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Department of Energy & Climate Change

EPSRC
Engineering and Physical Sciences Research Council

Energy Catalyst Round 2
Summaries of 32 Funded Projects

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383420 - making LEDs using 3C-SiC substrates

Anvil Semiconductors Ltd
Plessey Semiconductors ltd
University of Cambridge

Feasibility
12 months
£229,121
ref: 132135

The purpose of the project is to develop high efficiency, low cost GaN based LEDs on Anvil's silicon carbide on silicon wafers (3C-SiC/Si). Anvil has recently completed an Innovate UK funded feasibility study with the University of Cambridge that demonstrated its 3C-SiC layers, developed for low cost high efficiency power devices, have an exciting application in LEDs by providing a cubic substrate that enables the growth of single phase cubic GaN on large diameter silicon wafers. The ability to produce cubic GaN on large diameter silicon wafers is clearly recognised as a key enabler for increasing the efficiency and reducing the cost of LED lighting.

Plessey have started to commercialise LEDs produced in conventional (Hexagonal) GaN grown on large diameter silicon wafers using IP originally developed at The University of Cambridge. Anvil's IP manages the inevitable stresses when growing SiC on silicon wafers. The project brings these three technologies together, to produce high efficiency, low cost LEDs. Such a cost/performance improvement would have a disruptive effect on the LED market advancing the replacement of incandescent lights and CFLs with solid state lighting.

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383348 – diamond power electronics

Evince Technology ltd

Feasibility
12 months
£230,848
ref: 132136

This project relates to the development of enabling technology, to supply high voltage, high power semiconductor devices, based on diamond, to the energy industry. These devices utilise proprietary approaches to overcome the perceived limitations of diamond as a semiconductor material. These components will be embedded in power electronic systems with applications ranging from energy source grid interfaces, grid control technologies to large-scale end-use applications. Completion of this project will prepare the technology to be taken to market through a commercialisation phase starting with a diode product that will considerably improve the performance of existing power transistors, paving the way for a fully diamond replacement that will significantly reduce the cost and increase the efficiency of grid level power electronics.

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383521 - SiC hybrid power module

Anvil Semiconductors Ltd
Manufacturing Tech Centre

Feasibility
12 months
£199,110
ref: 132137

Driven by competition, demand and legislation designers of products are striving for increased efficiency, smaller size and weight and lower cost, but they are limited by the efficiency constraints of Si or the cost of today's SiC devices. Anvil's unique SiC technology enables the development of devices with the efficiency and size benefits of SiC but at the cost of silicon. However the benefits that can be achieved by changing to SiC are limited by the switching speeds which are in turn limited by the inductances produced by non-close coupling of discrete devices and ancillaries. This project is to develop a low cost hybrid module to enable close coupling of devices and ancillaries, reduce inductances and achieve switching speeds of 100KHz. This significantly increases efficiencies and reduces size and weight by removing ancillary components and heat sinks. The potential applications for such a module are very wide indeed: for example LED lighting, PV converters, general power supplies, electric car charging and EV/HEV.

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383407 – hybrid PV-battery for LV grid using GaN

Navarino Electric Systems ltd
Sharp Laboratories of Europe
Aston University

Feasibility
12 months
£217,436
ref: 132138

Under their "Gone Green" deployment scenario, National Grid forecast that energy generated from photovoltaics (PV) in the UK is expected to rise from 2 to 15 GW over the next 20 years. This is being driven by the UK's legal obligations around installing renewable energy sources & cutting greenhouse gases, the rising cost of energy & concerns around the security of supply – the so-called energy "trilemma". Power electronic converters are a key enabling technology for PV and other low-carbon technologies (LCTs). However the use of LCTs has resulted in problems for the electrical distribution nerwork such as supply voltage distortion and over-voltages, which threaten to limit or delay their uptake. This project aims to mitigate this threat by exploiting the benefits of a new Gallium Nitride power transistor module, which will be developed for use in a hybrid PV-battery unit for residential applications, but will have much broader applications e.g. electric vehicle charging & micro-CHP. These units will be much smaller, lighter & have lower cost than existing Silicon based units and their deployment will lead to an increase in the maximum allowable installed capacity on the network.

