

Decarbonisation



Nadine McGurk

Business Development Executive, Invest NI

Roger Henderson

NI Electricity Networks





Invest NI Net Zero Exchange

Derek Hynes
Managing Director NIE Networks

Roger Henderson
Network Investment Director

Edel Creery
Head of Stakeholder Engagement

Who we are and what we do

NIEN

Owens Electricity
Networks

910k+
Customers

**NIE
Networks**

2500

Employees &
Contractors

£150m

Local Economy
Annually

NIE Networks

A critical gateway
to Net Zero

Challenges and how we are addressing them

01 Capacity

02 Reliability/
Resilience

03 Access

01 Capacity



02 Reliability/ Resilience

03 Access

Decarbonisation

What we can deliver

Environmental, social and economic benefits

Create new skills and businesses

Drive innovation and new technologies

Deliver net zero

Richard Paul & David Moore

GES



GES Group
Providing The Best Solutions

Path to Net Zero

David Moore – CEO
Richard Paul - CTO



Energy Crises to Sustainable Green Growth

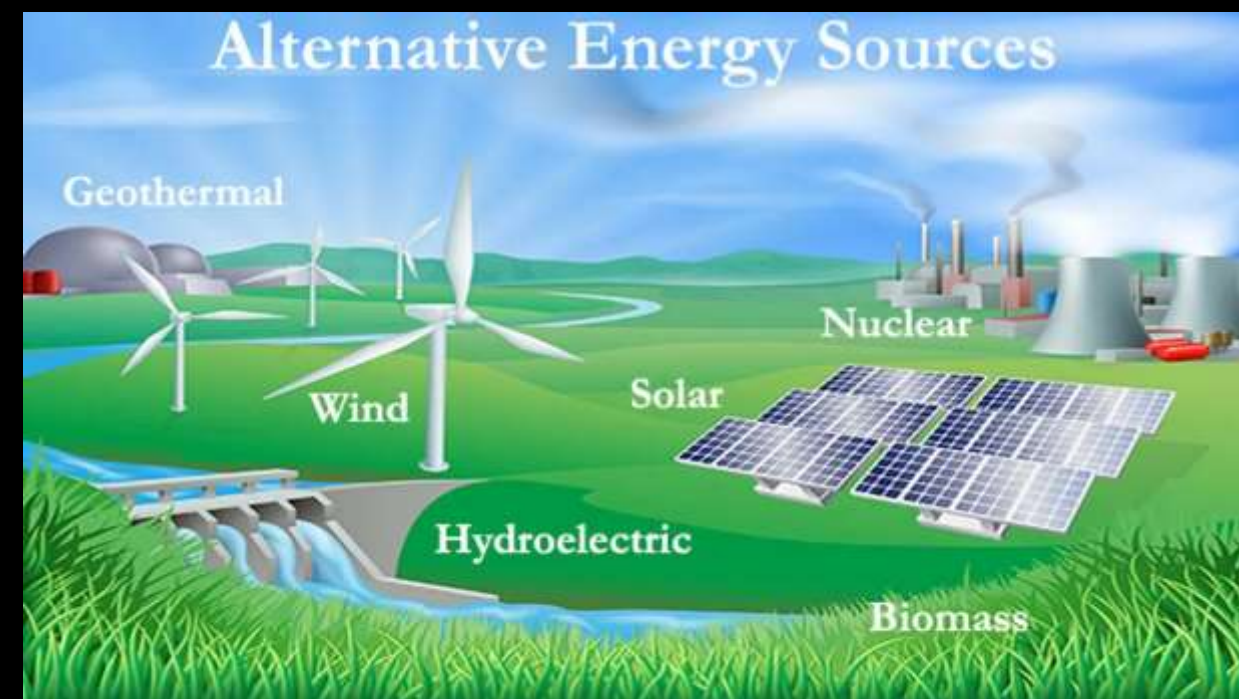
Expensive Gas &
Coal
Fossil Fuels



S - Natural Gas
M - Coal / Gas



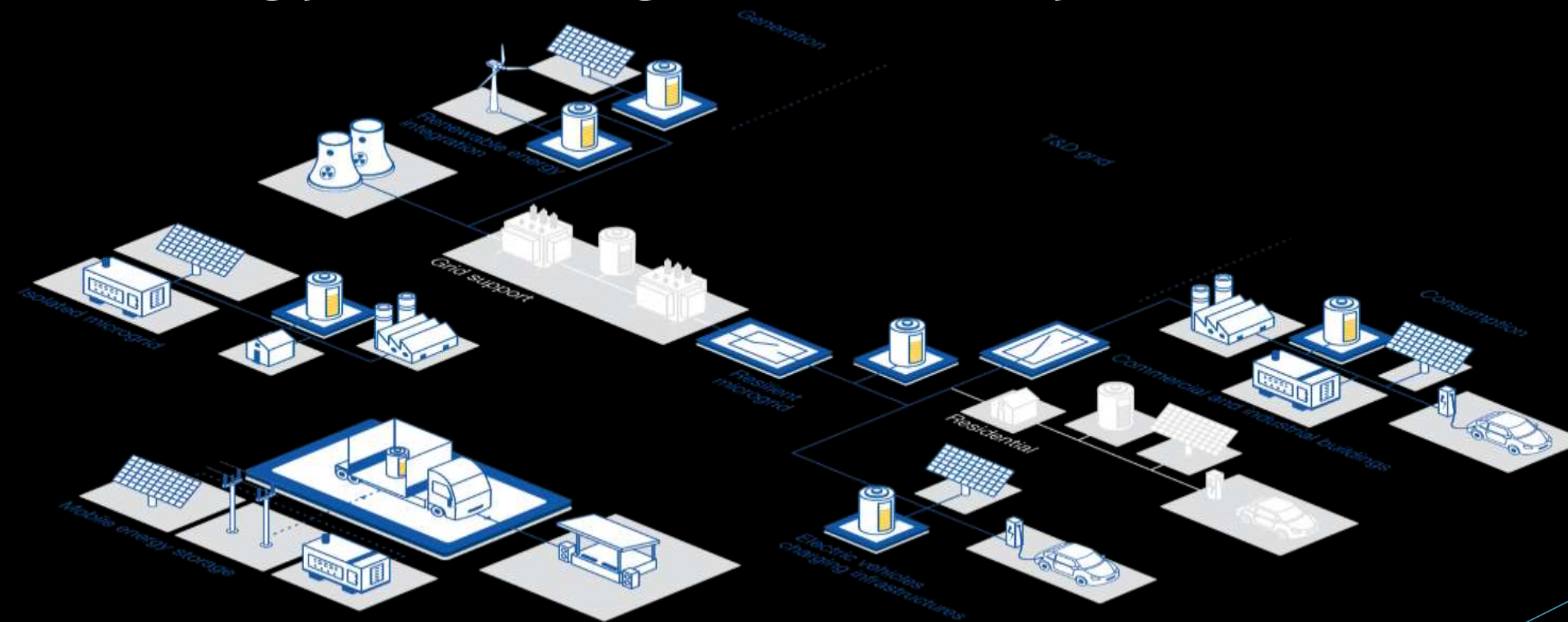
Decarbonisation & Electrification to Net Zero



Clean Tech Solutions

Wind Optimisation

Integration of Technologies to a Smart Grid with an Energy Management System



Challenges

- Fiscal challenges and Cost fears
- Attitudes & Planning
- Consumer Needs
- Infrastructure Suitability
- Curtailments
- Reinforcement Requirements



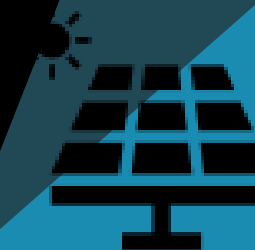
Solutions

- Clean Tech Engineering
- Replicated
- Sustainability
- Protection of Humanity
- Development of Green Economy



How to Deliver Net Zero

- 80% Renewable Energy by 2030
- Collaborate
- Create Policy
- Academia



Eddie McGoldrick

The Electric Storage Company



The Electric Storage Company

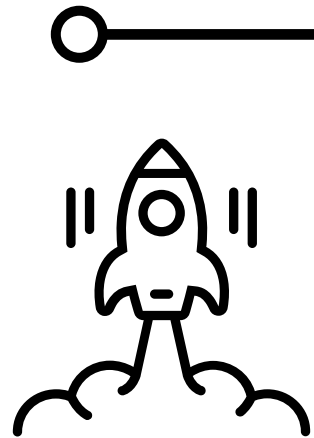
Enabling the energy revolution through data.

Strategic Partner with £10m+ (and customer pipeline) to bring Cheaper, Smarter, Greener electricity to wider EU and US markets



Our Story.

2017



Lift off!

The Electric Storage Company is born.
2 Co-Founders

2020



Project Girona

Our first Residential Smart Grid project.
PARIS is born.

2022



Team Grows

Team expands to 15. PARIS adds AI and market services.
Strategic Investor brings £5m and pipeline of clients

2023



Clients

Residential and commercial clients in Ireland and UK.

2024



Turn to the East

TESC expands to Europe.

Now Go West ?

What makes us different.



Our Experience.



Grids, software
and data science.

Passionate and
innovative team



Our Approach.

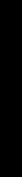


Data first, hardware
agnostic approach.

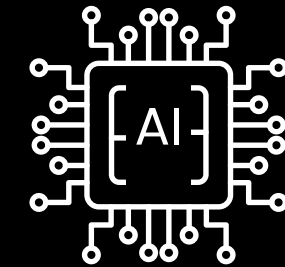
Maximum savings
for customers.



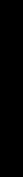
Our Partners.



Long term
relationships with
imaginative
partners.



Our Platform.



“We will always
have PARIS”

PARIS.

Predictive Analytical Renewables Integration System

Step 1 – Data Analysis for Predictability

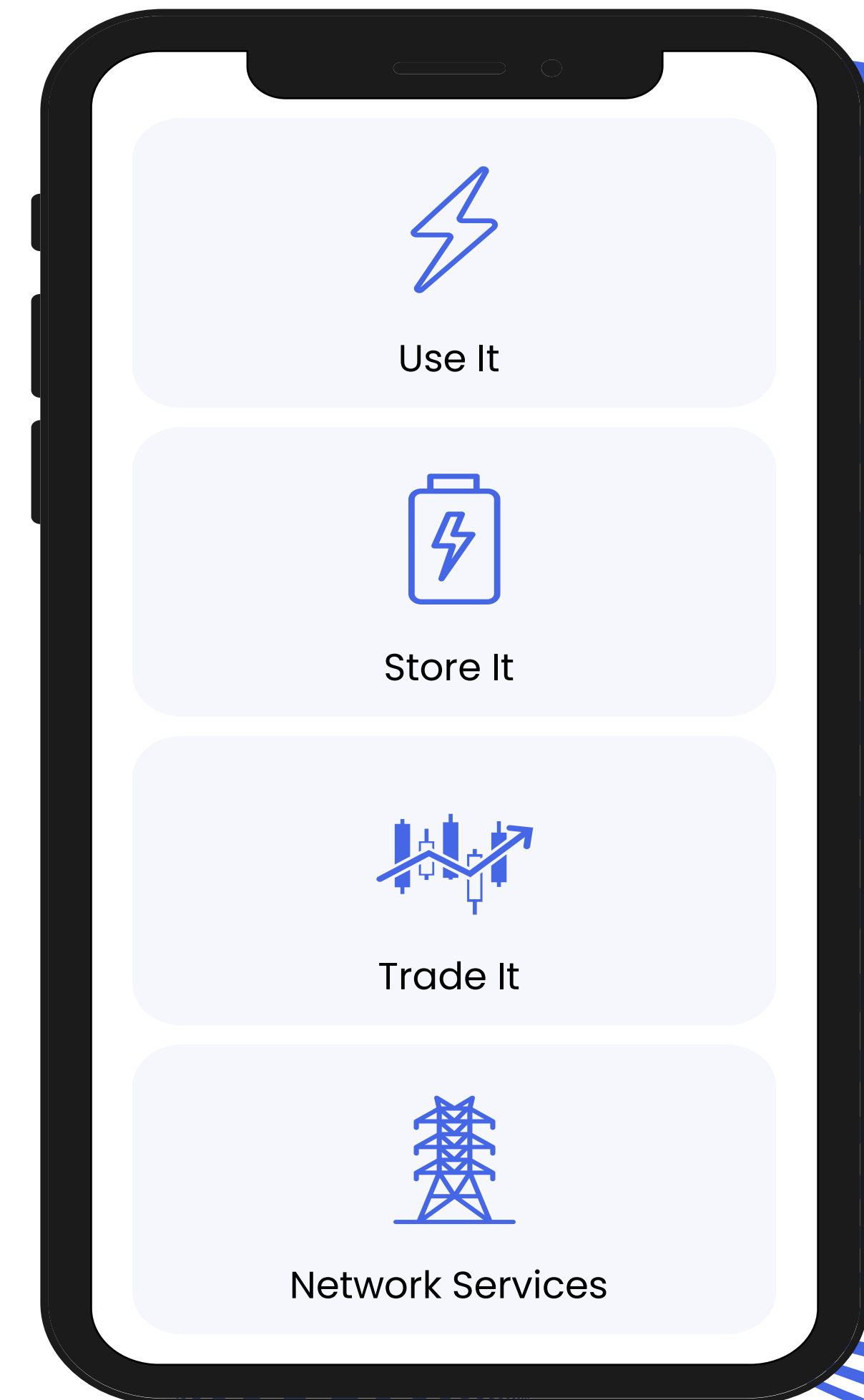
PARIS our IP (Designed, Developed and Owned by TESC)

