

Innovate UK

Results of Competition: Energy Catalyst - Mid Stage - Round 4
Competition Code: 1604_CRD2_ENRG_ENCATMS4

Total available funding is up to £10m from Innovate UK (projects >12 months only) with co-funding from DFID and EPSRC.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Oak Technical Services (Oaktec) E P Barrus Ltd	MG WEDGE Multi Gas World Engine for Distributed Generation of Electricity	£963,062	£614,646
Project description - provided by applicants			
Technology developer Oaktec and leading engine supplier EP Barrus will deliver the Multi-Gas WEDGE project which follows on from the highly successful Bio-gas EDGE project that investigated the capability of the novel Pulse-R engine technology to deliver efficient performance from impure bio-gas and other gas fuels. The EDGE project highlighted the tolerance and efficiency of the Pulse-R combustion system particular when benchmarked against market leading small diesels. The WEDGE project will address this strong commercial opportunity to directly displace highly polluting diesels in small generators for local power and many other global applications. The WEDGE project addresses the energy trilema as it will develop a new multi cylinder Pulse-R suited to many developing economies where gas fuels are prevalent, low cost and in secure supply and where a robust simple technology such as Pulse-R will gain strong market traction because of cost, flexibility and efficiency benefits. The new WEDGE engine will replace a diesel engine in a existing generator power system for test and demonstration purposes building on Oaktec and Barrus' existing activity in this sector.			

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Bio Dynamic (UK) Ltd Aq Sorption Ltd	Improving energy gains whilst reducing water required for Anaerobic Digestion of Food Waste	£833,352	£583,346
Project description - provided by applicants			
The use of waste food for energy generation via anaerobic digestion (AD) is a growth industry in the UK. The AD process produces a digestate, that can be classed as a biofertiliser or waste product; regardless of classification, most of the digestate is destined to go to land in one form or another. The AD process is inefficient, as there is still calorific content left in the digestate. Thus, Bio Dynamic Ltd and Aq Sorption Ltd, both Nottingham-based SMEs, propose a project to: i) increase the efficiency of energy generation at food waste AD plants by further processing of digestate; ii) recycle liquid from the digestate to the front end of the AD process, reducing significantly the requirement for liquid into the process; iii) minimising the amount of waste product from the AD process that requires shipping offsite, significantly reducing the carbon emissions associated with this transport. The project addresses all three elements of the energy trilemma - reducing carbon emissions (less transport; less fossil fuels), securing supply (food waste is an abundant resource), & reducing the cost of energy (by improving energy generation efficiency).			

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LICenergy (UK) Ltd TWI Ltd Offshore Renewable Energy Catapult EDF Energy R&D UK Centre Ltd DONG Energy Wind Power A/S Wilton Engineering Services Ltd Universal Coatings & Services Ltd Metallisation Ltd	Cost Reduction for Offshore Wind Now (CROWN)	£1,164,536	£823,182

Project description - provided by applicants

The CROWN project seeks to radically alter the corrosion protection system of offshore wind turbine foundations by replacing conventional paint and anode based solutions with thermally sprayed aluminium. By providing a durable, robust coating that has a 40 year design life, operations and maintenance costs of offshore wind from corrosion can be reduced. Introducing thermally sprayed aluminium as the corrosion protection system also conveys reduced manufacturing costs as secondary steelwork, anodes and lengthy paint dry times can be eliminated. The CROWN project will investigate novel manufacturing methods for thermally sprayed aluminum application and provide underpinning scientific results on the corrosion behaviour of this coating in conditions specific to the offshore wind industry. Life cycle cost models will also be developed to quantify potential savings and allow offshore wind farm developers to make informed decisions.

