



Paper 2/1 - Power generation and distribution in Scotland

For information

1. Purpose

1.1 This paper provides Commissioners with background briefing on the power sector in Scotland. Scottish Government officials have drafted this paper, at the request of the secretariat.

2. Background

2.1 The paper provides an overview of recent trends in the generation mix, an overview of transmission networks in Scotland, and a look ahead to the sector vision contained in the Scottish Energy strategy.

1. Context

1.1 The energy sector is the cornerstone of Scotland's modern, industrialised economy. It delivers reliable and secure energy to our homes and businesses, supports tens of thousands of jobs, and generated £41.8 billion in turnover for Scotland in 2016.

1.2 The policy environment that the sector operates in reflects a complex mix of devolved and reserved responsibilities. Certain aspects of energy policy, such as energy efficiency and fuel poverty initiatives, and the granting of consent and planning permission for nuclear power, energy infrastructure, and unconventional oil and gas, are matters for the Scottish Government and Parliament. Other aspects – such as market support for different forms of power generation, and regulation of the gas and electricity grids – are reserved to the UK Government and regulator.

1.3 Heat regulation is devolved to the Scottish Parliament. However, many of the issues which affect the heat market, such as the gas network, electricity, and oil, are reserved to the UK Government.

2. Electricity Generation

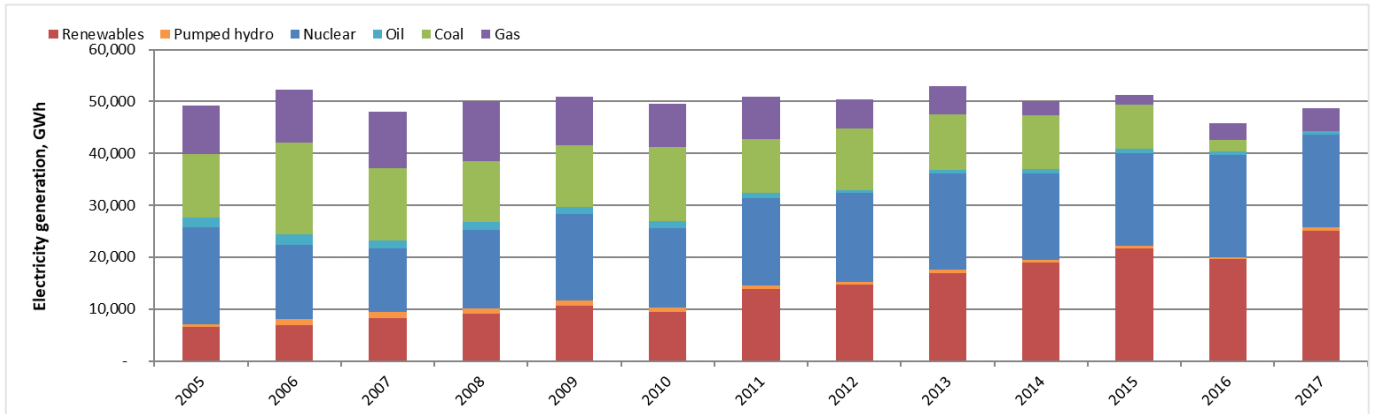
2.1 There have been significant changes to the electricity generation mix over the last quarter century driven by privatisation and subsidy schemes introduced to encourage the development of low carbon, renewable technologies.

2.2 Scotland has enviable natural resources, which have provided the platform for the recent growth in renewable energy deployment. Renewables currently deployed in Scotland include onshore and offshore wind, solar, hydro, wave and tidal.

2.3 The share of renewable energy as a proportion of the energy we generate and consume has increased considerably over the past decade. Provisional figures from 2017 show that renewable energy sources now supply the equivalent of 20% of Scottish final energy consumption, up from around 8% in 2009.

