H_2 Aberdeen, Hydrogen is here

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ABERDEEN CITY COUNCIL

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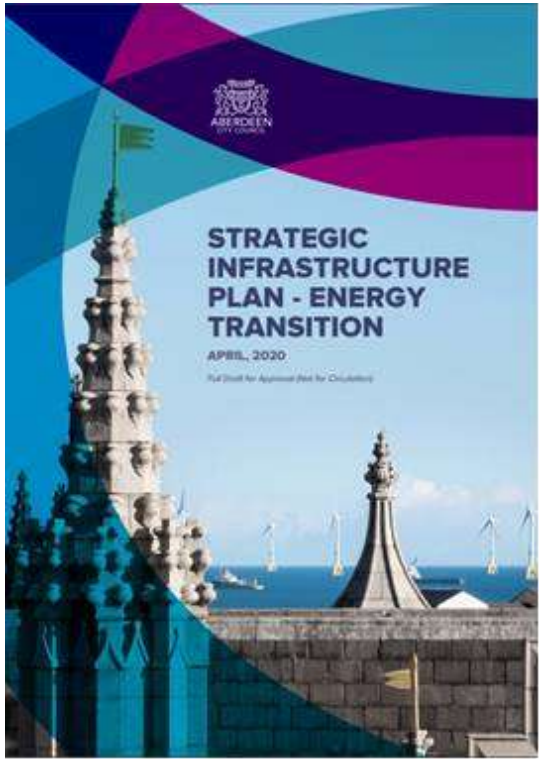
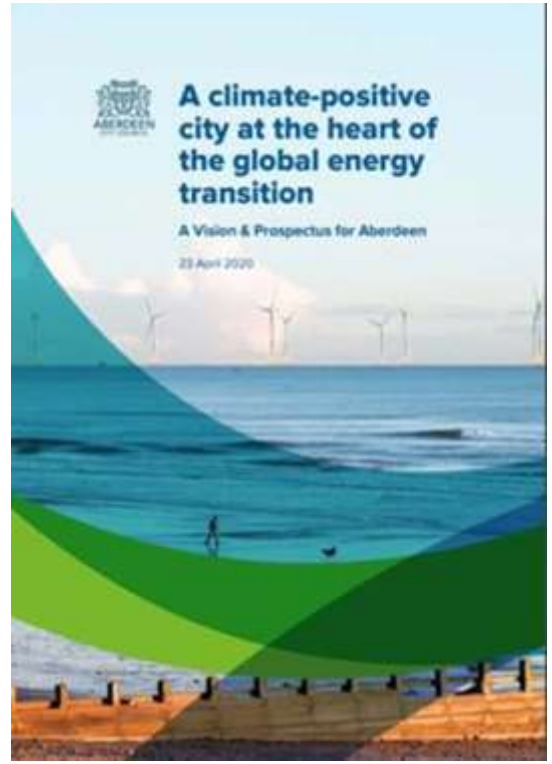
Why Hydrogen in Aberdeen





