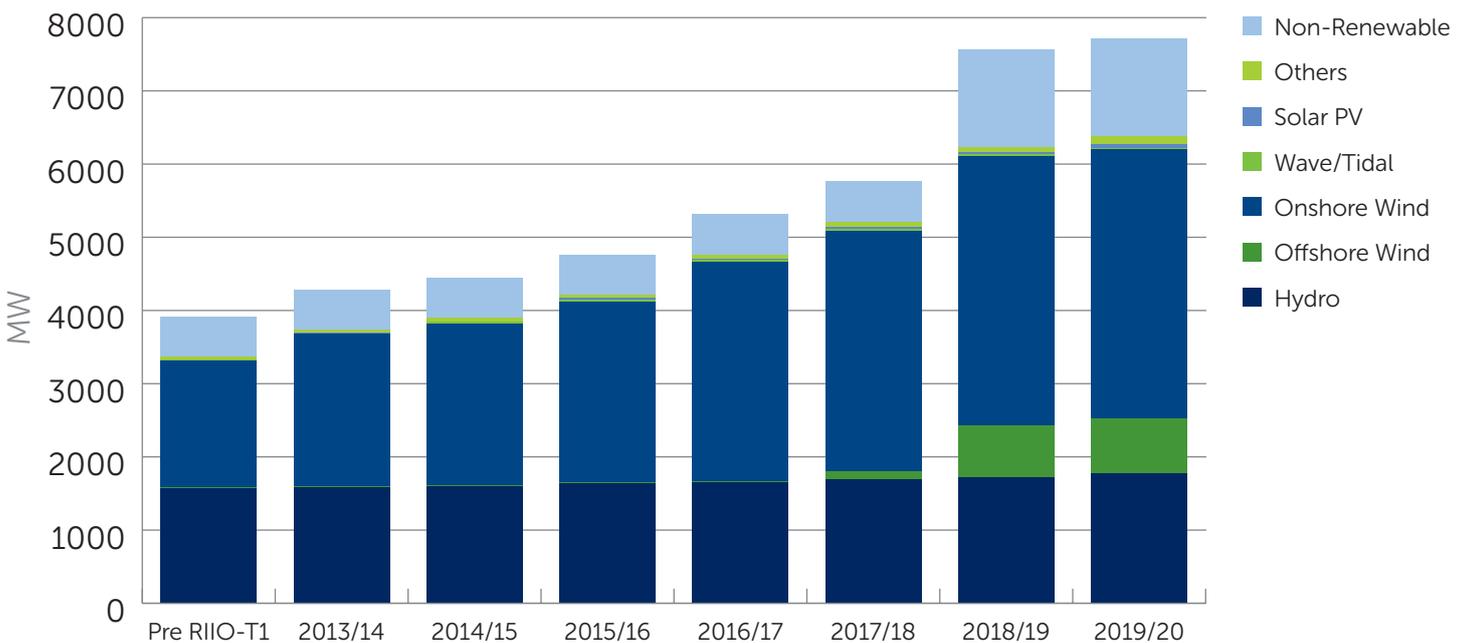
As the network in the north of Scotland becomes more decarbonised, fossil fuel and other non-renewable generation sources play a smaller role in the electricity mix, representing only 17% of the generation capacity on the network in 2019.

In the paper that we published in 2018, transmission connected generation represented 56% of the total generation capacity on the network in 2017. Since then, several large-scale offshore wind projects have connected to the transmission network as well as additional capacity at the Peterhead CCGT plant.

This has resulted in generation connected at transmission representing 83% of the total generation capacity on the network in 2019.

This rising figure demonstrates the need for our network to be capable of bulk power transfers to other network areas across Great Britain.

