

# INNOVATIONS IN UK ROAD TRANSPORT

*Driving the economy, cutting carbon*



SME innovators in low carbon road transport selected to exhibit at the LowCVP's Parliamentary Reception, March 2015

**LowCVP**  
Low Carbon Vehicle Partnership

Accelerating the shift to low carbon vehicles and fuels

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# FOREWORD

by Andy Eastlake, Managing Director,  
Low Carbon Vehicle Partnership

**IN RECENT YEARS** the UK motor industry has been a bright spot in an otherwise mainly bleak economic picture. A LowCVP study published last summer – *Investing in the Low Carbon Journey* – found that the UK auto sector has been revitalised by a long term vision and consistently applied policy centred on cutting carbon.



In the early 2000s, the UK motor industry was in a state of decline. Factory closures were commonplace, innovation was minimal and the supply chain had become hollowed out. Environmental regulations were seen as a threat in some quarters. The 2002 Powering Future Vehicles Strategy pointed to a way ahead through closer collaboration between industry, government and other stakeholders.

The vibrancy and innovation that now characterises the UK's automotive and transport sectors is exemplified in these pages by eight small and medium-sized companies that are turning some great low carbon innovations into jobs and exports ... and the prospect of significant growth for UK Plc. The examples range from engine and powertrain components to whole vehicles and novel fleets. The list includes a low carbon fuel innovator making transport energy from waste products.

The companies were chosen to exhibit at a Parliamentary reception hosted by the LowCVP; an event which also provided the opportunity to launch a new report commissioned by the European Climate Foundation – *Fuelling Britain's Future* – about the economic impacts of low carbon vehicles in the UK. This prospective study echoes many of the findings of the LowCVP's earlier research about the benefits of the low carbon shift to the UK economy, also emphasising that consumers have much to gain from these low carbon vehicles and fuels in the form of significantly lower motoring costs.

We were surprised and encouraged by the level of response to our call for exhibitors. The LowCVP website ([lowcvp.org.uk](http://lowcvp.org.uk)) features more excellent innovators who also responded to our invitation.

I hope you find them as interesting and exciting as we do, and share our optimism for the future of low carbon vehicles and fuels in the UK.

A handwritten signature in white ink, appearing to read 'Andy Eastlake', written in a cursive style.

[www.lowcvp.org.uk](http://www.lowcvp.org.uk)

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# CELTIC RENEWABLES

*Lower carbon transport energy*

**CELTIC RENEWABLES** specialises in sustainable biofuel. It is commercialising the production of biobutanol as an advanced biofuel from the copious residues of Scotland's most iconic export; the £4 billion malt whisky industry! Each year the industry produces over 2 billion litres of liquid waste from whisky distillation, together with 750,000 tonnes of barley residues. The Celtic Renewables process combines these effluents to make high value products, including biobutanol. This award-winning innovation not only provides a viable disposal route for the by-products of one of the country's most important industries, but also integrates renewable energy with environmental sustainability – and with major whisky industries worldwide, Celtic Renewables plans to deliver a pioneering new industry to the UK and beyond.



Celtic Renewables Ltd are innovatively re-developing a defunct fermentation technology – already proven on a global scale – to combine the two main by-products of the whisky production, namely 'pot ale' (the copper-containing liquid from the stills) and 'draff' (the used barley grains), to produce high value renewable products, including biobutanol. Biobutanol has 25% more energy per unit volume than bioethanol, a lower vapour pressure and higher flashpoint (making it easier to store and safer to handle). It can be blended without requiring modifications in blending facilities, storage tanks or retail station pumps.



Celtic Renewables' was a winner of the 2014 LowCVP Low Carbon Champions Award for Best Innovation by an SME. Their process aligns with the Government's objective of creating a sustainable biofuels market and with the DfT's recently announced plans to support the construction of a number of advanced biofuel demonstration facilities in the UK.



