



HyTrEc2

Hydrogen Transport Economy for the North Sea Region 2

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- The Hydrogen Transport Economy (HyTrEc) 2 project is part of the Interreg VB North Sea Programme Region Programme and is partly funded by the European Regional Development Fund.
- Falls within programme Priority 4: Promoting green transport and mobility
- Total budget of €6,180,602 of which the ERDF Contribution is €2,615,106
- Six year project from 2016 to 2023.



Green transport and mobility

Promoting sustainable transport and removing bottlenecks in key network infrastructures



HyTrEc2 Partners

Interreg VB North Sea Region
Programme Area 2014-2020

Regions within the NSR programme area





Objectives

- Implementing innovative hydrogen transportation solutions involving cars, vans, large trucks and refuse collection vehicles to advance the case for zero emission solutions for public and private sector fleets.
- Improving the supply chain and training so that the NSR becomes a Centre of Excellence for hydrogen transport.
- Developing innovative methods for the production, storage and distribution of green hydrogen.
- Complementing national programmes for hydrogen and facilitating joint NSR approaches and common standards.

What have we delivered so far?

Deliverable	Number
Number of hydrogen vehicles tested	33
Green hydrogen from wind and solar projects	4
Number of people trained in hydrogen	160
Number of businesses entering the supply chain	25
Organisations adopting hydrogen after HyTrEc2 influencing	39
Organisations engaged with HyTrEc2 (presentations, downloads, events)	+700
Video Views on YouTube (how to refuel a vehicle, tours of stations, tour of cars)	+5,000



Vehicle Deployments – Fuel Cell Electric Vehicles

- Hyundai ix35s in Groningen
- Toyota Mirais in Aberdeen City and Aberdeenshire
- Hyundai Nexos in Drenthe and Aberdeen City
 - Waste trucks in Groningen
- Vehicles mainly used by staff but in some cases placed on Car Sharing Clubs for citizens to try





Vehicle Deployments – Retrofitting

- Streetscooter in Groningen
- Renault Kangoos in Groningen and Aberdeen
- Nissan env200 van in Aberdeen
 - DAF H2ICed Roadsweeper
- Mix of electric + hydrogen range extenders and hydrogen-diesel injection



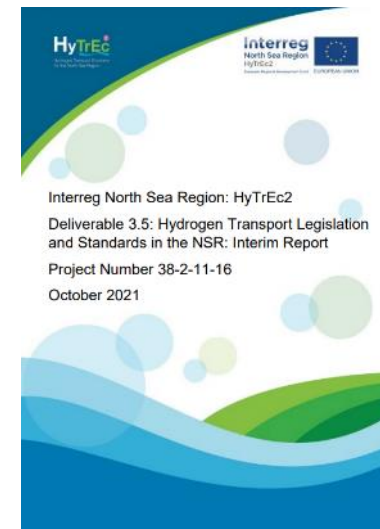
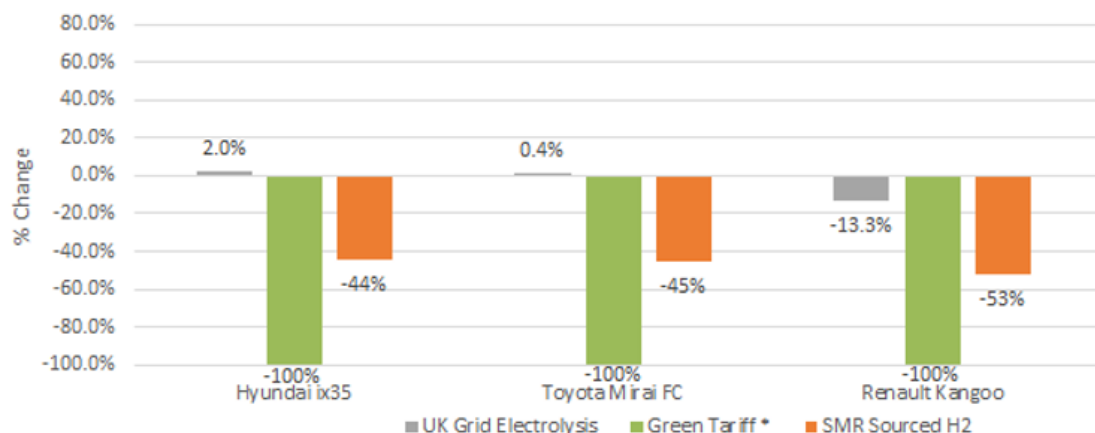
Vehicle Deployments - Simulation

- Forklift Truck Simulation
- Small and medium sized forklifts often have electrical drivelines
- Battery capacity is often not big enough during long working days with several shifts
- Trialled swapping out larger battery and replacing with Hydrogen storage and a battery with smaller capacity and volume
- Assume battery capacity of 54kWh and fuel cell 15kW
- Conclusion: possible to build and can perform, but size of fuel cell and optimal performance depends on detailed knowledge of the power requirement over the course of the day



