

WESTERN ISLES WHOLE SYSTEM UNCERTAINTY MECHANISM

18th October 2023



Scottish & Southern
Electricity Networks



AGENDA

- Welcome and introductions
- Setting the scene
- Taking a whole system approach
- High level options
- Next steps:
 - Project timeline and activities
 - Further engagement opportunities





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

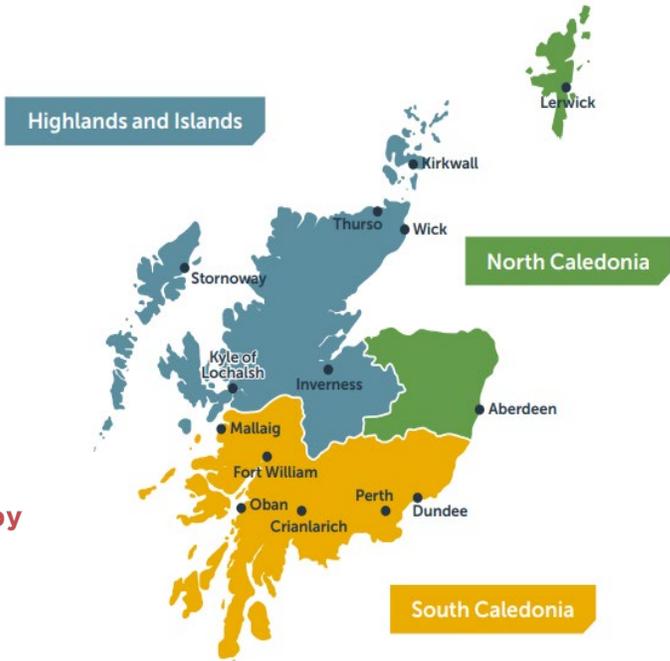
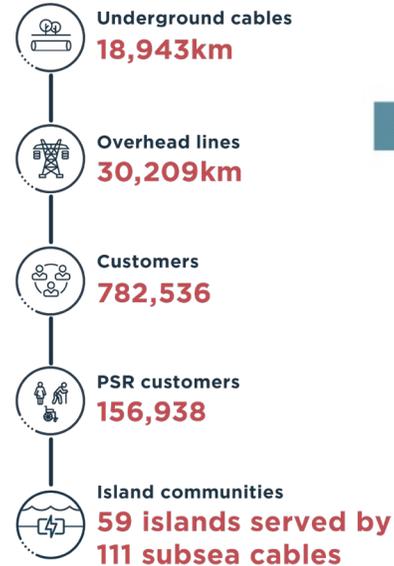
Over **460km** of subsea cables powering our island communities

