

ULEMCo

ultra low emission mileage company limited

FPC 2024

Challenges in the integration of
Hydrogen technologies and
alternative fuels

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Who we are and what we do



- ULEMCo specialize in the integration of hydrogen systems to vehicles, mainly HGVs and specialist equipment.
- Hydrogen can be applied and integrated in several ways; dual fuel combustion, fuel cell, 100% hydrogen combustion.
- Offering a range of solutions allows ULEMCo to help increase hydrogen demand and therefore grow the economy.



The Challenge

- The UK has a very ambitious Net Zero strategy.
- Decarbonization must be tackled in all industries.
- There isn't one single solution for all.
- Hydrogen integration faces its own challenges.

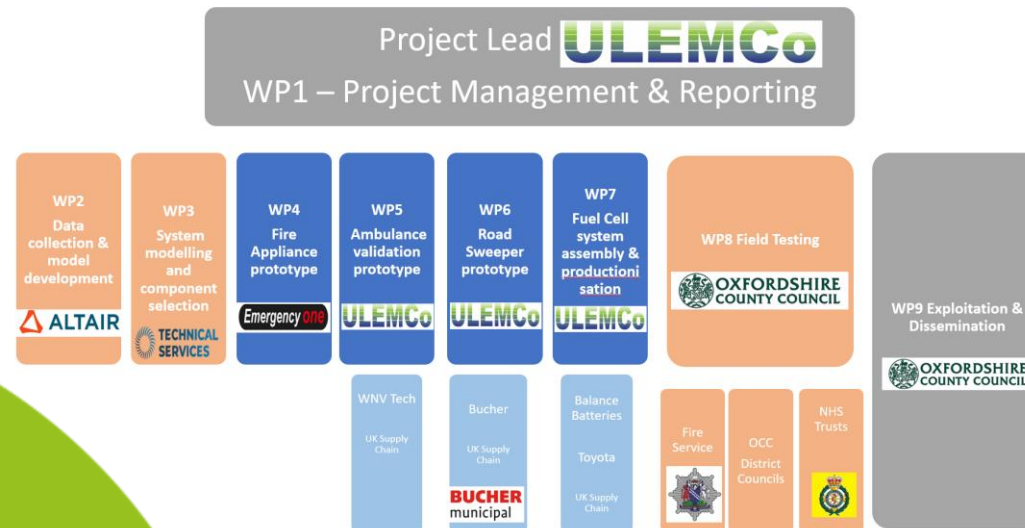


HyerPower Project Introduction



Develop a zero-emission hydrogen fuel cell-based range extension technology, which will be demonstrated into a series of 'world-first' specialist electric vehicle solutions: Fire Engine, Ambulance and Road Sweeper

- Creation of a bespoke modelling tool for optimization at a whole vehicle level
- A unique and flexible control system that will enable integration across a variety of base EVs
- A core physical cooling system that can be adapted for different vehicle types

