SECOND NATIONAL INFRASTUCTURE ASSESSMENT: BASELINE REPORT

SSE RESPONSE

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About SSE

SSE is a FTSE-35 company headquartered in Perth, Scotland. We are a leading generator of renewable electricity and one of the largest electricity network companies in the UK. We develop, own and operate low carbon infrastructure to support the zero-carbon transition. This includes onshore and offshore wind, hydro power, electricity transmission and distribution grids, and efficient gas-fired generation, alongside providing energy products and services for businesses, and we have interests across Great Britain and Northern Ireland, Republic of Ireland, Japan, Spain, Portugal, Denmark and Poland.

SSE recently announced a £12.5bn Net Zero Acceleration programme which will see the company expand on its ambition to be the UK's clean energy champion. The new programme will see SSE enable delivery of over a quarter of the UK's 40GW offshore wind target by 2030, including the world's largest offshore wind farm at Dogger Bank. We will also deliver over 20% of the necessary upcoming electricity networks investment in the UK to connect renewable energy and enable electrification of heat and transport, alongside investment in critical technologies like CCS, hydrogen and hydro pumped storage.

Introduction

SSE welcomes the opportunity to support the National Infrastructure Commission in its work to develop the Second National Infrastructure Assessment. This response to the Baseline Report provides a high-level overview of the areas where SSE will look to engage with the Commission to inform the NIA in 2023.

As a leading developer of low carbon energy infrastructure in the UK, SSE's response will focus on the infrastructure challenges associated with decarbonising the power sector as the Commission considers ***how a decarbonised, secure and flexible electricity system can be achieved by 2035 at lowest cost.***

The Baseline Report rightly acknowledges the progress the UK has made in reducing emissions from power generation since the Climate Change Act 2008. In that time the UK has benefited from a policy environment which has successfully directed private

investment away from fossil fuels and towards low carbon sources of generation. This has been most successfully demonstrated in the phase out of coal power and the expansion of renewables where the share of power generation has risen to over 40% in 2020.

This trend is set to continue with Government committing to deliver 40GW of offshore wind by 2030, and the recent ScotWind seabed auction process awarding lease option agreements for 25GW of offshore wind. Whilst this level of ambition is to be welcomed, meeting these targets will present a number of challenges to connect this scale of offshore wind and transition to a renewables-lead energy system.

Summary

To summarise SSE's views on the draft assessment, it views the following points

- Electricity market reform to support all low carbon generation equally
- Review of electricity transmission charging to reduce cost and risk for generators
- Network regulation supporting investment in a timely manner in both electricity transmission and distribution networks
- Extending the Offshore Transmission Network Review (OTNR) to look to 2035 and beyond
- Focussed Government supply chain support for offshore transmission
- A Cap and Floor mechanism to deploy hydro pumped storage
- A support framework for early, strategic deployment of hydrogen storage
- Increased ambition on Power CCS to support CCUS/hydrogen infrastructure

Delivering 40GW Offshore by 2030

No company in the world is building more offshore wind than SSE including the world leading Dogger Bank and Seagreen wind farms which will support more than 3,500 direct and supply chain jobs in the UK, helping drive our green recovery, such as the new GEG tower factory at the Port of Nigg.

The strength of the UK's offshore wind sector can be seen in highly competitive CfD and seabed auctions and the policy framework to support renewable deployment is working well at attracting investors and reducing costs to consumers. However, we believe that delivering 40GW by 2030 is only feasible if action is taken by Government, regulators and stakeholders to address current barriers including aligning planning and consenting processes with policy ambition.

As we continue to transition to a renewable-led system **reform of the electricity market will be needed** to decarbonising electricity at lowest cost, by equally supporting investment in new projects and repowered sites with an increasing number of periods of low or even negative wholesale electricity prices. This will become an increasingly significant risk for the deployment of future offshore wind projects where merchant returns post CfD are a vital consideration for developers looking to submit viable bid prices in an increasingly competitive market. UK Government has acknowledged this issue and begun to consult on the need for reform of the electricity market. If not resolved, this electricity market issue will begin impacting investment decisions in the coming years, and analysis commissioned by SSE by LCP suggested that addressing this issue would save consumers £20bn by 2050.

On the wider challenges of delivering 40GW of offshore wind the Commission's Baseline Assessment correctly identifies intermittency and the need to introduce more sources of flexibility onto the system. However, more emphasis should be given to the significant network challenges which will need to be addressed if the UK is to meet net zero.

Networks for Net Zero

Electricity transmission and distribution networks will play a critical role in meeting Government's targets for net zero. Significant investment in transmission infrastructure will clearly be needed to connect the scale of offshore wind which is set to be developed by 2030 and deliver it to where it is needed. At the distribution level investment in infrastructure will be needed to accommodate the electrification of the heat and transport sectors in their own low carbon pathways.

It is vital to ensure that the regulation of networks enables this investment to be made where it is required in a timely manner, to avoid constraints on the grid becoming a barrier to renewable developments. This is the single biggest barrier to achieving the Government's 40GW target and will require a change in approach from Ofgem to support strategic investment in networks over protracted 'needs case' investment decisions.

This approach must be replicated at the Distribution level where companies, including SSEN Distribution, are currently engaging with Ofgem on the price control period for ED2 which will be critical to ensuring network infrastructure is ready to accommodate increased demand for EV charging and electric heat pumps.