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



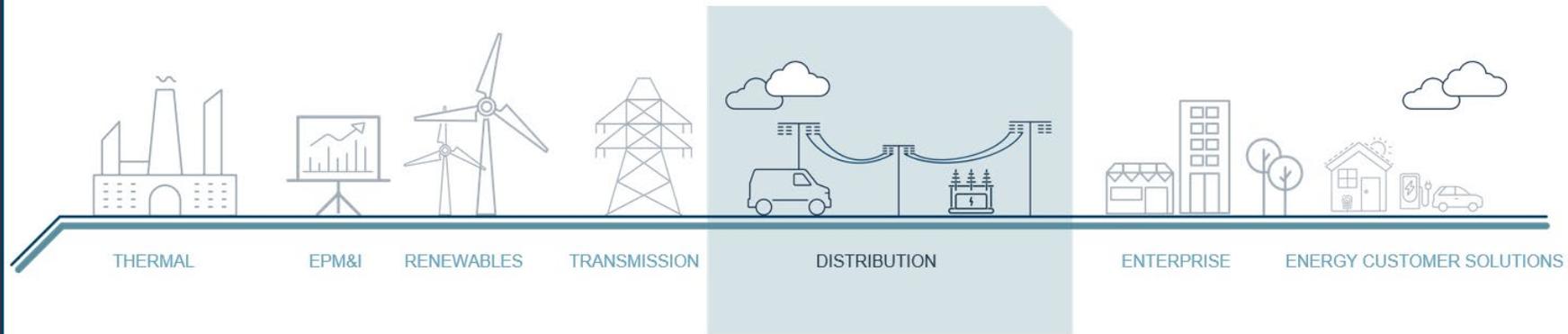
Figures as at October 2023

SHEPD overview



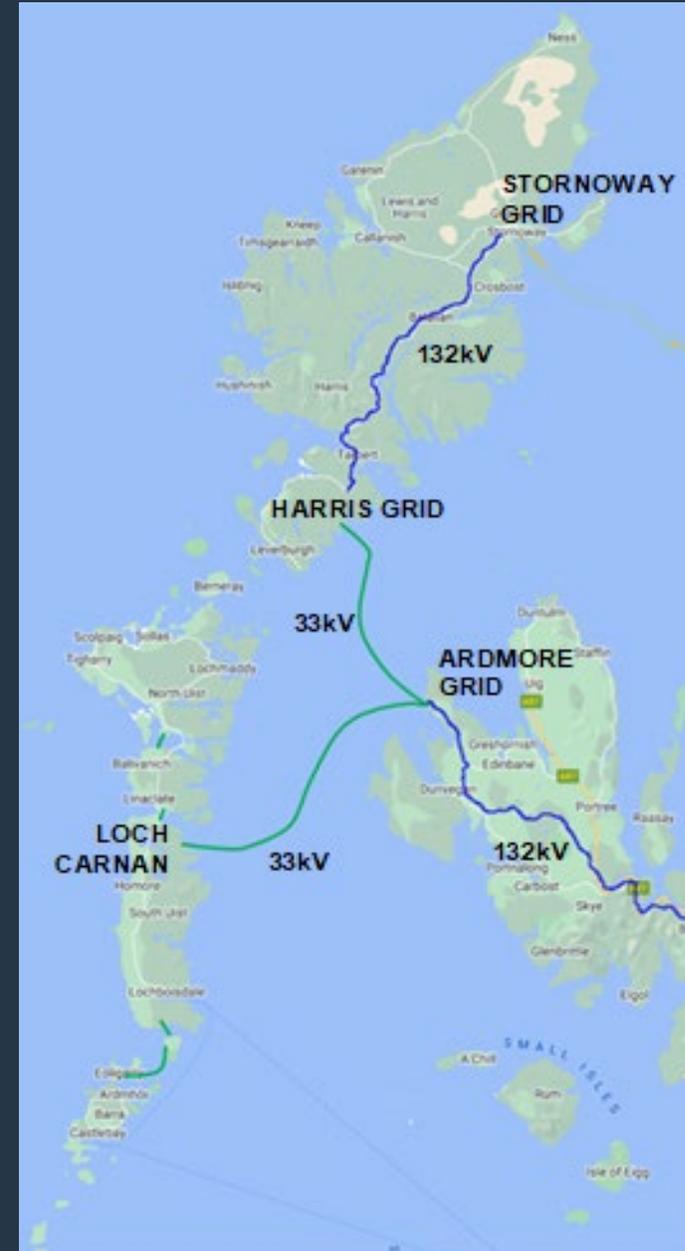
SHEPD
Scottish Hydro Electric Power Distribution Plc

