



UNDERPINNING A NEW HYDROGEN ECONOMY IN THE UK

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Regional focus, national impact, internationally networked



Enable large-scale
renewables integration
and power generation

Act as a buffer to
increase energy
network resilience

Distribute energy
across sectors and
regions

Decarbonise, Production,
Transport, Heating and cooling
Industrial processes

ERA UNIVERSITY PARTNERS



HEATING



PRODUCTION



MANUFACTURING



TRANSPORT



INTERNATIONAL ACADEMIC PARTNERS



REGIONAL POLICY & SKILLS



The Ten Point Plan for a Green Industrial Revolution

-  **Point 1**
Advancing Offshore Wind
-  **Point 2**
Driving the Growth of Low Carbon Hydrogen
-  **Point 3**
Delivering New and Advanced Nuclear Power
-  **Point 4**
Accelerating the Shift to Zero Emission Vehicles
-  **Point 5**
Green Public Transport, Cycling and Walking
-  **Point 6**
Jet Zero and Green Ships
-  **Point 7**
Greener Buildings
-  **Point 8**
Investing in Carbon Capture, Usage and Storage
-  **Point 9**
Protecting Our Natural Environment
-  **Point 10**
Green Finance and Innovation



Cranfield: A hydrogen living laboratory



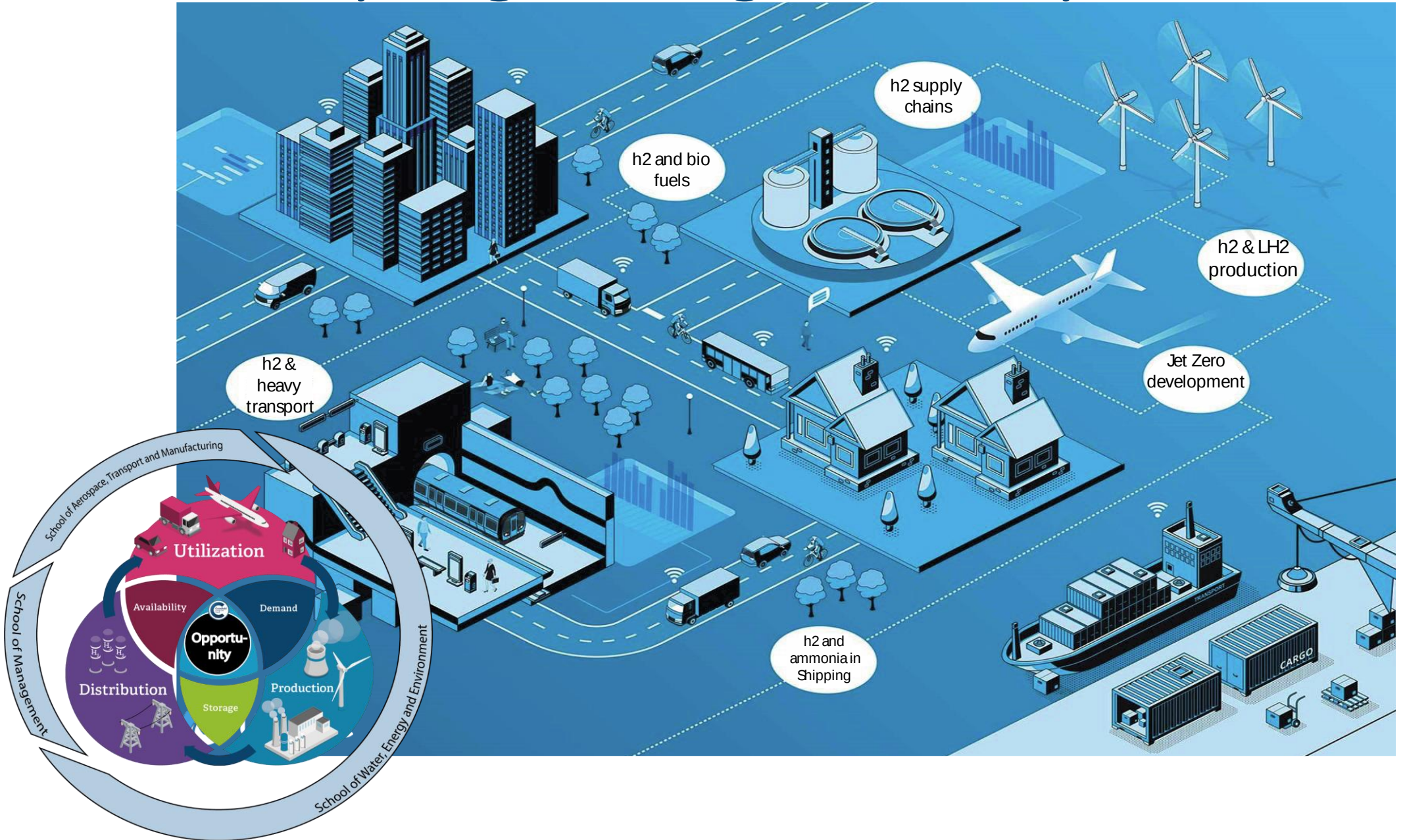
JET ZERO



H2
INNOVATION



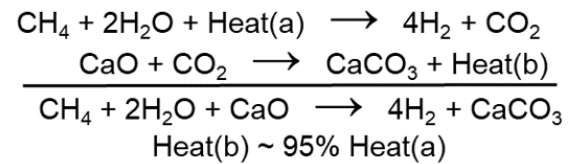
H2
INTEGRATION



Cranfield: A hydrogen living laboratory

HyPER Bio-HyPER

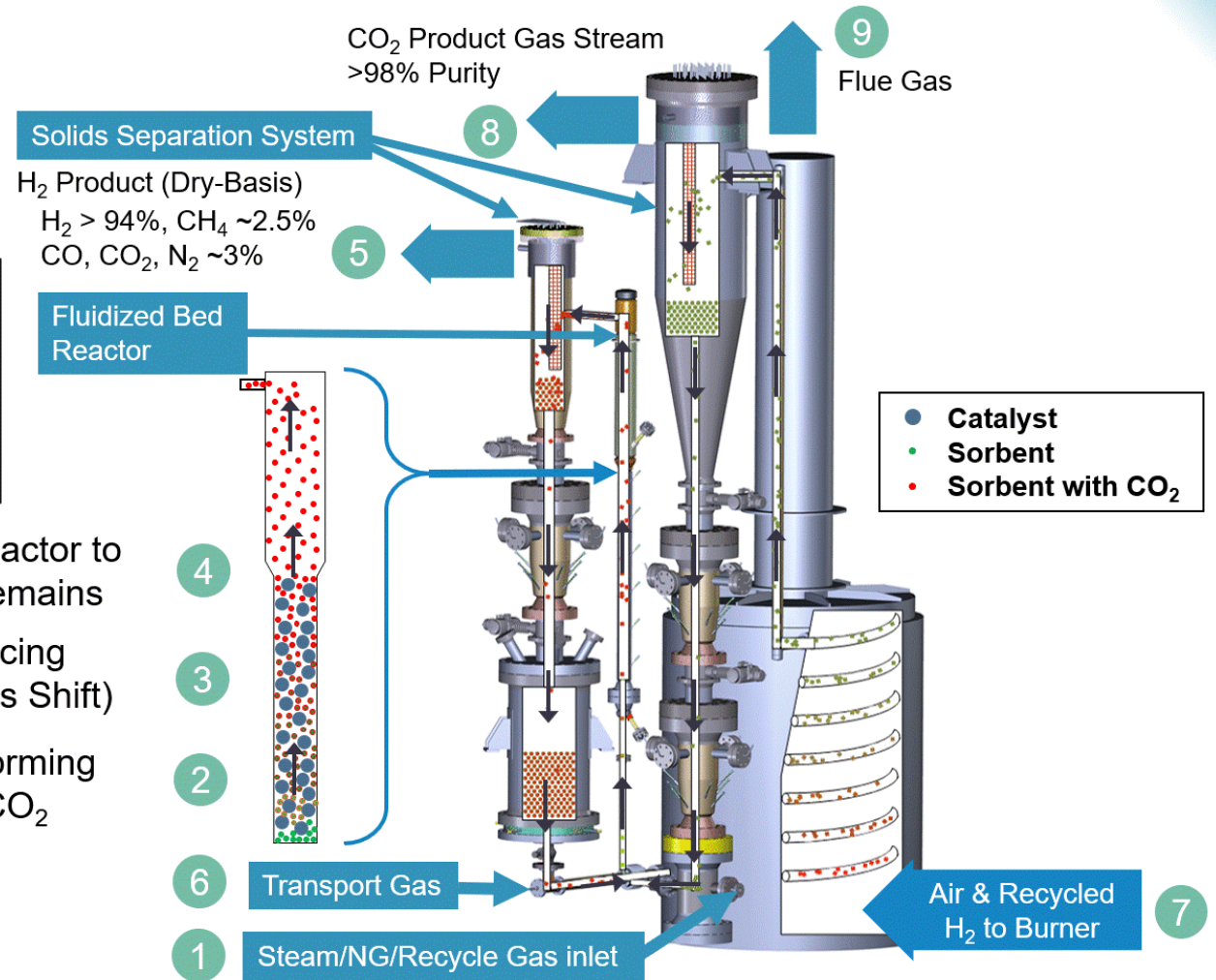
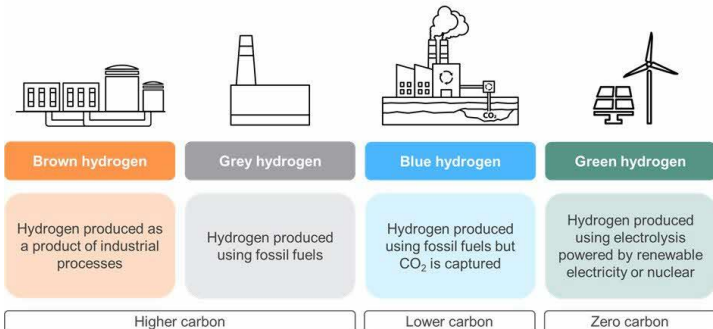
Sorption Enhanced Reforming (SER)