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ACT Blade Ltd Offshore Renewable Energy Catapult Ltd Renewable World East Africa BVG Associates Ltd NCC Operations Ltd Williams Grand Prix Engineering Ltd	Extra-light and sustainable textile wind turbine blade	£1,488,936	£1,106,088
Project description - provided by applicants			
<p>This project aims to develop, test and verify in simulated environments a prototype of the MODULAR version of the novel ACT Blade: a textile covered wind turbine blade which doesn't need a mould. The modular blade increases design, supply & production flexibility. The project follows on from a successful Early Stage Catalyst project validating ACT Blade potential to deliver 10% energy gain and 9% cost of energy reduction. ACT Blade modular version addresses the UK energy trilemma, providing significant economic benefits for UK and new opportunities for the global renewables sector. In developing countries, it can transform access to clean energy and drive local growth by avoiding logistics barriers and creating jobs/skills.</p> <p>The team, ACT Blade, Offshore Renewable Energy Catapult, National Composite Centre, BVG Associates, Williams Grand Prix Engineering & Renewable World, has all technical, commercial & management skills to succeed.</p>			

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Larkfleet Ltd Cranfield University	Solar Steam - A novel application of Fresnel lenses as a solar thermal collector to benefit industry.	£507,696	£304,446
Project description - provided by applicants			
One of the primary challenges facing the Global manufacturing sector is locating a sustainable and convenient source of heating, of which makes up 76% of the total energy demand. Currently, the industry largely relies on coal, oil and gas which involves large operational costs, expensive infrastructure and integration, high maintenance costs and insecurity of price. Solar heating is globally recognised as a potential solution, but adoption has been slow due to critical barriers in initial price, energy efficiency and space requirements for full integration. Larkfleet Ltd have developed a solution that overcomes these initial challenges: an innovative solar thermal collector using Fresnel lenses (modular array of plastic magnifiers that focus the solar radiation onto a linear receiver). The system will: 1) use tracking to provide accurate alignment with the sun throughout the day to maximise efficiency. 2) use plastic Fresnel lenses which drastically reduce the costs 3) be more compact than current solutions due to the shape of the lens. The system offers savings of £29k/yr for small textiles companies and will lower CO2 emissions by 67K tonnes by 2022. The initial target market is developing countries .			

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Anvil Semiconductors Ltd Plessey Semiconductors Ltd University of Cambridge	Vertical cubic GaN LEDs on 150mm 3C-SiC substrates	£852,836	£633,743
Project description - provided by applicants			
<p>The purpose of the project is to develop high efficiency, low cost, long wavelength LEDs in cubic GaN by combining Anvil's IP in growth of cubic silicon carbide on Si wafers; the University of Cambridge's expertise in GaN growth on large area Si substrates and Plessey's capability in volume production of LEDs in GaN-on-Si. The consortium is just finishing an early stage Energy Catalyst project that demonstrated the growth of 3C-SiC and c-GaN layers on 150mm diameter Si wafers and single phase cubic GaN layers that emit green light. This project will take the technology to the next level, producing vertical LED structures using large scale production processes. It will demonstrate scale up of the large area 3C-SiC substrate process and build on Plessey's current GaN on Si commercialisation activity to demonstrate device structures with potential for superior performance to conventional green LEDs. The ability to produce cubic GaN on large diameter silicon wafers is a key enabler for increasing the efficiency and reducing the cost of LED lighting thereby driving the solid state lighting revolution which promises to significantly reduce energy consumption and greenhouse gas emissions</p>			

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Solar Polar Ltd Imperial College of Science, Technology and Medicine Mamata Energy Private Ltd	India-UK Innovative Solar Cooling (Indiacool)	£632,851	£472,745
Project description - provided by applicants			
This project brings together a collaborative partnership comprising UK and Indian SME solar energy businesses, Solar Polar (UK - solar energy technology innovation) and Mamata Energy (India - manufacturing of solar energy technology) and the leading UK university, Imperial College London. Together this partnership will research and advance the development of two applications (solar cooled food cold-chain storage and solar air-conditioning) of Solar Polar's novel solar cooling technology, currently at TRL 3 to 4, through critical investigation, technology validation testing and consultation with the Indian cold-chain and air-conditioning industries. The innovative technology is a modular and low cost solar absorption cooling system that uses no electricity. India provides the ideal test-bed for Solar Polar's solar cooling system; its varied climate (from arid to tropical) provides test conditions that will enable a thorough validation of the technology; the Indian government is committed to significant investment in India's cold chain; and, as incomes rise and average temperatures increase, demand for air-conditioning in India (as in many other parts of the world) is forecast to grow significantly			

