The Green Pages
NEW FUELS GUIDE
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Extreme H debut Pioneer 25 at Goodwood Festival of Speed

with hydrogen fuel provided by Fuel Cell Systems Ltd

Extreme H, the world's first hydrogen-powered motorsport championship, made its highly anticipated public debut at this year's Goodwood Festival of Speed in July.

Marking a historic return to the site where its electric predecessor, Extreme E, first launched the ODYSSEY 21 race car in 2019, the championship unveiled its next-generation hydrogen vehicle, the Pioneer 25, in front of thousands of spectators

Fuel Cell Systems Ltd (FCSL) is the chosen refuelling partner at the event, ensuring the Pioneer 25. With over a decade of industry-leading experience, FCSL is delivering clean, safe, and efficient hydrogen energy using its advanced HyQube refueller.

The Pioneer 25 was refuelled with compressed hydrogen, with only water vapour emitted as a by-product. The refuelling process draws on FCSL's deep expertise in high-pressure hydrogen storage, dispensing, and on-site production via electrolysis—demonstrating the viability of zero-emission motorsport at scale.

Dr Lee Juby, CEO of Fuel Cell Systems commented:

"We're excited to provide a hydrogen refuelling service at Goodwood Festival of Speed for the third year in a row. In previous years we have also supported Toyota and BMW to refuel their hydrogen vehicles at the event. FCSL is a proud UK company, designing and building a range of refuelling products in our West Berkshire factory for cars, trucks, buses, trains and even planes."

More than just a race debut, this is a showcase of cutting-edge British hydrogen innovation. FCSL's involvement underscores the growing role of UK technology providers in shaping the clean energy future, both on and off the track.

The FOS Future Lab gives the public a chance to go behind the scenes, exploring the technology that powers one of the world's only hydrogen-fuelled race vehicles. FCSL's refuelling hardware and system design was on display as part of an interactive experience that highlights the entire hydrogen value chain—from production to delivery.

Rally star Catie Munnings, first to take on the hillclimb, said:

"To drive the hydrogen-powered Pioneer 25 at Goodwood is an incredible honour. This event is a landmark in motorsport, and showcasing this game-changing technology—especially alongside the expert team at Fuel Cell Systems Ltd—makes the experience even more special."

The event also featured a series of panel discussions hosted by Extreme H, where FCSL will join championship representatives, engineers, and drivers to discuss the future of hydrogen technology, motorsport innovation, and sustainable engineering.

As Extreme H leads motorsport into a cleaner future, Fuel Cell Systems Ltd proudly powers the journey—delivering real-world hydrogen solutions for one of the world's most demanding and high-profile stages.

The RTFA: Driving the uptake of sustainable, renewable fuels

We're often asked the differences in all these new fuels. We ran this article in an issue of The Green Pages several years ago (an overview of the range of sustainable fuels), but I really don't know that the industry is very well educated yet. With that in mind, I make no excuses in running it again and hope that it helps with your understanding of what's available and how it's used.

The RTFA is an organisation (born out of the Renewable Energy Association) specialising in the drive of the uptake of sustainable renewable and low carbon fuels. The voice of the UK's renewable liquid and gaseous fuel producers and suppliers.

These fuels are delivering valuable carbon savings today, and the companies that produce them will be the innovators and investors of the future. They will be making fuels for those sectors of transport that cannot ultimately be electrified, such as heavy freight, aviation and marine.

The PEIMF and the RTFA are developing a great understanding and here we introduce them to you, with a brilliant overview of the range of sustainable fuels out there.

The RTFA are calling upon Government to have greater ambition in the fight to reduce carbon emissions from transport.

BIODIESEL

Biodiesel achieves greenhouse gas savings of 87% – 92% compared to diesel. It is made from oil and fat-based waste residues and oil crops. Waste-based raw feedstocks are preferable, as these give the best greenhouse gas saving and sustainability.

First biodiesel produced from fatberg feedstock, mocked up to look like limited edition single malt whisky.

Standard diesel sold at forecourts contains around 7% biodiesel, and for this reason is known as B7. This fuel meets the EN590 standard for ultra low sulphur diesel. Higher blends (of 20%, 30% and even 100% can be used) and typically require some modification to the engine and fuel storage infrastructure. B100 (100% biodiesel) must comply with European Biodiesel Standard EN14214, whilst B20 and 30 must meet EN16709.

Some bus and truck manufacturers (OEMs) do not warranty the use of higher blends in their vehicles.

Argent tanker loading B100 for delivery to customers fuelling depot

This may be due to the required tests not having been done, rather than genuine concerns over engine impact.

