

# INNER HEBRIDES & ORKNEY WHOLE SYSTEM UNCERTAINTY MECHANISM

19<sup>th</sup> October 2023



Scottish & Southern  
Electricity Networks

# ●●●● AGENDA

- Introductions - 5mins
- Setting the scene – 10mins
- Taking a whole system approach– 10mins
- High level options – 10mins
- Next steps – 5mins





# SETTING THE SCENE

Landel Johnston, Head of RIIO-ED2 Non-Load, CBRM Lead

# SSEN OVERVIEW

## OUR DISTRIBUTION NETWORK AT A GLANCE

Over **3.9million** homes and businesses

More than **888,000** customers on our Priority Services Register

Over **128,000km** of overhead lines and underground cables

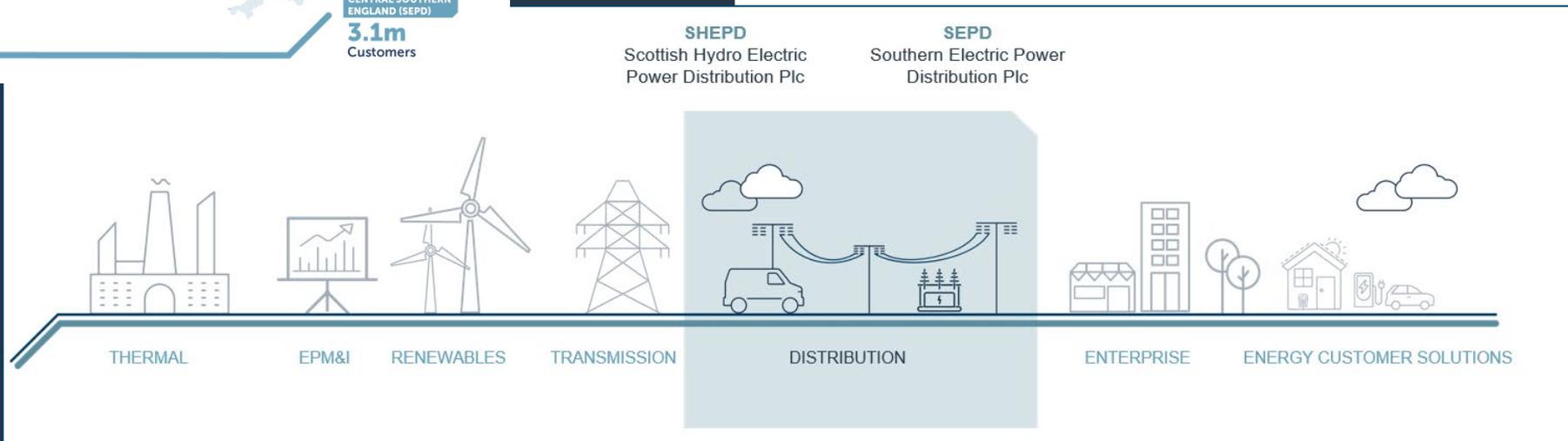
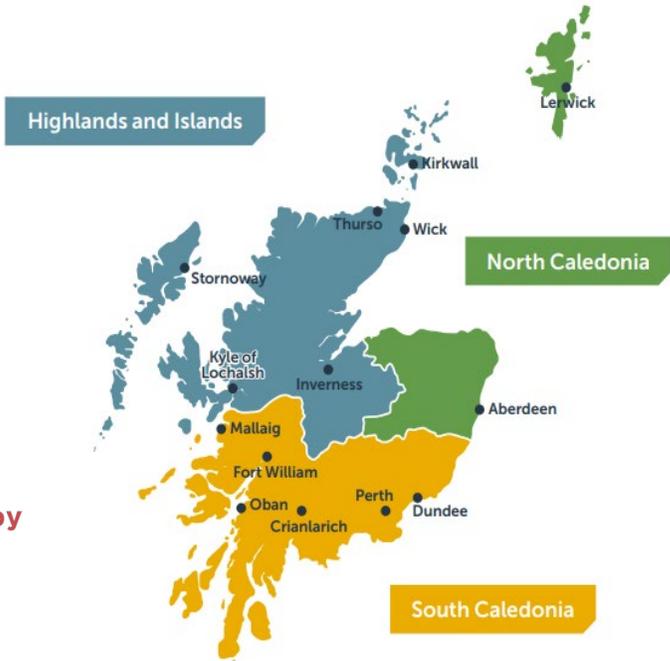
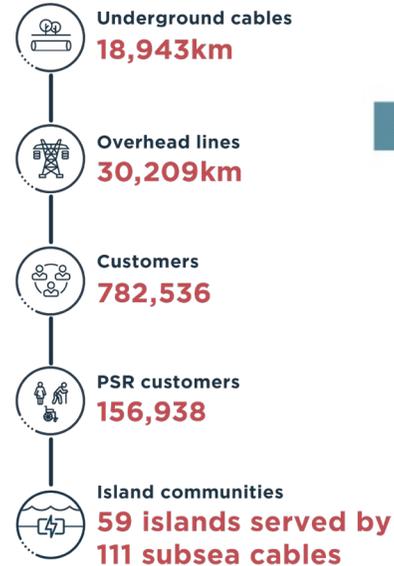
Over **460km** of subsea cables powering our island communities

