

Green Hydrogen Development

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Electrification & Hydrogen to facilitate Decarbonisation



ELECTRIFICATION

- Lowest cost renewable electricity in high growth, solving majority of areas



Long-range, heavy duty transportation



Chemical processes & industry feedstock



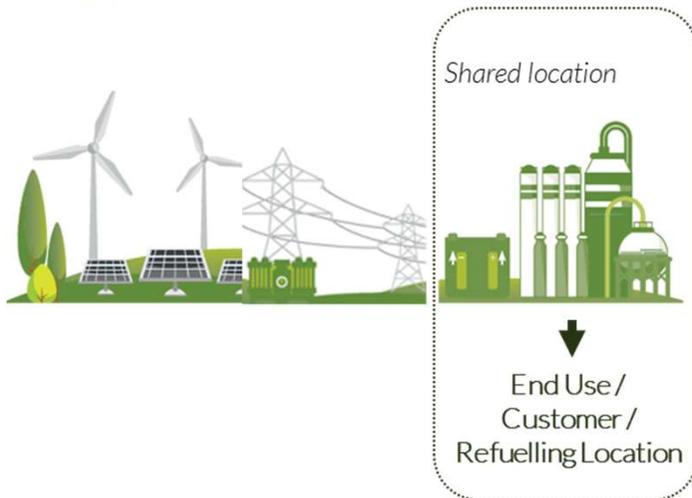
HYDROGEN

- Critical to solve decarbonisation where difficult to electrify, incl. Rail sector

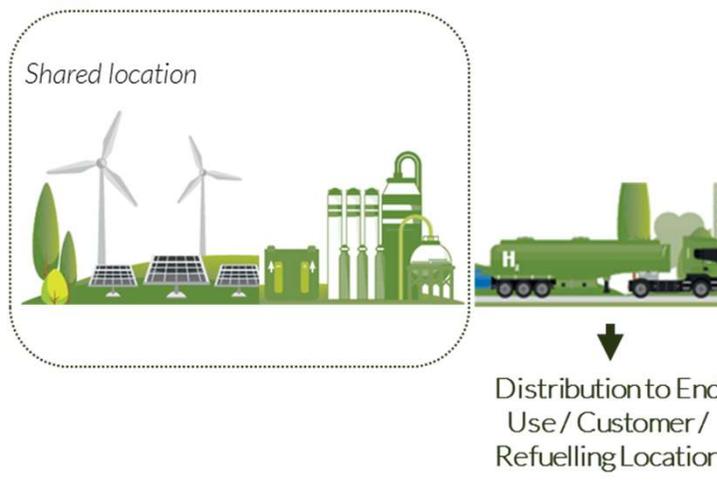
GREEN HYDROGEN PRODUCTION - Several Options to produce locally, or off-site



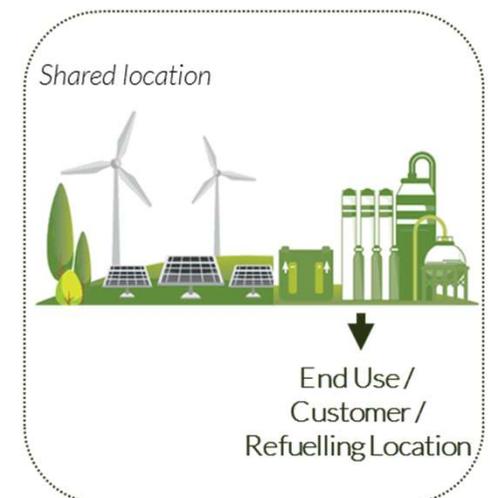
On-site Production



Co-located with Renewables



Holy Grail...