Figure 2 Total generation capacity on the network by technology



Source: SHE Transmission plc

Residential Consumption

Electricity

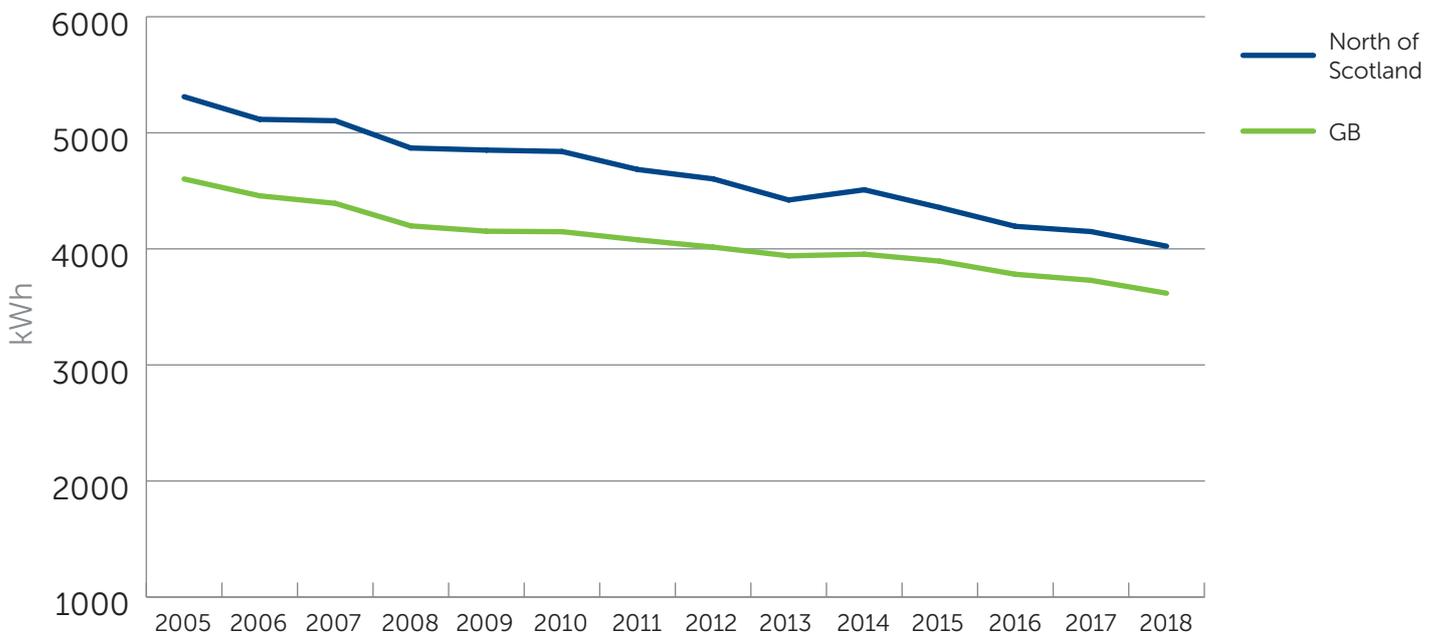
A reduction in total electricity consumption and average electricity consumption for residential customers is continuing in the north of Scotland which is broadly in line with the decline seen at a GB level. Efficiency improvements in domestic appliances and the adoption of low energy lighting are most likely the main contributing factor to the decline in residential electricity consumption across GB.

Average annual residential electricity consumption in the north of Scotland fell from 4,149kWh to 4,023kWh, a reduction of 3.05% from 2017 to 2018. This continues the trend that we reported in our 2018 paper. Further to this, a reduction was seen across all the local authorities in the north of Scotland, with Aberdeenshire seeing the largest decrease from 2017 to 2018 with average residential electricity consumption falling by 3.9%.

Building upon our previous papers, the Orkney Islands and the Shetland Islands remain as the two local authorities with the highest levels of average residential electricity consumption in the north of Scotland.

This could be attributed to their location and dependency upon electric heating to meet domestic heating requirements. In the future, it is possible that residential electricity consumption will increase due to further uptake of electric vehicles with home charging points and new homes being built with electrified heating.

Figure 3 Non weather-adjusted residential electricity consumption per point of supply in the north of Scotland



Source: Department for Business, Energy & Industrial Strategy Sub-national electricity publication 2005-2018