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DavyMarkham Ltd Sheffield Forgemasters RD26 Ltd Nuvia Ltd	Development of a UK Manufactured Spent Fuel Cask	£1,261,716	£671,751
Project description - provided by applicants			
DavyMarkham Limited, Sheffield Forgemasters Engineering Limited and Nuvia Limited are collaborating in the development of a new concept of heavy walled, metal, dry storage Spent Fuel Cask that is suitable for local site or off-site interim storage, transport and disposal. This design of Spent Fuel Cask will be flexible to allow the development of a range of casks that will meet the UK market requirements but also market requirements worldwide. The project scope is to develop the concept to a point that will allow a pre-production Spent Fuel cask to be manufactured.			

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Straw Innovations Ltd Qube Renewables Ltd University of Southampton University of Manchester	Rice straw to Biogas (R2B) Project	£1,499,979	£1,185,093
Project description - provided by applicants			
Rice is the world's number one food crop, but its stems and leaves (straw) are a major waste product in developing countries, especially in Asia where around 300 million tonnes of it are burned each year for disposal, damaging the environment and human health. It is generally a poor quality feed for livestock and is not suitable for incorporating back into flooded rice fields, which would result in emissions of methane - a powerful greenhouse gas. Prior research has shown that it can be made into a clean-burning cooking fuel (biogas) using anaerobic digestion, but there are many technical and non-technical barriers to be overcome, such as getting the straw from the field to a hub economically and overcoming challenges in processing it into fuel. This project brings together two innovative businesses and leading academics in their field to set up a field trial in the Philippines, backed up by significant lab work and analysis in the UK. The aim is to develop a practical solution that could profitably serve remote communities of rice farmers, who are among the 3 billion people worldwide who lack clean cooking fuel but are surrounded by this vast, underused bioenergy resource.			

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Cambridge Carbon Capture Ltd WRK Design & Services Ltd Ylem Energy Ltd	Electricity and Zero Emissions from Landfill Gas	£652,553	£455,592
Project description - provided by applicants			
<p>Cambridge Carbon Capture Ltd (CCC) has Patented technology able to remove CO₂ and CO from mixtures of gases and convert it into a solid mineral by-product with commercial value. The objectives of the project are to demonstrate that our technology is capable of removing CO₂ and possibly other contaminants from simulated landfill gas to leave mainly methane. We will then use the methane in a genset to produce electricity with the CO₂ from the resulting flue gases being captured using our process - delivering zero carbon electricity. We shall also be analysing the by-products to ensure they are stable and environmentally benign and have commercial value. In a previous InnovateUK sponsored project we have successfully demonstrated our technology is able to capture CO₂ from a nitrogen and CO₂ mixture using a 'batch' process. Through this project we also aim to develop our technology demonstrator to run continuously and autonomously and develop the understanding and expertise to design a pilot demonstrator to be located at one of our partner's waste sites and capture new IP resulting from the project.</p>			

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IPEC Ltd MTG Research Ltd	Enhanced PD monitoring for EHV cables	£277,682	£194,377
Project description - provided by applicants			
The EHV-PDM project will develop a system that can detect small electrical discharges in high voltage electricity cables in order that maintenance can be carried out before the cables fail. The discharges, called Partial Discharge (PD), create tiny current and voltage pulses that can be picked up at distances of several kilometres by highly sensitive PD sensors. Detected signals will be processed in order to reduce the influence of electrical noise interference and the processed information sent by fibre optic cable to a central monitor. This allows engineers to detect the on-set of these discharges and, through further analysis, identify the exact location of the source in order that preventative maintenance can be carried out in a timely fashion			

