Hydrogen & Energy Storage

May 12th

ALL-ENERGY EXHIBITION AND CONFERENCE 2022

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

ORION – Shaping Shetland as the UK's first clean energy island

Gunther Newcombe, ORION Project Coordinator

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 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

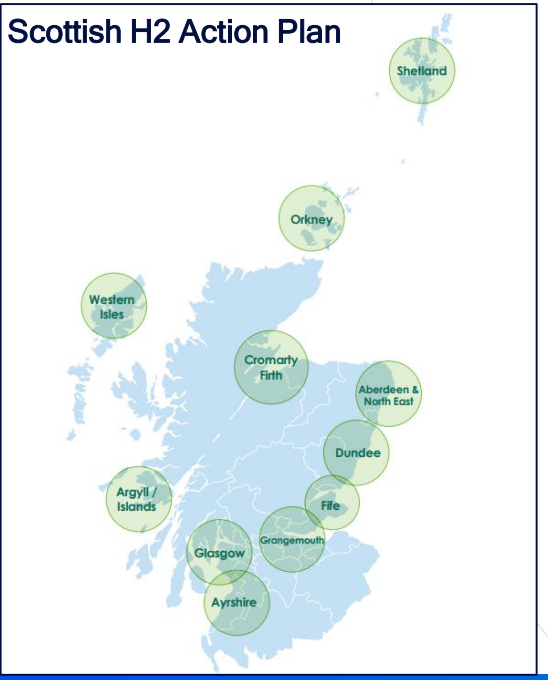
Norwegian power
Potential to import hydro-electric power from Norway (Maali Line) to electrify offshore and develop green hydrogen

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

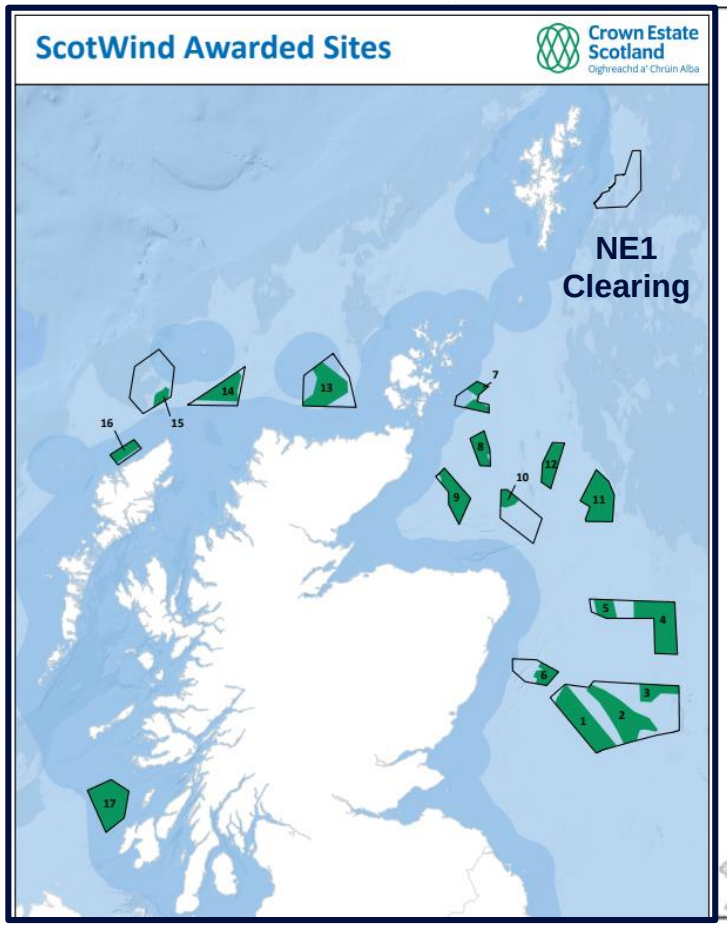
Reykjavík
Offshore Platform
FPSOs
Offshore Platforms
Bergen
Oslo
St Fergus
Aberdeen
Hamburg
London
Rotterdam