SEPD
Southern Electric Power Distribution Plc



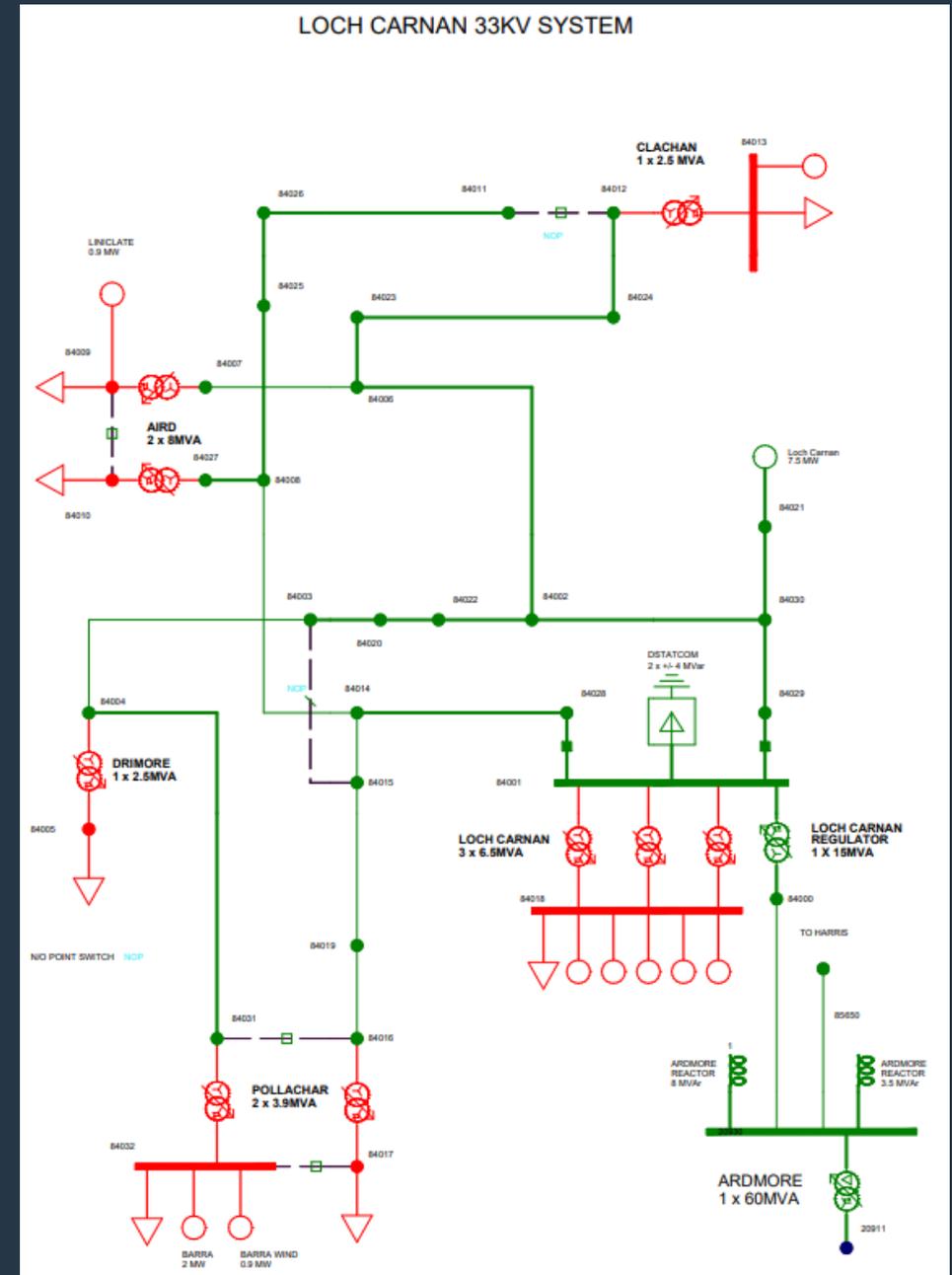
●●●● CURRENT NETWORK

- The Isles of Lewis and Harris are currently supplied by SSEN Transmission's network via a single circuit fed from the 132kV busbar at Fort Augustus Grid Substation.
- The radial circuit comprises of mainly 132kV overhead line to Ardmore Grid Substation on the Isle of Skye.
- A 33kV section of overhead line, land and subsea cable (owned by SSEN Distribution) connects to Harris Grid Substation from Ardmore GSP 33kV busbar.
- This is then "Stepped up" to 132kV and an overhead line (owned and operated by SSEN Transmission) runs the length of the island to Stornoway Grid Substation
- The isles of North Uist, Benbecula, South Uist, Eriskay, Barra and Vatersay are fed from a 33kV subsea cable circuit from Ardmore GSP to Loch Carnan 33kV Switching Station.



CURRENT NETWORK

- The Island Group is supported by a number of 33kV / 11kV primary substations.
- There are two Primaries on Harris (Stockinish and Tarbert) and eight Primaries on Lewis (Arnish, Barvas, Battery Point, Callanish, Coll, Gisla, Laxay and Maaruig).
- The isles of North Uist, South Uist, Benbecula, Eriskay, Barra and Vatersay are supported by four primary substations (Clachan, Aird, Drimore and Pollachar).
- SSEN Distribution also operates four embedded Diesel Power Stations on the Western Isles. These are Arnish and Battery Point on Lewis, Loch Carnan on South Uist and Barra Power Station on Barra.