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Bennamann Ltd Chynoweth Farm Partners	Bringing profitability to small scale on-farm AD through cryogenics	£448,370	£313,859
Project description - provided by applicants			
<p>This project will develop a low cost biogas upgrading system to make the capturing of methane on small dairy farms economically viable. This is achieved through innovative technical and business model solutions. The technical improvement is brought about by a cryogenic process that uses renewable energy for biogas refining. A proportion of the energy used to process the biogas is recovered at the point of use to create liquid Biomethane. Low cost, off-the-shelf components will be utilised for minimum maintenance and remote monitoring and control making the process well suited to hub-and-spoke systems in developing countries. The business model uses the existing farm infrastructure to capture the biogas and converts it into its most value outputs (CBM/LBM), which attract more than 6 times the revenue of electricity/grid gas). The obstacles that have prevented diffusion (lack of grid connection, high capital expenditure, reliance on subsidies) are removed with our disruptive solution. Our innovation will help farmers to create a paradigm shift in energy distribution thereby circumventing the current need for grid or mains gas connection.</p>			

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Sustainable pipeline Systems Ltd Wholesale Welding Supplies Ltd T/A Weldability SIF Foundation	Spiral wound pipeline mobile technology development	£978,593	£685,015
Project description - provided by applicants			
SUSTAINABLE PIPELINE SYSTEMS LTD is developing game changing new technology for the installation of pipeline infrastructure. Automated mobile manufacturing modules offer the potential to halve total installed pipeline cost, more than halve the environmental impact and greatly improve the logistics of pipeline installation. Feasibility work has used advanced 3D finite element modelling techniques to built and successfully evaluate designs for 36inch diameter pipelines. The technology advances develop applications for high strength steel strip and build on manufacturing control technologies developed for the automotive industry			

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Ceres Power Limited British Gas Trading Limited	Developing a lower cost, higher efficiency SOFC mCHP system for the UK residential market.	£1,498,899	£849,343
Project description - provided by applicants			
This project will bring together Ceres Power's fuel cell technology, a major Japanese OEM's system engineering pedigree and British Gas's home systems experience to develop a compact, low cost, wall hung, high-efficiency, low carbon, micro-Combined Heat and Power (mCHP) system for the UK market. Success will deliver a UK specified design incorporating significant UK technology value and enable a decision to be made on a UK product field-trial and launch programme, resulting in a market attractive mCHP capital and operating cost model. This will require the development of a simplified system architecture with its associated control and safety challenges; the design of low cost flexible electronics for power conversion, safety and control; and a home heating system and controller which optimises the operation of the system in a UK home environment. Innovate UK funding is critical to the Japanese OEM proceeding in the UK and will allow the specific challenges of the UK market to be addressed earlier, accelerating the deployment of a distributed-generation product into the UK which helps address the energy trilemma. This will generate valuable returns for UK technology.			

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Switchee Ltd Peabody Trust Viridian Housing	Smart Thermostat for Social Housing	£387,195	£292,037
Project description - provided by applicants			
<p>Switchee have built a proof of concept prototype smart thermostat for larger landlords which will be the first of its kind, as it will monitor occupant usage patterns and adjust heating provision accordingly. We have tested the prototype in a cohort of social housing and received a very positive response. We have 9 further UK housing associations signed up for concept trials. The value proposition is that by monitoring and learning occupancy habits and trends, Switchee can optimise heating controls and reduce both energy bills and the carbon footprint of social homes by up to 20%. The data Switchee uses to understand occupancy patterns can give landlord maintenance and customer support teams valuable management information.</p> <p>This InnovateUK project seeks to take Switchee from a prototype device that has already demonstrated proof of concept and take it through the development stage. We will work with potential end users to gain commercial feedback and evidence of utility, to enable a focussed project launch after project completion</p>			