Vehicle Monitoring

% Change in WTW g.CO2e/km vs Cenex Diesel Comparator





Green Hydrogen Production, Storage and Distribution

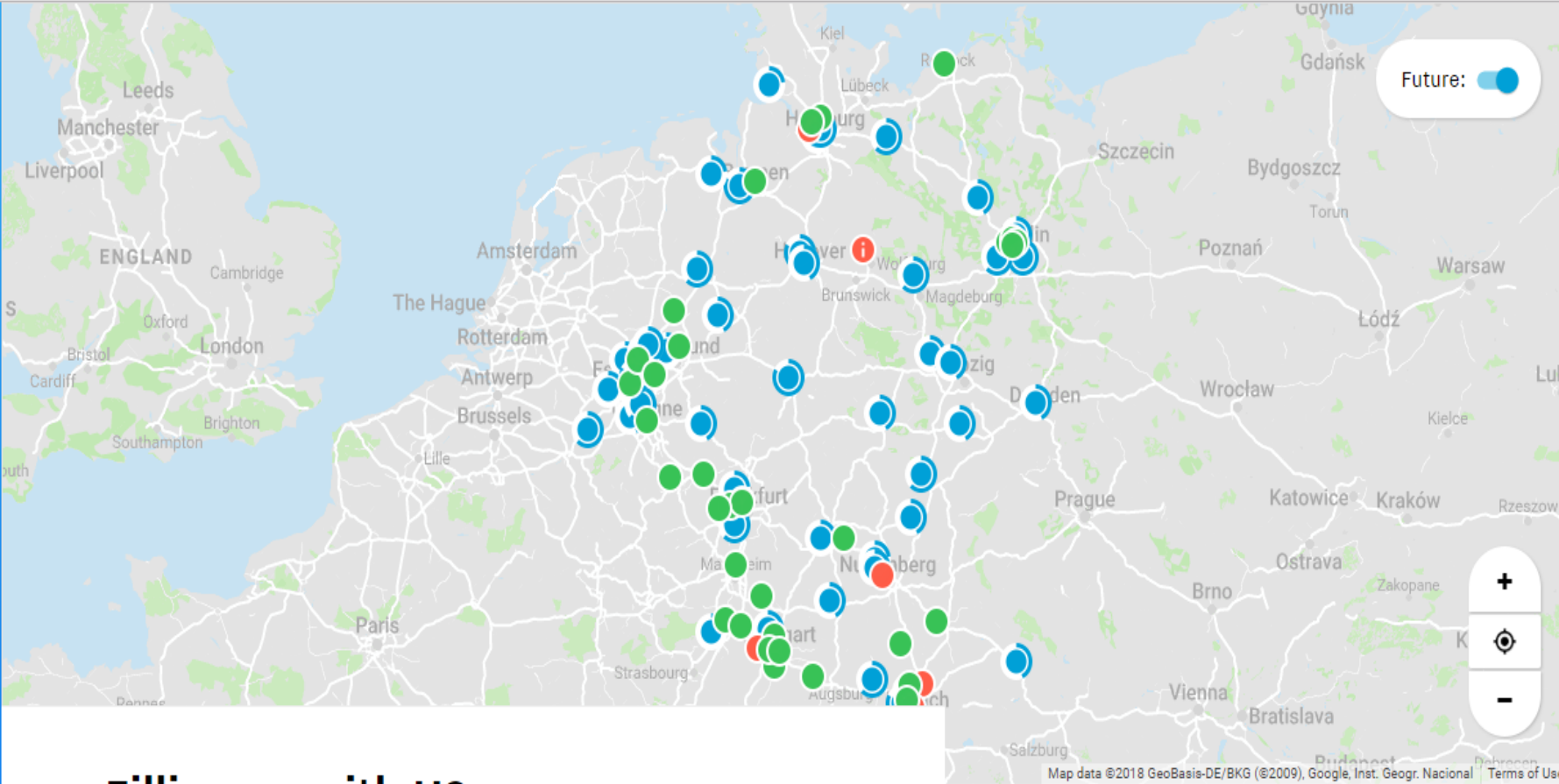
- Hydrogen Refuelling Station connected to solar array in Groningen
- Hydrogen refuelling station using green tariff electricity in Aberdeen
- Hydrogen refuelling station in Narvik
- Business cases for renewables and green hydrogen production in Drenthe, Aberdeen Hydrogen Hub and RISEs Economic Modelling for Green Hydrogen in the NSR