Biodiesel is produced by reacting waste oil with methanol to produce Fatty Acid Methyl Ester. Glycerine is produced as a by-product. There are 3 biodiesel manufacturers in the UK, and all are members of the RTFA. The RTFA is keen to see more fleet operators using higher biodiesel blends, as well the biodiesel content of retail fuel increased from 7 to 10%

Inside the biodiesel production facility at Stanlow

BIOETHANOL

UK produced bioethanol can achieve GHG savings of over 85%. Bioethanol is made from fermenting starch rich biomass (such as feed wheat or corn). This process produces ethanol with by-products of CO_2 (which can be sold for use in the drinks industry) and DDGS.

DDGS stands for distillers' dried grains and solubles, and is a protein-rich solid which is used as an animal feed. Feed wheat is high-starch, low-protein grain, which is unsuitable for making milling flour for human consumption. The fermentation process turns the starch to alcohol and concentrates the protein in the animal feed by product. It's a virtuous circle, and of great benefit to UK agriculture, and means that we need to import less soy-based animal feed from South America. Bioethanol can also be made from water.

Nova Pangaea Technologies (UK) Ltd is developing technology for converting lignin-rich feedstocks into ethanol, along with high value chemicals.

The petrol sold on public forecourts in the UK contains around 5% bioethanol, but that should soon change. E10 (petrol with up to 10% bioethanol) is sold in many countries and the UK will follow suit this September.

Ensus UK and ABSugar make bioethanol in the UK, and Vivergo, also owned by Associated British Foods, has a plant which is currently mothballed, awaiting the introduction of E10.

BIOMETHANE (THE RENEWABLE EQUIVALENT OF NATURAL GAS)

Methane is increasingly used to fuel heavy duty vehicles in the UK. It is used in cars elsewhere (particularly in Italy) but this is not envisaged for the UK. Fossil methane, or natural gas, can achieve a GHG saving of around 15% compared to diesel, but the renewable equivalent, biomethane, can achieve savings in the region of 85% – 110%.

Biomethane achieves negative carbon emissions when produced from animal manure, as it is captured instead of being released into the atmosphere during manure storage. All biomethane supplied to vehicles in UK is dispensed from companies that are members of the RTFA.

A map showing the ever-increasing number of locations where HGV drivers can fuel with gas can be found at www.gasvehiclehub.org

Gas can be used either in compressed from or liquefied, and predominantly in >40 tonne HGVs. The cost of ownership and GHG benefits are greatest on the heaviest duty cycles.

Compressed biomethane requires more storage space on the tractor, and is generally used on 2 axle tractor configurations. Compressed biomethane is stored at pressures of [250bar], whilst liquified is stored at 5 – 10 bar but requires refrigeration at around -160C.

Compressed biomethane (CBM) may be supplied directly or via mass balance. LNG will always be mass balanced. Mass balancing in this context is putting biomethane in the gas distribution grid in one location, and taking an equivalent amount of gas out in another location, but having the sustainability characteristics of the biomethane follow the contractual pathway taken by the gas. Natural gas and Biomethane both pay a fuel duty of 24.7p/Kg and VAT at 20%. This fuel duty rate is fixed to 2032, with a review in 2024.

A Volvo tractor unit fuelled by liquefied biomethane

The RTFA - *continued overleaf*

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BIOPROPANE (RENEWABLE EQUIVALENT OF LPG

LPG is a fossil fuel, and biopropane is the renewable equivalent. RTFA member Calor Gas supplies biopropane for both transport and heating. Biopropane is a by-product of the production of HVO. LPG is a mixture of propane and butane and is a by-product of natural gas and oil extraction and oil refining. It boils at a low temperature and is stored in pressurised steel vessels such as gas bottles or bulk LPG tanks. It can be used as a vehicle fuel and is particularly used in forklift trucks.

DROP IN FUELS

Any renewable or sustainable fuel that can be blended with conventional fossil fuels at any level, whilst still meeting the relevant fuel standard (be that for petrol, diesel, aviation or gaseous fuels) is known as a “drop in” fuel. The Department for Transport regards renewable liquid drop in fuels that can be blended with petrol and diesel as strategically important; encouraging their development through the Renewable Transport Fuels Obligation via the development fuels sub-target.

To qualify as development fuels, these fuels must be made from wastes or residues, but not feedstocks that typically go to make biodiesel (i.e. not made from segregated oils or fats). Drop in paraffinic diesel can also be made from non-bio sources. For example; hydrogen can be reacted with CO2, to make methane, which can then be put through the Fischer Tropsh process. Shell does this with its GtL (gas to liquid) product using natural gas, but here we are talking about the renewable version.

