

2023

An Introduction to Powerhouse

...taking the past and making the future

Vision and Mission



Vision

To be a global leader in energy solutions that improve the environment and support the circular economy for future generations.



Mission

To provide flexible, innovative, solutions to global pollution by converting plastic and other waste into **cost effective energy products** that **improve our environment** for future generations

What Powerhouse does



Offers its innovative Distributed Modular Generation

(DMG®) product platform for the advanced thermal treatment of waste streams, converting them to a synthesis gas, and can be adapted for various applications around the world



Designs non-recyclable waste regeneration facilities

to produce electricity, heat, and gases such as hydrogen and methane whilst removing carbon from the system



Provides associated engineering and testing services and customer support



DMG® is trademarked and there are patents both approved and pending



Operates an R&D facility based at the University of Chester's Energy Centre at Thornton, Cheshire



Powerhouse Technology Centre at Bridgend **to open early 2024**

A sustainable investment

- 01 Potential for a **leading position** in large, **growing** and **fragmented market**
- 02 Continued **value creation**
- 03 **Scale** will deliver sustainable market performance
- 04 **Additional growth** from bolt-on acquisitions
- 05 **Sustainable** and **environmentally responsible** with strong ESG
- 06 An **agile structure**, with growing operations



Drivers of Growth



Energy
Demand



Reducing
Pollution



Climate
Change

The Opportunity

Benefiting from three global demand-led areas



The need



For **energy**



To **reduce** pollution



To **reduce** reliance on virgin fossil fuels

The market in which we operate in is large



The market



Energy market - **\$20 billion** by 2030*



Climate change - **\$23 trillion** by 2030



Pollution reduction – EU Action Plan:
'Towards Zero Pollution for Air, Water and Soil'

The Technology



Technology

DMG® is an advanced conversion technology (ACT) during which feedstock is heated in the absence of oxygen. The material cannot burn, so its molecular structure is broken down



Expertise

PHE's knowhow lies in the understanding of how waste feedstocks behave, and how to apply feed rates, residence time and temperature ranges to optimize production of the end products.



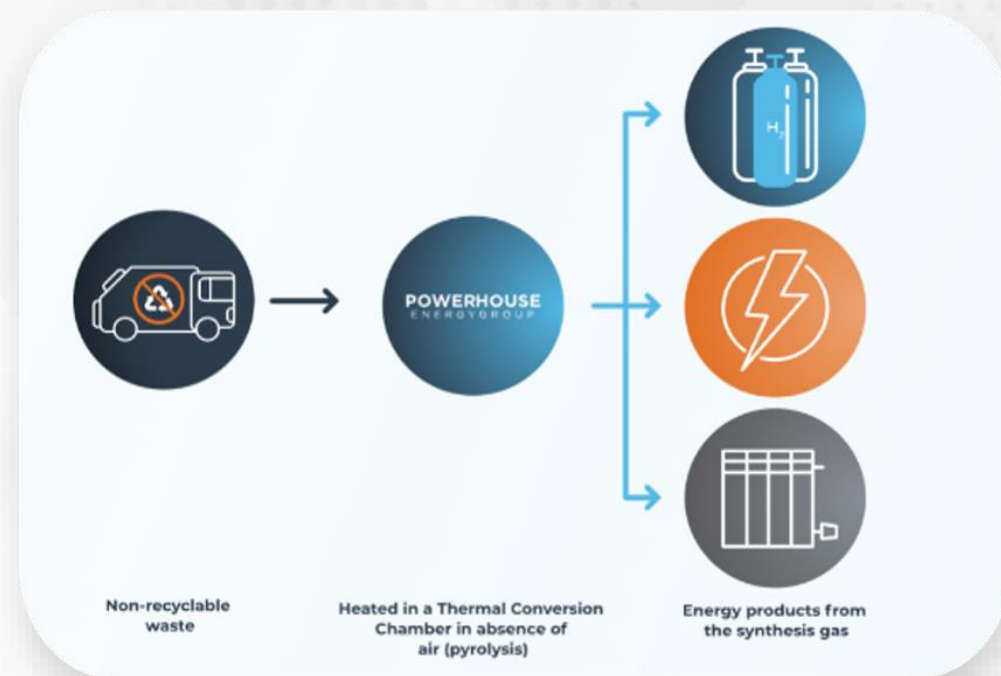
Conversion

Due to the high temperatures involved, the material is converted into a gas and solid residues, which are carbon rich drop out and are recovered