As well as a strategic approach to onshore network infrastructure, a co-ordinated offshore transmission network will be required to ensure the efficient connection of offshore generation assets to the main grid.

Instead of connecting offshore generation in a piecemeal manner a co-ordinated network would allow:

- Offshore transmission assets to be shared between multiple offshore projects
- An optimised network design to connect multiple generation assets
- Efficiencies in the supply chain and delivery of offshore transmission assets due to standardisation and modularisation of the offshore network design

Progress is being made as part of the Offshore Transmission Network Review (OTNR), but it is critical that this translates into project delivery in the timescales required**. The OTNR's Holistic Network Design (HND) should be a routemap for 2030, and look out to developing 2035 and 2040 outlooks to inform plans being made today**. This will be a fundamental change to the GB transmission system, and as such **the transmission network charging regime in place (TNUoS) will need review** to ensure it locational signals inform investment decisions rather than add cost and risk for generation whose location is largely determined through seabed leasing.

Whilst there has been increased and welcome focus from Government on securing domestic supply chains from offshore wind, **more can be done to support supply chain development for other parts of the value chain, notably on offshore transmission**. Government, regulators and industry should collaborate to help secure investment in HVDC technology given the amount of deployment happening in the UK waters and neighbouring markets, as well as leading technical and academic expertise such as at the UK HVDC Centre in Scotland. As well as securing domestic benefits, efforts in this area could also mitigate upcoming supply chain constraints.

Long Duration Storage

Long duration storage, including pumped hydro and hydrogen storage, has a critical role to play in delivering flexibility to the system, by storing and low carbon power until it is needed. As well as the important role it will play in a renewable-lead system, long duration storage can also reduce dependency on imported gas and therefore help to protect UK consumers from the high wholesale prices currently being seen in the market.

A soon to be published Aurora study commissioned by SSE shows that 24 GW of long duration storage, a more than eight-fold increase, is required by 2035 to cost-effectively and securely manage the intermittency of renewable generation needed to meet the government's decarbonisation commitment. Such levels would reduce gas imports by up to 50 TWh and help keep household energy bills lower and less volatile.

We welcome the Government's recognition of the importance of long duration in the Smart Systems and Flexibility Plan in 2021. Government also acknowledged that these projects face significant barriers to deployment due to financing challenges and high upfront capital costs.

SSE supports the Cap & Floor mechanism being adapted to hydro pumped storage and other similar long-duration storage and is looking for Government and Ofgem to work at pace to establish the regime in 2022. Having recognised the need for this

technology on the system, decisions are needed now to support deployment and ensure projects can be delivered by 2030.

SSE Renewable's flagship 1.5GW Coire Glas hydro pumped storage project in Scotland would be capable of storing 30GWH, which would more than double the total GB electricity storage capacity and have the capability to power three million homes for 24 hours non-stop. It would be one of the largest such schemes in the world in terms of storage capacity and would have an asset lifetime of at least 50 years.

In regard to hydrogen storage, currently there is no support framework or business model being proposed by Government. Given the lead times involved in developing an storage asset it could act as a barrier to deployment of low carbon hydrogen in the UK, as hydrogen storage can help secure security of supply and mitigate price volatility to support new production and demand. Government needs to ensure a business model is in place to support the early, strategic deployment of hydrogen storage capacity from the late 2020s. SSE Thermal and its partner Equinor are looking to develop the world's largest hydrogen storage facility in salt caverns at Aldbrough in the Humber, which would be initially capable of storing at least 230GWh of hydrogen.

CCS to provide flexibility in a renewable led system

As we progress to net zero, low carbon thermal power stations – using carbon capture and storage (CCS) or hydrogen – will play a crucial role in backing up a renewables-led transition, ensuring a balanced power system can provide security of supply.

Low carbon thermal power projects can also stimulate broader industrial decarbonisation, by underpinning investment in shared transport and storage infrastructure for carbon and hydrogen within clusters, allowing other sectors to reduce their emissions.

Whilst we welcome the Government's ambition on CCS as set out in the Net Zero Strategy, We believe there's a need for more than one power-CCS project this decade, going beyond the UK Government's commitment to at least one by 2027. This is in line with the advice of the Committee on Climate Change which has recommended that multiple power-CCS projects will be needed to meet the 6th Carbon Budget and net zero by 2050.

This decade we'll see around 12GW of nuclear and coal capacity come off the system, potentially alongside aging gas generation, combined with an expected increase in demand. While renewable generation can plug some of this capacity gap, it cannot do it alone. Supporting only one power-CCS project this decade is likely to only deliver between 700 and 800MW of capacity. More is needed to ensure a secure system without carbon lock-in.

Importantly, power-CCS has an important role in underwriting CCUS and hydrogen infrastructure within industrial clusters. Compared to industrial users, power stations have a long term and regular demand, acting as an anchor load to underwrite CCUS/hydrogen infrastructure. Therefore, power-CCS will not only reduce costs and provide firm, dispatchable capacity to decarbonise electricity, but it will reduce the need for subsidy for infrastructure and/or reduce the costs of using that infrastructure for other users. **As such Government needs to increase its ambition for power CCS to at least power-CCS project per industrial cluster by 2030.**