●●●● 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 Western Isles and surrounding waters has significant potential for wind generation and other 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



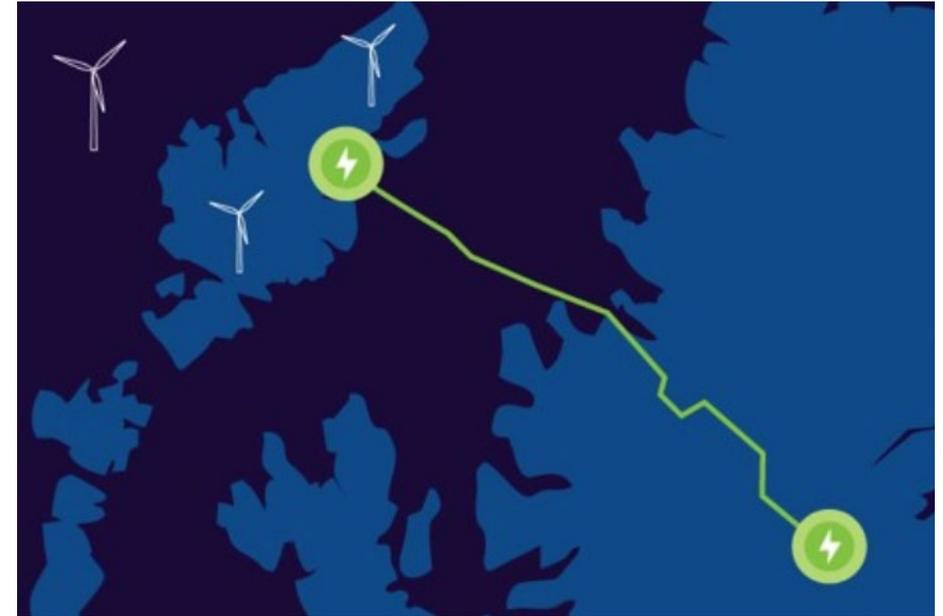
Aspect	Recap
History, and driver for HOWSUM mechanism	<ul style="list-style-type: none"> In our ED2 Business Plan, we proposed targeted investments in 15 subsea cables with the greatest needs case. In addition, we proposed several strategic upgrades, with three new cables between Skye and Uist, and Pentland Firth West to Orkney proposed. 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.
Underlying drivers for island investment	<ul style="list-style-type: none"> 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.
Regulatory provision	<ul style="list-style-type: none"> Two re-opener windows: (1) January 2024, (2) January 2025 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.

●●●● TRANSMISSION DEVELOPMENTS

HVDC link overview

- High Voltage Direct Current (HVDC) Converter Station and an AC Substation located near Stornoway
- Circa 4km of underground HVDC cable from the new HVDC converter station and AC substation to the landfall at Arnish Point, Stornoway
- 81km of HVDC subsea cable from Arnish Point, Stornoway to Dundonnell on the Scottish mainland
- Circa 80km of onshore underground HVDC cable from Dundonnell to a mainland HVDC Converter Station near Beaulieu
- HVDC link energisation planned for 2030
- For further information please visit: www.ssen-transmission.co.uk/projects

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Indicative map showing the Western Isles connection proposal



TAKING A WHOLE SYSTEM APPROACH

Andy Wainwright, Whole System Manager

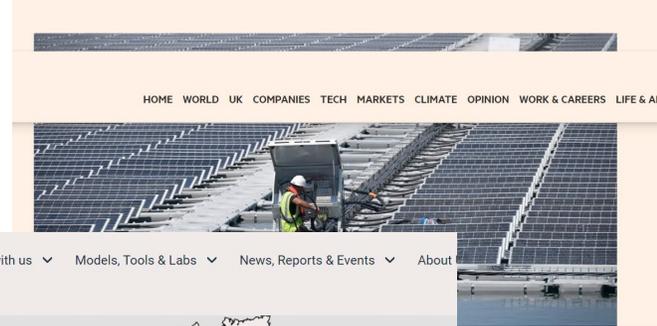
●●●● SUPPORT FOR A STRATEGIC APPROACH

- 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

KADRI SIMSON [+ Add to myFT](#)



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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

A map of the United Kingdom with various regions highlighted in different colors. A legend on the left indicates: a pink circle for 'Local Area Energy Plan', a light pink circle for 'Local Area Energy Plan (Working towards)', and a teal circle for 'Local Energy Asset Representation'. The map shows several regions in pink and teal, primarily in the south and east of England, and some in the north and west. A 'mapbox' logo is visible in the bottom left corner of the map area.

