

# Hydrogen in Transport

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# Translink – By Numbers

- 4k staff – one of largest employers in NI
  - Supporting over 6k jobs in NI
- Operates 13k services every day
  - 300k passenger journeys per day
- Maintains 1,400 buses and trains
  - 44m miles per year
  - 68% of NI population within 30 mins travel time of a major urban centre via public transport
- Maintains over 80 bus and rail stations & halts
  - 8k P&R spaces
- Maintains a £3bn railway asset
  - 300+ miles of rail track and over 1,600 civil structures



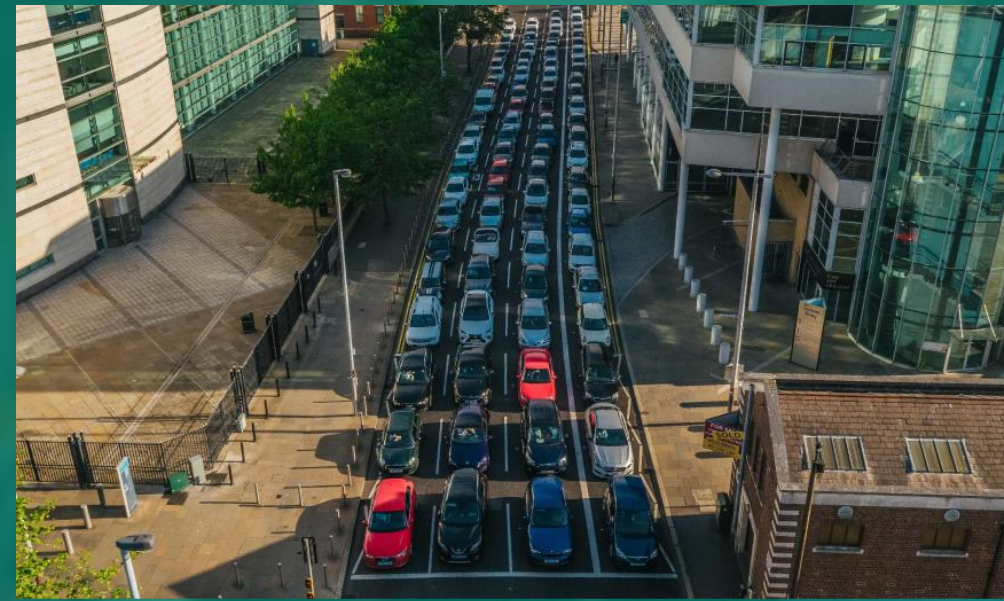
# The Need for Change

**Climate:** Transport emits 20% of NI's total GHGs, an increase of 22% since 1990, the biggest contributor is cars

**Energy:** Transport consumed 30% of NI's total energy in 2019, this will transition to renewables in the future

**Health:** Poor air quality is the biggest environmental risk to public health in the UK, contributes to 800 deaths a year in NI