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383370 – fridge demand response

DuckDuck Ltd

Feasibility
6 months
£55,178
ref: 132139

The aim of this project is test the feasibility of a simple, automated way for households to become involved in saving energy when the electricity network is stretched, which can happen many times a year.

This can be done via an internet-enabled smart plug connected to the fridge, which would switch it off (and back on) for a short time, on command from the National Grid. Households get paid for this, and some may donate this cash back to charity to buy the same plugs for a fuel-poor household (who would get paid every year).

As part of this project we would run a pilot with housholds to test the functionality and acceptance. Working with Kiwi Power, EnergyDeck, National Energy Action and Age UK.

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383329 – metal hydride H2 storage tank

Univ. of Nottingham
Arcola Energy
ITM Power
Luxfer Gas Cylinders UK

Feasibility
12 months
£144,508
ref: 132140

The technology for the generation and usage of hydrogen as a fuel is established however as present the best way to store the hydrogen is to pressurise the gas to 350 bar and above. That is 350 times atmospheric pressure. This has cost and safety considerations. Handling high pressure hydrogen requires thick and heavy metal cylinders or bulky composite cylinders. Electrolysers driven by electricity from renewables or from the national grid can readily generate hydrogen but this is at low pressures. Thus mechanical gas compressors are needed to compress the gas to above 350 bar. Such mechanical compressors are expensive and require constant maintenance and storing large quantities of hydrogen at high pressure requires blast zones. Being able to store the majority of gas at low pressure utilising metal hydride (MH) solid state stores not only is safer but it requires much less volume of space. Also fuel cells (which convert hydrogen and oxygen to water and electricity) operate at these low pressures too. So for certain stationary applications storing hydrogen utilisng a low pressure MH store makes sense and this project will build a prototype and explore this market.

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383317 – transparent copper electrode materials

Applied Materials Technology
Cranfield Univ.
Exergy ltd
Solaris Photonics

Feasibility
12 months
£214,547
ref: 132141

Transparent conductive electrode (TCE) is an essential component for solar cells and other devices such as displays, currently indium tin oxide (ITO) and silver are the prevailing choices. ITO and silver are however expensive. ITO has limited supply, and tends to degrade in performance under stress, so ITO-replacement TCEs have attracted extensive interests in the past years. Promising possible replacements include less expensive transparent conductive oxides, carbon nanotubes (CNT) or graphene-based thin films, conductive polymers, and metal grids based TCEs. This consortium aims to develop low cost and superior, sustainable Cu nanowires based TCE for solar cells, and explore its application to other devices.

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383531 – distributed sensors for offshore cable health

Fraunhofer UK Research ltd
Synaptec ltd
EMEC ltd

Feasibility
6 months
£51,074
ref: 132142

Offshore renewable energy such as tidal, wave and offshore wind is an important part of the UK energy supply and is becoming more so. However there are challenges when it comes to operating in an offshore or marine environment. The cable infrastructure can be vulnerable to being dragged or worn. The transmission capacity can limit the ammount of energy taken from a device or device array. Repair of offshore cables or infrastructure is costly. This project seeks to investigate the feasibiity of combining two types of sensor technology on a shared optical fibre network that can provide real time monitoring of electrical performance and also the physical condition of a cable in a marine energy project. The proposed system would use pre-existing optical fibre already on the installed power cable to opticallly interrogate electrical sensors and to also perform as a dsitributed sensor The expected outcome from the project is a system level design with technical and commercial development plan to fully exploit this technology.

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383373 – automated spiral-wound pipe

Sustainable Pipeline Systems ltd
Ridgeway Machines ltd

Feasibility
12 months
£209,134
ref: 132143

This project investigates the feasibility of advanced spiral wound steel strip technology for large diameter pipelines for the transport of energy in gas or liquid form. Advances in steel metallurgy and automated process controls combined with an innovative patented interlock offer a new approach with the potential to halve total pipeline costs and dramatically reduce emissions. PIpeline networks are key enabling infrastructure for energy transport and more cost effective than other methods with less environmental impact.
The project will bring together advanced finite element analysis methods , composite engineering concepts, advanced steel roll forming and winding technologies to bear on onshore pipeline engineering - which has not changed radically for 75 years

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383344 – odorant removal by de-sulphurisation