Winser report on energy networks offers plan for necessary transformation

HOME | NEWS & INSIGHTS | NEWS | WINSER REP



●●●● 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

02

High level options

03

Credible options technically assessed

04

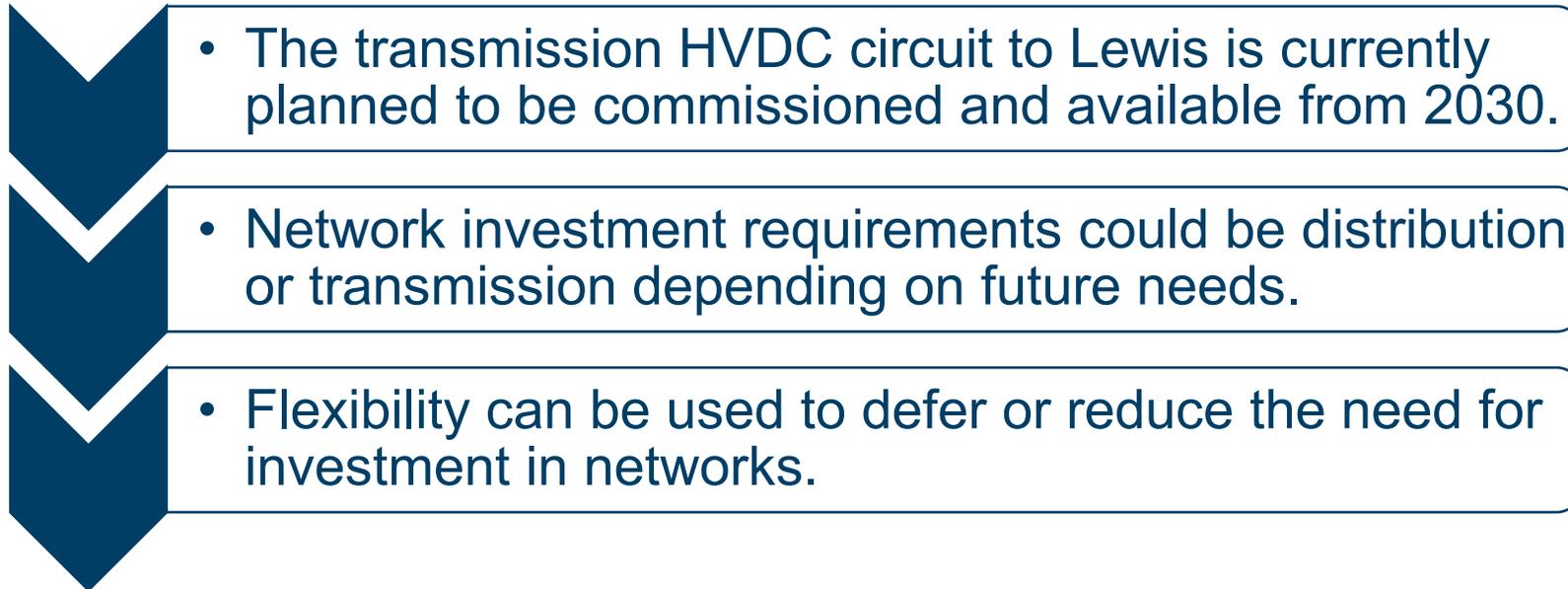
Cost-benefit analysis of technically feasible options

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 the Western Isles;

- 
- The transmission HVDC circuit to Lewis is currently planned to be commissioned and available from 2030.
 - 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.

