Scottish & Southern Electricity Networks

North of Scotland Generation and Storage

February 2018

Introduction

Over the past decade, the volume of generation connected to the transmission and distribution networks in the north of Scotland has grown significantly ranging from small community owned schemes to large scale generation projects across many different technologies.

As the network owner in the north of Scotland, Scottish and Southern Electricity Networks (SSEN) is challenged with understanding how generation and storage may develop in the north of Scotland and the subsequent impact on the network.

Having undertaken initial research into this area, we are now seeking views on identified issues that we believe may impact how generation and storage may develop in our area. Your responses will be used as an input into our planning process to determine the future requirements of the network in the north of Scotland.

About us

We are part of Scottish and Southern Electricity Networks, operating as Scottish Hydro Electric Transmission plc under licence and are responsible for maintaining and investing in the electricity transmission network in the north of Scotland.

Scottish & Southern Electricity Networks

Scottish Hydro Electric Transmission plc

Scottish Hydro Electric Power Distribution plc

Engagement process

We recognise that the input of affected and interested parties is vital if we are to develop the solutions needed to ensure the electricity network in the north of Scotland is fit for purpose now and in the future.

Our initial research identified 4 groups, shown in Figure 1, who represent some of the organisations that play a role in setting and implementing policy and developing generation and storage projects.

Figure 1: Key groups identified

To ensure we gained rich and varied feedback, we implemented a two-stage approach to capturing feedback:

1. Targeted interviews to identify issues affecting those in Figure 1; and
2. This broader consultation with a wider group of stakeholders.

Face-to-face roundtable meetings were carried out with organisations from August 2017 to December 2017 and we also received written responses from the different groups which supplemented the feedback gained from the face-to-face meetings

Groups	Organisations
Governments and Local Authorities	UK Government Scottish Government Aberdeenshire Council Highland Council Perth & Kinross Council
Community Energy Groups	Local Energy Scotland
Developers	Fred Olsen Renewables RES Scottish Power Renewables Scottish Renewables SSE Renewables
Network Operators	Scottish Hydro Electric Power Distribution

Our Research and Your Feedback

A summary of our research, using a variety of publicly available sources, and the feedback we received from those we engaged through face-to-face meetings, is provided below.

Generation Overview

In 2016, 5,141MW of generation capacity was present on the network, having grown from 1,988MW in 2005. Fossil fuel plays a relatively small role in the electricity mix, with the gas-fired power station at Peterhead representing only 8% of generation capacity on the network in 2016.

From 2005 to 2016, new generation from wind (2,853MW), hydro (219MW) and solar (22MW) was added to the network. Other technologies, such as tidal, biogas and CHP, make up the remainder of generation additions, totalling 59MW from 2005 to 2016.

Understanding the scale and location of additional generation that is expected to request access to the network is fundamental in enabling us to plan our future investments and manage the impact of variable renewable generation on the network.

Further to this, embedded generation (generation connected to the distribution network) has increased significantly in recent years, representing 47% of the total generation capacity on the network in 2016. This has grown by 16% from the levels seen in 2005 and therefore requires us, as the transmission owner, to work closely with the distribution network owner (Scottish Hydro Electric Power Distribution plc) to understand the potential impact on the network, and how this can be best managed from a whole system perspective.

