OEUK OFFSHORE ENERGIES UK CONFERENCE AND EXHIBITION

Supply Decarbonisation Session

ORION Clean Energy Project | Shetland Islands Council | Net Zero Technology Centre – Technology Driving Transition | HIE | University of Strathclyde Glasgow

ORION – Shaping Shetland as World Leading Clean Energy Hub

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Opportunity for Renewables Integration with Offshore Networks

Ambition

Clean Energy Project

Create

Create on Shetland a green hydrogen export business at industrial scale by harnessing offshore wind power and creating new jobs

Transform

Transform Shetland's current dependency on fossil fuels to affordable renewable energy to address fuel poverty and improve community wealth

Enable

Enable offshore oil and gas sector transition to net zero utilizing renewable energy to sustain thousands of jobs and security of supply

Transformational opportunities at a local, regional and national scale delivering net zero

Shetland regional energy hub

Clean Energy Project

Offshore wind
ScotWind license area NE1 to east & INTOG blocks contain over 4GW of potential

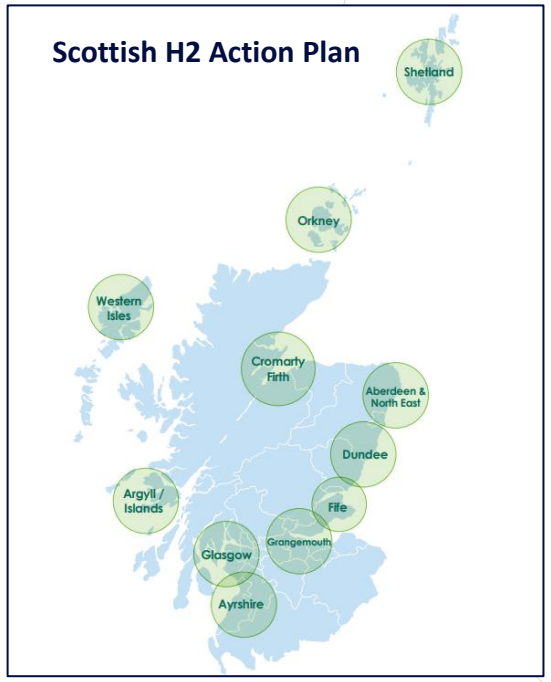
Norwegian power
Potential to import hydro-electric power from Norway (Maali Line) to electrify offshore and develop green hydrogen

Shetland power
600MW interconnector operational in 2025

Pipeline hydrogen export
SIRGE & FUKA system can be utilized to transport hydrogen to St Fergus

Marine hydrogen export
Shetland ports can be developed for hydrogen or hydrogen derivative fuel export

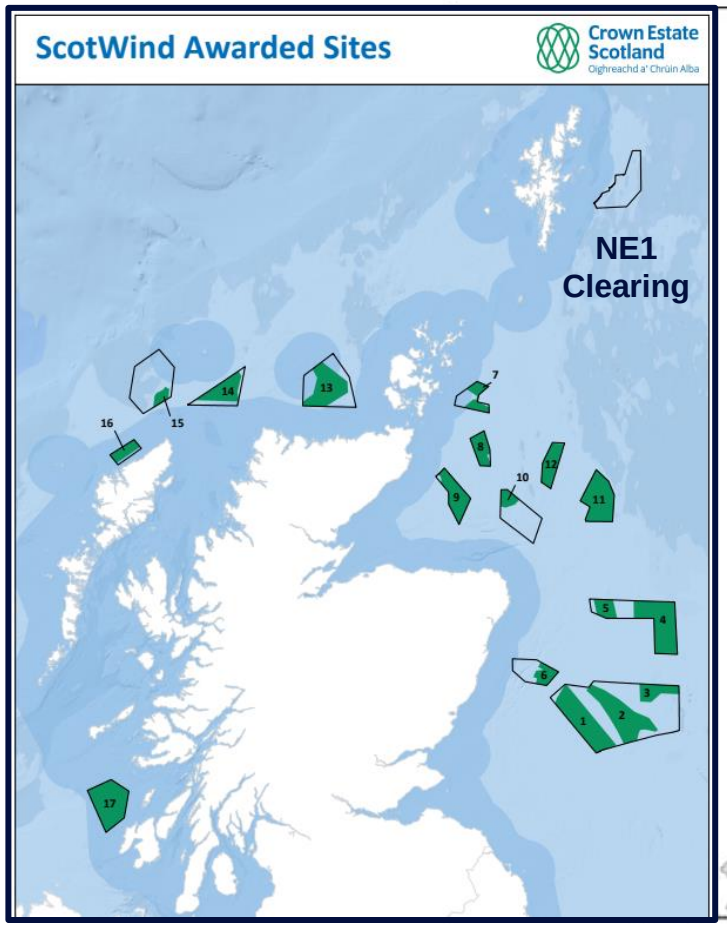
Reykjavík
Offshore Platform
FPSOs
Offshore Platforms
Bergen
Oslo
St Fergus
Aberdeen
Hamburg
London
Rotterdam

