



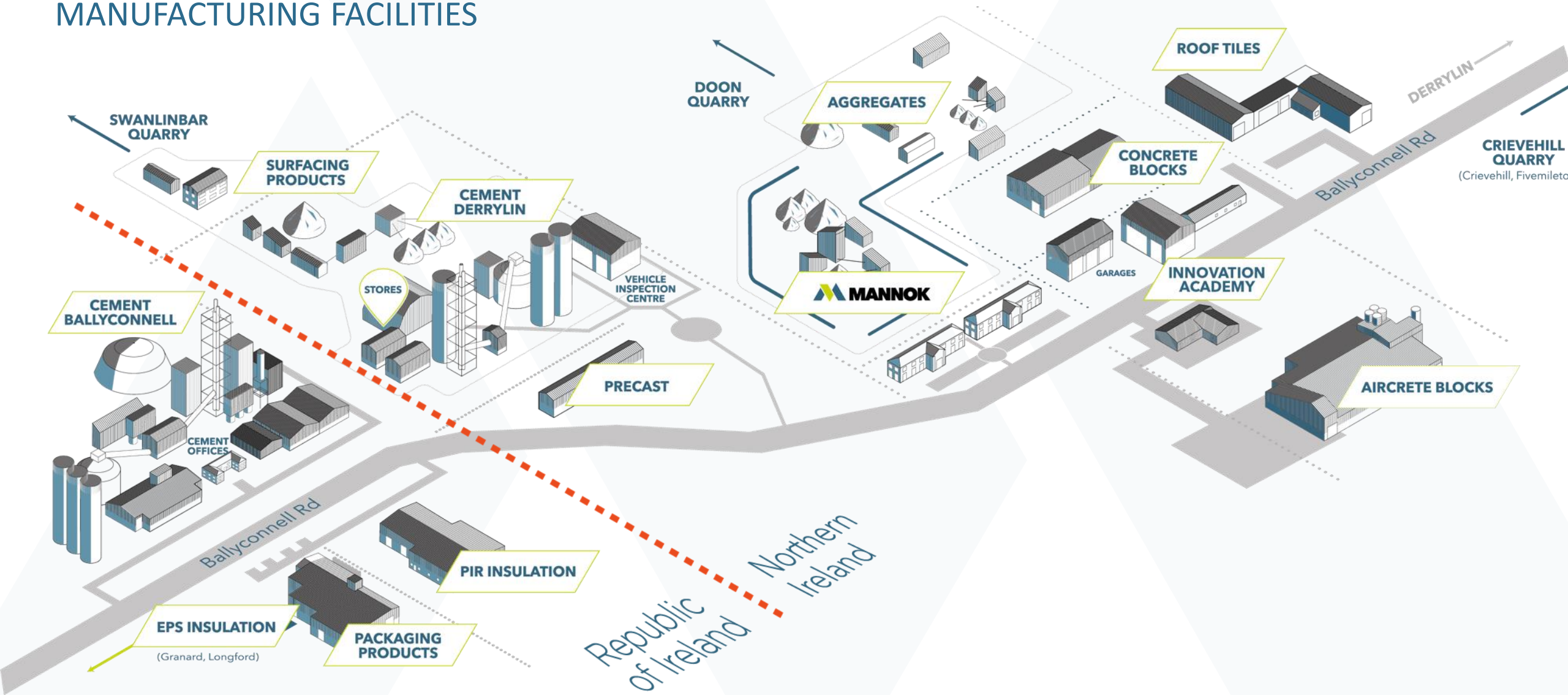
Fermanagh Hydrogen Valley Project

U.K. Hydrogen Innovation Launch

30th May 2024