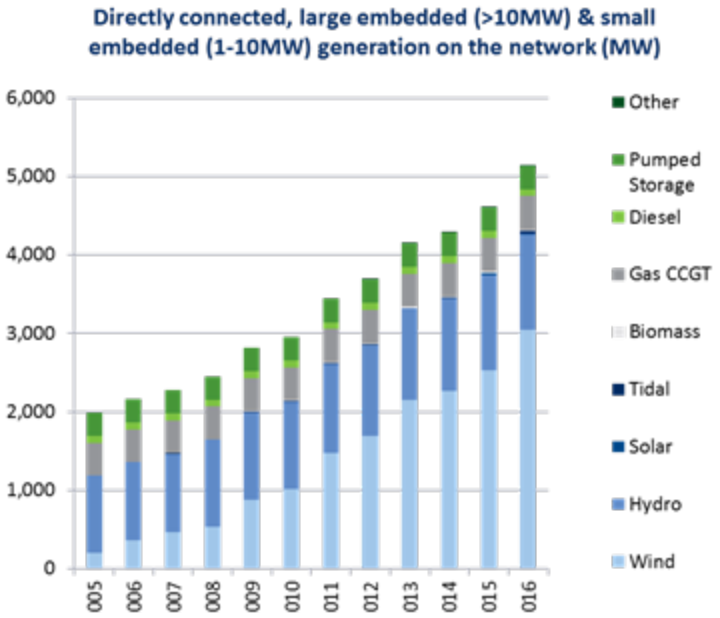

Figure 2: Source - SHE Transmission plc

Factors influencing investment in new generation in the north of Scotland

Our engagement with generators and developers indicates that decisions on new generation developments will be dependent on two main factors: energy policy and economics. Subsidies for different energy technologies are a focus area that directly links these two determinants.

Energy policy

The Climate Change Act (2008) committed the UK to reducing greenhouse gas emissions by at least 80% by 2050 when compared to 1990 levels, and it is this target that underpins energy policy in the UK.

The UK Government's recent publication of its Clean Growth Strategy[1], outlined key policy areas that it believes will enable the UK to meet its 2050 climate change target. The UK government detailed that it will phase out the use of unabated coal by 2025, deliver new nuclear and improve the route to market for renewable technologies such as offshore wind and other less established technologies. These policies remain unchanged from 2015 when Amber Rudd oversaw the Department of Energy & Climate Change.

Key differences exist between the UK and Scottish Government's policy support for energy technologies such as the Scottish Government's no new nuclear stance. The focus from the UK Government has shifted from established renewable technologies to less established renewable technologies such as offshore wind. However, the Scottish Government continues to show support for established renewable technologies such as onshore wind and solar, evidenced through its Onshore Wind Policy Statement[2] and potential changes to permitted development (PD) rights for certain renewable installations.

Whilst energy policy remains a reserved matter for the UK Government, there are additional ways in which the Scottish Government can encourage investment in the energy sector. The Scottish Government's Energy Strategy[3] detailed a new target which it hopes will provide further clarity to the energy sector and highlights its commitment to a whole-system approach to energy. The target sets out that the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption be supplied from renewable sources by 2030.

Our engagement highlighted that planning policy plays an important role in the development of energy in Scotland. The Planning (Scotland) Bill, which will review how land is developed and used in Scotland, is currently making its way through the Scottish Parliament. We were advised that some local authorities are developing supplementary guidance for renewable and low carbon technologies, intended to provide additional direction to developers on appropriate sites and the required information, to ensure that planning applications are populated with the correct information prior to submission.

Further to this, an upcoming review of building regulations will consider the role of low carbon generation in new building developments.

Economics

Discussions with electricity generators and developers confirmed that project and market economics are the other main influencing factors for how generation and storage will develop in the future.

The expected wholesale price of electricity is one of the main factors determining investment decisions for projects. The volatility of these prices leads to significant uncertainty, making it difficult to forecast outcomes for different technologies. In an effort to address this uncertainty and provide some guarantees for energy developers to projects that support policy ambitions, the UK Government provides subsidy support for some technologies.

1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf
2 http://www.gov.scot/Resource/0052/00529536.pdf
3 http://www.gov.scot/Resource/0052/00529523.pdf

Not all energy technologies will be able to receive government subsidies, with the focus shifting to less established technologies such as offshore wind, Remote Islands onshore wind in Scotland, and some advanced conversion technologies. The Clean Growth Strategy stated that up to £557m will be made available for future Contracts for Difference (CfD) auctions with the next auction expected to take place in Spring 2019. The CfDs for nuclear are agreed directly between the UK Government and the developers. Future new nuclear projects will be challenged to deliver projects for less than Hinkley Point C.