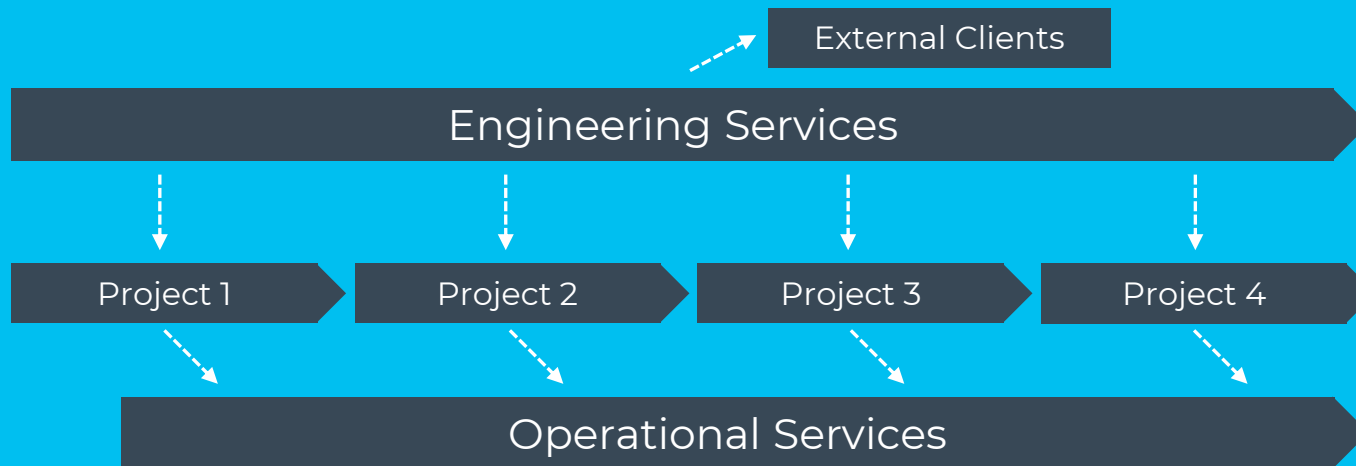
Results

PHE has tested a range of wastes and holds all results in its proprietary PERMS model (Powerhouse Energy Rapid Modelling System)



Business Strategy

- 01 Continuous and re-occurring revenues from provision of services to external clients
- 02 Investment in capital project development through SPVs
- 03 Share sale of SPV whole or part to provide development premium
- 04 Dividends from capital project SPV operations
- 05 Participation in operations as appropriate



Existing client base and growing project pipeline



Current projects:

- Protos, Cheshire
 - Planning permission implemented
 - Option for lease
 - Engineering being finalised with Petrofac
 - Site infrastructure in place
- Ballymena, Northern Ireland
- Longford, Republic of Ireland:
 - JV with Hydrogen Utopia
- Pipeline of prospects in Australasia and SE Asia



Engsolve clients include:

- Blue Chip energy and commodity companies
- Independent technology developers
- Project developers
- Multiple sectors



Powerhouse Technology Centre

- Located at Brackla Industrial Estate, Bridgend
- 938 square meters
- Company's new head office
- Houses the Feedstock Testing Unit, offices and facilities for meetings and presentations
- Close to excellent infrastructure

Centre will be a place to:

- Innovate
- Invent
- Learn
- Develop and
- Grow
- and for visitors to see what we do



The Board



David Hitchcock

Interim - Chairman



Paul Emmitt

Chief Executive Officer



Ben Brier

Chief Financial Officer



Hugh McAlister

Non-Executive Director



Professor Karol Kacprzak

Non-Executive Director



Tony Gale

Non-Executive Director

Why invest in Powerhouse Energy?