MANUFACTURING FACILITIES



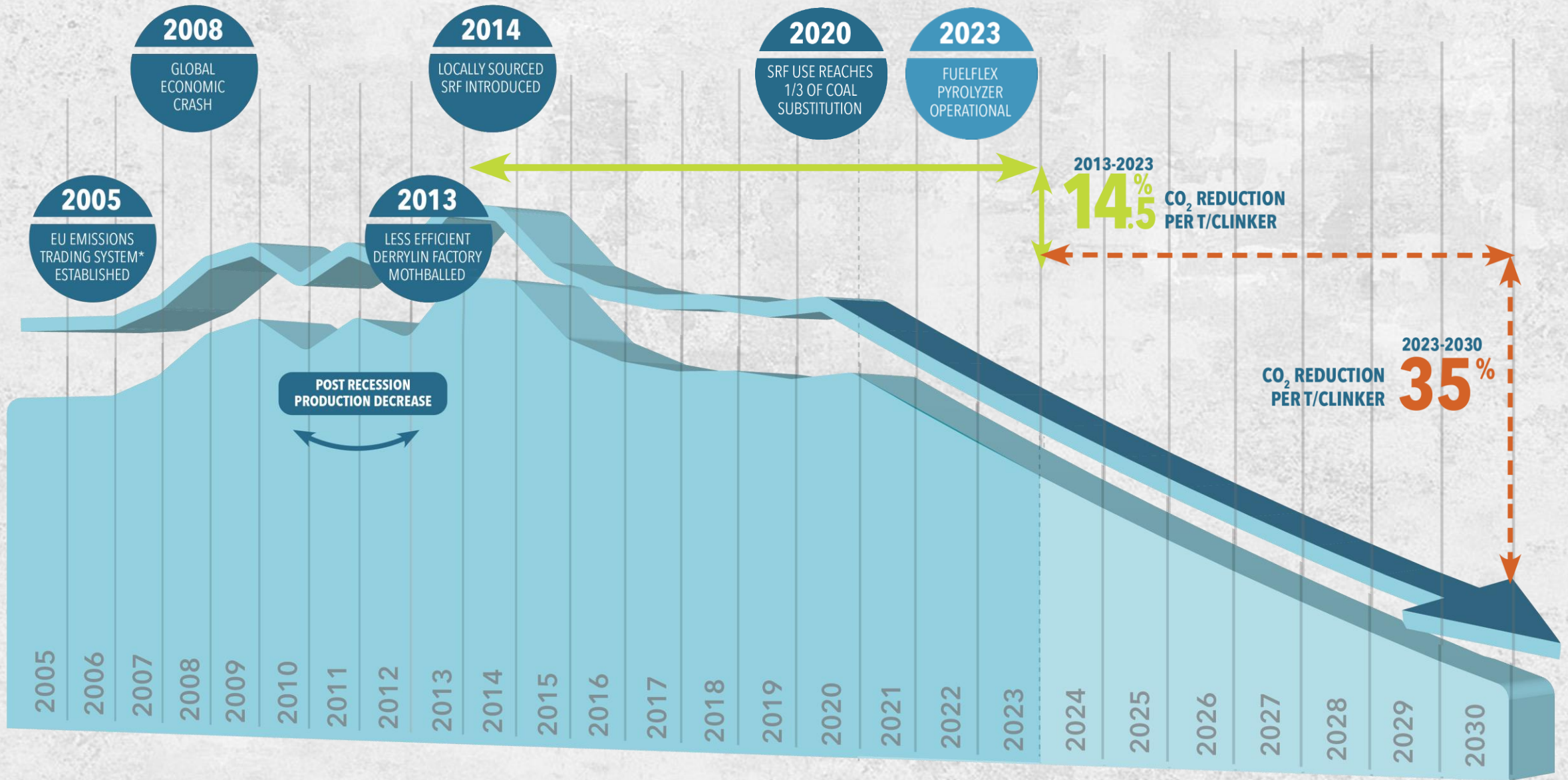
800+Employees
2023**€307m**Turnover
2023**€112m**Investment
2015-2023