Gas Recovery & Recycle
Johnson Matthey ltd
Univ. of Cambridge

Feasibility
12 months
£150,177
ref: 132144

Efficient distributed electricity generation using stationary fuel cells is recognised one option to address the energy trilemma, by improving the security of supply and reducing both CO2 and local emissions in a cost effective way. The ORACLE project aims to establish the technical and commercial feasibilty of novel concept to remove the sulphur containing odorants added to the natural gas supply that would otherwise poison these fuel cells. In doing so it addresses a known technology gap in the fuel cell industry. Success would quickly generate a significant new market opportunity for GR2L and Johnson Matthey, and establish Cambridge University at the forefront of a new research area. The partners will establish whether a technology called Chemical Looping Combustion, curently used to purify argon gas, can be redesigned to selectively destroy the contaminants in natural gas, enabling them to be trapped on a safe, high capacity absorbent. The idea builds on 2 patent filings and offers the potential for a unique fuel flexible, compact purification module for fuel cell developers, with excellent performance and cost characteristics.

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383503 – solar absorption cooling system

Solar Polar ltd

Feasibility
12 months
£89,355
ref: 132145

Solar Polar has invented a solar cooling system design concept for a system that will require no electrical power, will have no moving parts and will provide cooling at low cost (per Watt of cooling load). Our innovative system design will be simple to build with local materials, will be easy to maintain, reliable and will have an operating lifetime of 30 years or more. It will be ideally suited to the cooling requirements of dwellings and small to medium sized offices and retail spaces. It therefore has the potential to be a world leading, near-zero carbon cooling technology. Within this project we shall undertake: technical appraisal of each element/component of our system concept and of the system as a whole; detailed market research; technology and competitor analysis; detailed modelling of the performance of our technology in different locations/orientations; a costing exercise and cost-benefit analysis for varying applications/locations; identification of potential collaborative partners; identification of standards and accreditations required in key markets and development of technology development and commercialisation route maps.

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383383 – photon multiplier film for PV efficiency

Eight19 ltd
Univ. of Cambridge

Feasibility
12 months
£225,361
ref: 132146

SiFi is a short project to assess the technical and commercial feasibility of a new approach to increasing the conversion efficiency of photovoltaic modules by splitting high energy visible photons into 2 infra-red photons before they are absorbed in the module. The photon splitting process is known as "singlet fission". By increasing the photon flux absorbed, greater power can be generated by a photovoltaic module.

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383422 – coating for improved PV efficiency

Opus Materials Technologies
Solar Cloth
Cornelius Specialities
TWI ltd
Loughborough Univ.

Feasibility
12 months
£249,339
ref: 132147

The SOLplus project will explore the feasibility of using novel nanostructured coatings to improve the operational performance of solar PV by preventing dirt and grime accumulation on solar PV modules and reducing or eliminating the associated drop in power output (typically up to 10-20%). The project will establish the proof of principle that these durable, transparent, and superhydrophobic coatings can be put on both glass and flexible substrates to prevent the build-up of dirt on solar panels. Such coatings will be a significant advance in the field of repellent surfaces, with the potential to be self-cleaning . By maintaining the design performance of the solar PV system, such a coating would allow for significant cost and emissions savings since the lowered power losses would directly translate to a higher LCOE for solar power and contribute to significant reductions in carbon emissions. The project will provide the UK an opportunity to exploit an emerging advanced materials technology and be better equipped to meet its renewable energy targets by extracting the maximum performance output from the investment made into solar PV reducing the LCOE for solar PV.

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383405 – direct CO2 capture

Univ. of Cambridge
Cambridge Carbon Capture ltd

Feasibility
12 months
£246,888
ref: 132148

Cambridge Carbon Capture Ltd (CCC) is developing Patented technology to capture and store CO2 permanently as a rock. In doing so a number of valuable mineral and metal by-products are produced that, at current commodity prices, would more than offset the cost of capturing the CO2. Carbon capture as a profit making activity rather than a cost. CCC's current process involves 2 steps, the purpose of this project is to enable the University of Cambridge to collaborate with CCC to test the feasibility of combining these two steps into a single process and thereby significantly reduce costs.