Electric Heating

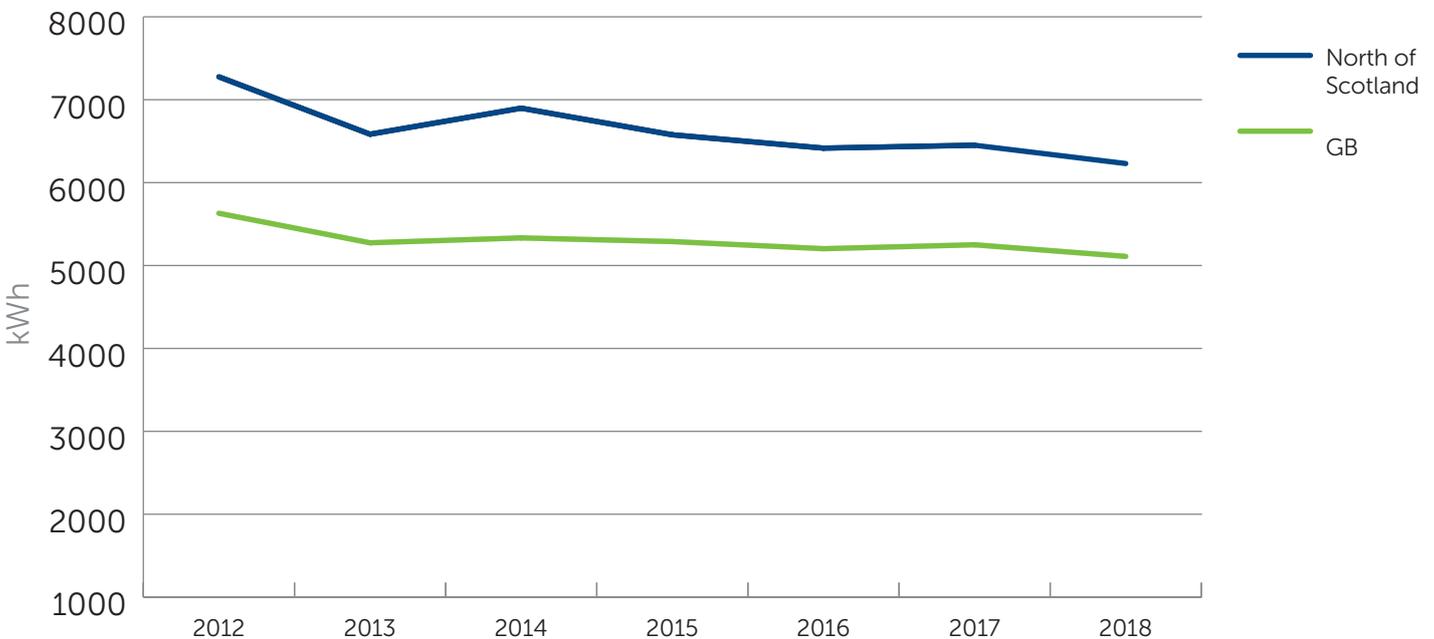
From our analysis in previous years, it highlighted that the use of economy 7 meters (commonly used for metering electric heating) occurs across all local authorities in the north of Scotland and that it is not simply limited to off gas grid areas such as rural areas and the Islands. This can be attributed to houses, flats and tenements in both urban and rural areas using electricity as a heating fuel.

In the north of Scotland, average residential electricity consumption from economy 7 meters decreased by 3.4% from 2017 to 2018 whereas at a GB level, consumption fell by 2.7% in the same period. Shetland Islands, Perth and Kinross, and Aberdeenshire were the local authorities with largest decrease in average residential electricity consumption from economy 7 meters, all seeing a reduction of 4.6% from 2017 to 2018.

The Scottish Government's Climate Change Plan includes a challenging target for low carbon heating technologies, stating that by 2032, 35% of heat for domestic buildings will be supplied using low carbon technologies.

The target includes the electrification of heat. In the future, electric heating may be classified as a low carbon heating technology due to further decarbonisation of electricity generation, which may impact how quickly the target is met. The recovery of the COVID-19 pandemic may also affect this target, with the Scottish Government's 2020 update to the Climate Change Plan being delayed to further assess the effect of the pandemic in relation to emissions and heat targets.

Figure 4 Non weather-adjusted average residential electricity consumption from economy 7 meters per point of supply in the North of Scotland



Source: Department for Business, Energy & Industrial Strategy Sub-national electricity publication 2005-2018