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# CONTROLLED POWER TECHNOLOGIES

## *Emissions reduction technologies*

**CONTROLLED POWER TECHNOLOGIES** was founded in 2007 by senior automotive executives and clean energy finance specialists Turquoise to focus on the problem of cutting emissions from road vehicles. The company brought together the expertise in powertrain, power electronics and control software required for developing and commercialising emissions-reduction technologies which are now actively being sought by vehicle manufacturers. The company is expanding rapidly and generating new jobs and growth.



The first product to emerge from CPT's development pipeline was VTES, an electric supercharger that reduces emissions of passenger cars by up to 10% through improved air supply to the engine. This was bought in 2011 by Valeo of France which has established a new subsidiary in the UK to make and market the product once production begins in 2016.



CPT's second product is SpeedStart, a belt-driven integrated starter generator. Depending on the application, a SpeedStart system can support e-boosting of the engine, recuperation of energy wasted during braking, very refined and fast stop-start, and e-drive for parking and low speed motoring. In brief, it can provide ~ 80% of a full-hybrid car's functionality for ~20% of the cost, delivering emission reductions of up to 25%.



Other products being developed by CPT to date include: COBRA, an electric supercharger used for reducing CO2 and particulate emissions of heavy duty vehicles; and TIGERS, a turbo-generator used for capturing waste energy expelled through the exhaust.

**EMPLOYEES/LOCATION:** 52/Basildon, Coventry, and offices in Germany and the US.

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[www.cpowert.com](http://www.cpowert.com)



# GNEWT CARGO

*Technology and logistics*

**GNEWT CARGO** final mile delivery service provides emission-free delivery to London. Gnewt (which gets its name from Green New Transportation) uses an all-zero-emission fleet for other third-party logistic companies, large retailers and forward-thinking organisations who recognise that goods always need to be moved around cities, but that this can be done in ways which are efficient, environmentally friendly and cost effective.

The company's all-electric fleet, consists of pedal-powered cargo cycles and a variety of electric vans that navigate the final mile in Central London to deliver customer consignments. The cargo cycles and all-electric vans offer a solution that combines the use of bikes with vehicles for heavier loads.

Gnewt Cargo is an innovative organisation focused on cutting carbon emissions in London. Their business model has set about proving that sustainability doesn't mean that businesses have to sacrifice efficiency or cost effectiveness. The company has created many jobs and it has been independently verified that CO2 emissions per parcel delivered have been cut by 62%.

**EMPLOYEES/LOCATION:** 115/London SE1.  
Further information on Gnewt Cargo's story:  
[www.vimeo.com/39263328](http://www.vimeo.com/39263328)

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[www.gnewtcargo.com](http://www.gnewtcargo.com)

# MERCURY FUEL SYSTEMS

*Lower carbon transport energy*

**MERCURY FUEL SYSTEMS** offers dual fuel systems for heavy commercial vehicles which cut fuel costs as well as carbon emissions. The systems are attractive to operators as they use cheaper liquefied petroleum gas (LPG) and can be adapted to use compressed natural gas (CNG), liquefied natural gas (LNG) and other liquid fuels currently under development.

Quicksilver AFI-6 is the first fully sequential LPG injection system designed and developed specifically for the HGV transport sector. The system blends both diesel and LPG in precise quantities, optimising emissions and economy.

The system consists of a second separate fuel tank mounted on-board the vehicle and a second engine control unit (ECU) which allows the system to monitor the engine condition. Mercury Fuel Systems has spent the last 5 years developing and marketing the system with commitments received from several customers.

The company has recently taken delivery of a Euro 6 DAF vehicle and is working to adapt the system and support existing customers and their vehicle fleets to achieve the latest emissions requirements.

Recent independent test work carried out by Millbrook shows carbon emission savings of 5 tonnes per 100,000kms travelled and a 15% fuel cost reduction. This would result in a total of 37.5 tonnes of carbon saved over a typical 5-year contract.

