Scotland's electricity infrastructure: inhibitor or enabler of our energy ambitions?

Scottish Parliament - Net Zero, Energy and Transport Committee
April 2023

sse Renewables

Introduction to SSE Renewables

SSE Renewables is a leading developer and operator of renewable energy, headquartered in the UK and Ireland, with a growing presence internationally.

We have an operational portfolio of around 4GW of onshore wind, offshore wind, and hydropower generation, with a secured future project pipeline of over 13GW in development. Our operational portfolio comprises nearly 2GW of onshore wind capacity, almost 0.5GW of offshore wind capacity, and 1.5GW of flexible hydropower and pumped storage capacity. These generation assets produce around 10TWh of renewable power each year.

SSE has a £12.5bn Net Zero Acceleration Plan, through which we're investing £7m a day in critical low-carbon infrastructure that will help the UK achieve energy independence. By the end of the decade, we have plans to invest over £24bn in Britain alone, £15bn of which will be in Scotland.

Electricity network readiness

1. Do the current business plans from SSEN and SPEN (in relation both to transmission and distribution) allow for sufficient investment in networks to realise the Energy Strategy's ambitions?

While it is more appropriate for SSEN and SPEN to comment on their current business plans we have set out below more general views, particularly with regards to offshore wind, on some of the barriers posed by grid in realising the Energy Strategy's ambitions.

Timely grid connections (for all forms of renewable energy) are one of the most significant barriers to accelerating the pace of renewable energy deployment and to meeting the Scottish Government's target for achieving net zero by 2045.

With specific regard to offshore wind, the Scottish Government ambition of 11GW of offshore wind by 2030, alongside the UK Government's ambition of 50GW offshore wind represent a huge step change for the sector. However, we now need significant focus on delivering the grid necessary to facilitate these ambitions. It will be vital that the Holistic Network Design (HND), Offshore Transmission Network Review (OTNR) delivery models and processes like the Accelerated Strategic Transmission Investment (ASTI) framework enable faster delivery of offshore wind in Scotland.

While the allocation of 25GW in the ScotWind leasing process, rather than the anticipated 10GW, was a welcome but unexpected development, it has heightened the need for an efficient grid process (including a fit-for-purpose charging framework) and grid design.

In addition, while we support the move to a more coordinated approach to delivering the offshore transmission network required to meet our ambitions, it is important to recognise that the OTNR is currently having the effect of delaying, and not accelerating most of the projects that the Scottish and UK Governments are counting on to deliver their 2030 ambitions for offshore wind deployment. It is vital that we ensure that the OTNR and the HND processes enable the timely progression of survey, cable, development works and ultimately project permitting. Transparent engagement on the HND, HND Follow-up Exercise (HND FUE) and Detailed Network Design (DND) processes will be key to this. It will also be important that connection dates are sufficiently ambitious and aligned to government targets.

2. To what extent are SPEN and SSEN able to alter investment plans in response to a fast-moving policy environment?

This is a matter primarily for SPEN and SSEN to comment on.

System resilience

3. What role will dispatchable electricity sources - pumped hydro, battery technologies, thermal generation (hydrogen power, gas with CCS) - play in ensuring security of supply and system resilience? Should any other technology play a role in supporting Scotland's electricity system?

As we introduce ever greater levels of variable renewable energy to our electricity system, electricity storage and flexibility will become an ever more important element in delivering energy security.

Scotland is fortunate that our rich history in hydropower, Scotland's original source of renewable energy means that we already have a major source of low carbon electricity which can provide significant flexibility and storage capacity to our electricity system.

SSER is the proud custodian of the great majority of Scotland's hydropower assets, with around 1.5GW of conventional hydro capacity and 300MW of pumped storage hydro. When full, our hydro catchments can hold up to 900GWh of storage. Many of our hydro assets have now been providing green power to Scotland for over 70 years and we are continuously investing in our hydro fleet to ensure that not only can they continue to generate well into the future but that we maximise the flexibility needed for our future electricity system.