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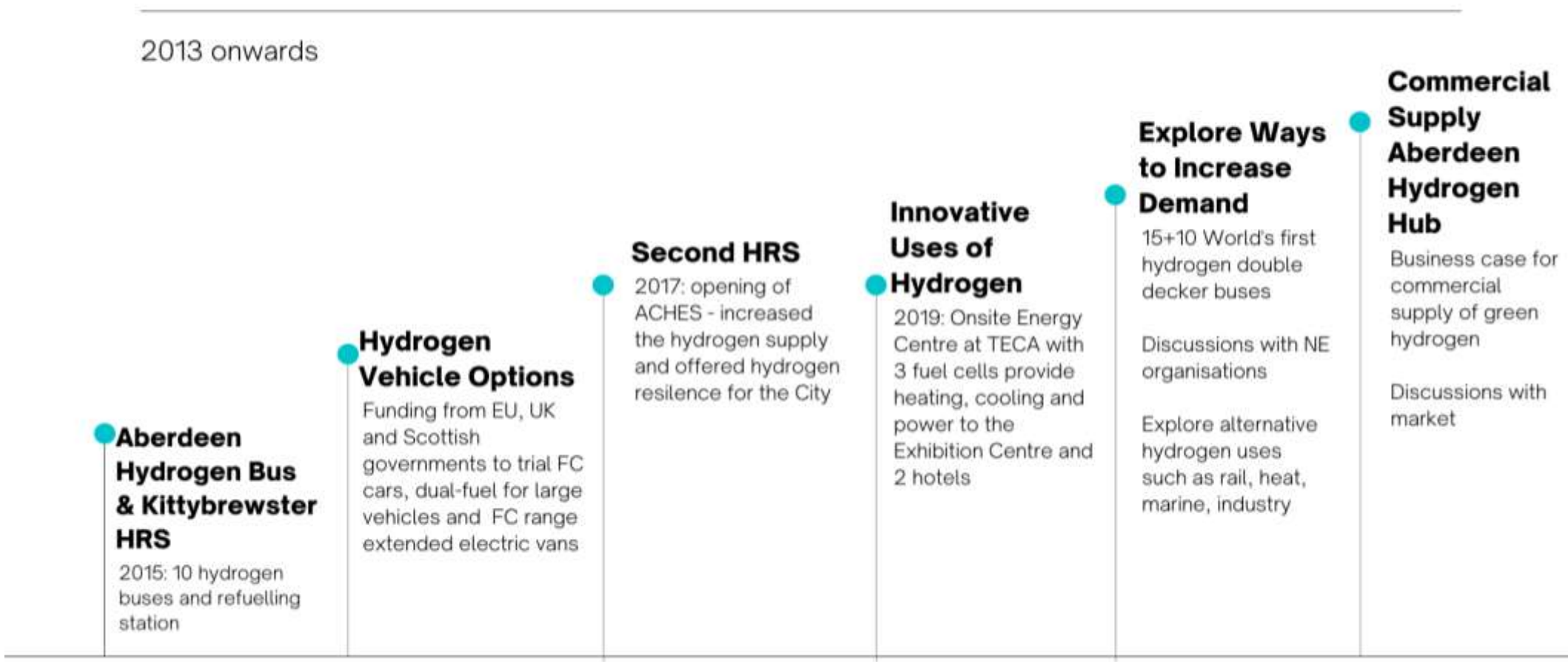
H2 ABERDEEN TIMELINE



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Refuelling Infrastructure

- 2 stations delivering 130kg and 360kg/ day
- 350 & 700 bar capable
- Refuel cars, vans, buses, large vehicles
- Both ‘green tariff’ stations
- Availability issues

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Hydrogen Vehicles in Aberdeen

- One of the largest and most varied fleets in Europe
- Deployed over 85 vehicles to date
- Includes cars, vans, buses, refuse trucks, road sweepers,

Hydrogen Vehicles in Aberdeen

FCEV – (fuel cell electric vehicle) H2 tank & oxygen from air come together in fuel cell to create electricity powers the vehicle. Small battery on board. FCEVs typically also use a relatively small hybrid battery to capture regenerative braking energy and provide peak power support to the fuel cell.

REEV (fuel cell range extended electric vehicle) – either or both power sources can be used to drive the vehicle. H2 also used to top-up the battery thus further increasing drive time. Either or both power sources can be used to drive the vehicle and top up the battery.

H2 ICE (internal combustion engines) – interim technology; reduces tailpipe emissions by approximately 20-30%. Bridging technology – makes h2 accessible straight away.

