Hydrogen Technology Developments to Unlock Innovative Solutions

Net Zero Technology Centre

Technology Driving Transition

National Subsea Centre

All Things Hydrogen Conference

(Hydrogen Production Developments)

14th March 2023

Net Zero Technology Centre

ABERDEEN CITY REGION DEAL:
Powering Tomorrow's World

#ABZdeal

Scottish Government
Riaghaltas na h-Alba
gov.scot

HM Government

Research & Technology Development Projects

TechX Accelerator & Growth Programmes

Net Zero Technology Services

1,810+ Technologies screened

344 Approved projects

165+ Field trials complete, planned or underway

bp · TotalEnergies · equinor · Shell · REPSOL SINOPEC · Harbour Energy
cnooc · EnQuest · Ørsted · wood. · XODUS · Schlumberger
subsea 7 · HALLIBURTON · Petrofac · Worley · SIEMENS energy · Baker Hughes

£244Mn Invested with industry

53 Partnerships

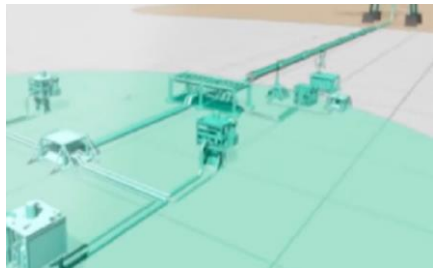
£150Mn Leveraged from industry partners

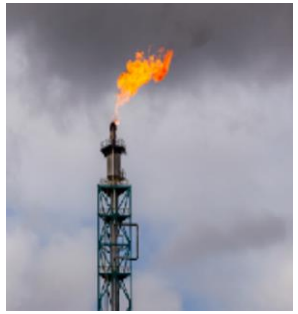
Research & Technology Development Projects