**Economy:** Transport is crucial to connecting society and the economy. Connectivity is key driver for the economy.



Climate Action

# The Race to Zero



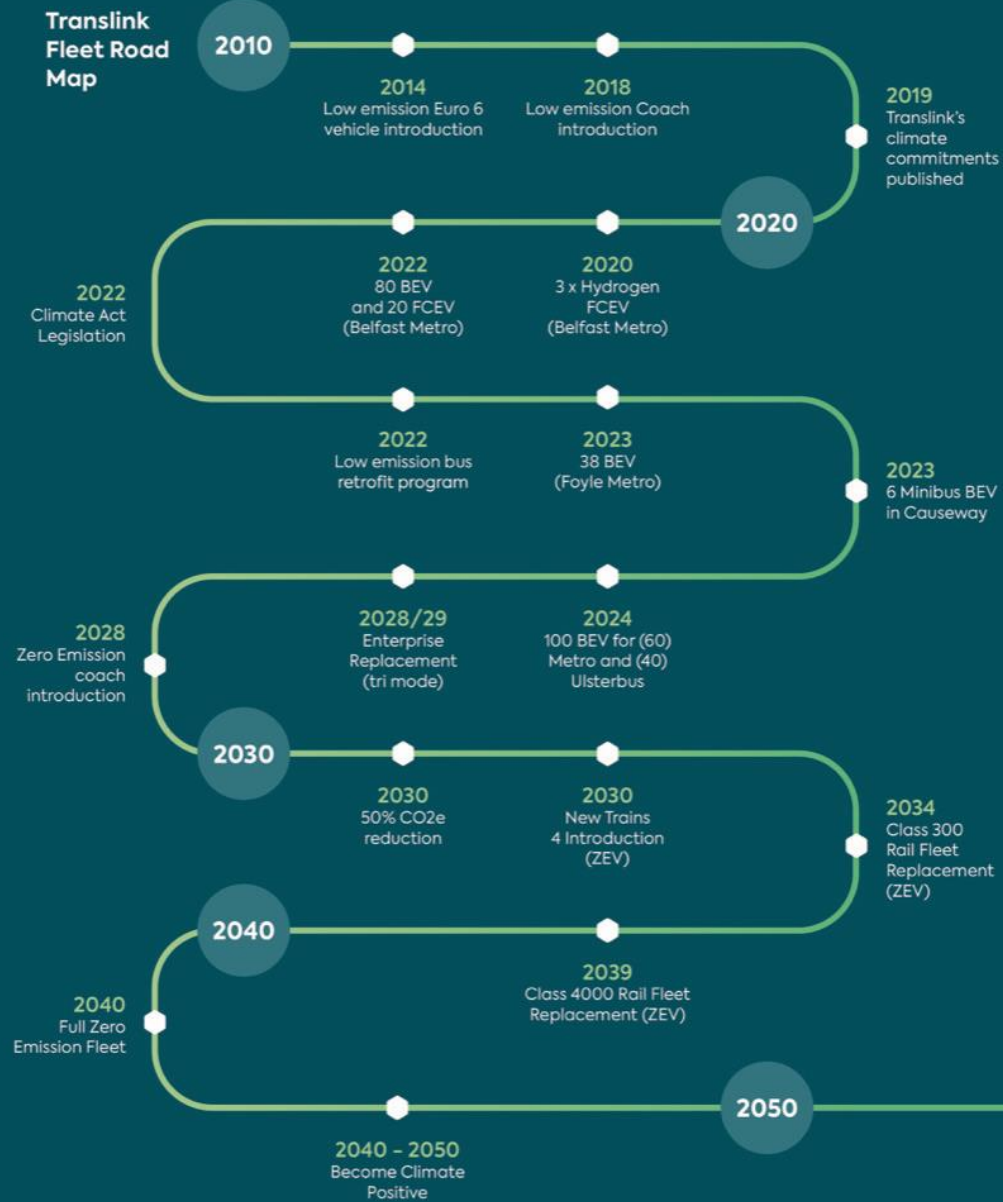
**50%**  
reduction in  
emissions by 2030  
or sooner



**Net  
Zero**  
by 2040  
or sooner



**Climate  
Positive**  
by 2050  
or sooner



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**T** Translink

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# Translink Zero Emission Bus Programme

**NIH2 Pilot**



**3 Hydrogen buses  
for Belfast - live  
Dec 2020**

**Phase 1**



**80 Electric buses  
and 20 Hydrogen  
for Belfast – live  
March 2022**

**Phase 2**



**New Foyle Metro Electric  
Fleet ,Derry~Londonderry  
- live Sept 2023**

**Phase 3**



**100 Electric buses  
– go live Summer  
2024**

# NIH2 Consortium Project (Proof of Concept)

- Consortium formed with Power NI
- £4.2m project
- £1.9m OZEV funding (UK Government)
- 3 Hydrogen Double Deck Buses – entered service December 2020
- First Hydrogen Refuelling Station in Ireland
- Upgrades to Workshop to make Hydrogen safe facility
- Hydrogen to be manufactured on Wind Farm in Co. Antrim



# Hydrogen Refueling Station – Milewater Service Centre



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# NIH2 Consortium Project – Electrolyser Long Mountain