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HECTOR
(Hydrogen Waste Collection Vehicles in North West Europe)

HECTOR Project will deploy 7 different types of fuel cell garbage trucks in 7 different cities in 5 countries:

- **Aberdeen (UK)**
- **Groningen (NL)**
- **Arnhem (NL)**
- **Duisburg (DE)**
- **Herten (DE)**
- **Brussels (BE)**
- **Touraine (FR)**

The aim of the project is to demonstrate that fuel cell garbage trucks provide an effective solution to reduce emissions from road transport in the North West

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propreté.brussels · TouraineVallée de l'Indre · METROPOLE RUHR AGR GRUPPE · HAN AUTOMOTIVE RESEARCH

https://www.nweurope.eu/projects/project-search/hector-hydrogen-waste-collection-vehicles-in-north-west-europe/

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Hydrogen Fuel Cell Waste Truck

UK’s first operational FCEV waste truck

- Supplied by Geesinknorba / Hyzon
- Mercedes Econic 6 x 2 chassis
- 26t GVW
- Refuels 15kg of hydrogen at 350bar
- Estimated range 150miles

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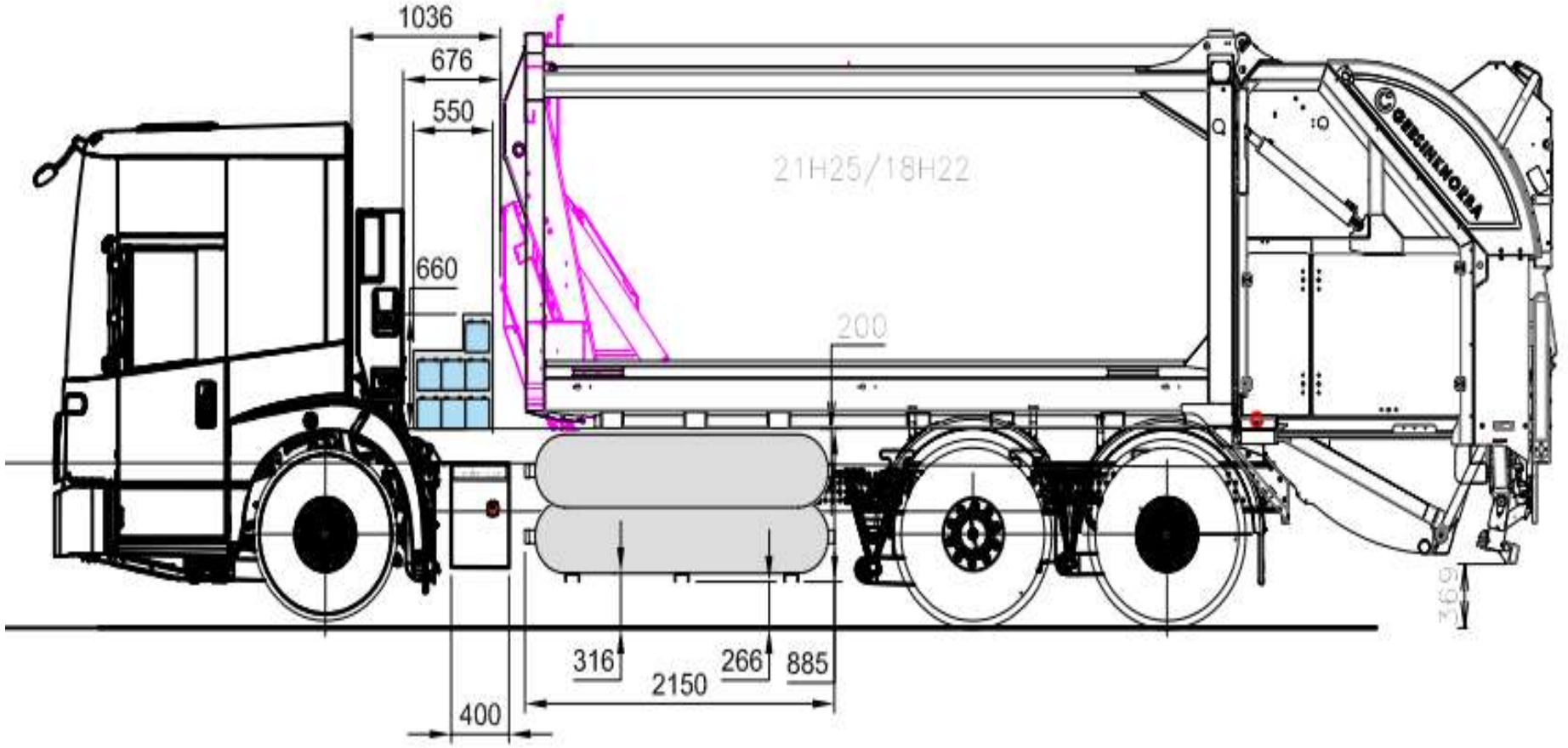
1036
676
550
660
21H25/18H22
200
316
266
885
2150
400