However, as we move towards net zero, we will need to significantly increase our existing energy storage capacity. Pumped storage hydro is the world's largest, most proven, cost-efficient, and mature long-duration electricity storage technology and National Grid ESO, as part of its 2022 Future Energy Scenarios (FES) stated that more than a tripling of the UK's current pumped storage capacity may be required by 2050 to reach net zero.[1]

Furthermore, a study by Aurora Energy Research has shown that 24GW of long-duration electricity storage, an eight-fold increase, is required by 2035 to meet the government's decarbonisation commitment cost-effectively and securely.[2] Such levels would reduce gas imports by up to 50TWh and help keep household energy bills lower and less volatile.

The government has recognised that long-duration electricity storage will be "essential for achieving net zero" yet the recent Review of Net Zero by Chris Skidmore MP argued the absence of an appropriate market framework is impacting investment in long-duration storage technologies such as pumped storage.[3]

SSER's up to 1.5GW Coire Glas project with 30GWh of storage capacity in the Highlands would store enough water to power 3 million homes for 24 hours non-stop. It would be the UK's largest-ever electricity storage project, more than doubling the country's current storage capacity as well as being the largest hydro project in 40 years. In addition, as it is predominantly a civil engineering project, most of the more than £1.5bn estimated total capex cost would be spent domestically – a major boost for the UK economy and local supply chains.

With an appropriate market framework in place, SSER believes Coire Glas could be delivering flexibility to the system by the end of the decade – and initial tunnelling and exploratory works totalling £100m are already underway.

As highlighted by AFRY's report on the 'Benefits of long duration electricity storage' of last year, further long duration storage solutions such as hydrogen salt cavern storage will also be required in a net zero system.[4]

---

[1] https://www.nationalgrideso.com/future-energy/future-energy-scenarios
[2] https://auroraer.com/media/long-duration-electricity-storage-in-gb/
[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128689/mission-zero-independent-review.pdf
[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1095997/benefits-long-duration-electricity-storage.pdf

4. What are the key barriers to deploying these technologies and how should they be addressed?

Just as the CfD mechanism has been very successful for facilitating the deployment of variable renewables, pumped storage and other large-scale long-duration electricity storage technologies require an adapted Cap and Floor revenue stabilisation mechanism to enable investment given their high capital costs, long lead times and the lack of revenue certainty.

Alongside an adapted Cap and Floor, both network charging and the Capacity Market need to be reformed to better value the role such flexible assets provide in terms of alleviating constraints and supporting GB's security of supply.

In the British Energy Security Strategy, the UK Government committed to having an appropriate policy framework in place by 2024 to enable investment but no detail has yet been provided.[5] The Government's timetable needs to be urgently accelerated to ensure projects such as Coire Glas can support the grid by the end of the decade.

Unlocking pumped storage projects like Coire Glas will deliver significant economic benefit to Scotland and we would urge the committee to make representations to the UK Government to urgently move forward with putting in place the necessary market support to underpin investment in long-duration storage.

5. Do proposed UK Government reforms to the electricity capacity market align with the Draft Energy Strategy?

The UK Government's recent Capacity Market consultation made a number of steps towards better aligning the mechanism to our transition to net zero.[6] However, more substantial reform is required over the coming years as part of the Review of the Electricity Market Arrangements (REMA) process to ensure it is mechanism that helps stimulate investment in the flexible low-carbon technologies needed to reach both government's decarbonisation commitments.

Alongside becoming increasingly lower carbon, the Capacity Market mechanism needs to be enhanced and optimised to better value and reward flexibility, responsiveness, and other system attributes that technologies such as pumped storage can provide to the system.

Wind

6. What are the key barriers to achieving the Scottish Government's ambition for onshore and offshore wind contained in the Draft Strategy; could the readiness of the electricity network to accommodate new projects affect the business case for the proposals?