Sorbent elutriates through reactor to filter while heavier catalyst remains

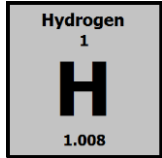
CO₂ absorbed by sorbent forcing more CO₂ to form (Water-Gas Shift)

Steam Methane Reforming produces H₂, CO & CO₂



Water management for electrolysis

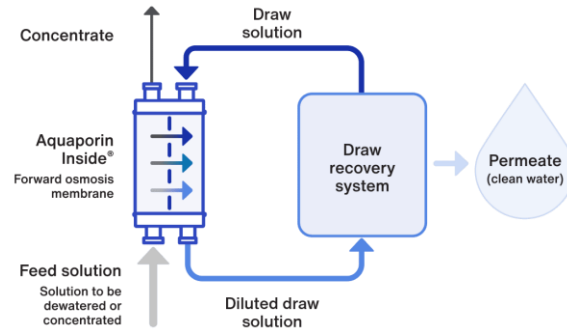
An example of how we work across 'conventional' hydrogen production



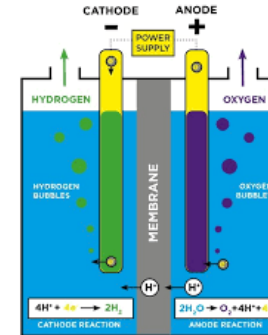
958 Million litres of water required each day



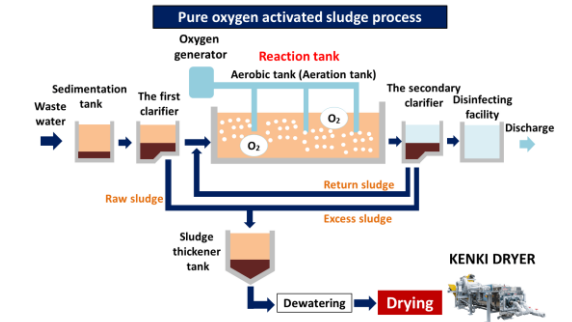
Linking source water to treatment options for safe provision of high quality water