Advanced data analytics and algos

Electricity consumption, renewable energy generation , market and weather forecast data, tariffs and grid constraints on each site

Step 2 – Optimisation for Flexibility

PARIS makes one of 4 decisions and implements for you –
driving cost savings,
reducing CO2 and
new additional revenue streams from self generation.



What we are looking for.

PARIS.

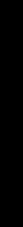
Market Expansion



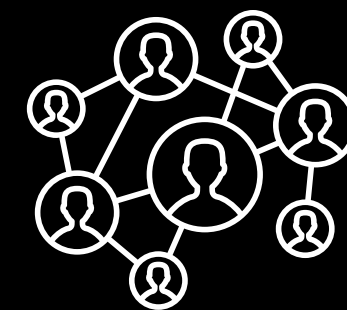
Get ahead of the competition by 'white labelling' our PARIS platform.



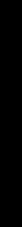
Imaginative Partner



A partner who wants to reduce costs, carbon and complexity for their customers.



Well Connected



We want a partner for our transition into the wider European market and US markets.

Stephen Lagan

Lagan Energy Engineering



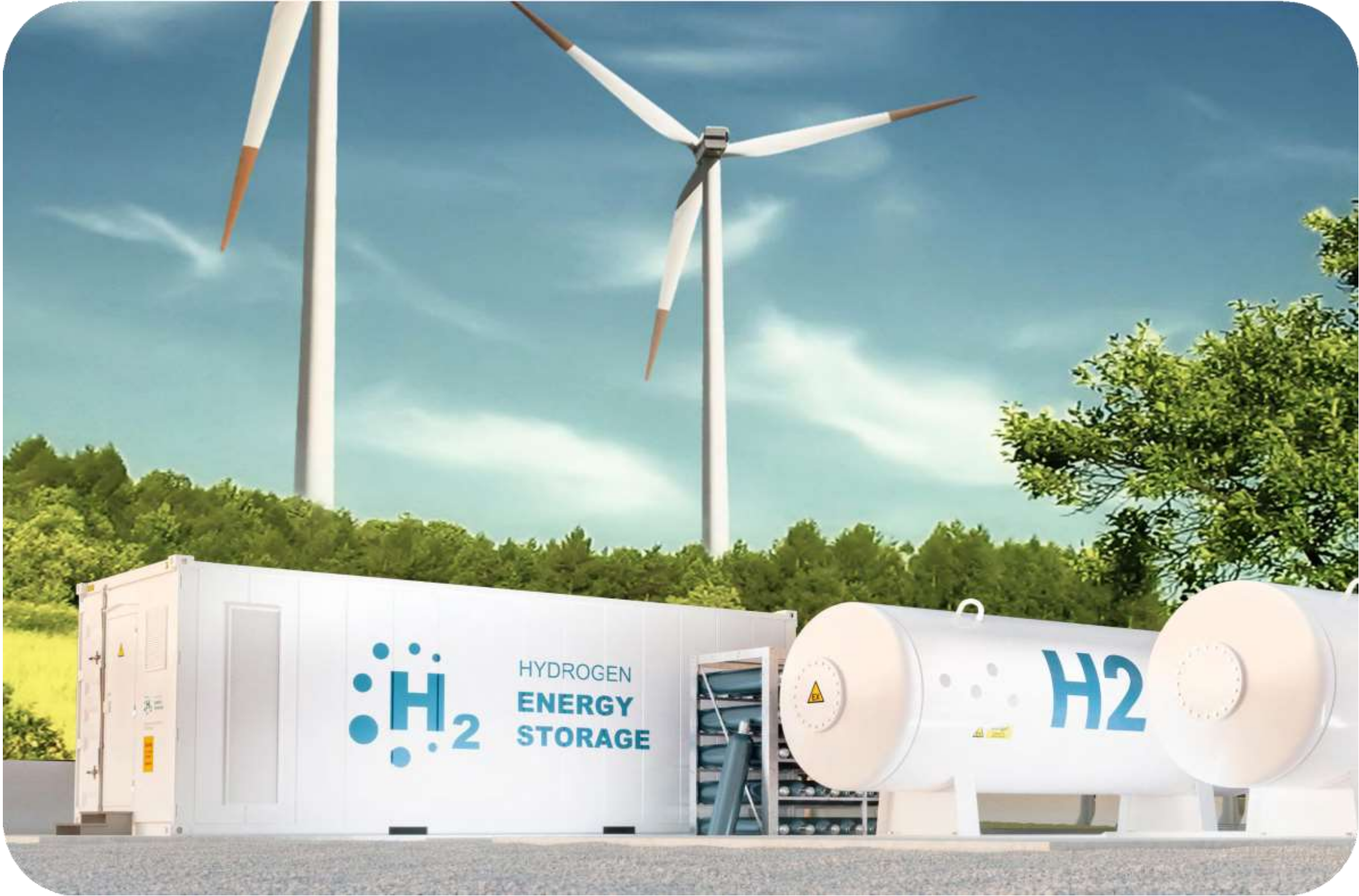