Internal Use

Exploring the Solutions



Transport

Heavy Duty, Long Range

- SP Hydrogen are supporting various projects, which include the following vehicle types:
 - Heavy Duty Vehicles (inc. RCVs, HGVs etc.)
 - Bus Refuelling Depots
 - Non-electric Rail Routes
 - Clean Shipping and Aviation Fuels

Support Schemes

- SP project designed to be compliant with RTFO support scheme where possible, which drives cost comparison with diesel fuel operational costs.
- Capital Grant schemes considered in order to bridge funding gap between ICE vehicles and zero-emission alternatives.
- Close working relationships for optimised Total Cost of Ownership Models



Industrial Process

Industry Requirements

- Hydrogen is viable for high-Temperature processes which are needed in Steel, glass and brick production as well as distillers,
- Hydrogen is also needed for chemical processes such as fertiliser and ammonia.
- All these processes currently utilise either grey hydrogen or natural gas and need to be transitioned to support decarbonisation.

Support Schemes

- BEIS "Hydrogen Business Model" intended to address the gap between the production of hydrogen and the price of Natural Gas for current fossil fuel users.
- Capital funding support for hydrogen projects will mean cost-effective fuel switching for large-scale industrial users.
- Innovation funding facilitates early adopters and pilot projects for initial phases of larger programmes.



Alignment with Energy & Transport Infrastructure

Hydrogen



STRATEGIC SITES ACROSS UK AND IRELAND IN DEVELOPMENT

Key locations for coverage across United Kingdom & strategic ports etc.

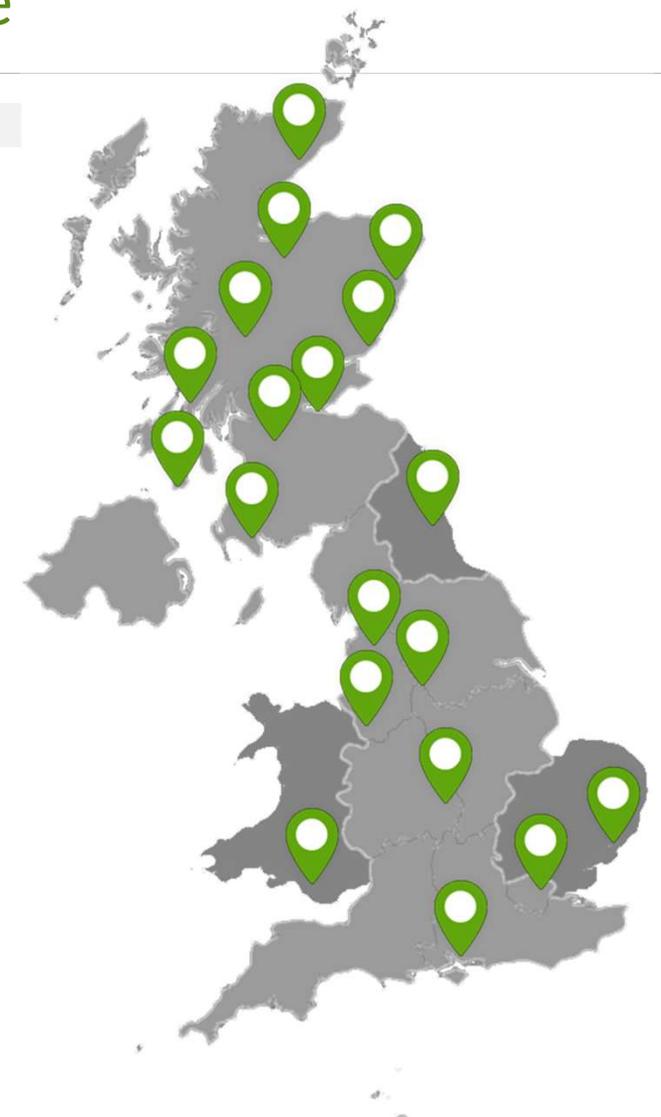
More than €3Bn
global investments in
Green Hydrogen in
next 10 years




 e.g. Central Belt Production
 • >8 tonnes / day available before 2024


 e.g. Highlands Production
 • >20 tonnes / day available before 2025


 e.g. East Coast Ports
 • >1000 tonnes / day, 2x major sites, available from 2025



Whitelee Hydrogen



Summary

- Co-located at Whitelee Windfarm, near Glasgow
- 20MW Planning Application, incl. up to 40MW solar PV, with a 50MW, 50MWh battery
- Anticipated planning consent Q1 2023, operations late 2024
- £9.4 million grant from BEIS Storage at Scale innovation fund
- In partnership with ITM/ILE