Science on new tech for electrolyser water supply



Establishing water quality thresholds for electrolyser application

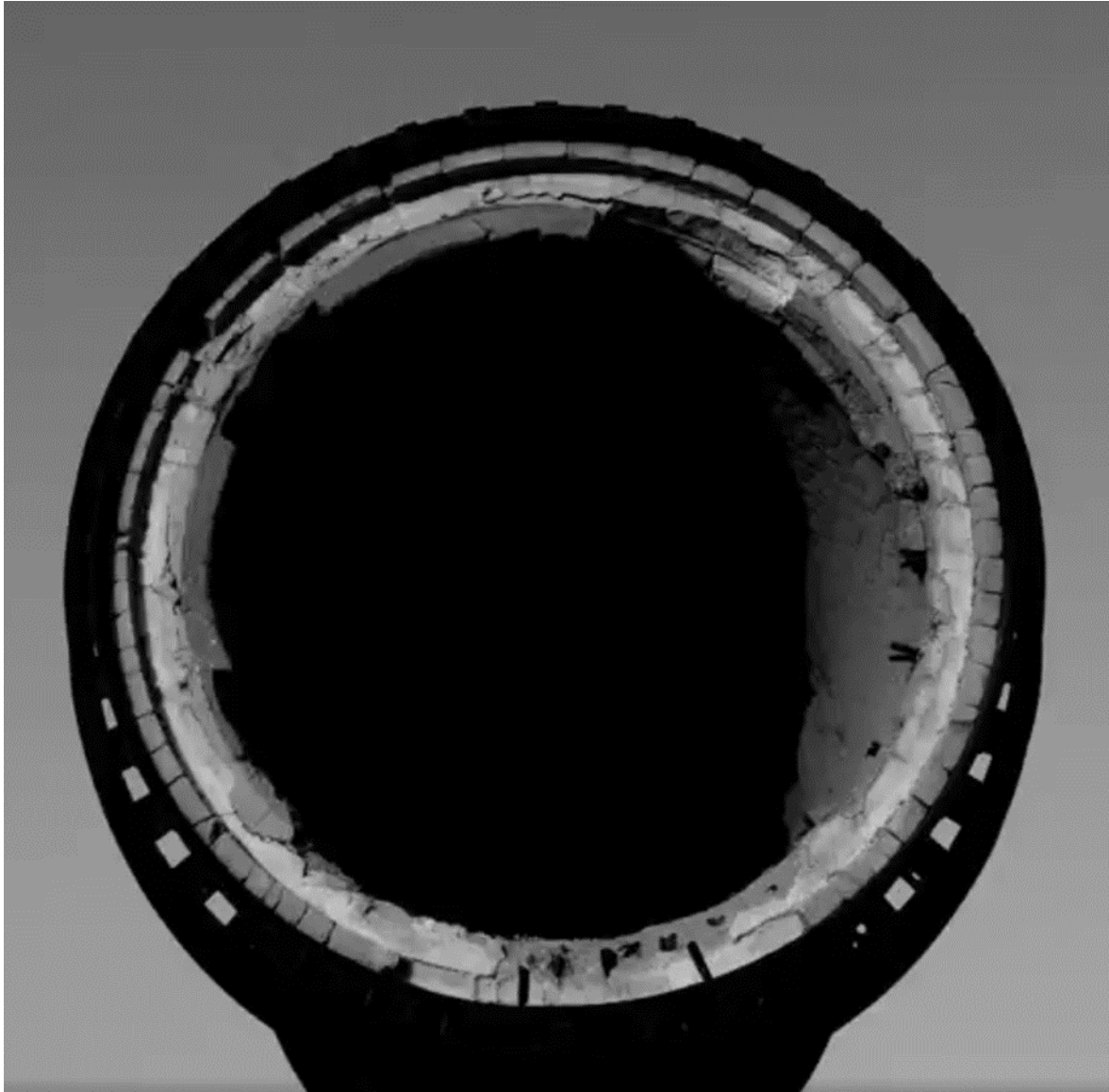


Integrating electrolyzers on-site with existing treatment technology



Manufacturing & Materials