Integration of Low Carbon Solutions

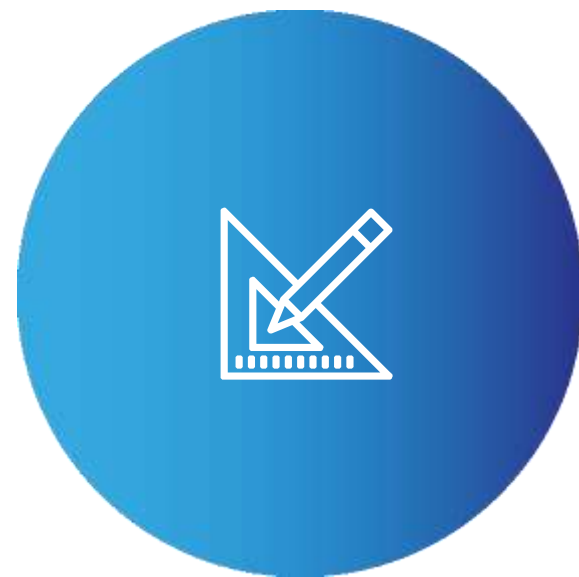
Stephen Lagan Operation Director

laganenergyeng.com

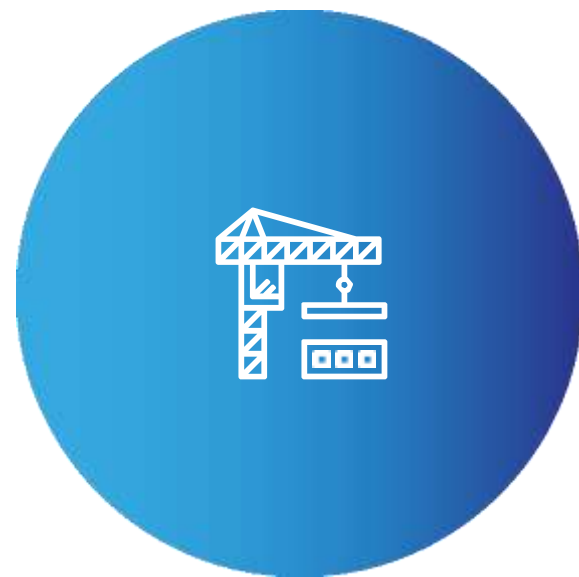
Your Partner in Energy and Beyond



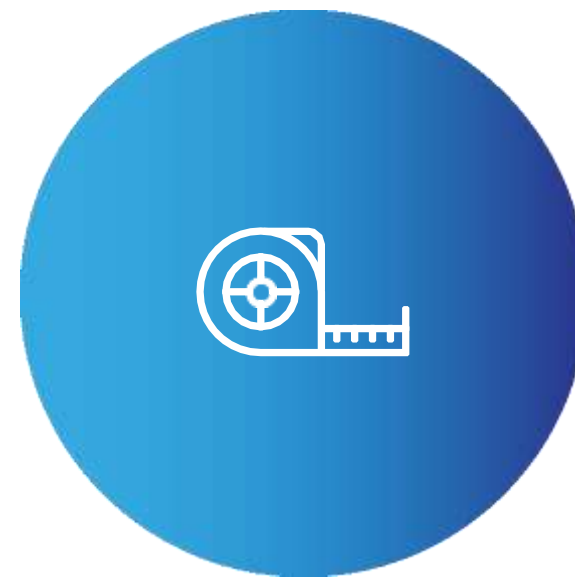
Our Service Offering



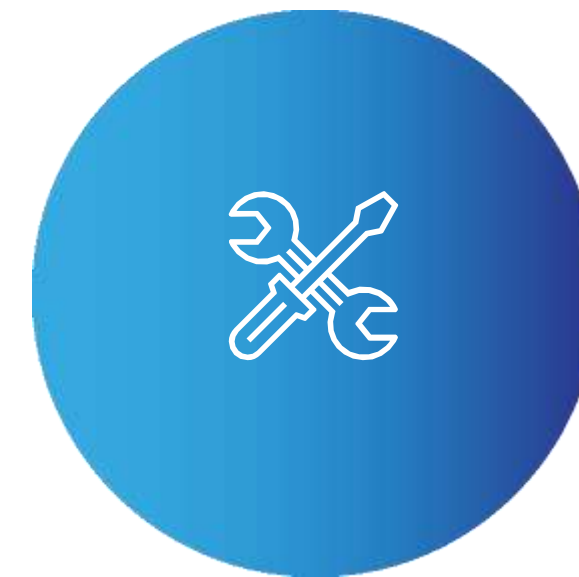
Design your
solution



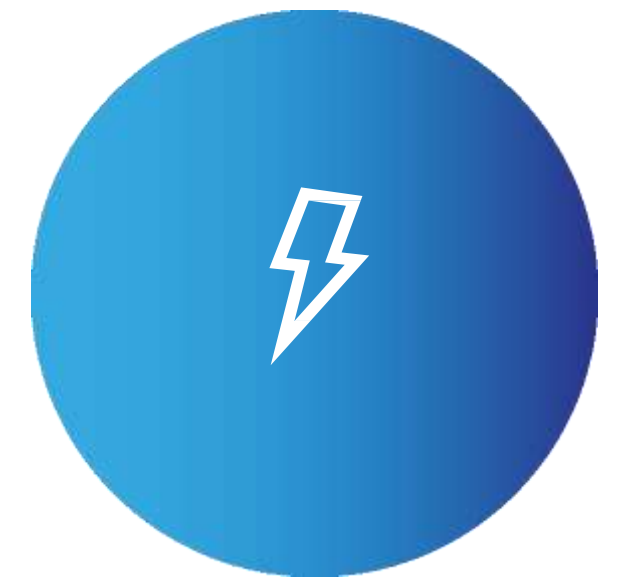
Construct
your project



Commission
your system

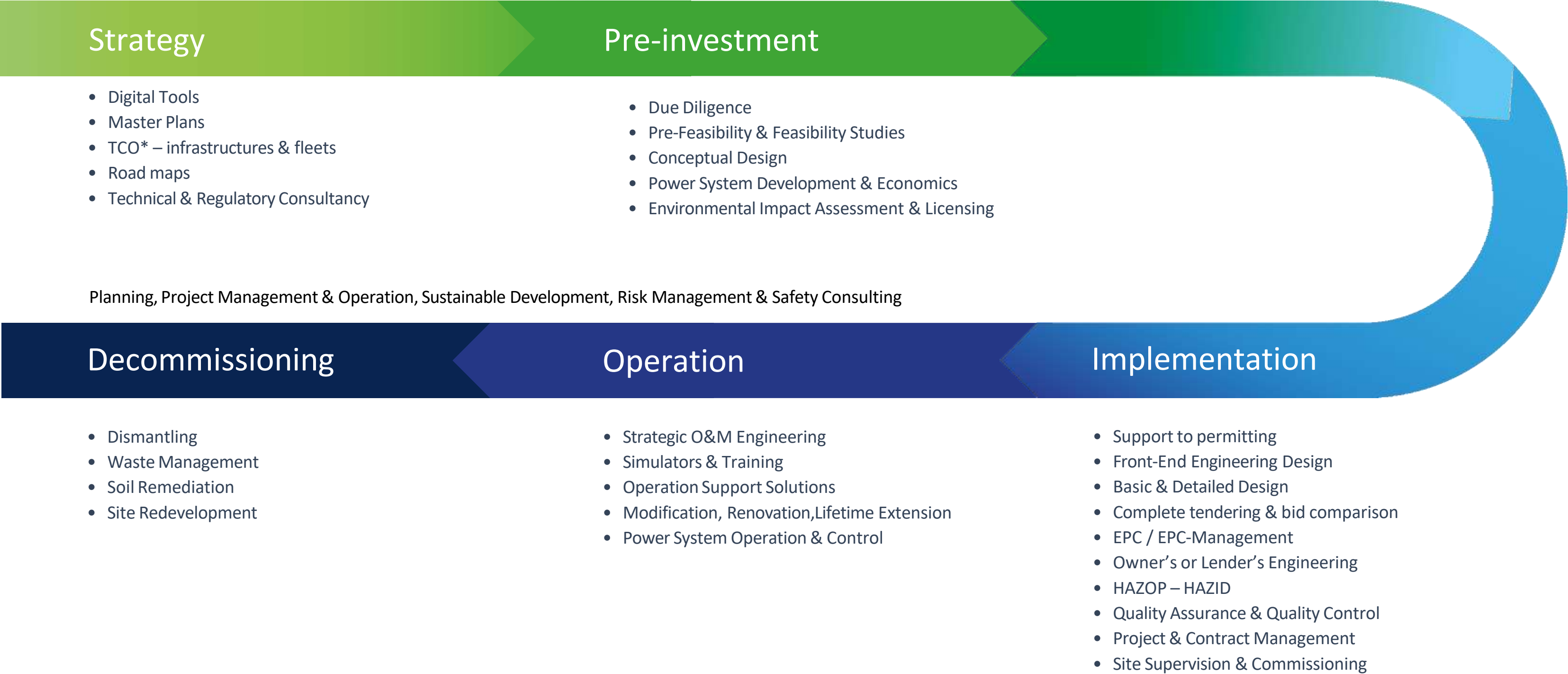


Maintain
your assets



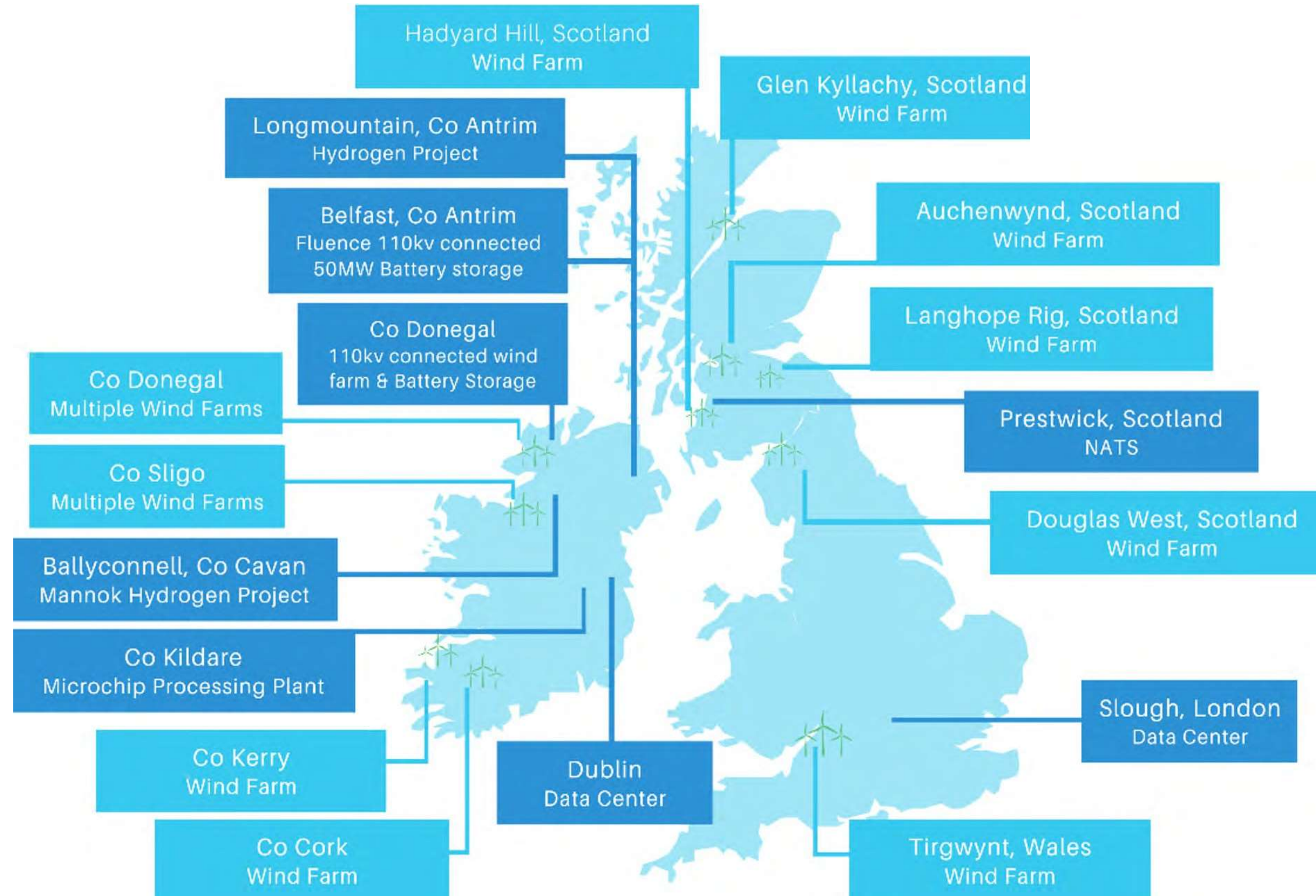
Operate
your system

Offering you an A-Z value proposition

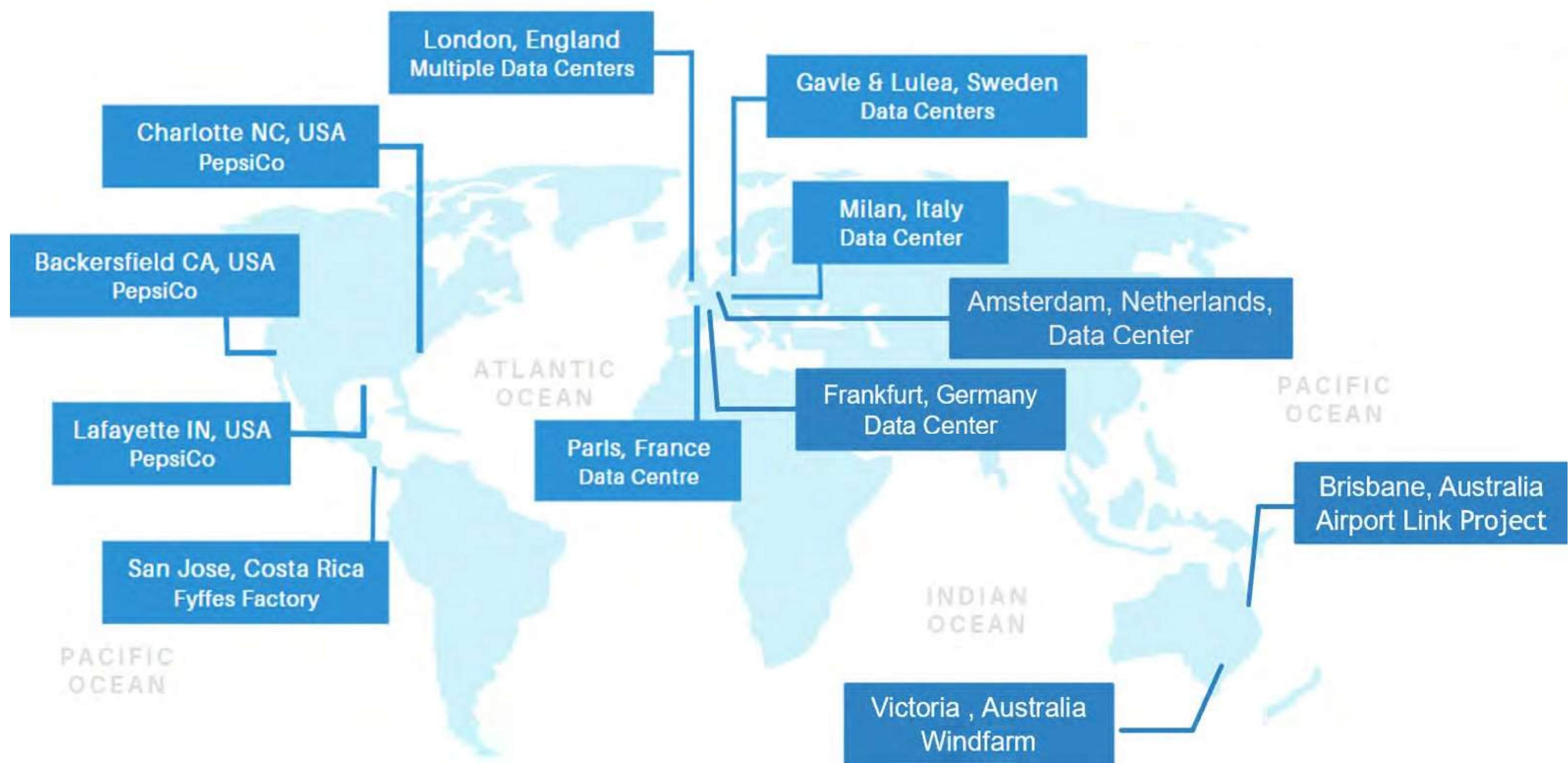


*TCO : Total Cost of Ownership

Ireland & UK Locations



Lagan Energy Global Geographic Footprint



Longmountain Hydrogen Project

Longmountain Wind Farm hydrogen project is a first of its kind in the UK and Ireland for green hydrogen production at large scale wind generation.