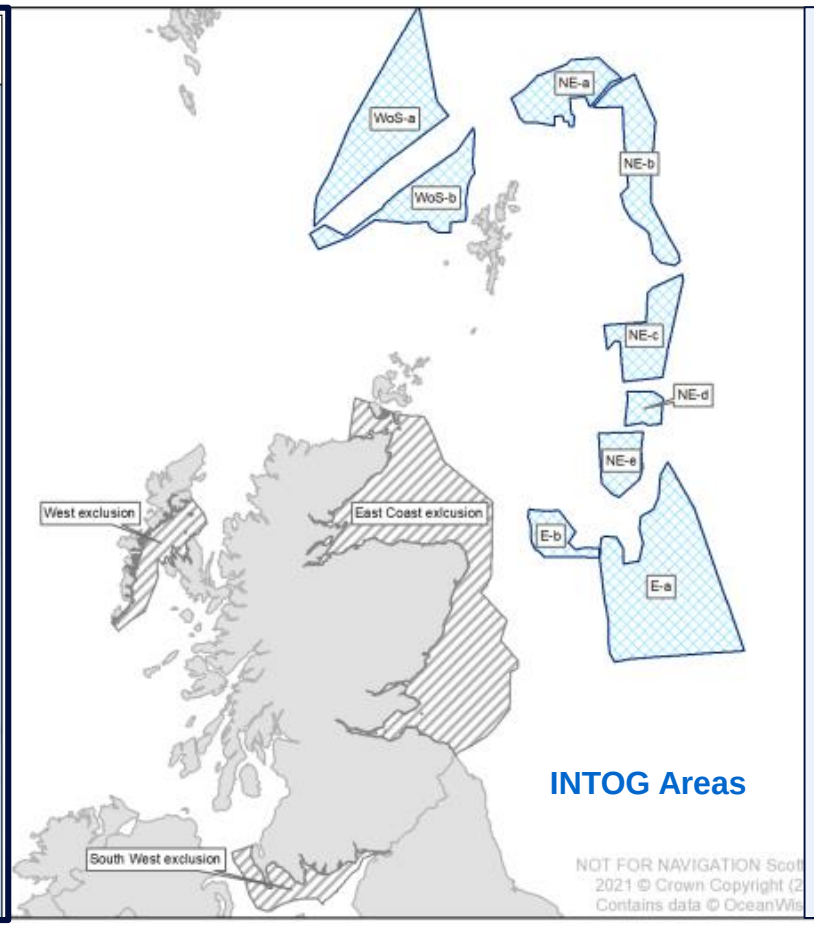


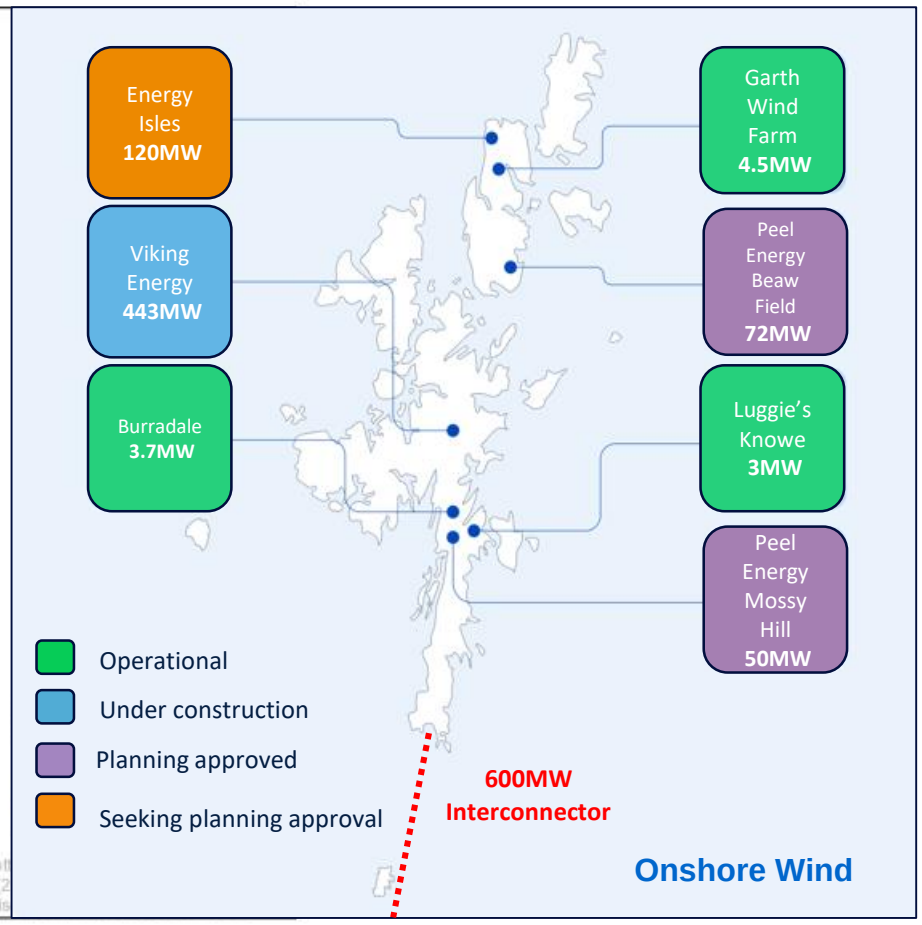
Transitioning from an oil & gas to a renewable energy hub