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CCm Research Ltd	Biogenic Nutrient and energy optimisation in Anaerobic Digestion	£299,887	£209,921
Viridor Waste Management Limited		£226,600	£113,300
PJH Partnership Ltd		£187,822	£131,475
Project description - provided by applicants			
<p>CCm technology has been developed with the aid of a Energy CAT award from the Innovate UK. In phase we demonstrated at pilot scale our ability to produce highly effective fertilisers which have been demonstrated at field scale and substantial GHG reductions. This award not only helped us to successfully develop the fertiliser production system based on direct post combustion capture but it also highlighted a wide range of waste materials that could – in addition to captured CO2 - be utilised, in an integrated form of upgrading, to increase the utility of the products that we make, further reduce the operational costs and substantially increase GHG savings. CCm Research wishes to optimise its carbon utilisation technology in order to demonstrate the benefits that it delivers on the Anaerobic Digestion (AD) Unit in Somerset at a larger scale. In so doing we also aim show how process integration and waste upgrading could be delivered across the power generation, fertiliser and water treatment industries within the next decade.</p>			

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Paperback Collection and Recycling Limited	Developing and testing a new Energy from Waste gasification feedstock	£627,287	£439,101
Refgas Limited		£166,090	£116,263
University of Glasgow		£124,867	£124,867
Project description - provided by applicants			
<p>The UK Energy from Waste (EfW) market is under developed & lags behind the EU. Inefficient mass burning plants, high gate fees & low quality, inconsistent feedstock make the market unattractive to waste fuel suppliers & investors, meaning most of the UK's waste resources are exported to Europe or landfilled. Advanced Thermal Treatment techs eg. gasification, & high quality waste fuels are key to stabilising the output of EfW. Paperback Collection & Recycling (PCR), Refgas & the School of Engineering at Glasgow University, seek to develop a unique variety of briquette fuel recipes consisting of C&I & Municipal Solid Waste (MSW) streams, & test these in a modified 0.5MW gasification plant to provide a unique scalable, flexible & affordable integrated EfW solution to the marketplace. The waste fuel will increase the no. of gasification feedstocks, improve their consistency & quality, & divert significant amounts of waste from landfill. The plant will use proprietary Refgas technology, PCR will develop briquetting & shredding techniques to process the waste into a form that can be used in gasifiers, making gasification EfW commercially viable & opening the market.</p>			

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Albatern Limited	An online, risk driven, condition monitoring, predictive maintenance management and design upscaling tool for marine	£1,042,740	£729,918
TWI Limited		£249,847	£249,847
Brunel University London		£196,499	£196,499
Project description - provided by applicants			
For marine energy to compete with other energy systems, a step reduction in CAPEX/OPEX and increase in availability times (AVT) is required. Albatern WaveNet scalable wave energy convertors (WECs) at 7.5kW scale, in grid arrays, have achieved a several fold CAPEX reduction compared with alternative designs, and at 1GW grid scale aim to achieve a levelised electricity cost of £150MWhr, competitive with offshore wind, by 2024. As an enabling technology for this target an online, in-service, risk driven; condition monitoring, predictive maintenance management and design upscaling tool (RISKMAN) will be developed for WECs FOR THE FIRST TIME, to achieve a step OPEX reduction, AVT enhancement and design life optimisation. RISKMAN will input monitored fatigue cycle (vibration spectra) into theoretical models of fatigue life, refined by historic reliability data, to derive probability distribution functions for the remaining life of generator components and hence optimised maintenance schedules. RISKMAN will be a generic system applicable to all types of WECs, for exploitation of all the huge wave resources in poor, off-grid and island communities in developing countries.			