CLIENT	Energia Renewables
LOCATION	Northern Ireland
PERIOD	2019 – 2022
CAPACITY	1 MW electrolyser Design and Build
SERVICES PROVIDED	<div><div>Design and Build</div><ul style="list-style-type: none">• Principal Contractor for the design and build of the Civil and Electrical BOP including SCADA and GCC• Ensure grid code compliance once final install complete.• Assist client with compiling employers' requirements for tender.• Participate in HAZZOP and HAZZID meetings to achieve full compliance for operational phase.• Execution of all electrical studies to include, harmonics, load flow, short circuit,• Maintain responsibility of CDM regulation on site.• Fully comprehensive handover file.• ATEX zone competent persons - Compex</div>



Construct your project

CASE STUDY

Construction of 110kV 45MW Wind Farm:

- Installation / craneage of 110kV / 33kV 100MVA transformer.
- Assembly of 110kV / 33kV transformer in conjunction with manufacture commissioning engineer
- Installation of all 110kV assets (including steel work): 110kV CT's, VT's, CVT's, 110kV pantograph disconnectors & associated earth switches, 110kV circuit breaker
- Installation of 33kV 7-panel switch board.
- Completion of all 33kV cable jointing activities: 156x joints.
- Installation of all HV equipment control cabling and SCADA communication cabling.
- Installation of substation LV general services.

Thank you



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David Surplus

B9 Energy Solutions



B9 Power-to-X Projects in Northern Ireland



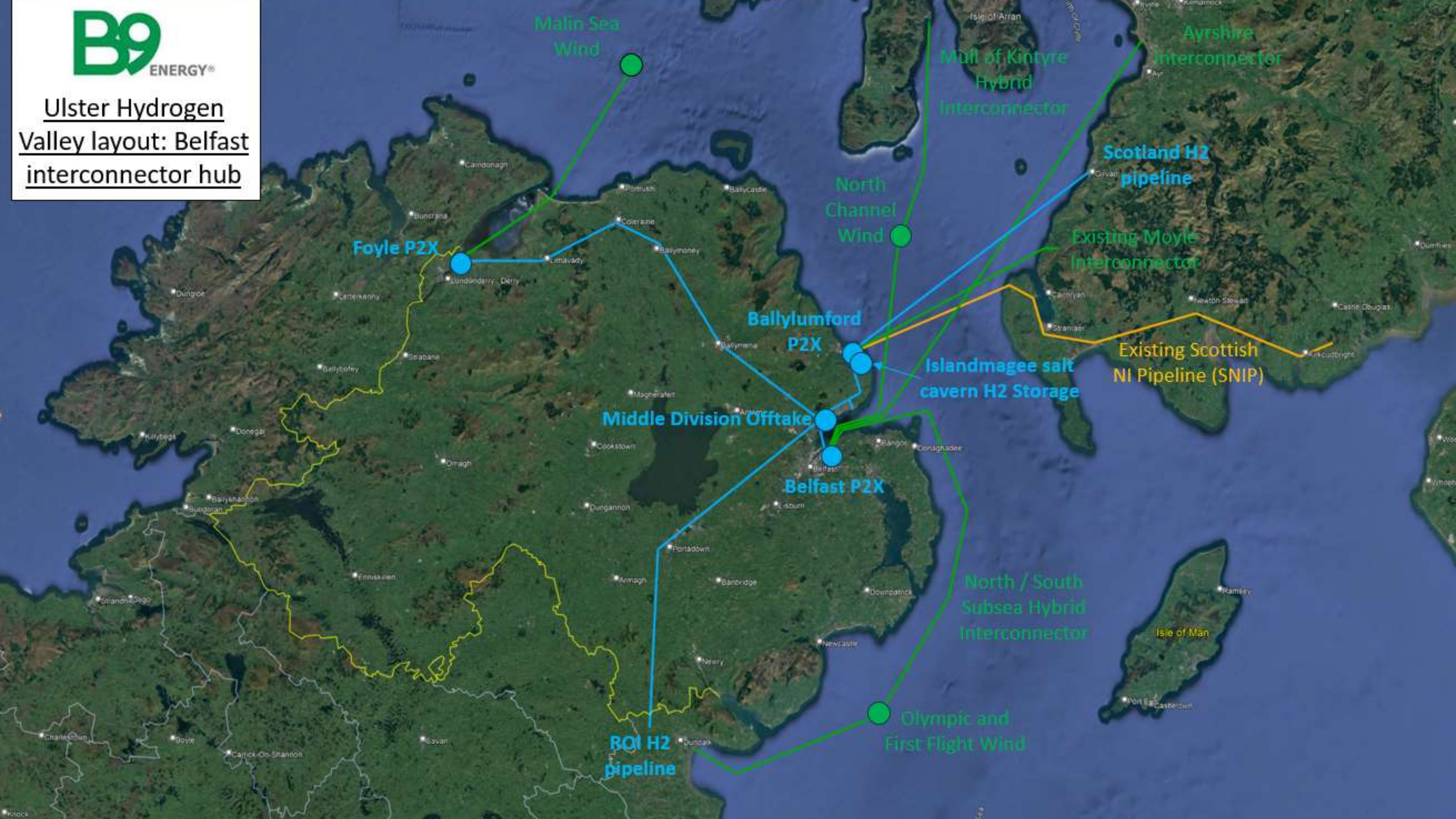
Ref: 3.45 GWe Ulster Hydrogen Valley

**Providing enabling infrastructure to support offshore wind, security of electricity supply,
and decarbonisation of heat, power and transport.**

David Surplus OBE
B9 Energy Storage Ltd
March 2024



Ulster Hydrogen
Valley layout: Belfast
interconnector hub



Kevin Lunney

Mannok





NI Net Zero Exchange - Decarbonisation

17th to 22nd March 2023



Kevin Lunney
Director of Operations



*“ We have a moral and ethical obligation to do everything in our power and sphere of influence to off-set the worst effects of the three global crisis we are all facing;
Climate Change, Biodiversity Loss and the Pollution Of Our Environment. ”*



Liam McCaffrey | Chief Executive Officer



PILLARS OF SUSTAINABILITY

PEOPLE

PEOPLE DEVELOPMENT
WORK LIFE BALANCE

TOP PRIORITY

WELLBEING
FULFILLING WORK

SAFETY

PROFESSIONAL
PROGRESSION



PROTECT
BIODIVERSITY

REDUCE EMISSIONS

DECARBONISE

RESPONSIBLE USE OF
LIMITED RESOURCES

CIRCULAR ECONOMY

PLANET



LOCAL
COMMUNITY

PARTNERSHIPS

EDUCATION

SOCIO-ECONOMICS

CULTURAL HERITAGE

REGIONAL

PROSPERITY



PARTNERS



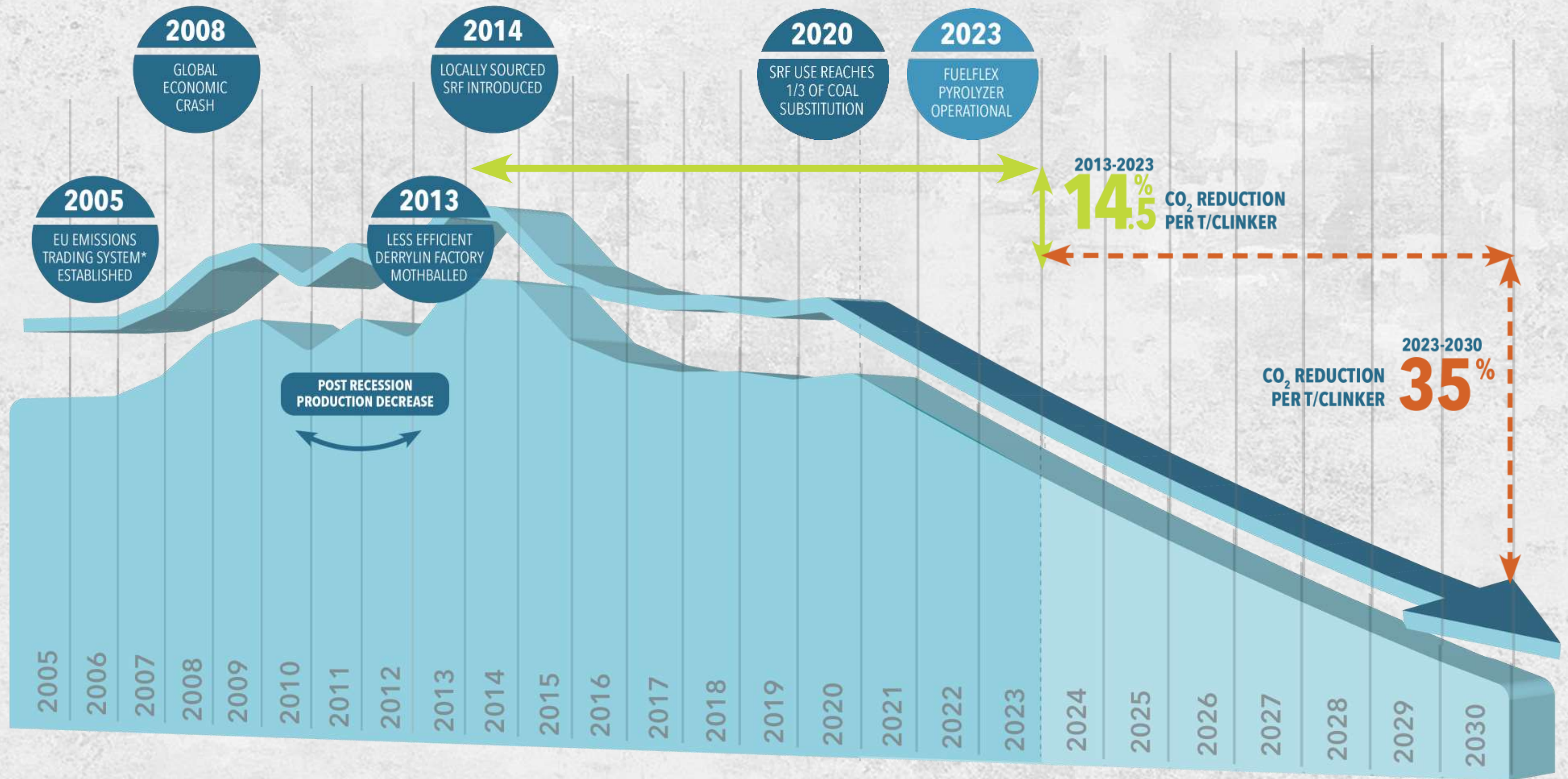
SUSTAINABLE
DEVELOPMENT
GOALS

Adopting

7

Principal

Goals



EMISSIONS REDUCTION TO 2030

By 2030 we aim to reduce our overall Scope 1 and 2 emissions by 35% compared to 2020 levels. To achieve this, ten key projects are already underway. This includes research and development opportunities, innovation and new technology deployment focusing on lower carbon materials, products and engineering solutions. A further target for cement production is a commitment to reduce our carbon intensity to < 550 kgCO₂ per tonne of cementitious material by 2030.

PROJECT	GREEN HYDROGEN (KILN)
PROJECTED CARBON REDUCTION	65,000 t/CO ₂
% TARGET REDUCTION	8.5%

As a high density energy carrier, hydrogen has the potential to be used as a green energy source. We have commissioned a feasibility study with support from Invest NI to investigate the potential for locally generated hydrogen use, particularly to displace diesel fuel for our fleet, and potentially to support the cement manufacturing process along with oxygen, which is a by-product of hydrogen production. In addition, we are working with the wider industry and academia on Ireland's green hydrogen transition project, HyLIGHT.