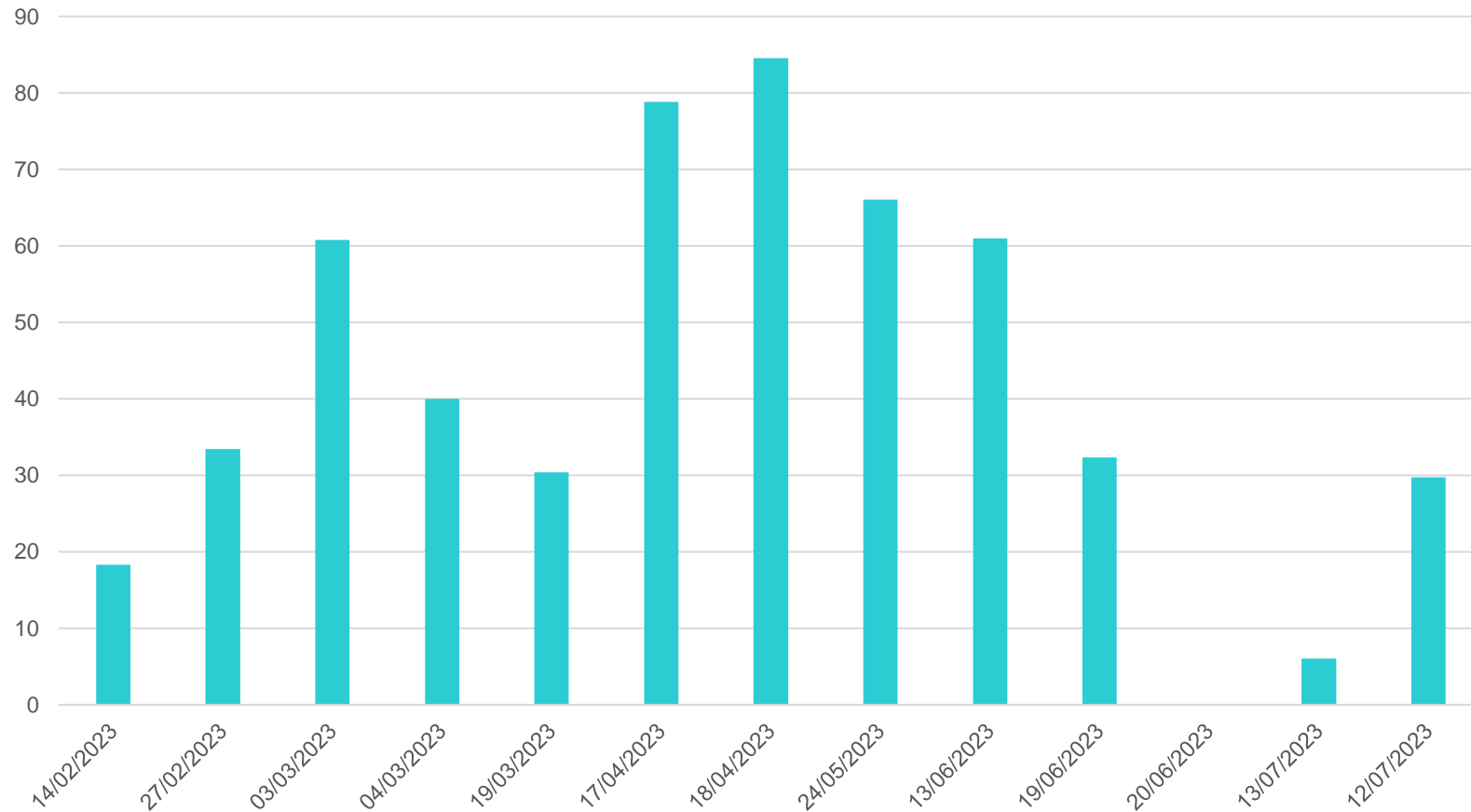


The “Sweet Spot” with Hydrogen Fuel Cells and EV Drivetrains

- Finding the right zero-emission solution for your machines/vehicles can be a very involved process.
- Firstly, you must analyse the energy demands of the vehicle alongside other factors (e.g., downtime, infrastructure, etc.)
- Once you have established the route in which you are going to take, you can start to look at optimizing the solution.
- Utility and rapid response vehicles add even more complexity.



Fire Engine Daily Covered Distance (km)