Over **4,100** employees across the country



Figures as at October 2023

## SHEPD overview



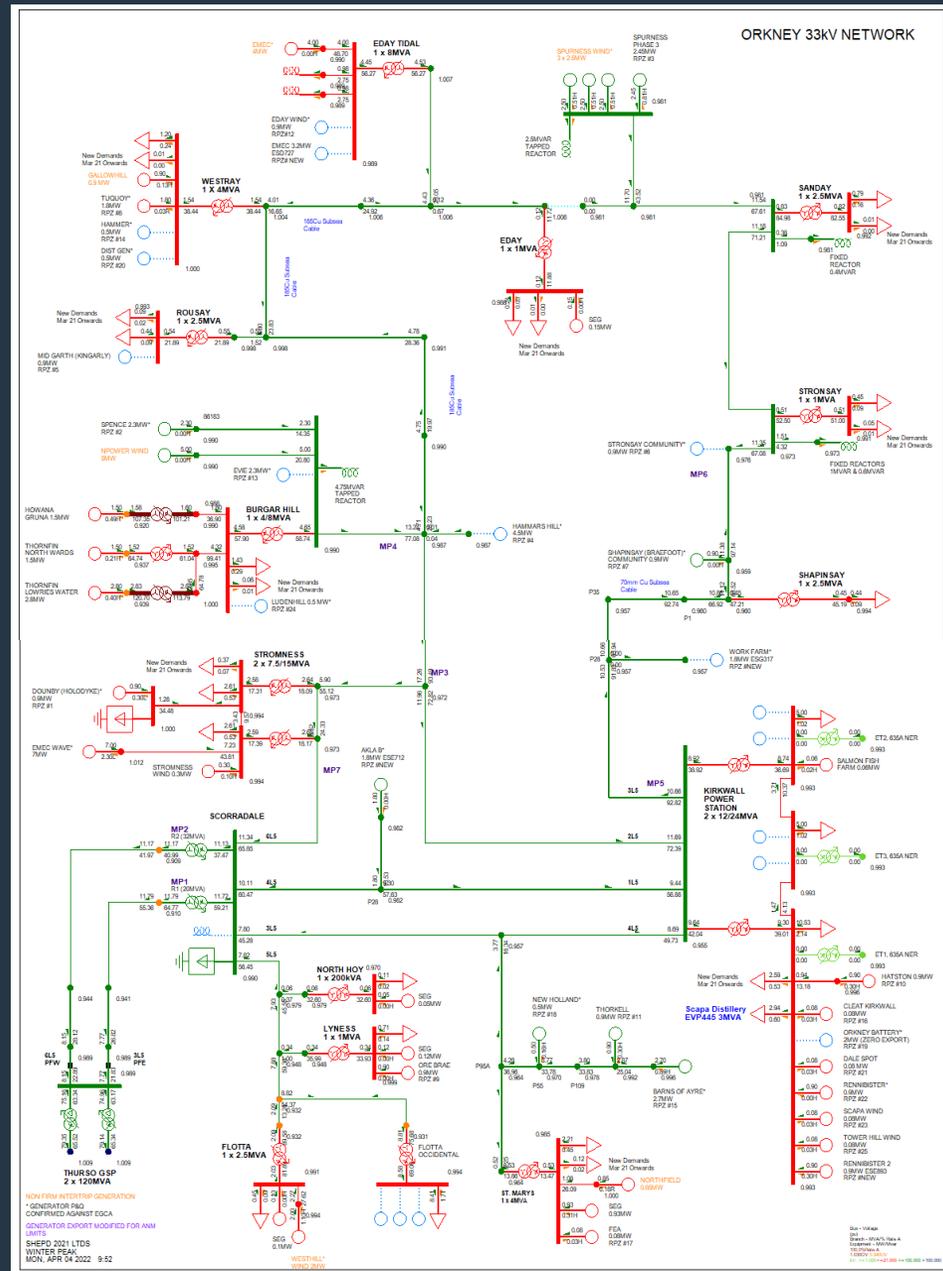
# ●●●● CURRENT NETWORK - ORKNEY

- The Orkney Islands are supplied by SSEN's Distribution network from Thurso South GSP via two 33kV circuits.
- The 33kV circuits consist of overhead lines, underground cables and subsea cables.
- The 33kV network on the Orkney islands is fed from Scorradale GSP, connecting the various islands through a mixture of ring and radial circuits.
- There is currently no Transmission network on the islands.



# CURRENT NETWORK - ORKNEY

- To ensure security of supplies in the event of the loss of either of the 33kV circuits feeding the islands, SSEN Distribution owns and operates Kirkwall Diesel Power Station to manage the demand on the islands in fault scenarios.
