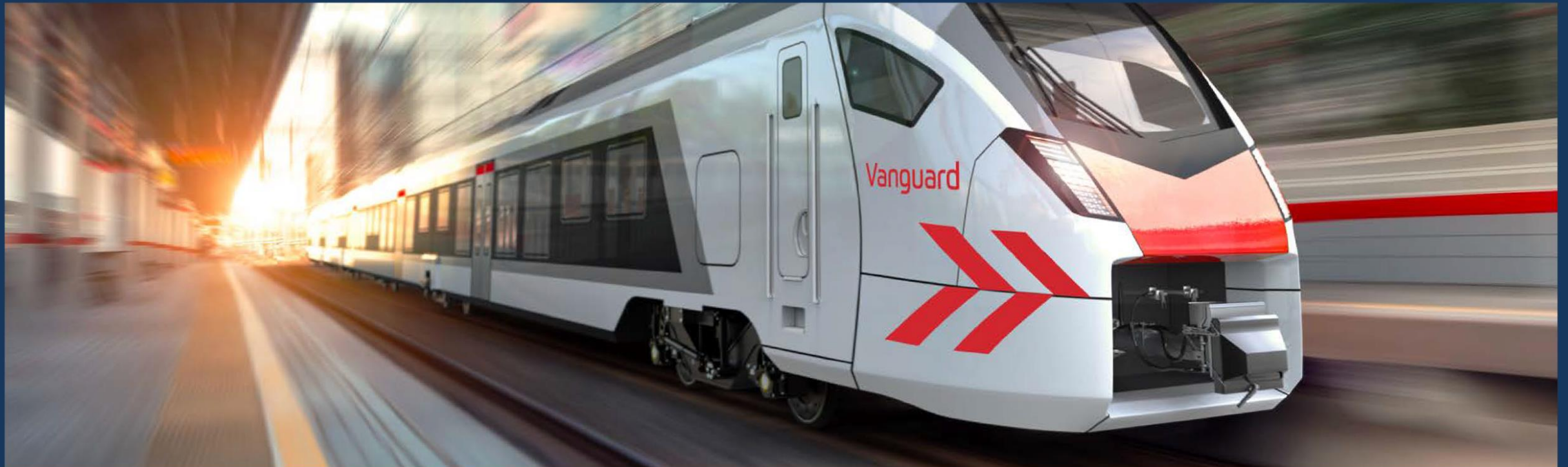


Vanguard

Changing Trains

A British Perspective on Hydrogen for Railway Applications





Accelerating
a clean future
through the
decarbonisation
of heavy
transportation



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Introduction



Why Decarbonise?

Why Decarbonise?

1. Air Quality – Public Health

Evaluation of air quality at the Birmingham New Street Railway Station

Alice Hickman, Christopher Baker, Xiaoming Cai, John Thornes, Juana Maria Delgado Saborit
Civil Engineering, Earth and Environmental Sciences, Geography, Earth and Environmental Sciences
Research output: Contribution to journal › Article › peer-review

5 Citations (Scopus) 1287 Downloads (Pure)

61

Overview Fingerprint

Abstract

Air pollution from diesel emissions is becoming an increased international concern, and whilst attention has been primarily focused on the automotive industry, concerns have also been raised about emissions from diesel rail vehicles. This paper reports an extensive series of measurements made at the Birmingham New Street station, a major rail interchange in the Midlands of England, with a mix of diesel and electric train movements, which is of particular concern because of the enclosed nature of the platforms. This study was undertaken in collaboration with Network Rail to better understand the environment in and around the station over a longer period to provide a more detailed analysis of the complex environment at the station. The station environment has been considered in terms of the European Union (EU) and Department of Environment, Food and Rural Affairs (DEFRA) limits as part of the monitoring methodology, but it should be noted that these limits do not apply in this environment as the Management of Health and Safety at Work Regulation 1999 and the Control of Substances Hazardous to

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Hickman_et_al_Evaluation_of_Air_Quality_at_Birmingham_New_Street_Railway_Station
Final published version, 1.08 MB
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Why Decarbonise?