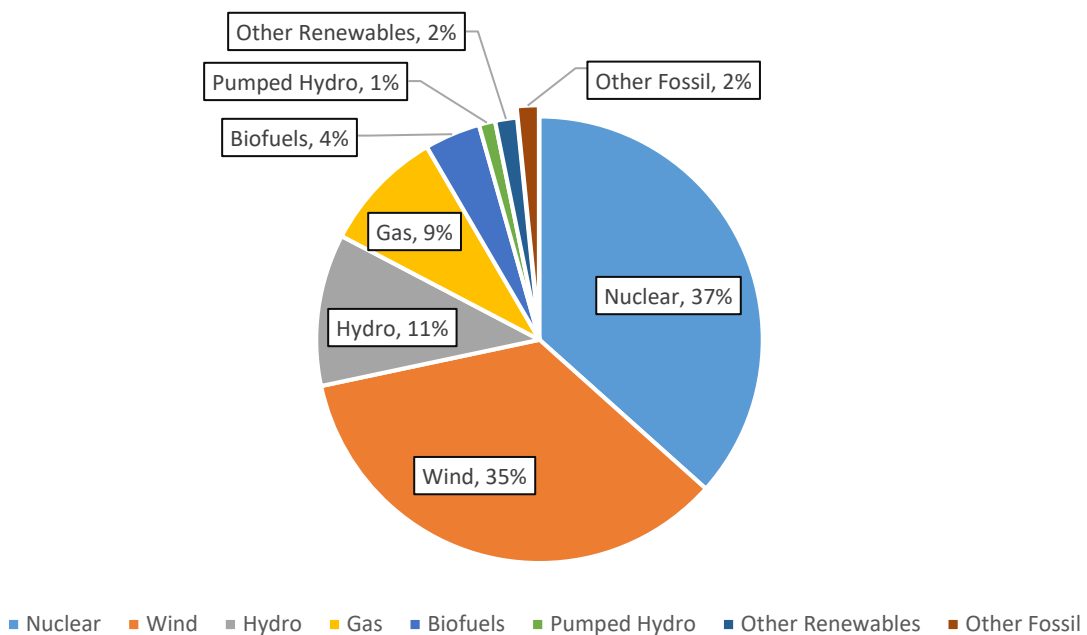
2.4 It is notable that, in the same year, 70.1% of gross electricity consumption was supplied by renewable sources – a substantial increase from 54.4% in 2016. This highlights that major strides towards decarbonisation have been made in Scotland in the electricity/power generation sector. Figure 1, below, illustrates the change in the electricity mix. It reflects that installed renewables capacity in Scotland was over 7 times larger in 2017 than in 2000.

Figure 1: Change in Scotland’s electricity mix, 2005-2017



2.5 Figure 2, below, breaks down the contribution of different technologies to the electricity mix in Scotland. Wind generation has grown from 38.5 MW in 2000 to over 7,635 MW in 2017.

Figure 2: Proportion of electricity generation in Scotland by fuel, 2017



2.6 In order to meet ambitious targets for the decarbonisation of the whole energy system, a similar transition to low carbon technologies will be required in the energy used for transport and heat. This is highlighted by the fact that, at the end of 2016, the final energy consumption split in Scotland was:

- 24% Electricity
- 24% Transport

- 52% Heat

3. The Scottish Energy Strategy

3.1 In December 2017, the Scottish Government published its first Scottish Energy Strategy – setting out our vision for the future of energy in Scotland. It takes a ‘whole-system’ approach, considering both the use and supply of energy for heat, power and transport - and sets Scotland on course for an inclusive, innovative and low carbon future.

3.2 The Strategy will help guide the decisions that the Scottish Government, working with partner organisations, needs to make over the coming decades. It is ambitious about what can be achieved in Scotland, but the social, environmental, economic and commercial benefits of this approach will depend on the involvement of all stakeholders in the transition. Achieving our aims will involve a variety of policy levers, and a combination of reserved and devolved powers. It will require collaboration across public, community and private sectors.

3.3 The Strategy established six strategic priorities, along with a range of actions, which place a focus on the areas which we are able to affect. Our focus is on the near term, in preparation for the major medium and long-term decisions we will be required to make in the next decade.

3.4 Meeting Scotland’s existing climate change targets will require the near complete decarbonisation of our energy system by 2050, with renewable energy meeting a significant share of our needs. Scotland’s Energy Strategy set two ambitious targets: 50% of all energy to come from renewables by 2030, and a 30% increase in productivity of energy use across the Scottish economy by 2030.

3.5 These targets are compatible with our existing climate change targets and demonstrate our commitment to a low carbon energy system and to the continued growth of the renewable energy sector in Scotland. They also retain flexibility, allowing us to respond to the way in which the energy sector may evolve in the years to come, and pursue all low or zero carbon options.

3.6 Because we can’t be certain what our energy system will look like by 2050, our strategy considers two indicative scenarios - one where the energy system is mainly powered by electricity, and the other where hydrogen is dominant. The pace of technological change, and advances in engineering and information technology across the economy and the energy sector during the next three decades, will have a huge bearing on the energy system and the ways in which we interact with it.

3.7 In the Energy Strategy, we committed to publishing an *Annual Energy Statement* which will report on progress made and future plans, providing an update on targets and statistics across the sector and an assessment of technological changes and advances with a bearing on Scotland’s energy system. We plan to publish the first Annual Energy Statement in May.

