

Welcome

NI Net Zero Exchange
Malaysia and Singapore

Northern
Ireland



H₂

Delivered by Invest
**Northern
Ireland**



Northern Ireland Net Zero Policy & Investment Vision

Jimmy Graham

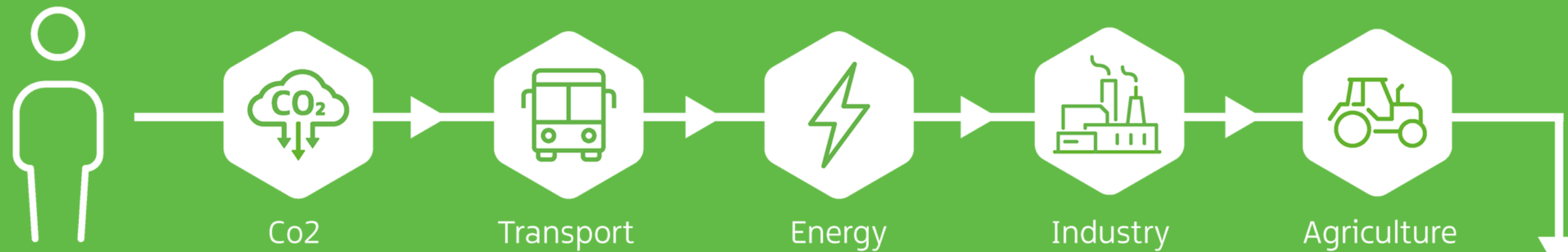
Department for Economy



Department for the
Economy
www.economy-ni.gov.uk

An Roinn
Geilleagair

Challenges



Opportunities





John Green

Strategic Investment Board



Decarbonisation Investment – Market Size



**Total low carbon capital
investment required**

Public sector investment

Private sector investment

Net Zero Accelerator Fund (NZAF)

£150m

Proposed NZAF fund size made up of up to three £50m tranches.

£2-10m

Indicative range of lot size which will differentiate the fund from existing financing products.

Equity

Investment instrument of choice will be pure equity or quasi equity (e.g. redeemable preference shares).

The
**Strategic
Investment
Board**



NZAF primary objectives:

01

Positive impact on GHG Emissions

02

Leverage private investment

03

Stimulate economic growth

04

Earn a return on investment

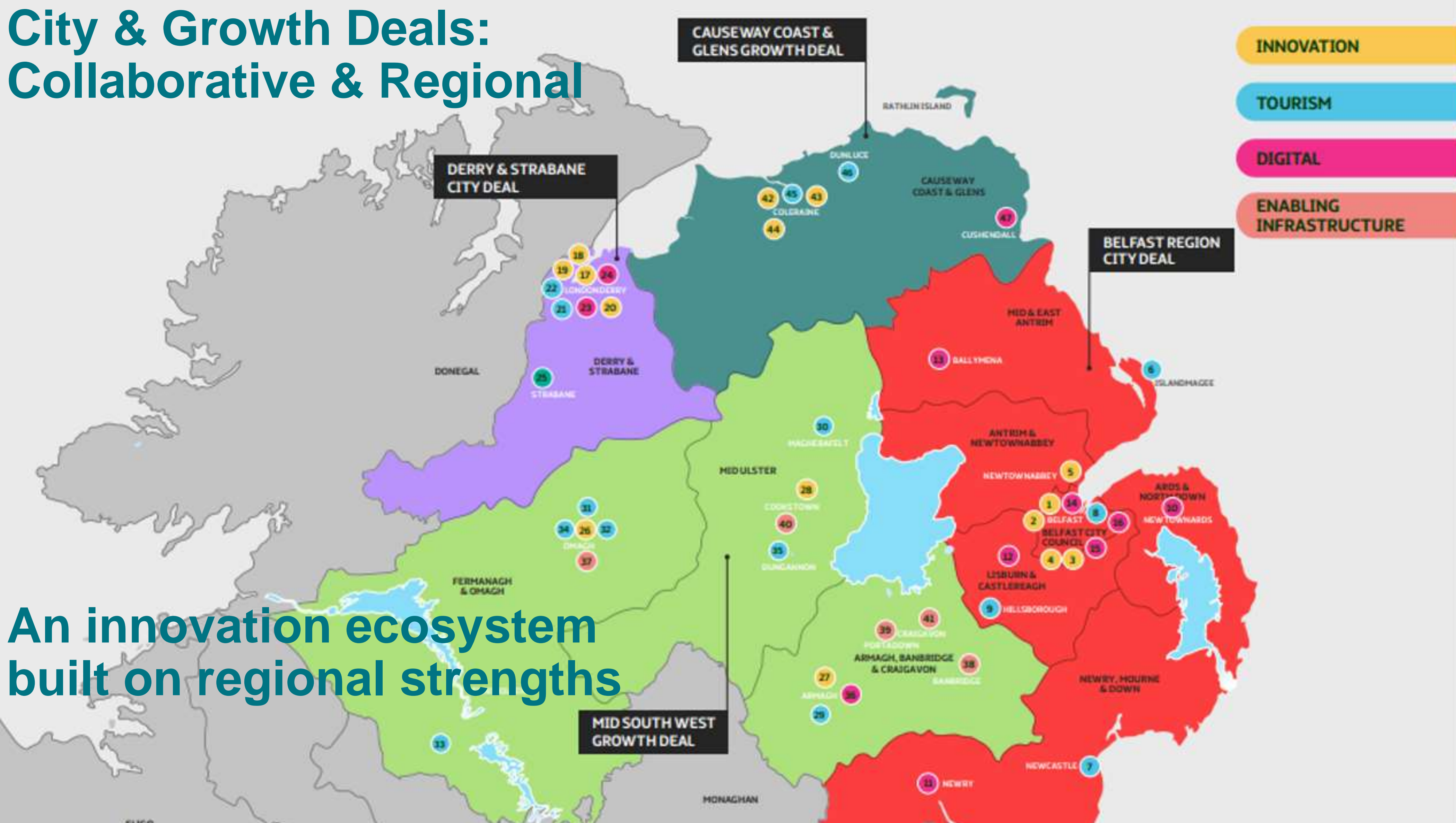
05

Flexibility

Sam Turner

Advanced Manufacturing Innovation Centre

An innovation ecosystem built on regional strengths



ADVANCED
MANUFACTURING
INNOVATION
CENTRE

iREACH
HEALTH

MOMENTUM
ONE
ZERO

£1.2 bn Investment in Belfast Region

DRIVING A GREEN INDUSTRIAL
REVOLUTION

£98m +

CREATING A PATIENT-CENTRED,
DIGITALLY-ENABLED CLINICAL
TRIALS ECOSYSTEM.

£62m

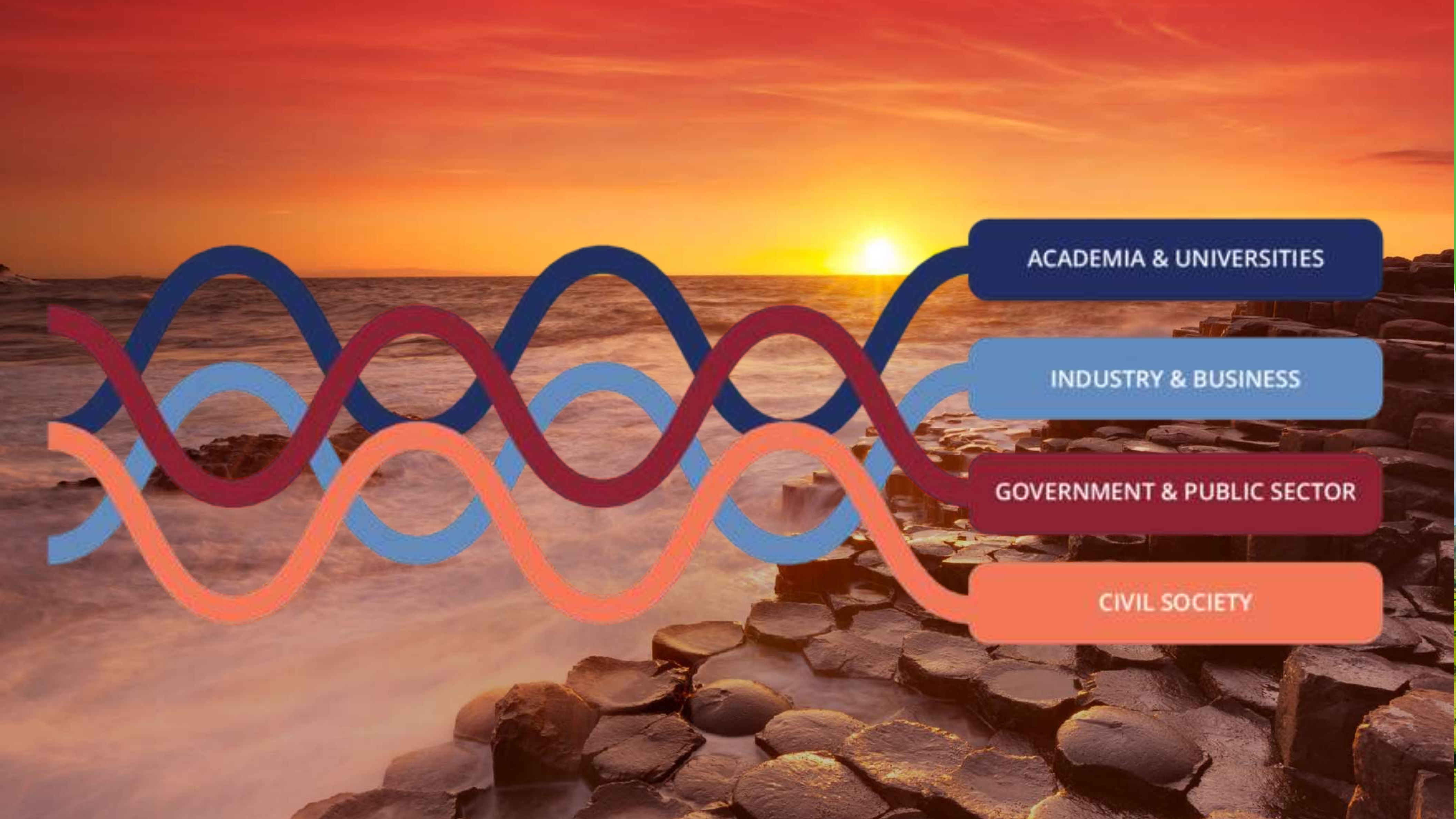
TRANSFORMING NORTHERN
IRELAND'S DIGITAL ECONOMY.

£70m

David Rooney

Queens University





ACADEMIA & UNIVERSITIES

INDUSTRY & BUSINESS

GOVERNMENT & PUBLIC SECTOR

CIVIL SOCIETY

Panel Discussion:

Northern Ireland Net Zero Policy & Investment Vision



Jimmy Graham, Director for Business, Gas, Minerals and Renewable Electricity, Department for the Economy

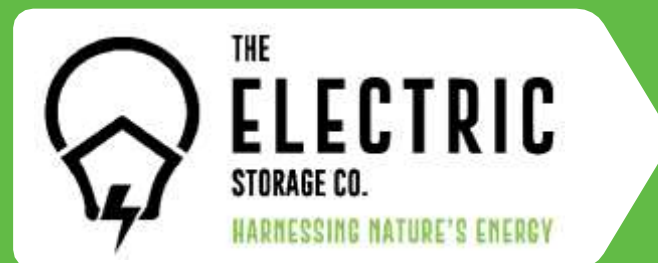


John Green, Strategic Advisor, The Strategic Investment Board

Northern Ireland collaborating to enable net zero

Eddie McGoldrick

The Electric Storage Company



Decarbonisation – challenge and opportunity



Smart Local Energy Systems





Mega Trends in Electricity Grids

1. Decarbonisation of electricity
 2. Decentralisation of generation
 3. Digitalisation of assets and services
 4. Democratisation through Prosumers
- Northern Ireland has made progress on all 4 fronts.
 - Based on **collaboration**

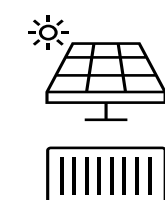




Project Girona – a story of collaboration

- £2.1m UKRI Grant + £1.5M matched funding
- Detailed Design for Smart Local Energy System
- PARIS developed and deployed as viable commercial product in GB, IRL and EU markets

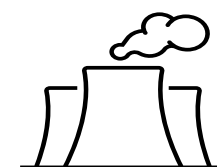
Outcomes at a Glance



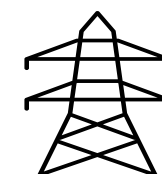
60 installations



50% plus £ savings



40 tonnes CO2 saved



30 mWh exported

Collaboration



Data & Energy Services Company

Maximising the value of renewable generation via storage, data and smart technology

Bringing cheaper, cleaner and smarter electricity to domestic and commercial customers

Stakeholders & Partners

Access

Housing
Executive

choice
Together we enrich lives

 Causeway
Coast & Glens
Borough Council

Rules

 **Utility Regulator**
ELECTRICITY GAS WATER

 Northern Ireland
Electricity
Networks



 Department for the
Economy

R&D

Invest 
Northern Ireland

 **UKRI**
Innovate
UK

The Consumer Council
CATAPULT
Energy Systems

CORNWALL INSIGHT
CREATING CLARITY





PARIS.