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Enertechnos Limited	Capacitively coupled cables for transmission and distribution of electrical power	£724,786	£507,350
TWI Limited		£180,000	£180,000
Custom Designed Cables Ltd		£332,930	£233,051
Brunel University London		£173,754	£173,754
Eland Cables Limited			£233,051
Project description - provided by applicants			
Capacitive Transmission Cable (CTC) is a novel technology for transmission and distribution (T&D) of electrical power. It offers a number of important advantages over conventional cable that arise from the fundamental difference in the way that electrical energy propagates within the cable; because of the multi-layer structure, and in contrast to a conventional conductor, CTC supports a transverse electromagnetic (TEM) mode, which alters the capacitive coupling with ground, enabling lower-loss underground and subsea AC cables. The technology has been demonstrated at voltages up to 600V, showing that we can achieve power transmission via capacitive coupling with a power factor very close to unity. This project will carry out a systematic exploration of the design space in collaboration with Brunel University using state of the art simulation techniques, and will develop fabrication techniques in collaboration with Custom Designed Cables and TWI Industries. This will enable us to design, manufacture and test samples at a range of operating voltages, powers and link distances.			

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Innovate UK

Results of Competition: Energy Catalyst - Mid Stage - Round 4

Competition Code: 1604_CRD2_ENRG_ENCATMS4

Total available funding is up to £10m from Innovate UK (projects >12 months only) with co-funding from DFID and EPSRC.

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
Libertine FPE Limited	10kWe ORC integrated free piston expander	£564,803	£395,362
Entropea Labs Limited		£361,147	£252,803
Brunel University London		£220,512	£220,512
Project description - provided by applicants			
Development of a patented 10KWe free piston gas expander (FPGE) for low-cost off-grid power generation from locally available heat sources. The FPGE is an Organic Rankine Cycle sub-system that can be integrated into a wide range of distributed power generation applications including biogas/biomass to power, exhaust waste heat to power (new and retrofit) and concentrated solar power systems. The objective of this mid-stage project is to demonstrate a modular 10KWe FPGE prototype and verify efficiency & performance through lab testing. The close integration of multiple components within the gas expander module improves system efficiency, packaging and cost. The 25 month project involves: System design & simulation; Component development; System integration; Lab testing & model validation. Final output will include the design & testing of an opposed free piston gas expander sub-system whose many applications will assist in meeting all aspects of the energy trilemma and are of direct relevance to the energy access needs of developing countries.			

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Innovate UK

Results of Competition: Energy Catalyst - Mid Stage - Round 4

Competition Code: 1604_CRD2_ENRG_ENCATMS4

Total available funding is up to £10m from Innovate UK (projects >12 months only) with co-funding from DFID and EPSRC.

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
Green Fuels Research Ltd	REFLOW: Renewable Energy from Fish Lipid Oil Waste	£794,387	£556,071
University of St Andrews		£345,217	£345,217
Biotecmex SA de CV		£153,723	£107,606
Project description - provided by applicants			
This project will improve the value chain in fish farming, an important industry in many developing countries and in global food supply. We will be developing new technology to recover bioenergy and renewable fuels from waste products of fish farming and new, sustainable approaches to fish feeding, aiming to improve growth and nutritional quality of the fish and to improve economic and social conditions for people.			

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Competition Code: 1604_CRD2_ENRG_ENCATMS4

