



COSTAIN

Hydrogen for Transport Feasibility and Demand Assessment

Creating a circular hydrogen economy
in South East Wales

Improving people's lives.

Today's speakers



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Our work with local authorities

Costain are a UK PLC with over 150 years of experience working in the construction, consultancy and digital innovation arenas.



Build nationally

Build nationally significant infrastructure solutions such as the A14 and HS2.



Advise clients

Advise clients on Business Case Development, Programme, Project and Commercial Management



Working towards net zero

Develop decarbonisation solutions



Cross-sector knowledge

Operate across the energy and water sectors



Digital knowledge

Develop digital solutions to improve peoples lives

Today, we are delighted to assist Adept Members in understanding our work with Hydrogen in South Wales



Hydrogen use in road transport



Fuel grade hydrogen is a clear viable technology option to support the decarbonisation of certain road transport vehicle operations (where battery electric technology solutions prove challenging)



Lack of grid capacity



Quick re-fuelling is essential



Energy intensive transport operations

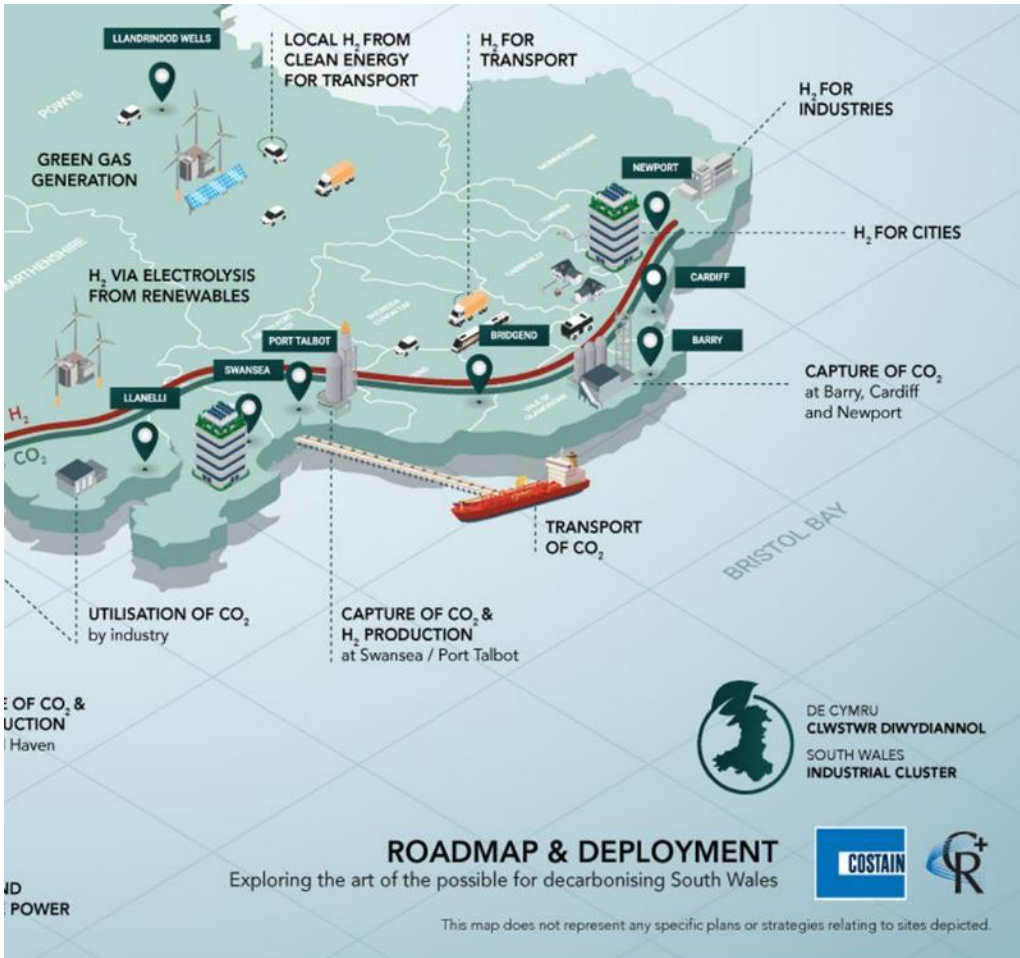


 Potential public sector application

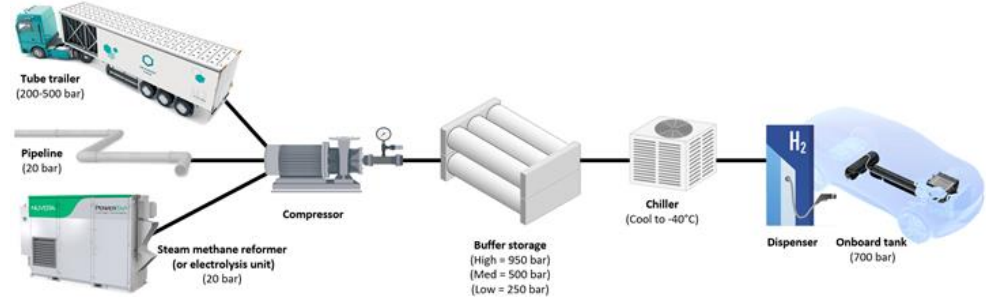