- 24 local generators are currently distribution-connected via an Active Network Management (ANM) system to ensure that the network is kept within rated capacity.
- There are also a number of Primary substations on the islands that support the 11kV network.



## ●●●● CURRENT NETWORK – MULL & TIREE ARCHIPELAGO

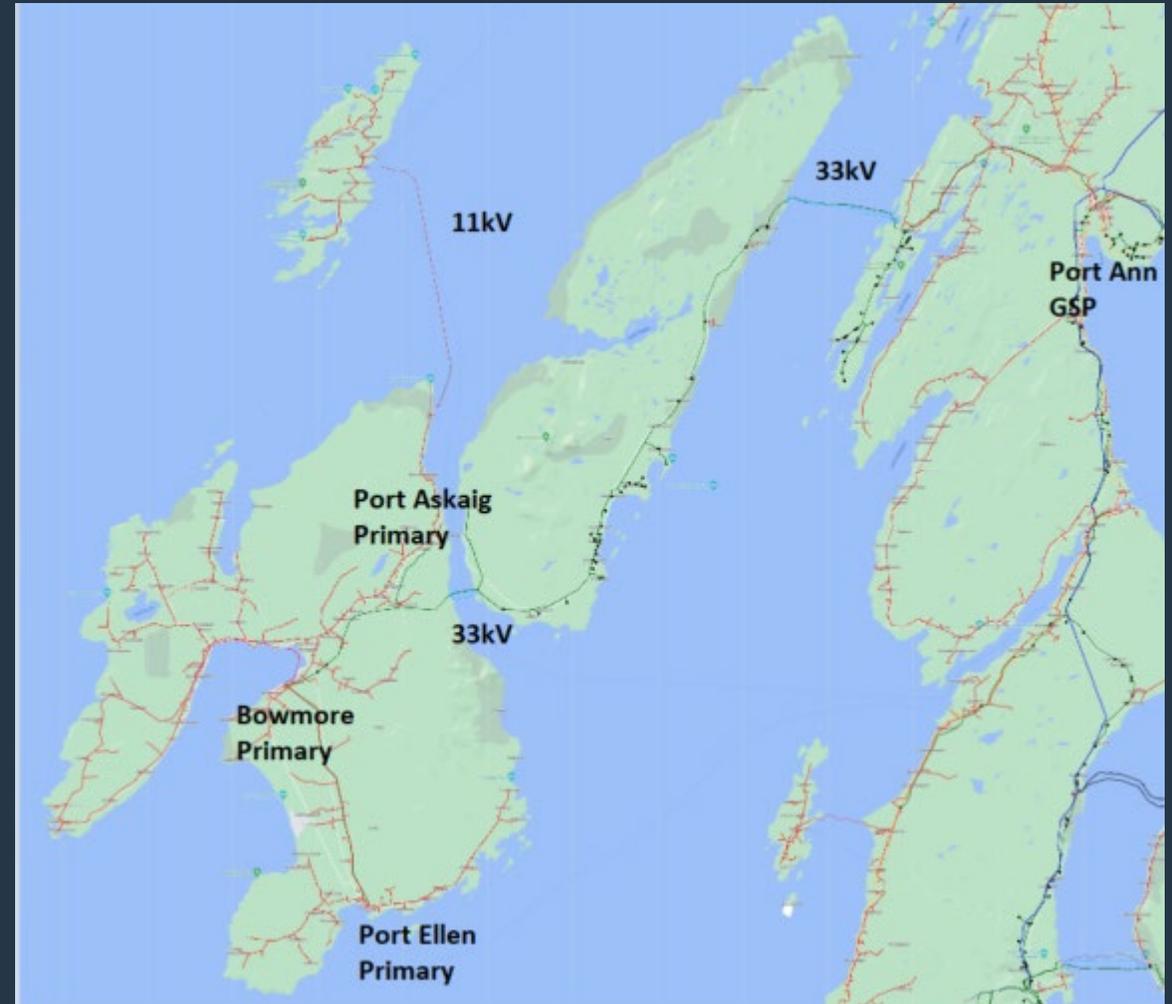
- The islands of Kerrera and Mull, are supplied by SSEN's Distribution network via two 33kV circuits from Tullich Switching Station, near Oban.
- The 33kV circuits consist of overhead lines, underground cables and subsea cables.
- There is also a third 33kV supply to the islands that connects to the Fort William network, acting as a back-up supply in fault scenarios.
- There is no Transmission network on the island group.