●●●● 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

●●●● DEVELOPING A PLAN TO DELIVER URGENT REQUIREMENTS WHILST TAKING A WHOLE SYSTEM VIEW

We believe that the future requirements for the Western Isles is comprised of two elements. This allows us to proceed with least regrets work quickly ensuring continued security of supply, whilst also taking a broader view of whole system needs.

Delivering a core spine to the Western Isles

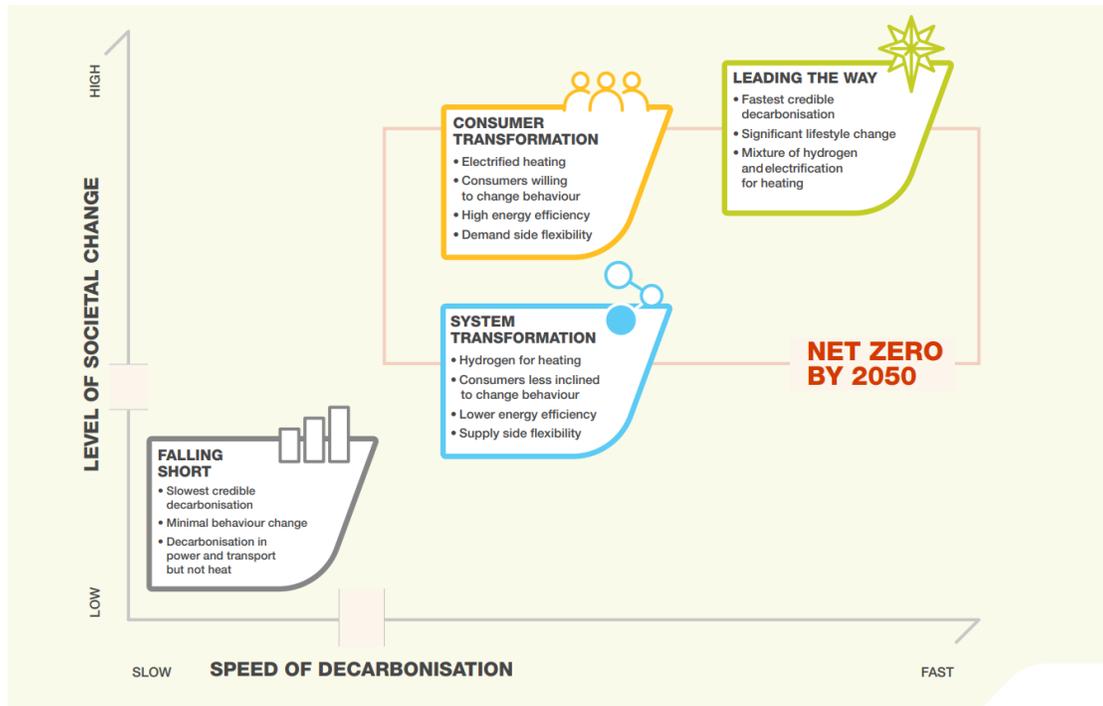
- Undertake technical assessment of future system demands and generation on Western Isles to 2045.
- Assess the appropriate solution to replace all cables whilst meeting future demand and generation requirements.
- Key benefits;
 - Replacing age expired assets improving security of supply to islands
 - Sizing future requirements to meet demand and generation requirements.

Taking a broader view of whole system needs

- Take a broader view of future resilience on the Western Isles post diesel generators
- Consider innovative non-build alternatives
- Key benefits;
 - Allows future resilience to the islands to be managed at lowest cost.
 - Potentially creates additional capacity for the islands for both demand and generation. This mitigates forecast uncertainty.



DELIVERING A CORE SPINE – 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 11th 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 10th October.