**EMPLOYEES/LOCATION:** 7/Avonmouth, Bristol.

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# METEOR POWER

## *Low carbon L-category vehicles*

**METEOR POWER** is developing the first downsized low carbon, hybrid engine for use in high performance motorcycles and lightweight sports cars. This will complement the development of a complete electric powertrain featuring innovative battery cooling and rapid charging, allowing a charge up to 80% in less than fifteen minutes. The charging time should fall further once battery technology catches up with the capability of rapid charging systems.

By downsizing the industry standard 1000cc engine found in most high-end sports bikes to just 300cc, a number of (patent pending) innovations will help reduce the overall CO<sub>2</sub> emissions from 140g/km to around 60g/km while retaining market-leading performance.

Meteor Power is the first company in the world to see the opportunity to build a hybrid motorcycle engine for road use and will ensure the company is the first motorcycle manufacturer to have an engine capable of passing both the new Euro 4 (2016) and Euro 5 (2020) emissions regulations.

Meteor's new British-designed and built high performance electric motorcycle, due in early 2016, will lead a range of electric and hybrid motorcycles with additional models due for release in 2016 and 2017.

As the first electric motorcycle capable of beating high performance petrol sports motorcycles, Meteor Power is confident of establishing a new class of electric machine to put the UK at the forefront of the global market.

**EMPLOYEES/LOCATION:**

4/Silverstone, Northamptonshire.

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**Meteor Power**

**[www.meteorpower.com](http://www.meteorpower.com)**

# PROTEAN ELECTRIC

## *Drivetrain technology*

**PROTEAN ELECTRIC** specialises in the design, development and manufacture of in-wheel and compact electric motor and drive technology for the automotive and cleantech markets.

The Protean Drive™ system can improve vehicle fuel economy, add performance and enable improved vehicle handling to both new and existing hybrid and electric vehicles. The Protean Drive system combines an in-wheel motor with an integrated inverter, control electronics and software – no separate large, heavy and costly inverter is required. Each motor, which is built around the wheel bearing, fits easily in the unused space behind a conventional 18 inch wheel. The direct-drive configuration reduces part count, complexity and cost, and improves NVH (noise, vibration and harshness) and efficiency as there is no need to integrate traditional drivetrain components such as gears, driveshafts, axles and differentials.

These direct-drive, compact in-wheel motors provide all the tractive torque needed for the vehicle in the wheel space thus giving far greater flexibility to vehicle designers while substantially reducing drivetrain losses. The reduced drivetrain losses mean less energy is wasted (during both acceleration and regenerative braking), resulting in longer range or smaller batteries.

Each in-wheel motor can be controlled entirely independently, providing far greater control, performance and vehicle dynamics than any other drive system.

The product has been 100% engineered in the UK and has been widely protected using the British Patent Office Green Channel, a service of the Intellectual Property Office for applications that have environmental benefits.

**EMPLOYEES/LOCATION:** 45/Farnham, Surrey.

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**[www.proteanelectric.com](http://www.proteanelectric.com)**



# REVOLVE TECHNOLOGIES

*Lower carbon transport energy*

**REVOLVE TECHNOLOGIES** is an engineering and service provider to the automotive R&D sector specialising in developing low carbon technology solutions for electric vehicles (EVs), hybrids and hydrogen applications.

Revolve has developed hydrogen diesel technology which allows today's diesel engines to use hydrogen as their primary fuel, significantly reducing the vehicle's CO<sub>2</sub> emissions and other harmful, local pollutants. The technology is a low cost solution for the introduction of hydrogen-fuelled vehicles which will enable the emerging hydrogen infrastructure to develop until high volumes of fuel cell electric vehicles (FCEVs) can be rolled out. The technology has been developed with the support of Innovate UK. There are 21 hydrogen-fuelled transit vans in service as part of several trial programmes.