Predictive Analytical Renewables Integration System



Data Analysis



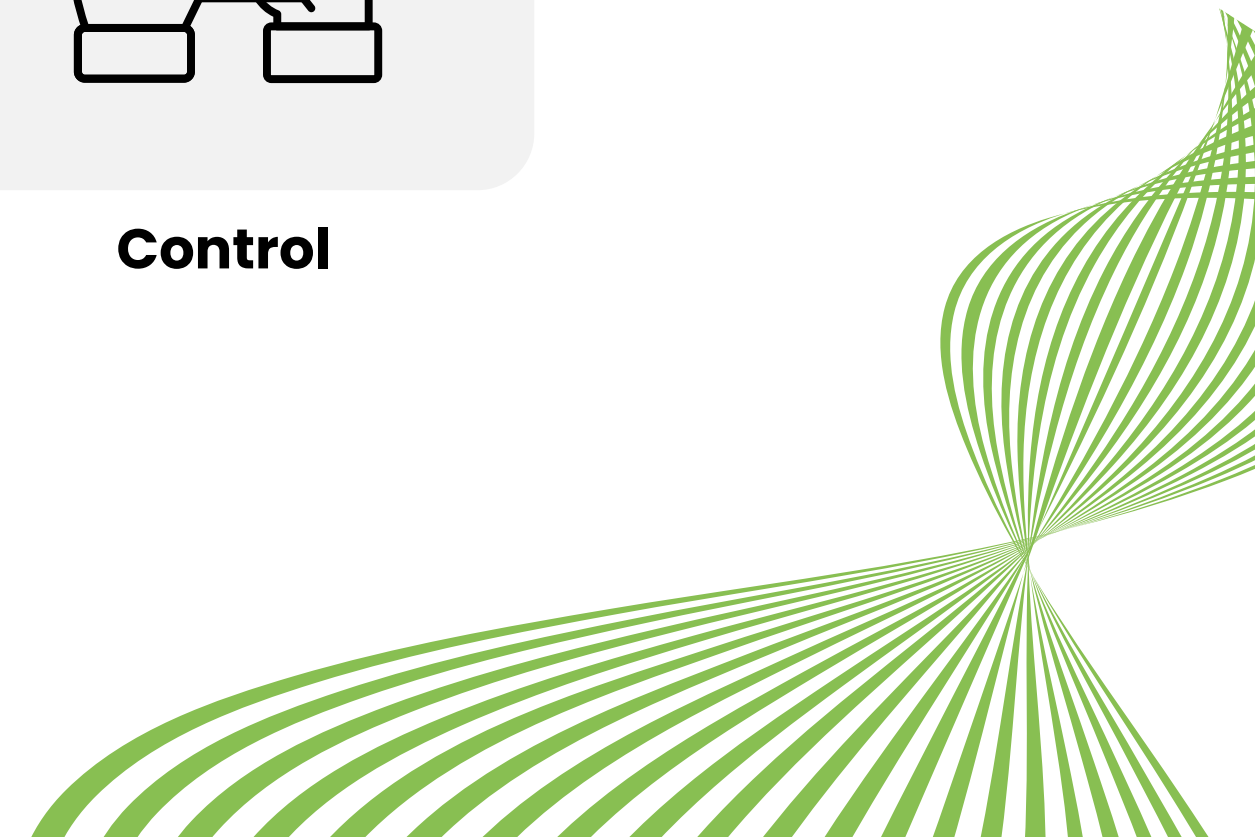
Predictability



Optimisation

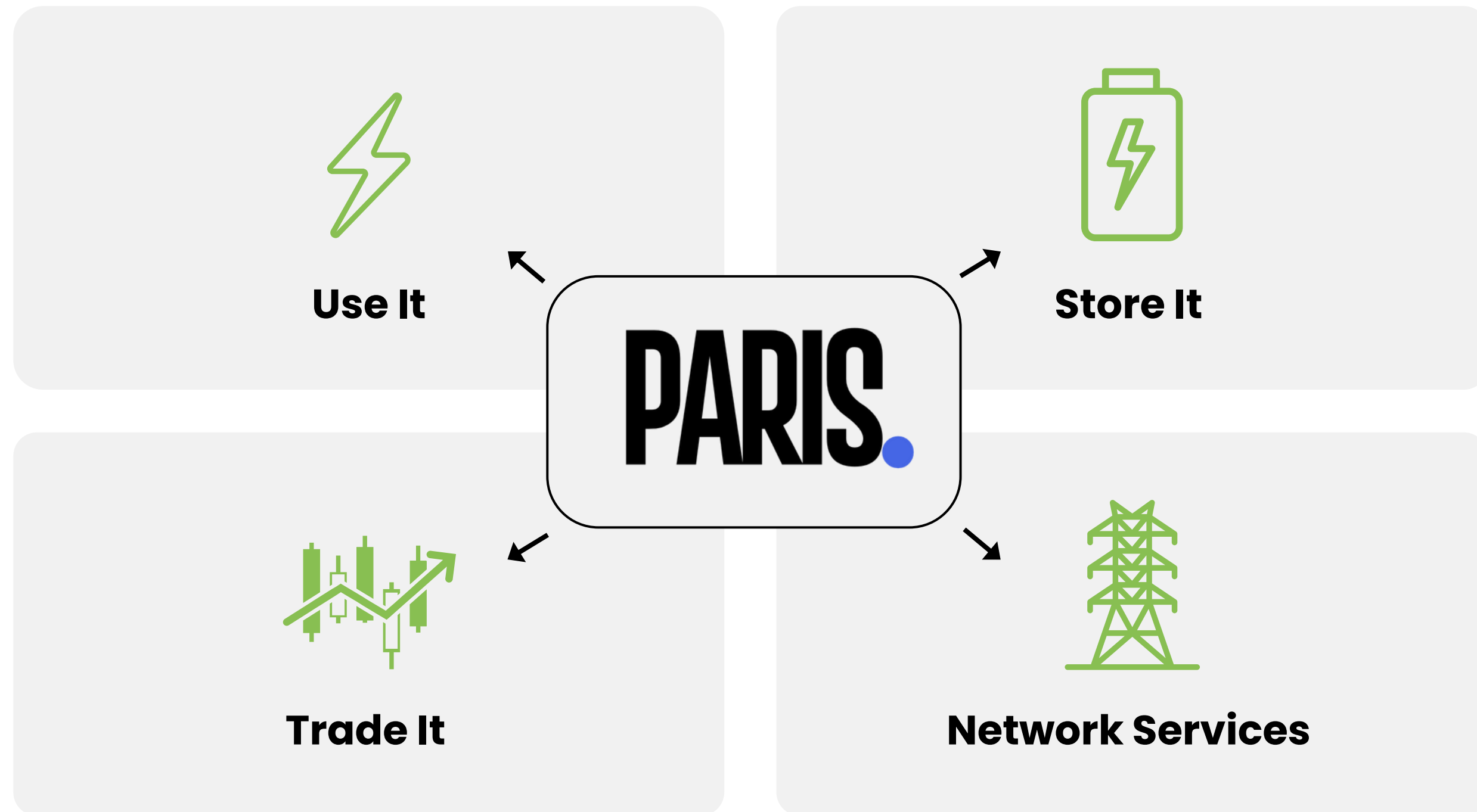


Control



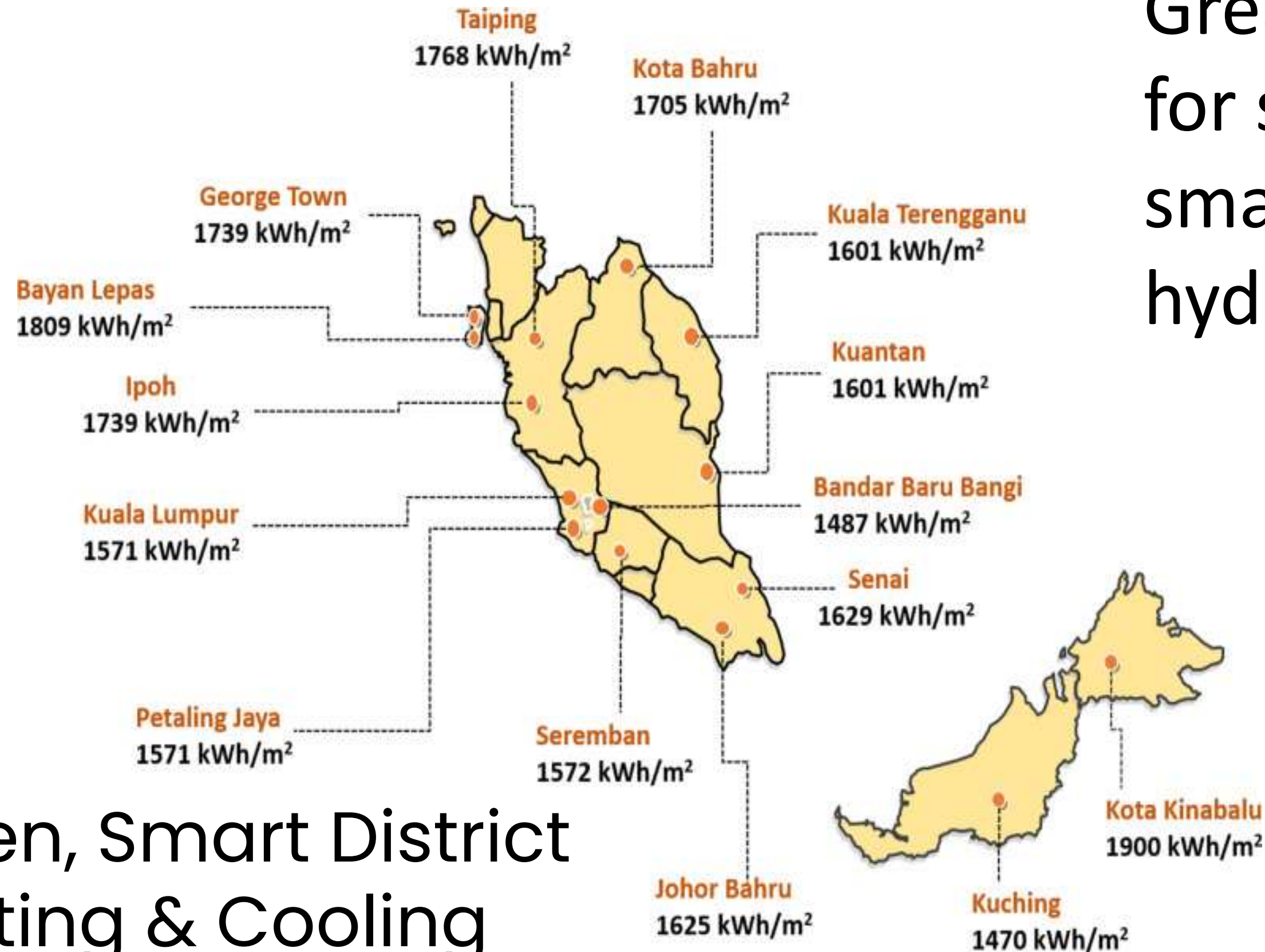


What does it do?