An additional consideration for developers is access to balancing and ancillary services and the Capacity Market to provide additional revenues over and above those earned from the wholesale market. National Grid, the System Operator, is currently undertaking a programme to streamline its product offering, allowing it to better meet the changing system needs. National Grid will rationalise and simplify its product offering, meaning that some products which exist today may not be available in the future. This could increase competition and the number of tenders for the remaining products.

Cost reduction will play a significant part in determining the final investment decision for projects involving newer technologies. There has been a substantial reduction in the costs of onshore wind, solar and battery storage, aided by global momentum in the deployment of these technologies.

Generation currently contracted

Utilising information regarding generation capacity that is due to connect to our network, we have a view on how the energy mix in the north of Scotland may evolve during the next decade but we are looking for your input.

Onshore wind

In November 2017, we published our paper on Onshore Wind Repowering where we highlighted that by the end of 2029 a total of around 700MW of existing capacity could be nearing the end of its life assuming a 20-year asset lifetime or 120MW if a 25-year asset life is used.

During the 2020s, there is also potential for additional new onshore wind capacity to come online. Our best view of additional onshore wind seeking to connect to the network in the north of Scotland is circa 1GW which is likely to connect early in the next decade.

What is the potential for more or less new onshore wind to come online during the 2020s?

Solar

From discussions with stakeholders, we were advised that the north and northeast of Scotland are the most suitable areas for future deployment of mid to large scale solar sites. Feedback we received detailed that there has been a growth in solar on households and businesses but there is further potential for this to grow during the next transmission price control period. Solar Trade Association Scotland carried out an analysis which highlighted that around 6GW of solar could be deployed across Scotland by 2030[4].

What potential levels of solar additions could we see in the north of Scotland by 2030?

4 http://www.solar-trade.org.uk/solar-action-plan-needed-realise-scotland-energy-vision/

Offshore wind

Our contracted position shows that up to 2030 an additional 1GW of offshore wind capacity may connect to our network. The UK Government's Clean Growth Strategy outlined that if future projects achieve a similar clearing price to that of Hornsea II and Moray Firth (£57.50/MWh), there could be as much as 9GW of offshore wind projects awarded CfDs for projects commissioning during the 2020s.

Later in 2018, the Crown Estate Scotland will be consulting with its stakeholders regarding the potential to issue new leasing rights for offshore wind projects as it has been some years since any leases for offshore wind projects were issued. It is likely that the number of new leases being offered will affect the future capacity of offshore wind generation in the north of Scotland.

What is the likelihood for more or less offshore wind to come online during the 2020s?

Wave and Tidal

The UK and Scottish Governments continue to support wave and tidal technologies through access to subsidies and innovation funding but have called on the wave and tidal sector to improve its competitiveness versus other technologies. This suggests that further cost reduction activities and technological innovation may be required.

Our contracted position shows that 402MW is set to connect to the network in the north of Scotland by 2030.

What is the potential for more or less wave and tidal capacity to come online by 2030?

Hydro

From our discussions with large scale renewable developers, a number of them advised us that the majority of hydro opportunities are for small scale installations and that the lack of incentives (monetary) means that they are not focused on delivering small scale hydro projects. However, they did explain that if incentives were in place, there may be the possibility to repower existing sites.

What are your opinions on the potential for hydro projects to be developed during the next decade?

Thermal

Thermal generation continues to play a role in the energy mix in the north of Scotland. Our best view shows that approximately 1.1GW of thermal generation will connect to the network by 2030. We expect that there will be an increase in thermal generation connecting to the distribution network.

Within the Clean Growth Strategy, the UK Government detailed that £100m would be invested to support carbon capture usage and storage (CCUS). This would be focused on industrial processes and could present an opportunity for thermal generation assets in the north of Scotland.

What is the potential for more or less new thermal generation to come online during the 2020s?