Applications:

- Multi-purpose production site for industrial use & heavy transport refuelling supply etc. as well as regional refuelling depots

Logistics

HYDROGEN LOGISTICS PARTNER

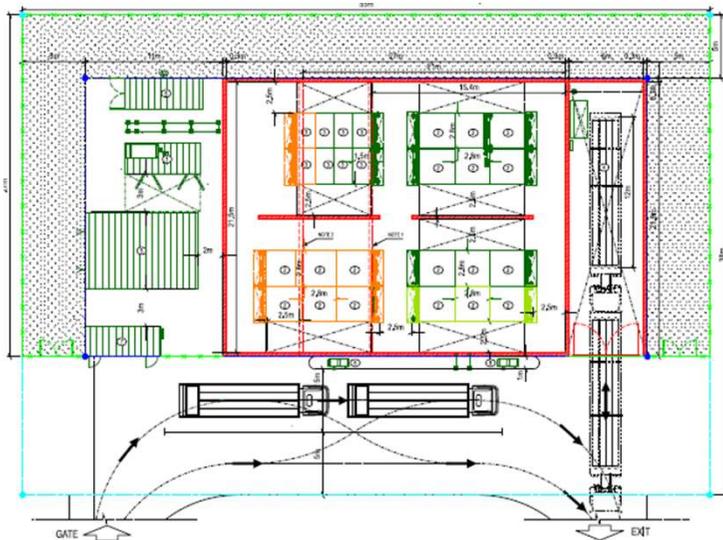
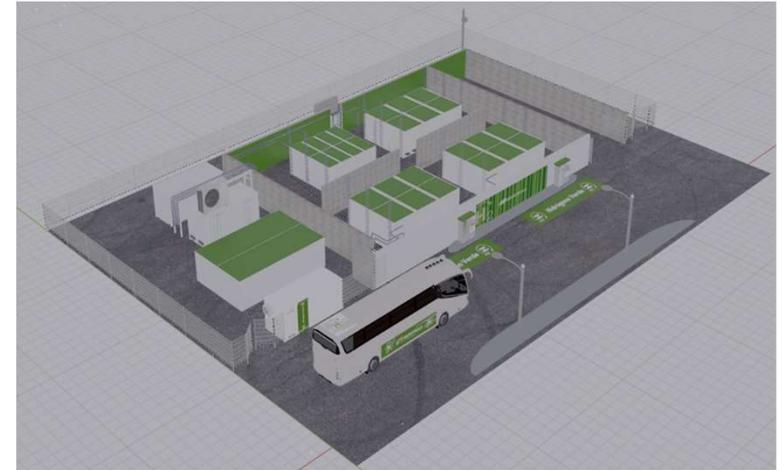
Scottish Power are working with the transport industry to establish a hydrogen transport partner

- Work is ongoing to develop a framework partner who will deliver logistics planning and distribution to meet our customer requirements.
- Key selection parameters will include the utilisation of low emission vehicles with pathway to operating zero emission vehicles to ensure we decarbonise our supply chain.
- We will also be working with trailer manufacturers to explore where the market innovation is coming from and where we have the opportunity to support these developments.



Typical Capabilities

- 2 x Twin Compressor designs for reliability
- Twin Dual Dispensers for multi-vehicle refuelling
- Approx. 6 Hr Refuelling window for full delivery of daily demand
- Includes parallel filling
- Typical Footprint – 20m x 25m



Potential Commercial Structure

- ScottishPower anticipate all capital investment required
- ScottishPower secure local planning and utility connections
- ScottishPower own and operate facility with long-term assets
- Fleet Operators procure vehicles and establish refuelling demand
- Refuelling Agreements based on fixed and variable elements
- Term, volume, roles & responsibilities refined per project

Internal Use

Hydrogen



THANK YOU FOR YOUR ATTENTION

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