## ●●●● CURRENT NETWORK – ISLAY & JURA ARCHIPELAGO

- The isles of Jura and Islay are supplied by SSEN's Distribution network from Port Ann GSP by a single 33kV circuit out of Lochgilphead switching station.
- This radial circuit consists of overhead lines, underground cables and subsea cables.
- The isle of Colonsay is supplied by a single 11kV circuit out of Port Askaig Primary.
- There is no transmission network on the island group.





# ●●●● DRIVERS FOR CHANGE

Asset condition – many of the sub-sea cables are around 40 years old and there have been a number of recent faults on similar vintage cables.

Diesel generators – these are a significant source of carbon emissions for SSEN and need to be decarbonised by 2035.

Load growth – electrification of heat, transport and industrial processes will increase demand on the islands.

Generation growth – the Inner Hebrides, Orkney and surrounding waters have significant potential for wind, tidal and other generation technologies.

System resilience – repairs to cable faults can take a significant period of time and there is a need to ensure we are able to keep the lights on to island communities particularly as diesel generators are phased out.



# THE JOURNEY TO DATE



Aspect	Recap
History, and driver for HOWSUM mechanism	<ul style="list-style-type: none"> <li>In our ED2 Business Plan, we proposed targeted investments in 15 subsea cables with the greatest needs case. In addition, we proposed several strategic upgrades, with three new cables between Skye and Uist, and Pentland Firth West to Orkney proposed.</li> <li>In April 2022, we agreed with Ofgem to transfer a number of these strategic upgrades (including one of the Skye to Uist cables), to be funded instead under the HOWSUM pending additional whole system analysis for island groups. In Final Determinations, Ofgem removed the second Skye to Uist cable from our baseline, also to be funded through HOWSUM. We received an allowance in our baseline to start work on HOWSUM cables.</li> </ul>
Underlying drivers for island investment	<ul style="list-style-type: none"> <li>Primarily proactive cable replacement where appropriate, taking account of asset age, health index and criticality scores, as well as enabling sustainable security of supply in a net zero world.</li> </ul>
Regulatory provision	<ul style="list-style-type: none"> <li>Two re-opener windows: (1) January 2024, (2) January 2025</li> <li>Broad eligibility scope encompassing investment in cables and other means of securing of supply in the Hebrides and Orkney (and potentially wider geographic area), where underpinned and justified on the basis of whole system analysis.</li> </ul>

# ●●●● TRANSMISSION DEVELOPMENTS

## Orkney 220kV HVAC link overview

### **Finstown Substation**

- 220/132kV AC Gas Insulated Switchgear (GIS) transmission substation including 132/33kV transformers for the Finstown Grid Supply Point (GSP)
- Planning consent granted for the substation

### **Single Cable Circuit from Finstown to Dounreay**

- 14km underground cable to the Finstown Substation
- 53km submarine cable reaching landfall near Warebeth

