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Powering Industrial Decarbonisation: SMRs for Materials Processing Industries

14 MAY 2026 | LONDON, UK

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KEYNOTE

Nicola Rega

EXECUTIVE DIRECTOR, CEFIC
CHAIR ON INDUSTRIAL APPLICATIONS, EUROPEAN INDUSTRIAL ALLIANCE ON SMRS

CONFERENCE

Powering Industrial Decarbonisation: SMRs for Materials Processing Industries

14 MAY 2026 | LONDON, UK

Small Modular Reactors – Industrial Alliance

Nicola Rega

Executive Director Climate Change and Energy

Cefic

Host: The European Chemical Industry Council, AISBL – Rue Belliard, 40 - 1040 Brussels – Belgium
Transparency Register n°64879142323-90

European Industrial Alliance on SMRs - TWGs

Technical Working Group - INDUSTRIAL APPLICATIONS

Key Objectives

IDENTIFY (A)	ASSESS (B)	DEVELOP (C)
Engage with industry stakeholders, regulators, and other relevant parties	Potential of SMRs by industrial sector Electro and energy-intensive industries, hydrogen, data centres, maritime applications, electricity network,…	A **roadmap** for the deployment of SMRs in industrial settings • potential **pilot projects** • support of **demonstration projects**
Identify the **technical, regulatory, and economic** challenges (SMRs for industry)	Potential **economic and competitive** advantages of using SMRs	
Identify **R&D needs** to optimize SMR technology for specific **industrial applications**	**Sustainability** benefits of the industry of using SMRs in different applications	**Recommendations** and guidelines for policy and regulatory frameworks

nuclearеurope

SNETP Sustainable Nuclear Energy Technology Platform

Challenges for SMR deployment for EIIs

- Upsetting the heat/steam **balance** on industrial sites
- Lower potential for **replicability** due to specific demand characteristics of each site
- Convening the **risk assessment** jointly between industrial and nuclear plants
- Conversion of industrial processes needed to enable **compatibility** with SMR

Technical

- Particular attention on the **permitting**

Regulatory

- **Proving** the expected competitiveness, **valorising** dispatchability beyond LCOE and build solid business cases driven by the willingness to pay
- Structuring **Power Purchase Agreements** of long date

Financial

Drivers for targeting FOAK projects

- **Minimal process disruption**: Applications that require little to no re-engineering.
- **Scalability and replicability**: Projects with high potential for replication at other sites.
- **Decarbonisation potential and demand size**: Applications with substantial demand and high decarbonisation potential.
- **Baseload energy optimisation**: Applications that can fully leverage the benefits of baseload energy production, such as continuous operation and high-capacity factors.
- **High-temperature heat demand**: Applications requiring high-temperature heat, where low-carbon alternatives are limited or non-existent, and electrification is not a viable option.

Recommendations

For decision-makers:

- **Support SMR and AMR technologies:** The EU should actively pursue parallel support for both SMR and AMR technologies to maximise industrial engagement and accelerate deployment timelines.
- **Provide financial support:** Increase the budget for existing and future financing instruments and ensure equitable access to funds to support SMR development and industrial applications.
- **Promote low-carbon hydrogen production:** Establish a level playing field for all forms of hydrogen production, including renewable and low-carbon hydrogen, and recognise nuclear power plants as a source of low-carbon hydrogen.
- **Address permitting and regulatory challenges:** Anticipate and proactively address permitting and regulatory challenges associated with deploying SMRs on industrial sites and adjust policy regimes accordingly. Explore different opportunities offered by NZIA in this respect.

Recommendations

For SMR developers:

- **Prioritise applications with minimal process disruption:** Focus on applications that require little to no re-engineering of existing processes and installations.
- **Target scalable and replicable projects**: Prioritise projects with high potential for replication at other sites to maximise impact and minimise risks.
- **Address high-temperature heat demand**: Focus on applications that require high-temperature heat, where low-carbon alternatives are limited or non-existent.
- **Engage with other EU partners** in developing concrete R&I, Demonstration, and infrastructure projects related to different industrial applications in the context of the IPCEI on innovative nuclear technologies and the Euratom Programme.

Thank you.

Contact:
Nicola Rega
Executive Director Climate Change and Energy, Cefic
nre@cefic.be

About Cefic

Cefic, the European Chemical Industry Council, founded in 1972, is the voice of large, medium and small chemical companies across Europe, which provide 1.1 million jobs and account for 15% of world chemicals production. Cefic members form one of the most active networks of the business community, complemented by partnerships with industry associations representing various sectors in the value chain. A full list of our members is available on the Cefic website.
Cefic is an active member of the International Council of Chemical Associations (ICCA), which represents
chemical manufacturers and producers all over the world and seeks to strengthen existing cooperation with global organisations such as UNEP and the OECD to improve chemicals management worldwide

The European Chemical Industry Council, AISBL – Rue Belliard, 40 - 1040 Brussels – Belgium
Transparency Register n°64879142323-90

PANEL 1

Technological Innovations in SMRs for Materials Processing

Chaired by Nicola Rega, Cefic / European Industrial Alliance on SMRs

- Ed Hawkes, Engineering Director – Fusion and Modular Nuclear, **Assystem**
- Mark Allan, Green Metals & Green Steel Centre Leader, **Materials Processing Institute**
- Rob Mossop, Consultant, **Equilibrion**

assystem

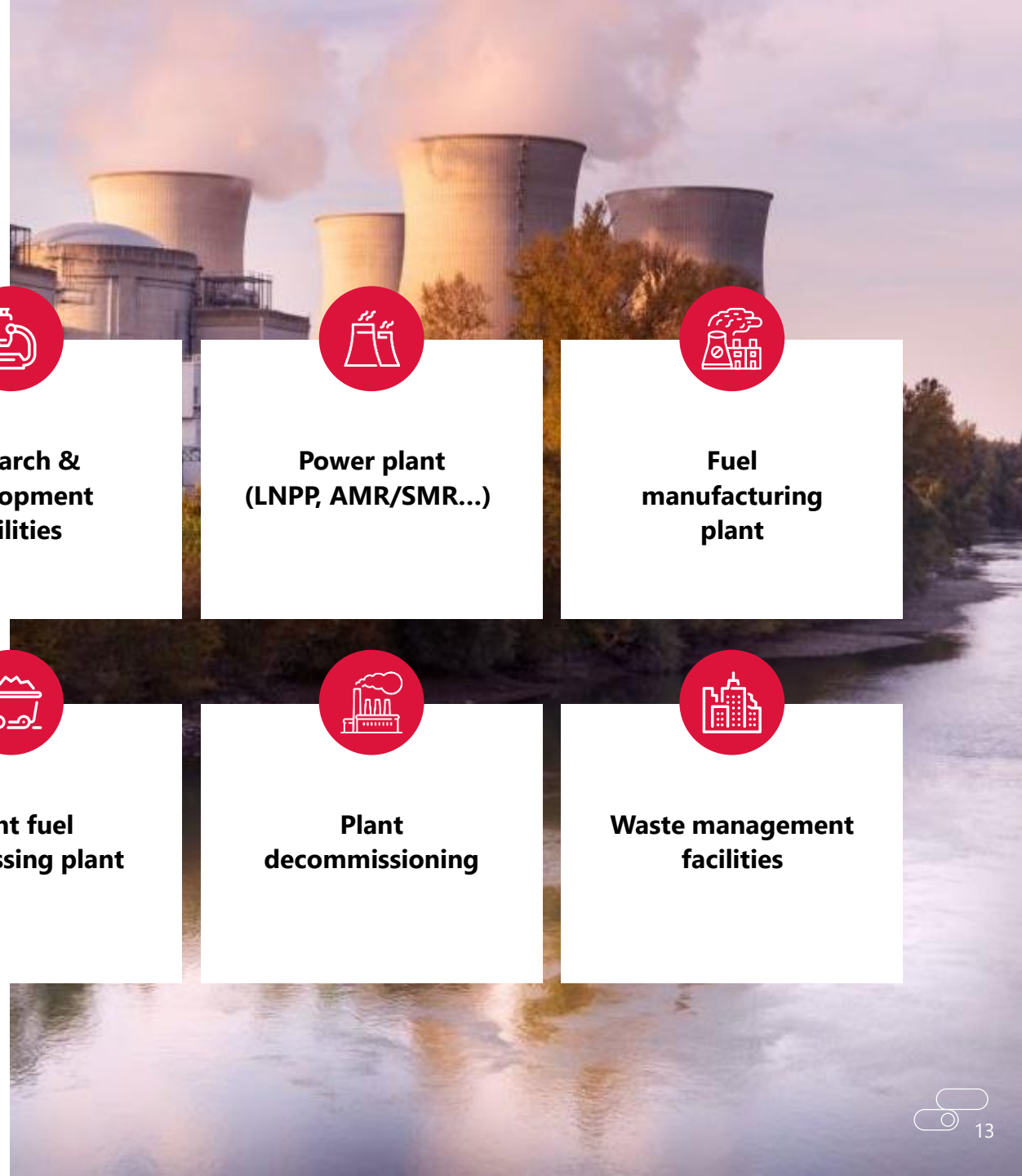
NEW NUCLEAR WATCH INSTITUTE

The Role of AMRs in Decarbonising Industry.

SWITCH ON ENGINEERING & DIGITAL FOR ENERGY TRANSITION

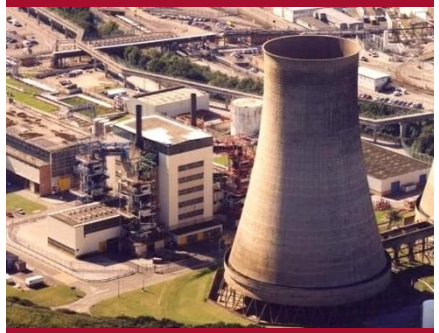
Assystem in nuclear.

- **60** years of **expertise.**
- Ranked in the **TOP 3** independent nuclear engineering companies in the world.
- **5,000** engineers & technicians **dedicated to nuclear.**
- Capabilities across the **full nuclear lifecycle.**



The Nuclear Landscape.

