

Korea-EU Horizon Europe Researchers Networking Forum on Energy & Advanced Mobility

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Decarbonisation**

**Net Zero Industry
Innovation Centre
@ Teesside University**

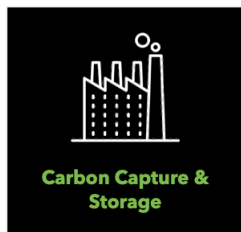
**Feasibility assessments
Industrial decarbonisation
Energy storage**



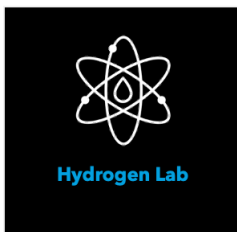
1. Short Introduction of your Organization

Net Zero Innovation Centre @ Teesside University (TNE 251 Young University Ranking; 801 University Ranking)

- Created to support the industry with research and consultancy services in net zero
- Labs to support fundamental research (TRL1-4)
- Facilities to support pilot demonstrations (TRL5-6)
- Embedded within Teesside cluster for commercial demos (>TRL5)



Carbon Capture & Storage



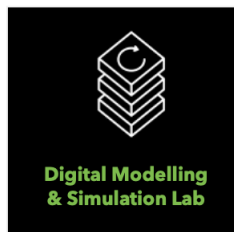
Hydrogen Lab



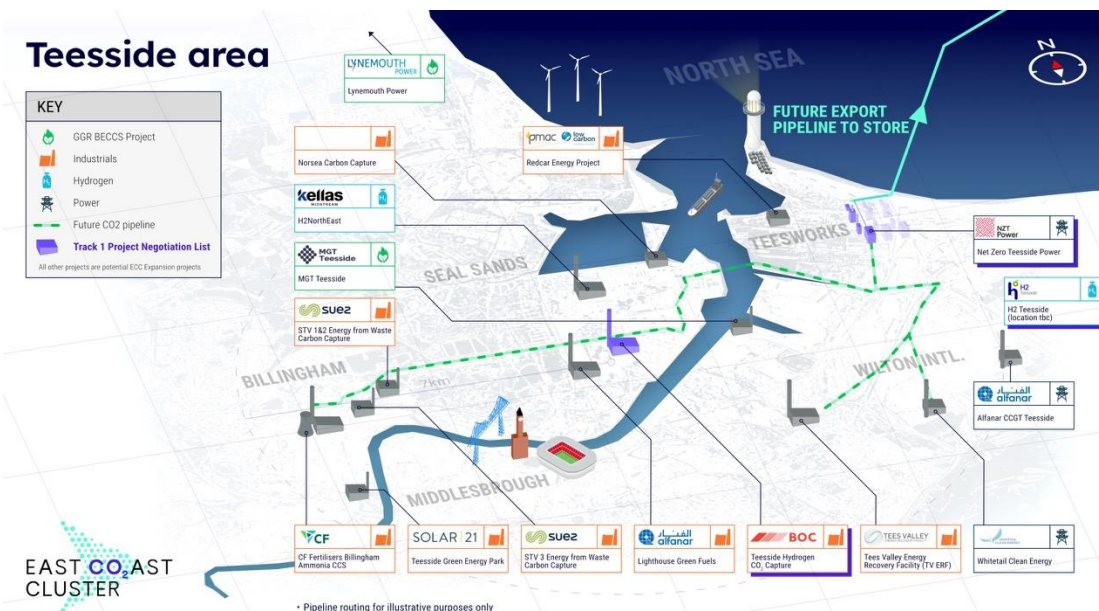
Smart Energy Systems



Circular Economy Lab



Digital Modelling & Simulation Lab



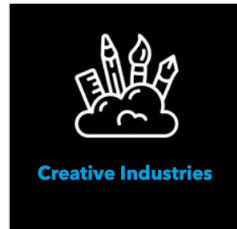
• Pipeline routing for illustrative purposes only