Wind energy

Clean Energy Project

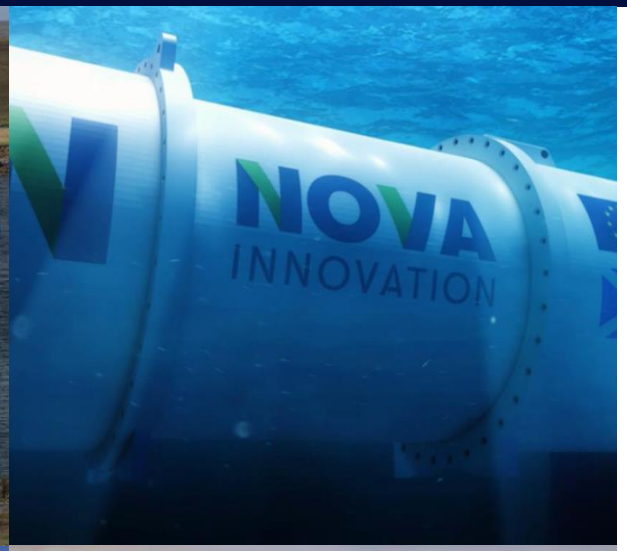






0.75 GW onshore and over 3GW of offshore wind to enable offshore decarbonization & produce green H2 for export

Tidal energy



- In 2016, Nova Innovation installed the world's first offshore tidal array in the Shetland, successfully powering homes, businesses and the Shetland grid
- The project has demonstrated long-term reliability and is now delivering impressive cost reductions, setting it on target to compete with grid fossil fuels
- Nova has worked with Tesla, creating the world's first tidal power station with the ability to deliver baseload tidal power - constant, steady state renewables to meet consumer needs
- Nova added a water to wire EV charge point located on the scenic shores of Bluemull Sound on the island of Yell, which now has the world's first cars entirely powered by the tide
- Nova Innovation has secured an agreement with Crown Estate Scotland to locate a 15MW array at Yell Sound in Shetland

Tidal power will play an important role in providing power locally and potentially green hydrogen

Sullom Voe hub potential

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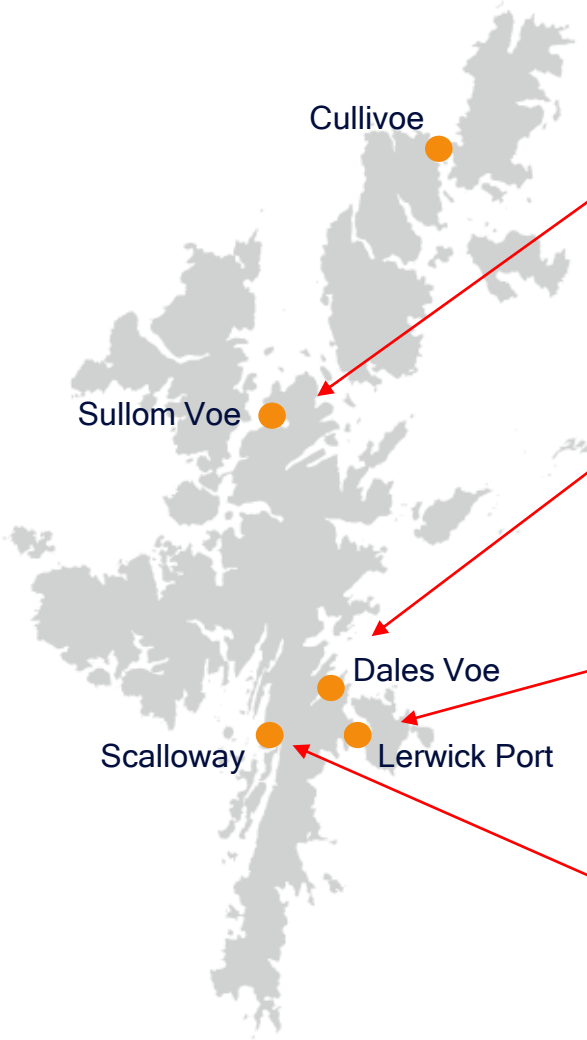
Sullom Voe could be repurposed to establish business opportunities harnessing skills to sustain and create new jobs