Revolve's H2ICED™ builds on the successful H2ICE project by modifying the engine of the latest Euro5 Ford Transit's 2.2l Puma Diesel vehicle to operate using compressed hydrogen as the main fuel, with minute quantities of diesel as the ignition catalyst. The vehicle seamlessly operates in either full diesel-only mode (as a standard vehicle) or as a unique bi-fuel diesel-hydrogen engine.

The concept aims to accelerate the availability of ultra-low CO<sub>2</sub>, hydrogen-fuelled commercial vehicles operating in Britain.

**EMPLOYEES/LOCATION:** 70/Brentwood, Essex.

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[www.revolve.co.uk](http://www.revolve.co.uk)

# TEVVA MOTORS

## *Range extended electric vehicles*

**TEVVA MOTORS** is developing for production the first commercially viable range-extended electric urban delivery truck. Tevva's innovative solution is applicable to both new-builds as well as the retrofit of older vehicles.

The company is focusing on the medium-duty (7.5t) urban back-to-base truck market – a £4.5 billion, 150,000 unit market in the EU alone. Unlike existing electric vehicles in this category, Tevva's product will meet all the performance benchmarks of a diesel truck – but with lower emissions, and at a lower total cost of ownership (TCO).

The in-series electric motor offers better environmental performance compared with a conventional diesel truck, with lower emissions – carbon, NOx and particulates – and lower noise. The battery is charged overnight, on lower cost tariffs, using existing three-phase charging systems.

Tevva's proprietary Predictive Range Extender Management System ensures that the battery is charged at optimum points on the truck's itinerary. This allows for significantly higher battery utilisation than is possible with pure EVs. In turn this lowers the stress placed on the battery, helping to substantially increase battery life.

Tevva is the only UK company to develop this type of vehicle. It uses UK technology and partners to deliver 23 different vehicle systems integrated into a working vehicle. Delivering up to 100% reduction in urban emissions, the Tevva truck will be the first range-extended electric vehicle (REEV) of its kind on the market. Tevva says it can replace a standard diesel truck giving fleet managers a lower emission and cost-effective choice without compromising on usability.

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**TEVVA**  
MOTORS

[www.tevva.com](http://www.tevva.com)



**ADVANCED  
PROPULSION  
CENTRE UK**

***“Helping to turn low carbon propulsion technology  
into products developed in the UK”***

The Advanced Propulsion Centre was formed in 2013, demonstrating the commitment between the government and automotive industry through the Automotive Council to position the UK as a global centre of excellence for low carbon powertrain development and production. It is a central pillar of the Automotive Industrial Strategy created by the Automotive Council and focuses on five strategic technologies. The APC focuses on the four shown in green, whilst the Transport Systems Catapult addresses the fifth, Intelligent Mobility.



#### **If you...**

- Are a company with a prototype, innovative low carbon propulsion technology.
- Want to turn your technology into an automotive product developed in the UK.

#### **The Advanced Propulsion Centre can help you...**

- Find partners and create a collaboration with other companies, suppliers and manufacturers.
- Access industry and government funding to share the risks and opportunities when preparing to bring your technology to market.

The APC is an industry wide collaboration with government, academia, innovators and producers of low carbon propulsion systems. It facilitates and supports partnerships between those who have good ideas and those who have a desire to bring them to market. The APC is also the custodian of the strategic technology consensus roadmaps developed by the Automotive Council which inform the UK's research and development agenda.

The services provided by the APC enable projects which provide profitable growth and sustainable opportunities for the partners involved and builds the UK supply chain. The APC's activities will build the UK's capability as a Propulsion Nation and contribute to the country's economic prosperity.

#### **Contact**

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SME innovators in low carbon road transport selected to exhibit at the LowCVP's Parliamentary Reception, March 2015

**THE LOWCVP**, which was established in 2003, is a public-private partnership working to accelerate a sustainable shift to lower carbon vehicles and fuels and create opportunities for UK business. Approaching 200 organisations are engaged from diverse backgrounds including automotive and fuel supply chains, vehicle users, academics, environment groups and others. Please visit the website to find out how to join and help drive the low carbon transport agenda.

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