Composites & Advanced Materials
Centre

nationalgrid  **LEVIDIAN[®]**

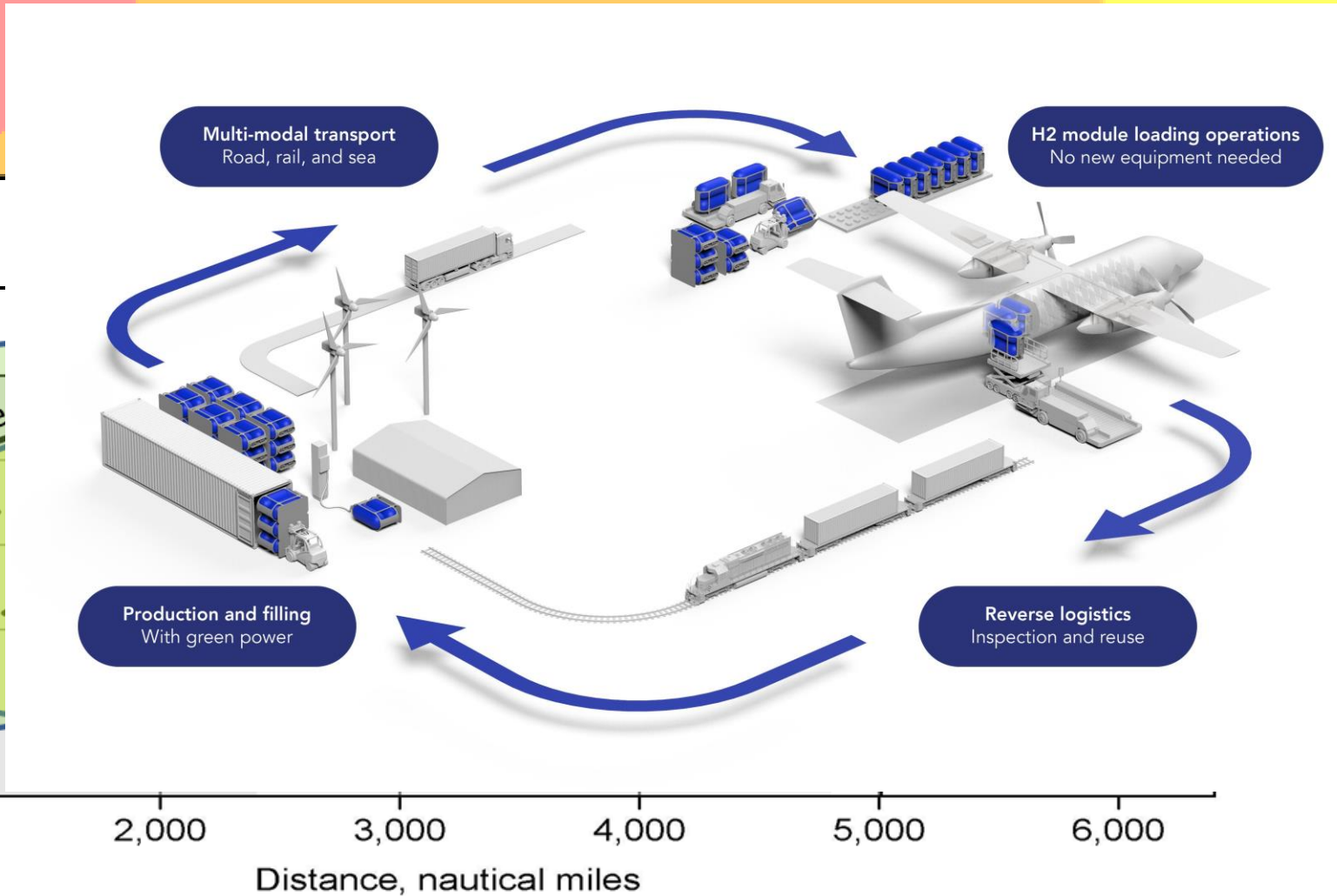
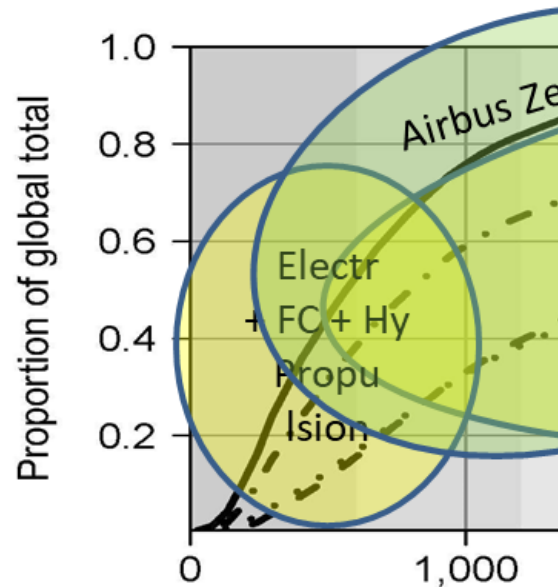
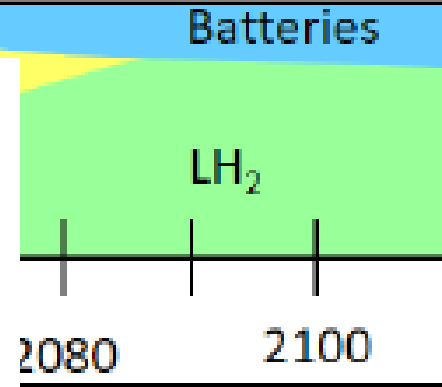
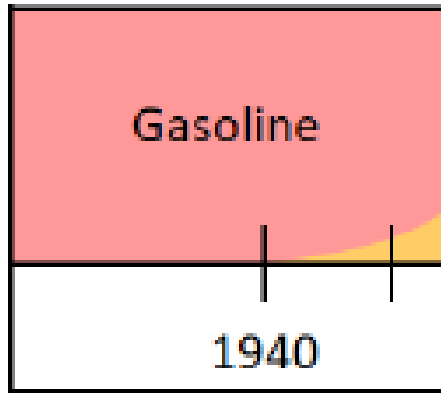