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Modular Tide Generators Limited	Modular Tide Generators Limited	£504,900	£353,430
A & P Falmouth Limited		£498,832	£249,416
University of Plymouth		£256,842	£256,842
University of Exeter		£179,044	£179,044
TidalStream Limited		£60,286	£30,143
Project description - provided by applicants			
<p>MTG Platform Concept 2 is a follow on from the successful early stage energy catalyst project MTG Tidal Raft Platform Concept (48514-345289) and is a 30 month consortium project to establish a pilot scale platform for the rapid deployment and operation of turbines generating energy from tidal and run of river flow. The project focusses on three areas of innovative technical development towards the commercialisation of the platform: (1) Validation of numerical models developed at early stage through tank testing and refinement of model; (2) Developing full scale prototype for field demonstration; (3) Appraise of the platform to rapidly install and remove turbines and power modules; (4) Testing the innovations component functionality and integration during field demonstration, in particular the 'Modular' and 'Hot-Swap' systems; (5) De-risking of operations at scale; including full life cycle costs (deployment strategies, development & production costs, reliability assessment).</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Future Transport Systems Ltd	2nd hEVEN	£674,289	£472,001
Jaguar Land Rover Limited		£253,530	£126,765
University of Warwick		£299,983	£299,983
Videre Global Limited		£49,760	£34,832
Project description - provided by applicants			
Future Transport Systems, Jaguar Land Rover, Warwick University and Videre Global are collaborating on the development of an energy storage system that takes advantage of 2nd life electric vehicle batteries. The 2nd hEVEN project will research and develop variations on Future Transport Systems' existing E-STOR energy storage system identifying how it can use a range of 2nd life batteries of different types and states of degradation. The collaboration will also research the economics and business cases associated with the use of 2nd life batteries. A key area of research in the project is the use of 2nd life battery storage systems in developing countries and Videre Global, a specialist in smart grid systems in the developing world will assist in determining and testing market requirements. Warwick University will undertake research into the use of 2nd life battery module based systems. Ultimately the project will help accelerate development of the E-STOR technology for high volume deployment.			

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Innovate UK

Results of Competition: Energy Catalyst - Mid Stage - Round 4

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Opus Materials Technologies Ltd	AlwaysClean	£199,845	£139,892
Cornelius Specialties Ltd		£209,996	£126,000
Above Surveying Ltd		£177,524	£124,267
Mahindra System Private Ltd		£2,000	£0
TWI Limited		£126,653	£126,653
Loughborough University		£124,967	£124,967

Project description - provided by applicants

The AlwaysClean project will establish laboratory scale verification & field evaluation that a durable easy clean coating for solar PV market can be achieved by the use of novel nanostructured additives. This coating will improve the operational PV performance by preventing dirt and grime accumulation on solar PV modules & reducing or eliminating the associated drop in power output (typically up to 10-20%, global reports data). This loss of energy has a direct impact on energy security & leading to a higher overall cost of solar energy per KWh. As durable highly repellent coatings are not commercially available today, current solutions involve periodic washing of the PV surface, using clean water which is an inefficient use of this precious resource. Cleaning also introduces damage into the surface reducing long-term performance. The coating developed under the Energy Catalyst 2 project SOLplus reduces the accumulation of contaminants & will help to achieve a secure PV energy capability. The AlwaysClean project will enable the growth of a technology that increases the potential for reliable & robust, uninterrupted PV energy generation that can be brought to developing countries.

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Innovate UK

Results of Competition: Energy Catalyst - Mid Stage - Round 4

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Bladon Jets (UK) Limited	Micro Turbine Renewable Energy Combustor (MiTREC)	£774,903	£542,432
Staffordshire University		£210,117	£210,117
Cranfield University		£177,160	£177,160
Quality Transmission Equipment Ltd		£145,745	£72,873
Project description - provided by applicants			
<p>Bladon Jets have identified that small scale micro turbine biogas power generators are the ideal technology to provide decentralised clean, affordable, and resilient energy in developing countries. To achieve this goal this project will design, manufacture and validate a combustion system that can run on renewable gaseous fuels, based on the existing Bladon Jets' 12kWe recuperated micro turbine architecture. To date, no micro scale Closed Cycle Gas Turbine (CCGT) system has been successfully operated with these fuels, due to their low calorific value and impurities, without impacting its current combustion and micro-turbine performance. The performance that needs maintaining includes; NOx emissions, the combustors ability to light and burn efficiently throughout the cycle, and achieving the required life. This project will also produce a study on what bio fuel pre-processing plant will be needed, prior to the micro turbine, and its associated costs, and another study on the market analysis and cost modelling of the bio-fuel distribution system. This will allow the feasibility of the entire process to be assessed and understood.</p>			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
ITPE Ltd	Instream Tidal Energy Research (InTER) project	£304,508	£213,156
Instream Energy Systems UK		£389,002	£272,301
A & P Falmouth Limited		£346,068	£173,034
Leask Marine Limited		£295,750	£207,025
Tension Technology International Ltd		£87,034	£60,923
University of Plymouth		£61,780	£61,780