PROJECT	KILN COAL DISPLACEMENT: ALTERNATIVE FUELS (SRF)
PROJECTED CARBON REDUCTION	49,000 t/CO ₂
% TARGET REDUCTION	6.4%

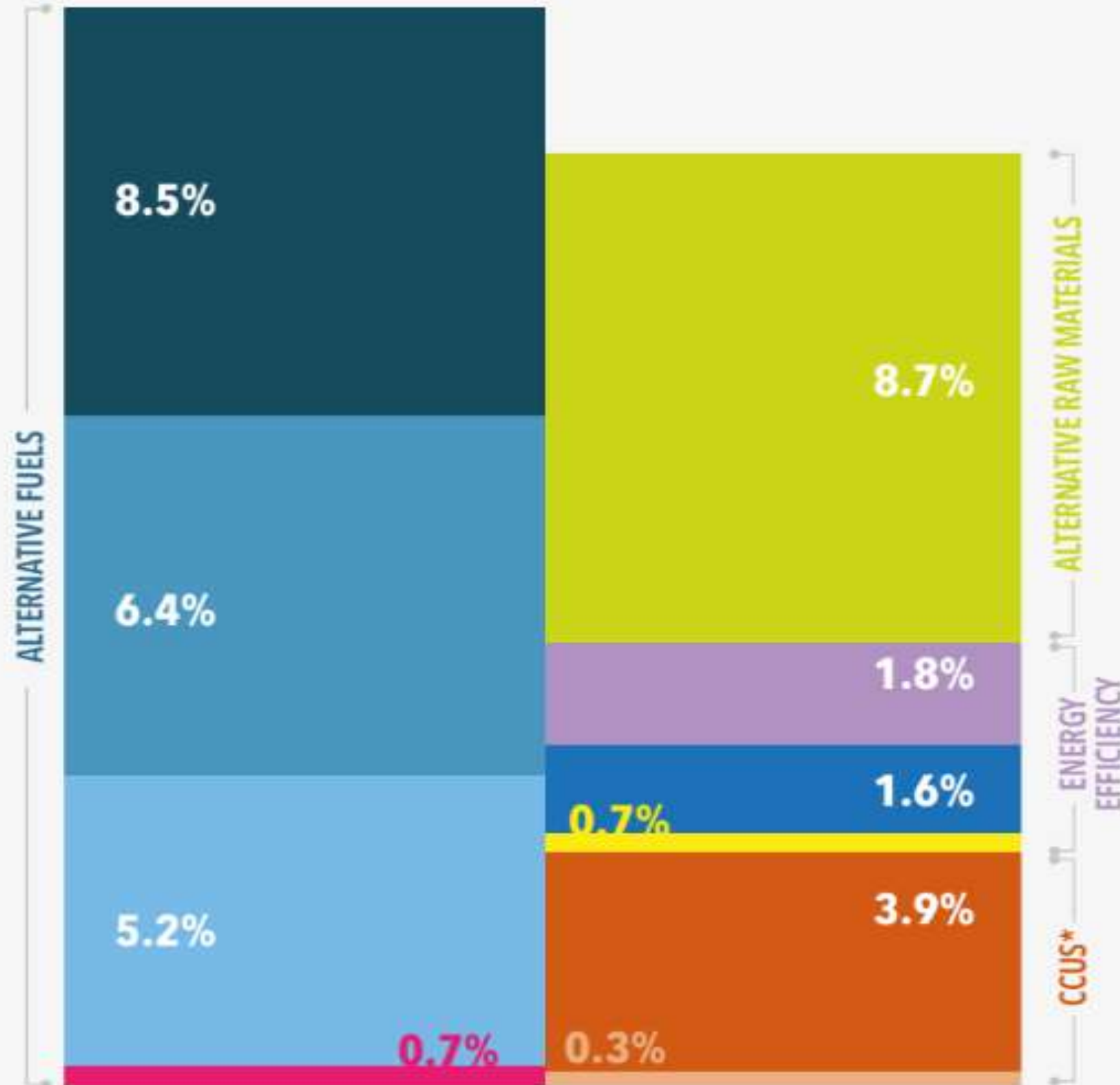
Gasification is a process that converts organic or fossil-based carbonaceous materials at high temperatures (> 700°C), without combustion and in a controlled environment, into carbon monoxide, hydrogen, and carbon dioxide. Waste gasification and co-incineration of the resulting gas energy in a combustion plant, such as a cement kiln, is one of the best proven techniques to increase the energy efficiency of waste-to-energy processes and optimise their contribution to our climate action and energy targets. Adopting SRF gasification in our cement production is currently under investigation.

PROJECT	CALCINER COAL DISPLACEMENT - FUEL FLEX™
PROJECTED CARBON REDUCTION	40,000 t/CO ₂
% TARGET REDUCTION	5.2%

With the completion of the Fuel Flex Pyrolyzer project we have exceeded our expectations of 80% displacement of coal in the calciner. The Fuel Flex has enabled us to displace up to 95% of our coal in the calciner resulting in a reduction of approximately 40000tpy coal. This will remove in the range of 34 - 58,000 tons of CO₂ from our emissions. Future development will see 100% displacement of our fossil fuels in the calciner.

PROJECT	FLEET REPLACEMENT DISPLACEMENT
PROJECTED CARBON REDUCTION	5,360 t/CO ₂
% TARGET REDUCTION	0.7%

Mannok is currently engaged in a detailed design FEED Study supported under the Net Zero Hydrogen Fund to develop a 5MW green hydrogen project that is capable of displacing 70% of the 4 million litres of diesel we use annual in our road fleet. We are also exploring the potential beneficial uses of the by-products of the hydrogen electrolysis process i.e. oxygen & waste heat.



PROJECT	SUPPLEMENTARY CEMENTITIOUS MATERIALS (SCMs)
PROJECTED CARBON REDUCTION	67,000 t/CO ₂
% TARGET REDUCTION	8.7%

SCMs are materials used as a partial replacement of Portland Cement to improve both fresh and hardened concrete properties. This reduces the carbon emissions associated with cement production through the displacement up to 20 - 25% of the carbon intensive clinker (Cement Intermediary) with suitable SCM's. Mannok is currently exploring the feasibility of a number of suitable locally sourced materials including waste materials, calcine clays (Natural pozzolans) and shales.

PROJECT	HEAT RECOVERY
PROJECTED CARBON REDUCTION	14,130 t/CO ₂
% TARGET REDUCTION	1.8%

The production of cement is a very heat intensive process. We aim to capture any excess or waste heat from the process, from the kiln and grate cooler specifically, and reuse this in the cement manufacturing process. We are investigating the potential to use this heat to generate electricity and thermal energy (combined heat and power - CHP) including the potential for combined heat and power, making it a more efficient process and reducing emissions.

PROJECT	SRF DRYING
PROJECTED CARBON REDUCTION	12,000 t/CO ₂
% TARGET REDUCTION	1.6%

With the addition of our new satellite burner, we aim to ultimately displace 100% of the coal being used to fire the kiln. To help in this journey we will install a new SRF drying system which will reduce the moisture content of the SRF and thereby unlock additional calorific value potential of the SRF allowing us to reduce further the coal consumption and the associated CO₂ emissions.

PROJECT	ABC COLLER REFURB
PROJECTED CARBON REDUCTION	5,000 t/CO ₂
% TARGET REDUCTION	0.7%

The ABC inlet is the only proven method for prevention of snowmen and the costly downtime that is required to remove the snowmen (Undesirable build-up of clinker). With the advances in cooling efficiency that the ABC provides, heat consumption savings in the range 10 to 30Kcal/Kg clinker can be achieved and as a result a reduction in the associated CO₂ emissions. The ABC will also help to reduce the energy consumption in the clinker grinding process and provide energy efficient cooling and air blasting.

PROJECT	FLUE STACK CARBON CAPTURE
PROJECTED CARBON REDUCTION	30,000 t/CO ₂
% TARGET REDUCTION	3.9%

We aim to utilise oxygen from the hydrogen electrolysis process to optimise the clinker burning process, resulting in exhaust gases that contain a higher percentage of CO₂ and can be captured in a more energy efficient way, which can then be stored or re-used. In addition, we are collaborating with the wider industry and academia as steering committee members of an SEAI funded CCUS research project.

PROJECT	FLUE DUST PORTLAND CEMENT (FDPC) - CARBONII
PROJECTED CARBON REDUCTION	2,000 t/CO ₂
% TARGET REDUCTION	0.3%

FDPC is a by-product of the manufacture of Portland cement which contains CO₂ in its composition. We aim to capture a percentage of this CO₂ using a patented mineralization technology and transform it into an aggregate to be used downstream in the production of our range of building products.

* CCUS - CARBON CAPTURE, UTILISATION & STORAGE
The aim of CCUS is to prevent carbon reaching the atmosphere by capturing it at source and either reusing it as a resource or permanently and safely storing it.

MANNOK **NET ZERO BY 2050**



Jose Casban

Nuada

 Nuada



Redefining Carbon Capture

with ultra-energy efficient capture technology

A large industrial facility, likely a refinery or chemical plant, with numerous smokestacks emitting white smoke. The scene is overlaid with a semi-transparent blue filter. The main text is in a large, bold, orange-red font.

6,100,000 MT pa

Annual carbon capture capacity
required to meet Net-Zero targets

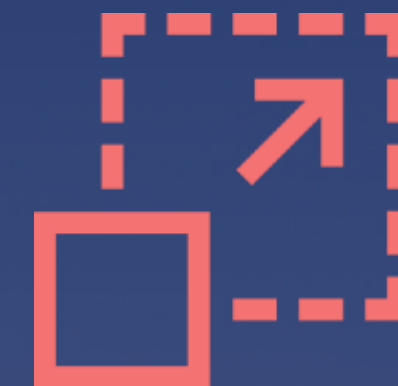
Source: IEA, Net Zero by 2050

The next generation of carbon capture

An ultra-energy efficient capture system
that combines the unique properties of
Metal-Organic Frameworks (MOFs) with
mature VPSA technology