Multifunctional graphene coatings for pipeline protection (G-COAT)



A project designed to support National Grid on the comprehensive upgrade of their gas pipeline network for the **future transition to pure hydrogen transmission.**

Cranfield: A hydrogen living laboratory



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240kW hydrogen fuel cell system in each nacelle, including fuel cell stacks, balance of plant and control unit

220kW Electric Propulsion Units in each nacelle; motor + inverter-controllers

Propellers: conventional, 3-blade, variable pitch, max RPM 2300

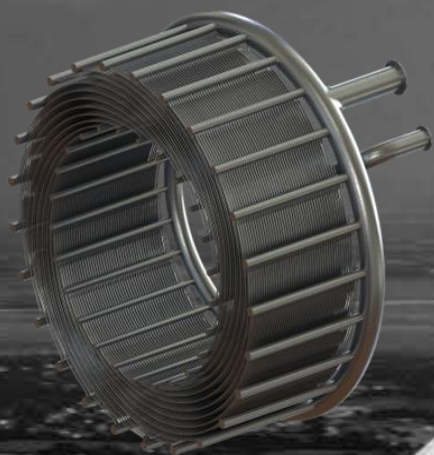
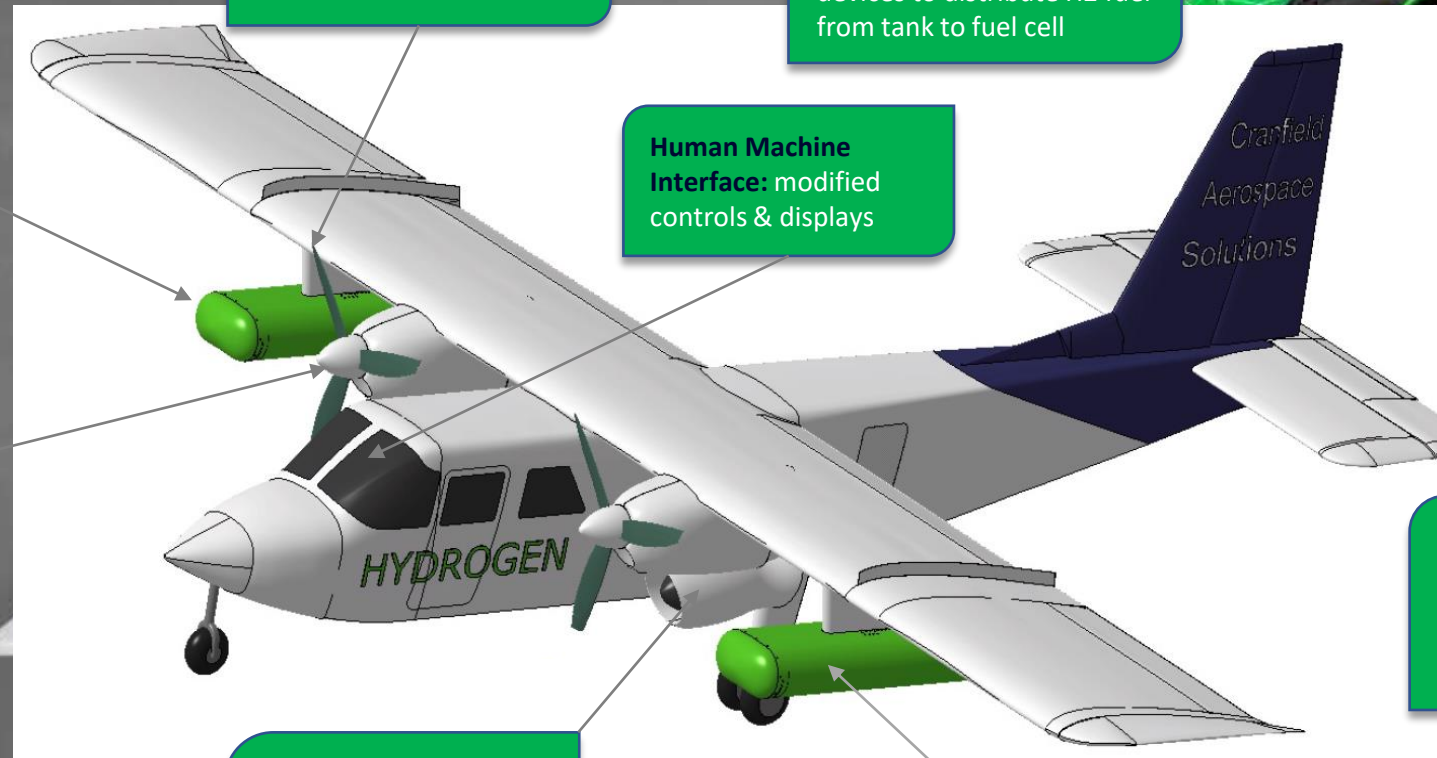
Hydrogen Fuel Distribution System: pipework & devices to distribute H₂ fuel from tank to fuel cell