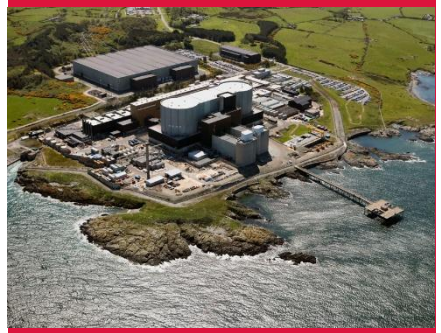
Generation I



Early Prototypes

- Calder Hall
- Shippingport
- Douglas Point
- EBR-I
- Obninsk

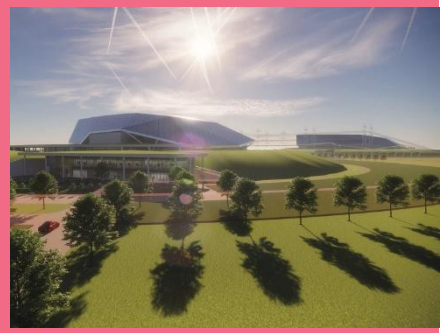
Generation II



Large-scale Power Stations

- AGR
- PWR
- BWR
- CANDU

Generation III/III+



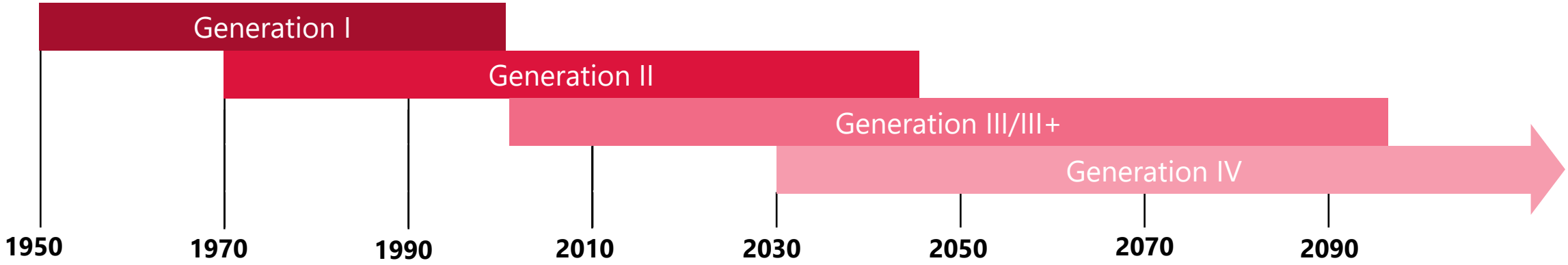
Evolutionary Designs

- EPR – Hinkley Point C, Flamanville 3, Olkiluoto 3
- AP1000 – Vogtle 3&4, Haiyang, Sanmen
- APR-1400 – Barakah, Saeul
- Small Modular Reactors – RR SMR, AP300, BWRX-300, Nuward, NuScale

Generation IV

Innovative Designs

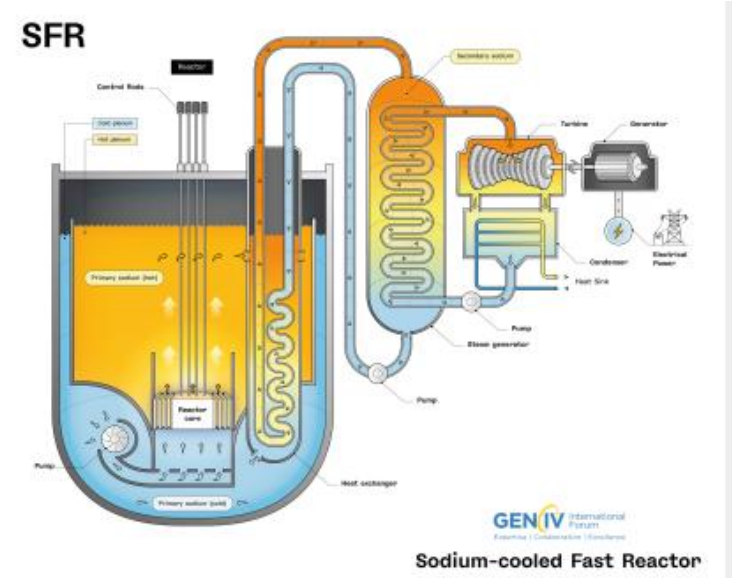
- SFR – TerraPower, PMBR
- LFR – BREST-OD-300
- HGTR – X-energy
- MSR – Kairos Power



https://www.rte.ie/news/2007/0929/94079-sellafield/; https://en.wikipedia.org/wiki/Wylfa_nuclear_power_station; https://en.wikipedia.org/wiki/Hinkley_Point_C_nuclear_p; RR SMR; https://www.world-nuclear-news.org/articles/key-equipment-manufactured-for-brest-od-300-reactorower_station; https://gif.jaea.go.jp/about/index_eng.html

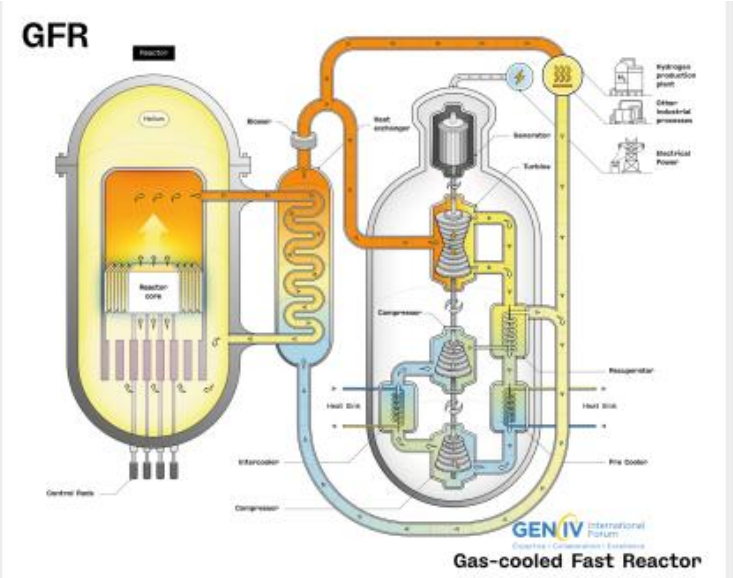
The AMR Landscape.