01

Leading the Market

Localised energy recovery and industrial gas production from wastes

02

Market Opportunity

Long-term structural demand underpins market growth

03

Competitive Advantage

High barriers to entry

04

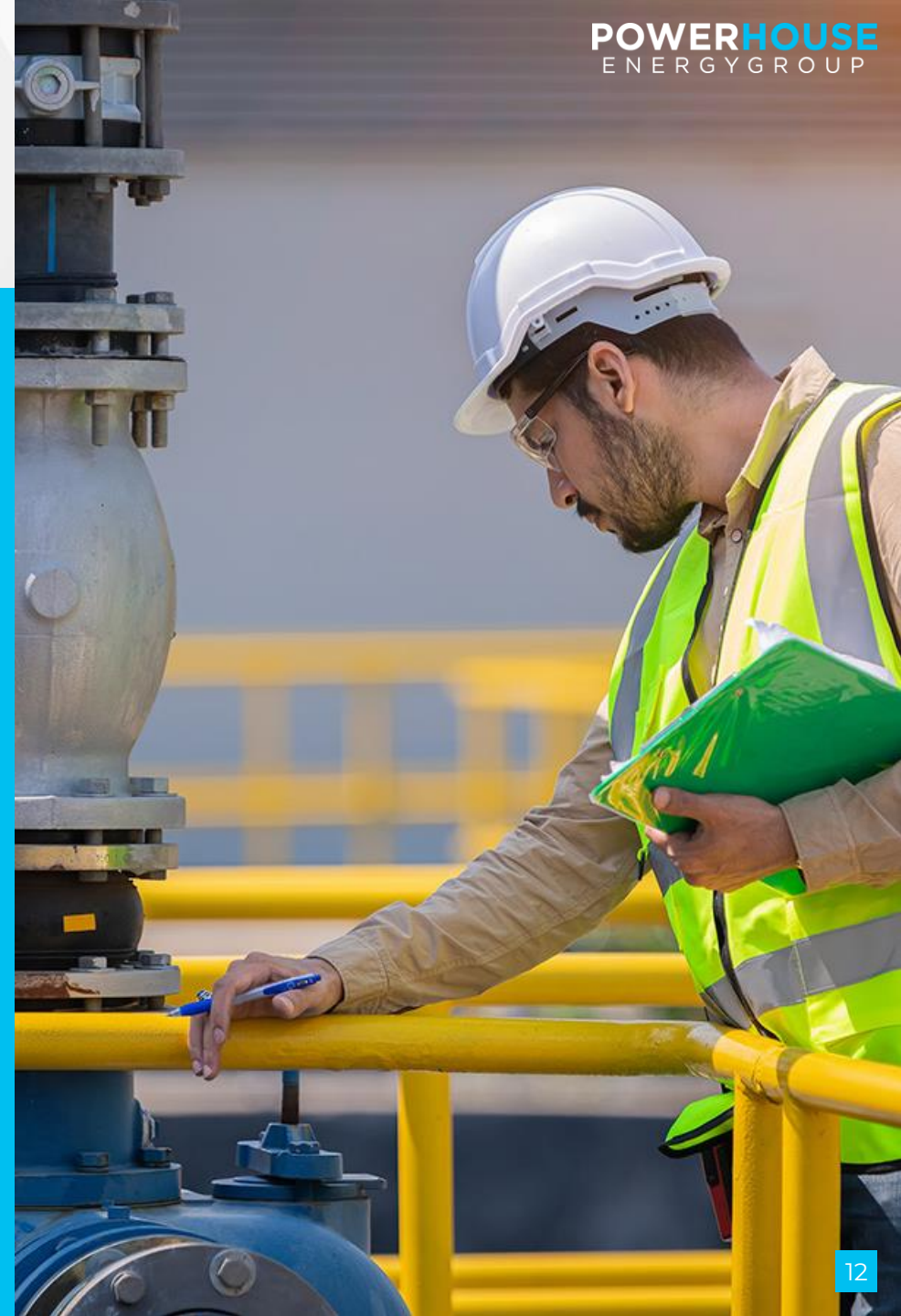
Purpose Driven

Commitment to sustainable development incorporating **pollution reduction** and **climate change minimisation**