Hydrogen use in road transport



Upstream production



Downstream transport usage



FCEV vehicle usage



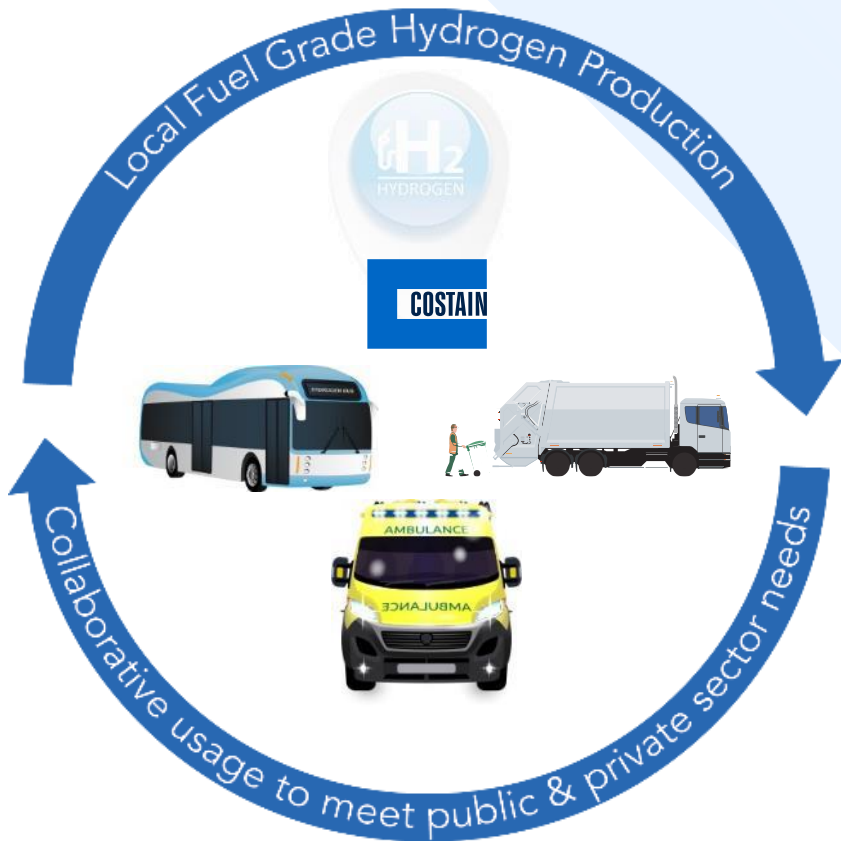
An innovative project to provide fuel grade hydrogen for vehicles in South East Wales



**Dŵr Cymru
Welsh Water**

Client challenge: how can we create value from waste gases following end of UK Gov Renewables Obligation scheme

Key findings: Solid business case opportunity to develop H2 production facility – prime target in Cardiff Water Works



**Llywodraeth Cymru
Welsh Government**


**CARDIFF
CAERDYDDO**

Client challenge: What is the potential demand for hydrogen in road transport in SE Wales and what are estimated costs to transition

Key findings: Enough fuel demand to support local hydrogen production BUT vehicle cost prohibitive at this early stage without support

“Making your poo work for you” project – more professionally known as Hy-Value



Q: 
How much low carbon hydrogen can we viably produce with 35 GWh of biogas?




Innovate UK feasibility grant award



Key study outputs:

- c. £25 million capital cost
- Producing 2000kg / day of fuel grade hydrogen
- Equates to daily supply for 100 fuel cell EV buses (or similar)
- Saving 9363 tonnes of CO₂ and 137kg of dust (air quality) per year

Demonstrator plant located at Cardiff East Wastewater Treatment Works



SUPPLY IS VIABLE BUT WHO'S GOING TO BUY THE HYDROGEN?