### **Mainland Dounreay West Substation**

- 275/220kV substation connecting to the nearby existing Dounreay Substation

**Energisation planned 2028**

**For further information please visit: [ssen-transmission.co.uk/projects](https://ssen-transmission.co.uk/projects)**





# TAKING A WHOLE SYSTEM APPROACH

Andy Wainwright, Whole System Manager

# SUPPORT FOR A STRATEGIC APPROACH

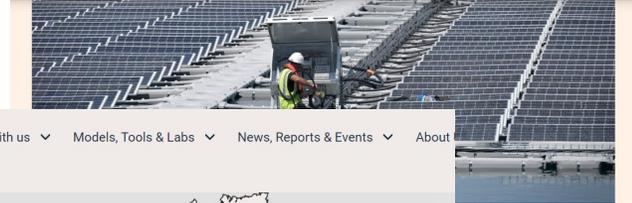
- Work carried out by NERA estimates that taking a strategic approach to investment could create a societal benefit to our customers of £1.1bn by 2050.
- ESC estimate four times the number of Local Authorities are now developing energy plans compared to two years ago
- Ofgem has recognised the need at transmission and introduced the new Accelerated Strategic Transmission Investment (ASTI) framework. Distribution should seek to meet the same aims, with a distribution specific solution.
- RIIO-ED2 introduced potential funding routes for anticipatory investment through Uncertainty Mechanisms, but without clarity on how such investment should be defined and justified.

There is no green future for Europe without an upgraded power grid

Electrifying the EU economy must be made easier, cheaper and quicker

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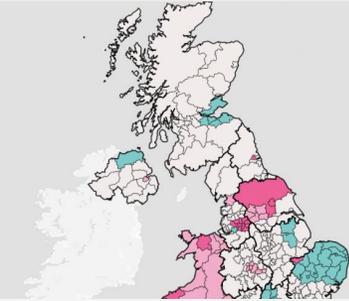


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## Which places have a Local Area Energy Plan?

- Local Area Energy Plan
- Local Area Energy Plan (Working towards)
- Local Energy Asset Representation



mapbox

## Winser report on energy networks offers plan for necessary transformation

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# ●●●● STRATEGIC INVESTMENT OVERVIEW

Strategic investment enables enhanced capacity on the Distribution System to be deployed in the short term in anticipation of expected longer term need.

There are several benefits of strategic investment;



Quicker connections for developers of demand and generation



Development and delivery efficiencies; doing work once rather than multiple times, and giving supply chains sufficient visibility to tool up



Reduced carbon costs through connection of zero carbon generation

# ●●●● TAKING A BROADER VIEW

We need to consider the future needs of the networks both for generation and demand. We also need to consider long term energy resilience for the islands.

High level options need to consider a wide range of solutions to ensure we are developing an efficient and robust network for the future these include;

- Development of the distribution network to provide resilience and capacity
- Extension of the transmission system if required to provide greater capacity and resilience
- Use of non-network options including repowering / replacing diesel generators, or introducing long term storage
- Use of flexibility services to manage peaks and troughs in demand





# DEVELOPING HIGH LEVEL OPTIONS

Andy Harvey, Strategic Network Development Engineer

# ●●●● OPTIONEERING STRUCTURE

01

Future energy requirements on islands;  
potential Regen work

02

High level options

03

Credible options technically assessed

04

Cost-benefit analysis of technically feasible options

05

Proposed solution

# ●●●● HIGH LEVEL OPTIONS – UNDERLYING ASSUMPTIONS

There are a number of underlying assumptions that are common to the way we develop options for Scottish Islands;

- Network investment requirements could be distribution or transmission depending on future needs.
- Flexibility can be used to defer or reduce the need for investment in networks.

Additionally, the transmission 220kV HVAC circuit to Orkney will commission and be available from 2028.