Gas

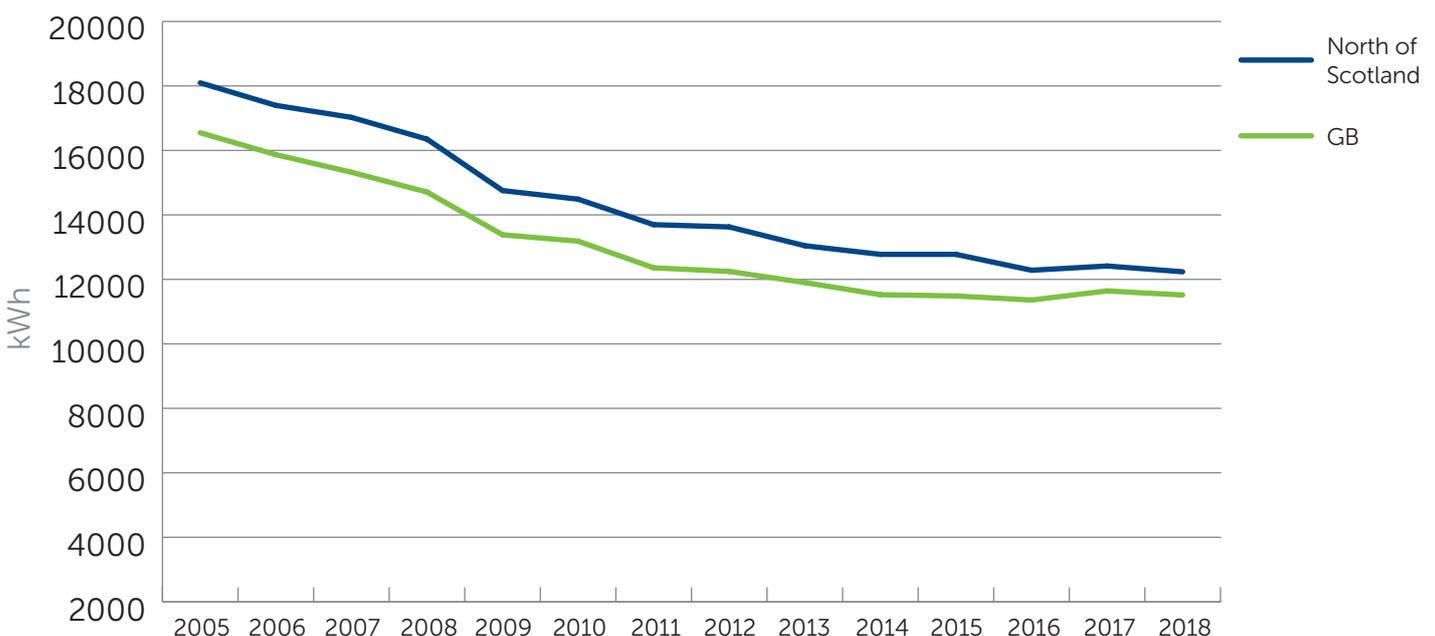
A decrease in total gas consumption for residential customers occurred from 2017 to 2018 at a GB and north of Scotland level. However, all local authorities in the north of Scotland experienced an increase in residential gas supply points from 2017 to 2018 besides Orkney and Shetland Islands, whom are not connected to the gas grid. Average residential gas consumption in the north of Scotland has been reducing at a faster rate in the same period compared to GB, decreasing by 1.4% compared to GB's 1.1% decrease from 2017 to 2018. All local authorities saw a reduction in average residential gas consumption from 2017 to 2018, with the exception of Aberdeen City seeing an increase of 3.8%, the local authority also had the smallest increase in gas supply points (0.5%) among all of north of Scotland's local authorities.

In the Scottish Government's Fuel Poverty (Target, Definition and Strategy) Bill 2019, a target was set that by 2040, no more than 5% of Scottish households will be in fuel poverty and no more than 1% will be in extreme fuel poverty.

A new definition of fuel poverty is outlined in the bill which resulted in an overall reduction of Scottish households defined as being in fuel poverty. The local authorities with the highest rates of fuel poverty are; Eilean Siar (36%), Moray (33%), and Highland (32%). Fuel poverty may occur due to the need for alternative heat fuel sources such as electricity, oil and LPG being used by households in the absence of having access to the gas grid and families being on lower incomes.

The Scottish Government's target that 35% of heat for domestic buildings will be supplied using low carbon technologies by 2032 will have to be closely monitored to ensure that there is a just transition to achieving the Net Zero targets so that more households do not fall into fuel poverty. A Just Transition Commission has been appointed and they plan on reporting to Scottish Ministers with practical, realistic and affordable recommendations for action in early 2021.

Figure 5 Weather-adjusted residential gas consumption used for heating per point of supply in the north of Scotland



Source: Department for Business, Energy & Industrial Strategy Sub-national gas publication 2005-2018