05

Investment Pipeline

To deliver **capacity growth**, **efficiency** and **longevity**



Appendix

Our ESG Priorities

- 01 **To integrate environmental sustainability** into our designs the engineering and operational services we provide, **minimising waste and optimising the use of resources**
- 02 **To reduce emissions** and set science-based targets to **achieve net zero** across the activities of the Company by 2035.
- 03 **To ensure the safety** and **wellbeing** of all our people and the people that work with us.
- 04 **To make a positive difference** to the communities we are part of and those we serve and to provide **high-quality jobs that support local economies**.
- 05 **To be collaborative, trusted** and a **good neighbour** helping to tackle common challenges.



Hydrogen Production



Local/Community based **scalable design** that can ease distribution of the gas.



Uses proven components in modules or skids, with small land take, visual and environmental impact.



Consumes approximately **35 tonnes daily** of waste, non-recyclable plastic – **but can be scaled up.**

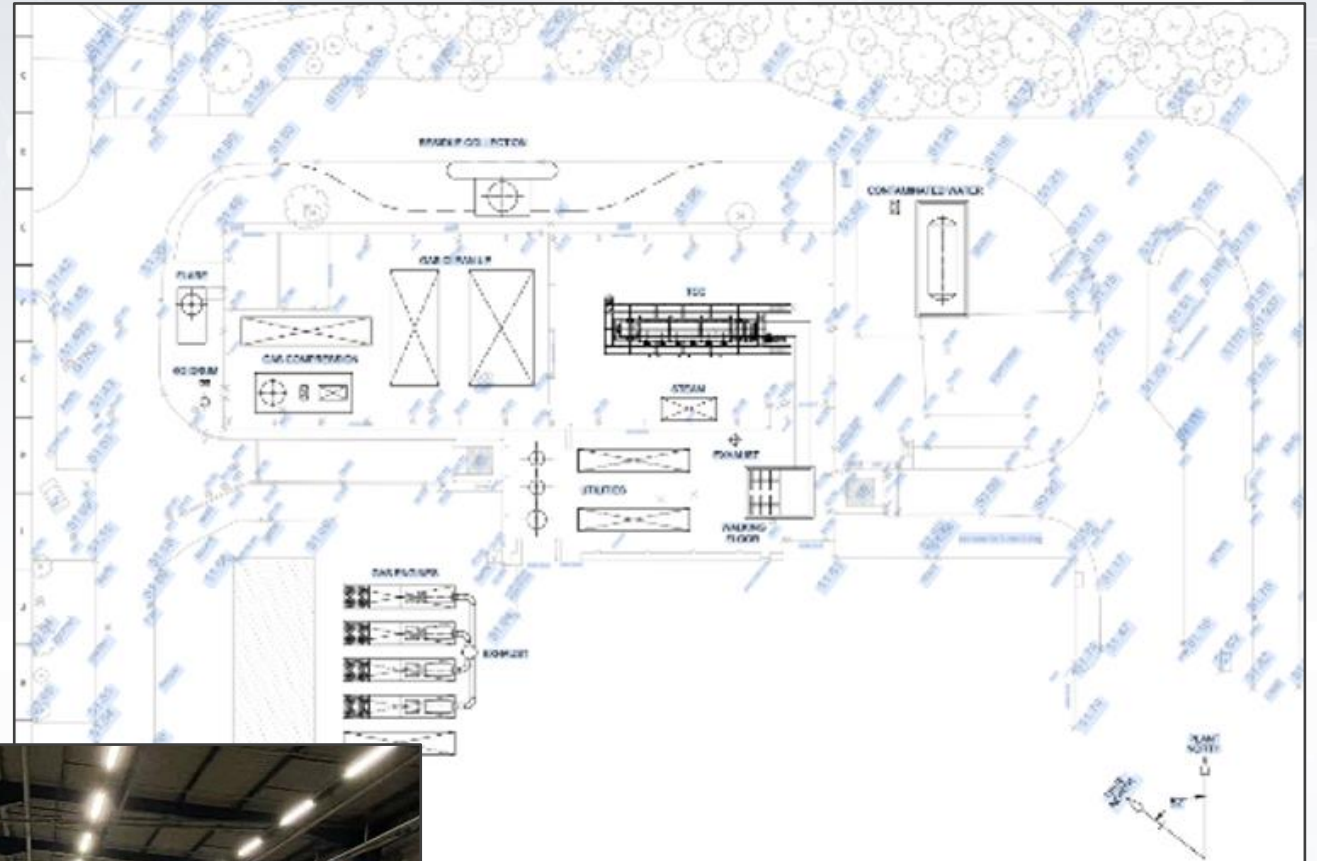


Produces approximately **2 tonnes per day** of hydrogen for the basic module size.



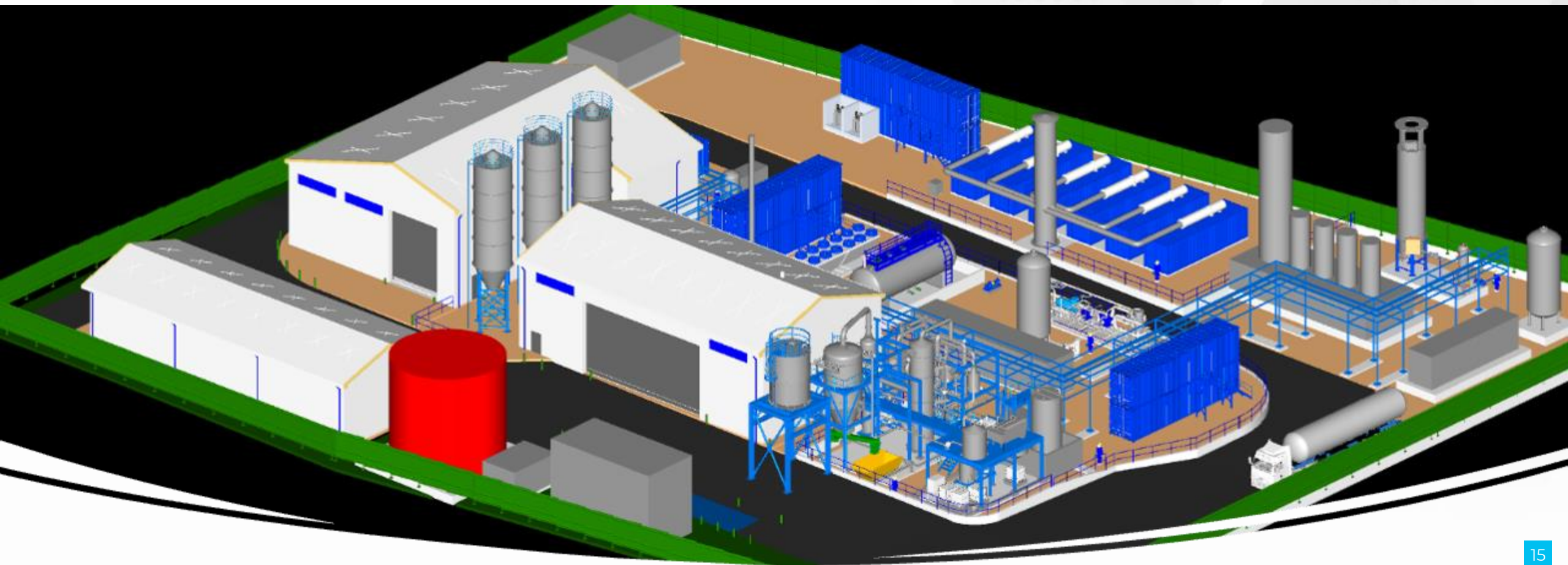
Northern Ireland

Pursuing opportunities in Ballymena NI, which is rapidly becoming the Hydrogen Hub of Northern Ireland, talks in progress on land options, feedstock supply and offtake arrangements.