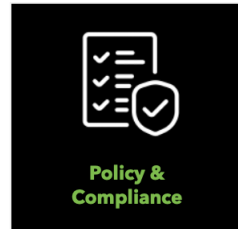
Business Expertise



Social Research



Creative Industries



Policy & Compliance



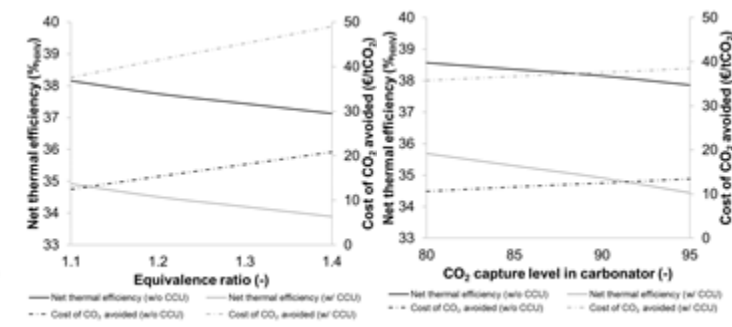
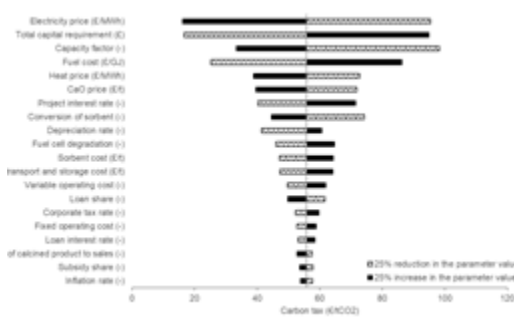
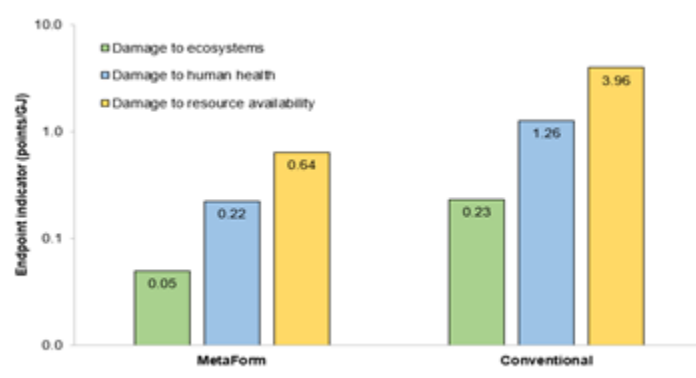
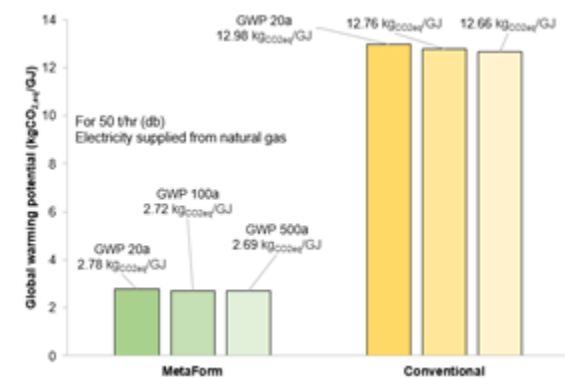
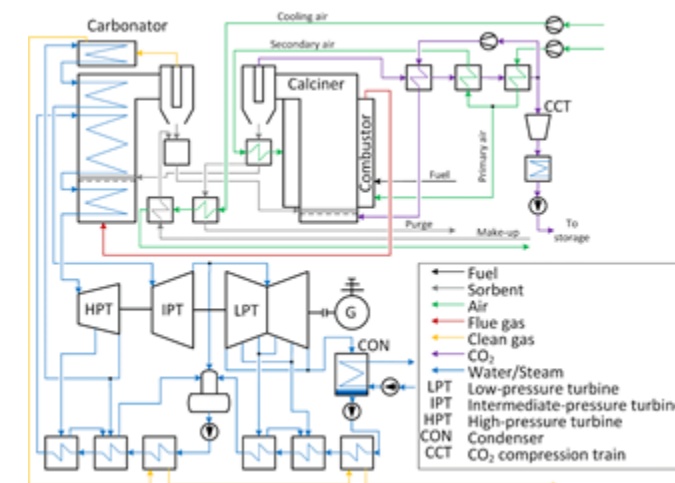
2. Expertise

Process design and feasibility

Development of breakthrough net-zero process concepts and assessment of their techno-economic viability and life-cycle environmental impact

Process design and engineering assessment of sustainable processes:

- High-temperature solid looping cycles (carbonate/chemical looping) for carbon capture, direct air capture and hydrogen production
- Process-intensified CO₂ use for bulk chemical production
- Hydrogen production via thermochemical and electrochemical routes
- Power-to-X processes