Interconnectors

As part of the transition to a smart, flexible system, planning for interconnection will be a major factor for network operators. There are currently three proposed projects looking to connect within the north of Scotland; NorthConnect (1.4GW), Icelink (1GW) and Maali (0.6GW) with expected connection dates ranging from 2022 to 2027.

New interconnectors are expected to be bi-directional, allowing electricity to be imported and exported. This will require transmission owners to manage the operational challenges of these variable flows and the potential adverse interactions between HVDC interconnectors and other HVDC schemes.

Do you think the current online dates are achievable and will additional interconnectors come online by 2030?

Energy storage

Energy storage is a technology that is recognised as a means to better manage intermittent generation. The successes of battery energy storage in the Enhanced Frequency Response (EFR) tender and Capacity Market in 2016 has helped increase interest in the technology.

Stakeholders advised that further clarification is required on which balancing and ancillary services energy storage assets can access. National Grid's rationalisation and simplification of its services will be key in providing clarity for battery energy storage projects and allowing batteries to compete effectively with other forms of generation.

The feedback highlighted that interested parties are considering the feasibility of utilising battery energy storage in conjunction with different types of technologies such as onshore wind, offshore wind and solar. However, the feedback suggested that in some instances the application of battery energy storage has not yet reached technical and/or commercial maturity.

Comments from stakeholders advised that standalone projects located near to Grid Supply Points (GSPs) could be possible if the economics were viable.

What levels of battery energy storage additions could we see on the network by 2030 and at what scale?

Where are battery energy storage projects likely to connect, at transmission or distribution?

Summary

So far our research and feedback from stakeholders has identified the following factors and assumptions as the main influences on generation development in the next decade. We will use these to inform our analysis, subject to further insight provided through this consultation.

1. Energy policy and economics will impact the investment decisions of future generation and storage projects.
2. Planning policy plays an important role in enabling future growth in generation and storage capacity in the north of Scotland, and the location of developments.
3. Changes to National Grid's balancing and ancillary services offering may impact the commercial viability of projects across all technologies, including battery energy storage.
4. There is the potential for 1GW of onshore wind and 1GW of offshore wind to connect to the network during the 2020s.
5. Developers are considering co-locating battery energy storage with different types of technologies such as onshore wind, offshore wind and solar and may consider standalone projects if the economics are viable.

Can you tell us if there are any other areas you believe would impact the development of generation and storage in the north of Scotland?

What next?

Later in 2018, we will be releasing a paper which summaries the feedback from our consultations and details the modelling undertaken to create Future Energy Scenarios for the north of Scotland.

Responding to this paper

To allow us to complete our assessment and confirm our assumptions, we would be grateful to receive your comments on the following areas:

Q1. What is the potential for more or less new onshore wind to come online during the 2020s?

Q2. What potential levels of solar additions could we see in the north of Scotland by 2030?

Q3. What is the likelihood for more or less offshore wind to come online during the 2020s?

Q4. What is the potential for more or less wave and tidal capacity to come online by 2030?

Q5. What are your opinions on the potential for hydro projects to be developed during the next decade?

Q6. What is the potential for more or less new thermal generation to come online during the 2020s?

Q7. Do you think the current online dates are achievable and will additional interconnectors come online by 2030?

Q8. What levels of battery energy storage additions could we see on the network by 2030 and at what scale?

Q9. Where are battery energy storage projects likely to connect, at transmission or distribution?

Q10. Can you tell us if there are any other areas you believe would impact the development of generation and storage in the north of Scotland?

This paper and an online feedback form can be found on our website at the following address:

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

If you have any other queries on the content of this paper then please get in touch with Imran Mohammed on the details below:

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We are inviting responses to this paper by **Friday 16 February 2018.**

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Information provided in response to this consultation may be used in future documents related to Future Energy Scenarios. Responses will be generalised and not attributed to specific respondees. If you would prefer the information that you provide to be treated as confidential, then please make us aware of this when responding to the consultation.