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

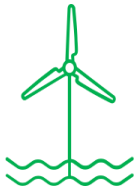
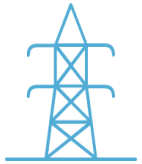
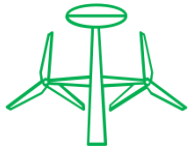
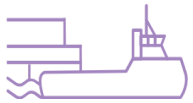
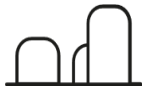
- Lerwick Port Authority operated
- 12.5m water depth
- 60t/m^2 quayside load capacity
- 45,000m^2 laydown with expansion
- Potential deeper water port 24m

- 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 can support offshore wind sector and hydrogen/clean fuel export

Shetland supply chain

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

Local hydrogen demand

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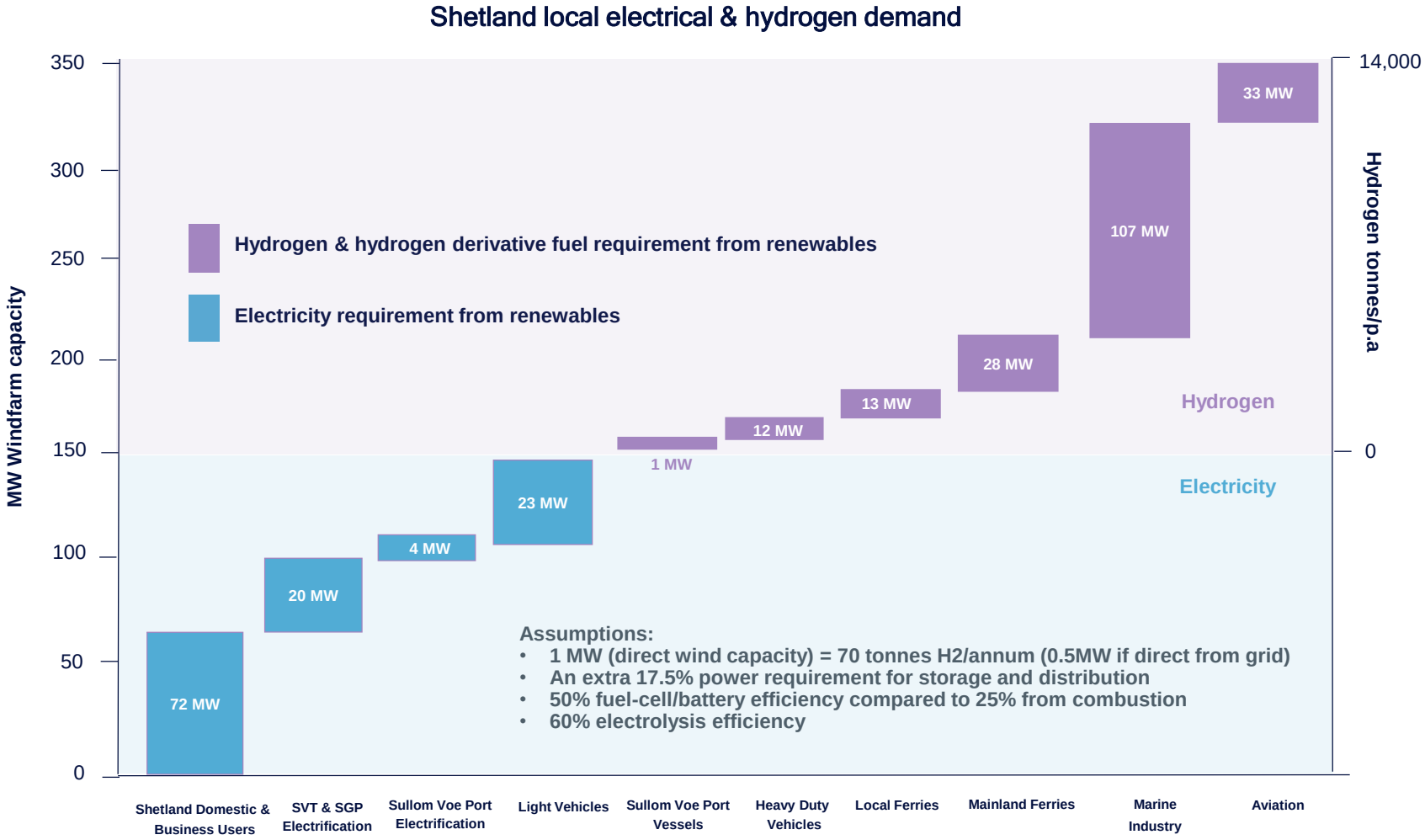
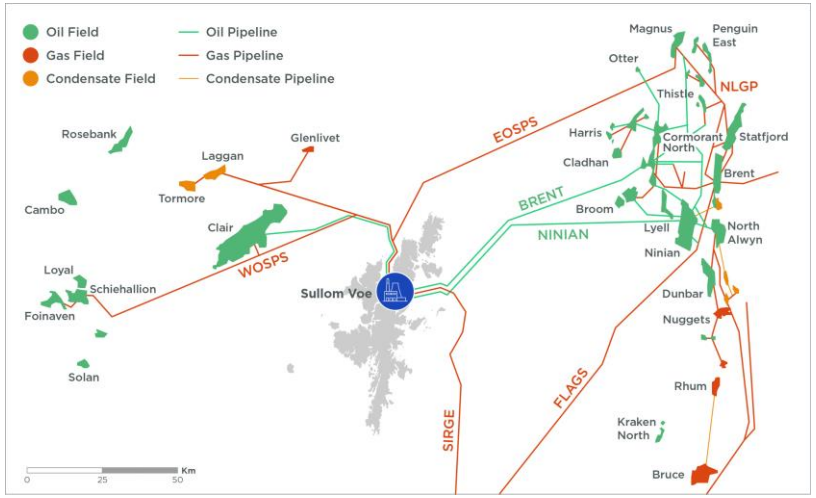