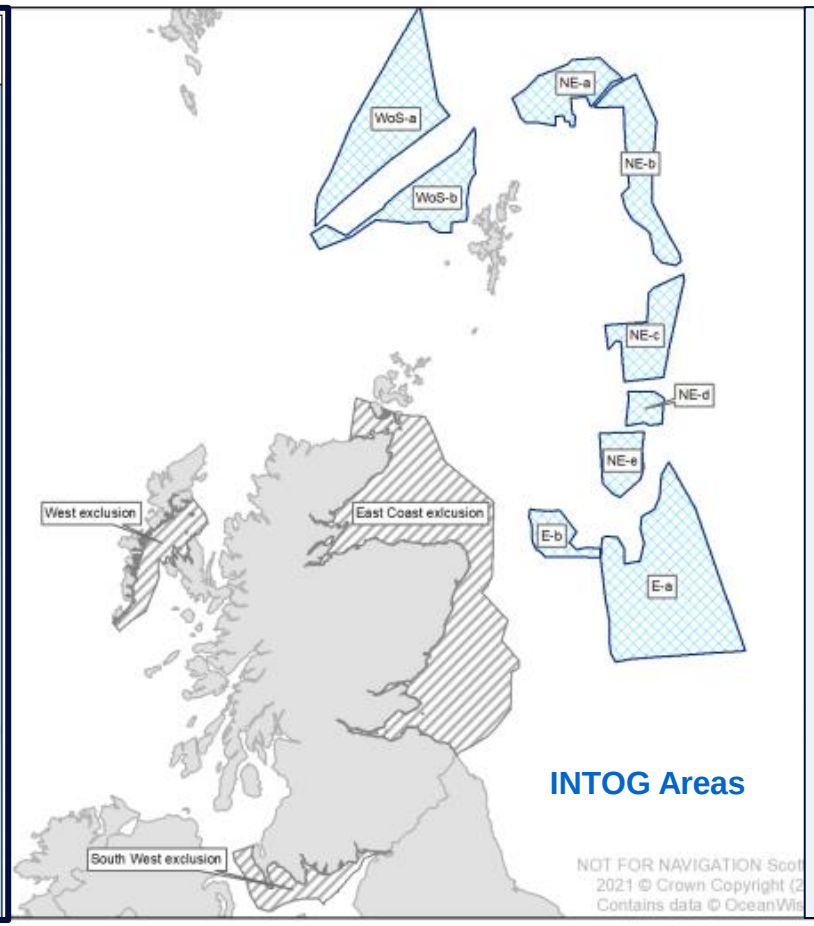


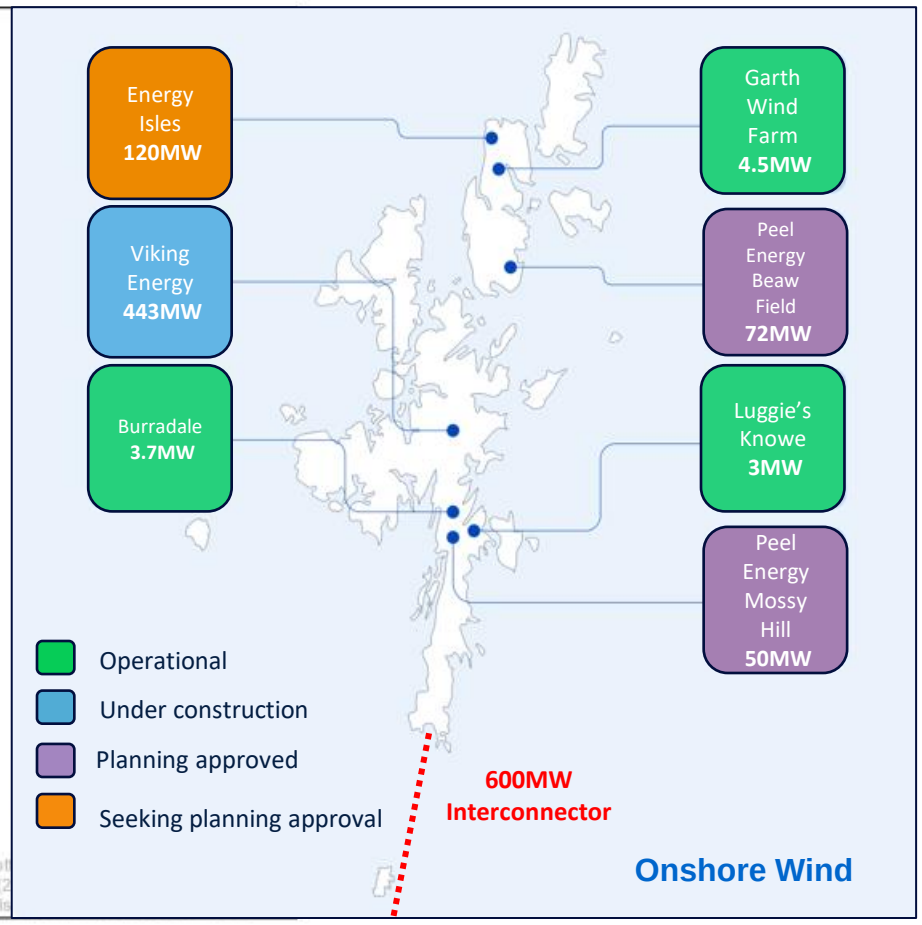
Optimally located with transition from an oil & gas to a renewable energy hub

Wind energy

Clean Energy Project







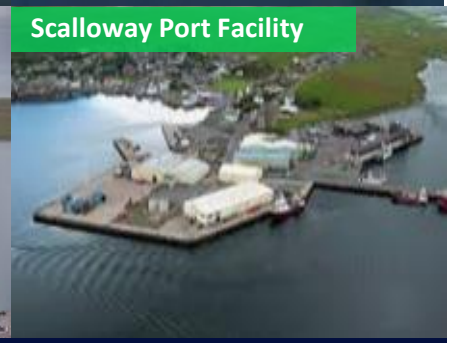
0.75 GW onshore and initially over 3GW of offshore wind potential