HyValue - project benefits



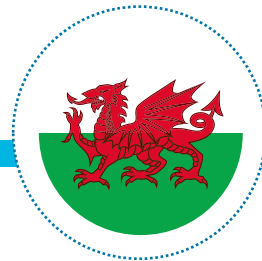
Fuel solution for fuel cell powered zero emissions vehicles

Net zero
Air quality improved



Economic benefits

Green jobs & attract new business



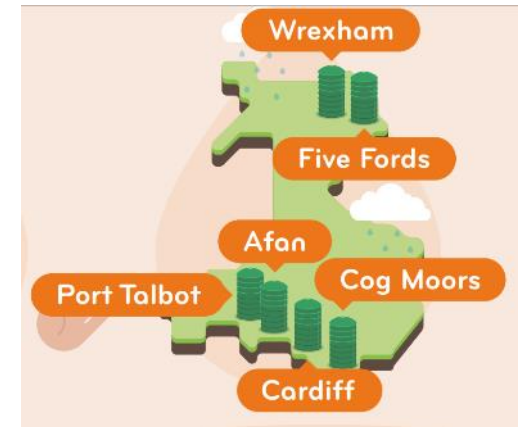
Wales as a Hydrogen Pioneer

UK and globally



Roll-out for water sites

Replicable Wales, then globally
Link to South Wales industrial cluster



Assessing potential hydrogen transport demand in the region



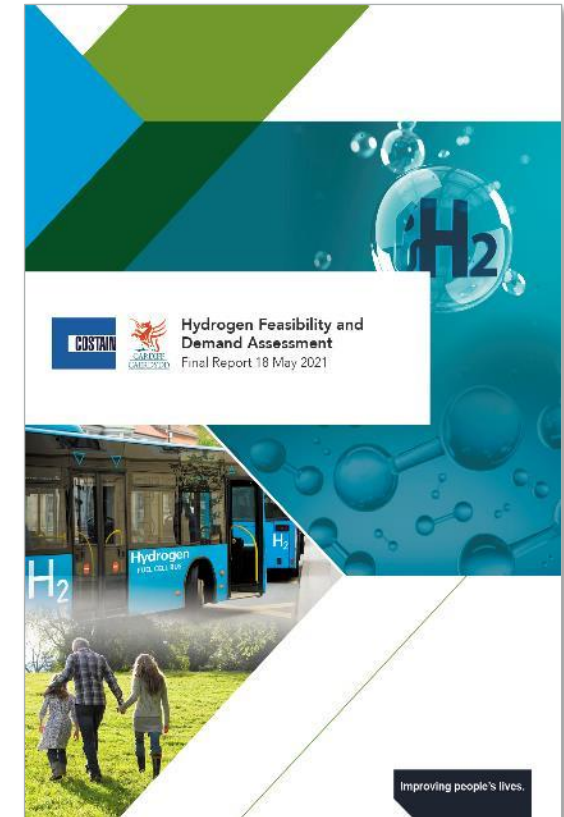
- All buses and taxis in Wales to be zero-emission by 2028
- Welsh Gov ambition for 200 FCEV buses in operation by 2024
- All council vehicles to be zero tailpipe emitting by 2030
- Challenge around decarbonising heavy duty vehicles



How feasible is a hydrogen solution and by when?



- Identify customer base and market viability (demand assessment)
- Review total cost of ownership of hydrogen fuel cell electric vehicles (buses & refuse collection)
- Understand future funding requirements/ opportunities and procurement routes

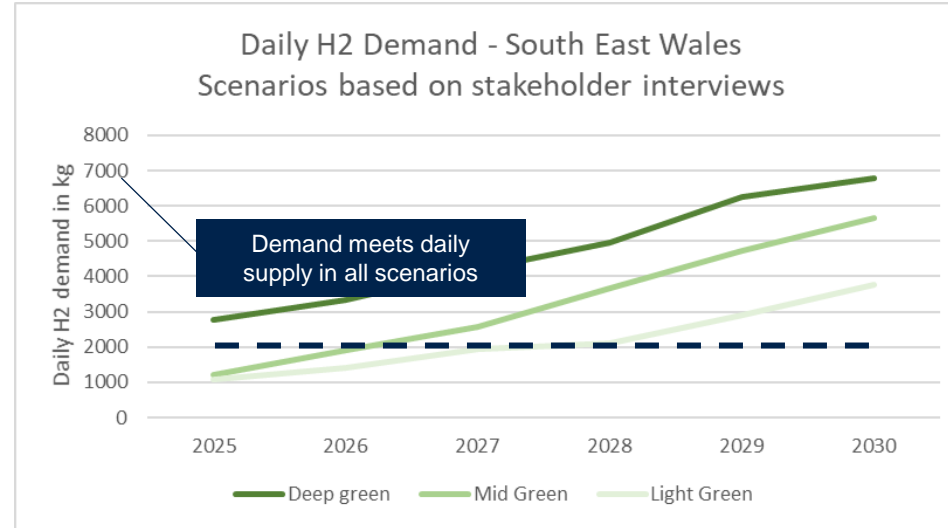


Demand assessment study - Stakeholder research



Demand assessment study - findings

Potential volumes of fuel grade hydrogen mapped against 3 economically and technically viable scenarios showed demand could meet Hy-value supply



Clear appetite for FCEV take up but also clear steer that investment was key to kick-start the transition