A typical feedstock for producing drop in liquid fuel would be residual waste. This is a mixture of biomass waste and waste plastics that cannot be recycled. The resulting fuel would be partly renewable, and partly recycled carbon fuel.

HVO (HYDRO-TREATED VEGETABLE OIL)

HVO is a drop in fuel, closely aligned to the chemical composition of diesel and with identical performance characteristics; warranty concerns are therefore not an issue. The Zemo Partnership (formerly the LowCVP) did a study on high blend biofuels, and noted that 99% of the Euro VI HDV fleet is estimated to be compatible with HVO. GHG savings are typically around 90%.

HVO is made from similar feedstocks to biodiesel, but is more expensive to produce. Although HVO is 100% renewable it pays the same full fuel duty as diesel.

HYDROGEN

The attraction of hydrogen is that it has zero tailpipe emissions, and vehicles can be refuelled quickly and have a long range. Set against this are the energy losses involved in production.

There are various different ways of producing hydrogen, and the upstream (or “well to tank”) emissions vary significantly depending on the production pathway. Renewable hydrogen can be made by electrolysing water using renewable electricity. This is the simplest form of a ‘Renewable Fuel of Non-Biological Origin’ (RFNBO). Another route for making renewable hydrogen is from syngas produced from biomass, known as biohydrogen.

Hydrogen from steam – reforming natural gas requires carbon capture and storage in order to be a low carbon proposition.

For use in transport (i.e. in fuel cells) the hydrogen has to be extremely low in moisture and very high purity (99% plus). At standard room temperature and pressure hydrogen has one third the calorific value of natural gas and half the calorific value of diesel. Pressurising and then storing hydrogen in excess of 700 bar to enable high-pressure filling is energy intensive.

RECYCLED CARBON FUELS (RCFS)

RCFs are liquid and gaseous fuels made from unrecyclable fossil fuels e.g. plastics or industrial. There is great interest in producing transport fuel from end of life tyres. As car tyres are around 40% biomass-derived, and truck tyres have twice that amount of biogenic content fuel made from them would be part renewable and part RCF.

The Department for Transport is considering whether to include these fuels within the Renewable Transport Fuel Obligation and a consultation on changes to the RTFO is due soon.

RENEWABLE AVIATION FUEL / SUSTAINABLE AVIATION FUEL

The Renewable Transport Fuel Obligation has a specific sub-target for strategically important fuels, and aviation fuel is one. Aviation fuel has stringent specification criteria and fuels must be certified in order to be used in commercial flights.

There are a number of aviation fuels derived from biomass that have been certified, and several others are in the approval process. Renewable aviation fuels can also be made from renewable hydrogen or from recycled carbon sources, such as industrial off-gases e.g. from steel production. This process involves fermenting the off gases to make ethanol, which is then synthesised into aviation fuel via A2J (alcohol to jet) technology. Renewable bioethanol sources can also be used for A2J.

For further information on all these fuels, or on the organisation, go to www.rtfa.org

The Zemo partnership joins forces with the FIA

In collaboration with the FIA, the world governing body for motor sport, Zemo Partnership has developed a unique scheme to certify the use of sustainable racing fuel. This is a modified version of the now widely deployed Renewable Fuels Assurance Scheme, which has been established by Zemo. The first application of the scheme will be in the 2026 FIA Formula One World Championship.

The FIA has mandated the use of 100% sustainable fuel derived from 'Advanced Sustainable Components' from the 2026 Formula 1 season, ensuring that fuels come from sustainable feedstocks and that they also meet stringent greenhouse gas emissions thresholds.

The Sustainable Racing Fuel Assurance Scheme (SRFAS) has been developed by Zemo Partnership and the FIA to provide robust assurance of the deployment of sustainable, low carbon fuels in motor sport.

The scheme is designed to further encourage the deployment of low carbon fuels in the wider market. The fuel used in racing cars is a demonstration of the emissions reductions achievable and could be applied more widely to the existing fleet of vehicles. There are currently over 1 billion internal combustion engines (ICEs) worldwide. This development will provide a high-profile example of the emissions reductions that can be achieved through the use of certified sustainable fuel.

The scheme provides an independent and impartial framework for approving each batch of racing fuel produced by racing fuel suppliers. It is underpinned by a third-party verification process to ensure compliance with the FIA’s standards for the blended racing fuel and associated components. As the scheme manager for SRFAS, Zemo Partnership will oversee compliance verification working closely with accredited auditing companies.

Gloria Esposito, Director of Sustainable Business at Zemo Partnership, who has led the initiative with the FIA says:

“We’re delighted to be collaborating with the FIA on this innovative scheme which will help drive emissions reductions from the use of sustainable low carbon fuels in the FIA Formula One World Championship from 2026.