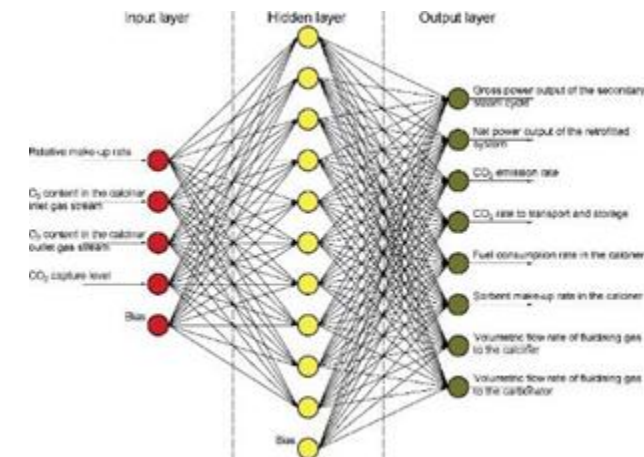
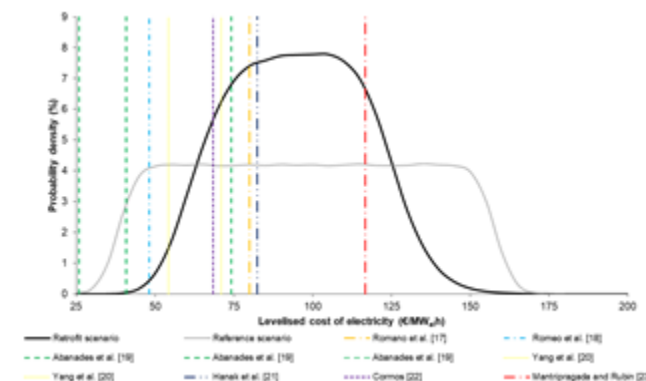
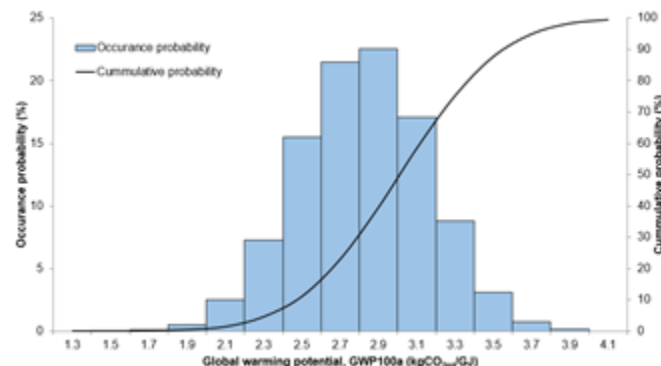
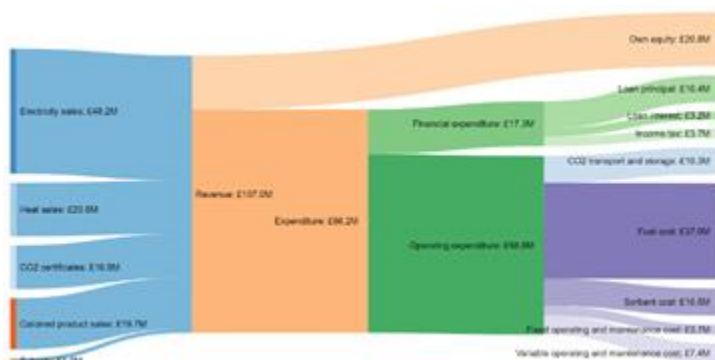
2. Expertise

Digital twins for risk assessment and business modelling

Stochastic modelling and uncertainty modelling to quantify risk in investment decision making process and business model development

Current activities research in:

- Reduced-order models and surrogate modelling for stochastic analysis
- Standardisation of economic assessment for net-zero technologies
- Quantification of uncertainties in economic and environmental models
- Development of sustainable business models based on CO₂ use





2. Expertise

Technology development and testing

State-of-the-art laboratories for CCUS, energy storage, and hydrogen research

Current activities research in:

- Material development, testing, and characterization
- Reactor development and testing (fixed beds, fluid beds)
- Process demonstrations (TRL5 Airhive DAC unit)





3. Your Project Idea

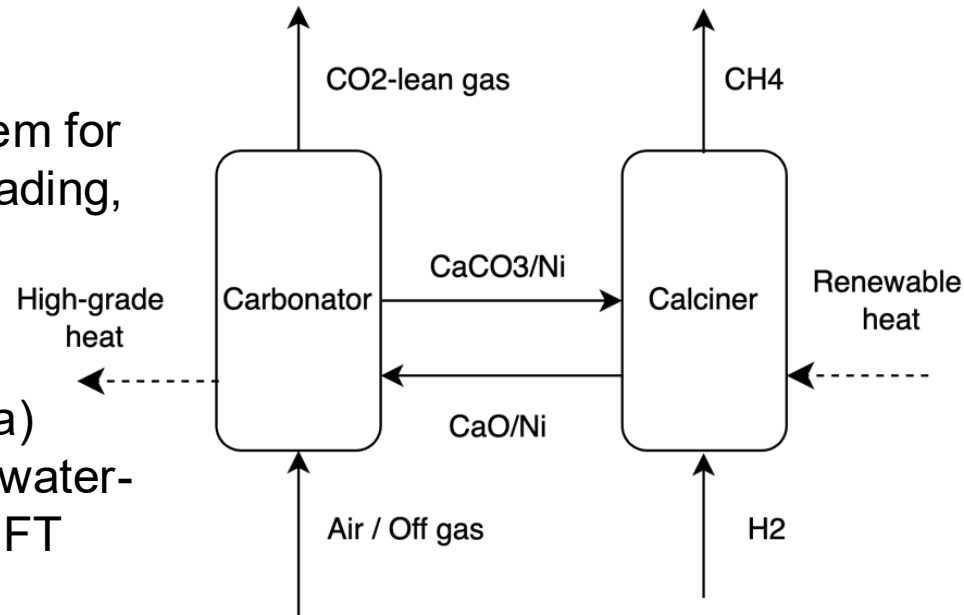
HORIZON-CL5-2026-04-Two-Stage-D3-02: Next generation of renewable energy technologies (TRL4/5)