Sullom Voe hub potential

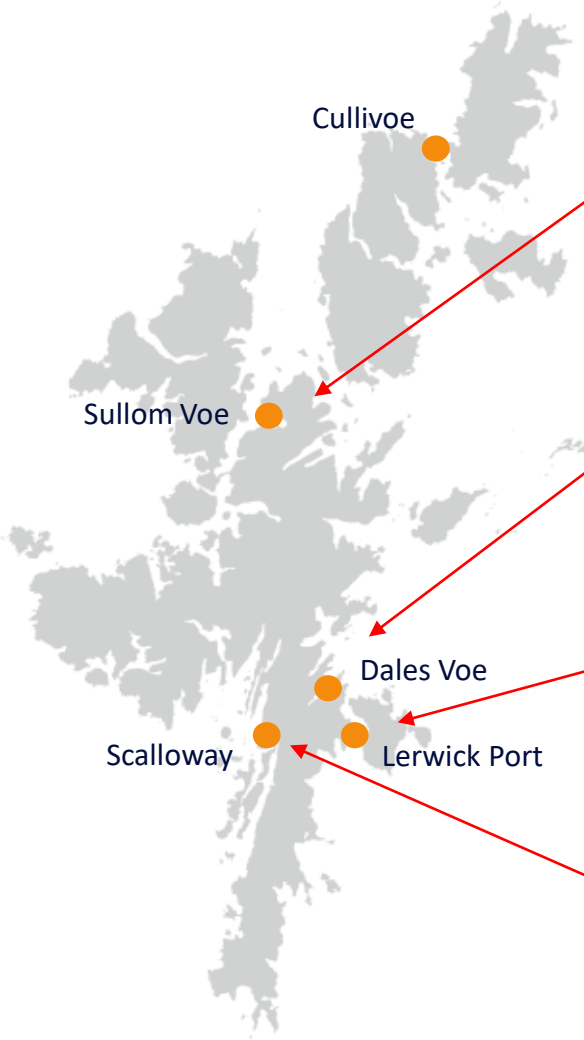
Clean Energy Project

Sullom Voe could be repurposed to establish business opportunities harnessing skills to sustain and create new jobs

Shetland ports



- 40 years+ oil & gas export from Sullom Voe terminal
- Deep water berthing facilities
- Support offshore wind & H2 export
- ORION linked EU & UK government port initiatives



- Shetland Islands Council operated
- 4 Jetties up to 24m deep
- Liquids & gas export/import
- Construction jetty up to 9.5m
- 14,000m^2 laydown with expansion

- Lerwick Port Authority operated
- 12.5m water depth
- 60t/m^2 quayside load capacity
- 45,000m^2 laydown with expansion
- Potential deeper water port 24m

- Lerwick Port Authority operated
- 4,600m quayside, 12.5m deep
- 50m anchorage available
- 130,000m^2 laydown available
- Additional laydown 100,000m^2

- Shetland Islands Council operated
- 850m of quayside
- Water depths up to 7m
- Limited laydown potential

Shetland ports well positioned to support offshore wind sector and hydrogen/clean fuel export

Shetland supply chain

Clean Energy Project

Resource	Infrastructure	Distribution	Transportation	Storage
Wind	H2 plants	Electricity	H2 pipelines	CO2 storage
Wave & Tidal	Port facilities	Hydrogen	H2 carriers	H2 storage

Shetland Energy Transition Skills Group

- Ensure that skills issues across Shetland, and wider, energy sector are well understood
- Ensure a skilled workforce is in place to address challenges and capitalise on opportunities
- Ensure a co-ordinated and partnership approach to help address Shetland's skills & training requirements
- Inform and influence Shetland's education and skills provision

University of the Highlands and Islands Shetland · Shetland Islands Council · HIE · Skills Development Scotland

Partnership approach working closely with industry

Shetland supply chain highly capable engineering, marine and civils skills

ORION studies

ORION Clean Energy Project

Worley energy | chemicals | resources

VOAR

Wood Mackenzie

Net Zero Technology Centre

Industry sponsored **Techno-Economic Study** with report completed Q4 2021

Abstract to be issued in May 2022

RICARDO

babcock™

Shetland Islands Council

University of Strathclyde Glasgow

UK Government & industry sponsored marine clean fuel study **Neptune Project**

Phase 1 complete April 2022 Phase 2 under consideration

University of Strathclyde Glasgow

Industry sponsored Shetland onshore & offshore region **Power Study**

Phase 1 complete April 2022 & Phase 2 in progress (12 months)

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Shetland & SIC **Net Zero Roadmap**