3.8 We will review our existing energy targets upon the passing of the Climate Change Bill, alongside a wider review of targets and policies across each of the key sectors, to ensure consistency.

4. The networks that transport power

4.1 Whilst the pathways for decarbonising transport, and particularly heat, are uncertain, we do know that many of the technological solutions will be dependent on electrical power. Whilst household demand for electricity has actually declined by around 15% over the last ten years thanks mainly to improved efficiency, overall demand is set to increase due to an anticipated switch to electric vehicles and electrically driven heating solutions. This will have major implications not just for electricity generators, but for the electricity networks on which we are reliant to carry electricity to the point of demand.

4.2 The modern power grid, together with the generation and load devices that it connects, has been called ‘the biggest machine on earth’.¹ There are 71,000 miles of electricity cable in Scotland, enabling the 13.5 GW of network connected generation (of which 10.3 GW is renewable) to be distributed to where it is required.²

4.3 The electricity system is changing quickly. One example is the demand from new renewable generators to connect to the (low voltage) distribution networks – resulting in many of these networks now operating at full capacity. New network capacity is needed, in some cases urgently, to meet this demand. However, we also need to use existing capacity far more efficiently through expanding opportunities to balance supply and demand at a local level within the constraints of the network.

4.4 Scotland’s electricity networks have some distinctive features – the transmission networks are owned and operated by SSE Networks in the north of the country and Scottish Power Energy Networks in the south, in contrast to England and Wales where this function is carried out by National Grid TO (Transmission Operator). National Grid SO acts as System Operator throughout Great Britain, carrying out the function of balancing supply and demand on a second by second basis.

4.5 In March 2019, we delivered on our commitment in the Energy Strategy to publish our *Vision for Scotland’s Electricity and Gas Networks*. This sets out our view on how the electricity and gas networks will need to evolve by the early 2030s to facilitate the decarbonisation of the whole energy system, and to meet wider Scottish Government targets (*link below*).

¹ <https://www.bloomberg.com/quicktake/u-s-electrical-grid>

² <https://www.gov.scot/binaries/content/documents/govscot/publications/publication/2019/03/vision-scotlands-electricity-gas-networks-2030/documents/vision-scotlands-electricity-gas-networks-summary-2019-2030/vision-scotlands-electricity-gas-networks-summary-2019-2030/govscot%3Adocument, p19>

4.6 As noted, network policy is a reserved policy area. Our goal remains to collaborate constructively and openly with the UK Government, Ofgem, and all relevant stakeholders to ensure that Scotland's ambitions are clearly acknowledged and understood.

5. A 'Just' Energy Transition

5.1 Although the transition to low carbon energy technologies will require significant further investment, it also presents significant economic opportunities. In 2017, Scotland's low carbon and renewable energy sector and supply chain generated an estimated turnover of £11.1 billion, accounting for 14.0% of the total UK turnover in this sector. In the same year, the sector supported an estimated 46,500 jobs and generated £349.5 million of exports. The renewables industry alone now directly employs 7,700 people in Scotland, with an additional 9,500 jobs indirectly supported.

5.2 The Scottish Government recognises the need to ensure that everyone benefits from the move towards low carbon technologies. The Energy Strategy makes a commitment to "promote consumer engagement and protect consumers from excessive or avoidable costs, prevent new forms of social exclusion and promote the benefits of smarter domestic energy applications and systems". In short, the Scottish Government wants to deliver a people-centred energy transition shaped by and for the people of Scotland.

5.3 We are developing a Consumer Vision and Action Plan to help us realise this ambition – this is due for publication in Spring 2019. The Action Plan will focus on domestic consumers in vulnerable circumstances where there is enduring evidence of detriment. This will include, but not be limited to, prepayment meter, off gas grid, electric heating and restricted meter customers. It will also consider the needs and interests of rural and island communities.

5.4 We also welcome any action which contributes to delivering a more equitable energy market. More needs to be done to ensure the needs of Scottish consumers are protected in the longer term and it is in this space that the Scottish public energy company – which the Scottish Government announced its intention to set up in October 2017, – can deliver improved consumer outcomes. Whilst overall energy consumption is significantly lower than in previous decades, the cost of energy to consumers has risen considerably. In 2017, 24.9% (or around 613,000 households) were designated as 'fuel poor'.

