

*tpgroup*

# Hydrogen powered trains

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Delivering an innovative new modular approach using existing 'green' technology to develop hydrogen safely and efficiently for the rail sector.

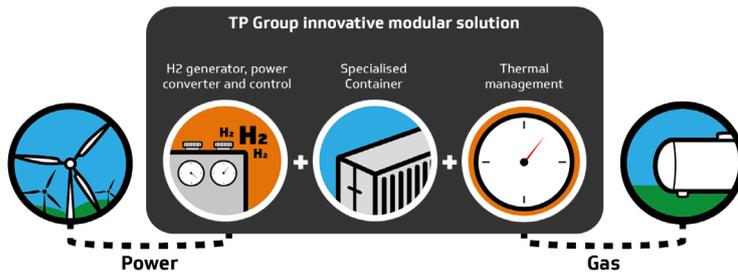
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Innovative thought.  
Absolute trust.  
Critical technology.



Hydrogen is increasingly being seen as the ideal clean energy source to power trains – not emitting harmful gases or requiring overhead cabling infrastructure. Neither does it require lengthy recharging periods and enjoys up to a 20 year in-service lifespan (40 times that of current batteries).

The challenge is how to safely and efficiently refuel hydrogen trains in remote areas at high pressure within the UK – operators are taxed with installing fuel cell technology into the UK’s trains which are smaller than its German counterparts due to our rail heritage.



TP Group’s solution seeks to utilise surplus ‘green’ renewable energy sources (from wind farms and solar panels) to power scalable rail side containerised solutions. This system generates hydrogen and stores the gas within specialised high pressure containers (up to 700 Bar) which enables fast refilling – up to 10kg per 250 litre tank.

## Benefits:

This modular system can be tailored to an operator’s specific requirements - from the range of hydrogen generation rates that can be configured to suit your needs through to options that include long-term availability contracts. It offers a number of benefits including:

- High purity hydrogen delivery through a simple to operate system with low maintenance and in-service costs
- Operational within remote off grid locations as it only requires a source of water and electricity to run – including saltwater through to portable water capability
- Offers a rapid, dynamic response to the Grid Operator’s variations in energy generation output
- Requires less setup costs - co-located to the source of energy reducing transfer line losses and costs associated with large scale plants

## So why TP Group?

With over 40-years of delivering hydrogen in extreme environments with ultra-high reliability, TP Group’s capability provides a high level of confidence. The organisation offers a unique understanding of creating and integrating system level Electrolyser Hydrogen generation solutions, with relatively low barriers to entry, and has industrial links to key enabling technologies such as PEM electrolysis cell stacks.