SSER strongly supports the ambition within the Scottish Government's refreshed Onshore Wind Policy Statement to deliver up to an additional 12GW of new onshore wind capacity by 2030 in Scotland. In addition, we support the analysis that despite the potential offered by offshore wind that this additional onshore wind capacity will be necessary to meet our target of achieving net zero by 2045.

There are a number of barriers which remain to achieving this ambition and we support the Scottish Government's intention to put in place a sector deal for onshore wind aimed at removing these barriers and delivering other benefits such as maximising supply chain opportunities and protecting and enhancing Scotland's biodiversity.

Planning remains a key barrier to achieving the 2030 ambition. However, we believe that National Planning Framework 4 (NPF4) adopted by the Scottish Parliament earlier this year represents a significant and positive step forward in tackling this barrier. It's a clear statement that tackling climate

[6] https://www.gov.uk/government/consultations/capacity-market-consultation-strengthening-security-of-supply-and-alignment-with-net-zero

change should be at the heart of our planning system and the recognition that the deployment of renewable energy infrastructure has a key role to play in this should now help to unlock further onshore wind development in Scotland.

However, it's important that we now see NPF4 fully reflected within our planning system whether that be in decisions taken by planning authorities, and the Scottish Ministers, the assessment of applications for renewable energy projects by statutory bodies, or within emerging Local Development Plans which will require to be prepared by local planning authorities following the introduction of the new development planning regulations later this year and which should take into account NPF4's policies and ambition.

While overall, we strongly support NPF4, there is one area of concern we would highlight, which is the policy on ancient woodland. We believe that the current wording in NPF4 of the ancient woodland policy could have significant negative implications for the deployment of onshore wind, particularly with regard to the future grid development needed to connect onshore wind to the electricity system.

We agree that avoiding impacts on ancient woodland should be a key priority for both renewable developers and those developing the associated network infrastructure. However, in some circumstances a degree of impact will be unavoidable due to the extent of ancient woodland cover in areas where network investment will be necessary. We believe that a change to the wording of the ancient woodland policy is urgently needed to ensure that we can both protect and enhance important habitats whilst also enabling infrastructure critical to meeting our renewable energy targets.

7. Given the generation potential, and market ambition, is there a risk of oversupply if options for use of surplus electricity (e.g., green hydrogen production) do not become reality?

In the Climate Change Committee's Balanced Pathway for the Sixth Carbon Budget, there is a 50% increase in electricity demand by 2035 and a doubling in electricity demand by 2050 (with some CCC pathways projecting as much as a trebling by 2050). Alongside this, continued digitalisation is expected to further embed the critical role of electricity to the functioning of the UK economy. This suggests that any projected risk of over-supply in electricity is low but does reinforce the need for much greater network capacity to ensure that electricity can be transported to where it is needed most. In addition, it demonstrates the critical role that energy storage technologies such as pumped storage will play in balancing the system both in periods of excess supply and high demand.

Hydrogen and the electricity system

8. How much of the Scottish Government ambitions for 5GW of hydrogen production capacity by 2030, and 25GW by 2045 should come from green hydrogen?

9. What are the key infrastructure barriers to building a hydrogen economy in Scotland and how should they be addressed?

Both green and blue hydrogen will play a critical role in a net zero economy across a variety of applications, particularly in the short-term as a key priority should be replacing the UK's existing grey hydrogen production. Over the longer-term as electrolyser production is scaled up and renewable energy costs decrease, we would expect green hydrogen to make a much larger overall contribution, but this will be influenced by a range of other factors, including government policy.

The main infrastructure barriers to enable a large, liquid, and competitive hydrogen market is the development of appropriately sized transport and storage infrastructure. Transporting hydrogen via pipelines will be increasingly important to link production facilities with end-users. This will be critical for the Scottish hydrogen economy in particular given much of the domestic demand for the hydrogen produced in Scotland is expected to be in England. Secondly, as there will be times when the supply of low carbon hydrogen will not align with demand from offtakers, storage infrastructure will be required to balance this misalignment as well as support the decarbonisation of the electricity system.