# NIH2 – Transport of Gas



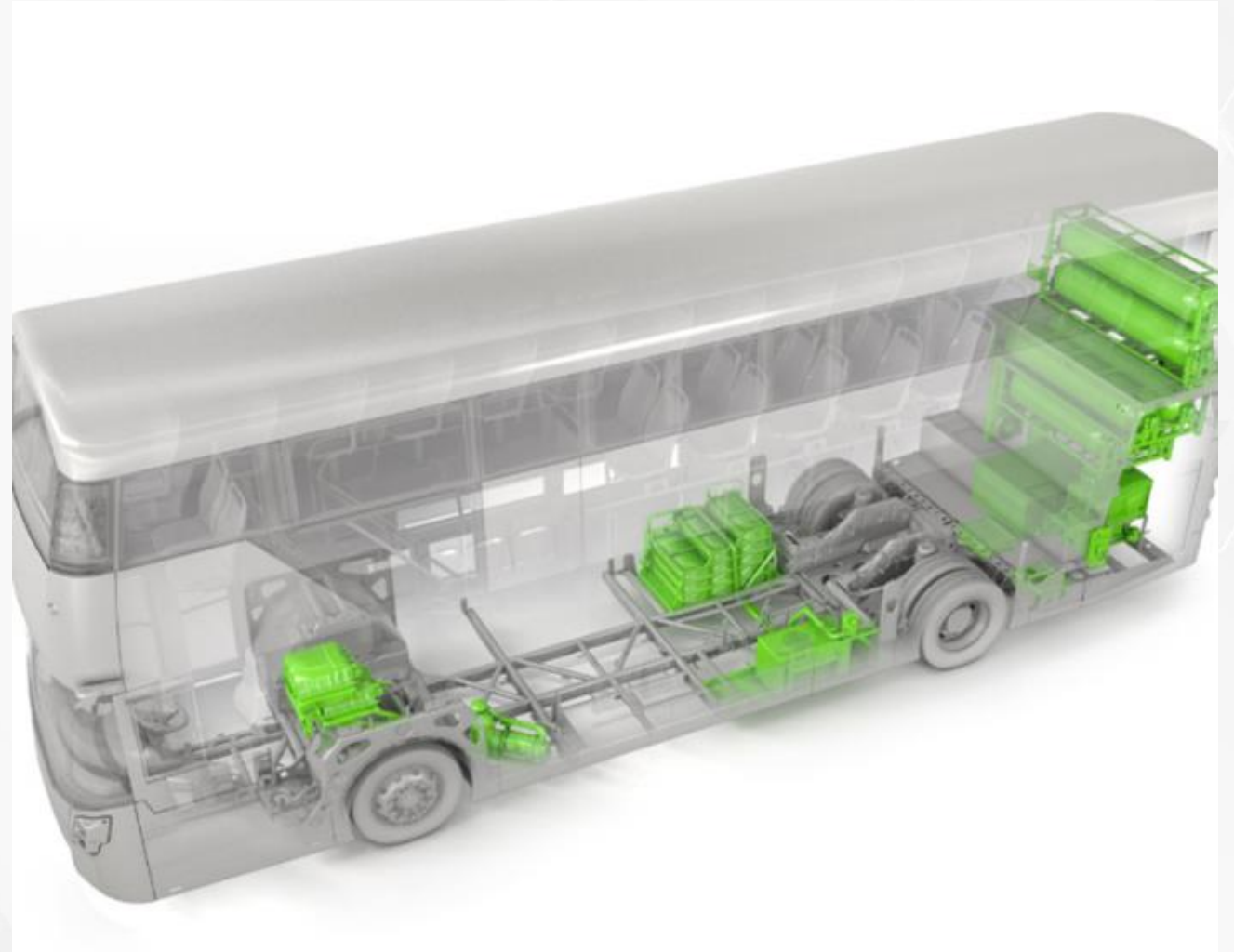
# Hydrogen Maintenance Bay – Milewater Service Centre



# Fuel Cell Electric Bus



- Wrightbus StreetDeck Hydroliner (FCEV)
- Hydrogen Fuel Cell power train and its battery pack can store up to 48KWh
- 6 hydrogen gas storage tanks which can hold 27KG/1120 Litres
- Filling Pressure – 350 Bar