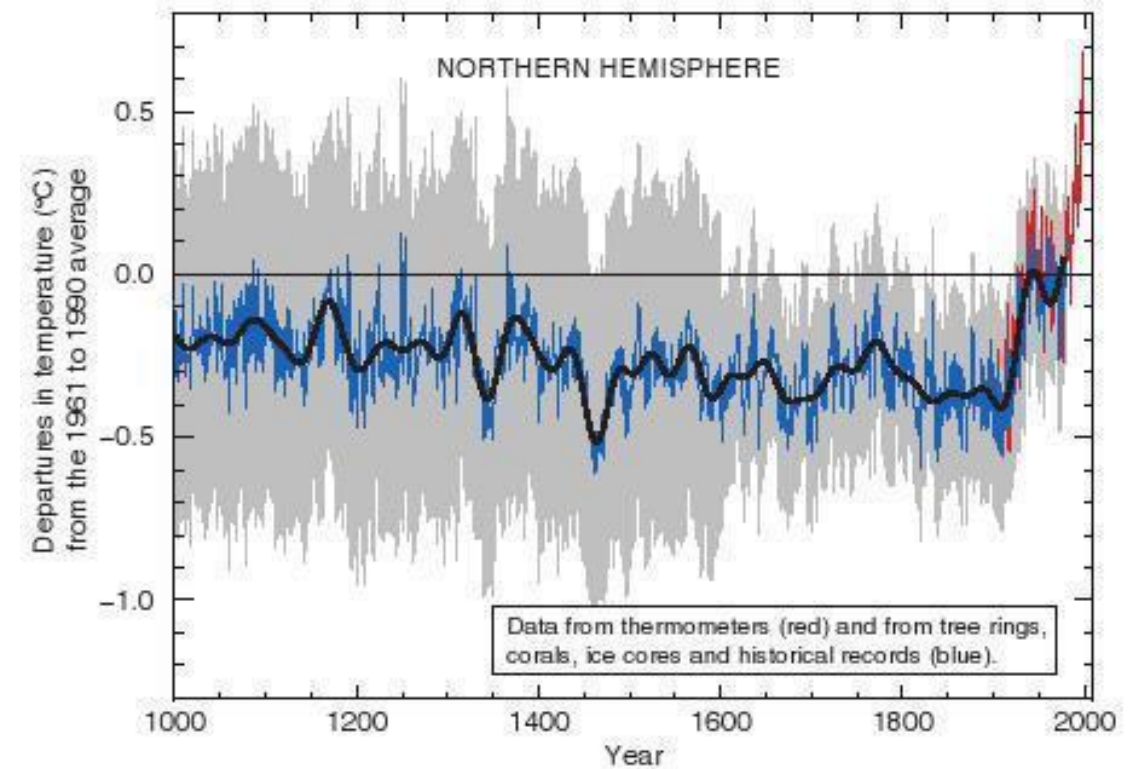
1. Air Quality – Public Health
2. Energy Security



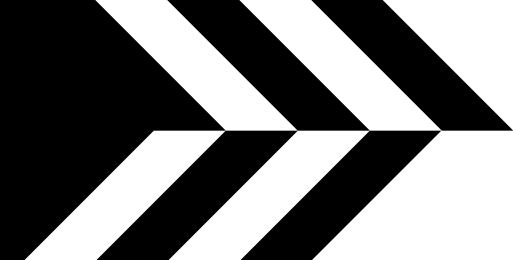
Why Decarbonise?