“I believe the worldwide appeal of Formula 1 will help raise awareness of the necessity to push towards net zero transport.”

Claire Haigh, Managing Director of Zemo Partnership, says:

“It’s vital that the renewable fuels used in ICE vehicles undergo robust sustainability verification to ensure they deliver clear benefits. I believe they have a significant role to play in decarbonising the UK’s vehicle fleet. We need to use ‘all the tools in the box’ to deliver the emissions reductions needed to achieve our targets.”

FIA President Mohamed Ben Sulayem:

“Innovation and progress go hand in hand and the FIA is at the forefront as we drive towards a sustainable future.

Alternative fuels are the next step, and today we are bringing a significant part of our sustainability vision to life with the availability of FIA-certified sustainable fuel, underpinned by an extremely robust procedure we can all be confident in. These on-track innovations continue to help grow on-road changes that impact each of us in our daily lives.”

Certas to expand investment in HVO, making it available at more depots

Certas Energy plans to further expand the availability of hydrotreated vegetable oil (HVO) at more of its depots across the UK. The company has recently increased its HVO storage and supply depot network by six and now has a total of 28 depots nationwide.

A member of Zemo Partnership's Renewable Fuel Assurance Scheme (RFAS), Certas says it aims to continue to broaden access to renewable fuels. An estimated one million litres of additional HVO will be added to the company's network to support the growing demand for sustainable fuels from UK businesses.

The latest investment also enables Certas Energy to increase the use of HVO in its own operating fleet by an extra one million litres, thus accelerating its decarbonisation plan and decreasing its carbon footprint. In the past year, Certas Energy has increased its sales of HVO by more than 60 per cent.

Richard Billington, Managing Director (Energy Solutions) at Certas Energy, said:

"I'm delighted to be confirming Certas Energy's continued and long-term commitment to supporting UK businesses. Today's announcement intends to reassure business operators and fleet managers that switching to high-quality renewable diesel has been made easier.

Broadening reliable access will continue to be a central part of our investment strategy, and we look forward to introducing additional HVO renewable diesel to our customers, to help decarbonise even more localities".

CERTAS ENERGY SUPPLY 300,000 LITRES OF HVO TO SILVERSTONE

This summer, for the second year in a row, Certas Energy partnered with Silverstone Circuit to supply Hydrotreated Vegetable Oil (HVO) at some of its biggest events at the home of British motorsport.

An estimated 350,000 litres of HVO will be used for the on-site generators at the track, powering mobile kitchens, lighting, stages for etc. at events such as the Formula 1 British Grand Prix and the Silverstone Festival.

The decision to switch to HVO is part of Silverstone's 'Shift to Zero' initiative, and it contributes to Formula 1's drive to be Net-Zero Carbon by 2030.

Certas Energy HVO is produced from waste and residue derived feedstocks, approved by the Renewable Transport Fuel Obligation scheme, which is audited by the Department for Transport, and can reduce carbon emissions by up to 90% (ref:Greenhouse gas reporting: conversion factors 2024 – GOV.UK).

Stephane Bazire, Head of ESG at Silverstone, said:

"Following a successful trial last year, I am delighted that the home of British motorsport has increased our commitment to renewable diesel this summer. Silverstone will continue to lead the way in lowering our carbon footprint as we accelerate in our race to Shift to Zero. Certas Energy has and continues to be a trusted and valued partner on this journey."

Darren Holloway, Commercial Director for Energy Solutions at Certas Energy, said:

"Certas Energy is a proud partner of Silverstone's exciting summer of racing events, and we are happy to have further strengthened our relationship with the venue this year. HVO is now a recognised and viable option for companies looking to reduce their carbon footprint in the short- and medium-term, and we expect more festivals and events to make the switch in the coming years."

Decarbonising road transport to help prosperity

The latest Zemo-convened Council for Net Zero Transport Quarterly Briefing, held in mid-September, focused on how decarbonising road transport can help to build long-term economic prosperity for the UK. Chaired by Lord Deben, leading industry experts exchanged views on how the transition to net zero transport can create thousands of jobs, upskill the workforce, cut congestion and pollution costs and foster innovation in sectors such as retail electricity.

Alongside Lord Deben - who is a former chair of the UK's Climate Change Committee - were Dyrr Ardash (Director of Business Development, Warwick Manufacturing Group), Catherine Bowen (Head of Decarbonisation and Future Mobility, BVRLA, Jamie Wilson (Head of Concepts and Advanced Engineering, Alexander Dennis) and Charles Wood (Director of Policy, Energy UK).