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383397 – syngas & emissions filtration technology

Smart Separations ltd
Univ. of Surrey

Feasibility
12 months
£240,795
ref: 132149

Smart Separations is developing a proprietary microfilter technology that can be easily tailored to suit many different needs by varying the pore size in a controlled manner. The regularity of the pore size is a unique selling point in many different markets and applications. New filters based on this technology are highly innovative and potentially highly commercially disruptive.
The energy industry is suffering from out-dated processes to clean, purify and filter their exhaust fumes. With this award, the SSL technology will be used to develop filters for particulate removal in energy generating applications such as incineration, gasification and power generation; resulting in lower energy costs and cleaner emissions. The excellent chemical and thermal resistance of SSL's filters are well suited to applications in both syngas and flue emissions treatment. It is also possible to integrate particulate and chemical removal into a single multifunctional system, so infrastructure and running costs can be dramatically reduced.

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383227 – wind telecoms hybrid

X-Wind Power ltd
Sitec Infrastructure Services ltd

Feasibility
12 months
£205,915
ref: 132150

Project proposes to develop a wind energy and telecoms hybrid mast structure, utilising X-Wind Power proprietary 2 bladed vertical axis wind turbine concept. The project aims to develop an integrated solution at 6kW scale and detailed design solution at 80kW scale, i.e. suitable for single operator, or multiple operator telecommunication sites.

The project is a collaboration between Sitec Infrastructure Services and X-Wind Power.

The X-Wind vertical axis turbine is ideally suited to this application as its blades are entirely above the proposed location for the telecom radio antenea. A horizontal axis turbine would tend to 'chop' the radio signals creating unacceptable loss of network quality.

Sitec identified X-Wind as the turbine of choice for this application due to its low noise, low vibration, easy maintenance access for both telecoms and the turbine, the long periods between maintence intervals and lastly its small footprint, which is 1/3 of the area of an equivalent conventional turbine.

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383318 – UAV gas-monitoring system

British Geological Survey
QuestUAV

Feasibility
12 months
£245,560
ref: 132151

The energy industry produces, transports and uses large volumes of gases, including methane and carbon dioxide. It is important that such gases do not accidentally leak from production facilities, pipelines and stores, but these cover large areas and it is very challenging to monitor them effectively with current technology.

The British Geological Survey and QuestUAV are meeting this challenge by developing a cost-effective small unmanned aerial vehicle (UAV) gas detection system that trained operators can take to sites for rapid monitoring. These will fill the market gap between time-consuming surface monitoring and costly conventional manned aircraft and will identify areas of leaks or fugitive emissions, that can then be investigated further and, where necessary, rectified.

Detecting methane will be the main focus of the work. We will modify the best small methane detectors, and develop new ways to combine the flight data and gas analyses in order to produce 2D and 3D maps of gas concentration. To demonstrate high confidence in the results, we will also thoroughly test the accuracy of the measurements using more standard (though slower) methods.

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383559 – efficient heat exchangers

Oxford nanoSystems ltd
Heatric ltd

Feasibility
12 months
£187,052
ref: 132152

TEHEx aims to transform the economics of waste heat recovery (WHR) for electricity generation by moving the calculation point of where low grade heat becomes economic, and to provide an enabling technology wherever 'boiling heat transfer' is used in energy processes. More efficient and lower cost heat exchangers would extend WHR growth to less economic sources and be an enabler for the vast resources of geothermal (the 'Cinderella' of renewables) and long-term the nascent river and ocean thermal energy conversion (OTEC). A major UK company Heatric, exporting >£100m of world-beating heat exchangers, has identified Oxford nanoSystems as an SME with a unique coatings technology which could cement and grow the UK's lead in advanced heat exchange technology. Improved performance would allow Heatric to continue its recent strong growth in sales and employment and allow it to create new markets by the innovative combination of its unique 'Printed Circuit' heat exchanger design, ONS's 'boiling enhancement' coating technology and academic expertise from leading universities. Technology developed could find significant application in other areas of energy efficiency and security.

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383560 – ultra-low-temperature battery

Hyperdrive Innovation ltd
Oxis Energy
British Antarctic Survey

Feasibility
12 months
£112,348
ref: 132153

This project brings together two companies - Hyperdrive Innovation and Oxis Energy - who are the forefront of battery technology in the UK to explore the technical feasibility of a new generation of energy storage for use in extremely cold climates. This will be achieved by developing a low temperature electrolyte for Lithium-Sulfur (Li-S) rechargeable battery chemistry, and chemistry-agnostic battery management system and packaging that can withstand and outperform the current lead-acid battery solution. British Antarctic Survey will act as subject matter experts to inform the development of a battery capable of operating in one of the harshest environments on the planet. Such a battery would allow British Antarctic Survey (BAS) to significantly increase autonomous scientific measurements made in the Antarctic, but without increasing transport costs or emissions. The resulting technology will lead to a follow-on mid-stage project to develop a high energy density rechargeable battery that can operate at -80 °C for Antarctica survey organisations and several other crossover markets for energy storage and unmanned systems.