NZTC Programmes

Emissions Reduction

Field development





Production, operations and logistics

Late life and decommissioning

Energy System Integration

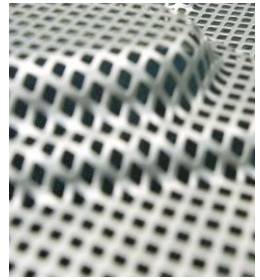
Renewables and energy storage

Hydrogen and other clean fuels

Carbon capture, utilisation and storage

Offshore Energy 4.0

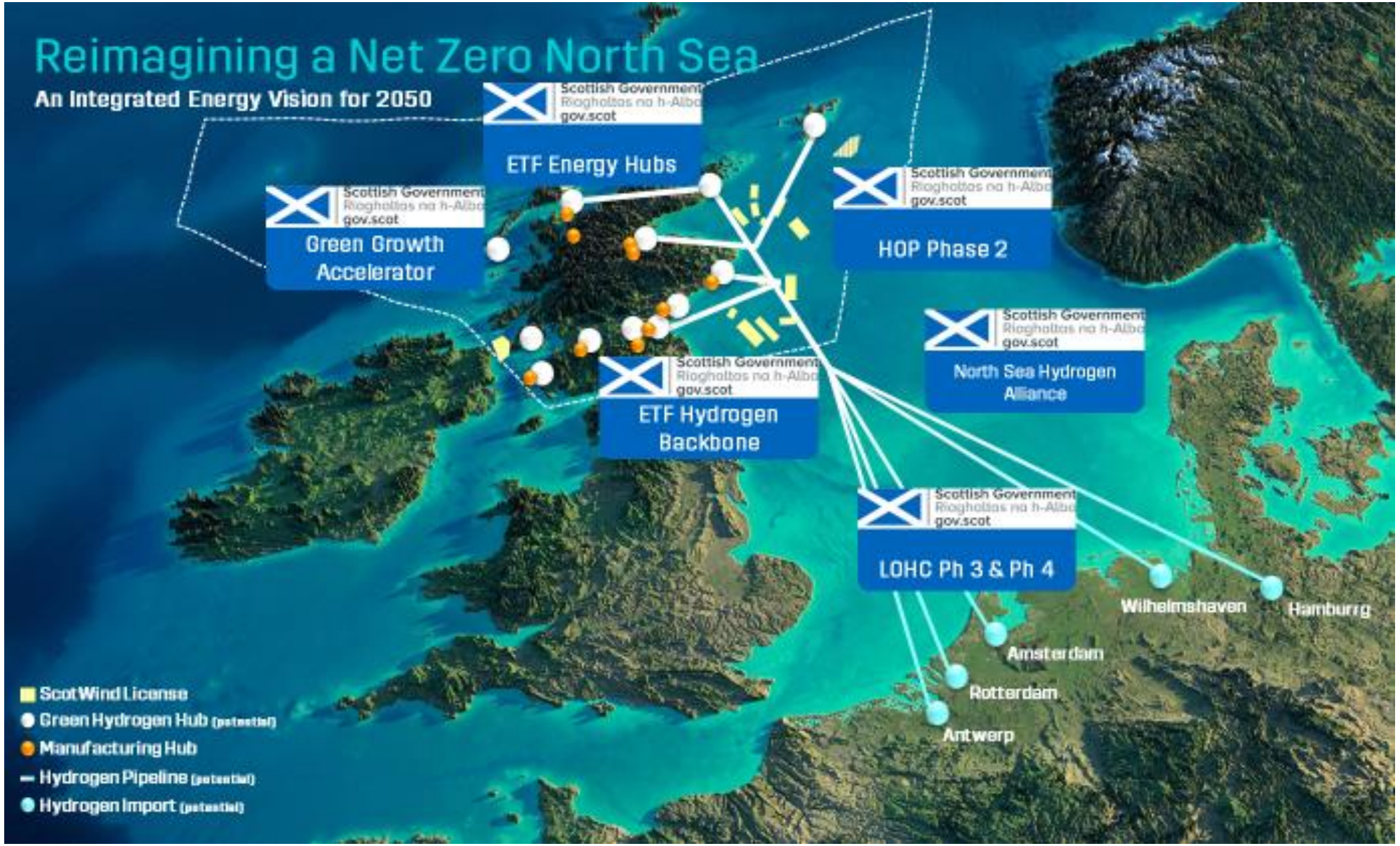
Smart assets



Automation and remote operations

Robotics and autonomous systems.

Strategic H_2 Projects



Net Zero R&D Programme: Calls for Ideas

The Scottish Government
Riaghaltas na h-Alba

Scottish Funding Council
Comhairle Maoineachaidh na h-Alba

Scottish Enterprise

CFI 1: DAC / DSC

2020 — 2023

CFI 2: H_2 Energy Production, Transportation, Storage & Utilisation

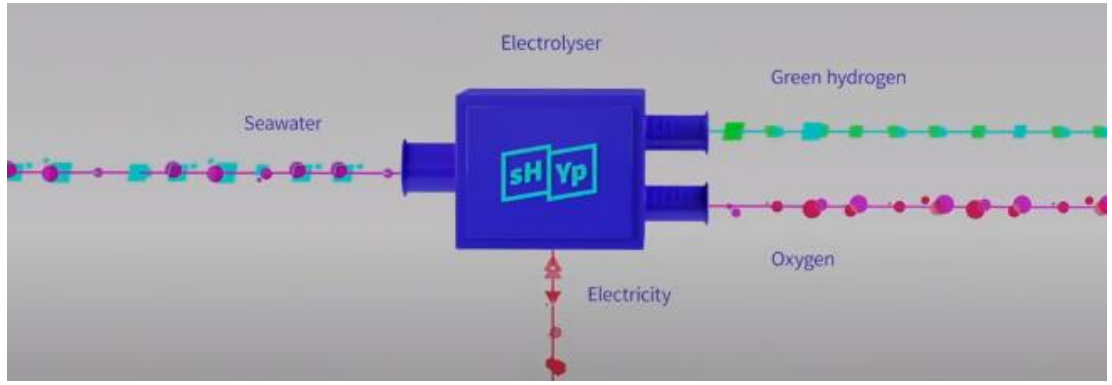
- Optimising the Production of Blue Hydrogen
- Hydrogen / Hydrogen Carrier Utilisation
- Bulk Hydrogen Transportation
- Long-term Hydrogen Storage

Industry Collaboration - 60 Companies

bp ventures
nationalgrid
SGN Your gas. Our network.
Baker Hughes
DNV
TechnipFMC
Scottish & Southern Electricity Networks
centrica
Logan Energy hydrogen technologies
TÜV SÜD
PORT OF CROMARTY FIRTH

sHYp BV Ltd w/ University of Strathclyde

- Novel membrane-less electrolyser
- Separates seawater producing green H_2 and O_2
- No need for a desalination unit
- Efficient CO_2 capture from sea water
- Validate and optimise electrolysis efficiencies & ensure stable operation of the electrolyser