Plastics to Hydrogen No1

First industrial scale unit has been developed to FEED level at Protos Plastic Park near Elsmere Port with approximate **development cost of £50 million**, Planning approved and draft permit received.



Technology Development

Expanding on Previous works

- Background research on behaviour of materials under heat and the application of thermo-chemistry
- Aspen process simulation
- Working with universities on design analysis using advanced computerised methods
- ~50 Kgs per day of feedstock processing
- Providing testing data for process modelling

Laboratory 1 $\frac{1}{2}$ Unit

Process Research Demonstrator

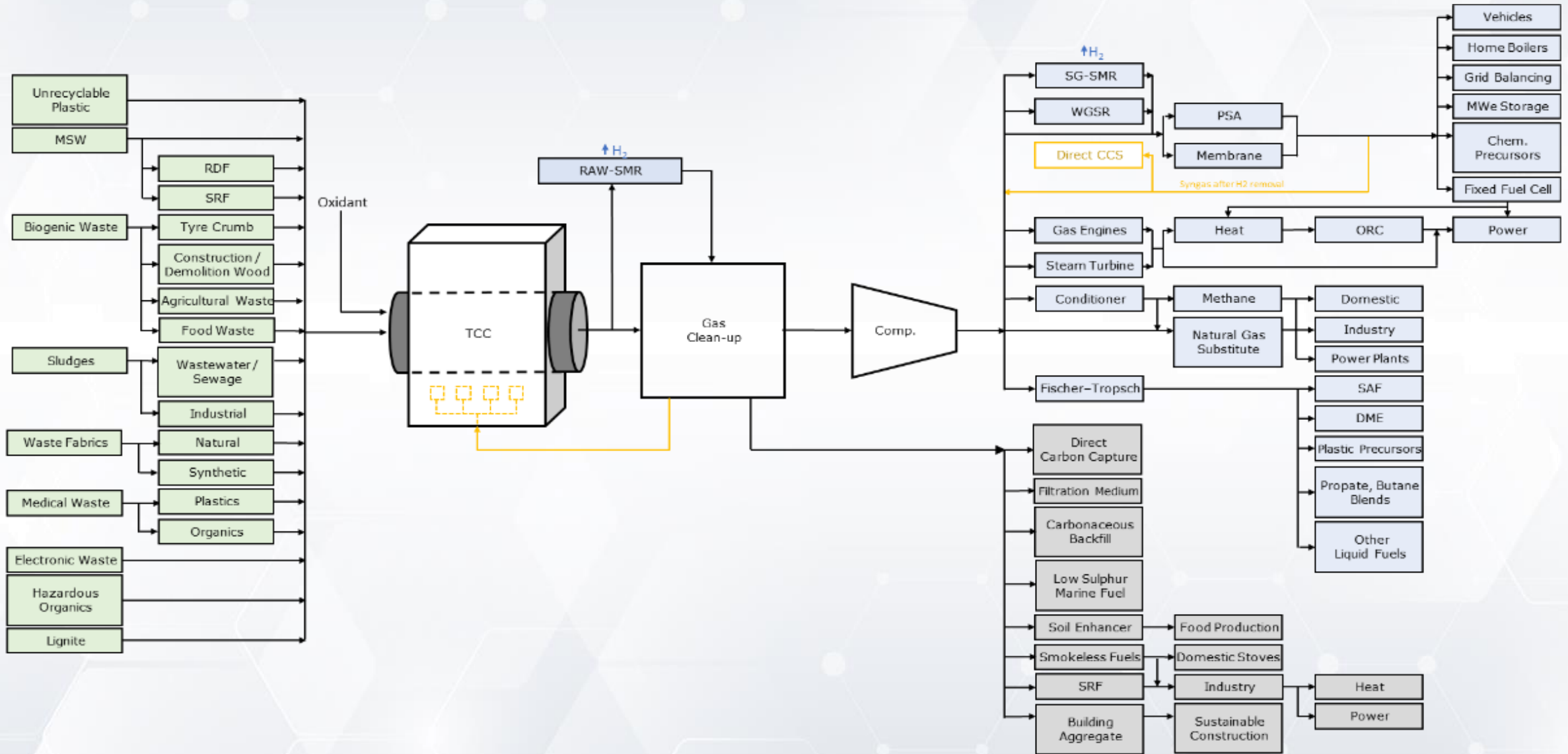
- ~750 Kgs per day of feedstock processing
- Providing testing data for process modelling
- Syngas produced run through Gas Engine generator
- Connected to University Micro Grid