STABILTY & INVESTMENT

The panellists and invited delegates discussed how delivering green growth from decarbonising transport will require long term stability to facilitate new investment. While the Government's new industrial strategy provides greater clarity, UK manufacturers face particular challenges, such as higher electricity costs than European competitors as well as growing uncertainty as a result of US tariffs.

Low carbon industries also need a robust skills base. Immigration policy remains contentious, and growth in defence industries could draw talent away from low carbon transport.
At the same time, the sector must engage mass markets in tandem with government policies to boost demand for used EVs. The panel agreed that there is a need to bust some misconceptions, for example those around battery life.

CLEAR VISION REQUIRED

Zemo's Acting Managing Director, Jonathan Murray, stressed the need for the sector to set out its own clear vision for net zero, backed by coordinated engagement with government. Zemo will work with members and partners to make the case to DfT, DESNZ and mayoral authorities for the potential of 'green growth' in road transport and the policies needed to deliver it.

www.zemo.org.uk

Biomethane Station Data
September 2025

ReFuels N.V., a leading European supplier of renewable biomethane (Bio-CNG) for the decarbonisation of heavy goods vehicles (HGVs), recently published Bio-CNG station data for September 2025.

- 5,223 tonnes of Bio-CNG were dispensed from CNG Fuels' 16 public access refuelling stations in operation, an increase of 15% from 4,543 tonnes in September 2024 (14 stations)
- Average daily dispensed volume of 174 tonnes, up from 151 tonnes dispensed per day in the year-earlier period
- A daily average of 2,099 vehicles refuelled across the station network, up 18% from 1,774 vehicles in the same period last year
- Prices for Renewable Transport Fuel Certificates (RTFCs) averaged 24.8 pence, up 21% compared to September 2024

"We report steady double-digit growth in dispensed biomethane volumes driven by our expanding refuelling station network and continued adoption of Bio-CNG as the decarbonisation solution of choice by UK fleet operators. In September, Tesco and Co-op, two of the nation's largest food retailers, announced the delivery of 42 and 30 new Bio-CNG trucks, respectively, thereby lowering fuel costs and unlocking a total of 8,000 tonnes of potential annual CO2 savings.

Currently, seven of the UK's top ten supermarkets are fuelling at our network. This validates Bio-CNG as the go-to solution for cutting HGV emissions today and supports our strategy of doubling the refuelling capacity by end-2028," said Philip Fjeld, CEO of ReFuels.

CNG Fuels had 168 unique customer fleets refuelling across the network in the three months ending 30 September 2025, compared to 163 for the comparable period in 2024.

In addition to Bio-CNG dispensing, CNG Fuels generates revenue from sales of Renewable Fuel Transport Certificates (RTFCs). CNG Fuels is awarded 3.8 RTFCs per kilo dispensed Bio-CNG, which are sold to fuel suppliers with a blending obligation. In September, the average price per RTFC was 24.8 pence, compared with 20.5 pence in September 2024.

CNG Fuels supplies biomethane through a growing network of refuelling stations, currently operating 16 public access Bio-CNG stations on major trucking routes in the UK. Two stations are moving into development, one near the M4 in South Wales, offering direct access to key freight routes for efficient east-west transport, and one in Swindon supporting efficient transport between London, South Wales and the Midlands.

ReFuels provides monthly operational updates, which are normally released within ten working days after the end of the month.

ABOUT REFUELS

ReFuels is decarbonising Europe's truck fleet through its 40% ownership of CNG Fuels – a fully integrated clean fuel infrastructure platform combining sourcing of renewable biomethane (Bio-CNG), Renewable Transport Fuel Certificates (RTFCs) and ownership and operation of the UK's largest clean fuel station network. By the end of 2028, the target is to have a capacity to serve 20,000 heavy goods vehicles per day, while the long-term ambition is to become Europe's leading integrated supplier of alternative fuels for commercial fleets.

For further information, please visit: **www.refuels.com**

TESCO GOES GREENER WITH BIO-CNG

Tesco has added 42 IVECO CNG trucks to its Scottish fleet – refuelling daily at CNG Fuels' new Livingston station between Edinburgh and Glasgow.

The station is located ajacent to Tesco's distribution hub and has capacity to refuel 600+ HGVs/day on 100% renewable biomethane. Each truck is expected to clock 200,000km annually, enabling potential CO_2 savings of up to 6,473 tonnes per year.

"These vehicles represent a significant step towards our goal of reducing emissions and achieving carbon neutrality in our operations by 2035," says Cliff Smith, Fleet Engineering Manager at Tesco.