Project description - provided by applicants

The aim of the Instream Tidal Energy Research (InTER) project is to design, build and test a 100 kW tidal energy device featuring two vertical axis turbines on a floating research platform. The project will develop a new platform technology that will enable Instream Energy Systems (Instream) to make the step from inland hydrokinetics and access tidal resources in the UK. Deployment and system testing of the prototype will take place in an appropriate marine environment with a simulated grid interface. Instream's technology aims to overcome many of the existing challenges in the tidal sector including high installation costs and access to shallow water resources to achieve lower-risk, cost-effective commercial projects. The InTER project builds on Instream and IT Power's (ITP) recent platform concept design work and Instream's existing rotor design. The resulting 'Turbine Deployment Unit' (TDU) will support 2 rotors. The key phases of the project will include, numerical and physical modelling, design, fabrication, assembly, deployment, commissioning, demonstration, and recovery. The consortium assembled has the expertise necessary to internally carry out the project phases.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Avonwood Developments Ltd	Intelligent Real-time Corrosion Monitoring and Detection on Wind Turbines (iWindCr)	£438,050	£306,635
Avanti Communications Ltd		£400,184	£200,092
University of Portsmouth		£166,958	£166,958
Project description - provided by applicants			
The Intelligent Real-time Corrosion Monitoring and Detection on offshore Wind Turbines (iWindCr) project co-funded by the Energy Catalyst and led by Avonwoods Developments with Avanti Communications and the University of Portsmouth as partners, will develop cost-effective and innovative technology comprising sensors and advanced software plus end-user applications for detection and monitoring of corrosion and surface damage on vulnerable parts of wind turbine installations. The outcome of the project is expected to improve turbine lifespan, output and reliability by reducing the Operation and Maintenance (O&M) costs from unplanned or unscheduled maintenance caused by corrosion and surface damage to key turbine internal and external components.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Recycling Technologies Ltd	Development of a plastic waste derived fuel for industrial burner application	£857,204	£600,043
Cranfield University		£325,590	£325,590
Dunphy Combustion Ltd		£82,519	£49,511
Henty Oil Limited		£28,800	£0
Project description - provided by applicants			
<p>The UK generated 3.7 Mt of plastic waste in 2014. Of this, only 1.1 Mt was recycled and 2.6 Mt was disposed of to landfill or Energy from Waste. Even though end-of-life Residual Plastic Waste [RPW] has a high calorific value, it is currently an environmental and financial liability. Recycling Technologies Ltd. [RT] has developed a process that recycles RPW into a commercially valuable hydrocarbon called Plaxx™. Plaxx™ is a substitute for crude oil derived Heavy Fuel Oil [HFO] that is used in industrial burners. It is Ultra Low Sulphur [S<0.02%] fuel and has the potential to displace a substantial amount of HFO around the world. Conversion of just 30% of the UK's plastic waste to Plaxx™ will meet 100% of the UK's HFO demand. However, our ability to process Plaxx™ requires a better understanding of how to control its chemistry and improve its physical properties. The aim of this project is to identify gaps in Plaxx™ quality and trial innovative technologies to upgrade Plaxx™, such that it will meet the specifications of an industrial burner fuel. If successful, this project will address the energy trilemma and the plastic waste issues globally.</p>			

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