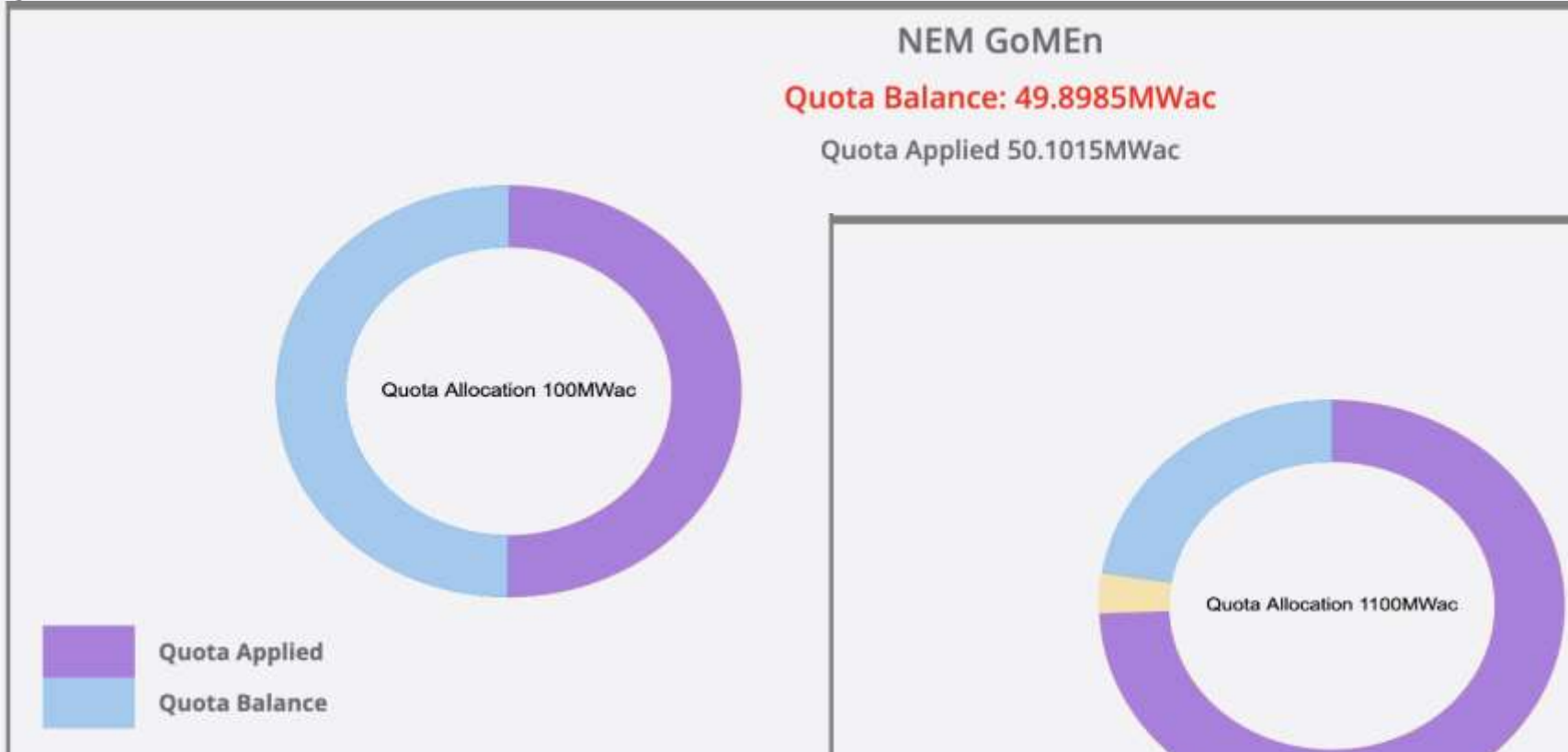
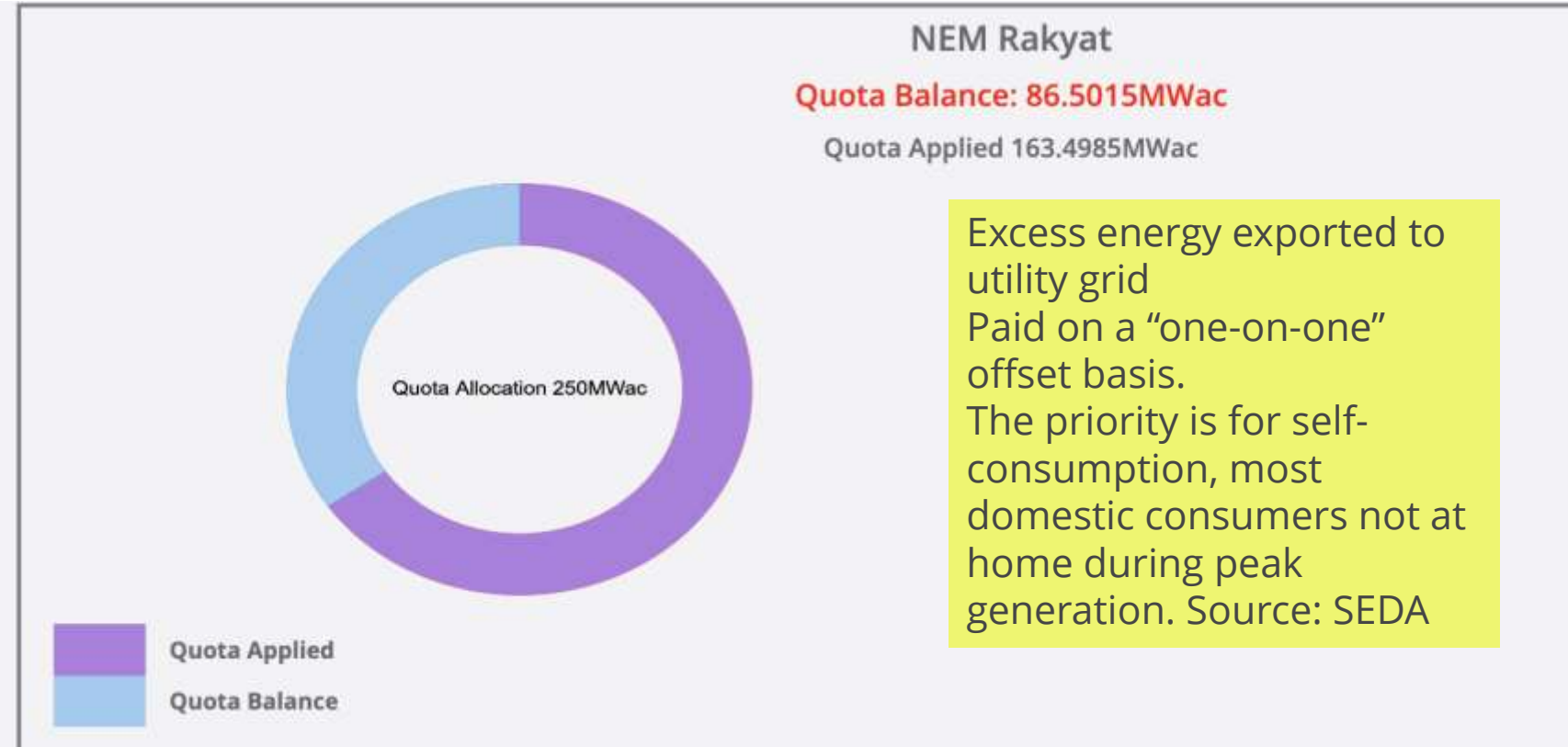
Irradiance map of towns in Malaysia

Great location
for solar and
small-scale
hydro ?

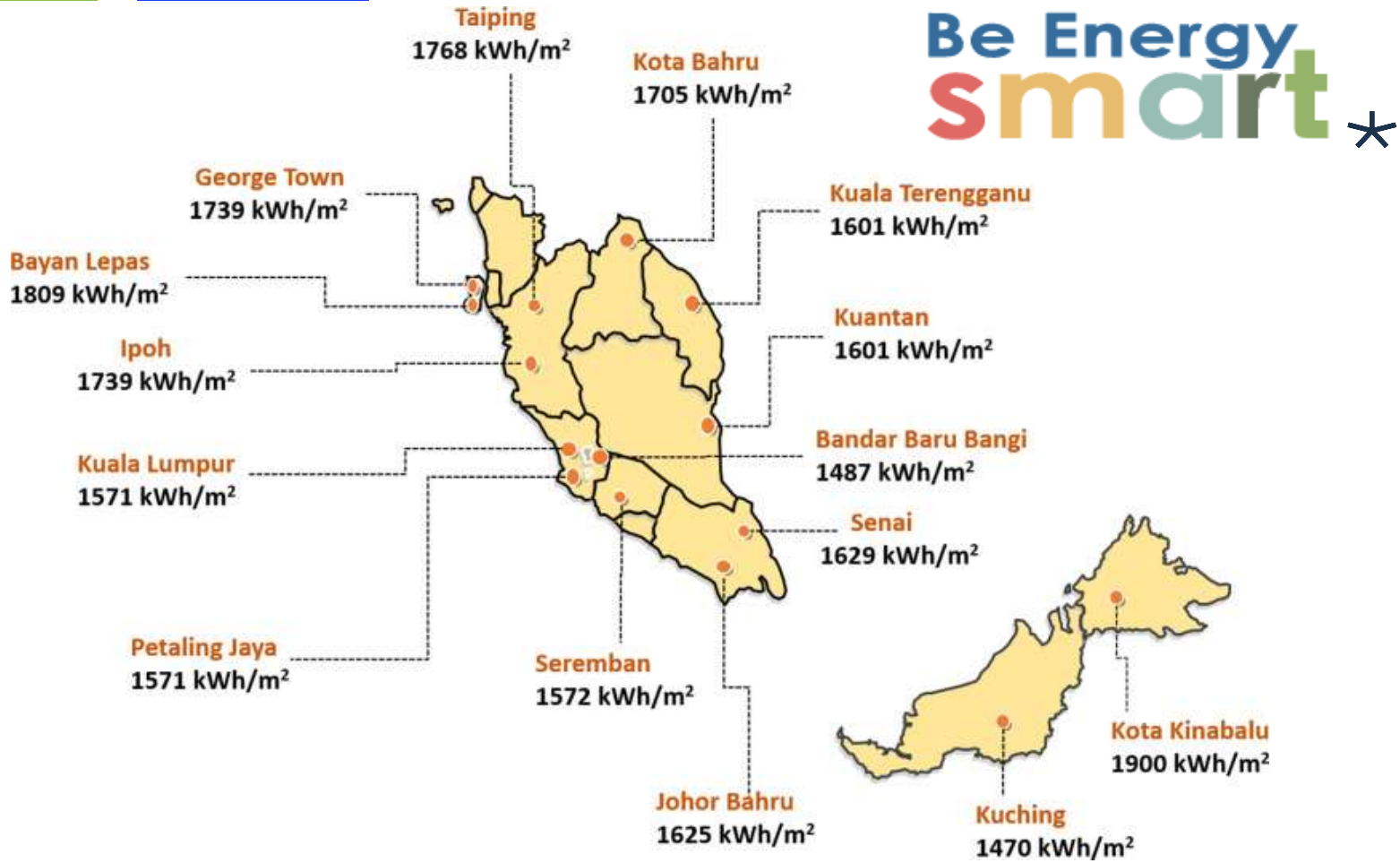
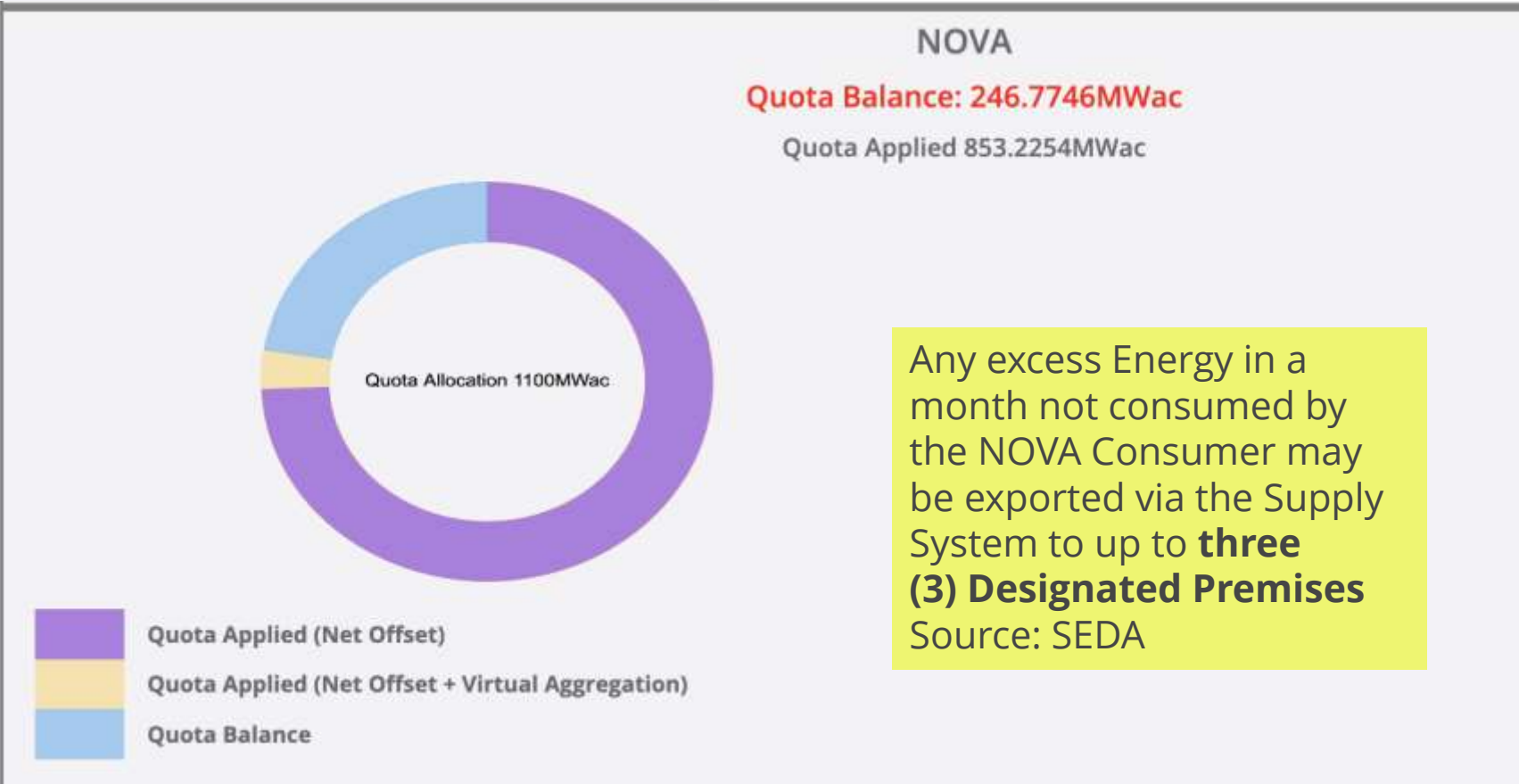


Green, Smart District
Heating & Cooling
potential?

Giga Opportunity in Malaysia



Solar PV installation on Government premises <1MWp
Some premises not operating during the weekends or public holiday. Source: SEDA



Irradiance map of different towns in Malaysia

PARIS.