●●●● DELIVERING A CORE SPINE – DEVELOPING AND ASSESSING OPTIONS

Stage 1 of Jacobs Scope – Initial Optioneering & Power System Studies

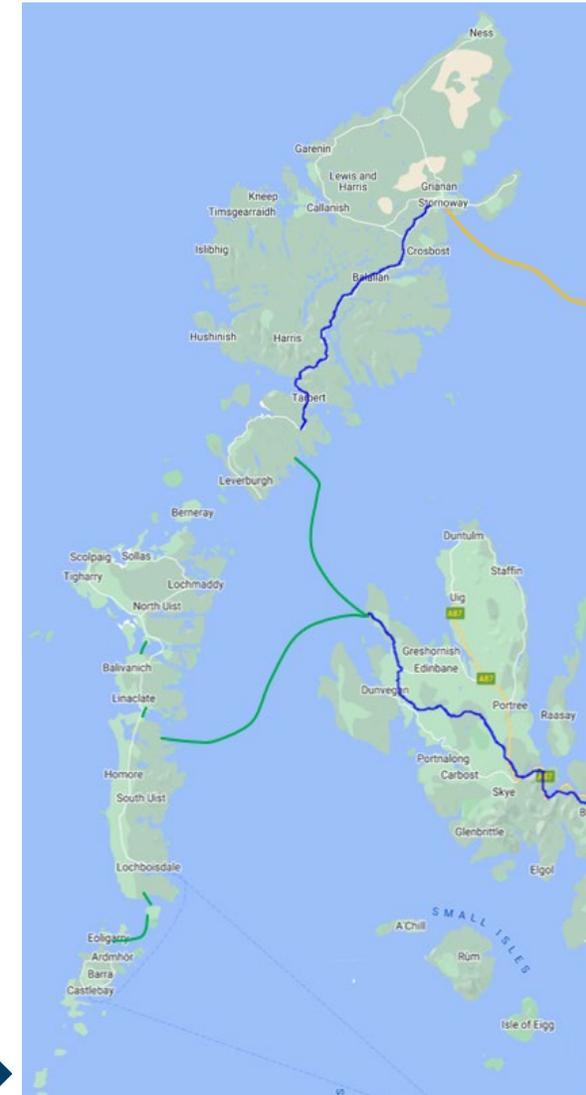
- Identify & review alternative options to support the health index improvement of the existing subsea cable connection to Uist considering N-1 licence obligations, DFES projections and SHET proposals to inform a Whole System solution for the island group.

Stage 2 of Jacobs Scope – Cost Benefit Analysis & Engineering Justification

- Assess the stand-alone solutions for the proactive replacement of the current Skye to South Uist subsea cable through cost benefit analysis to establish least worst regret and enable decision making based on the preferred investment.

Stage 3 of Jacobs Scope – Ofgem Re-opener Submission Support

- Continued support in the form of drafting the HOWS (Outer Hebrides) report as the re-opener submission to Ofgem, Confirming the long-term view of the proposed strategies and alignment with the Whole System approach through the final report



Options under consideration for long term resilience of the Western Isles;

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



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

① Start presenting to display the poll results on this slide.

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

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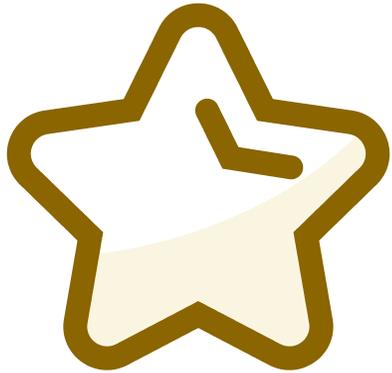
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How do you feel about the following statement "SSEN has the right approach to delivering urgent requirements whilst taking a whole system view".

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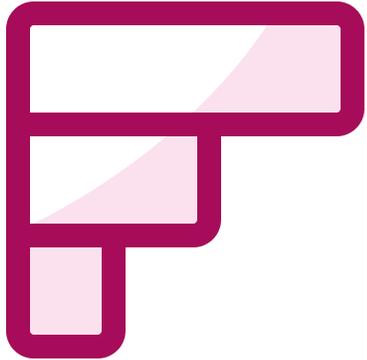
Are there any further benefits, or unintended consequences, to the proposed approach that you would like us to consider?

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Options under consideration for long term resilience of the Western Isles;

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

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Thinking about the options under consideration for the long term resilience of the Western Isles, please rank them in order of preference.