SFR



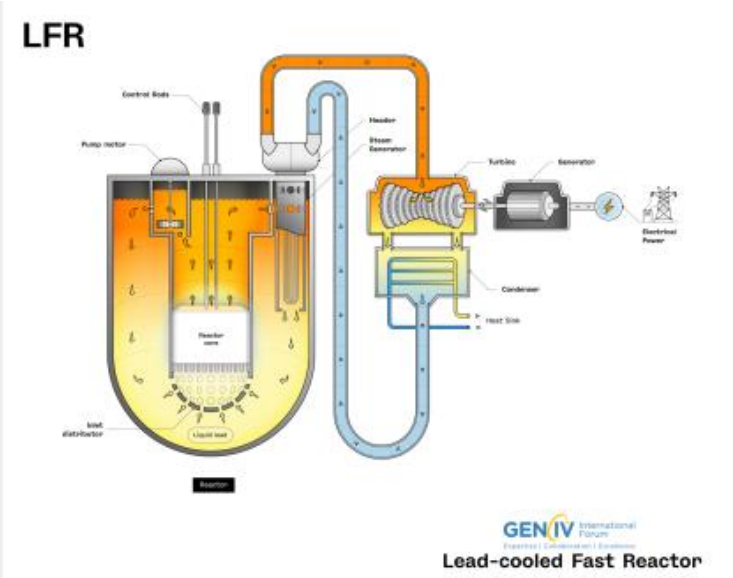
Sodium-cooled Fast Reactor

GFR



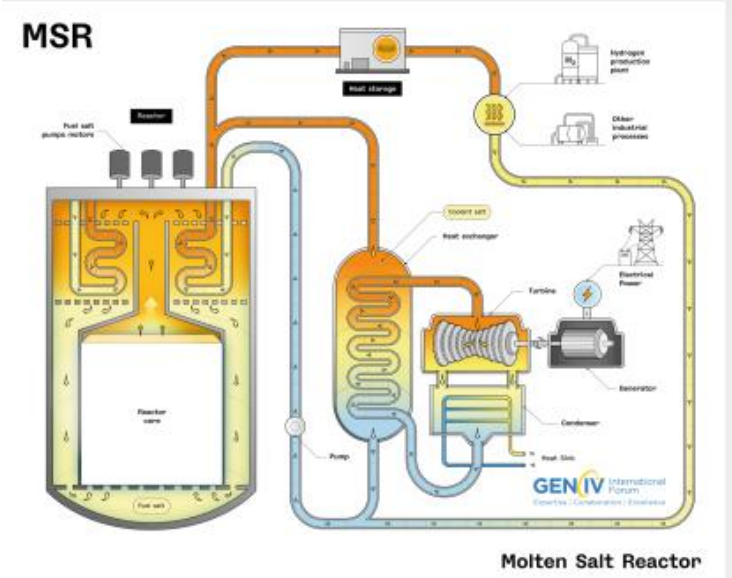
Gas-cooled Fast Reactor

LFR



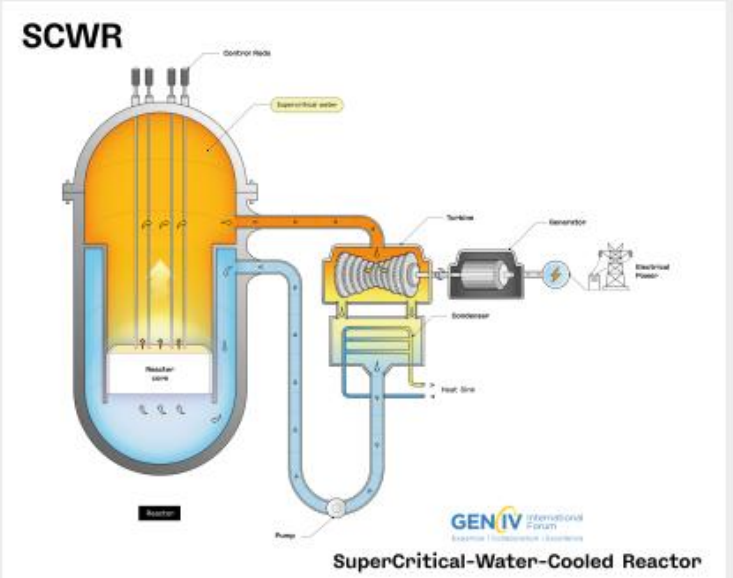
Lead-cooled Fast Reactor

MSR



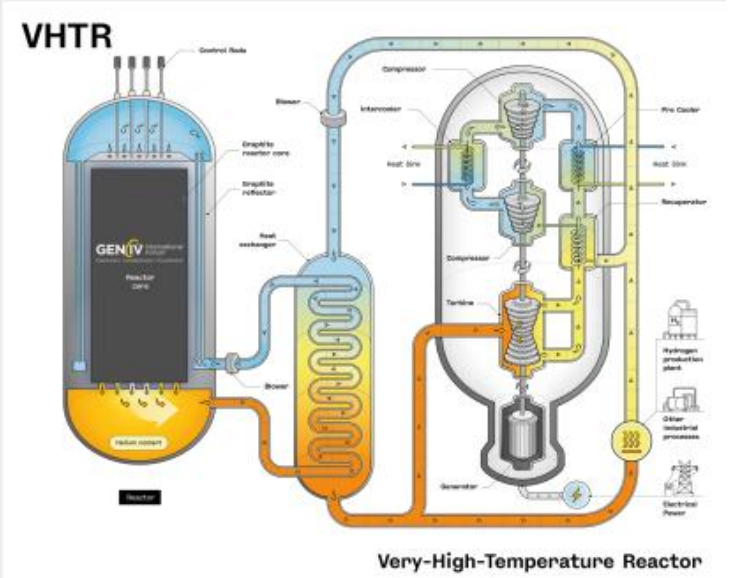
Molten Salt Reactor

SCWR



SuperCritical-Water-Cooled Reactor

VHTR



Very-High-Temperature Reactor

https://www.gen-4.org/generation-iv-criteria-and-technologies

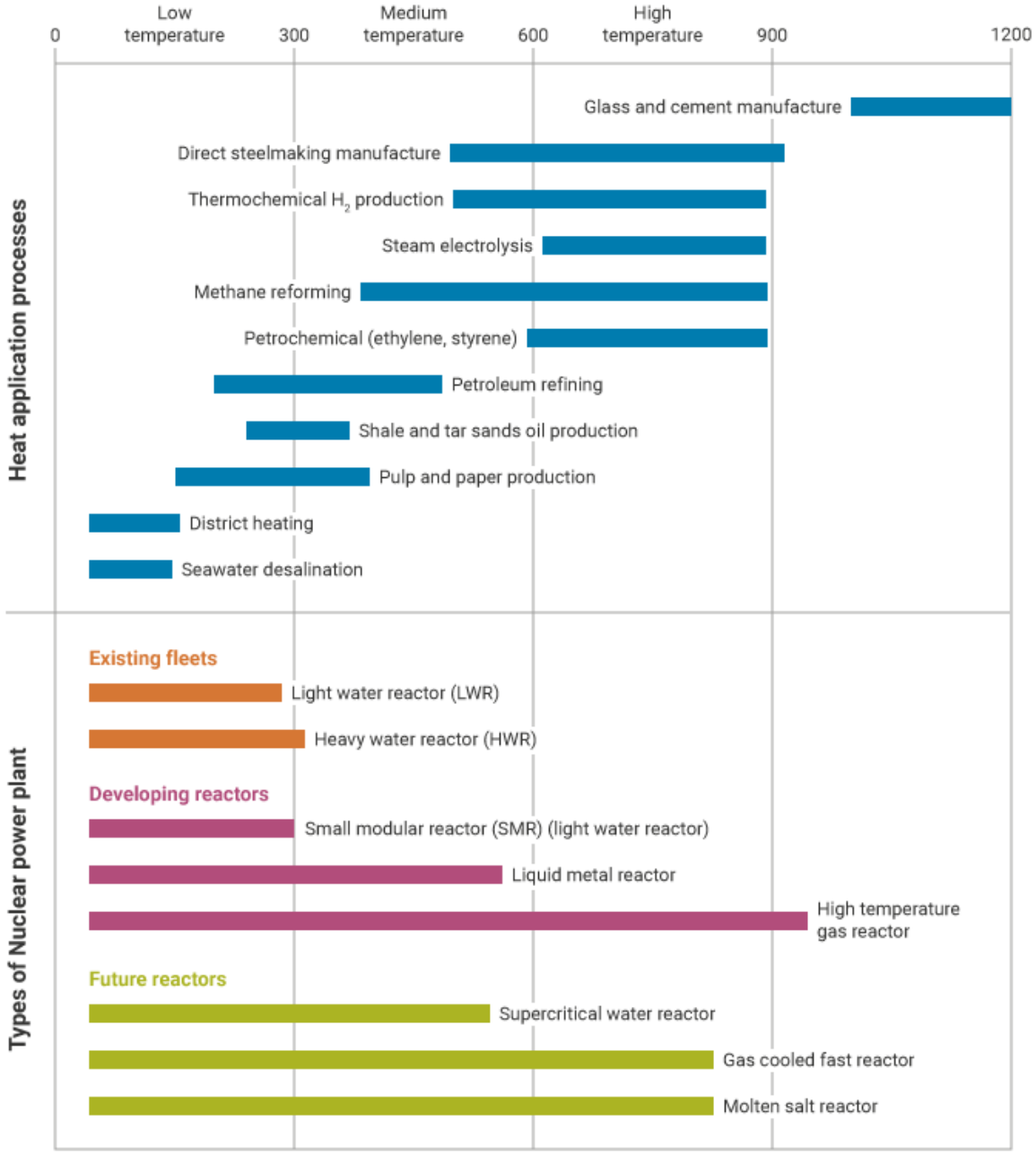
Putting the ‘A’ in AMR.

- Exotic coolants allow unpressurised operation due to high boiling points, reducing the risk associated with coolant leaks.
- Several AMR designs have high thermal inertia, providing longer windows before operator intervention is required.
- Molten Salt Reactor designs with liquid fuels have fusible plugs that drain the fuel in faulted conditions, preventing accidents.
- Accident-tolerant fuels offer significant safety, and hence plant simplification, benefits.
- Pebble-bed designs enable on-line refuelling, reducing outage frequency and increasing availability.

https://www.ans.org/news/2026-02-23/article-7780/triso-pebble-lifecycle-studied-in-new-ornl-kairos-power-partnership/

AMRs and Industrial Applications.

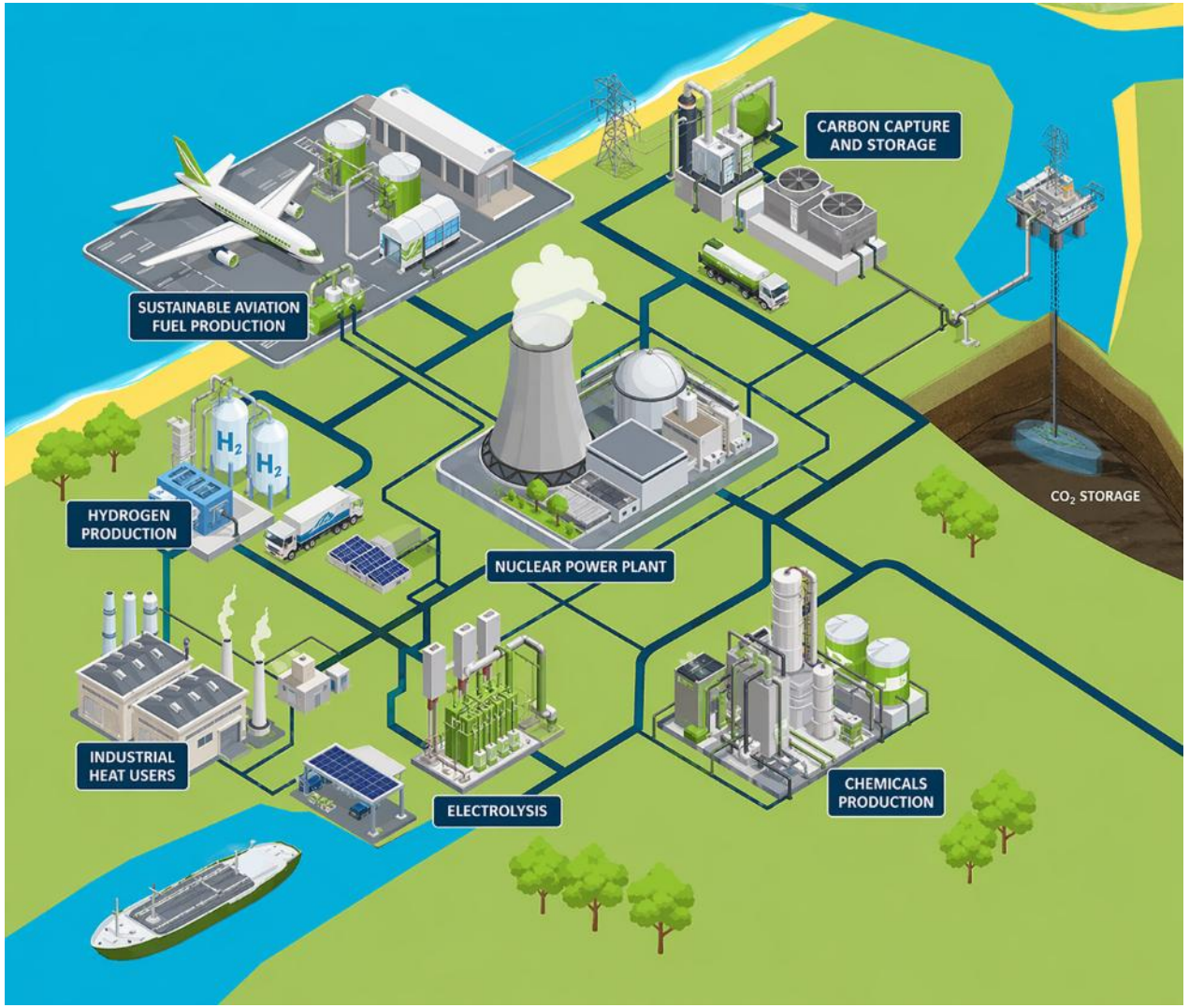
- AMR technologies offer opportunities to help decarbonise a range of industrial processes beyond just electrification.
- Higher operating temperatures open up the potential high-temperature heat off-take for industrial applications, including hard-to-abate sectors.
- Higher operating temperatures allow greater efficiencies to be achieved and the direct use of nuclear heat also avoids inefficiencies associated with the production of electricity.
- The use of nuclear power in electrolysis provides a stable route for the production of green hydrogen for other processes such as Sustainable Aviation Fuel production.



https://world-nuclear.org/information-library/non-power-nuclear-applications/industry/nuclear-process-heat-for-industry

The Nuclear Anchor.