1. Air Quality – Public Health
2. Energy Security
3. Climate Change

We will achieve this through technology and modal shift



Decarbonisation Options (Heavy Rail)



Lineside Electrification



Battery

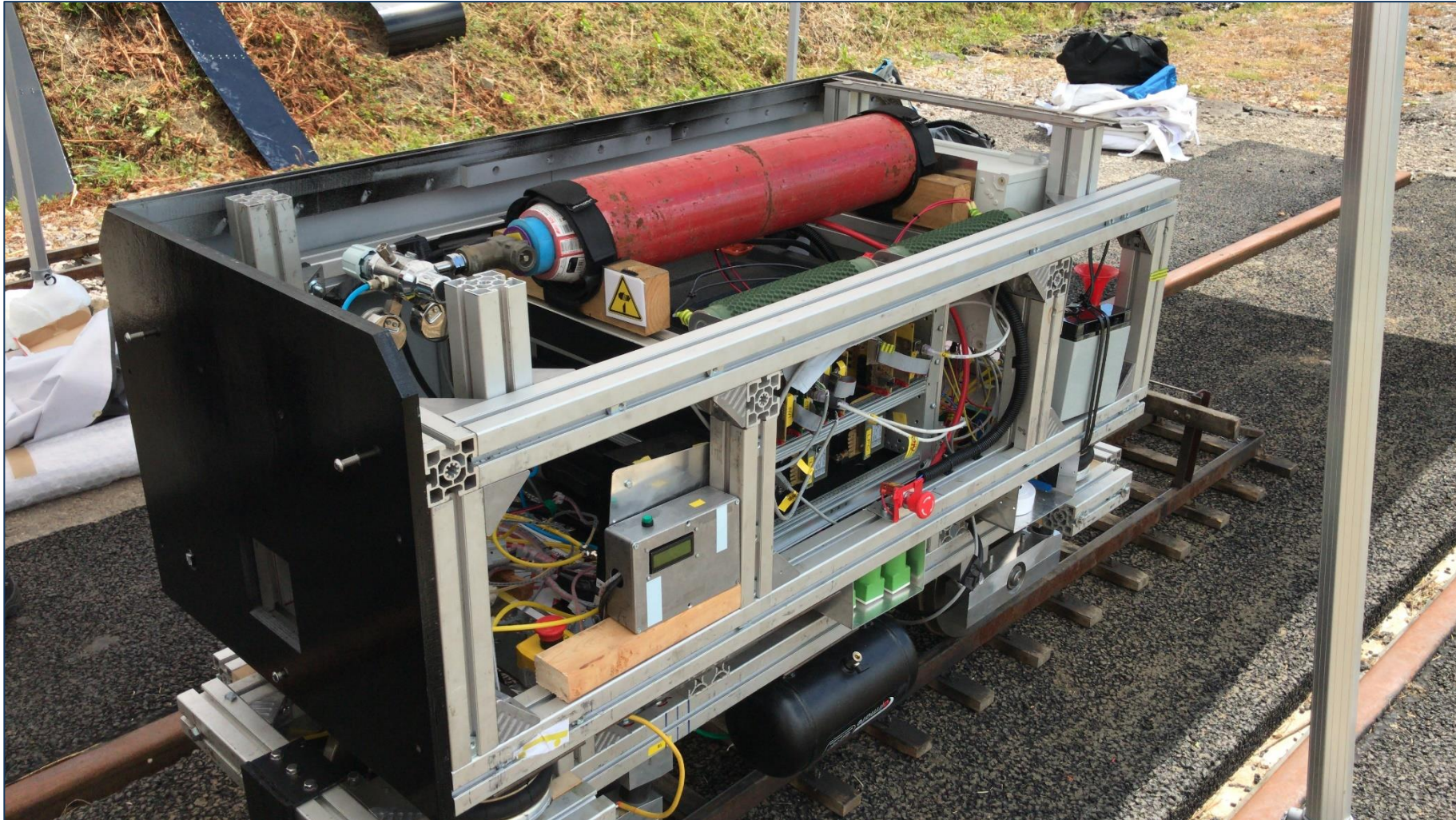


Hydrogen



Our Hydrogen Projects

Inside Hero



Our Projects in Motion: Hero



HydroFLEX 1



The "HydroChamber"



