Hydrogen Transport-Use Case Studies

Hydrogen Energy Association

Hydrogen for Heavy Transport Case Study: Reynolds Logistics

Hydrogen Energy Association

Key Messages

- RL is aiming to transition its 120 HGV fleet to zero carbon fuels, with hydrogen being a core solution to its long-distance, high payload movements.
- At this stage, logistics companies need Government support if they are to invest.
- OEMs must be encouraged to meet ADR regulation criteria to allow hydrogen powered tractor units to transport hydrogen.

Background

- Reynolds Logistics (RL) is a family-owned haulier business with approx. 120 HGVs, each 44 tons. It offers bulk transportation of gases and fuels around the UK. Partners include Essar and Gasrec. Currently, the majority of the HGV tractor units are diesel powered, apart from approximately 10 fuelled with Bio LNG. The average daily range of each HGV is 200-300km.
- RL is striving to be Net-Zero as soon as possible.

Hydrogen Opportunity

- RL sees hydrogen technology as one of the few solutions that provides a solution to the range and payload issues of heavy haul.
- RL transports hydrogen as a product, so using it to power its fleet would be a compatible progression.
- Hydrogen is seen as an invaluable Zero-Emissions solution for a sector that constitutes a large portion of the emissions from the UK transport sector.

HyHAUL Project

- RL is part of a consortium working to deliver the largest hydrogen mobility corridor in the UK to accelerate the decarbonisation of the HGV sector.
- HyHaul was a winner of the Zero Emission Road Freight Demonstration (ZERFD) (£30 mil) and will deploy 30 hydrogen fuelled trucks by 2026. RL is looking to deliver hydrogen to refuelling stations via hydrogen powered vehicles where feasible.
- This pioneering project will not only demonstrate the viability of hydrogen use in the HGV sector, but the appetite for its adoption.

Considerations

Cost

- While RL see hydrogen powered tractor units as the best option from an emissions and carbon footprint perspective, it would, while the technology availability is still developing, be very cost-prohibitive for logistics companies with single figure margins to invest without Government support.

Regulatory

- OEMs are not yet demonstrating that the new hydrogen tractor units they produce meet the criteria specified by the European Agreement concerning the International Carriage of Dangerous Goods by Road, as well as the Safe Loading Pass Scheme.
- This currently prevents hydrogen powered tractor units from transporting hydrogen and accessing oil and gas terminals, which comprise a large proportion of RL's cargo and clients respectively.

Looking Ahead

- Ultimately, RL is aiming to transition its entire fleet to low carbon fuel solutions, ideally hydrogen, as soon as possible.
- The business is looking for Government to support the transition to hydrogen technology while initial investment costs remain high.
- Demand led incentives must be introduced for OEMs and logistics companies alike to increase the availability of hydrogen tractor units and reduce their cost.

"Reynolds Logistics believe passionately in the transition of the logistics sector to zero carbon fuels and the criticality of hydrogen within that solution. The first step is to ensure that hydrogen is transported wherever possible using hydrogen powered vehicles, then we would like to see this technology integrated into the remainder of our fleet. Doing this without government support is currently cost prohibitive." - **Mark Lowe, Head of Business Development, Reynolds Logistics**

Hydrogen for Heavy Transport Case Study:
South Derbyshire District Council

Hydrogen Energy Association

Key Messages

Key Messages

- Hydrogen is an ideal replacement for diesel refuse collection trucks.
- Improved availability and affordability of green hydrogen and its supporting infrastructure are needed for small scale use.
- Upgrading a refuse vehicle with a dual-fuel hydrogen and diesel engine is an effective way of reducing tailpipe emissions in the short-term.

Background

- South Derbyshire District Council (SDDC) sits within the eight district councils of Derbyshire County in central England.
- There is a lot of hydrogen activity in region with Toyota, JCB, and the East Midlands Hydrogen cluster.
- Refuse collection vehicles (RCVs) are key priority for Derbyshire County Council's decarbonisation - there are around 160 in the region.
- Two refuse trucks have been trialled using hydrogen and diesel blend by SDDC, which forms the basis of this case study.

Hydrogen Opportunity

- Electrification is not viable to power refuse collection trucks in Derbyshire's rural setting, whereas hydrogen satisfies all the operational demands.
- SDDC found using hydrogen to be more efficient than diesel in terms of the fuel consumption of the RCVs.
- The economic feasibility of using hydrogen for RCVs is currently challenging but does improves dramatically with scale.
- The public was very receptive to the SDDC trial.