Complete end June 2022

Net Zero Technology Centre

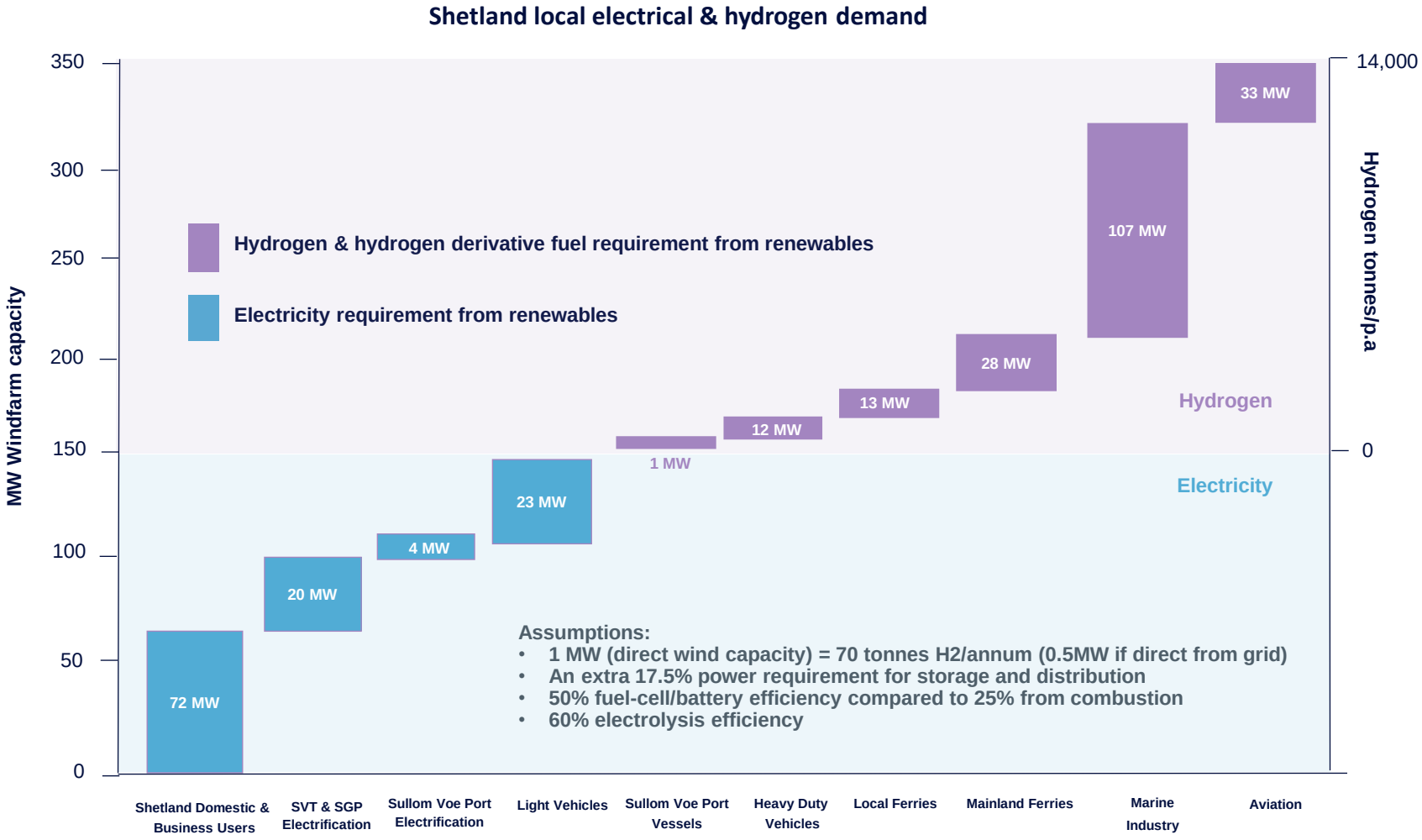
Scottish Government & industry sponsored **Energy Hub** and **Hydrogen Backbone** project