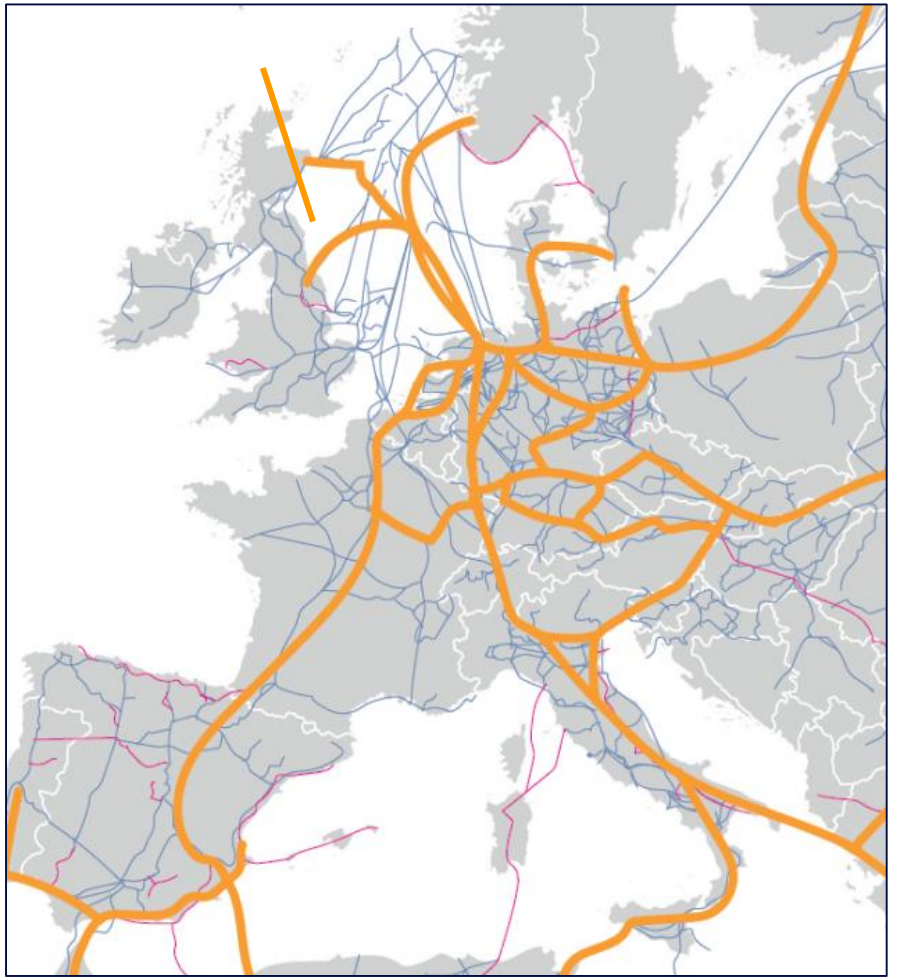
Significant local demand for both land and marine clean fuels