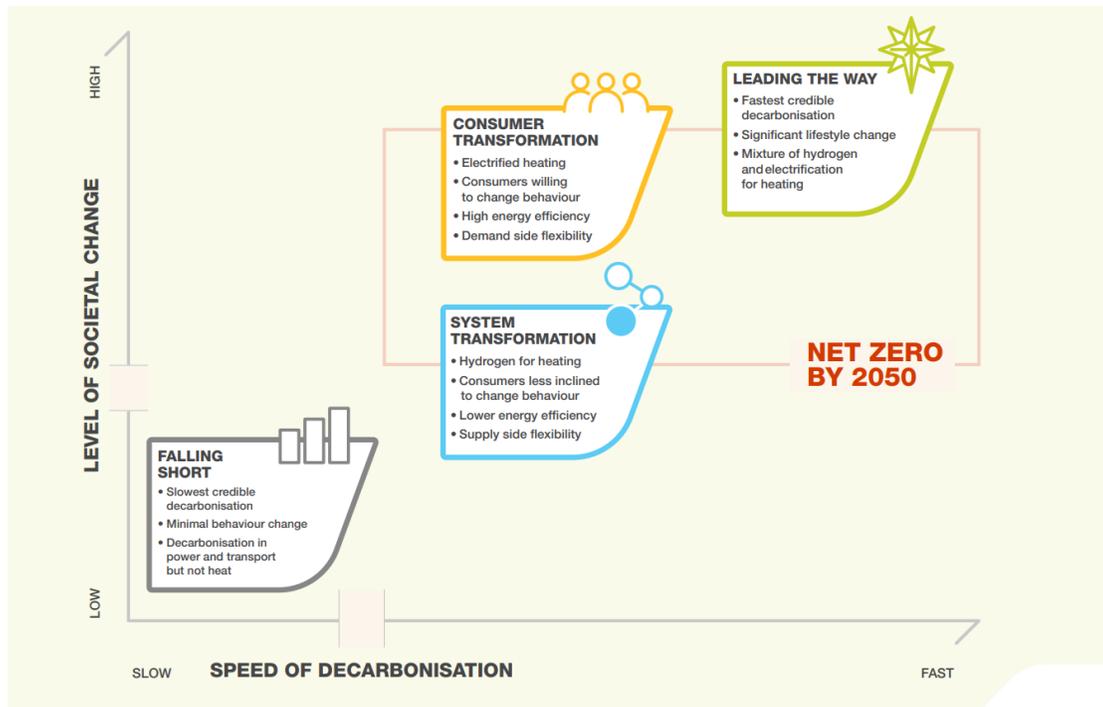
## ●●●● ASSESSING OPTIONS FOR EACH DRIVER

We have taken a high-level qualitative assessment of the drivers for change and assessed the need case for each driver.

Driver	Timescale required	Breadth of options available	Certainty of need
Asset replacement	Asset condition information indicates cables are life expired and need replacement in x years	Network will be needed to islands; uncertainty around capacity needed.	Need case is clear.
Diesel generation replacement	Replacement by 2035 at latest	Range of options available including repowering diesels and storage. Also potential for additional network resilience.	Need case is clear.
Demand growth	Need to consider demand requirements to 2045	Uncertainty around capacity needed.	Need case can be based from DFES projections. Does carry some uncertainty.
Generation growth	Need to consider generation requirements to 2045	Uncertainty around capacity needed.	Need case less clear though there are DFES projections.
Continued resilience	To be in place ahead of potential diesel generation replacement	Range of options available including repowering diesels and storage. Also potential for additional network resilience.	Need case is clear



## MANAGING UNCERTAINTY– UNDERSTANDING LONG TERM DEMAND AND GENERATION REQUIREMENTS



- DFES forecasts the growth of different technologies across the distribution network
- These forecasts are used to justify network investment
- Ensures the network is ready for the connection of LCTs, DERs, Generation etc.
- The Whole System team works with Local Authorities to support development of local area energy plans across our licence areas
- These plans are used to inform the DFES, improve the quality of growth forecasts, facilitate anticipatory investment in the network
- North of Scotland round-table held on 11<sup>th</sup> October. Feedback and input is currently being collated to help inform our 2022 DFES.
- This will be further informed by the insights we obtained from our dedicated Islands roundtable on 10<sup>th</sup> October.

●●●● TAKING A BROADER WHOLE SYSTEM VIEW  
OF FUTURE NEEDS

Options under consideration for future  
needs of the Inner Hebrides and Orkney;

- Repowering of diesel generators
- Use of storage technologies on the islands
- Network reinforcement
- Use of flexibility
- Combination of elements



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**How do you feel about the following statement "SSEN have assessed the options for each driver appropriately".**

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**Are there other factors you think we should consider when assessing options for each driver?**

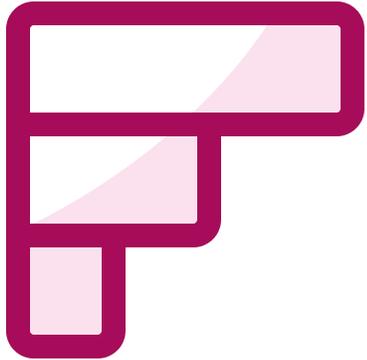
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●●●● TAKING A BROADER WHOLE SYSTEM VIEW  
OF FUTURE NEEDS