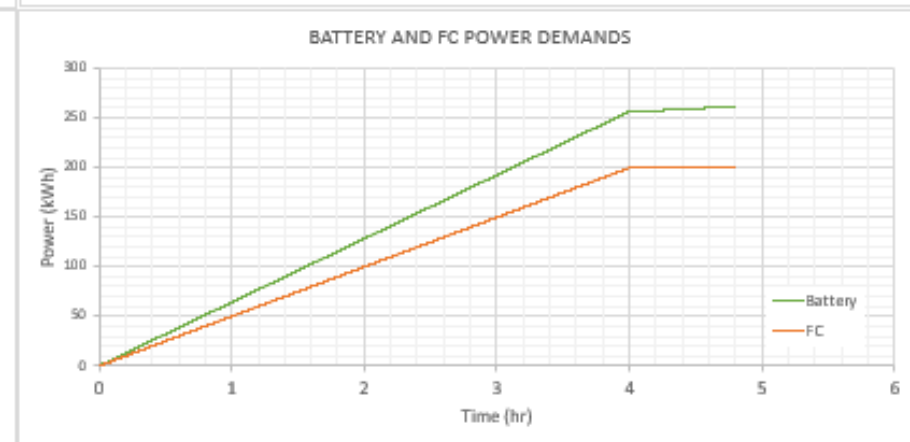
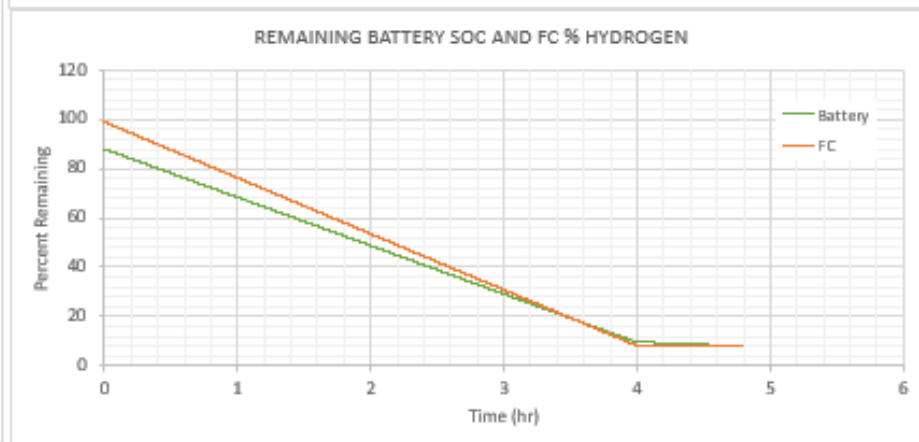
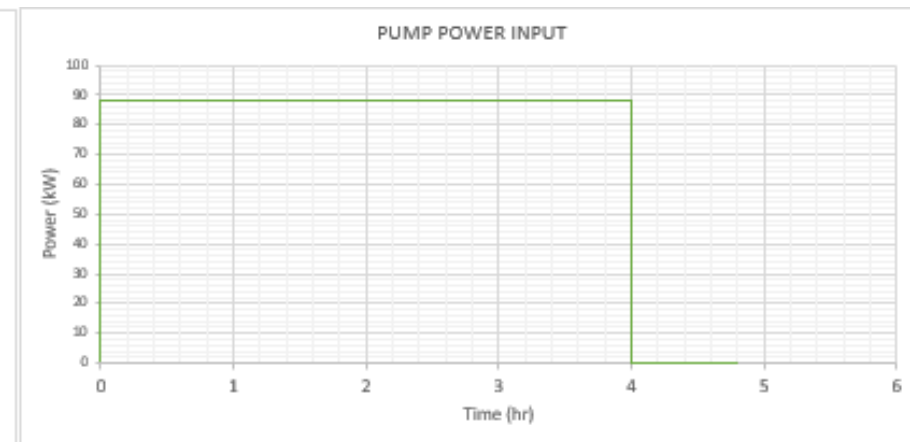
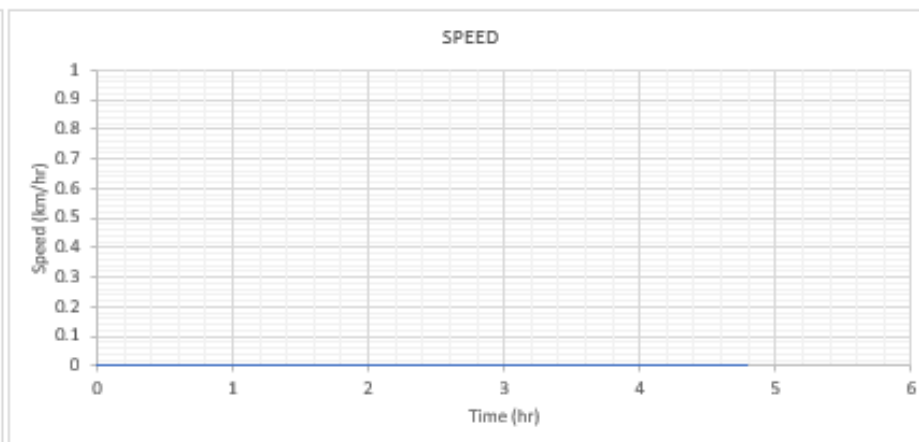
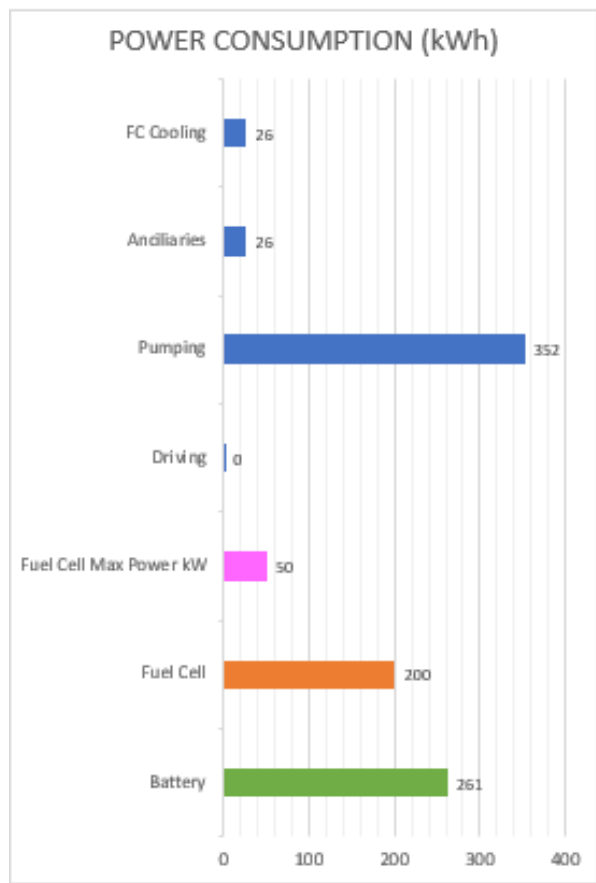