Regional H2 demand



Pipeline infrastructure in Shetland region

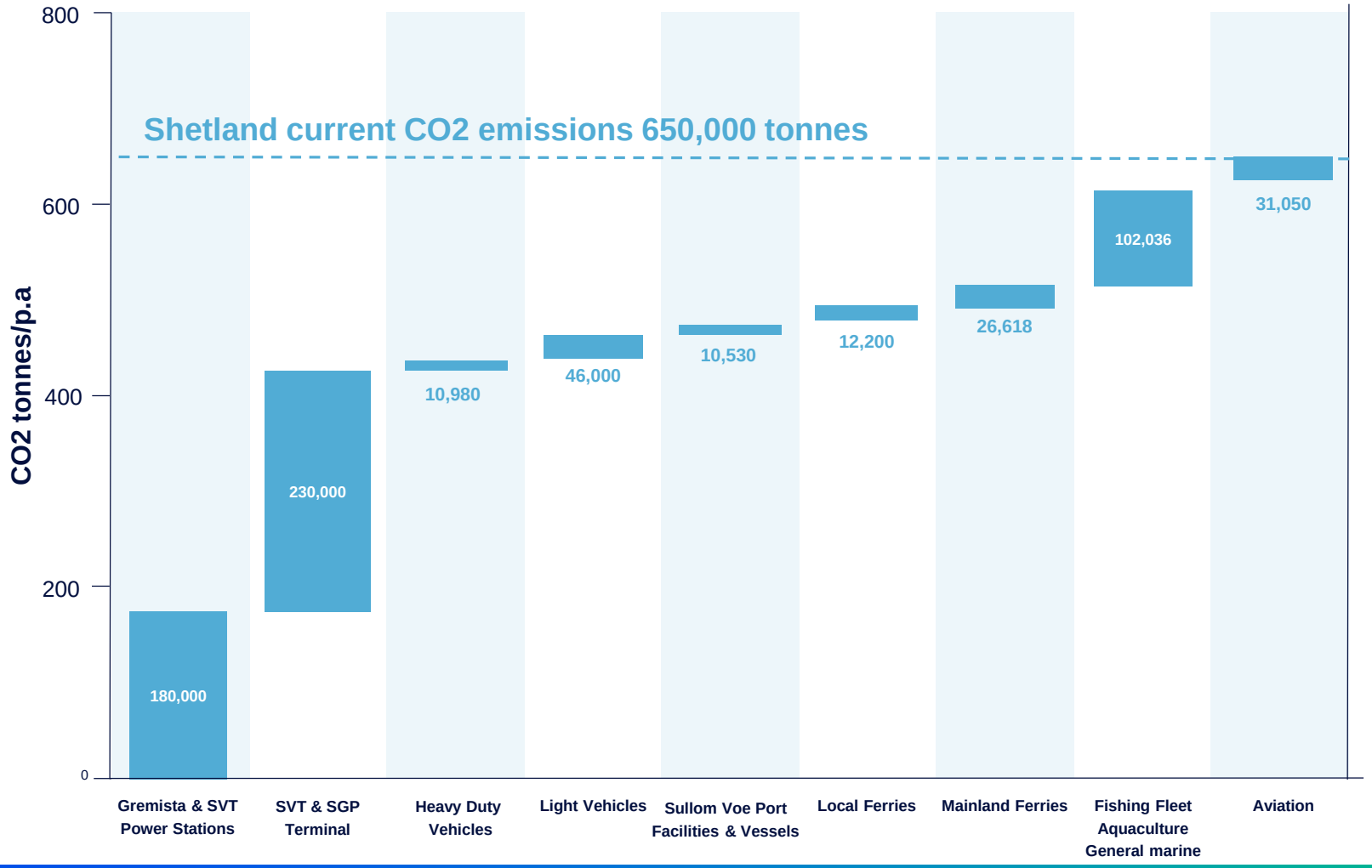
Liquid Organic Hydrogen Carriers (LOHC) & Green Ammonia tankers