The Equipment Within HydroFLEX 1



Our Projects in Motion: HydroFLEX 1



HydroFLEX 2



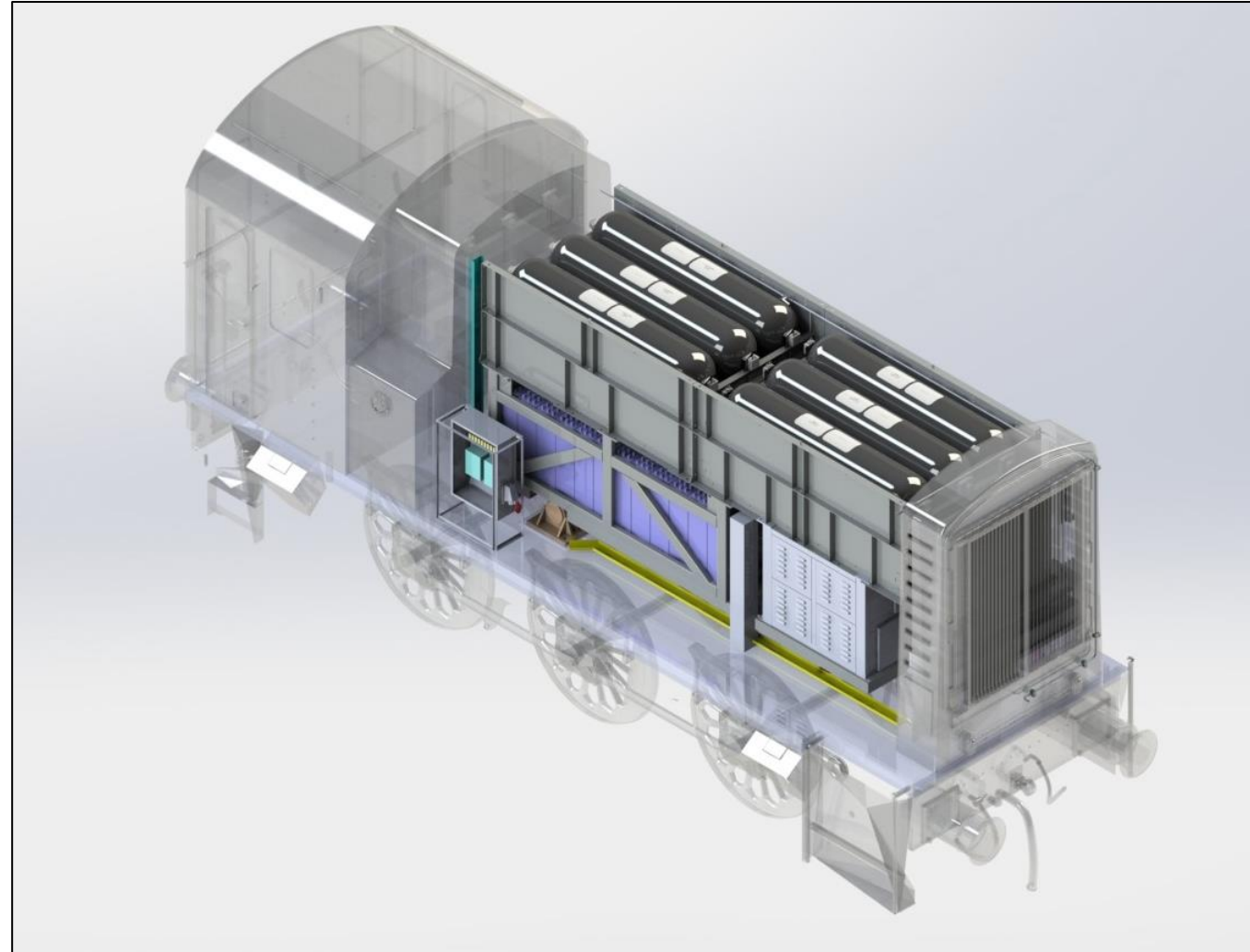
Projects in Motion: HydroFLEX 2



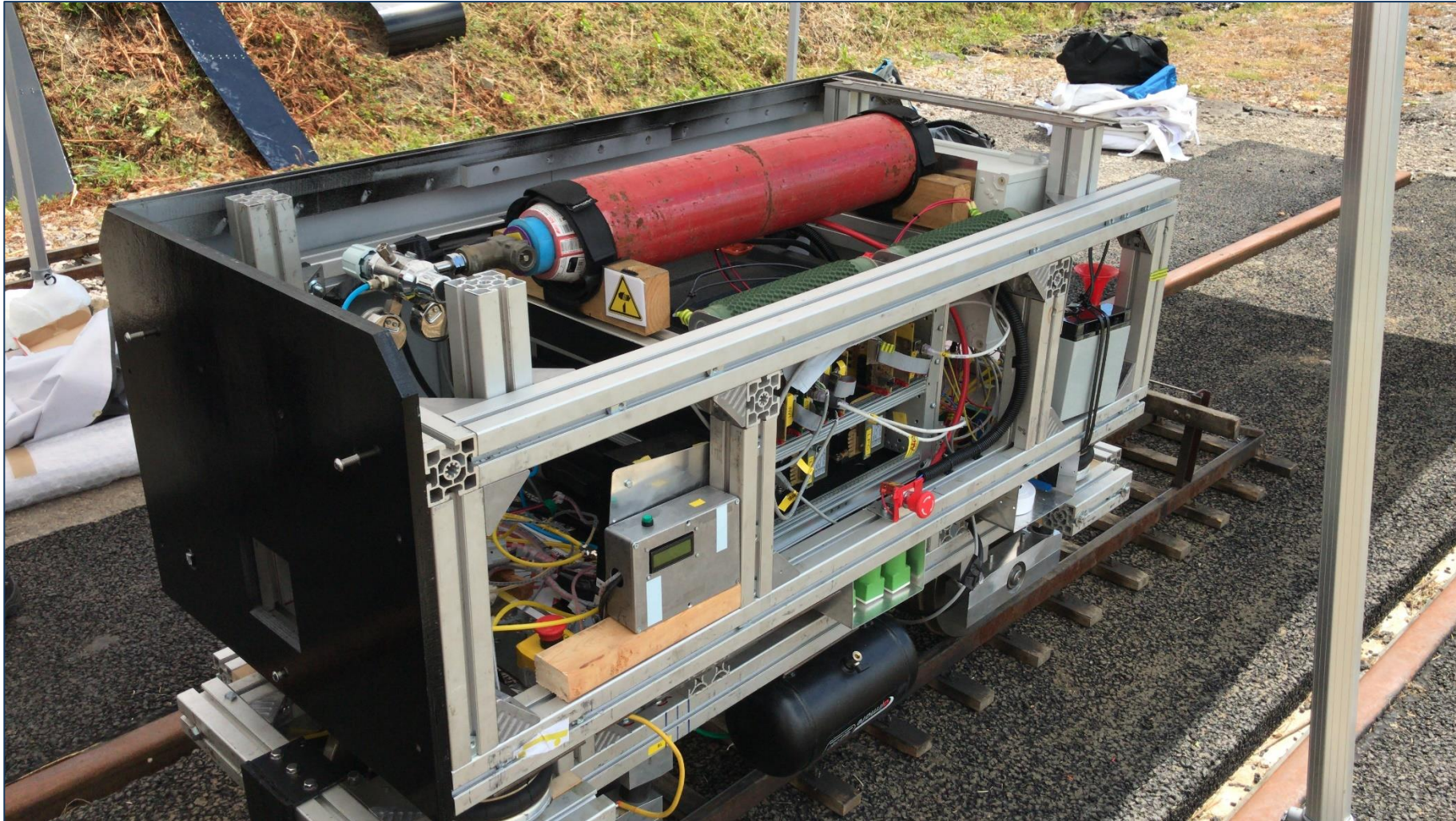
In Build: HydroShunter



The Design of HydroShunter



