

Making ultra-low emission practical for commercial vehicle fleets

Amanda Lyne, Managing Director at ULEMCo Ltd explains how operators can deploy ultra-low emission vehicles without compromise by converting diesel vehicles to dual fuel hydrogen

THE fundamental aim of ULEMCo's technology is to provide a cost-effective and immediate opportunity for commercial vehicle owners to reduce their carbon and air quality emissions.

In time, as we get nearer to 2050, energy from hydrogen will be a fundamental part of the global and local solution to decarbonisation, with its ability to be generated from a range of sources, its abundance and being an intelligent solution to energy storage. ULEMCo's conversion technology enables vehicle owners to achieve their environmental targets without compromise to range and operational performance.

CONVERTING DIESEL VEHICLES TO RUN AS DUAL FUEL HYDROGEN VEHICLES

In collaboration with the fleet operator, the process starts with understanding the scope for hydrogen use in the fleet, both from a vehicle type perspective and the options for sourcing hydrogen within the vehicle's duty cycle.

ULEMCo then designs and engineers a safe, cost-effective solution specific to requirements or using its existing designs. It specifies the appropriate parts that meet with regulatory requirement for vehicle systems. The engine software is optimised to ensure performance and management of emissions; creating an appropriate engine control unit, that either runs alongside the vehicle's existing system or in conjunction with it.

The company then builds and fits the system, ensuring all the safety standards are met. The vehicle is then delivered back along with the appropriate paperwork and training to enable the vehicle to be used on the roads. Where appropriate, ULEMCo will also provide the whole system solution including refuelling and hydrogen supply.

WHAT MAKES THIS APPROACH ULTRA-LOW EMISSION?

Hydrogen is a zero-carbon fuel at point of use. When generated from renewable sources, or when combined with carbon capture and storage it is 100% carbon free; from other sources it helps to improve energy efficiency and grid balancing. For transport applications hydrogen can be used in a fuel cell to generate electricity directly on board the vehicle, or in a conventional combustion engine, replacing hydrocarbons such as diesel, petrol or methane gas.

If hydrogen is used in combustion engines, particulates and other emissions that impact on air quality are also dramatically reduced, although the by-products of the reaction with nitrogen in air (NOx etc), have to be managed carefully. The breakthrough has come by using Compression Ignition (diesel) engines, which enables ULEMCo to apply its know-how to optimise the combustion process, to replace significant quantities of diesel with hydrogen, and control for by-products, at the same time as being very efficient (40%). By using the vehicle's existing emission controls systems such as Exhaust Gas Recirculation (EGR), Selective Catalytic Reduction (SCR) etc, the company also ensures

tailpipe emissions meet or exceed standards. This opens the door to the use of hydrogen in a wide range of commercial vehicle applications where other approaches to reducing emissions are either too expensive, impractical or compromise vehicle performance. Ultimately, this enables the operator to deploy ultra-low emission vehicles without compromise to achieve both CO₂ reduction and air quality improvement!

THE REAL WORLD DRIVING EXPERIENCE

In truth, there's little to say with regard to what it's like to drive in dual fuel mode, as ULEMCo has specifically designed the system to make sure that there's no obvious difference in performance.

It designs the systems so that the tanks won't interfere with load space, for instance under the chassis. There is some impact to payload, with the weight of the tank system, however this is significantly less than would be needed to give the equivalent power/range from a battery.

Filling up with hydrogen will take about five minutes, depending on the fill volume needed.

HYDROGEN SAFETY AND THE SAFETY FEATURES IN H2ICED®

While hydrogen should be handled carefully, millions of tonnes are already used safely in industry every day. Hydrogen gas is very light, and disperses rapidly in the open air.

The hydrogen is stored in tanks and fed through pipework that meets global standards specifically set for on board vehicle safety. In addition, ULEMCo fits a side impact absorbing framework around the tanks to provide additional protection.

ULEMCo's Trade Mark for the hydrogen diesel dual fuel technology is known as H2ICED® – these systems have been engineered to minimise the chance and impact of a leak. The control systems are then designed further to ensure that should anything untoward happen, the system will cut off the flow of hydrogen immediately. The system is fitted with both dynamic and static leak detection; and a pressure relief mechanism.

The conversion does not impact on any of the vehicle manufacturer's design and structural integrity, nor is there any change to normal safety features where fitted, such as anti-lock braking etc. All vehicles are supplied with the appropriate certification from the Vehicle Standards Agency to indicate that it is safe to drive on the road.

BENEFITS OF HYDROGEN DUAL FUEL CONVERSIONS:

- ✓ A practical route to reduce carbon emissions and improve air quality
- ✓ Without compromise to duty cycle, range and payload volume
- ✓ For a range of vehicle types, particularly large commercial vans and HGV

FURTHER INFORMATION CAN BE FOUND AT ulemco.com