Industrial and commercial consumption

Electricity

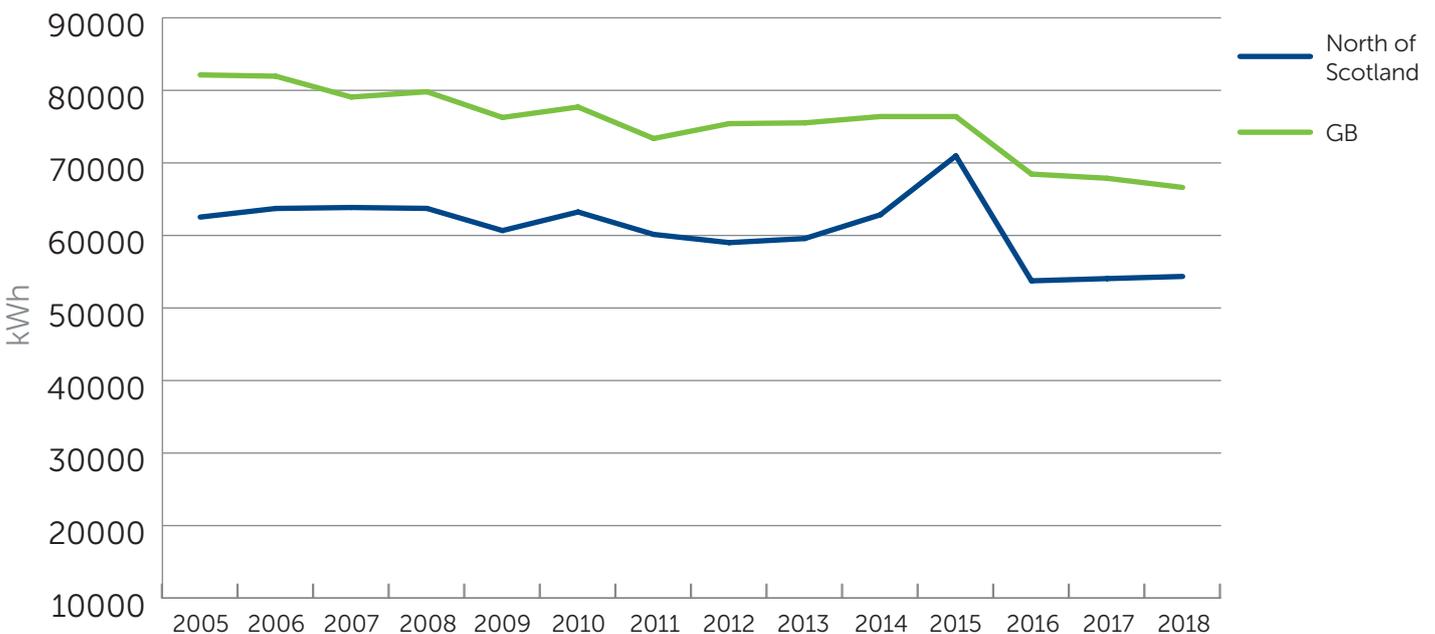
Our previous analysis highlighted a sharp increase in 2015 for total and average electricity consumption for industrial and commercial customers in the north of Scotland. It was hypothesised that this increase could have been attributed to increases in production in the food and drink industry in the north of Scotland according to stakeholder feedback. However, current analysis shows a sharp return to a decline followed by a plateau in the north of Scotland's industrial and commercial electricity consumption in the past three years.

At a GB level, average industrial and commercial electricity consumption reduced by 1.9% from 2017 to 2018 whereas in the north of Scotland, average industrial and commercial electricity consumption showed a slight increase of 0.5% in the same period. Four local authorities saw a reduction in average electricity consumption from 2017 to 2018; these local authorities being Aberdeen City (1.8%), Aberdeenshire (0.2%), Argyll and Bute (1.8%), and Shetland Islands (0.2%).

The remaining local authorities in the north of Scotland all experienced slight increases in average industrial and commercial electricity consumption ranging from 0.1% in Angus to 1.8% in Eilean Siar from 2017 to 2018.

The Scottish Government's Climate Change Plan states that they plan on reducing emissions from the industrial and commercial sector a further 21% of 2018 levels by 2032. In order to achieve this, Scottish Government have committed to supporting industry investment in energy efficiency measures that will enhance productivity and improve competitiveness.

Figure 6 Non weather-adjusted average industrial and commercial electricity consumption per point of supply in the North of Scotland (kWh)



Source: Department for Business, Energy & Industrial Strategy Sub-national electricity publication 2005-2018