*“ 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





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%

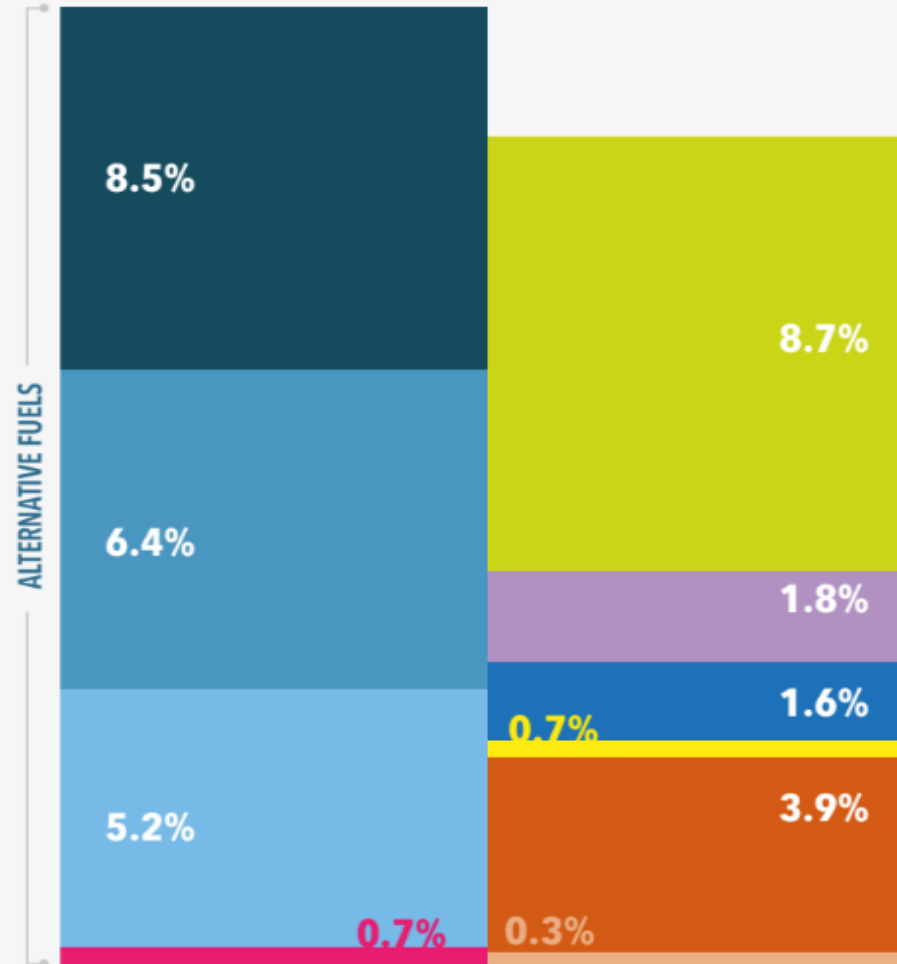
Gasification is a process that converts organic or fossil-based carbonaceous materials at high temperatures (>700°C), without combustion and in a controlled environment, into carbon monoxide, hydrogen, and carbon dioxide. Waste gasification and co-incineration of the resulting gas energy in a combustion 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 CEMENTIOUS MATERIALS (SCM's)	
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) - CARBONB	
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.