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383335 – steam ejector/water turbine micro-CHP

Univ. of Nottingham
Geo Green Power ltd
Venturi Jet Pumps ltd
Environmental Process Systems
Ashwell Biomass ltd

Feasibility
12 months
£253,756
ref: 132154

The aim of the project is to develop an innovative and highly efficient, micro-CHP using steam ejector/water turbine/Pelton wheel system. The technology can be used for heat and power provision in industrial and commercial applications. The low cost system would reduce carbon reduction by the utilisation of renewable energy sources, waste heat or hybrid sources (e.g., waste heat/natural gas). The micro-CHP system will employ water as the working fluid and also addresses the fundamental UK energy supply problems. WaterGen system could be rapidly introduced to reduce the UK generating gap and improve the energy supply security through buffering the intermittent output of renewables.

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383367 – low-cost sodium-ion battery

Queen Mary Univ. London
Johnson Matthey plc

Feasibility
12 months
£183,240
ref: 132155

Due to their outstanding energy and power density, lithium-ion batteries have become the main technology for today's electrical energy storage, from small portable electronics up to large electrical grid storage. However, the lithium-ion bateries are not suitable for small scale energy storage because of their relatively high cost and increasingly higher strain on lithium resources. Recently, sodium-ion batteries started to receive significantly more attention as a low cost and affordable alternative to lithium-ion batteries. This collaboration between School of Materials Science and Engineering at Queen Mary University of London (QMUL) and Johnson Matthey (JM) will advance the development of low cost and highly performing anodes based on abundant and renewable resources and cathode development based on reduced use or substitution of critical raw materials with more abundant, lower cost, elements while maintaining performance. This will accelerate the development of sodium ion batteries which could be later integrated into battery modules, creating a new generation of affordable stationary battery systems.

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383337 – electrochemical N2-to-NH3 study

Univ. of Oxford
STFC
Siemens plc

Feasibility
12 months
£194,606
ref: 132156

This project is concerned with exciting developments of new electro-catalytic technologies for Green eNH3 production with the energy derived from wind power.

This contrasts with the traditional catalytic process for industrial NH3 production where non-renewable natural gas is used as the energy and H2 source with a concomitant release of large CO2 emission. Thus, the development of new renewable electrocatalytic technologies can substantially reduce carbon emission by utilizing wind energy to produce carbon free NH3.

This electrification of the chemical industry will improve energy security by reducing the dependency on dwindling supply of natural gas. Further applications of eNH3 for energy storage and transportation will reduce the cost of integrating renewable into the energy mix.

Oxford University and STFC will collaborate with Siemens, UK to explore various new catalytic surfaces to produce ammonia from nitrogen and hydrogen (or water) by electrochemical means. This program is part of a wider consortium which is making the UK a central research hub for Green Ammonia.

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383518 – adding predictive capabilities to PV

Senseye ltd

Feasibility
12 months
£55,206
ref: 132157

The aim of this technical feasibility project is research the feasibility of applying proven technology, performance management and efficiency principles from the aerospace sector to the solar energy sector through prototyping of advanced predictive analytics leveraging the technical and market innovations provided by the Internet of Things (IoT). The study will have a stakeholder group of solar companies.

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383546 – spray-deposition of CIGS & inkjet electrodes

Precision Varionic International
UCL

Feasibility
12 months
£250,273
ref: 132158

The UK has substantial built up areas which can be utilised to develop large scale installations of PV. However despite the inherent advantages of Building integrated PV, unsubsidised PV uptake is still limited due to the high investment costs & slow payback timescales. Thin film PV offers significant advantages over conventional c-Si solar cells for BIPV, including; (i) Ease of installation, (ii) ability to afix cells without drilling roofs or using complex fixturing, (iii) cell efficiency (at non optimal elevations) & (iv) weight (~30% the weight of crystalline Si). CIGS solar cells offer considerable promise with record efficiecnies of 21.7%. However, widespread uptake of CIGS technologies is limited due to the inherent high cost/W of the cells. NOVA-Cell will address the cost/W of CIGS cells by undertaking a feasiblity study to assess the application of novel non-vacuum chemical spray assisted vapour deposition of CIGS to replace exisitng high cost vacuum based technologies. The project will also study the application of novel ESJET printing of fine structure fingers & busbar Cu metallisation to replace expensive screen printed Ag pastes to increase cell efficiency by 0.6% & reduce the overall cost/W by 10.6%.