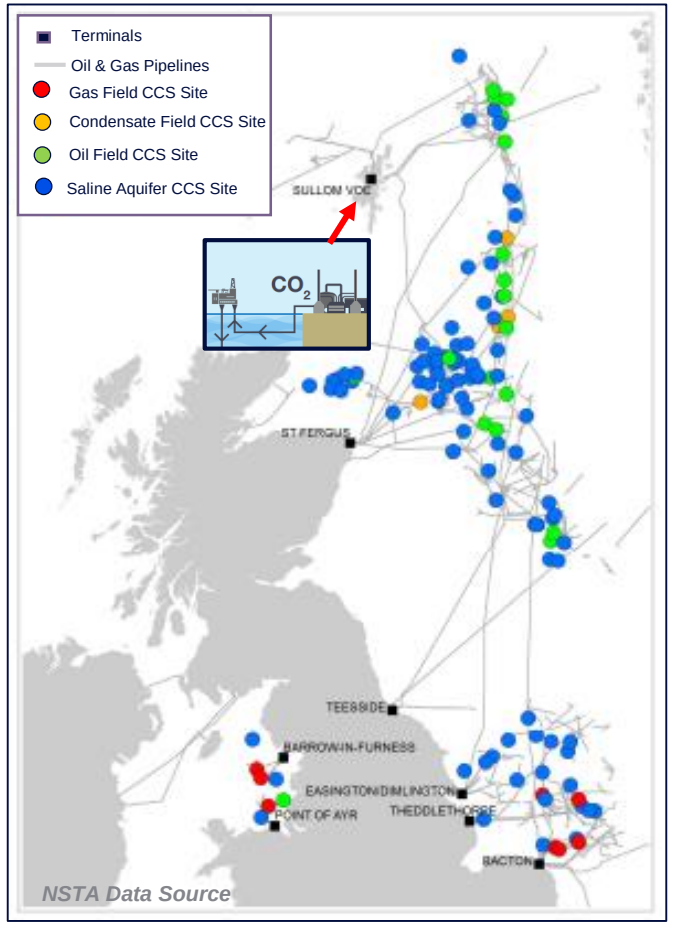


European H2 Backbone

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

CO2 management





Sullom Voe Terminal CO2 hub

Clean fuels and electricity could abate local CO2 emissions

Energy hub & H2 backbone studies

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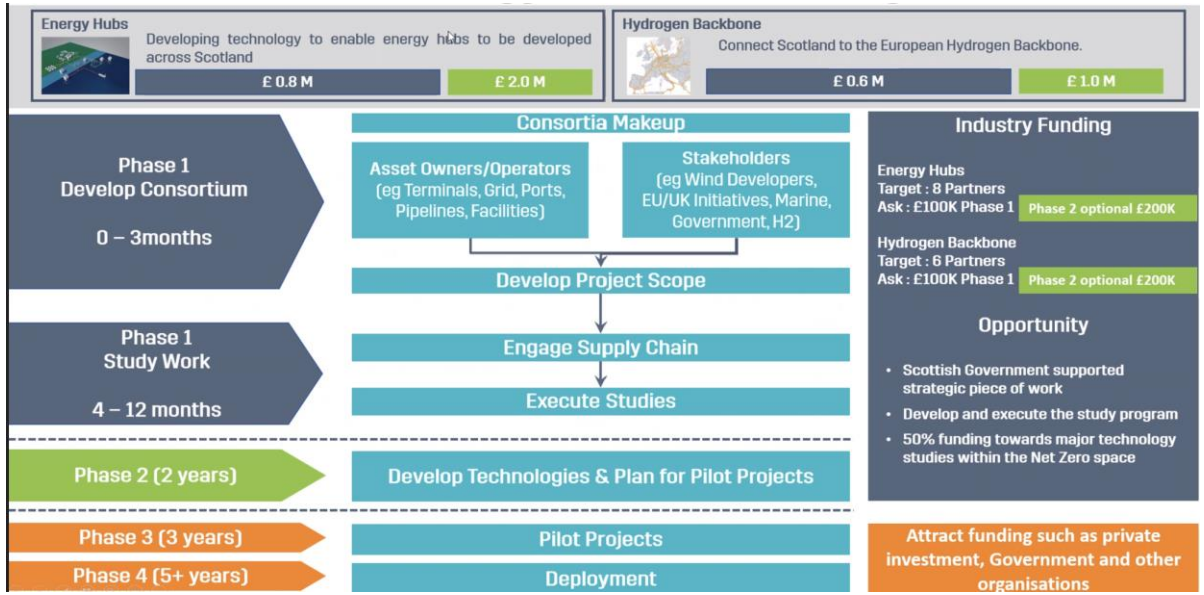