- The safety benefits of AMRs also allow opportunities for siting closer to industrial off-takers and population centres.
- This increased flexibility in siting allows a new nuclear to act as an anchor project around which new industrial off-takers can develop.
- The nuclear power plant provides a stable, long-term source of power, while the off-takers represent a ready-made customer base that can assist in attracting up-front financing for the power plant.
- Increasing ‘pull’ from potential off-take projects and local industrial clusters.



Bay Hydrogen Hub.

- Pilot project at Heysham nuclear power plant to divert small amounts of heat and steam to an electrolyser to produce hydrogen.
- Hydrogen supplied to Heidelberg Materials for use in a burner to extract moisture from aggregates.
- First tests demonstrated up to a 50% reduction in NOx ppm and near zero carbon emissions.

https://www.edfenergy.com/energy/power-stations/heysham-1

Thank you.

Materials Processing Institute

1944 - 2019 75 YEARS OF INNOVATION

Synergies and opportunities.. Materials processing x SMRs

Mark Allan, Green Steel Centre Lead

14th May 2026

Materials and Process Innovation for a Sustainable Future

Materials Processing Institute

SCOTLAND
Aberdeen
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St Andrews
Stirling
Edinburgh
Glasgow
United Kingdom
Newcastle upon Tyne
Durham
Belfast
Isle of Man
Dundalk

www.mpiuk.com

Materials and Process Innovation for a Sustainable Future

We are the independent, one-stop shop for scaling up and commercialising innovations in materials, technologies and processes

Established independently out of the UK steel sector in 2014 and now working internationally with and beyond steel, metals, cements and energy

We are proud of our societal mission alongside our technical and economic impact, supporting early careers and workplace wellbeing and diversity

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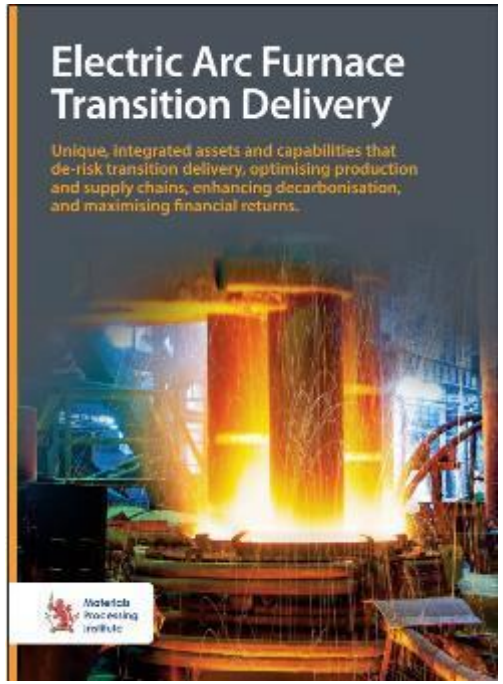
The Green Steel Centre works with the steel industry and supply chain, to develop and perfect technologies, materials, processes, and knowledge to decarbonise steel production and accelerate the emergence of a sustainable, profitable Green Steel economy

Derisking Green Steel is about people, plant and vision



Scrap quality

Ore reduction and melting (NG/H_2 DRI)

"Best in Class" analytical lab equipment

AI process and material optimisation

Robust wireless instrumentation

Human-centred AI

7T EAF

AI

Gas, Electric, H_2 Heating Furnaces

Pilot Scale Plant

Assay melting
Steelmaking
Blending scrap and OBM
Slag making
Equipment testing
Carbon assessment
Lime assessment
Residuals assessment

Train and educate the next generation of electric steelmakers

Slab and Ingot Casting

LCA and ViU

Rolling and forming

Materials Processing Institute


UK Government
The UK Steel Strategy
Materials Processing Institute
UK Primary Steelmaking Review 2025
UK Steel Strategy Demand Assessment
Executive Summary
13 February 2026
Prepared for the Department of Business and Trade
Department for Business & Trade
HATCH
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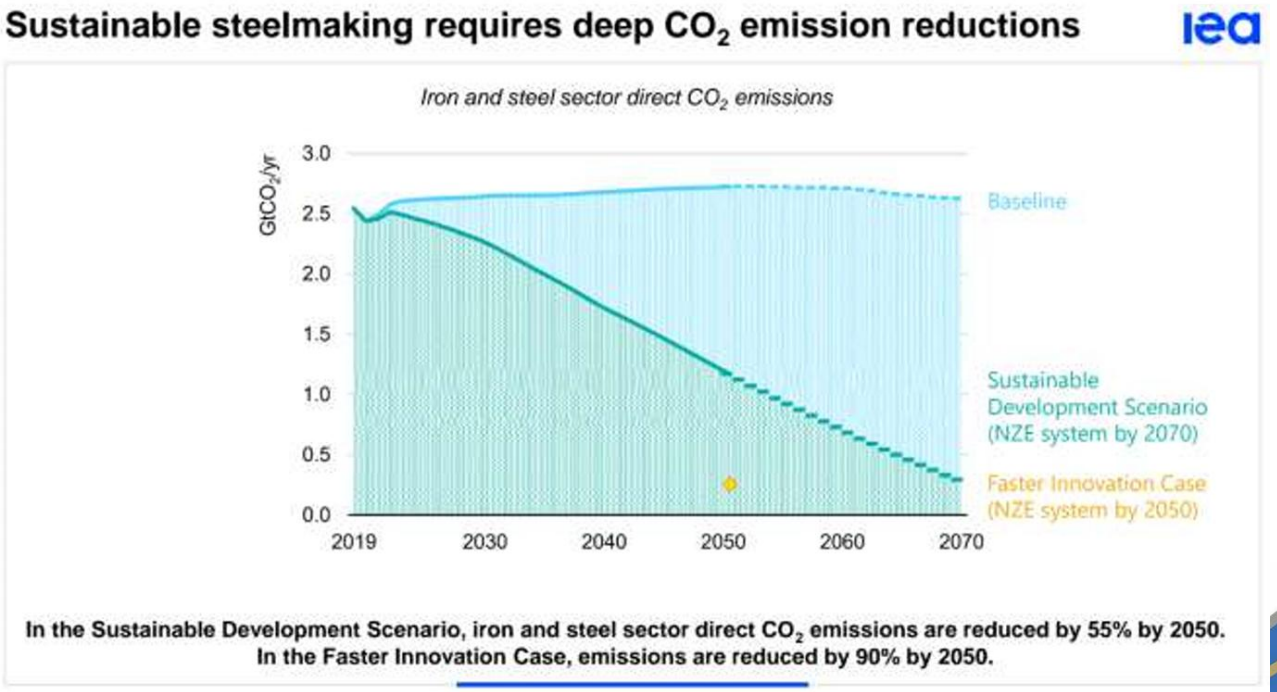
Iron and Steel Evolution x SMRs

- Fossil-free iron and steel is starting to break through as a material of choice for responsible procurement in a sustainable economy.
- Steelmaking globally contributes 8% or more of annual human CO2 emissions. Many steel brands now have a ‘green’ offering and various national or international standards are emerging (Responsible Steel, Global Steel Climate Council, Low Emissions Standard Steel, the Taxonomy of Green Steel for India) in tandem with growing market demand for independently certifiable low embodied emission products.



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Iron and Steel Evolution x SMRs

- Deep decarbonisation of iron and steel is possible through a combination of electrification and fuel switching
- The world's first new build 'fossil free' plants are scheduled to come on stream from 2026, reducing iron by DRI but using hydrogen not natural gas, then melting it and blending with recycled scrap in EAFs, casting and rolling it into shape – with the whole operation powered by renewable electricity.
- Other steelmakers and iron ore suppliers are transitioning to these technologies more gradually over the next decade.