Both the development of large-scale transportation and storage will require appropriately designed business models to enable investment which the UK Government committed to designing by 2025. We would stress the need for this process to be accelerated such that they can be established and operating in 2025 to facilitate investment.

Ofgem

10. Ofgem are "working with government, industry and consumer groups to deliver a net-zero economy". What changes have recently been made to support the delivery of net-zero? What more could be done to support a regulatory regime that delivers decarbonised energy supplies affordably?

Currently Ofgem's statutory obligations do not contain any requirements for enabling net zero, and we believe this would be a helpful starting point, alongside its existing consumer obligations, to modernise the regulator's approach to critical infrastructure investment. Including net zero as a primary objective for Ofgem will help to give more balance to their decision making, ensuring future consumers benefit from decision made today whilst consideration should also be given to extend this remit to include economic growth.

11. What are the most important issues for the UK Government's Review of Electricity Market Arrangements to address? What are the benefits of the current system, and the potential pitfalls of moving away from it? What are the implications for the Draft Energy Strategy of the Review?

The UK Government's Review of Electricity Market Arrangements is of critical importance to Scotland and its ambitions to decarbonise and deliver a just transition. It is also true that the UK Government's targets are heavily dependent on what happens in Scotland and therefore the continued participation of the Scottish Government in the REMA process is vital.

REMA can help reduce the costs of delivering a decarbonised electricity system as the system evolves from being based on fossil fuels to being based around renewable energy. However, proposals being put forward to introduce locational wholesale pricing under 'nodal' or 'zonal' pricing would increase uncertainty for project developers, which would in turn increase the cost of capital for what is a capital-intensive energy transition. The impact of this would negate any perceived benefit from locational marginal pricing.

Fundamentally, recent increases in constraint costs can be put down to a lack of electricity transmission build over the 2010s that has not kept pace with wind generation built to deliver on 2020 renewable energy targets. The 'Connect and Manage' policy from 2010 had sought to address this but was not appropriately reflected in the regulatory regime. We are hopeful that the OTNR signals a step change in the regulatory mindset required to deliver on net zero ambitions.

Critically a move to nodal or zonal pricing would cause a significant period of uncertainty during the upcoming decade of delivery required to reduce the economy's exposure to imported fossil fuels and deliver a decarbonised electricity system on the path to net zero. To ensure low carbon investment in Scotland can continue at pace, it is critically important that the prospect of nodal and zonal is removed from the next stage of REMA due from the Department for Energy Security and Net Zero at the end of the year. If not, with the UK election due in 2024, there is a risk the uncertainty of splitting the market into different price areas may overhang the electricity sector and increasingly feed into investment decisions.

SSER and the majority of the renewable energy sector are strongly in favour of a more incremental, BAU+ approach to REMA. A summary of SSE's REMA response is referenced below,[7] and we would also point to a leading study from the University of Strathclyde, which was jointly commissioned by Scottish Power and SSE which builds further evidence on this important issue.[8]

[7] https://www.sse.com/media/p5dcwazx/221010-beis-rema-consultation-sse-response-summary-2.pdf
[8] https://www.strath.ac.uk/whystrathclyde/news/2023/researchersadvisecautiononrushingtoadoptlocationalmarginalpricingofelectricity/

Community Energy

12. Are community and locally owned projects inhibited by the current electricity network?

N/A

13. What are the key infrastructure barriers to Scottish Government community energy ambitions and how should they be addressed? Is it enough to "encourage" shared ownership models, or should a more formal mechanism be implemented?

SSER is committed to delivering shared ownership on renewable energy projects where appropriate and we are in active discussions with a number of communities. The key barriers to delivering shared ownership include the willingness of communities to explore shared ownership, the skills and capacity in some communities to take on the responsibilities associated with shared ownership and the ability to access the required funding.

From our experience the diversity of different communities and projects means that a 'one size fits all' approach to shared ownership will be difficult to deliver. We would also note that we believe it is important that shared ownership models don't damage the overall commercial viability of projects.