

Results of competition:

Unlocking the hydrogen energy market - Collaborative R&D

Total available funding for this competition was £6m from the Technology Strategy Board.

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Cascade Technologies Limited (lead) BOC Limited ITM Power (Trading) Limited NPL Management Limited University of St Andrews	Quality control for the hydrogen supply chain	£983,946	£602,252
Project description (provided by applicants)			
<p>Cascade Technologies, a manufacturer of high-technology, laser based gas analysers and the National Physical Laboratory have joined together with leaders in the hydrogen energy sector, BOC, ITM Power and the University of St Andrews to develop a new tool for the quality assurance of hydrogen fuel.</p> <p>Cascade Technologies, with support from the University of St Andrews, will develop a laser gas analyser to measure the impurities in hydrogen fuels. The analyser will then be tested on-site at hydrogen production facilities and refueling stations (ITM Power and BOC). Finally, the measurements made by the new analyser will be verified by experts at NPL. Just as now, fuel impurities can be damaging to internal combustion engines. This is also the case for the fuel-cell vehicles of the future. This new laser based approach could mean real-time online chemical analysis of fuel impurities, at the pump, without the need for a scientist or laboratory. This fit-and-forget technology promises to dramatically increase the confidence which tomorrow's drivers can expect to have in their fuel.</p>			

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Cella Energy Limited (lead) Arcola Energy Limited The Scottish association for Marine Science	Opening solid hydrogen storage markets through civil marine UAS	£451,860	£320,149
Project description (provided by applicants)			
<p>Hydrogen's use as a clean, lightweight fuel is held back by technological limitations and the high cost of storage and fuel cells. This project aims to overcome barriers to market entry by proving a profitable early market application in small unmanned aircraft systems (UAS) designed for marine research, extending range and payload compared with lithium batteries.</p> <p>A consortium comprising Cella Energy's hydrogen materials developers, Arcola Energy's fuel cell expertise and the Scottish Association of Marine Science's UAS research team are working to demonstrate a flyable aircraft with innovative solid-state hydrogen storage integrated with lightweight fuel cells as a proof-of-concept for <7 kg marine UAS. Small UAS are rapidly developing tools for agriculture and public safety on land; and marine and climate research, and energy monitoring offshore, where they benefit from less restrictive aviation regulation. Civilian UAS are due to emerge as an early-adopter of highly energy dense, green power solutions like hydrogen, in advance of a revolutionary low-carbon fuel for road vehicles. This project emphasises the benefits to society of the safe use of UAS, and of hydrogen.</p>			

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Commercial Limited (lead) Arcola Energy Limited BOC Limited	Innovation in services for off-grid hydrogen energy	£231,539	£133,987
Project description (provided by applicants)			
<p>This project aims to produce a convenient, low-cost and low carbon energy service to customers who need power in remote situations, such as construction sites, environmental monitoring or transport equipment. The service will use hydrogen as a fuel and fuel cells as the power source, together optimised to match the power requirements of modern low energy equipment and lighting. This energy service will aim to replace conventional, noisy, polluting and inefficient diesel or petrol generators where possible. By providing a service the partners aim to help companies make the switch to new, cleaner technologies.</p> <p>The project is led by Commercial Group who are an integrated business services company used to delivering services to customers and the first company in its sector to be Carbon Neutral and Zero Waste. Arcola Energy brings hydrogen and fuel cells expertise to enable a service and BOC has many years of experience and significant previous investment into hydrogen energy systems.</p>			

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EPL Composite Solutions Limited (lead) Crompton Mouldings Limited Element Materials Technology Hitchin Limited Jonam Composites Limited JRE Precision Limited	Hydrogen - Optimisation of Storage and Transfer (HOST)	£998,754	£578,850
Project description (provided by applicants)			
<p>The aim of this project is to design, develop and manufacture thermoplastic composite vessels and pipes for hydrogen storage and transfer applications at pressures up to 700 bar. Such products will be fully recyclable, impact resistant and durable. A key objective is to produce such products at economically acceptable levels in order to drive forward the hydrogen vector for all energy sectors.</p>			

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R-Tech Services Limited (lead) Arcola Energy Limited TWI Limited Pancom Limited	Continuous Monitoring system for fuel tank SAFETy assurance on Hydrogen powered Vehicles (COMSAFE HV)	£476,842	£301,988
Project description (provided by applicants)			
<p>Hydrogen (H) is a renewable energy supply that is returned to its source, water, in the process of generating energy. It does so without carbon or any other harmful emissions and its carbon footprint in the energy generation cycle is lower than that of any other renewable. Therefore, given recent advances in fuel cell technology, it is an attractive and realistic option as a mass market transport fuel. However, to reach such a market, the confidence of both the public and safety regulatory bodies will need to be gained. Specifically, H tank failure probabilities on vehicles will need to be orders of magnitude less than those in existing industrial H usage, a major challenge given that transport is a relatively uncontrolled environment.</p> <p>A continuous monitoring safety assurance sensor unit for vehicle H tanks, which stores a record that can be read during routine vehicle services, is proposed. This will greatly reduce failure probabilities, through early detection of H embrittlement (HE), fatigue defects and diffusion leakage. Other main project innovations include the use of passive acoustic emission (AE) sensing to keep system costs at a small fraction of the cost of a vehicle H fuel tank.</p>			