Complete end 2022

Government & industry sponsored studies forming a comprehensive technical and business foundation

Local hydrogen demand

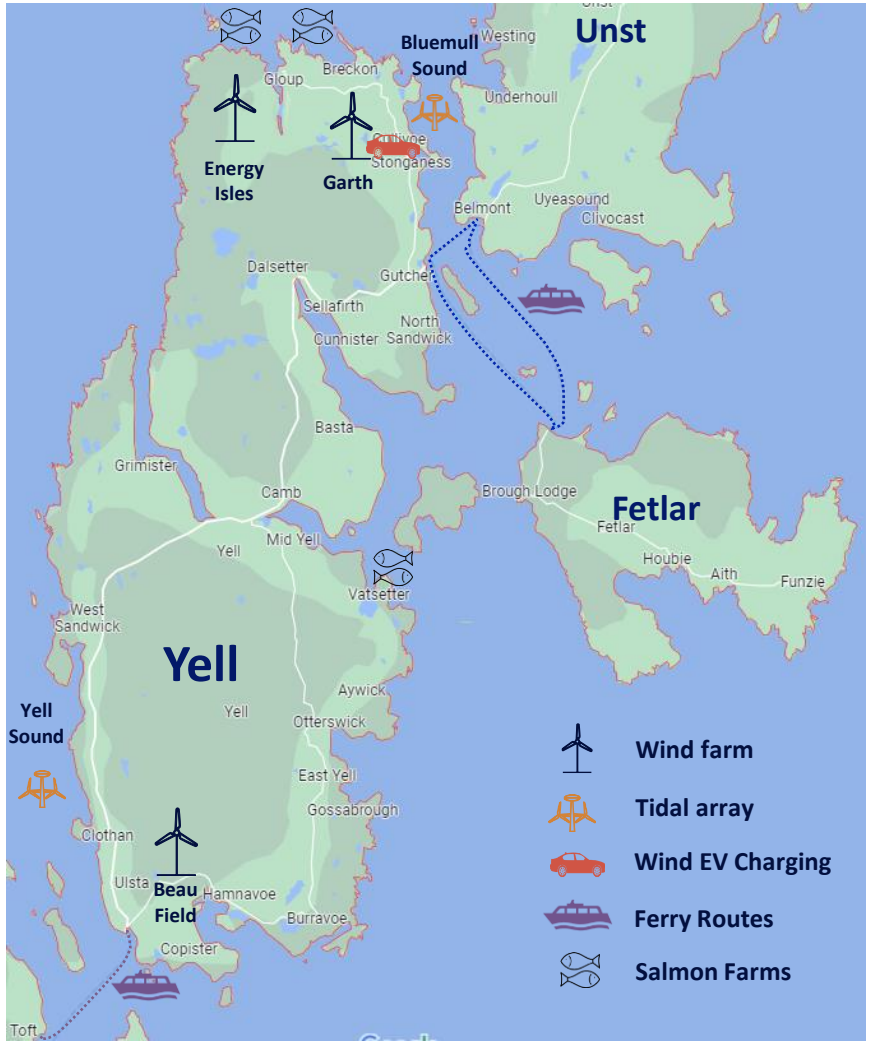
Clean Energy Project



Significant local demand for both land and marine clean fuels

Carbon neutral island

Clean Energy Project



Garth Wind Farm (Operational 4.5MW)