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- Use of flexibility
- Combination of elements

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**Thinking about the options under consideration for the long term resilience of the Inner Hebrides and Orkney, please rank them in order of preference.**

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**And finally, are there any other options you think we should consider?**

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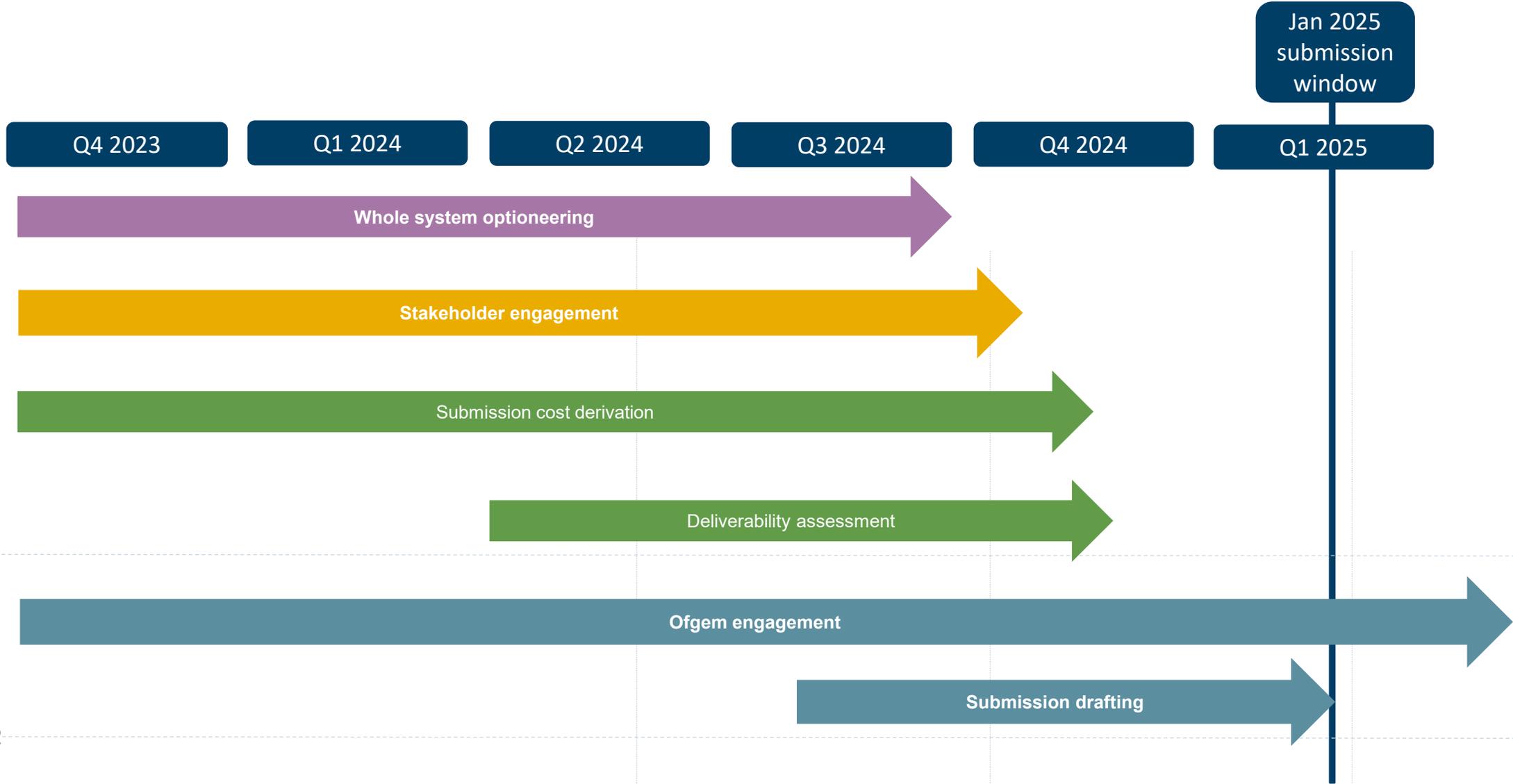


# NEXT STEPS

?



# CURRENT PROJECT TIMELINE





**THANK YOU**

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