- Response vehicles don't necessarily cover long distances; however, their daily use is extremely erratic.
- The “duty cycle” is not repetitive, downtime is infrequent and will result in opportunity charging only.

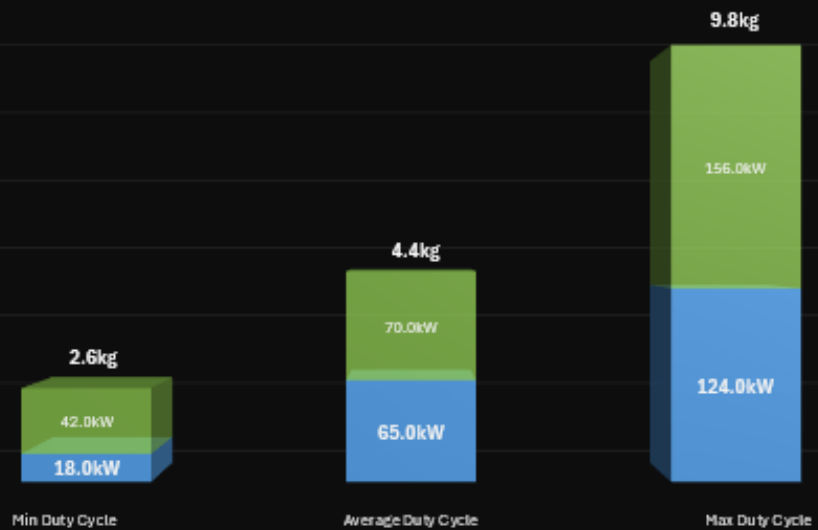
4-Hour Pumping Requirement

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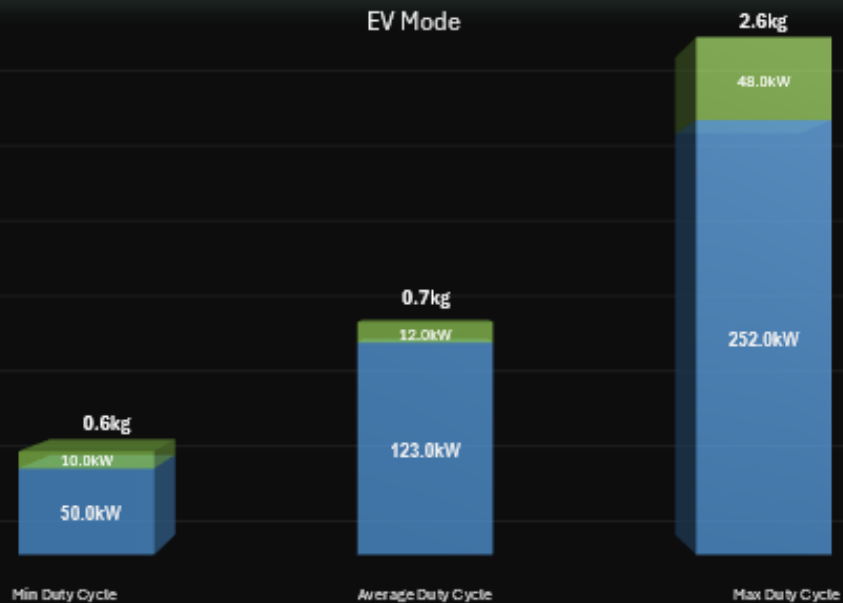