Gas

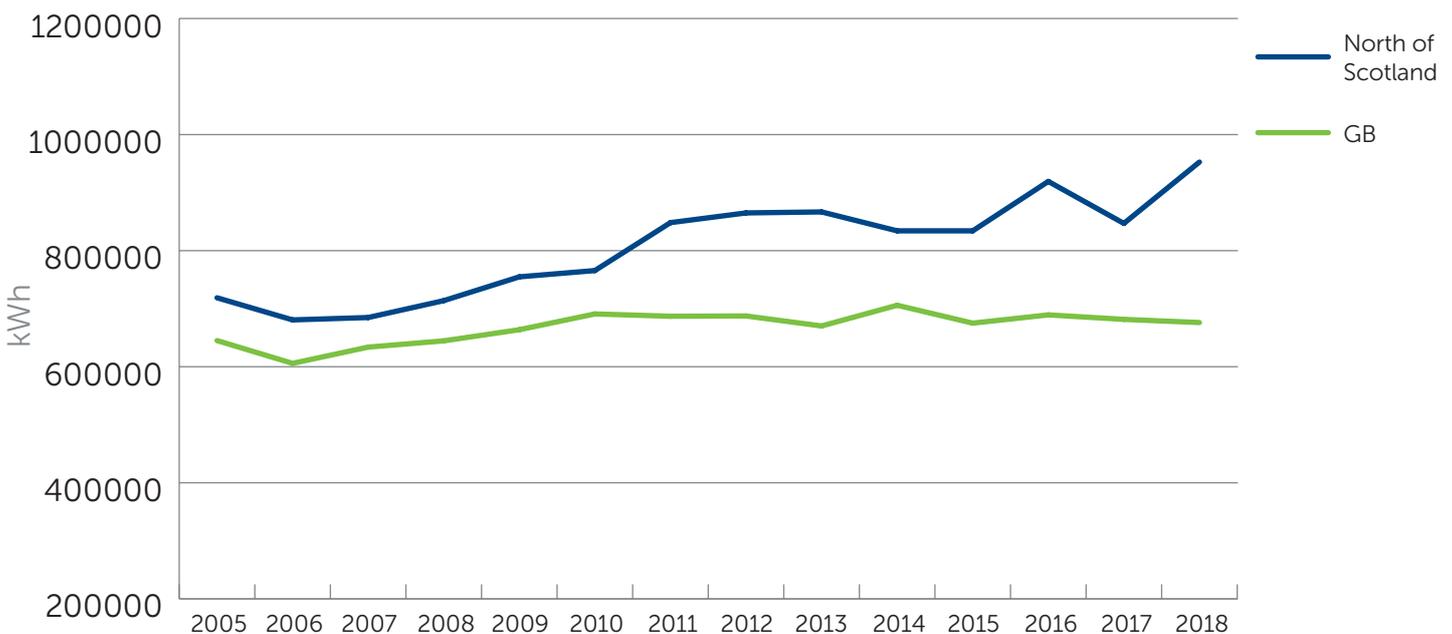
From 2017 to 2018, GB and the north of Scotland experienced significantly different trends in total and average industrial and commercial gas consumption. In the same period, average industrial and commercial gas consumption in the north of Scotland increased from 846,939kWh to 952,720kWh, an increase of 12.5%, whereas at a GB level, a decrease of 0.8% occurred.

One local authority has experienced a significant increase in average gas consumption from 2017 to 2018; Argyll and Bute (9.8%). Three other local authorities saw a slight increase in average gas consumption from 2017 to 2018; Eilean Siar (3.4%), Moray (2.1%), and Aberdeenshire (0.2%). The remaining local authorities all saw decreases in industrial and commercial gas consumption with Highland seeing a reduction of 14.1% from 2017 to 2018. All local authorities experienced an increase of industrial and commercial gas supply points from 2017 to 2018 except for Aberdeen City, seeing a decrease of 1.6% to industrial and commercial gas supply points.

Building on our previous papers, it was hypothesised that the Scottish food and drink industry was responsible for increases in industrial and commercial gas consumption. Upon investigation, it has been found that the Scotch Whisky industry accounts for 75% of all Scottish food and drink exports and is seen to be currently expanding. Many whisky distilleries are now using natural gas a lower carbon fuel source for their distillation processes instead of LPG and oil.

This could explain the gas consumption spikes that are seen in the north of Scotland. Although, this does not explain the sudden dip seen in 2016-2017 in the north of Scotland. Further investigation is required to conclude what caused the sudden decrease in industrial and commercial gas consumption from 2016 to 2017.