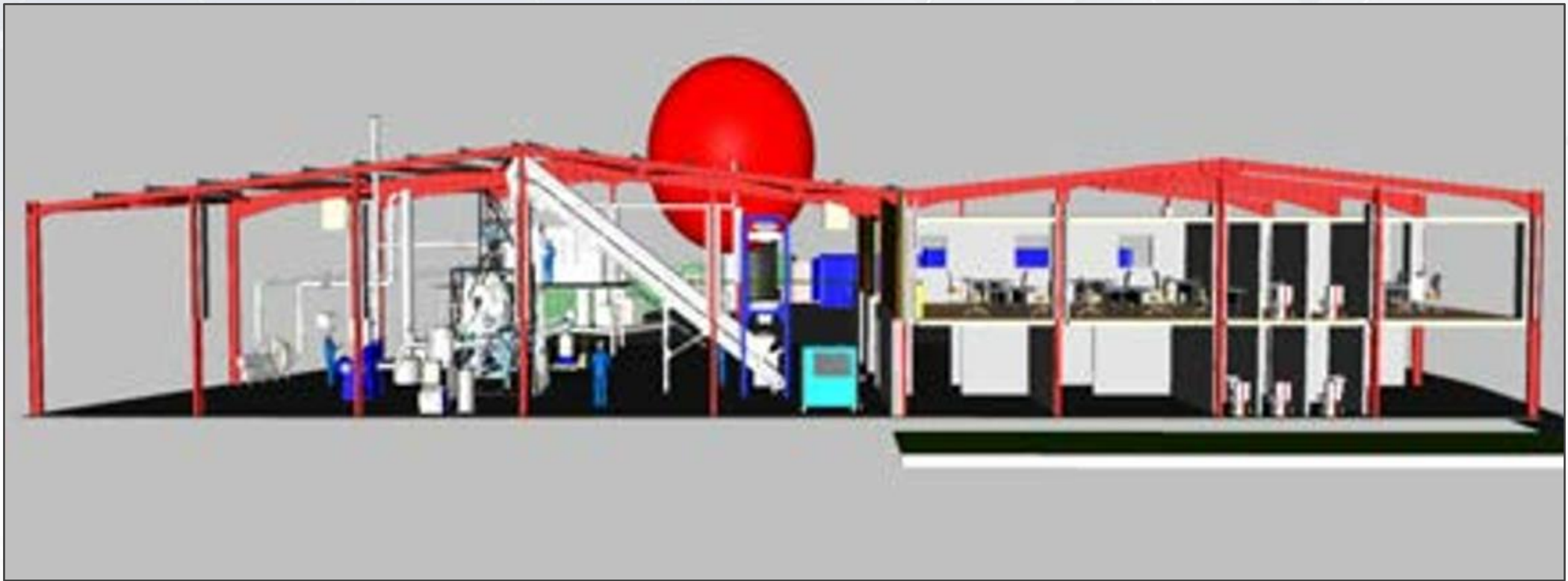
Pilot Plant (in build)

- ~2,500kg a day of feedstock processing
- Providing testing data for process modelling
- Providing a technology showcase
- Widens R&D scope



The Potential of Powerhouse Technology





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