Hydrogen Mode



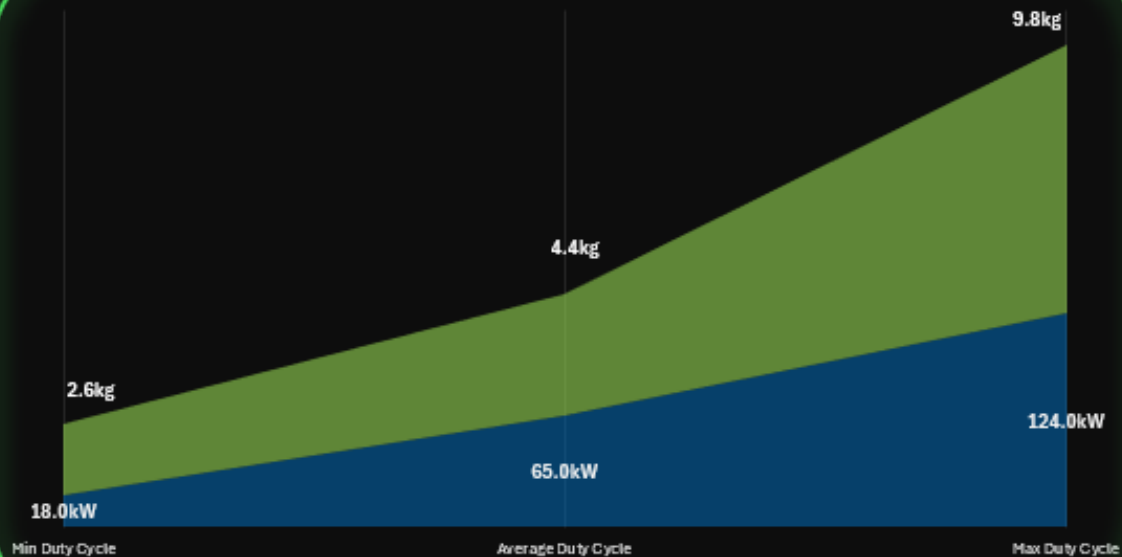
■ Battery ■ Hydrogen

EV Mode



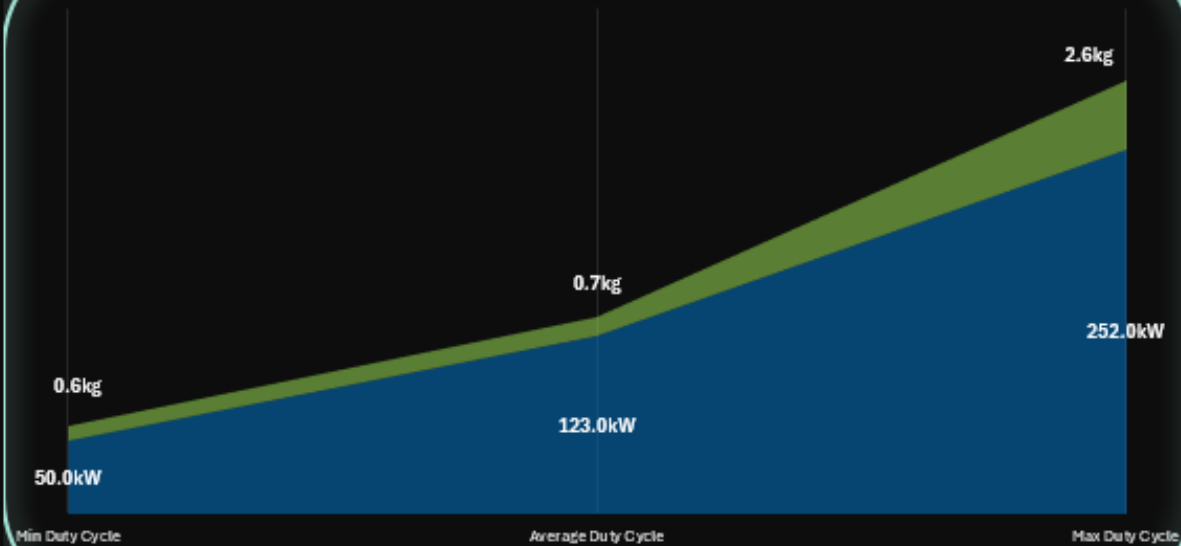
■ Battery ■ Hydrogen

Hydrogen Mode



■ Battery ■ Hydrogen

EV Mode



■ Battery ■ Hydrogen

Potential Design

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Hydrogen Opportunities in Construction

- Hydrogen propulsion technologies are ahead of the refueling infrastructure in the UK.
- To enable hydrogen use in other sectors the availability of hydrogen and access to refueling must increase.
- A sector with significant potential for hydrogen usage is construction.
- It's estimated that there are over 300,000 NRMM items in use in the UK, contributing to the emissions of 11.4M tonnes of CO2 on construction sites in 2020.