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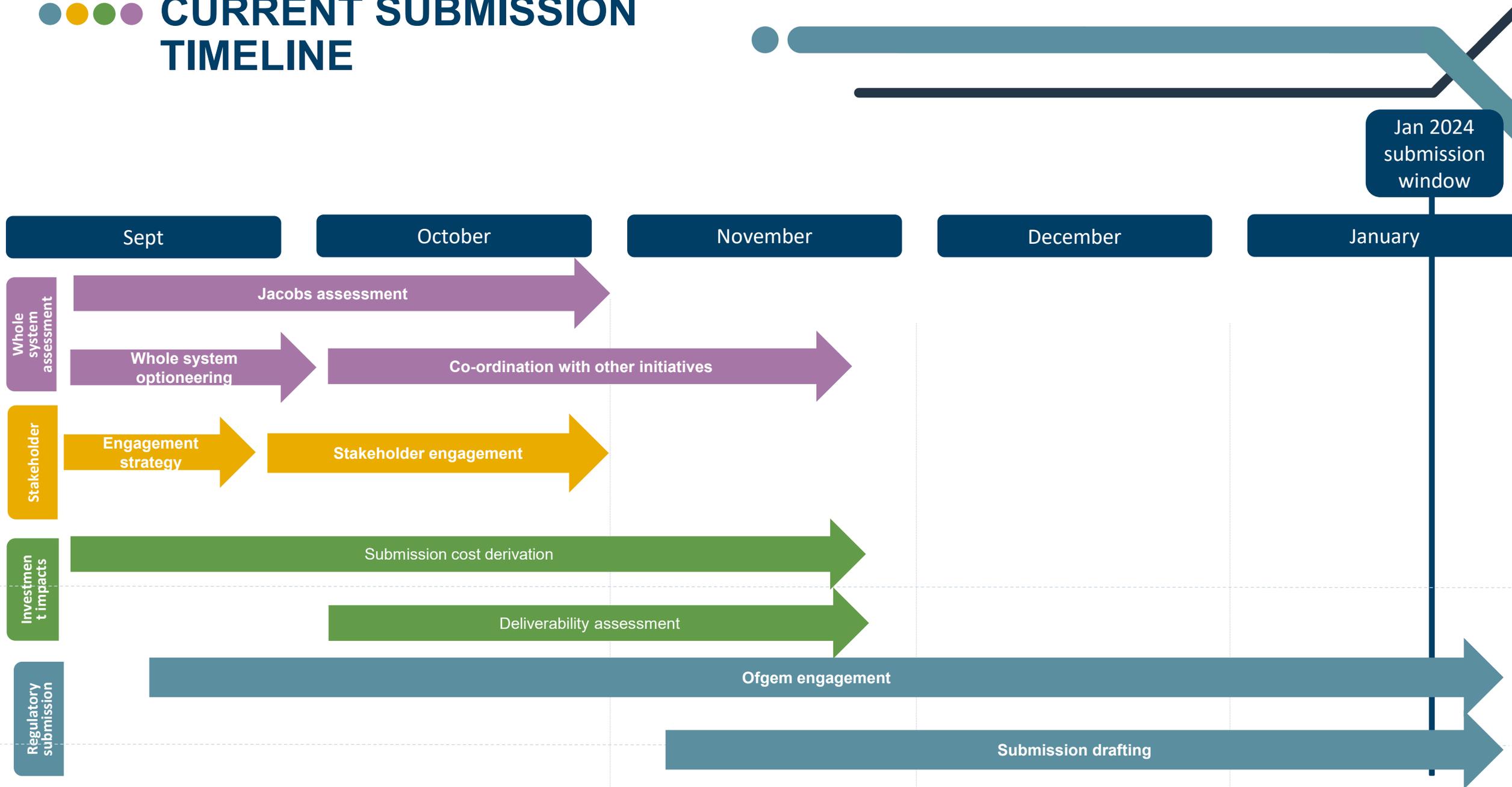
And finally, are there any other options you think we should consider?

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NEXT STEPS

●●●● **CURRENT SUBMISSION
TIMELINE**



Jan 2024
submission
window

Sept

October

November

December

January

Whole system assessment

Stakeholder

Investment impacts

Regulatory submission

Jacobs assessment

Whole system optioneering

Co-ordination with other initiatives

Engagement strategy

Stakeholder engagement

Submission cost derivation

Deliverability assessment

Ofgem engagement

Submission drafting



THANK YOU

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