Workshop & Training Considerations

- Manufacturers supply technical training to workshop staff and familiarisation training to the drivers covering fuelling and vehicle operation
- Several workshop staff underwent High Voltage Training as well as manufacturer's training.
- Modifications carried out in the current workshop - designated hydrogen bays, this area is fitted with sensors to identify any leakage. Other cosmetic workshop modifications including floor covering lightening alarm processes and fire safety considerations.

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Duel Fuel Waste Truck (H2ICED)

- Hydrogen & Diesel
- 9.8 kg capacity
- 180 km range
- Can run on diesel if hydrogen supply is ever an issue
- CO_2 emission saving – between 20-30%

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Roof Mounted Tanks

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Test tanks – routing considerations

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Hybrids

Variant	Chassis	H2 Cylinders	H2 Cylinder Location	KGs of H2 for use with 350bar fill	Range based on usage data
26T 2018 plates	Merc Econic 6x2	2 x 205 litre	Chassis Mounted	9kg	162km
26T 2021 plates	Merc Econic 6x2	3 x 74 litre	Chassis Mounted	4.9kg	88km
18T 2021 Plates	Merc Econic 4x2	3 x 74 litre	Chassis Mounted	4.9kg	88km
12T 2021 Plates	DAF LF 4x2	2 x 205 litre	Roof Mounted	9kg	306km

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Hydrogen Hybrid Technology

In 2021, the 2 original (2018 26T) hybrid RCVs drove 17,594km/ 10,932 miles in total.

10,980km / 6,822 miles were undertaken with hydrogen and 4,109 miles on diesel alone

This resulted in an average displacement of 635 litres of diesel with hydrogen per vehicle, at an average displacement rate of 23% and CO2 savings of 1,728 kg of CO2 savings per vehicle (3,455 kg in total)

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Some Hybrid Facts

- Hydrogen mixes with the diesel – these vehicles are displacing, on average, 23% of the diesel and reduces carbon emissions by 23% of the diesel equivalent
- The more energy efficiently they are driven, the more diesel they will displace with hydrogen
- Takes 8 mins to refuel at 350 bar Hydrogen
- Generally should refuel every 2nd day
- Does mean need to fill up twice, however, we see this as a bridging technology – cost to retrofit is 6-8% that of a new FCEV waste truck and allows drivers, mechanics and citizens to get used to the technology
- Allows us to reduce carbon emissions in short-medium term until further H2 waste vehicles are available on the market at a more realistically affordable price.

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ABERDEEN HYDROGEN HUB

- Region was running low on h2 supply for further fleet and bus deployments so a commercial partner was needed to scale up
- On 3rd February 2022 the Council announced a new Joint Venture company wholly owned by the Council and BP to deliver the Aberdeen Hydrogen Hub
- BP will build, operate and manage the Hub including:
  - Solar power array
  - Green Hydrogen production facility
  - Refuelling for public transport, trucks, cars and vans
- The Hub will be Scotland's first scalable green hydrogen production facility with first gas expected Q1 2024
- Inclusive growth by supporting hydrogen supply chain developments, skills and training and wider community benefits
- Potential for delivery of future phases could see production scaled up for export through larger volumes of hydrogen using offshore wind developments

bp

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Any questions?

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