Ultra-Energy
Efficient



Modular &
Scalable



Mature
Process



“Heatless”
Capture



Flexible
Applications

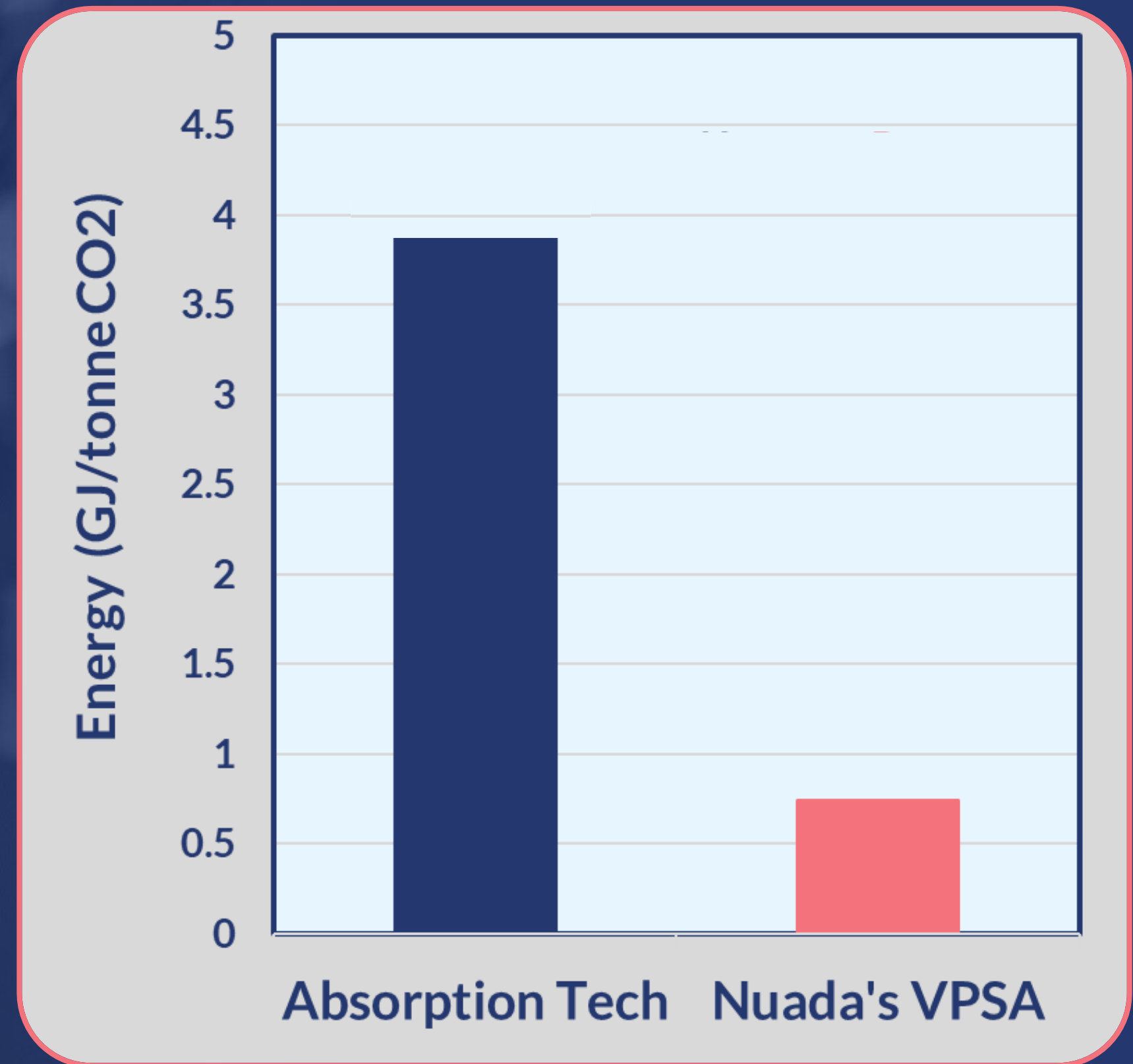


No Toxic
Solvents

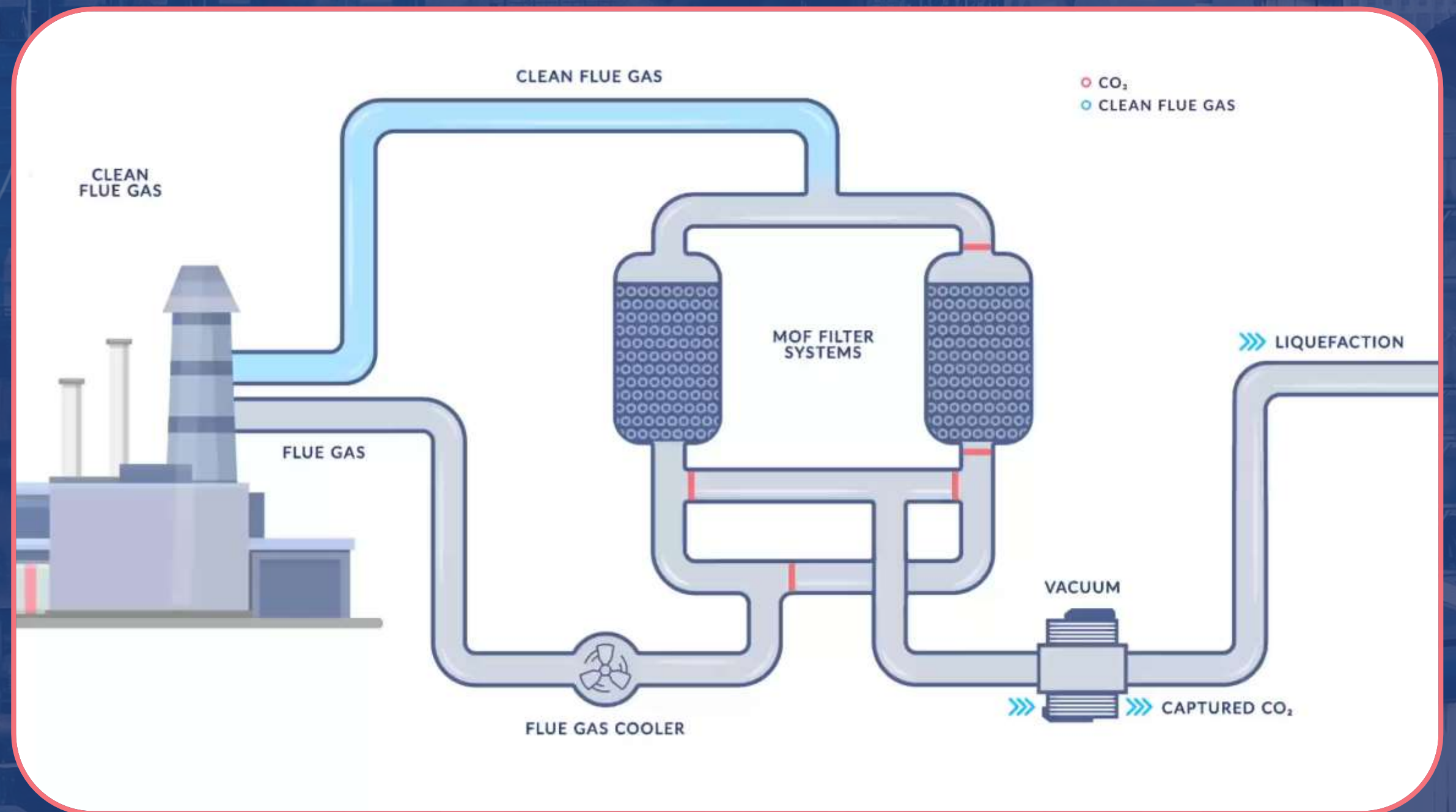
A step change in innovation

Cutting energy use by c.a. 80% versus amine tech

Our heatless, End-of-Pipe filtration system slashes cost of capture



Vacuuming CO₂ from industrial emissions



“Global cement majors are
piloting our next-gen capture
technology”



“Validating versatility via an energy
from waste flue gas at the UK’s
CCS innovation sandbox TERC”



Department for
Energy Security
& Net Zero



University of
Sheffield
Energy Institute

TERC



Net-Zero starts here

Pilot



1TPD
(Today)

Demo



50TPD
(2025)

Deploy



>1000TPD



Capturing the future

Thank you

We build energy-efficient machines that vacuum CO₂ out of industrial emissions

Proven



Multiple prototypes
(TRL5 & beyond)

Protected



Several patents :
From material to
systems

Scalable



Modular & materials
& process already
scaled

Pioneering



Award-winning.
Over £6m in grant
funding secured

Core investors:



BGF



BARCLAYS

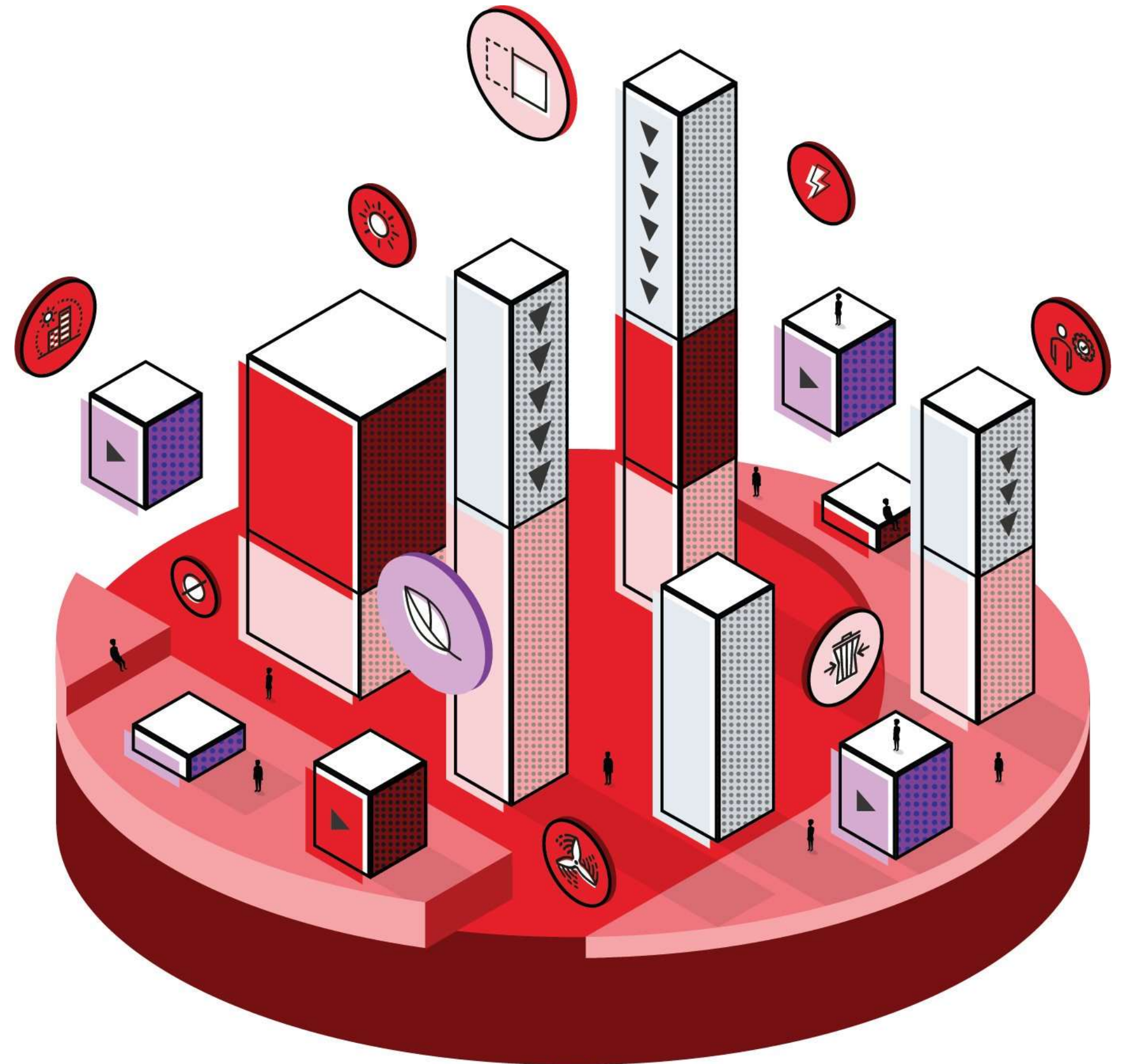
Melanie Thrush

ARUP

ARUP

Decarbonisation

Wrap up



Carbon

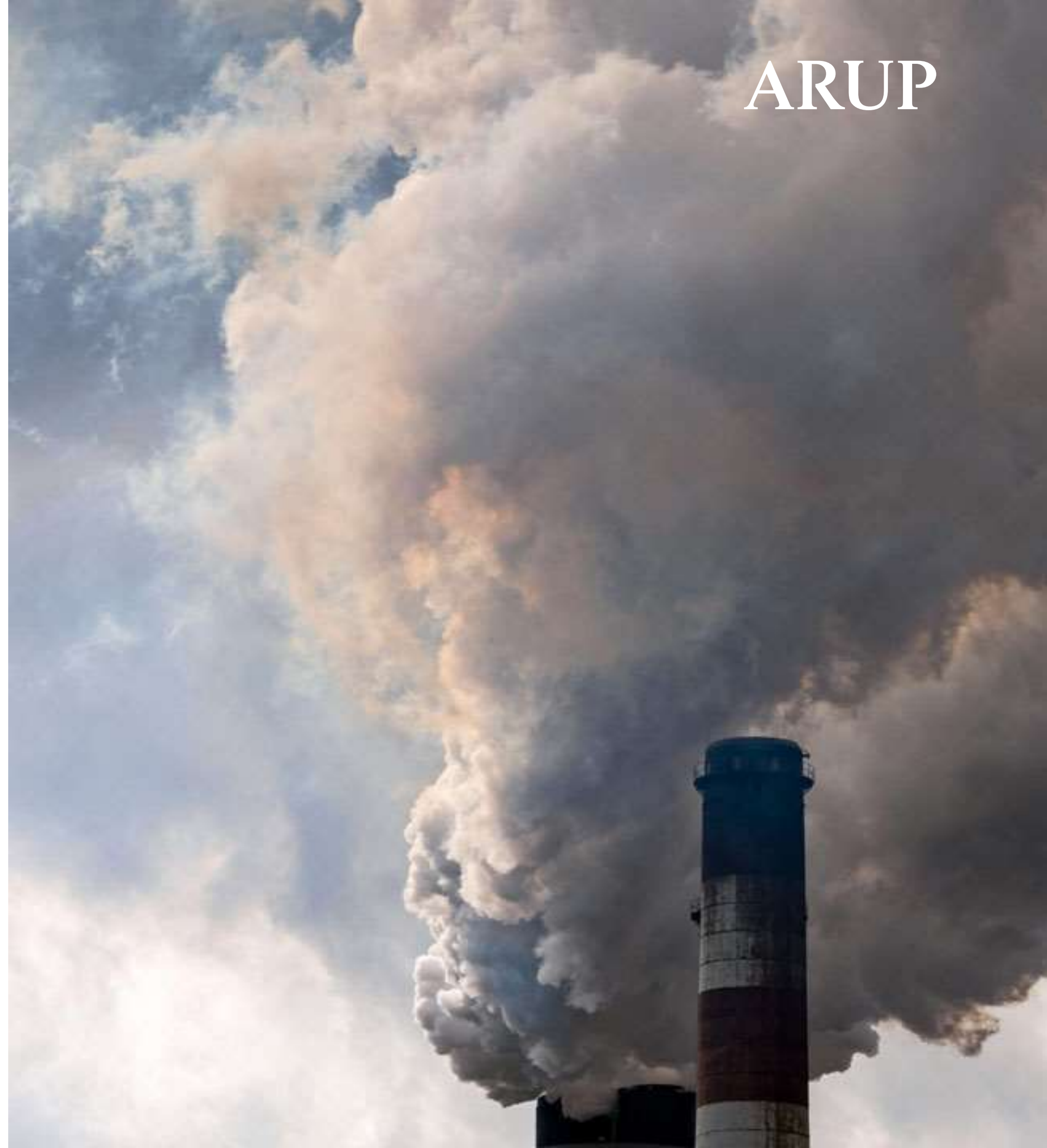
Decarbonisation

Greenhouse gases

Carbon footprint

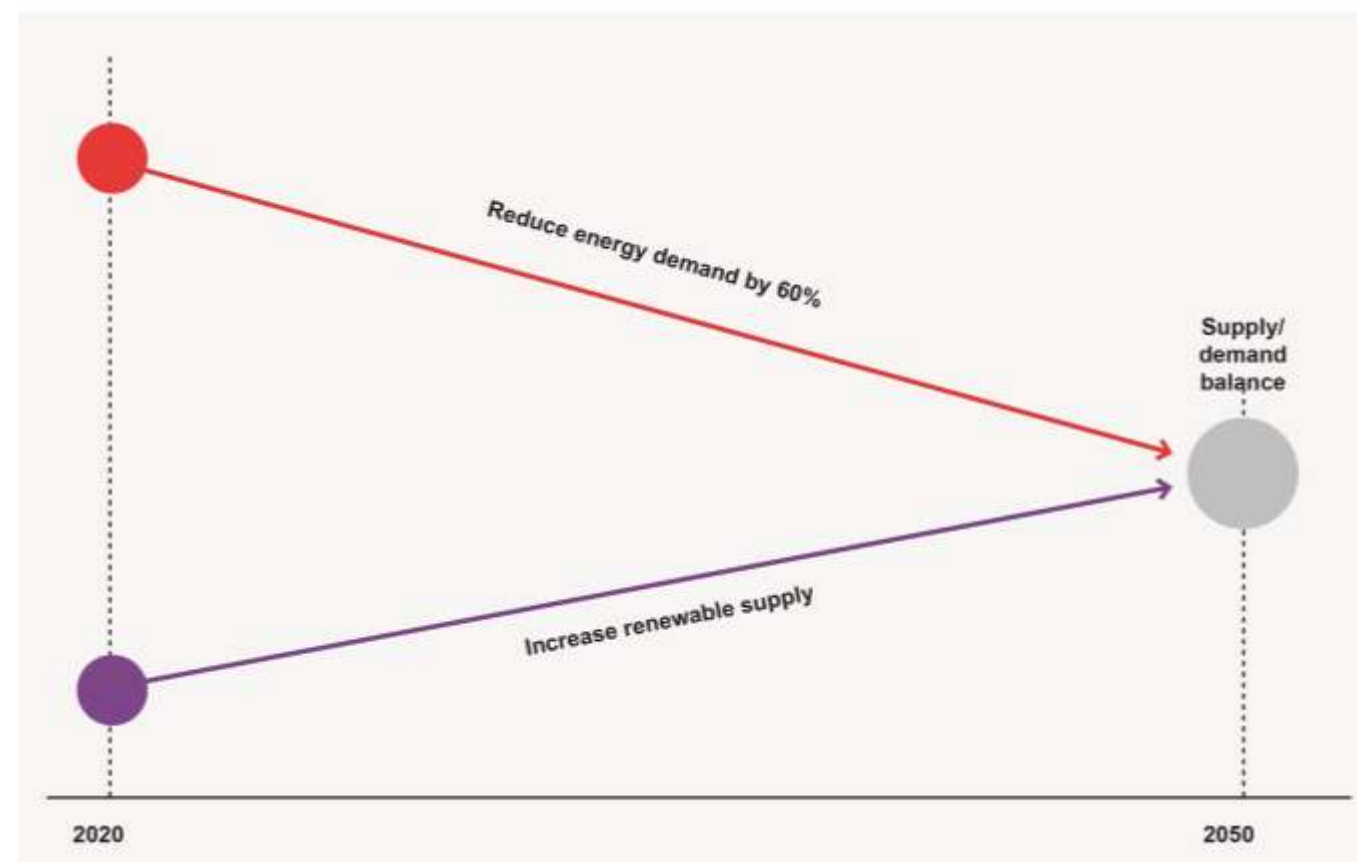
Embodied and operational carbon emissions

Scope 1, 2, 3 emissions



Carbon goals and Net Zero carbon

Setting the right decarbonisation
goals.

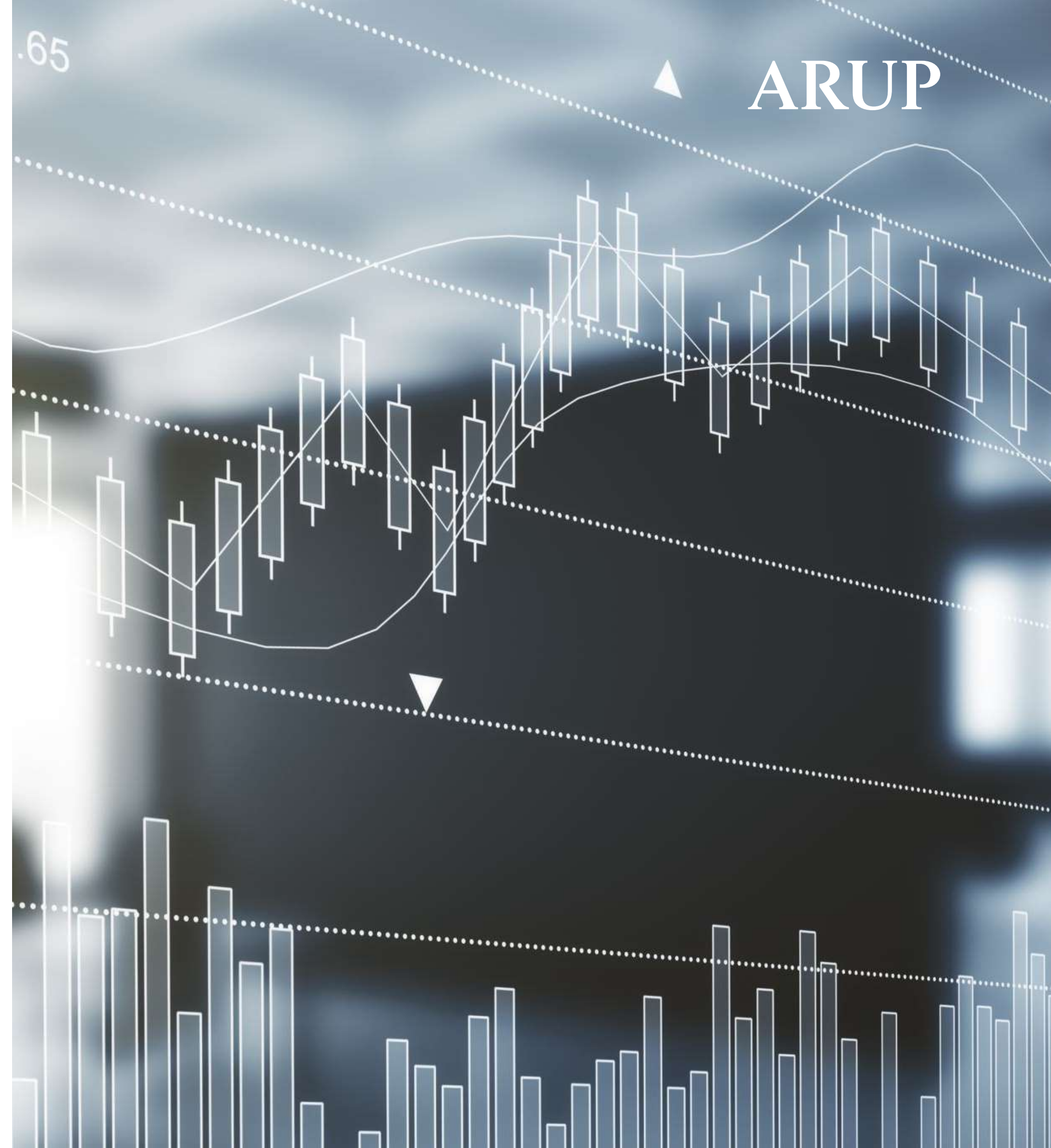


Net- zero strategy for the built environment, Arup (2020)



What is driving decarbonisation?