Figure 7 Weather-adjusted average industrial and commercial gas consumption per point of supply in the North of Scotland



Source: Department for Business, Energy & Industrial Strategy Sub-national gas publication 2005-2018

Transport

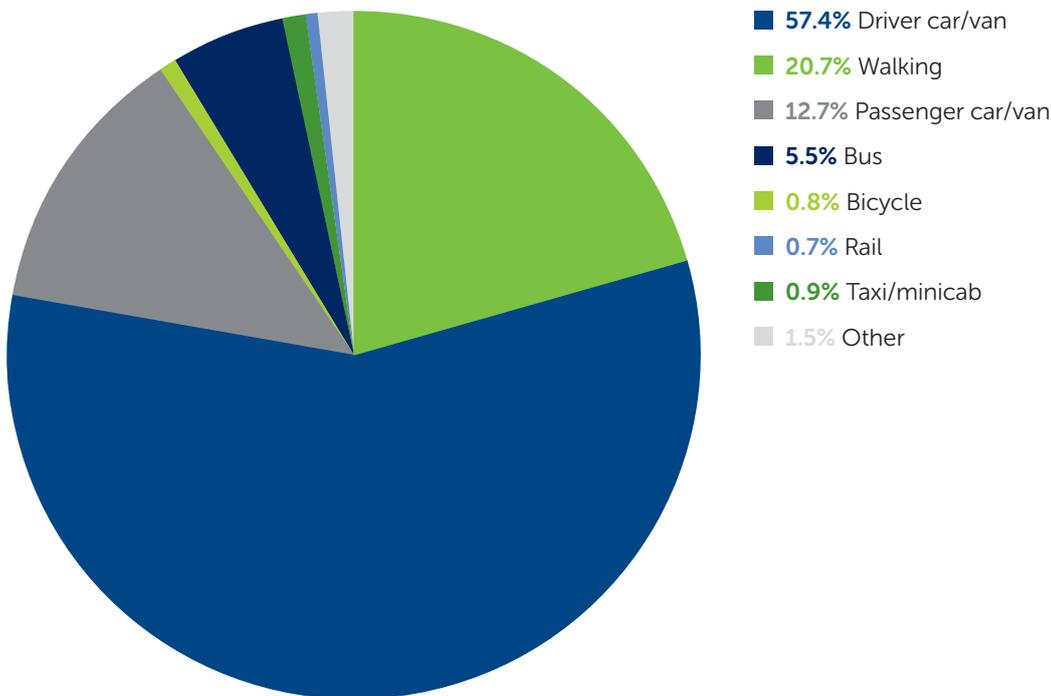
As we look to tackle the Climate Emergency, the Committee on Climate Change’s Net Zero paper detailed the fundamental role that transport will be required to play to meet the UK and Scottish Governments respective Net Zero targets. In February 2020, the National Transport Strategy (NTS2) was laid before the Scottish Parliament which outlines an ambitious vision for Scotland’s transport system for the next 20 years. The strategy consists of four main priorities; reducing inequalities, tackling climate action, helping deliver inclusive economic growth and improving our health and wellbeing. This is a positive step from the Scottish Government as the new National Transport Strategy will enable Scottish Government to meet its 2045 Net Zero target. A key action will be to phase out the need for new petrol and diesel cars and vans by 2032 as announced in 2017.

In our previous publications, driving was identified as the most popular mode of transport in 2015 and 2017.

Our current analysis shows that this continues to be the case however the proportion of people driving in the north of Scotland in 2018 decreased by 0.7% to 57.4%. The proportion of people in the north of Scotland using public transport such as buses and rail has increased from 2017 to 2018 by 0.4% and 0.3% respectively. Walking (20.7%) and cycling (0.8%) have remained relatively stable modes of transport in the north of Scotland in 2018.

Due to the COVID-19 pandemic, the demand for public transport across Scotland has fallen by 85% to 95% against normal levels according to Transport Scotland. However, walking and cycling trips have increased as the general public stay in their local areas. How will people’s travel behaviour change in the longer term? We will continue to monitor this as lockdown begins to ease.

Figure 8 Main mode of travel in the north of Scotland, 2018 (%)



Source: Scottish Household Survey - Travel Diary 2018

Electric Vehicles

In order to allow the Scottish Government to meet its Net Zero target, the phasing out of new petrol and diesel cars and vans across Scotland by 2032 will play a key role. However, this will be coupled with additional measures such as the introduction of Low Emission Zones across major cities in Scotland.