Human Machine Interface: modified controls & displays

Thermal Management System: one per nacelle; advanced heat exchanger, providing integrated liquid cooling for HFCS, EPU & PDS

Hydrogen Fuel Tanks: stored at 700 bar gaseous

Power Distribution System (PDS): conversion & distribution of electrical power output from HFCS to EPU, HFCS balance of plant & 28V aircraft systems



Introducing Airbus ZEROe

Turboprop



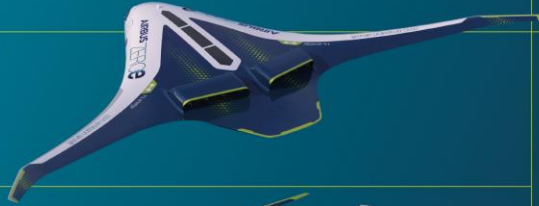
<100
Passengers

Hydrogen
Hybrid Turboprop
Engines (x 2)

1,000+nm
Range

Liquid Hydrogen
Storage & Distribution
System

Blended-Wing Body



<200
Passengers

Hydrogen
Hybrid Turbofan
Engines (x 2)

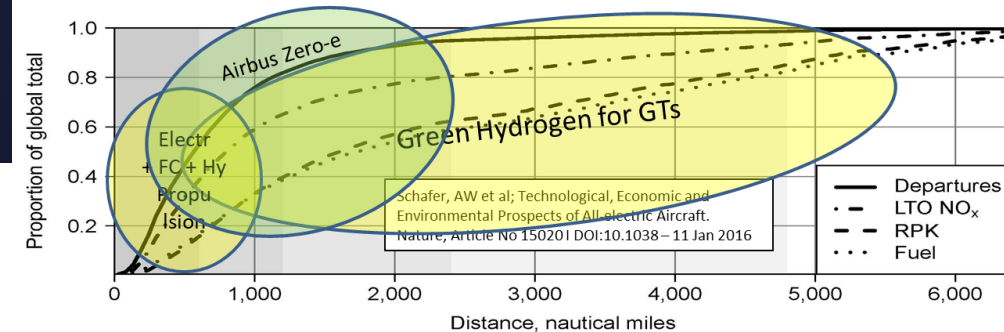
2,000+nm
Range

Liquid Hydrogen
Storage & Distribution
System

Turbofan



AIRBUS





Thank you for
your attention,
do reach out if
you want to
partner with us



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<https://hydrex.ac.uk>

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