Policy drivers and market pressures in the European Union (EU)



Legislative and market pressures

Clients' drivers for decarbonisation



Legislation compliance

Global and regional policy and legislative drivers such as:

- Paris Agreement
- European Climate Law
- EU Green Deal and associated policies (EU Action Plan for Financing Sustainable Growth including mandatory disclosures)
- *Fit for 55* programme and related policies
- Alignment with EU Carbon Budgets



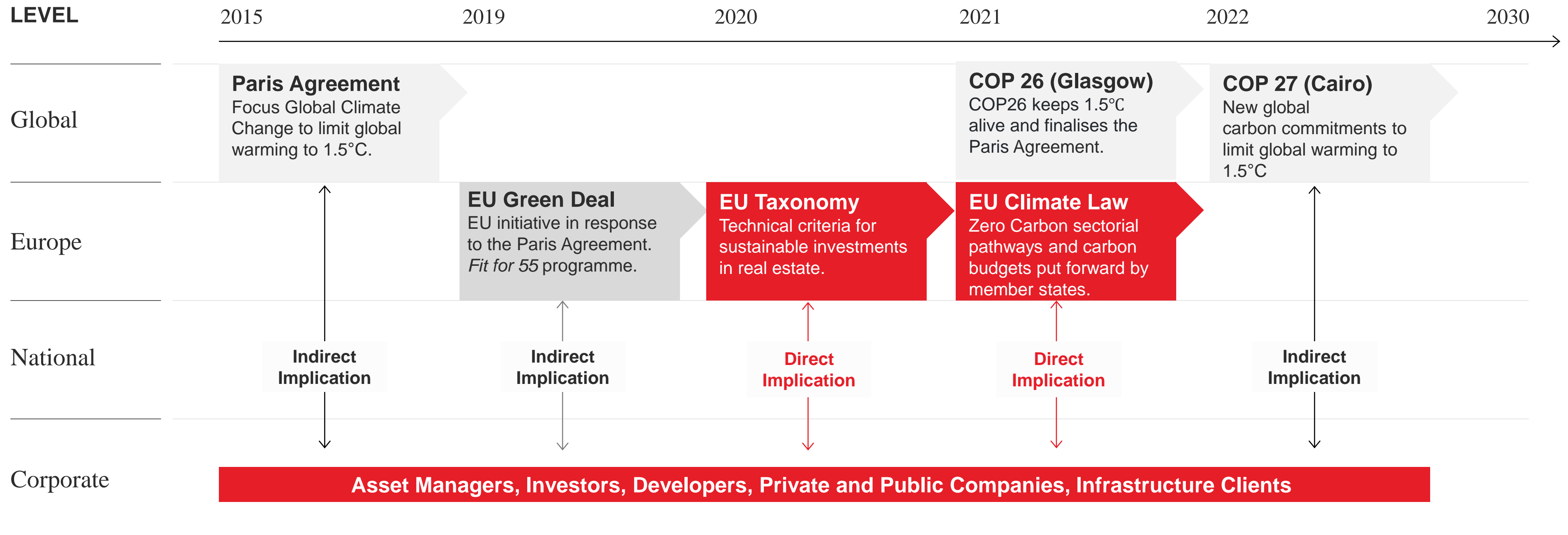
Right to play, access to market

Market drivers such as:

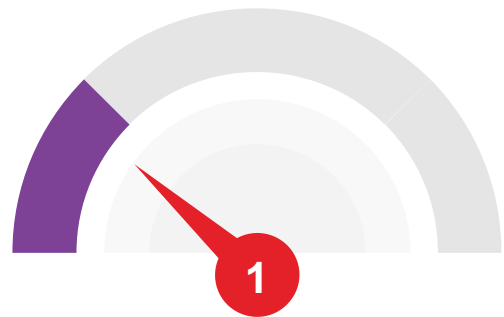
- ESG Ratings and new frameworks
- Voluntary disclosure frameworks (TCFD, GRI etc)
- Risk management including:
 - Reputational risk arising from customer expectations
 - Stranding risk requiring appropriate ESG considerations to avoid premature asset write-off
 - Increase cost of Carbon in markets and offsets

Policy changes are aiming at *zero carbon*

Key policy drivers for decarbonisation



Arup's approach and services

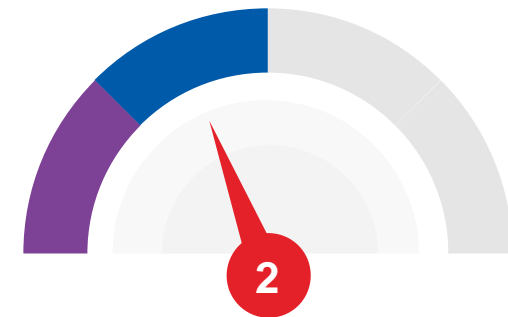


Define and measure

We work with our clients to carry out an assessment and analysis of where Green House Gas (GHG) emissions are generated.

Carbon Footprint

Scope 3 and Supply Chain mapping



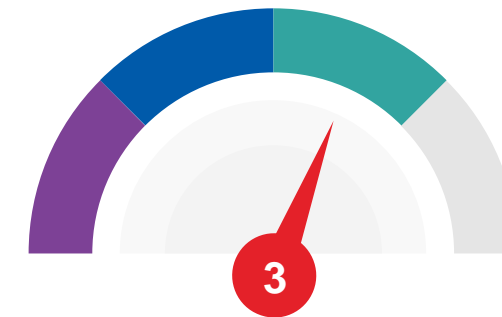
Strategy, roadmap and plan

We produce the net zero roadmap, defining the changes that will be required at the portfolio, asset and operational level in order to meet your goals and deadline.

Decarbonisation implementation and investment plans (Roadmap and Pathways)

Net Zero Carbon Incentives and funding

Carbon Offset Strategy



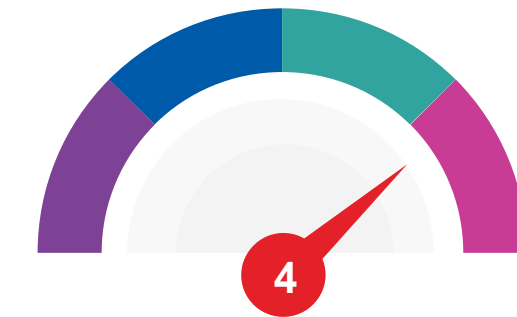
Initiate and change management

Our teams help clients to embed the tasks and milestones of their net zero strategy. This is a combination of practical change management and cultural shift in procurement.

Whole-of-life Net Zero Carbon Brief (Procurement)

Decarbonisation Guidance and Training

Decarbonisation Policy Advice



Deliver, monitor and reassess

Rigorous annual reporting and reassessment are essential to ensure that milestones are met during the transition. Ongoing monitoring to establish that relevant regulations continue to be met.

WLC Assessment Through Design

Carbon reporting and disclosure

Net Zero Carbon Certification

The net zero journey

What's the vision?

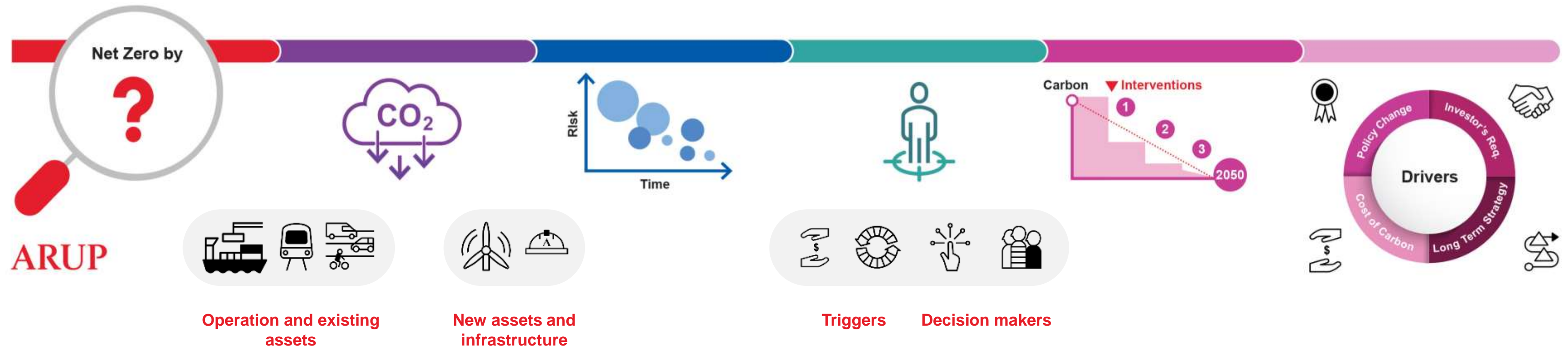
Carbon footprint

Prioritise actions
Intensity Cost Capital

Program management

Design and delivery

Monitor outcomes and tune process

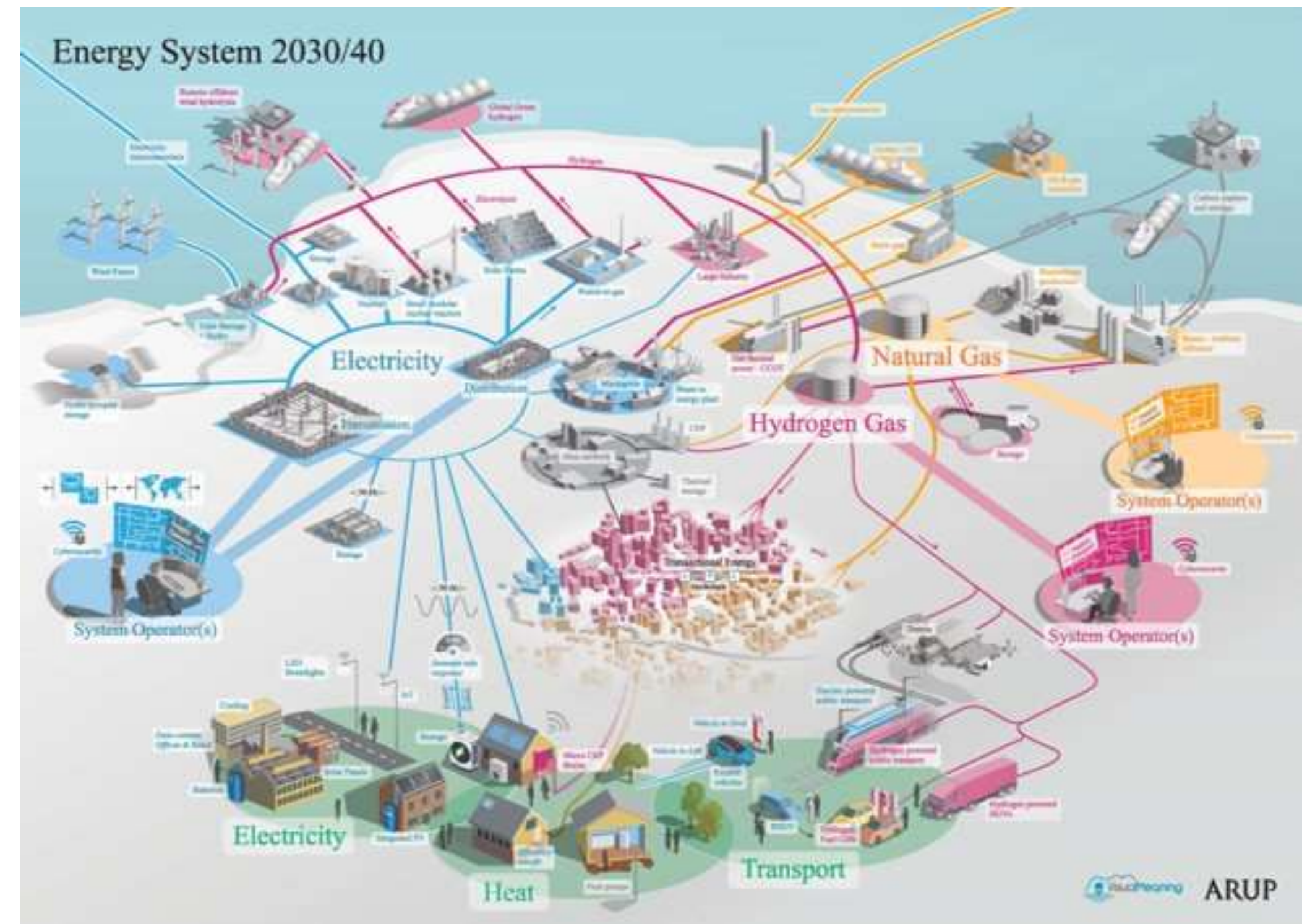


Key Components

Decarbonisation of the whole energy system

- Networks (Power Transmission and Distribution, Gas Networks, Regulation.)
- Urban Energy (Heat networks, storage, energy efficiency)
- Hydrogen, CCUS and New Fuels
- Nuclear (waste management, new build, new technology)
- Renewable generation (wind, solar, tidal, geothermal)

ARUP



ARUP