ENERGY VALLEY PHASING

1

Produce Green H₂ and O₂ from curtailed wind at Slieve Rushen wind farm

2

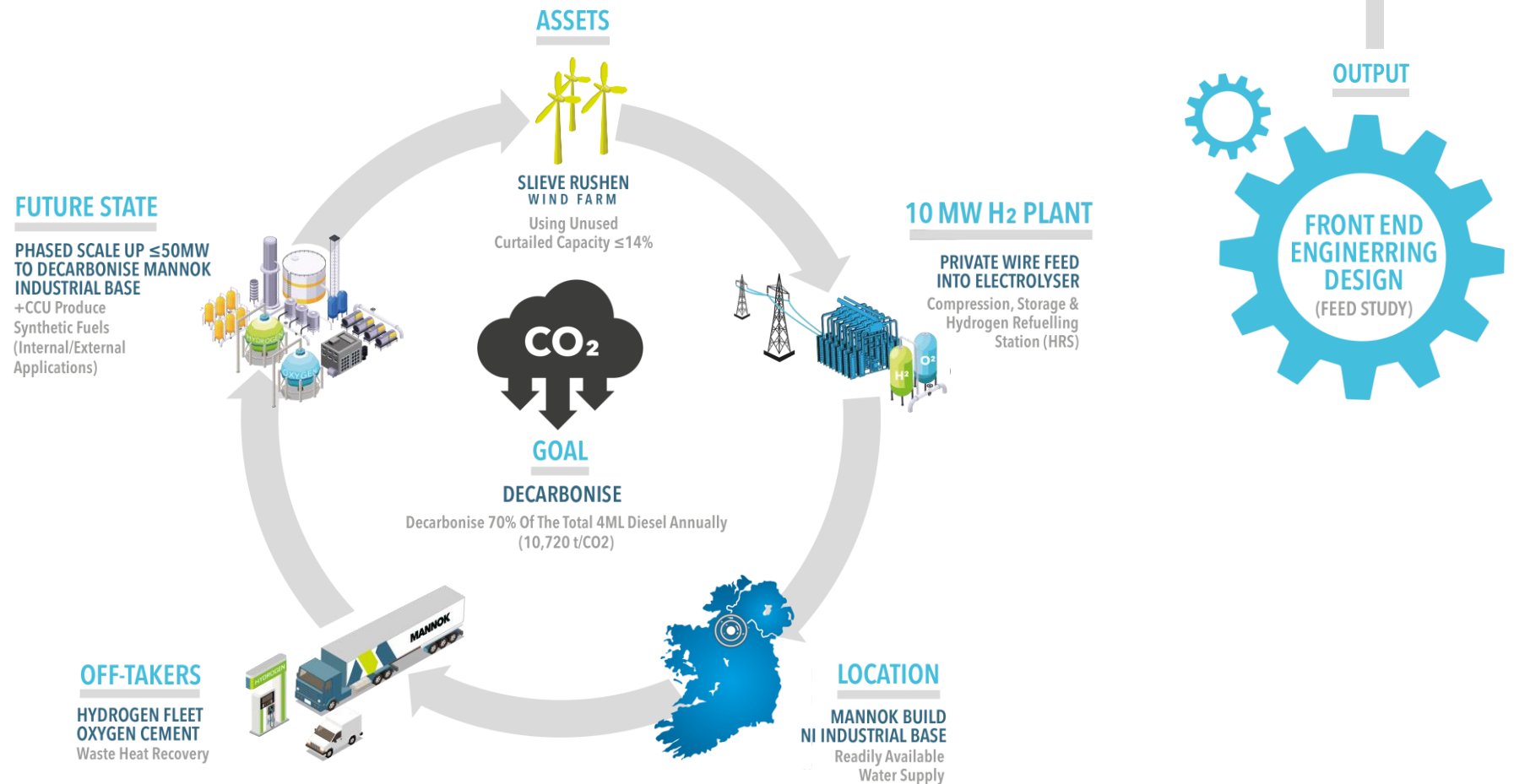
Create new c50MW Renewable project close to Mannok operations