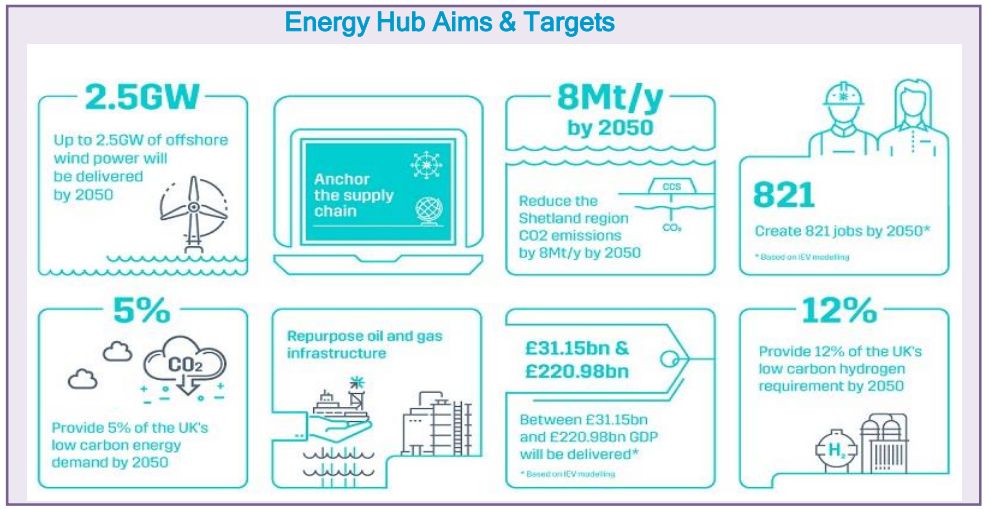

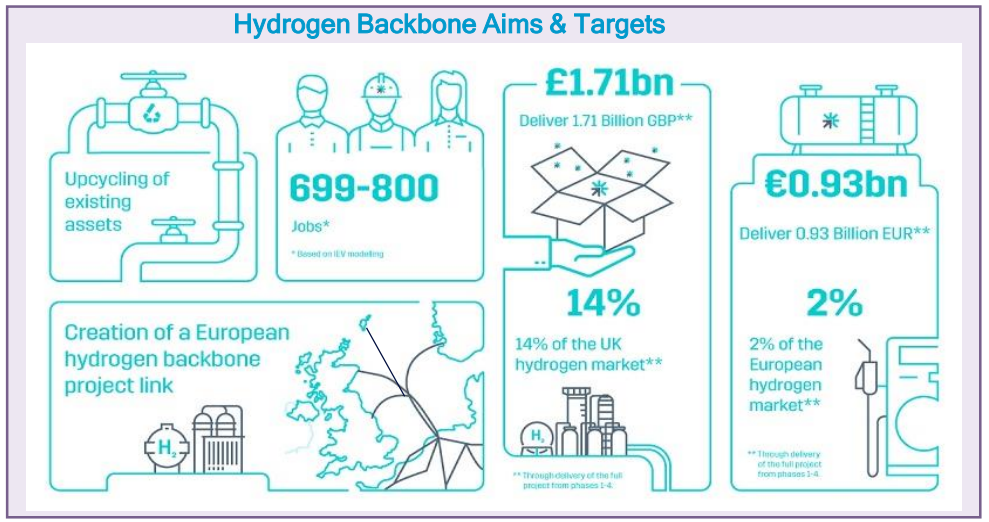

NZTC project management with industry consortia and Phase 1 completed by mid November 2022

Shaping Shetland as the UK's first clean energy island

ORION Clean Energy Project

ORION is a strategic framework connecting organisations with a common ambition: to transform the Shetland region into a centre for secure and affordable clean energy.

- Harnessing offshore wind to produce green hydrogen for transport and heating
- Delivering clean and affordable energy for Scotland, the UK and Europe
- Creating new jobs, tackling fuel poverty and reducing carbon emissions
- Decarbonising offshore oil and gas to support the net zero transition

Our vision is to build a world-leading clean energy hub, attracting people of all ages to live, work, study and invest.

Shetland: Islands of Opportunity

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