- **The transition away from 'integrated' steelmaking (all the ore-to-steel activity on one site powered ultimately by one pile of coal) is disrupting iron ore supply chains, metallic iron supply chains, and steelmaking**

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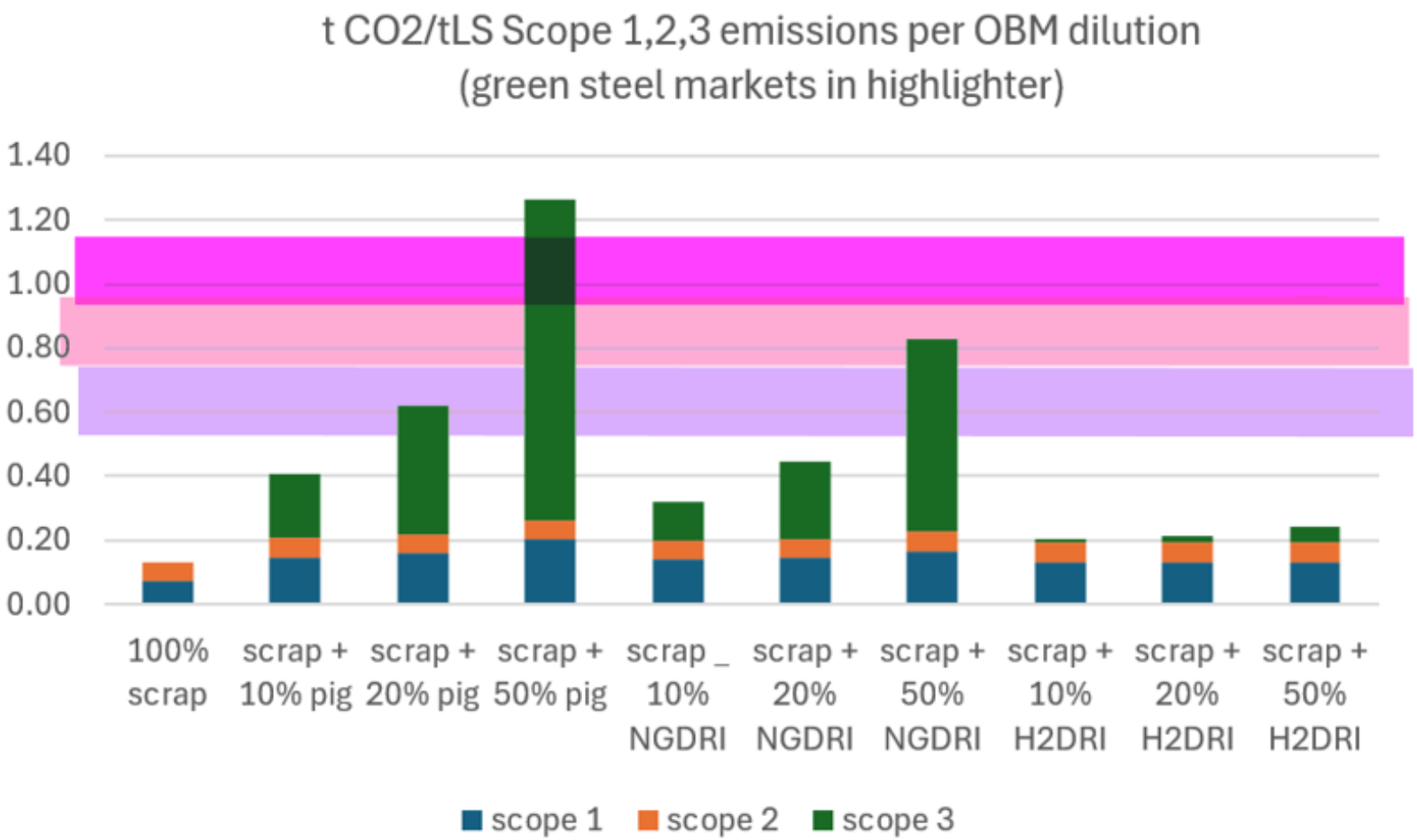
Production:

- Demand
- Ore-Based Metallics (OBM) Demand
- Production
- Supply
- Recommendations



Iron and Steel Evolution x SMRs

- This level of decarbonisation is significant for any energy grid or supply chain, particularly once DRI plants switch from natural gas to green hydrogen:
- a hydrogen DRI plant producing 2 million tonnes of iron per year would require around 12GWh of electrical power annually for electrolysis and heating of the hydrogen.
- A downstream steelplant would have a similar order of magnitude of electrical load, equivalent to a small city.
- This is why steelplants already have their own power stations..

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Iron and Steel Evolution x SMRs

- The attractive synergies between large steelplants and nuclear power is that lower point source emissions marry with a high baseload high temperature heat output which can supply electrical power, direct heat and electrical or thermally cracked hydrogen, all three of which can be utilised in making iron and steel, and forming it into products.
- Hydrogen DRI plants typically operate at around 900 °C; electrical steelmaking has a variable and spiky, but predicable load of hundreds of MW, and rolling and forming steel often requires temperatures of 1100 °C or more.
- In terms of hazard management, all major steelmaking sites are already top-tier COMAH.
- Challenges will be around lead times, reliability, whole life costs, and qualification for ‘green steel’ market standards

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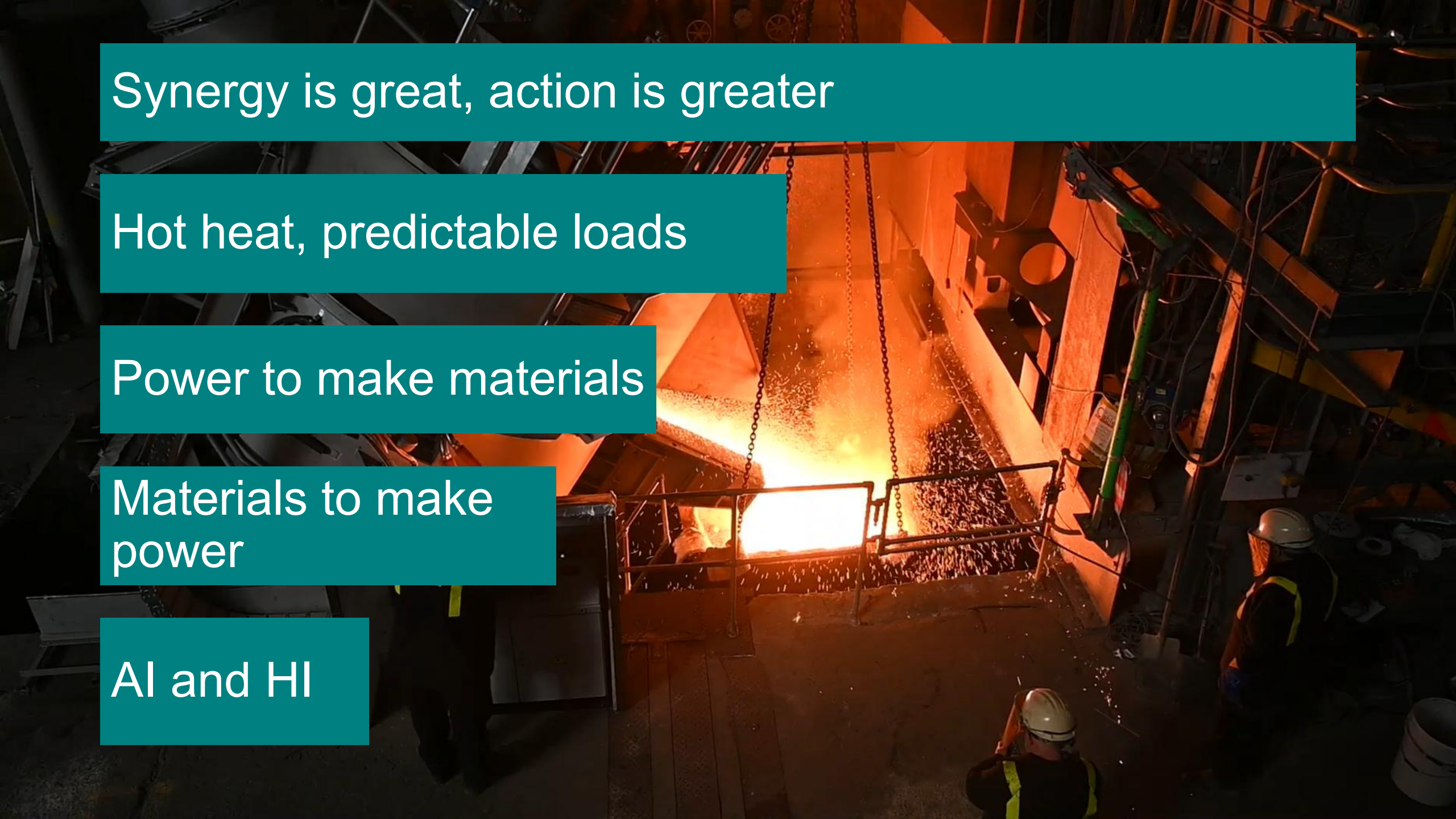
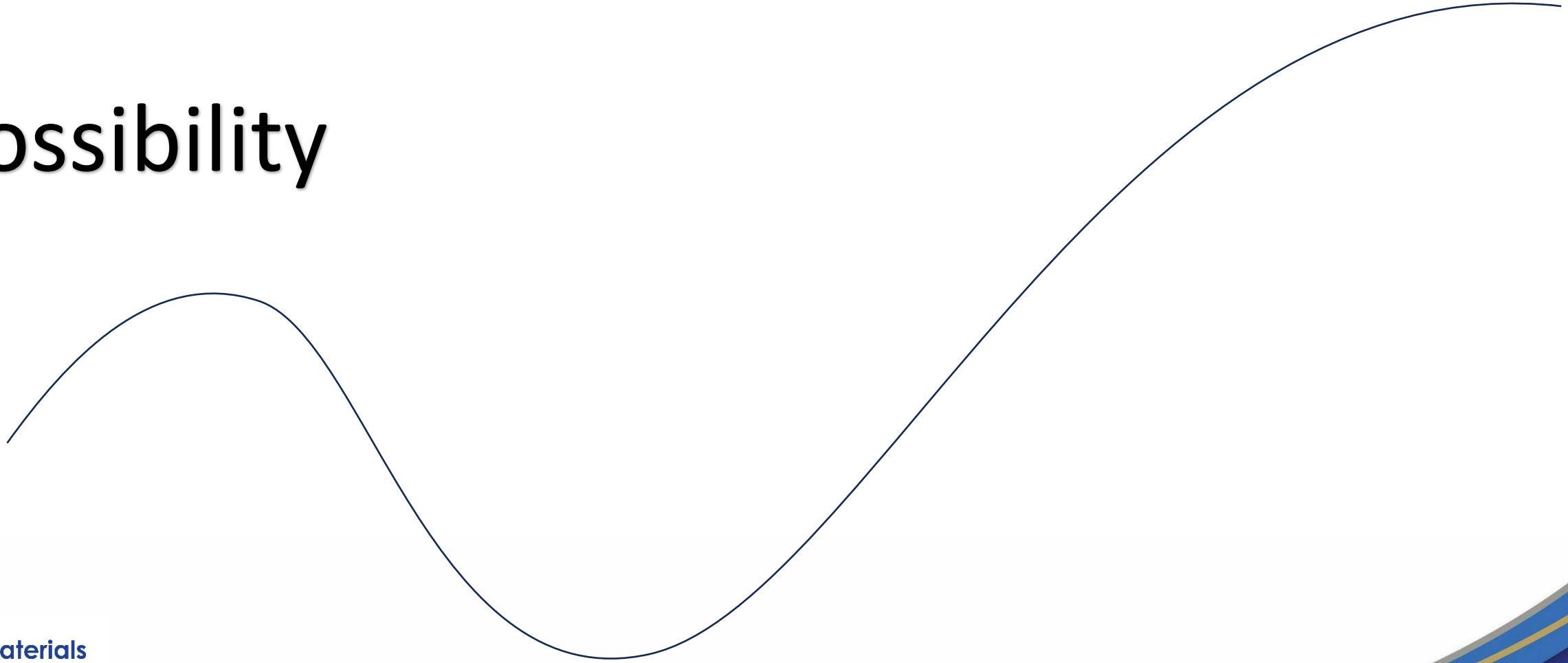