3

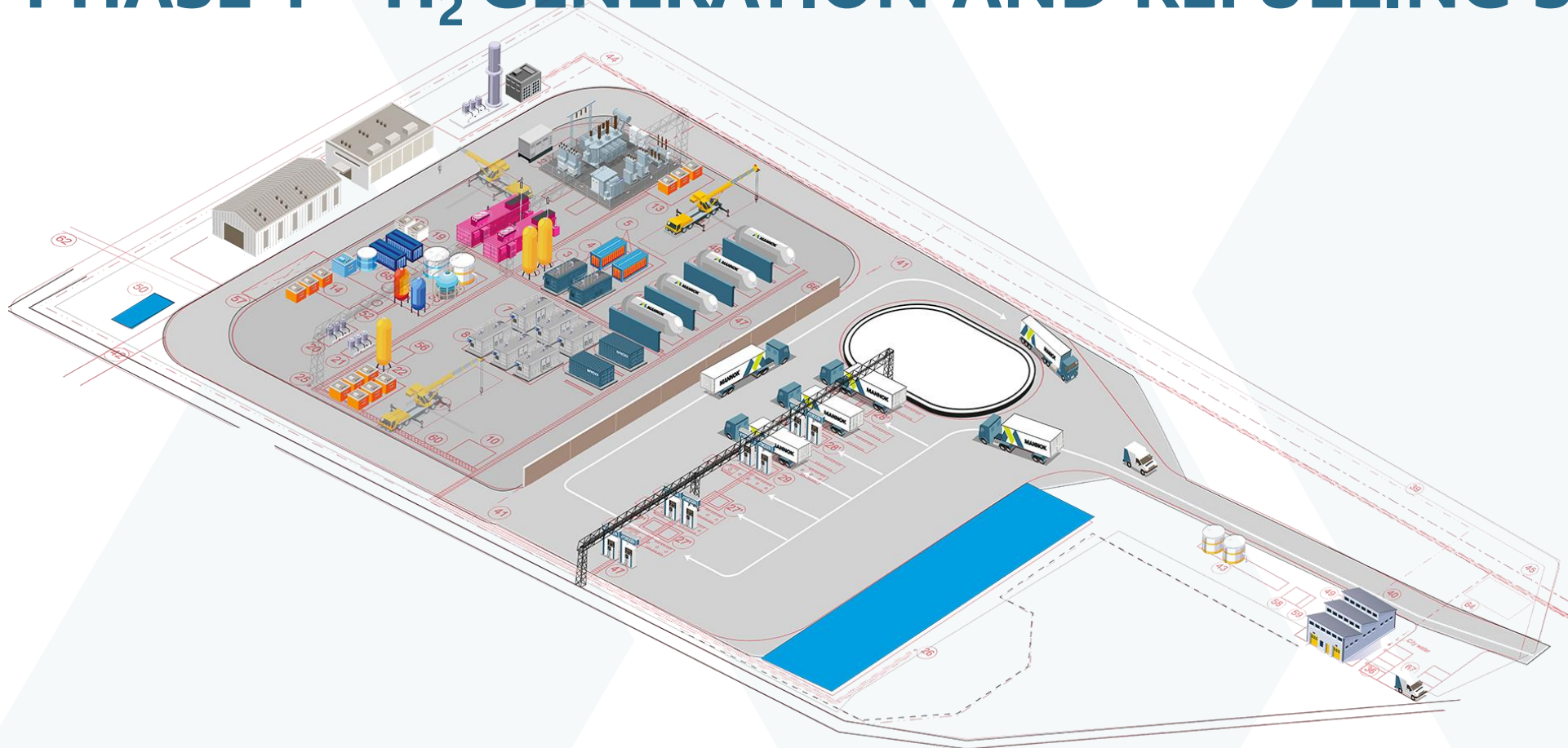
Increase renewable generation capacity combined with WHR

4

Further Wind and Solar generation combined with CCU at cement plant to produce Syngas



PHASE 1 - H₂ GENERATION AND REFUELING STATION



- Front End Engineering Design complete with tenders being negotiated
- Planning for Hydrogen production in 2027
- Examining many possible curtailed wind locations for similar future projects
- Significant step on an exciting journey to Net Zero





PARTNERSHIPS & COLLABORATION



NEXT STEPS

HAR2 TIMELINE

- I. Expression of Interest Window: Opened on 14/12/2023 and due completion by 05/02/2024. Government will complete an initial eligibility check and may give feedback to Projects which appear ineligible.
- II. Application Window: Government unlocks online application form from 14/12/2023 and project representative creates account. Application window opens 06/02/2024 and due completion by 19/04/2024.
- III. Eligibility Checks & Evaluation: Expected over the period of April to Autumn 2024.
- IV. Confirm Shortlist of Projects. Expected in Autumn 2024 with due diligence and VfM assessment and commence negotiations with selected projects: Late 2024 to Early 2025.
- V. Award of Contracts: from early 2025.
- VI. Projects in Operation: from between March 2026 – March 2029.

- Advisory Panel – Engaged with a diverse variety of experts ✓
- Progress with planning application ✓
- Refine engineering design ✓
- Market (re) engagement & tender process ✓
- Site visits – Generating a suitable list (WIP)



GREEN HYDROGEN

THE WAY FORWARD



THANK YOU