South Derbyshire: Hydrogen Refuse Vehicle Trial

- The aim was to trial the small-scale use of hydrogen as a transport fuel for RCVs. The
- government funded the trial of **two 26 tonne refuse trucks**, upgraded by ULEMCo, on a dual-fuel basis to run on hydrogen and diesel for a **5 month period**. Gaseous hydrogen
- was used to displace **34%** of the diesel use and thus tailpipe emissions were reduced by an average of **34%.** The RCVs operated very similarly to **100% diesel**, but with added power and acceleration. A Fuel Cell Systems mobile refueller provided refuelling, which
- took **8-9 minutes** (a similar time to diesel). A BOC pressurized tube trailer was used to store the hydrogen. The fuel efficiency of dual fuel RCV's was higher than diesel by an
- average of **2.5%** as a result of the combustion engines burning cleaner with hydrogen.

Considerations

Procurement of hydrogen / infrastructure

- SDDC could not procure any green hydrogen for the trial (only grey) and there were limited options for small scale use, as producers are currently more inclined to focus on large-scale industrial users.
- The storage and refuelling infrastructure was also limited; the nearest refuelling station was in Birmingham.

Cost

- **61%** of the trial cost came from the infrastructure procurement and dual-fuel conversion.
- If the trial was scaled up to **25 RCV's**, the additional hydrogen infrastructure cost required to reduce tailpipe emissions would drop to **£3.00 per kg of CO2e** removed, compared with **£22.25 per kg of CO2e** when only two RCV's are used.

Looking Ahead

- Following the trial, SDDC sees hydrogen as a suitable low carbon fuel with which to decarbonise its fleet of RCVs. Yet, until the cost of hydrogen and its associated infrastructure significantly reduces, scaling up hydrogen use for local fleets is currently not economically viable without government support.
- The government should aim to stimulate regional hydrogen transport and storage networks to increase the accessibility of green hydrogen for smaller scale transport applications.

"This hydrogen dual fuel pilot demonstrated that, operationally, hydrogen can be used for small scale transport use, but it also highlighted the necessity of government support to allow the cost of hydrogen and its associated infrastructure to be commercially viable at this early stage" - **John Kinderman, Principal Climate Change Officer, Derbyshire County Council**

Hydrogen for Heavy Transport Case Study:
Wales & West Utilities

Key Messages:

- Battery technology is unsuitable for more than 50% of WWU LCV operational demands. >95% of LCV journeys could be completed by a hydrogen FCEV
- The government's position should reflect the value of hydrogen in decarbonisation commercial vehicles.

Background

- Wales & West Utilities (WWU) operates the gas distribution network across Wales and South West England.
- This requires a 2370 strong commercial fleet (all vehicles are owned by WWU). Includes 60 HGVs (mostly rigid 8-wheel tipper/grabs).
- Also includes 1,400 LCVs, mainly vans and light tippers, at least half of which are below 3.5 tonnes. LCVs account for 85% of WWU's fuel use.
- WWU are currently using a combination of electric and hydrogen vehicles, yet the business is aiming to redirect as much of the decarbonisation targets to hydrogen as possible to achieve a 100% low-carbon fleet by 2035.

Hydrogen Opportunity

- WWU note that hydrogen technology is far more suited to cope with the operational demands of LCVs than battery electric (BE) technology, and should thus not solely be limited to use in the HGV sector.

Decarbonisation of LCVs

- WWU Estimates < 50% of journeys could be completed by a Battery Electric Vehicle (BEV) (assuming overnight recharging). In contrast, >95% of journeys could be completed by a Hydrogen Fuel Cell Electric Vehicle (FCEV) (assuming daily refuelling).
- Hydrogen powered LCVs would see no unladen weight increase, which can be as much as 25% when using BE technology.
- Hydrogen LCVs allow WWU staff on call-out standby the flexibility to use vehicles at any moment, as opposed to waiting for sufficient charge before attending the call-out. Either way, few industrial staff can accommodate a home charger for BEVs.
- Hydrogen solutions have a similar range to diesel equivalents and do not present the same 'range anxiety' issues as BEVs (particularly in colder weather).

Considerations

- Despite having the intent and the commitment to hydrogen technology, WWU note a lacking availability of hydrogen HGVs and LCVs, as well as their supporting infrastructure.
- There is no government roadmap in this regard for the period up to 2030 and beyond.

Looking Ahead

- Any organisation using LCVs to visit remote locations or serve construction/excavation sites will have similar issues with BEV.
- DfT must give quality advise and adopt a position on hydrogen that reflects its value to the decarbonisation of goods vehicles. .
- An emphasis must be placed on improving the reliability and availability of hydrogen refuelling stations. It is very difficult for stakeholders, such as WWU, to commit to a hydrogen fleet without these assurances.

"We need hydrogen to act as an 'and' technology, as it offers a more acceptable option for decarbonisation." - **Stephen Offley, Net Zero Transport Manager, WWU**