Safe Harbour Opportunity in Singapore

1. Smart Local Energy System template available
2. Belfast Harbour modelled on PARIS
 1. Combine tenants generation and storage
 2. Dynamically manage grid constraints
3. Scope for SLES model as Singapore port relocates



MPA
SINGAPORE



Pete Gray

ARUP

ARUP

ARUP



NI Water Hydrogen and Oxygen Demonstrator Project

Partnerships for the Goals



Pete Gray (Associate Director, ARUP)

March 2024 Net Zero Exchange

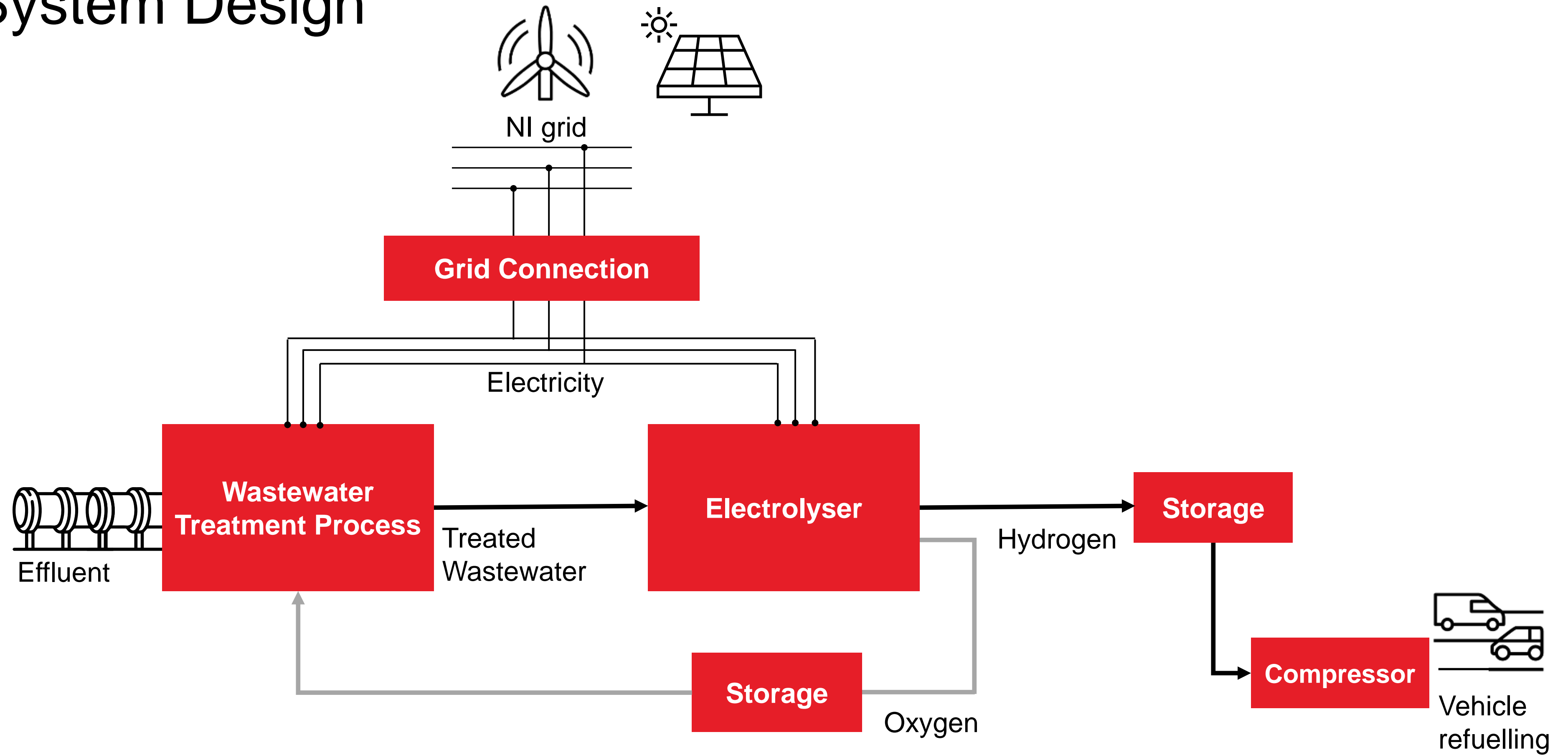


Decarbonise transport



+70 Wastewater treatment works beyond capacity in NI

System Design



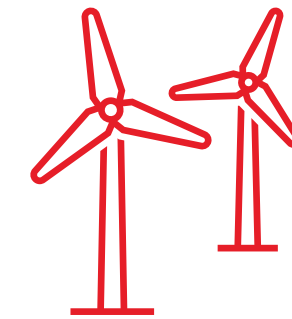


Electrolyser installed at Kinnegar Wastewater treatment works

Wider benefits for Northern Ireland



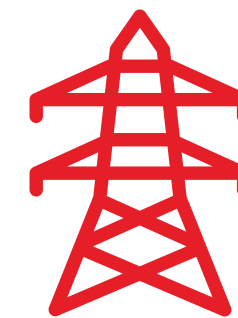
Create jobs



Enable more
wind generation



Decarbonise and
improve air quality



Support flexibility
in electricity grid

How did we deliver this?

NIW procured a long term Strategic Partnering Agreement

Strategic Partners



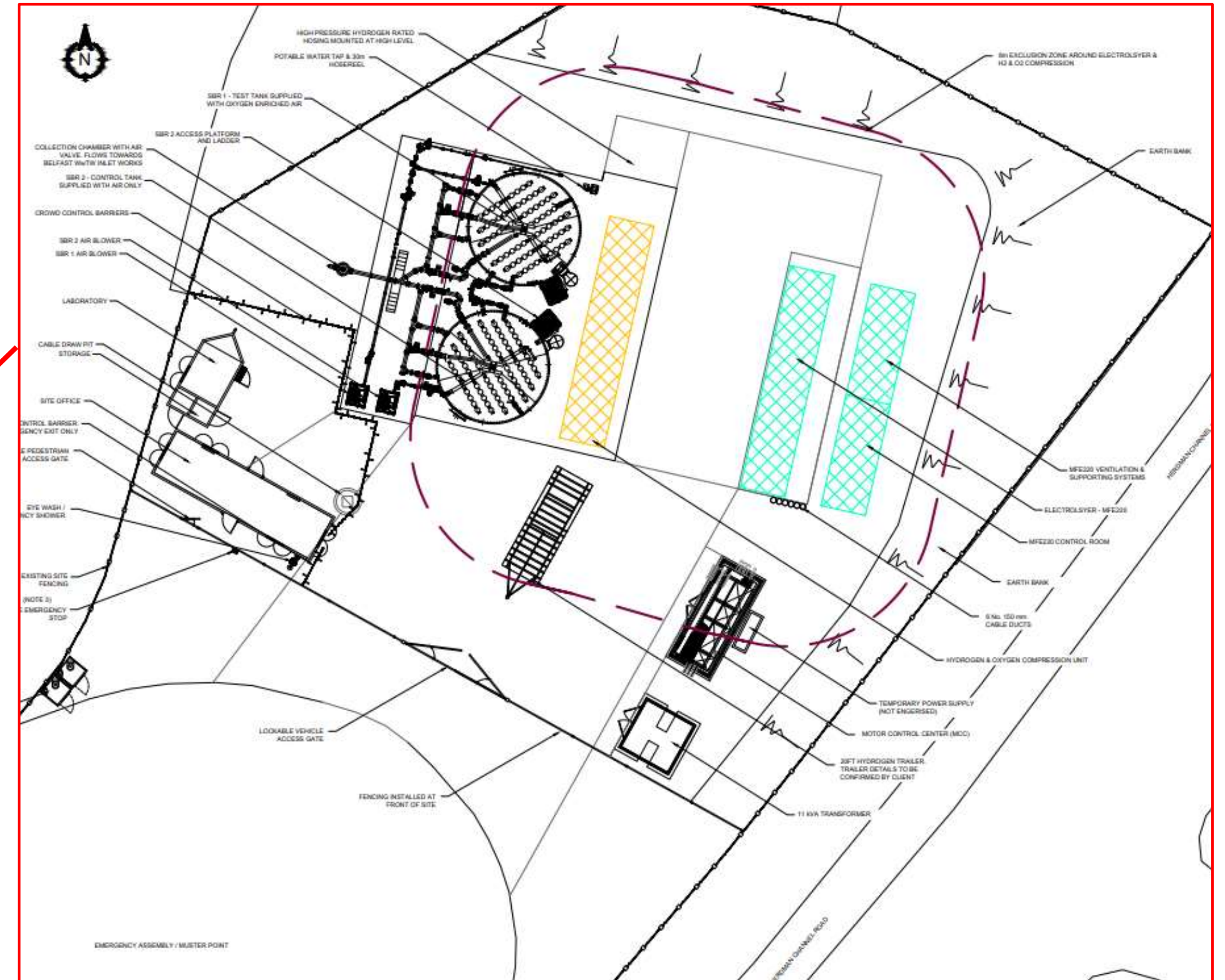
Client Side Advisers



Client



Why Belfast WwTW?