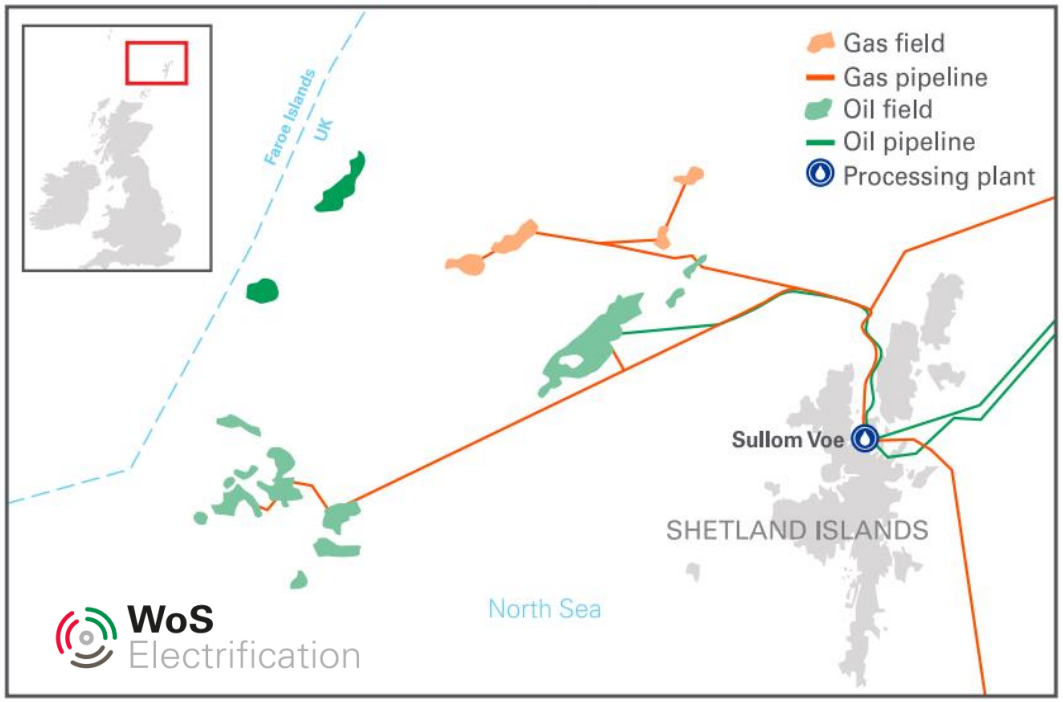
Beau Field (Planning approved 70MW)

Bluemull Sound (1MW) Yell Sound (In planning 15MW)

Energy Isles (In planning 120MW)

Significant opportunity using local renewable energy to decarbonize Yell

West of Shetland Electrification (WoSE)



West of Shetland oil & gas developments

Objective: To support emissions reduction targets on the pathway to net zero, operators are jointly evaluating hub solutions for full and partial electrification of their West of Shetland (WoS) operated developments

Opportunity: A partial or full electrification solution has the potential to materially reduce carbon emissions from operations.

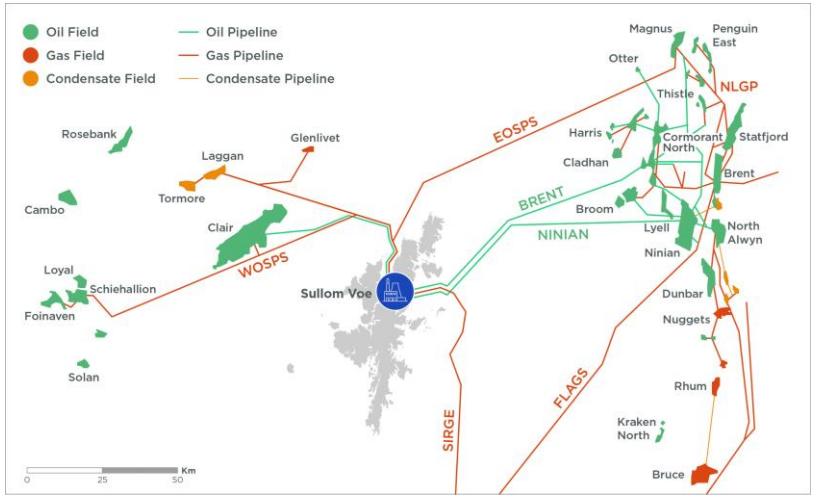
Scope: Establish if a hub solution (onshore or offshore) for full or partial electrification (power from shore or offshore wind) is achievable and economically viable in the respective project timeframes