Synergy is great, action is greater
Hot heat, predictable loads
Power to make materials
Materials to make power
AI and HI

Reality

Possibility



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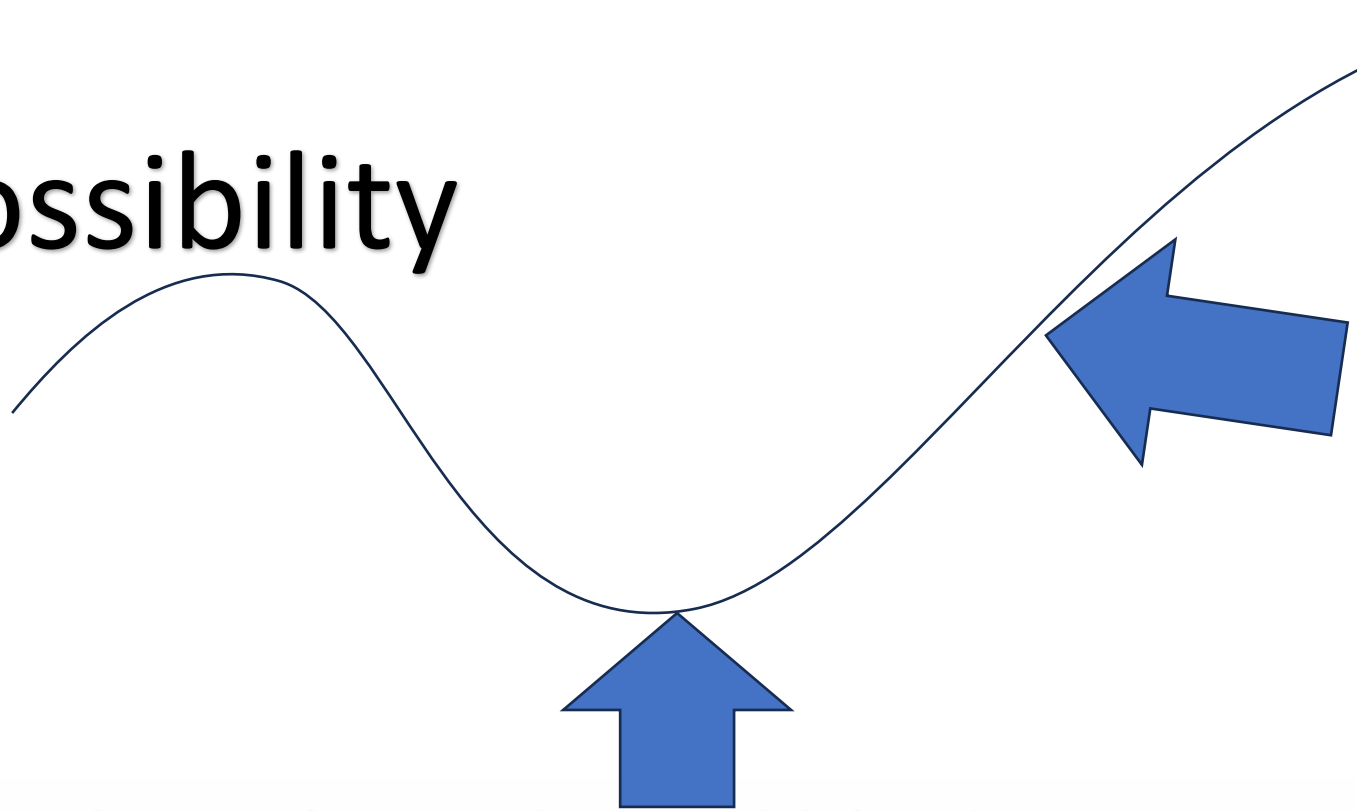
Reality

Possibility



Accelerating through credible partnerships

Derisking through credible demonstration

Materials Processing Institute

Thank you – please get in touch

Shiva Sundaram
Commercial Director
Shiva.Sundaram@mpiuk.com

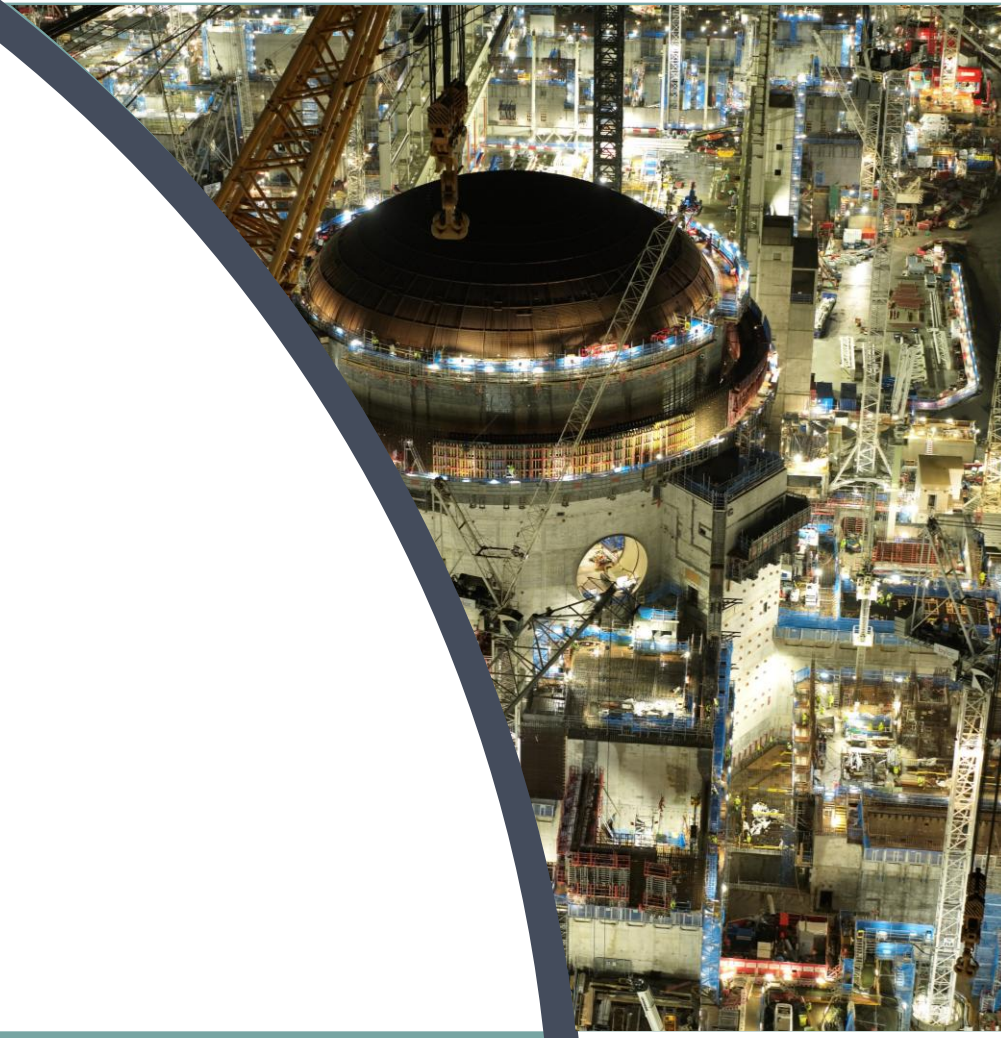
Mark Allan
Green Steel Centre
Mark.Allan@mpiuk.com

email
enquiries@mpiuk.com

Phone
+44 (0)1642 382000

www.mpiuk.com

Nuclear for Industrial Decarbonisation



Dr Rob Mossop

14th May 2026

Who we are

Equilibrion's mission is to deliver meaningful emissions reductions by enabling nuclear energy to decarbonise heat, transport and fuels

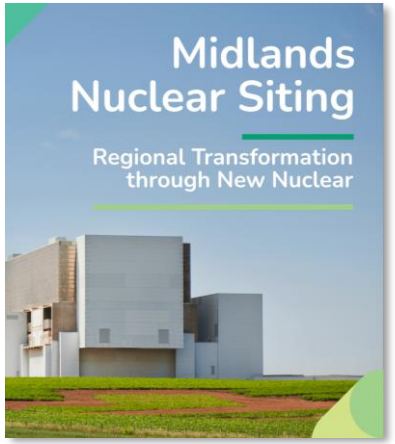
We do this by designing and delivering cross-sector propositions that enable end-to-end deployment of nuclear energy solutions

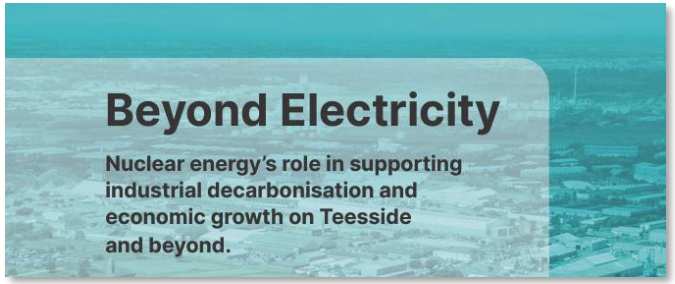
At the event today:

Dr Rob Mossop

Consultant

Physics and Design of Advanced Nuclear Reactors





SNETP
Sustainable Nuclear Energy Technology Platform

eq.flight

Department for Transport

Clean technologies still depend on fossil heat

Green technology is still, and in some cases increasingly, underpinned by fossil-powered materials processing:

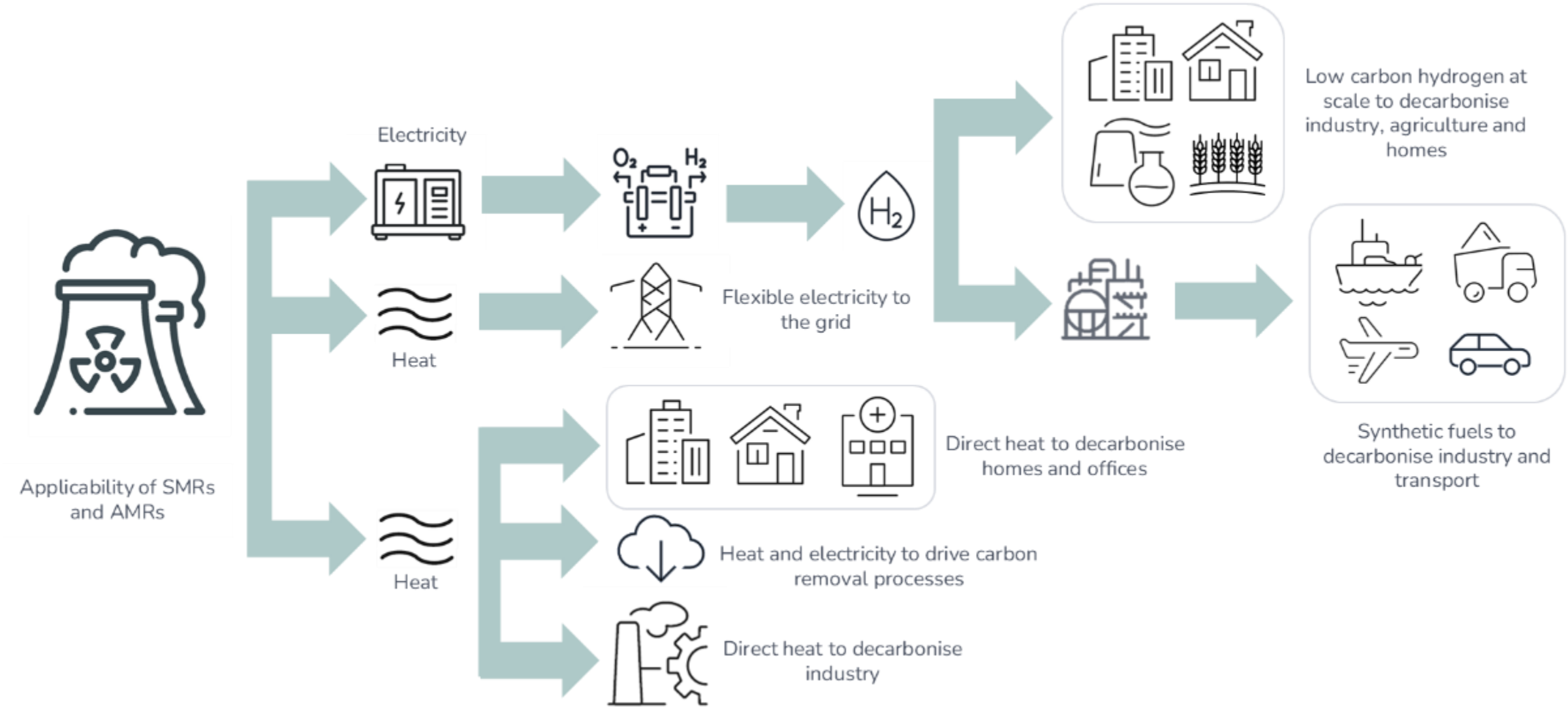
1. Near total de-electrification of magnesium production in China, putting electrified manufacturers out of business on price

2. Nickel for batteries increasingly produced in Indonesia, where coal generation is growing exponentially and expected to triple by 2040

3. Solar panel supply chains are increasingly dependent on coal-powered Chinese production, with several new coal plants directly feeding silicon and polysilicon facilities in Xinjiang.

The idea of a renewable and battery-led 'electrostate' is proving difficult, potentially impossible to achieve.

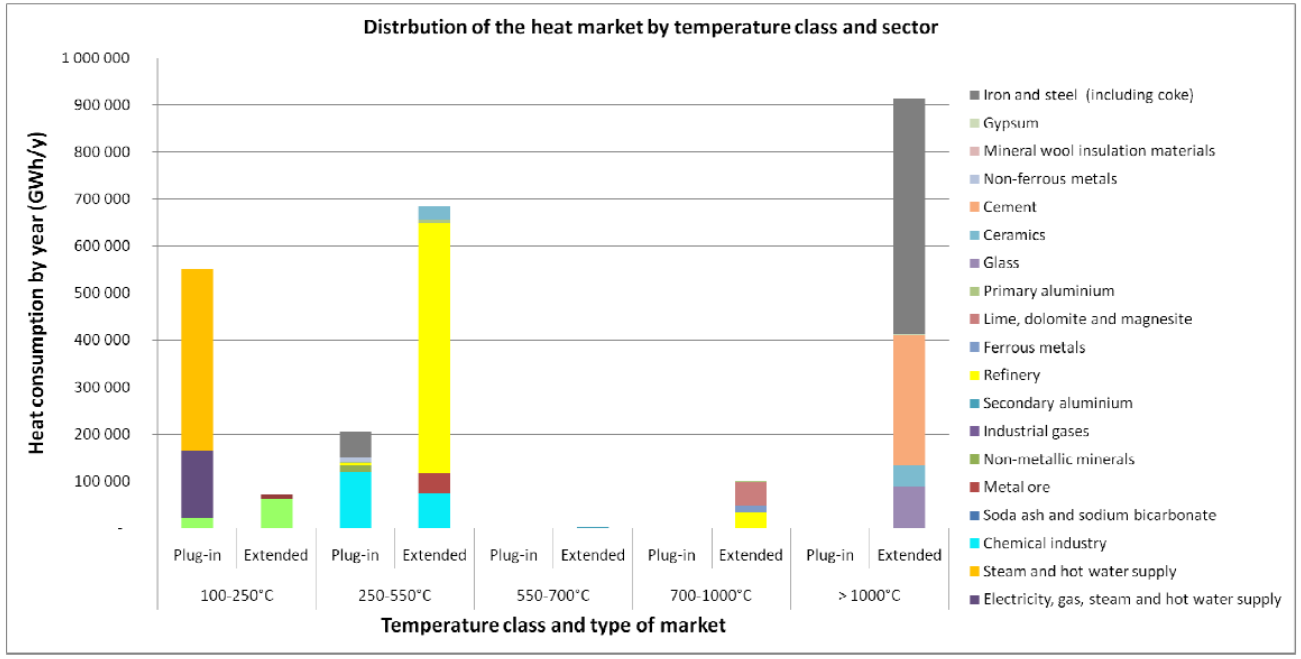
Role of Nuclear Energy

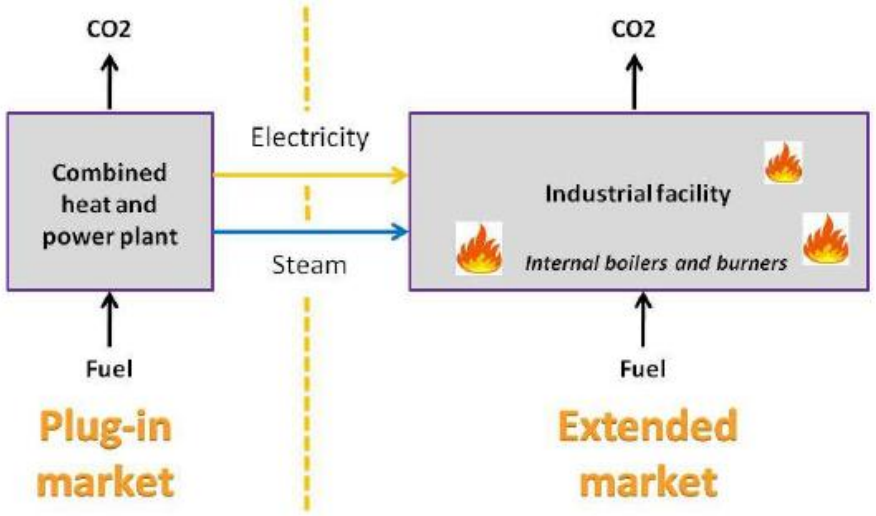


The 2011 EUROPAIRS Report

Equilibrion have been commissioned by SNETP to provide an update to the landmark EUROPAIRS project from 2011

The objective of the EUROPAIRS study was to quantify the European industrial heat market and qualify the energy usage in European heat intensive industries, with a focus on temperature