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38296 – integrated whole energy storage with H2

ULEMCO ltd
Revolve Technologies ltd
Clean Power Solutions ltd

Feasibility
12 months
£209,122
ref: 132159

This 12 month technical feasibility project tests the opportunity for an innovative whole system approach to solve the trilemma of improving energy security from increased deployment of renewable generation which is otherwise grid constrained, providing an overall improvement of the commercial viability of renewable generation, and reducing the cost of producing "green" hydrogen particularly where additional grid costs are incurred, such as farms and remote locations. It creates a technically validated, detailed model, based on using a novel control system, that balances energy generation and use on site that is connection compliant to the parameters stipulated in Engineering Recommendation G83/3, enabling real time cost, grid balancing and peak shaving capability to store and produce low cost hydrogen. The project, led by ULEMCO Ltd with partners Revolve Technologies and Clean Power Solutions, takes the current individual system components (already installed at Springbank Farm, Cheshire), adds SMART on board vehicle storage, low cost h2 refuelling, and then gathers real use data to define, quantify and validate the optimum operating value of the whole system.

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383419 – waste-water bio-fuelcell

C-Tech Innovation ltd
Imperial College

Feasibility
12 months
£243,175
ref: 132160

Thanks to an innovative electrochemical device, this project will add value to organic materials dissolved in waste-water streams by generating electricity upon their electrochemical oxidation in a low cost but high power fuel cell (15 mW/cm2). Large amounts of waste water contaminated with sugars and other high energy organic molecules are currently generated as a result of the industrial activity in sectors including food manufacturers, beverage production, breweries, wineries or biofuel generators. These water streams represent an increasing problem for those industries as expensive and slow water cleaning procedures are mandatory prior to municipal disposal. The system here proposed enables significant carbon dioxide savings and a dramatic drop the energy requirements for water remediation and related costs. Alternative technologies are capital intensive with low electrical generation efficiency (anerobic digestion) or uneconomic (microbiological fuel cells with a power density of less than 2 mW/cm2). Unlike many renewable energy sources, this fuel cell provides continuous and clean electricity generation to support the grid and provide peak shaving.

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385177 – wind turbine integrated LIDAR

ZephIR ltd
Loxham Precision ltd

Mid-Stage
18 months
£698,205
ref: 102467

WinTIL will develop the technology for the first generation of LIDAR systems suitable for integration into wind turbines, in order to provide advance information about the incident wind field across the entire rotor area. This data can then be used by turbine control systems to minimise fatigue loads and to optimise energy extraction. Reductions in fatigue loads on turbines and components will enable optimised service intervals and extend service life for onshore and offshore turbines. More efficient, safer and more reliable energy generation will reduce costs and improve public perceptions of wind energy. It is currently impossible to use lidars in this way due to technology limitations and the need for systems to be cheaper, more reliable and compact. WinTIL will integrate continuous-wave (CW) lidar into the turbine and reduce system complexity through innovations such as automatic scanning, optimised optical transceivers and data processing algorithms. The WinTIL consortium has experience of incorporating current wind lidars into turbines for research purposes, and is ideally placed to move these concepts to a market-ready design.

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385239 – manufac. of MARBN steel for power plants

Doosan Babcock ltd
Wyman-Gordon ltd
Goodwin Steel Castings ltd
Alstom Power
Metrode Products ltd
Loughborough Univ.
Nottingham Univ.
Univ. of Birmingham

Mid-stage
36 months
£1,208,619
ref: 102468

The recent TSB funded "IMPACT" project successfully developed a novel alloy, MARBN, capable of enabling a 25°C temperature and at least 2% efficiency increase, with consequent emission reductions, in new steel-based steam power plant. IMPULSE is a consortium involving the IMPACT project group with new partners to lead the industrialisation and commercial deployment of MARBN in new and retrofit boiler plant.

