

A zero-carbon railway – making it happen

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Who we are



Porterbrook has been at the heart of the UK rail network for over 25 years and currently owns around a quarter of the national passenger rail fleet.



c.4,000 rail vehicles



Invested in new rolling stock



Invested each week in the UK supply chain

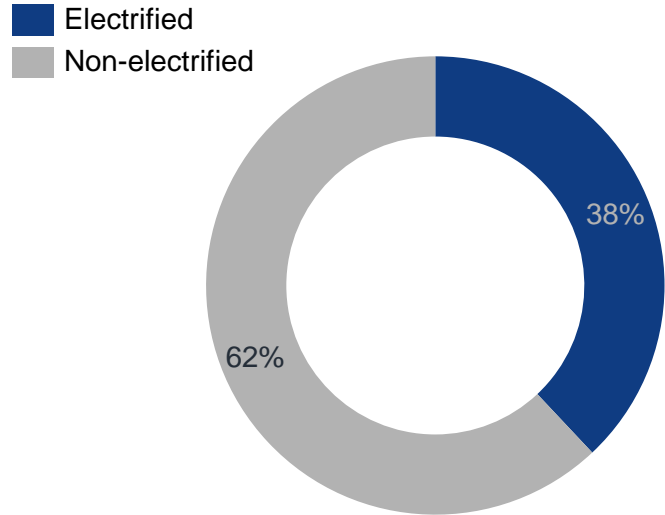


Over £20m invested in decarbonisation initiatives

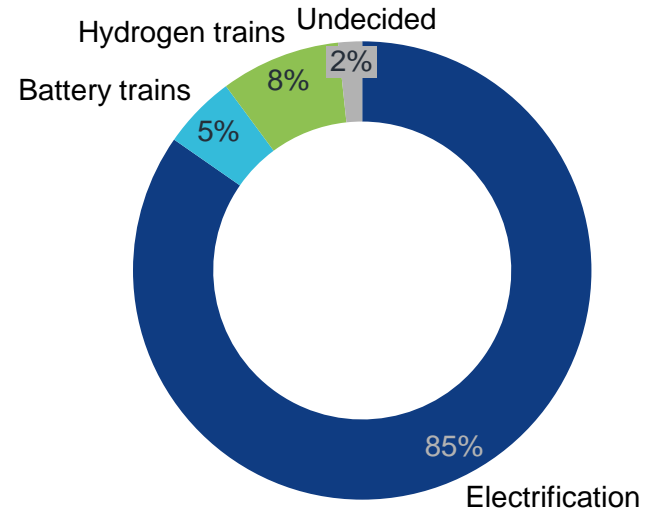
Options for rail decarbonisation



38% of the network is currently electrified....



TDNS recommendations for the remaining 62%



- How can we **accelerate** the deployment of hydrogen and battery trains?
- What can we do **now** to improve rail's carbon footprint?

Our approach



① Long-term solutions

- Strong case for small-scale retrofit fleets to:
 - Go through safety and approvals
 - Develop the associated infrastructure
 - Gain whole-system experience

HYDRO FLEX  **ELECTRO FLEX**

② Interim solutions

- Electrification is a 30y+ programme
- In any scenario diesel trains will be needed for many more years
- Upgrades to diesel trains is the best option to improve the industry's footprint in the short term

 **HYBRID FLEX**


Eminox

Long-term solutions - Hydrogen



HydroFLEX Phase 1: prototype

- The UK's first hydrogen train and the world's first retrofitted hydrogen train
- Designed in partnership with University of Birmingham and launched at Rail Live 2019
- Successful mainline testing undertaken in September 2020
- Supported by two rounds of InnovateUK funding

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 UNIVERSITY OF BIRMINGHAM


UK
Innovate
UK



£1m

Investment from Porterbrook and the University of Birmingham

Long-term solutions - Hydrogen



HydroFLEX Phase 2: production version



- Production version underway, including:
 - Bi-mode 25kV AC & hydrogen
 - 90mph top speed in hydrogen mode
 - Capable of a full day's operation
- To be showcased at COP26 in partnership with Network Rail



£6m

Additional Porterbrook investment in Phase2

Interim solutions – improving existing diesel trains



HybridFLEX

- Upgrade our existing diesel trains with a new battery pack and a Stage-V compliant engine to deliver:
 - Last-clean mile in battery mode in and around stations
 - GHG emissions reductions c.25%
 - NOx and PM reduction c.70%
- Demonstrator unit developed for Chiltern
- Currently being tested between Duffield and Wirksworth, ahead of passenger service later this year



Chilternrailways
by arriva



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Existing Diesel



Eminox

- Air pollution carries the greatest environmental risk to human health, especially to those exposed for long periods
- Eminox exhaust aftertreatment technology allows us to significantly reduce the NOx and PM emitted from our vehicles, improving air quality
- Initial trials on an SWR Class 159 vehicle reduced NOx emissions by 80% and PM by over 90%
- Technology to be rolled out to GWR's Class 158 fleet



South Western
Railway

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