5.5 Scotland has a different definition of Fuel Poverty compared with England and Wales. The Scottish definition is expected to be revised this year through the Fuel Poverty (Target, Definition and Strategy) Scotland Bill³ which is currently with the Scottish parliament. This will define Fuel Poverty in terms of:

³ <https://www.parliament.scot/parliamentarybusiness/Bills/108916.aspx>

- the ratio of the cost of fuel needed to heat the home to net income, after housing costs;⁴ and
- an income threshold defined for different household types.

Households must fulfil both conditions to be considered in fuel poverty. The Scottish Government will also be setting out the actions it will take to deliver the targets set out in the Bill in a new Fuel Poverty Strategy that is likely to be published in 2020.

5.6 The Scottish and UK Governments will work in collaboration to ensure that the energy transition delivers economic benefits for Scotland and the rest of the UK. The recently published UK Government Offshore Wind Sector Deal, for example, commits the industry to sourcing 60 per cent total lifetime UK content and increasing UK content in the capital expenditure phase. There will also be a need for highly skilled workers in manufacturing areas throughout the supply chain.

6. The impact of EU Exit

6.1 Legally-binding EU renewable energy and energy efficiency targets have played a defining role in stimulating the huge growth in renewable energy in Scotland, and significant inward investment.

6.2 The success Scotland has had in decarbonising the energy system over the last decade and a half or so has been due to a complex structure comprising regulation, subsidy, signals to business and investors, the planning system, and targets.

6.3 The EU's Directives and Regulations are some of the fundamental pillars of that structure – via the 'Clean Energy for All Europeans' package, which includes the Renewable Energy Directive, the Energy Efficiency Directive, the Effort Sharing Regulation, the Emissions Trading System, and the new Governance Regulation for the Energy Union and Climate Action.

6.4 These have set a legally-binding framework for action at member state and Union level around things such as targets for future shares of renewable energy in 2020 and 2030, carbon capture and storage, and a clear emissions reduction trajectory and carbon price for the power and energy intensive industries sectors via the ETS. It is backed by other supporting measures such as CO₂ standards for cars and vans, and energy efficiency standards for products and buildings, and measures to support technology innovation such as the EU's research framework programmes like Horizon 2020. These EU frameworks have been vital in driving the new products and technologies needed to accelerate the transition towards a low and zero carbon economy – in particular less mature sectors such as wave and tidal energy.

⁴ Housing costs includes rent or mortgage, council tax and charges for water and sewers.

6.5 The deployment of renewable energy has grown threefold in Scotland in the last decade and a healthy pipeline of projects are in the planning system at present. Since 2009, (RED) the Scottish share of renewable energy in gross final energy consumption has grown more rapidly than the UK or the EU average, surpassing it in 2015. On energy efficiency, since the introduction of the Energy Efficiency Directive 2012, final energy consumption in Scotland has fallen by nearly twice as fast as in the rest of the UK (4% fall compared to 2%). It is not possible to quantify the positive impacts of EU Regulations and Directives in isolation from the rest of the support framework, nor is it possible to directly attribute progress to the Directives themselves. However, binding EU renewable energy and energy efficiency targets, and their associated Directives, have driven domestic policy and behaviour, which may in part account for Scotland's strong performance.

6.6 This overarching EU framework in turn feeds upwards into the EU's legally-binding contributions to the UNFCCC Kyoto Protocol and Paris Agreement for climate change, and downwards into member state commitments and targets – such as the UK and Scottish Climate Change Acts, support mechanisms for renewable energy and energy efficiency, and bilateral collaborations with other member states, such as on offshore renewables and interconnectors.

6.7 The UK government's approach to these frameworks will be influenced by whether or not it secures an agreement with the European Union before exit. The draft Withdrawal Agreement and Political Declaration set out that the UK and EU intend to negotiate for cooperation on electricity and gas, on carbon pricing, and to ensure efficient trade over interconnectors. The extent of this cooperation will be influenced by the wider negotiations on the UK's future relationship on trade, where issues around ensuring a 'level playing field' and degrees of regulatory alignment will be important. In this scenario, the EU is likely to expect the UK to remain closely aligned on issues such as climate change, given longstanding cooperation between the UK and EU in the UNFCCC, and may also expect the UK to continue to meet wider EU obligations on matters such as renewable energy and energy efficiency, as a condition of continuing access to the EU's internal energy market.

6.8 In the event of 'No Deal', the UK Government has been using its powers under the EU Withdrawal Act to ensure that the UK continues to have a functioning statute book for energy and climate legislation, and to ensure continued security of energy supplies. The Scottish Government remains opposed to a 'No Deal' EU Exit and the significant risks it would present for the Scottish economy and consumers. It is unclear in the No Deal scenario what approach the UK Government would take towards the wider energy and climate governance frameworks set out above.