Areas of action:

- Joint evaluation of regulatory framework
- Examination of technical development concepts
- Agreed methodology/metrics for assessing costs and economics
- Concept evaluation with supply chain
- Analysis of alternative concepts
- External stakeholder and supply chain engagement
- Evaluation of project delivery and ownership models

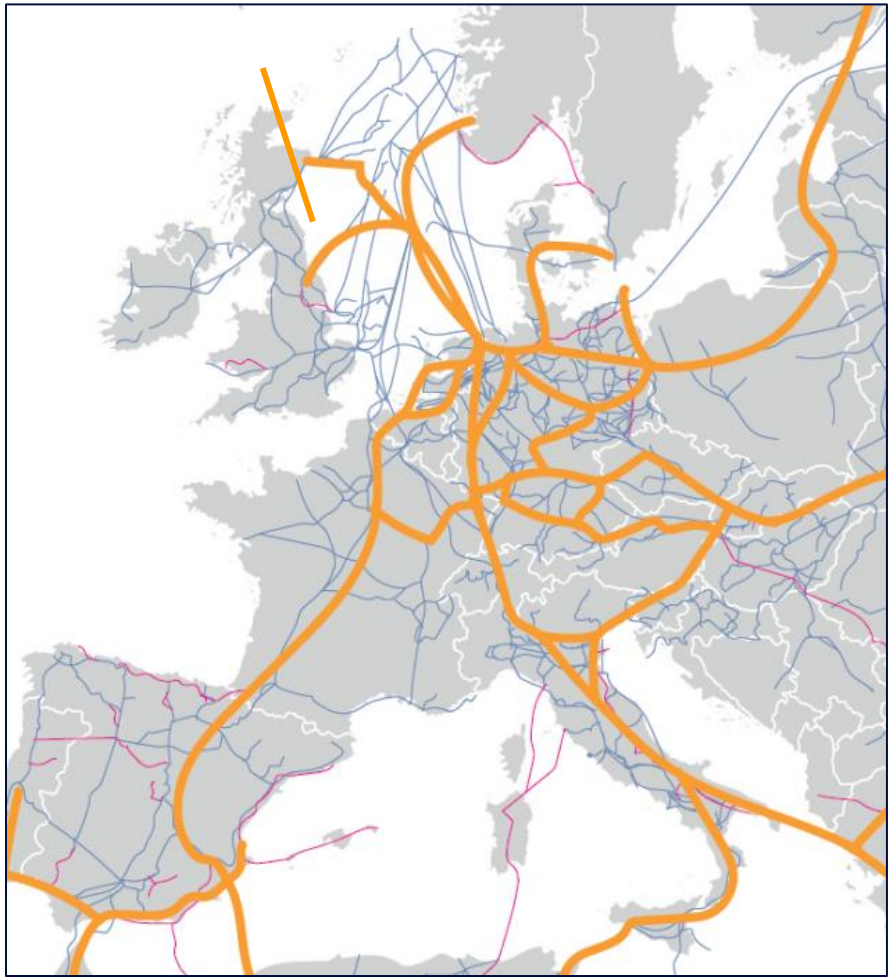
Ongoing collaboration, but significant technical, commercial and regulatory challenges remain to be addressed

Regional H2 demand



Pipeline infrastructure in Shetland region

Liquid Organic Hydrogen Carriers (LOHC) & Green Ammonia tankers



European H2 Backbone

Exporting to UK & Europe via tanker, gas pipeline blending and new pipelines

In summary

- Shetland is opportunity rich and has the potential to become a renewable energy hub
- Targeted studies providing a sound technical & business foundation
- Onshore green hydrogen generation by 2025 using onshore wind and tidal
- Offshore decarbonization & industrial scale H2 production by 2030 using offshore wind

In Partnership with: Shetland Islands Council | Net Zero Technology Centre Technology Driving Transition | HIE | University of Strathclyde Glasgow