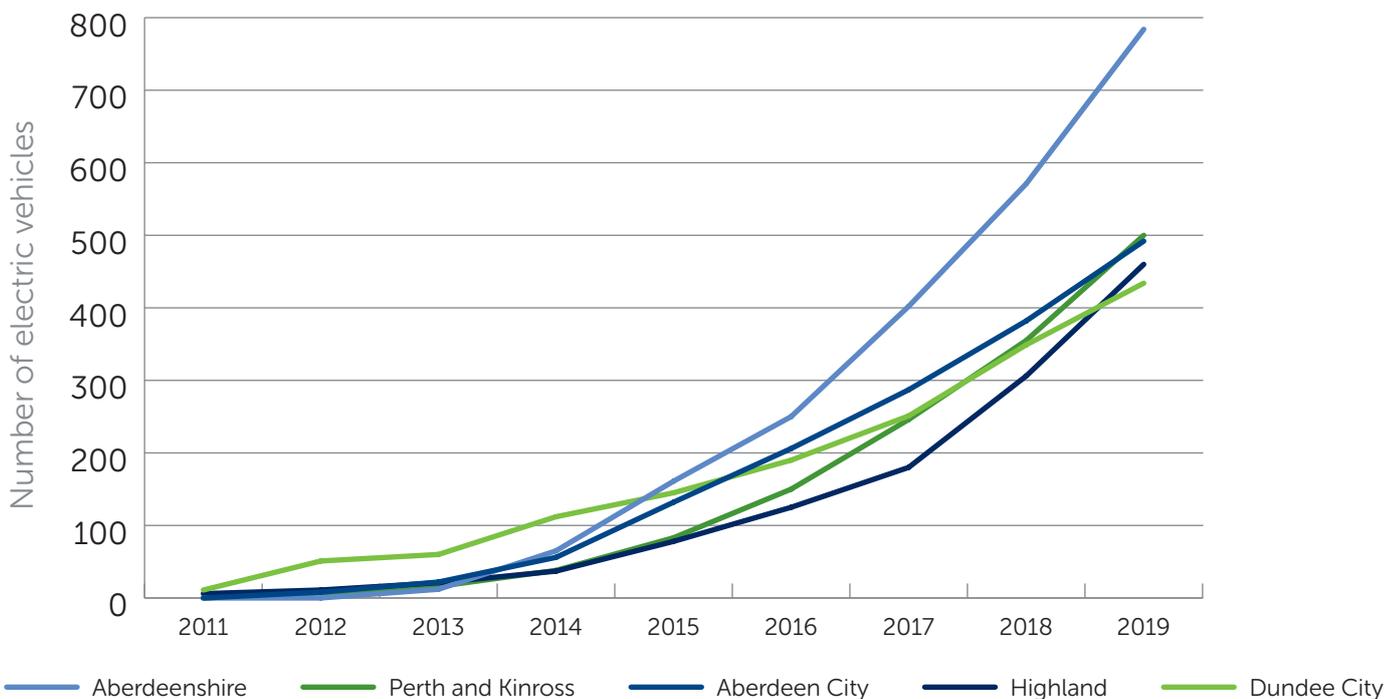
There were 3,671 licenced electric vehicles (EVs) in the north of Scotland in 2019, an increase of 95% from 2017 with electric vehicles now representing 0.5% of all vehicles in the north of Scotland. The total number of EVs licenced in GB increased by 97% to 250,864 vehicles from 2017 to 2019, and now represents 0.7% of all vehicles in GB.

Similarly, to our 2018 publication, Aberdeen City, Aberdeenshire, Dundee City, Perth and Kinross and Highland remain as the local authorities with the highest total number of licenced EVs in the north of Scotland.

Whilst the number of EVs in the north of Scotland and GB continues to increase due to Government investment in charging infrastructure, and generous loans from the Energy Saving Trust, more needs to be done to incentivise the general public to switch to EVs. Further investment in charging infrastructure will reduce range anxiety that does not exist with drivers of conventional petrol and diesel vehicles.

The Scottish Government created a new public-private partnership with Scottish and Southern Electricity Networks (SSEN) and Scottish Power (SP) Energy Networks to ensure that the the charging infrastructure is in place to facilitate an electric vehicle revolution. Furthermore, EVs are relatively more expensive than their petrol and diesel equivalents. Incentives such as scrappage schemes, which the UK Government is exploring, could give the general public the push needed to make the switch to an EV.

Figure 9 Top five local authorities with highest number of licenced electric vehicles in the north of Scotland



Source: Table VEH0131, Department for Transport

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**Scottish & Southern
Electricity Networks**

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We want to hear from you

We are really interested in hearing your views as to how we can keep you informed and make improvements to our analysis. If you would like to get in touch with the team to ask questions, and provide feedback and comments then please use the details shown below.

This document and future North of Scotland Future Energy Scenario documents will be hosted on:

www.ssen-transmission.co.uk/information-centre/industry-and-regulation/future-energy-scenarios



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