Main objective:

To develop TRL4/5 pilot for an integrated capture–conversion system for renewable fuels production from biogenic/waste CO₂ (biogas upgrading, WtE, breweries).

The idea:

The innovation is in integrated calcination and CO₂ utilisation with a) methanation reaction to produce synthetic natural gas b) reversed water-gas shift reaction to produce syngas, iii) integration with methanol, FT fuels production





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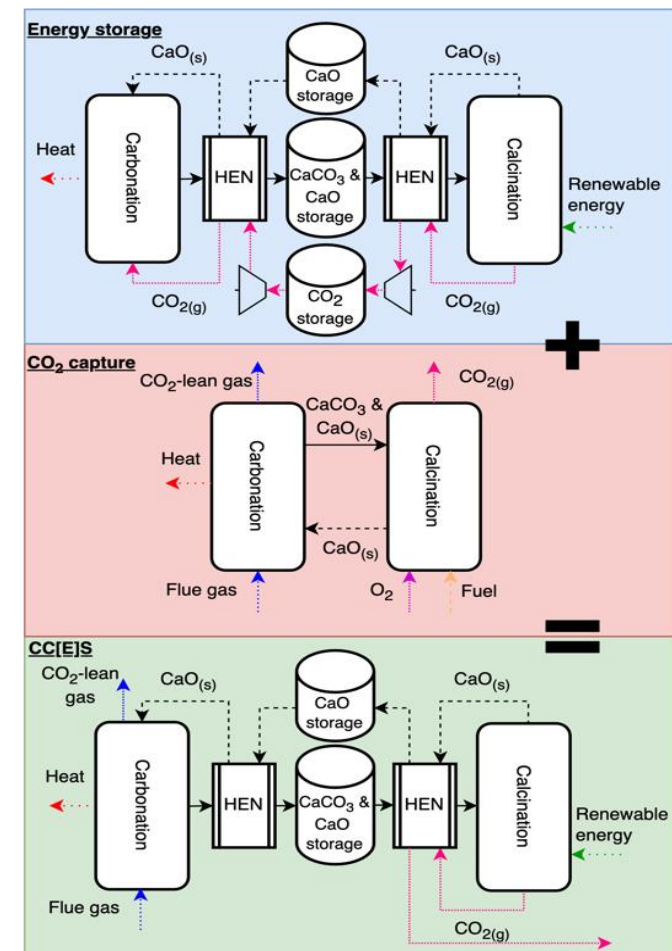
HORIZON-CL5-2027-05-D2-08: Demonstration for Long-duration Battery Energy Storage Systems (BATT4EU Partnership) TRL6/7 &
HORIZON-CL5-2027-07-D3-28: Integrated Approaches for Retrofitting Infrastructures with Innovative Energy Storage Technologies (TRL6/8)

Main objective:

To develop TRL6 pilot for an integrated CO₂ capture-energy storage system demonstrated for selected industrial clusters.

The idea:

The innovation is in solar/wind energy driving the calcination process $\text{CaCO}_3 \rightleftharpoons \text{CaO} + \text{CO}_2$ (charging). The reverse reaction (discharge) delivers 300–700°C heat and optional power (steam/sCO₂), while capturing CO₂ from industrial flue gases.





4. Profile You are Seeking and Why

PARTNERS FOR HORIZON-CL5-2026-04-Two-Stage-D3-02

- Material development via DFT & AI
- Material production scale up
- Industrial sites for demonstration

PARTNERS FOR OTHER HORIZON CALLS

- HORIZON-CL5-2027-05-D2-08: Demonstration for Long-duration Battery Energy Storage Systems (BATT4EU Partnership) TRL6/7
- HORIZON-CL5-2027-07-D3-28: Integrated Approaches for Retrofitting Infrastructures with Innovative Energy Storage Technologies (TRL6/8)



5. Contact Details

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