

Hydrogen Trains: Here? Now?

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33 Locations across UK&I



#1 UK Rolling Stock & Services



UK&I Employees 6,000



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A hydrogen train for the UK

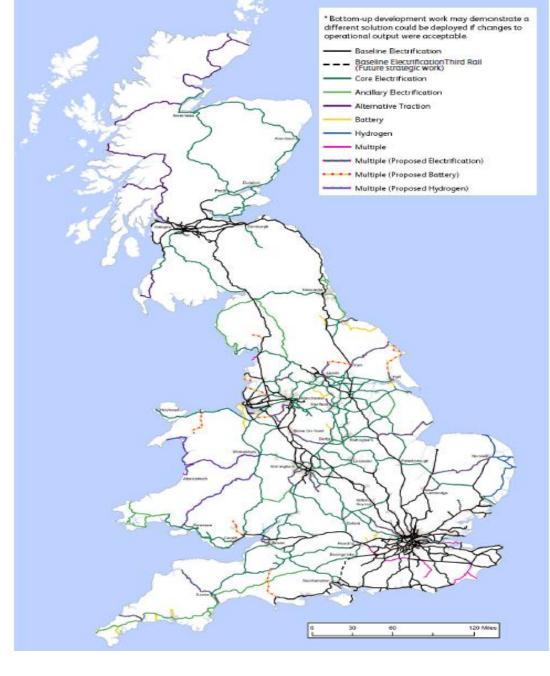


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The right technology in the right places

- The technologies for decarbonising rail traction are known electrification hydrogen and batteries
- Battery trains offer flexibility and transitional support during electrification but range and performance is limited
- Hydrogen offers the best compromise for green onboard energy storage because it is more compact and much lighter than batteries – for longer range there is no other choice
- To some, this makes hydrogen a "competitor" with electrification for longer, trickier regional routes
- In reality, electrification, batteries and hydrogen are complementary and need to be pursued in parallel
- Plans and maps are being redrawn as the rail industry is "reorganised" once again





Capacity – rail carries 9.6% of journeys for 1.4% of the emissions

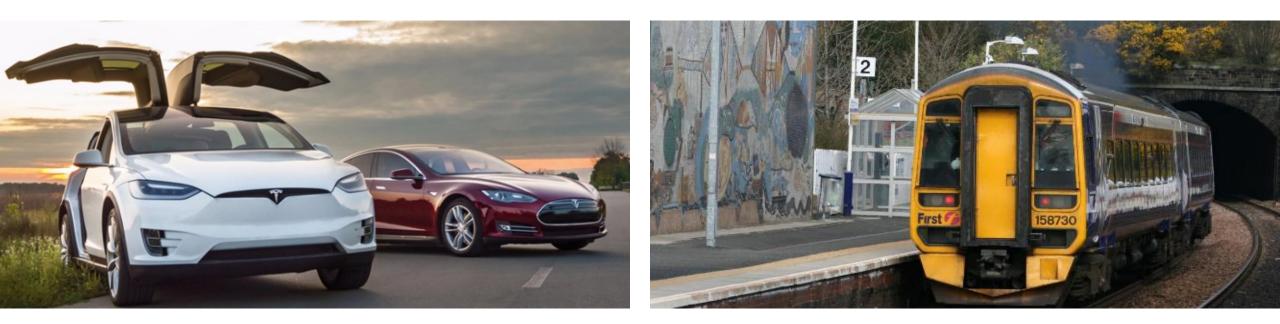


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What do people believe?

- What is the greenest way to make your journey?
- Electric car, or
- Diesel train
- In most cases, the train's emissions, per passenger km are, today, lower...



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The greenest mode of transport

- According to the Office of Rail and Road, rail emissions accounted for 0.4% of the UK's total CO2e emissions in 2019
- Rail made up 1.4% of the UK's transport CO2e emissions in 2019, but in comparison 9.5% of all passenger kilometres were made using rail
- But since 2019 passenger numbers are down, emissions per passenger are up, has the age of the train simply passed?
- So, why decarbonise it at all? Do we get enough "bangs for our buck" with rail decarbonisation?
- And, why start now? There's loads of time...





Alstom hydrogen trains - there (not here) and now

Fleets are being built elsewhere to meet decarbonised transport vision



- Coradia Stream (Italy)
- 6 trains plus 8 options
- Fleet to deploy in Lombardy
- Enters service Q4 2023



- Coradia iLint (Germany)
- 41 trains ordered in two fleets
- Enters full service H1 2022
- Pre-series trains in passenger service since 2018



- Coradia Polyvalent (France)
- 12 trains plus 2 options
- To operate in four regions
- Bi-mode hydrogen-electric

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