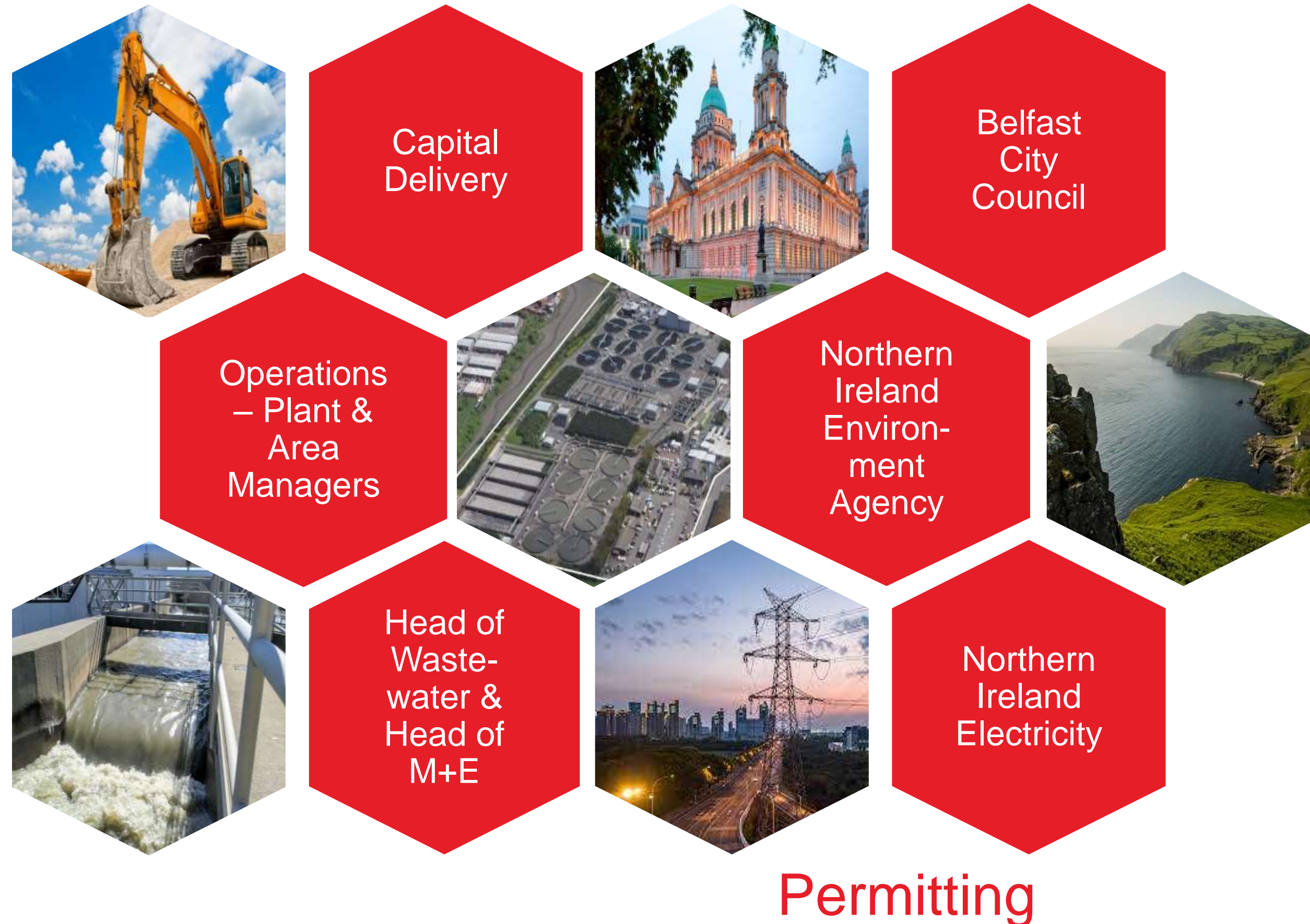


Stakeholder Engagement and Health & Safety



Internal NI Water Stakeholders

Stakeholder Engagement and Health & Safety



Stakeholder Engagement and Health & Safety



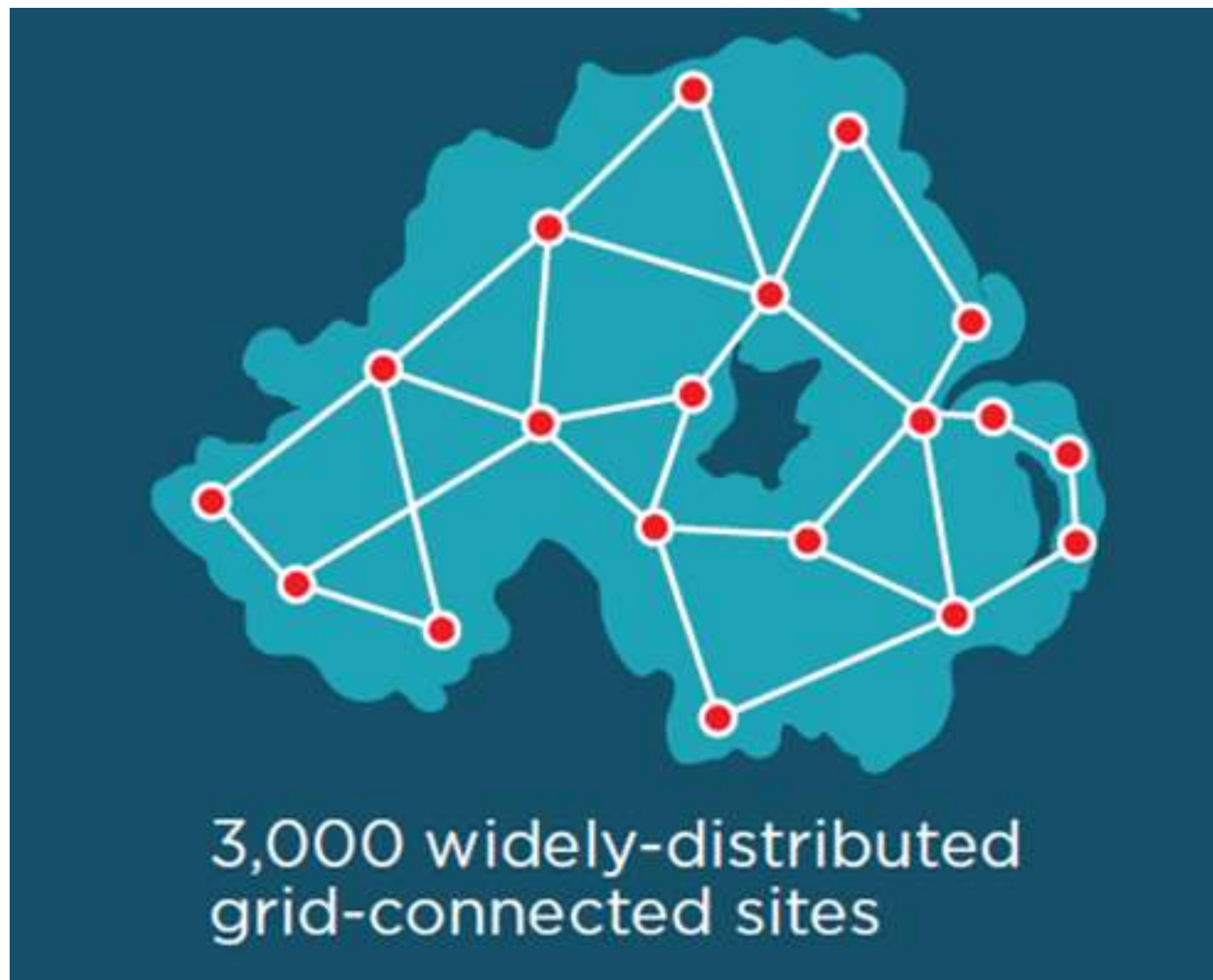
Progress



Hydrogen buses



Next Steps



Government + Public Sector



Belfast
City Council



Government + Public Sector + Private Industry



Belfast
City Council



ARUP

Pete Gray, ARUP & Neil McKenzie Lagan, MEICA

NI Water Hydrogen and Oxygen
Demonstrator Project, Q&A

David Surplus

B9 Solutions



Enabling the scalable green methanol revolution



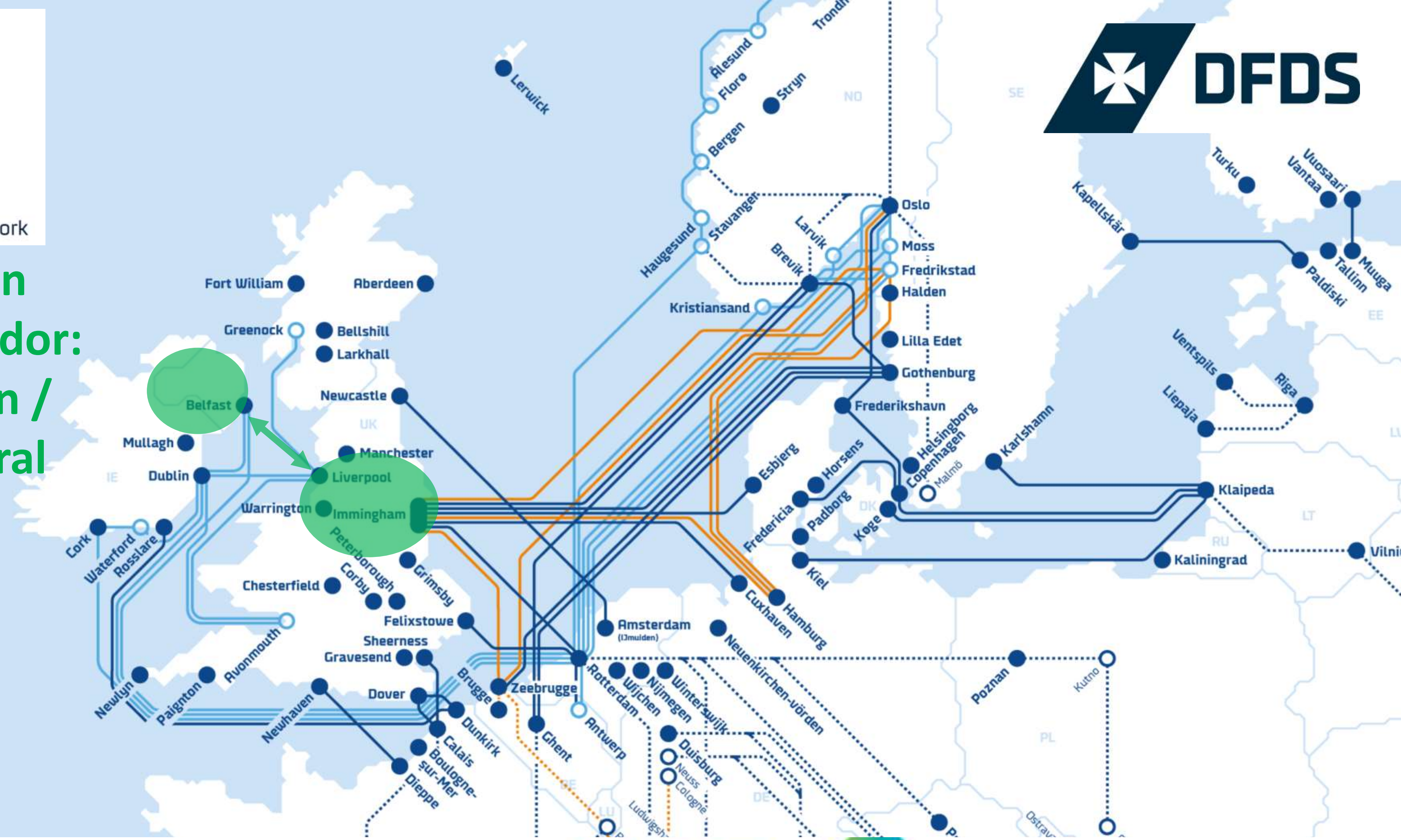
Ref: UK Government funded `NI/GB Green Shipping Corridor Feasibility Study and pre-deployment trials`

Providing an opportunity to contribute match funding and corporate investment.

David Surplus OBE
B9 Energy Storage Ltd
March 2024

- DFDS Locations
- Rail Hubs
- RoRo & RoPax Network
- RoRo & LoLo Network
- Pure LoLo Network
- Rail Connections
- DFDS Operated Rail Network

NI/GB Green Shipping Corridor: zero emission / carbon neutral



Early decarbonisation milestone of:

5% Scalable Zero Emission Fuel (SZEf) by 2030.

Scalable means: having the potential to be produced at the volumes necessary to meet a significant amount of global marine demand by 2050