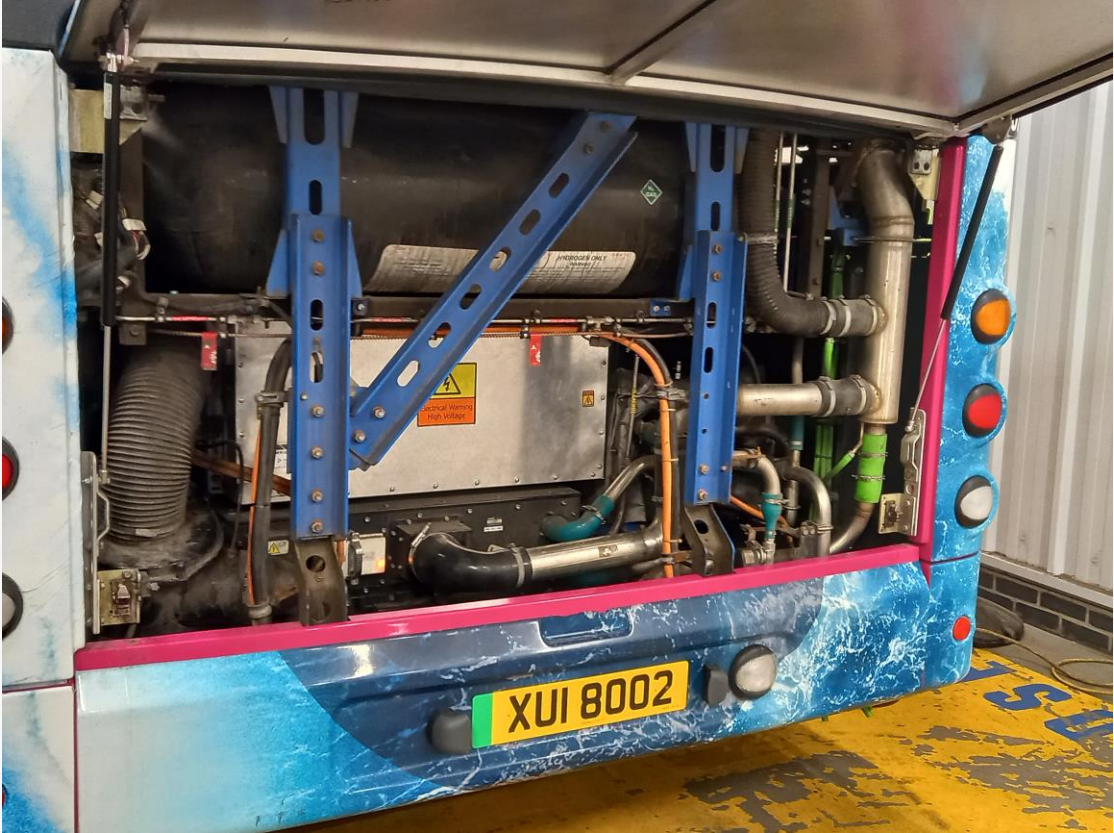
# Hydrogen Fuel Cell Electric Vehicle



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# Hydrogen Fuel Cell Electric Vehicle



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# Hydrogen Fuel Cell Electric Vehicle



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## PHASE 2 – Belfast Metro

- 20 FCEV Double Deck Buses
- Installation of Hydrogen Refuelling Station
- Upgrades to Workshop to make Hydrogen safe facility
- Project Cost £15m
- First buses entered service April 2022
- Hydrogen supplied from mainland GB





# Hydrogen Refueling Station - Newtownabbey



# Hydrogen Refueling Station - Newtownabbey



# Zero Emission Bus Options

## Battery Electric Vehicle (BEV)

## Fuel Cell Electric Vehicle (FCEV)

>1500 BEVs in operation in UK/Ire

~100 FCEVs in operation in UK/Ire

Capital cost 1.8 times higher than diesel

Capital cost 2 times higher than diesel

Operational cost better than diesel

Operational cost higher than diesel

Range 130-170 miles/ Charge 3 – 6 hours

Range 200-220 miles/ refuel 6 – 10 mins

No garage modifications necessary

Garage Modifications necessary

Energy efficiency 73%

Energy efficiency 22%

Readily available source of Green Renewable Electricity

Very limited supply of Green Hydrogen in NI/ROI



# Hydrogen Buses – Challenges

- Capital and operating costs
- Challenges of upscaling
- Depot capacity implications – land take
- Energy/Logistics – transport to point of use, fuel storage
- Infrastructure costs - refuelling, garage conversions, power connections
- Garage modifications – Hazard vs risk based approach
- Availability and cost of Green Hydrogen
- Rate of technological development – Batteries, Hydrogen fuel cells infrastructure and vehicle technology



# Translink Hydrogen Bus Projects – The Positives

- Zero Emission – addresses climate change and air quality concerns
- Vehicles have performed well so far
- Infrastructure works – well managed, lots of learnings
- Strong collaboration across supply chain
- Well received by customers and drivers
- Staff skills transition
- Strong support from Government, Councils and other stakeholders
- Raises profile of Public Transport as a solution to climate crisis
- Suitable for Urban/Suburban duty cycles



# Thank You



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