Refuelling – Replaceable Storage



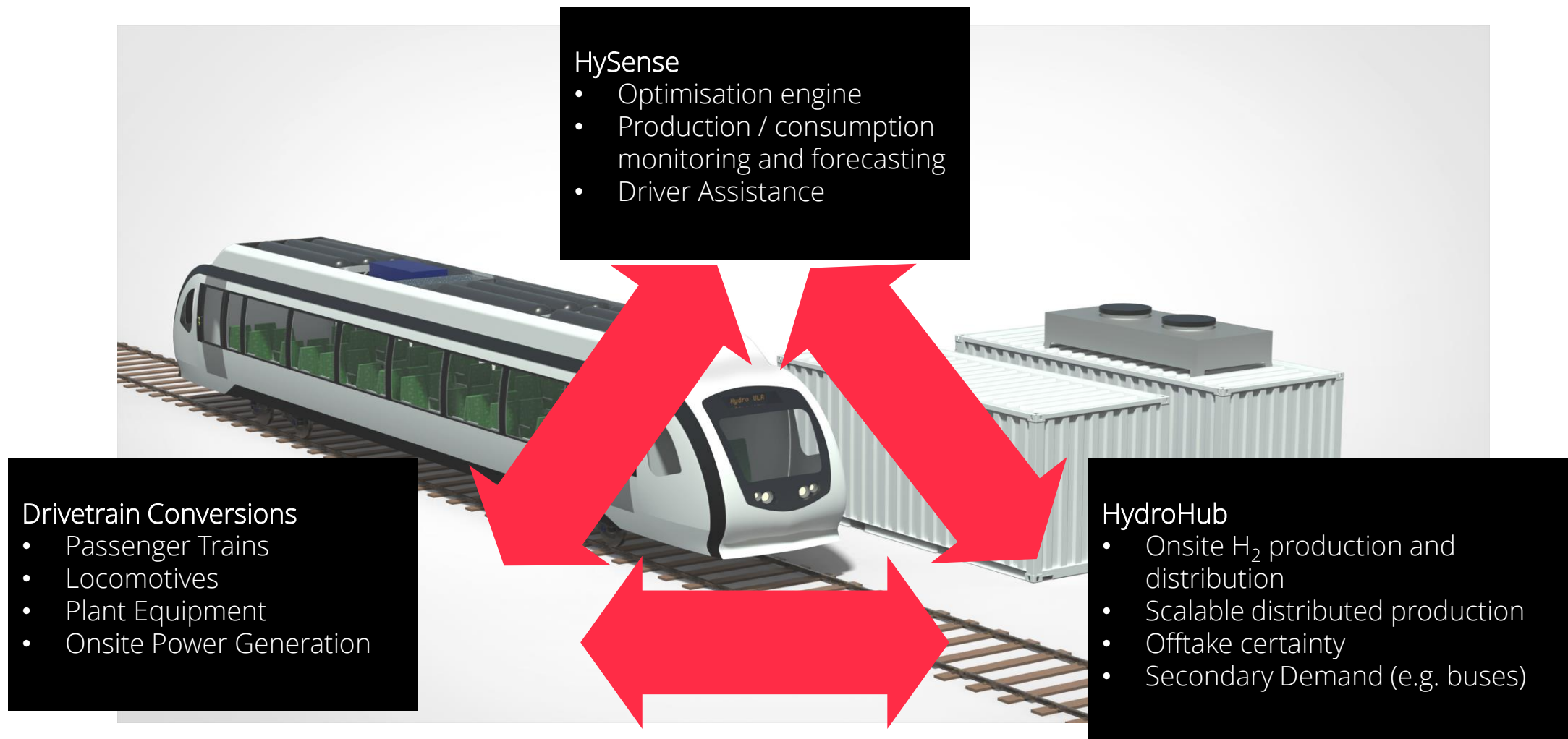
Refuelling – Manifolded Cylinder Pallets



Refuelling – Tube Trailer



The Whole System Approach



Future Steps

Different Technologies:

Hydrogen ICE

Hydrogen Turbine

Cryo, Ammonia, Metal Hydrides?

Scaling of Hydrogen Supply

Refinement of Current
Technologies and Projects



Summary, Lessons Learned, Next Steps



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Any Questions?



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