All electric: Up
to 50NM



*Not Scalable due to
lack of green CO₂?*

Green Methanol:
>100NM

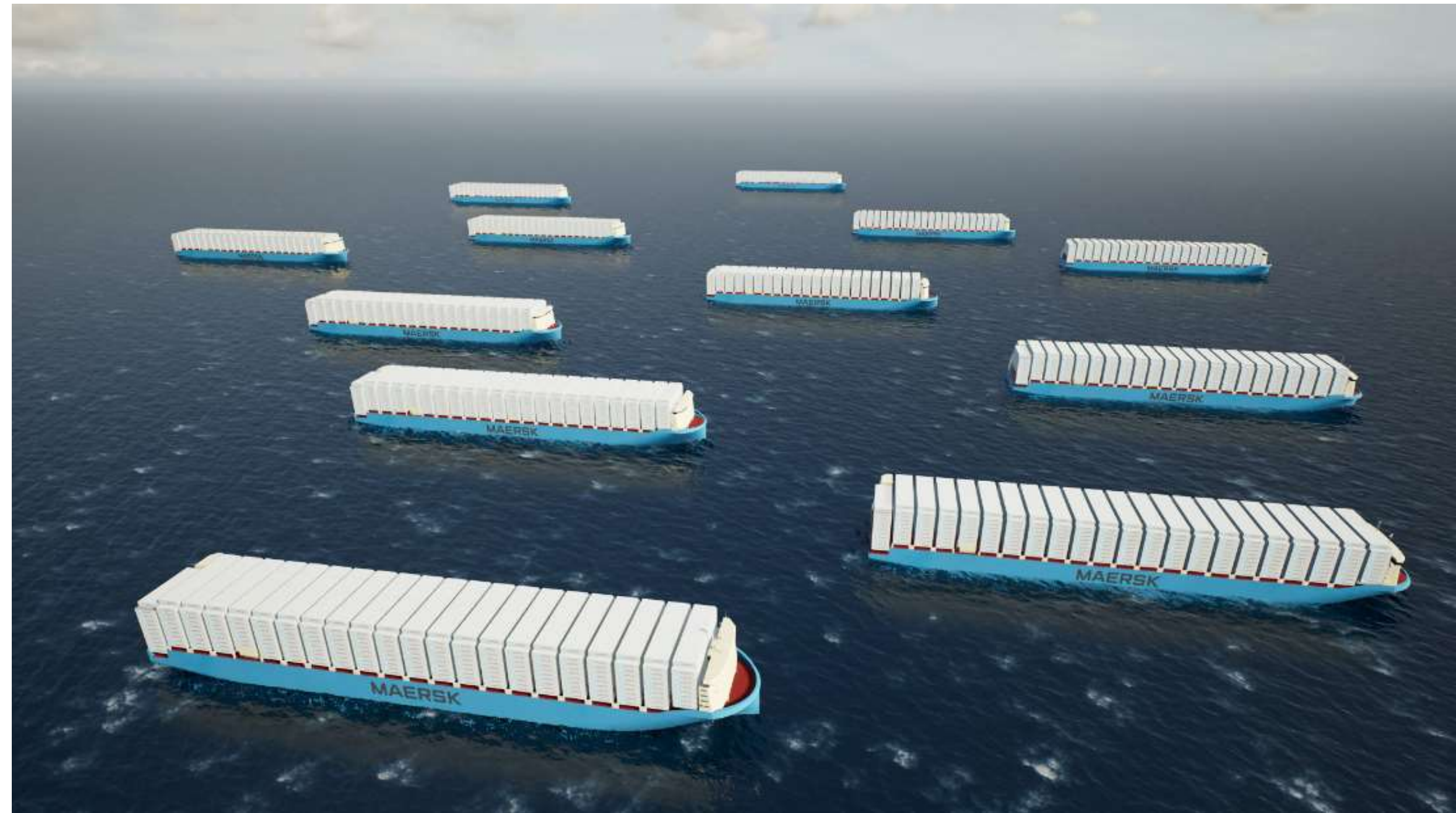


H₂ hybrid: 50
to 100NM

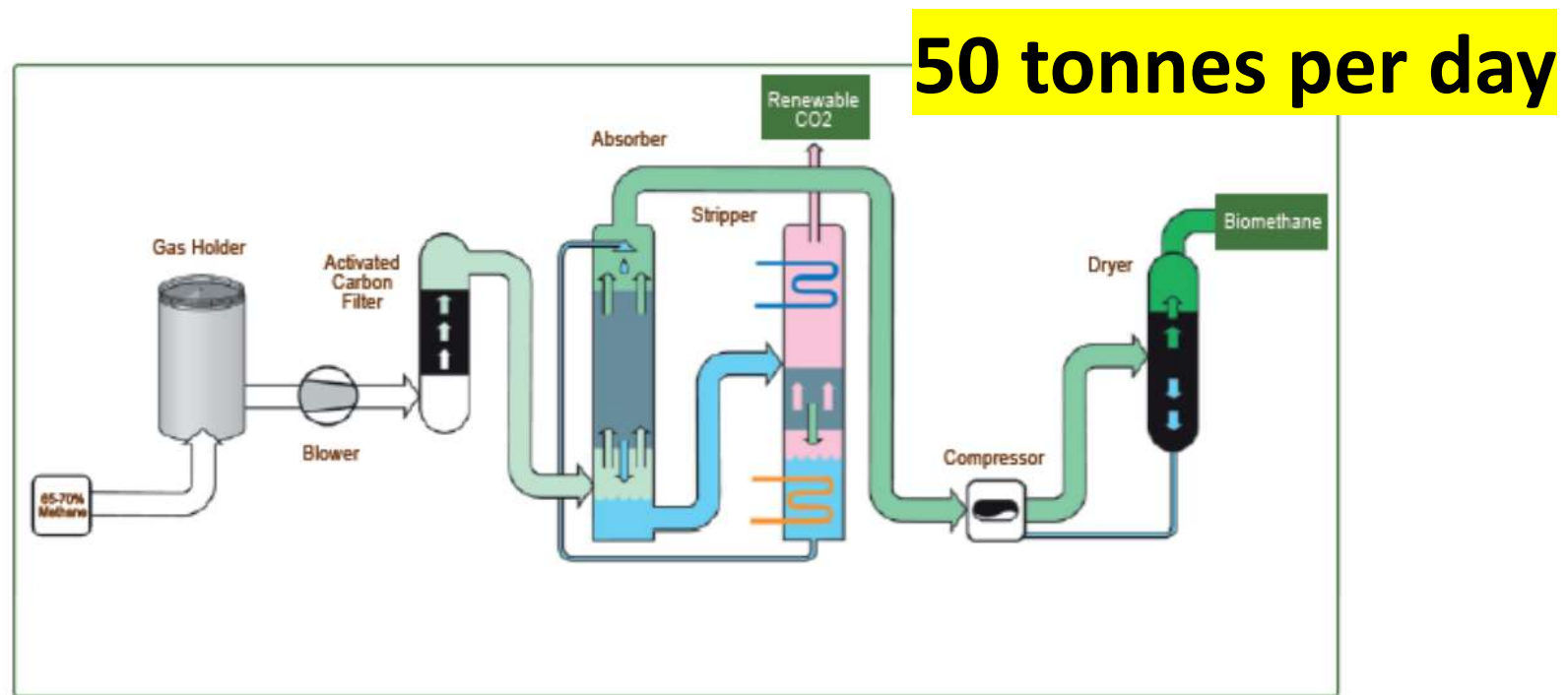


Green Ammonia:
intercontinental

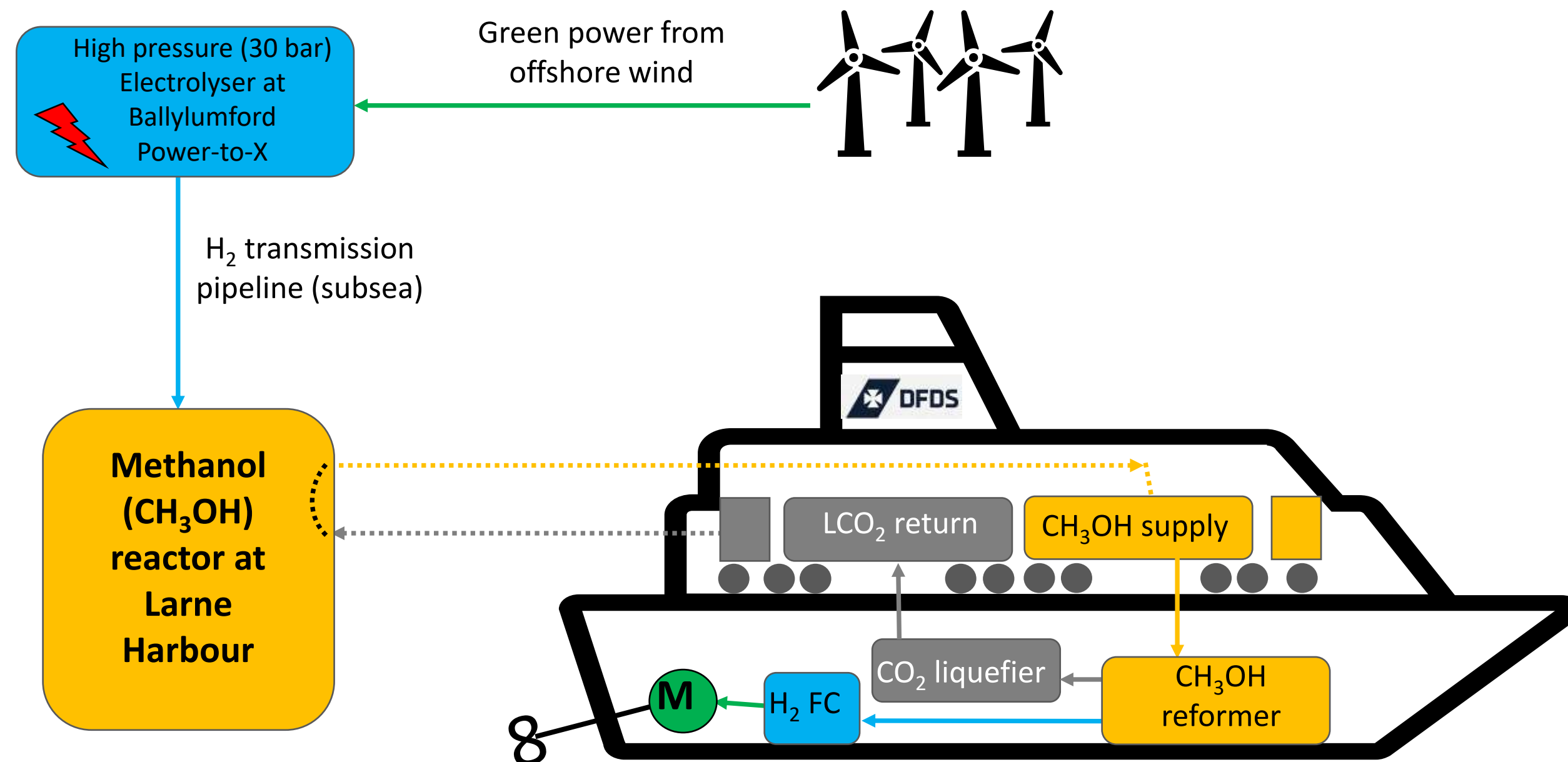
Green methanol demand growing rapidly



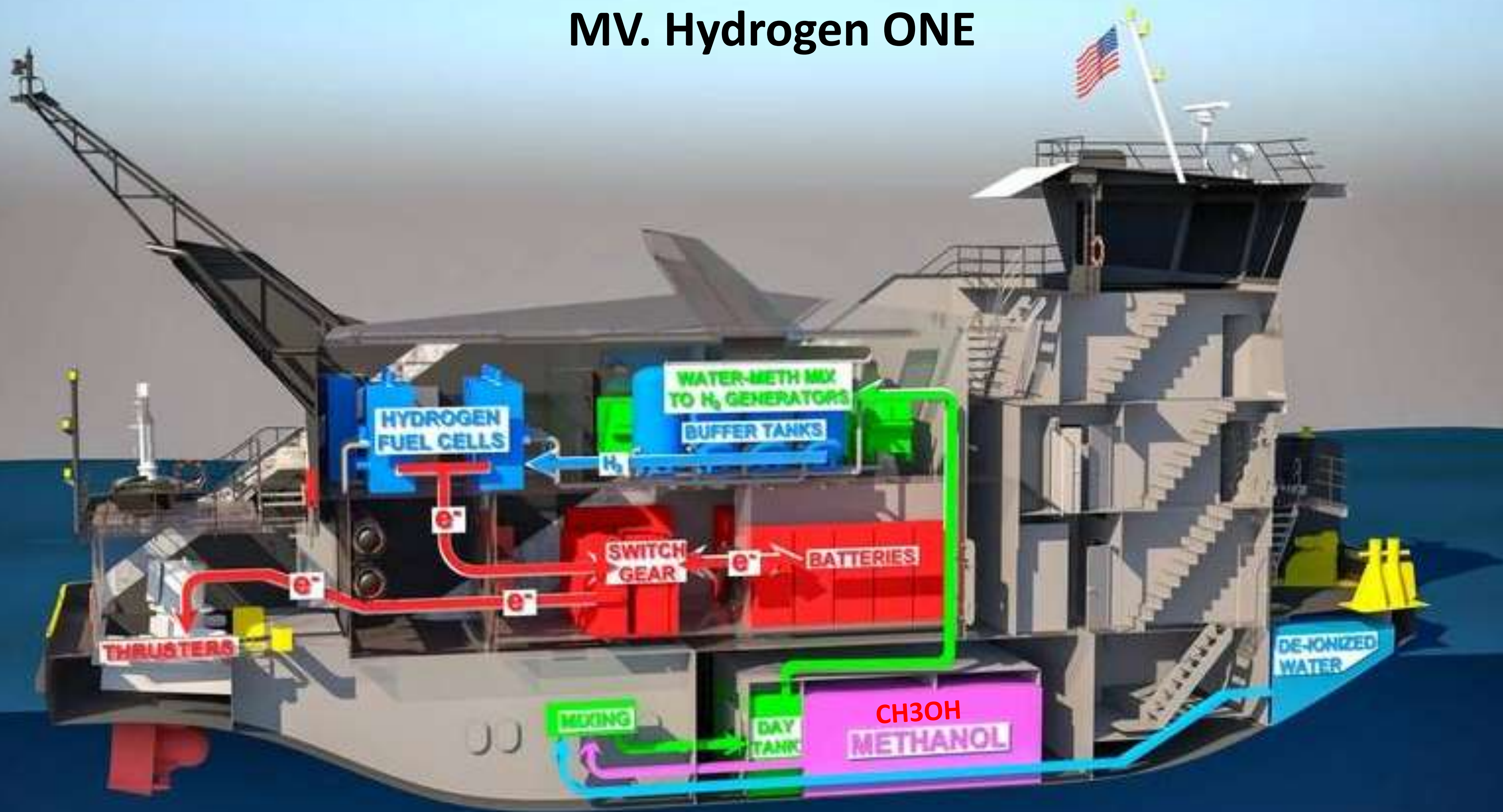
Sources of green CO2



Recirculation of CO₂: Patent Pending Process



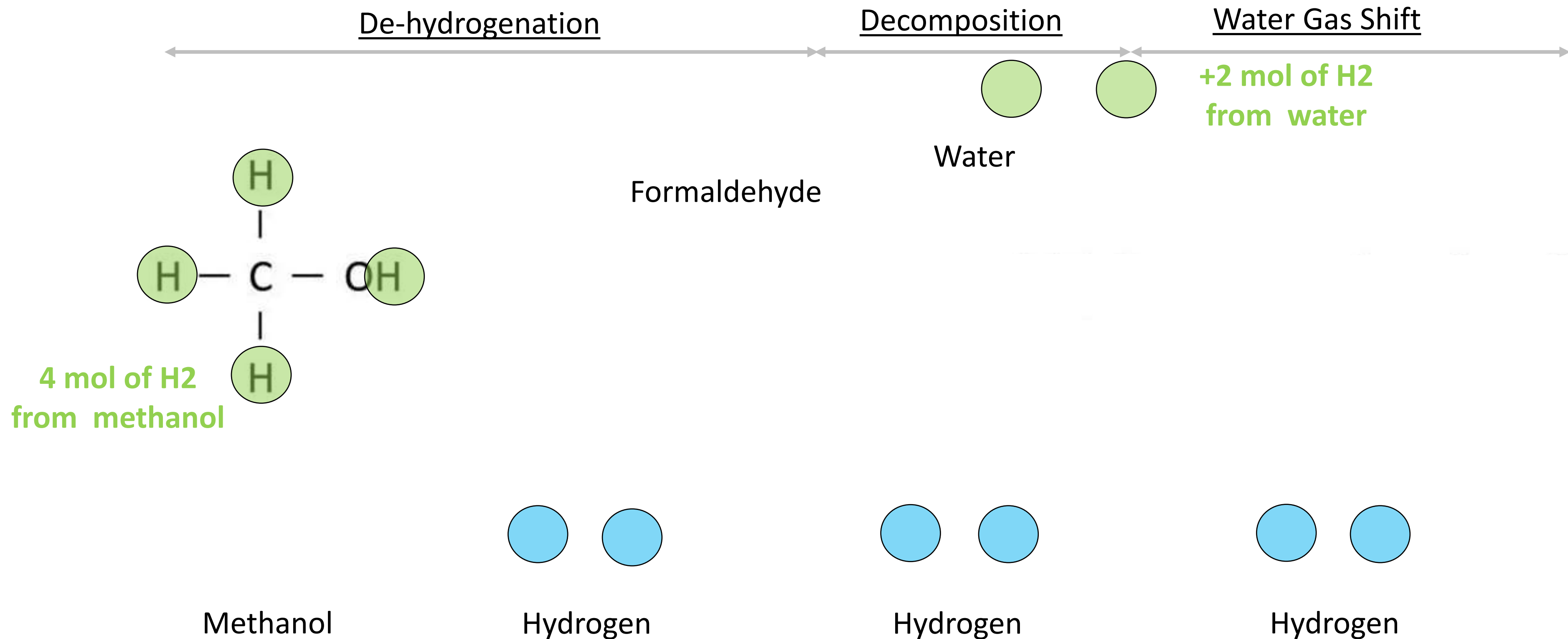
MV. Hydrogen ONE



Combined methanol reformer / H₂ fuel cell unit

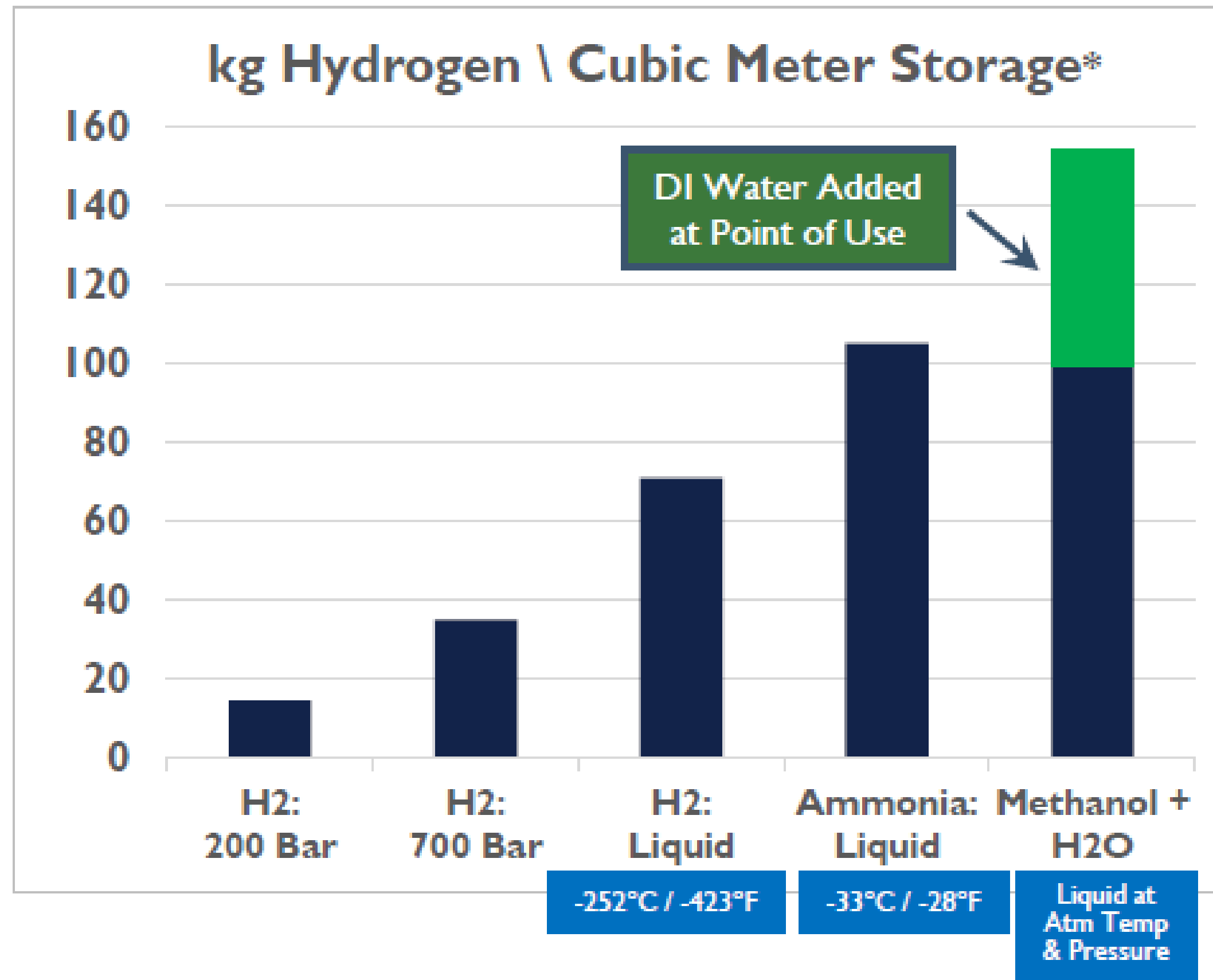


Methanol reforming + Water Gas Shift



Results in 6 mol of H₂ output

Energy Density





**Precedent set for truck-to-ship
bunker transfers with LNG fuel**

Early decarbonisation milestone of:

5% Scalable Zero Emission Fuel (SZEAF) by 2030.

Scalable means: having the potential to be produced at the volumes necessary to meet a significant amount of global marine demand by 2050



All electric: Up
to 50NM



*Scalable due to
recirculation of
green CO2*

Green Methanol:
>100NM



H2 hybrid: 50
to 100NM



Green Ammonia:
intercontinental

Next steps

- Seeking match funding for Innovate UK / Department for Transport ‘Clean Maritime Demonstration Competition’ round 4 grant:

	Total costs (£)	Funding level (%)	Funding (£)	Contribution to project (£)	Other public sector funding (£)
B9 ENERGY STORAGE LTD <small>Lead organisation</small>	1,807,902	70.00	1,265,531	542,371	0

- Green shipping corridor feasibility study: £128,452 Shipowners & ports
 - Pre-deployment trials: £413,918 OEMs
- Investment round for B9 Energy Storage Ltd.
 - Seeking £10m for 3-year expansion of project development team to 15 persons.
 - Power-to-X project development portfolio of circa 3.45GWe