Buses
Out of depot for 18 hours plus
Challenging topography



Critical response vehicles
Utilities/emergency services
Need to be on standby, at scale 27/4



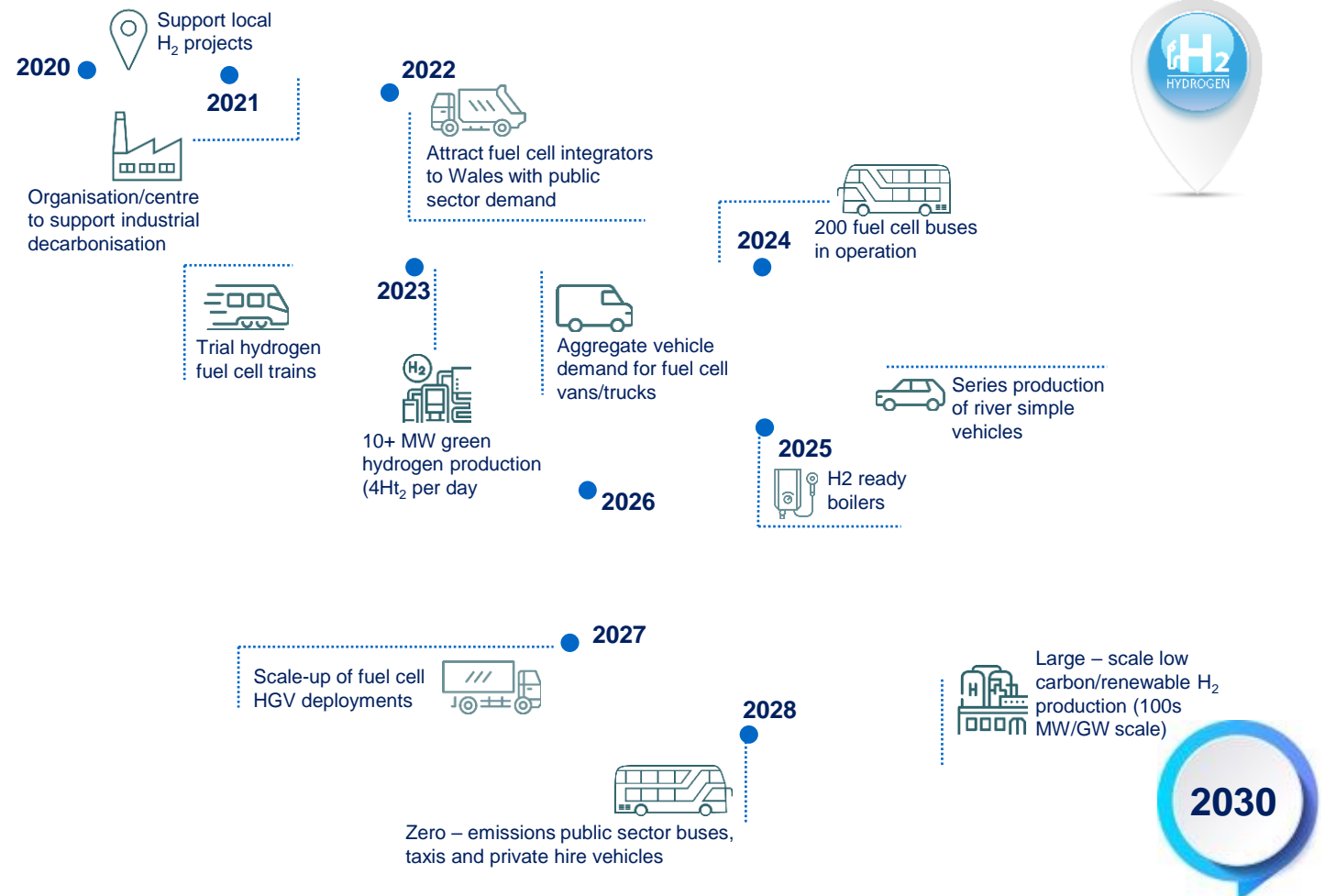
Refuse collection vehicles
Long, challenging routes, especially
in rural areas



What the demand assessment study recommended...



- ✓ Organisations should develop fuel cell electric vehicles alongside battery electric technology subject to right operational conditions
- ✓ Clear funding pathway required (especially if Welsh Gov want to meet 2024 target of 200 FCEV buses on Welsh roads)
- ✓ Collaboration between organisations will bolster progress and reduce cost



What next for the project?



Hydrogen Plant Development

Offtake agreements needed to provide investment certainty
Design supports investment decision

2022

Procure and construct hydrogen production facility

FCEV Fleet Progression

Seek grant funding for pilot vehicle technology

Pilot scheme & purchase of Phase 1 FCEV fleet replacements

2024/5

Investment decision

Plant go live

Thank you



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