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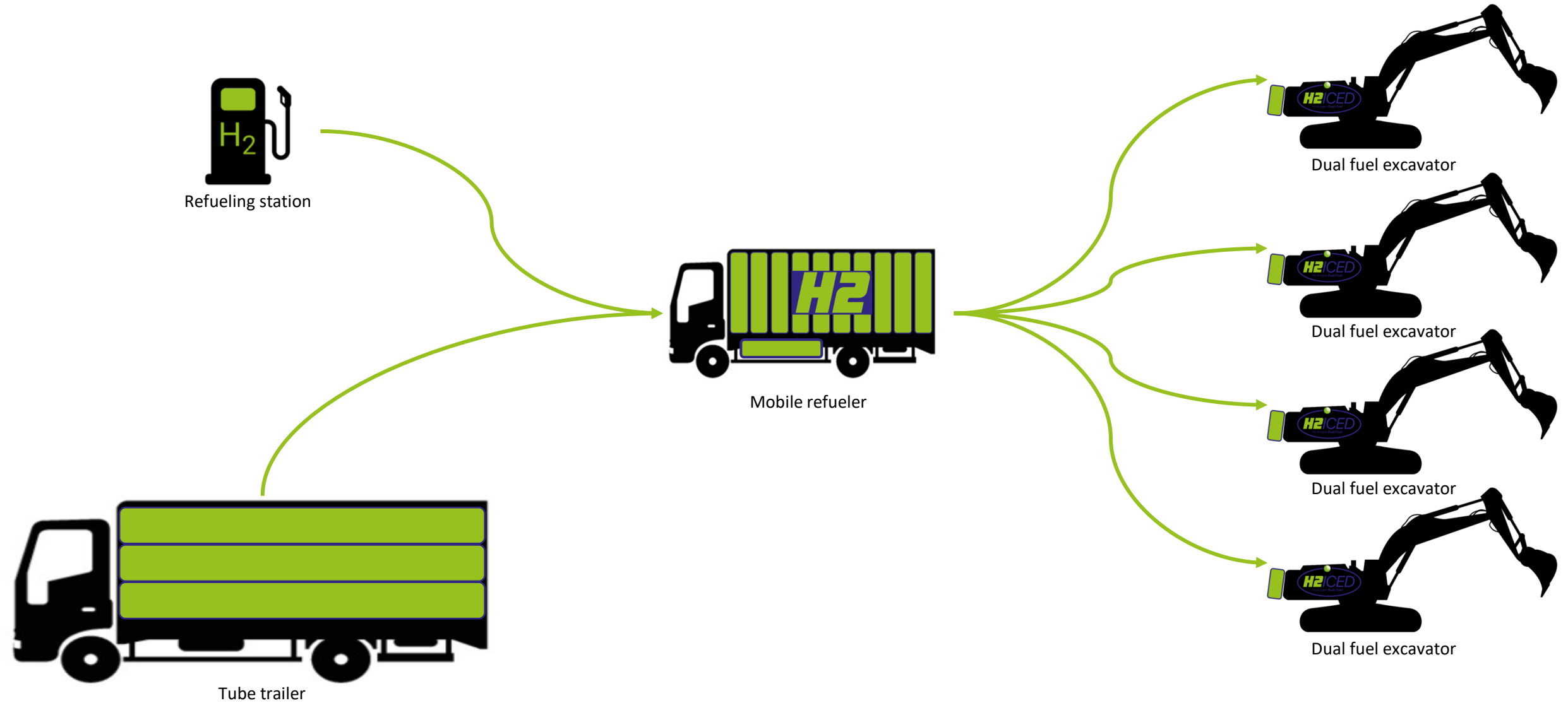
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Hydrogen Challenges in Construction

- Diesel and its renewable alternatives (HVO, etc.) are easily transported and stored.
- Hydrogen is more complicated in comparison to diesel, but diesel is not a zero/low emission fuel.
- Electrification of a full construction site would be extremely challenging due to the high energy demands.
- There is a place for both electric and hydrogen solutions on site.
- We must find a way to efficiently provide hydrogen to the various machines and equipment



A Possible Refueling Solution



Thank you

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