REPSOL

DNV

Astrimar
Reliability by Design

TechnipFMC

Baker Hughes

Supercritical Solutions Ltd. w/ University of St Andrews

SUPERCRITICAL

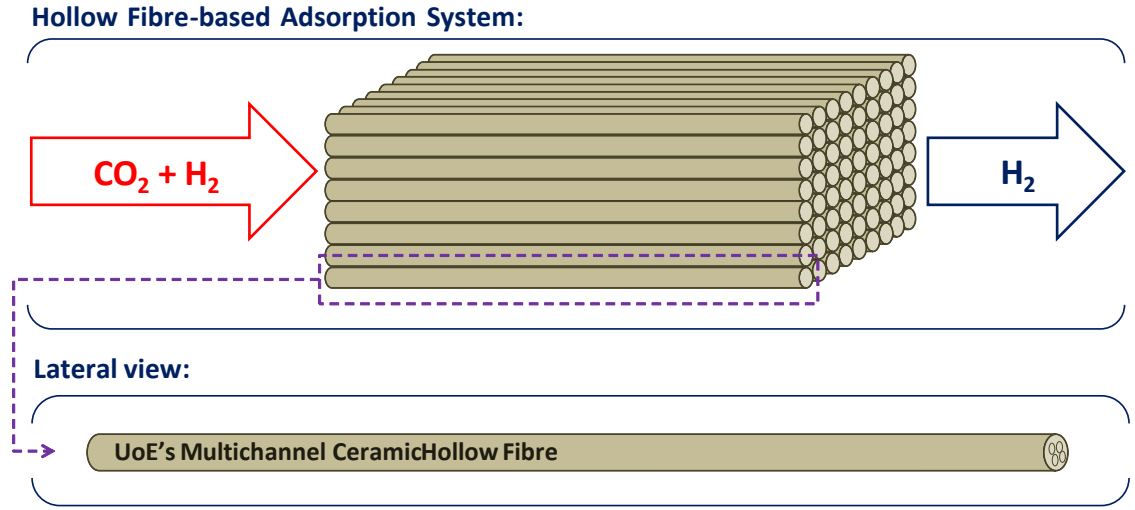
University of St Andrews

- Novel ultra-efficient electrolyser development to produce low-cost green H_2 directly from water
- Potential to improve industry conversion rates by 30% (using renewable power and waste heat inputs)
- Hydrogen production at pressure
- No need for gas compression – minimising capital expenditure
- Prototype scale build

bp ventures

Immaterial w/ University of Edinburgh

- Hollow fibre-based adsorption system
- Purification of blue H_2 production
- Improved efficiency (vs PSA systems)
- Smaller, cheaper & more durable (compared with PSA systems)



B9 Energy Storage Ltd w/ University of Glasgow

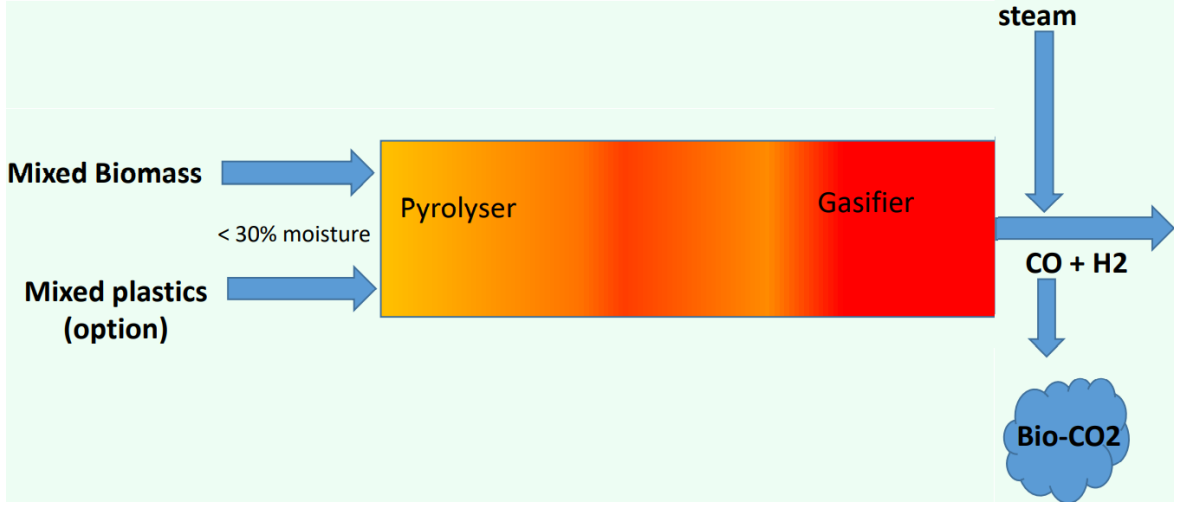
- Membrane-less seawater electrolyser system
- Produces green H2
- Investigating electrode materials; metal alloys, and coatings to replace standard stainless-steel electrodes
- Small-scale prototype system to demonstrate electrochemical separation of basic alkaline and acidic components
- Pathway to scale up with established industry relationships

Slanj Ltd w/ University of Strathclyde

SLANJ LTD

University of Strathclyde Glasgow

- Novel high temperature, pressurised integrated pyrolysis-gasifier unit
- Local organic waste residues, food, compost, wood
- High purity, lower cost bio-hydrogen
- Other net zero energy or fuels



Logan Energy hydrogen technologies

The James Hutton Institute

University of St Andrews

International Biochar Initiative

ecoidea facilitating industrial ecology

DROCHAID RESEARCH SERVICES LTD

PanAgris

FloGroFresh

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Questions?