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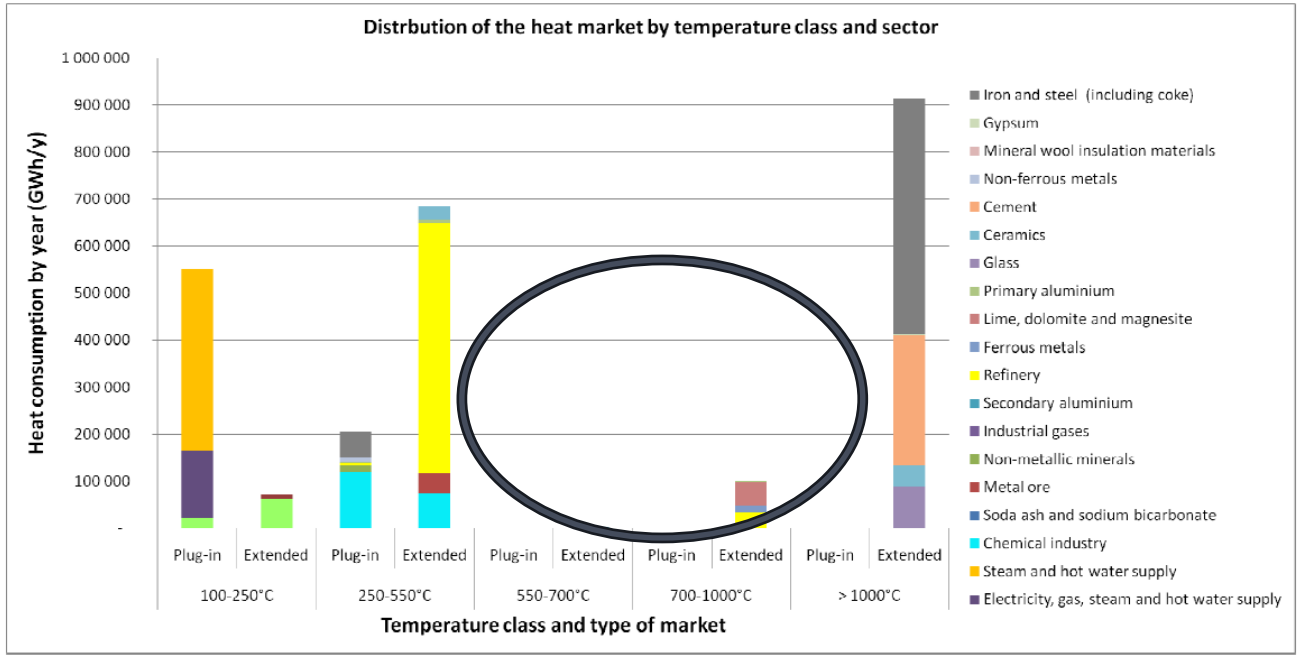


The big 4 contributors:

- **Steam and hot water**: Nuclear CHP can replace fossil boilers with reliable steam and hot water
- **Refinery:** AMRs can supply 500–550°C steam, process heat and hydrogen
- **Iron and steel:** Best fit is hydrogen for DRI, plus power and reheating support
- **Cement:** Supports preheating, clean fuels and electricity; full kiln substitution remains harder

End User Perspectives

End User Perspective

- Reliability and cost are central
- No single pathway will dominate
- 24/7 operations need firm energy
- Integrated energy systems are becoming more attractive

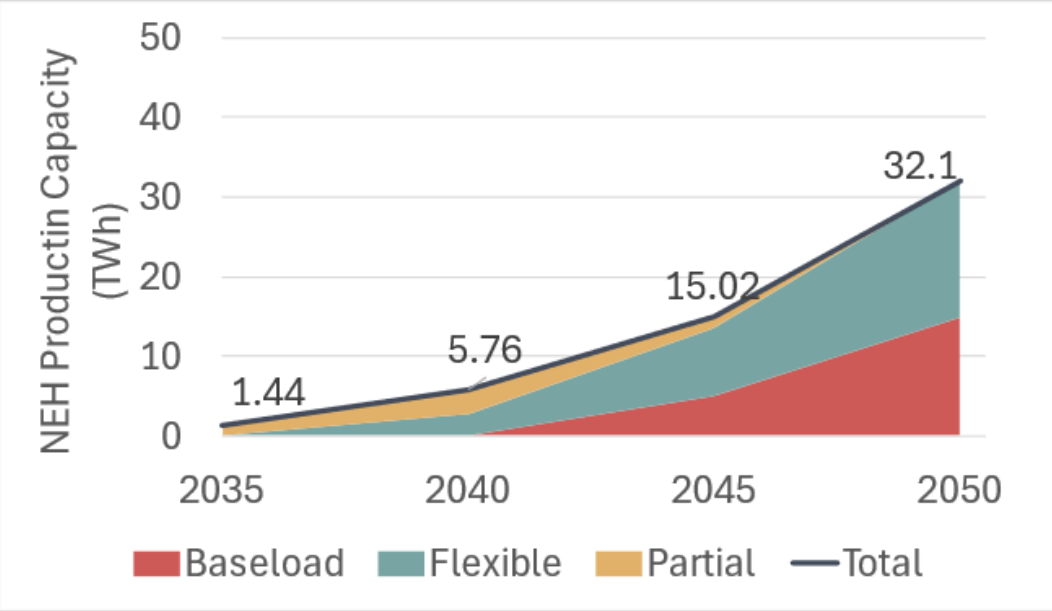
Potential Solutions

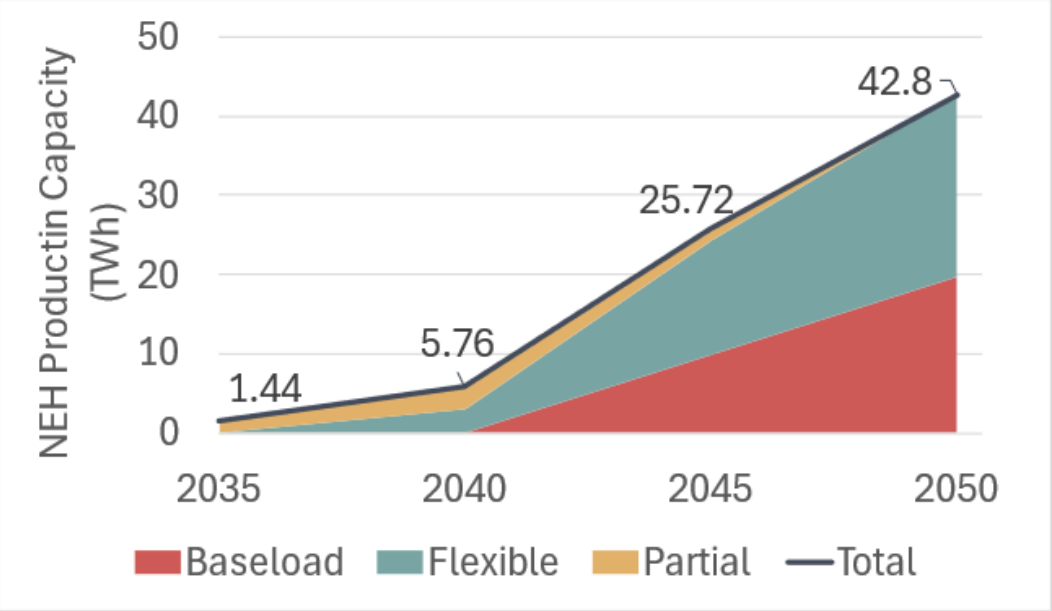
- Deliver steam at up to 550°C alongside electricity to replicate Combined Heat and Power plants
- Power the production of hydrogen and synthetic fuels to decarbonise combustion processes

Can be delivered by multiple reactor technologies
More important to consider offtake and its management

Gas Networks

Equilibrion has worked with multiple gas networks across the UK to assess the potential for new nuclear generation to meet future domestic and industrial demand for heat and hydrogen





One study showed that 108% of the predicted Northern Gas regional hydrogen demand can be met by NEH by 2050. For Wales and West, the equivalent percentage is 189%. Both calculations are based on a robust analysis of potential SMR and AMR deployment sites within each region.

Economics of Nuclear Enabled Hydrogen

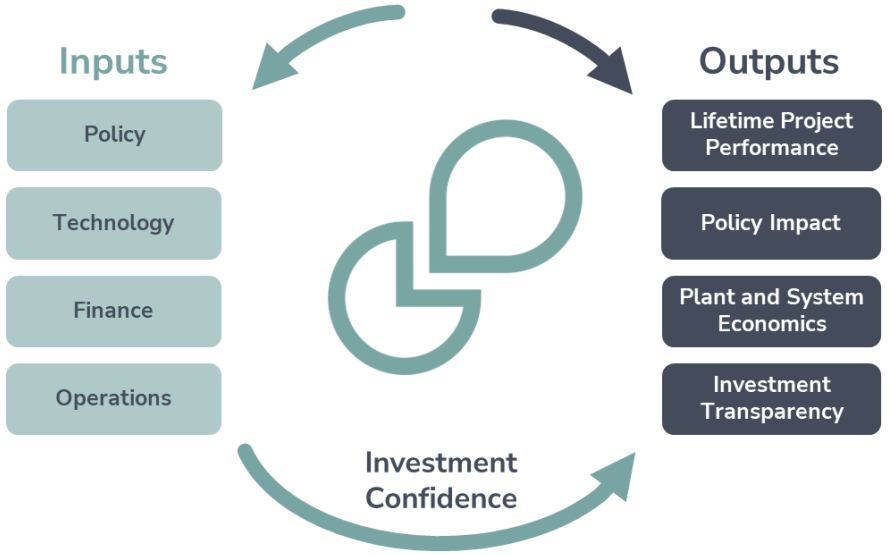
Challenge

Uncertainty in policy and market dynamics complicates long-term project planning where traditional cost models don't capture the benefits of flexible, multi-output configurations

Solution

Specialist techno-economic and policy impact modelling tool, purpose-built from the ground up to integrate the impact of flexible generation and different offtake technologies on development of new nuclear projects

- Our analysis shows that flexible hydrogen can be cost-competitive with renewables with the potential to reduce costs further
- NEH is forecast to cost between £159/MWh and £166/MWh compared to forecast costs of hydrogen using renewable energy inputs at £156/MWh



Build nuclear for the whole energy system

Grid decarbonisation is achievable, but electrification alone will not decarbonise all heat, fuels, and industrial processes.

- Design new nuclear to use, not waste, clean heat with heat offtake considered from concept, layout, licensing, and balance-of-plant design.

- Build nuclear as whole-system decarbonisation infrastructure supporting power, industrial heat, hydrogen, synthetic fuels, energy security, and long-term industrial competitiveness.

Thank You

Rob Mossop
07496 414113
rob.mossop@equilibrion.co.uk

www.equilibrion.co.uk

Q&A Discussion

Technological Innovations in SMRs for Materials Processing

Chaired by Nicola Rega, Cefic / European Industrial Alliance on SMRs

- Ed Hawkes, Engineering Director – Fusion and Modular Nuclear, **Assystem**
- Mark Allan, Green Metals & Green Steel Centre Leader, **Materials Processing Institute**
- Rob Mossop, Consultant, **Equilibrion**