H2 Mobility and HyTrEc2 App



H₂



Filling up with H2

Hydrogen mobility starts now

34 9 In operation 48 in progress

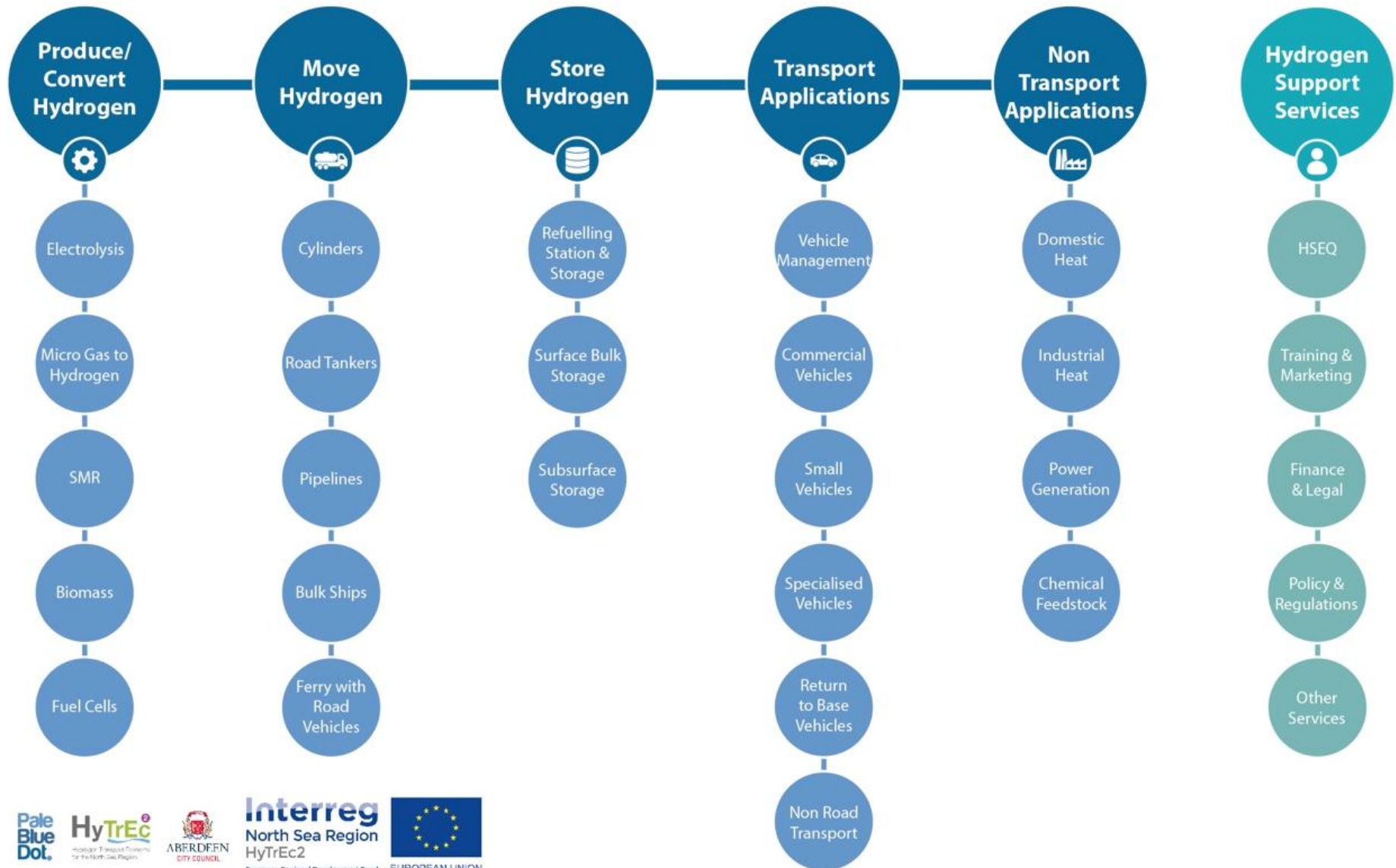
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Enabling the Market

- All Partners have been having difficulty on some level
 - Vehicle procurement/ retrofitting
 - Hydrogen Refuelling Stations and Green Hydrogen
 - Training courses for technicians to maintain vehicles
- First exercise was for all Partners to speak to their national hydrogen organisations on supply chain identification
- Commissioned consultant Pale Blue Dot to identify the hydrogen supply chain across the North Sea Region

Hydrogen Supply Chain Map



Training

- Technicians training courses accompanying increasing numbers of vehicles offers opportunities for technical colleges as well
- September 2022 training day at NESCol in Aberdeen – mix of presentations and practical sessions with students and stakeholders





Collaboration

- Local authorities will have to deliver decarbonisation targets!
- Successful demonstration projects in Europe → learnings can be shared, many local authorities are facing the same challenges
- Transnational interoperability, transnational customer information are essential for the development of zero-emission transport and energy systems → European cooperation is essential in these sectors
- Engaging with other European projects such as G-Patra and HECTOR
- Local authorities have purchasing power: creating the demand is key





What's Next?!

- Delivery of Ground Power Unit and “Transportable Hydrogen Demonstrator Model” which will engage with educational establishments in Drenthe
- A couple of large hydrogen applications – including hydrogen truck in Aberdeenshire
- Hydrogen applications in port side settings including consideration of multi-modal (HGVs, maritime and rail) and multi-fuel (hydrogen, electric and diesel/ petrol) refuelling stations
- Satellite Hydrogen Refuelling Station “Footprint”
- Final Conference



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