IMPULSE will develop MARBN ingot casting, pipe manufacture and welding, together with design and performance data to enable standardisation and implementation of new build MARBN boilers. This will complement the current Innovate UK "INMAP" project on large cast MARBN turbine components, thereby providing a unified UK materials and manufacturing supply chain for a new generation of world-leading ultrasupercritical steam plant for the world market. MARBN will also play a key role in UK and European retrofit component markets, where its superior strength will enable current fossil plant to meet unprecedented demands of highly flexible operation, as required to enable rapid parallel deployment of intermittent wind and solar generation with major CO2 savings.

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385250 – electrolyser manufacturing capability

ITM Power Trading
Gwent ltd
Escubed ltd

Mid-stage
18 months
£531,271
ref: 102469

With the roll out of Hydrogen Refuelling Stations (HRS) and Power-to-Gas (P2G) systems the requirements for electrolyser production is set to grow rapidly from 2015 onwards.

The UK has a leading position in rapid response PEM electrolysis and whilst it has been, and is possible to fulfil current demand using existing manual production processes the requirements to scale up production capacity is pressing, as is the need to reduce lifetime system costs in order to broaden demand.

This project seeks to address the technical challenges associated with production scale up and low cost manufacturing of PEM MEAs for electrolysers, in order to meet future demand.

This will be achieved by working closely with key supply chain partners bringing expertise from a range of industries to tackle an area of stack production which offers greatest cost reduction opportunities.

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385253 – high-resolution printing of PV electrodes

Precision Varionic ltd
Intrisiq Materials
Oxford Photovoltaics
Johnson Matthey
Swansea Univ.
Queen Mary Univ. London
Pilkington Technology Mgmt.

Mid-stage
30 months
£1,880,738
ref: 102470

Photovoltaic solar cells deliver clean green energy and the technology has been well proven with over 2.5 GWp currently installed in the UK alone. However, photovoltaic uptake is still limited due to the high CAPEX outlay and slow Return on Investment (ROI). In order to accelerate widespread photovoltaic installation, there are strong drivers to further reduce the cost per Watt of solar cells.

HI-PROSPECTS directly addresses this by developing innovative high resolution electrostatic ink jet technology to deposit fine copper electrode structures, thereby increasing cell efficiencies by reducing shading losses and replacing expensive and volatile silver pastes with cost effective nanoscale copper. HI-PROSPECTS will demonstrate the technology on silicon cells and on next generation perovskite solar cells with target efficiency of 17% at less than £230 / kWp. The project will facilitate the additional manufacture of up to 5 GWp of PV by 2023, generating 4100 GWh of electrical power.

Innovate UK
Technology Strategy Board

Department of Energy & Climate Change

EPSRC
Engineering and Physical Sciences Research Council

385229 – low-cost storage of renewable energy

Faradion ltd
Moixa ltd
Univ. of Warwick

Mid-stage
36 months
£459,962
ref: 102471

The project is a three year programme undertaken by Faradion Ltd, Moixa Ltd and Warwick University to develop sodium-ion batteries for the storage of domestic solar energy. The stored energy, generated when there are high levels of sunlight can then be used later in the day when demand is at its highest. The attraction of sodium-ion batteries is that they promise to be significantly cheaper than lithium-ion batteries so enabling a faster take-up of energy storage technology.

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EPSRC
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384159 – removable nacelle for DeltaStream tidal array

Tidal Energy ltd
Cardiff University
Swansea University

Late-stage
18 months
£1,623,967
ref: 102440

Tidal Energy Limited (TEL), the UK technology company behind the DeltaStream tidal stream turbine and owner and operator of the Ramsey Sound test site in Pembrokeshire, is working with the Marine Energy Research Groups of both Cardiff and Swansea Universities to design, analyse, construct and test a new removable nacelle system.

The project is aimed at significantly reducing the operation and maintenance costs associated with commercial tidal turbines, as well as identify operational limits and robust equipment to withstand the demanding physical characteristics of the marine environment.

Success of the project will accelerate TEL's plans to implement arrays of DeltaStream turbines thereby helping arrest climate change, ensure security of supply and help to develop the new tidal energy industry, creating thousands of new jobs in UK.