**For more information contact:
d.surplus@b9energy.co.uk**



David Surplus OBE
B9 Energy Storage Ltd
March 2024

Paul Monaghan & Kevin Lunney

Mannok Holdings





Northern Ireland Collaborating to Enable Net Zero

17th to 22nd March 2023



Kevin Lunney
Operations Director

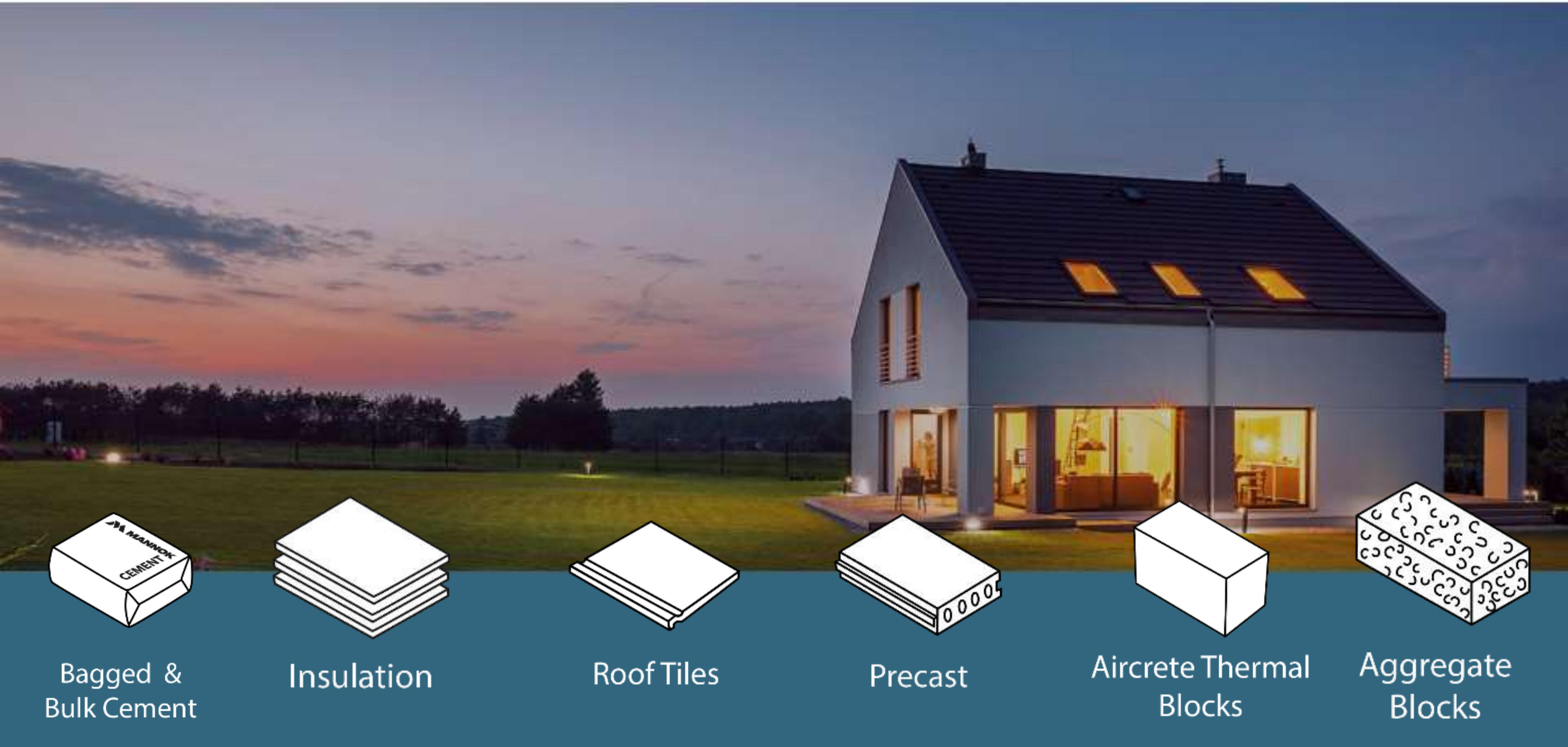




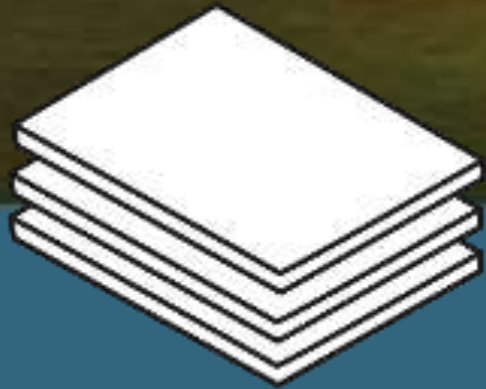




BUILDING FOR COMFORT



Bagged &
Bulk Cement



Insulation



Roof Tiles



Precast



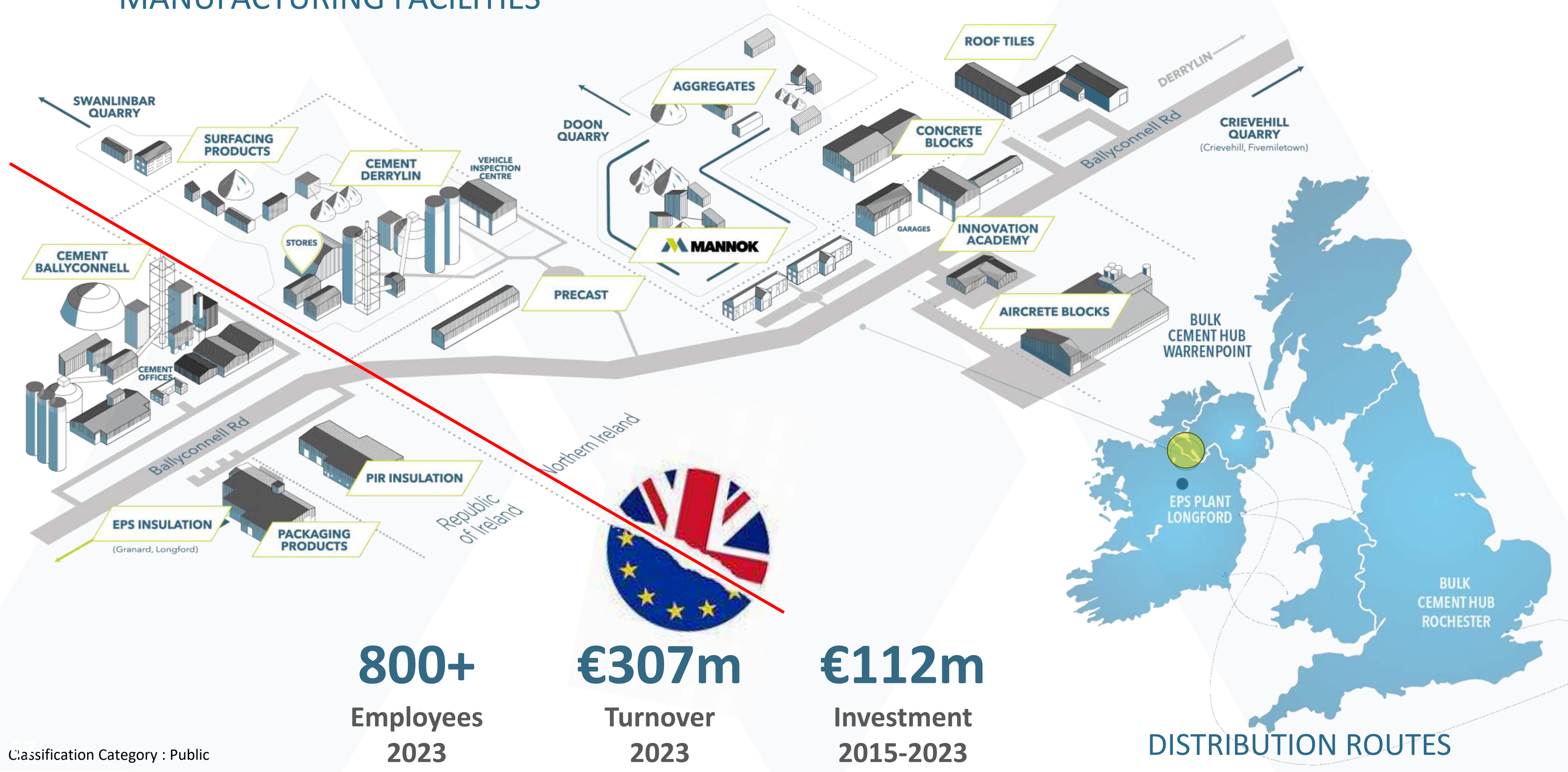
Aircrete Thermal
Blocks



Aggregate
Blocks

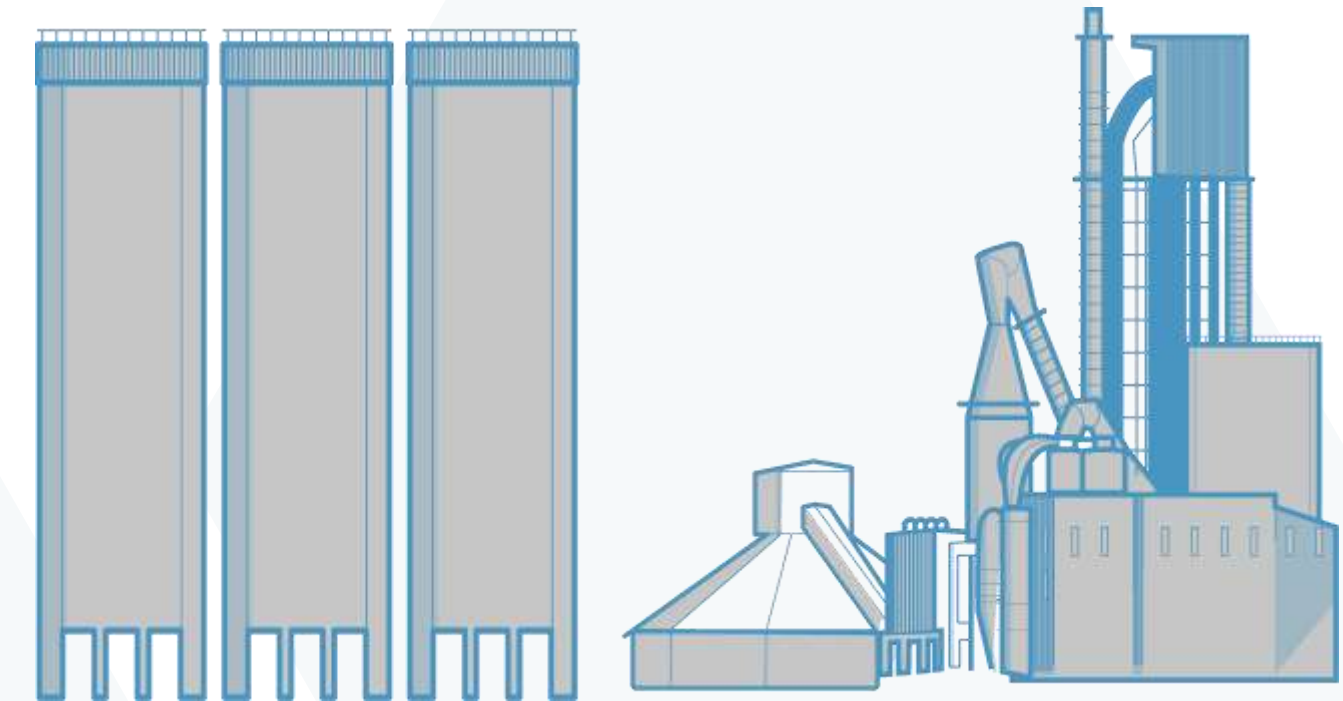
MANNOK

MANUFACTURING FACILITIES



CHALLENGES & OPPORTUNITIES

- Very Carbon Intensive Product Range
- Large HGV Fleet dependent on Road/ Diesel
- No rail network/ No gas connection
- Very congested Electricity Grid
- 100 miles to the sea by road (CCS)
- Irish Sea Crossing for 50% of business



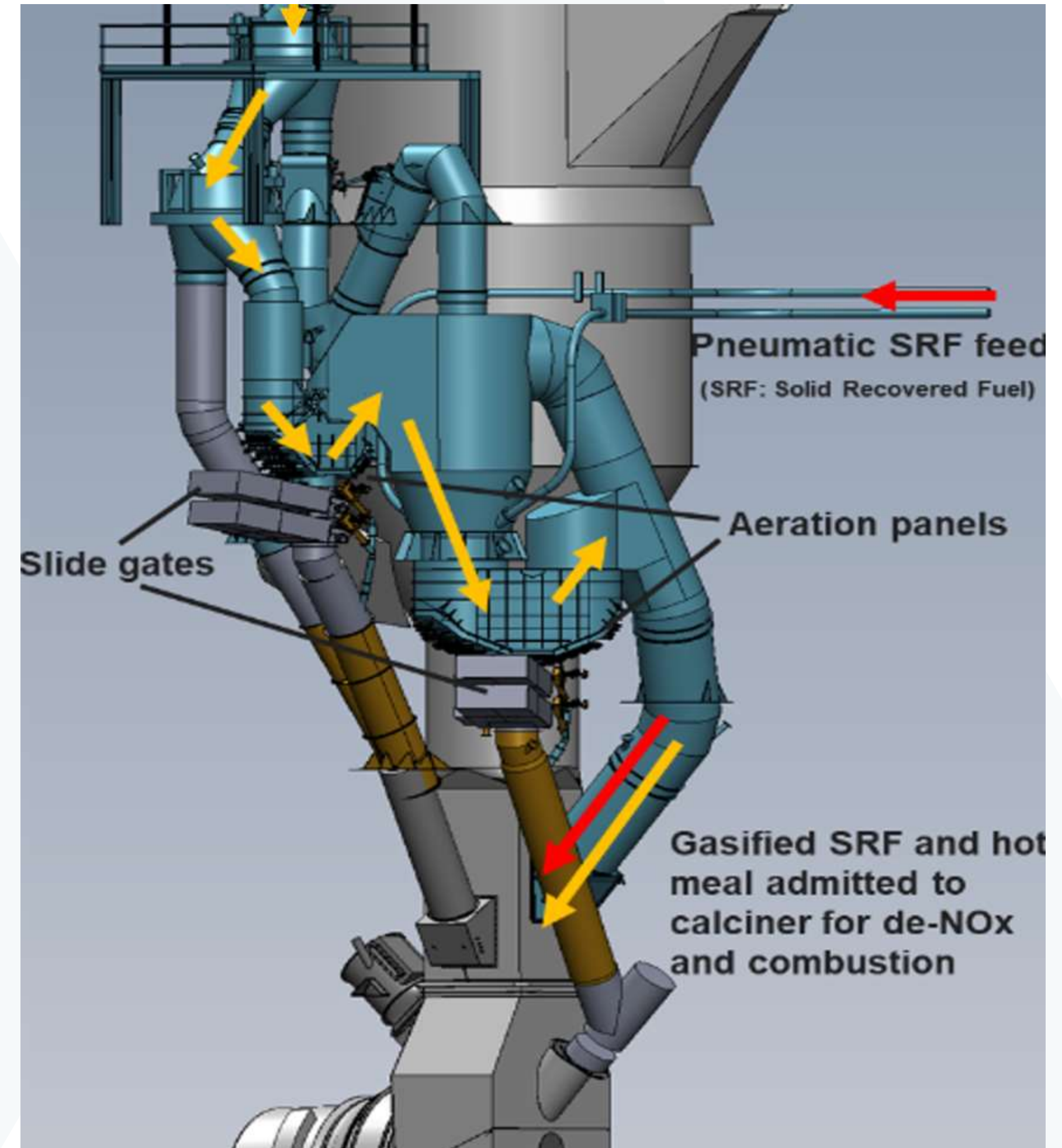
- Limestone & Raw Materials
- High Wind Yield Region
- Have well-developed strategy and plan to decarbonise
- Very competent and determined workforce
- Increasing interest from international partners/ academics/ research institutions to our ambitious Net Zero Plans

CEMENT INNOVATION

- Coal Removal
- Plant Electrification
- Waste to Energy
- Alternative Raw Materials
- Introduction of Hydrogen/ BioChar
- Carbon Capture and Mineralisation

FUELFLEX® Pyrolizer

World First
€12m/y savings annually
58,000t reduced CO₂/y
48,000 litres/y of Ammonia Water
NOx Reduction
Increased Potential for Waste to Energy





SITE VISIT BY SOUTH KOREAN DELEGATION – FUEL FLEX® LAUNCH



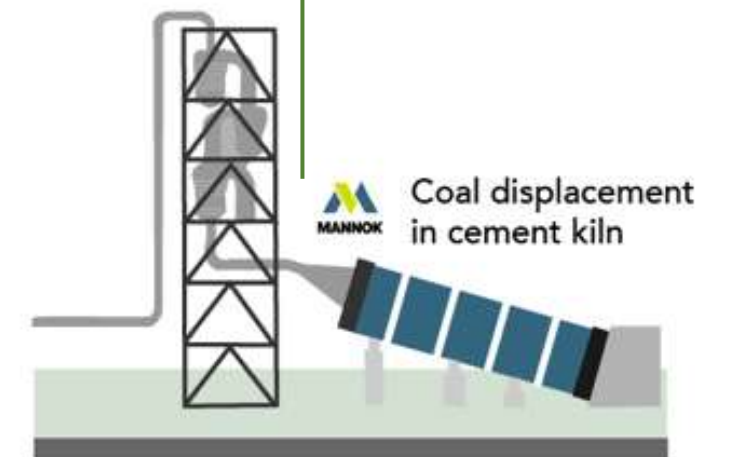
PHASE 1 - CURTAILED WIND TO H₂

Curtailed and Constrained energy from existing 54MW windfarm

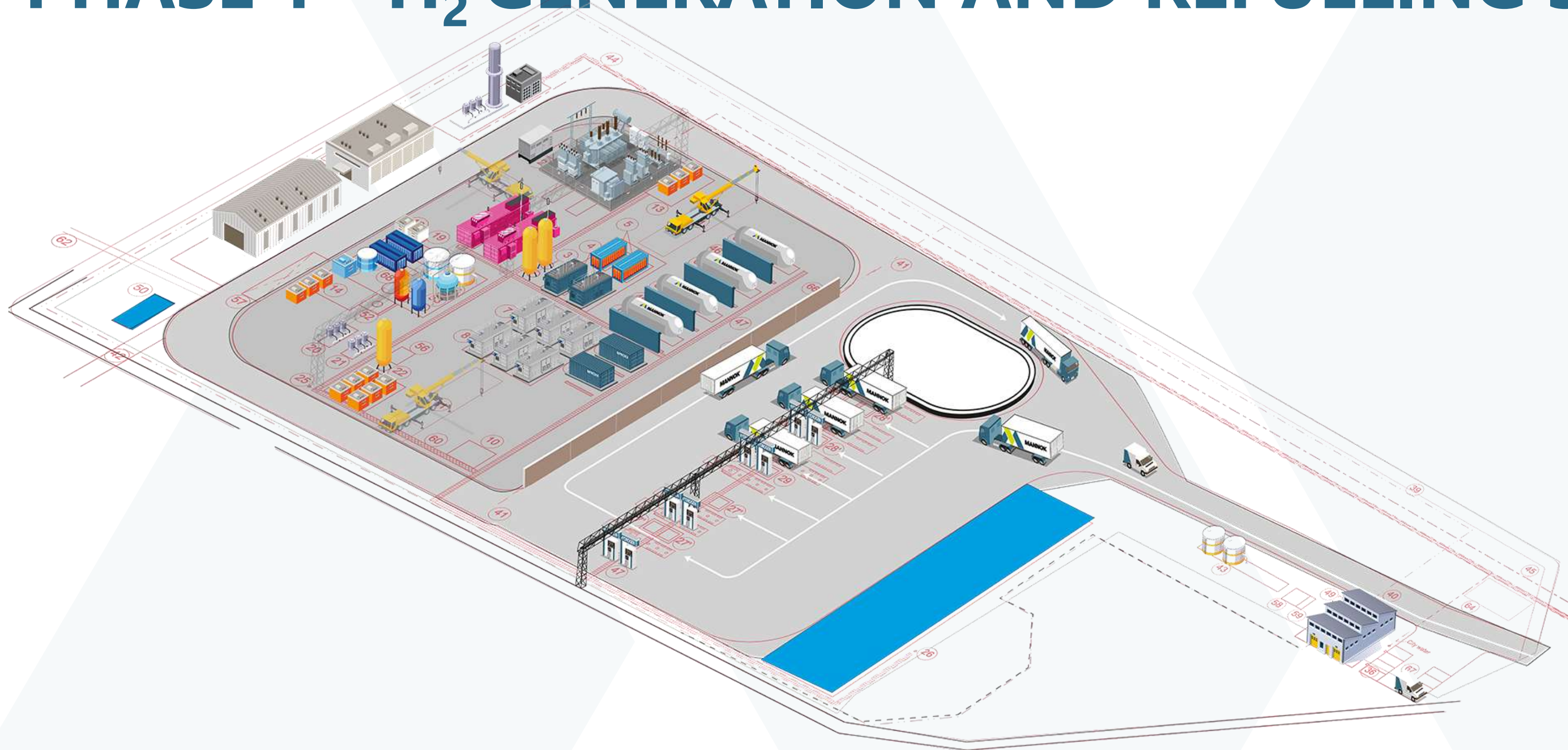
Used to generate large-scale green Hydrogen and Oxygen (Electrolytic Hydrogen Generation)

Hydrogen used in Mannok fleet of 200 vehicles and sold to other businesses

Oxygen used in new Oxy-fuel combustion process in Cement Plant: Improves efficiency and makes carbon capture easier



PHASE 1 - H₂ GENERATION AND REFUELING STATION



- Front End Engineering Design complete with tenders being negotiated
- Planning for Hydrogen production in 2026
- Examining many possible curtailed wind locations for similar future projects
- Significant step on an exciting journey to Net Zero



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NestWatch 1

Q&A:

Paul Monaghan & Kevin Lunney Mannok Holdings,
Stephen and Emmet Lagan, Lagan Energy Engineering