

Innovate UK

All Energy 2016
innovation showcase

Project Directory

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Introduction to directory

Innovation is key to addressing global challenges of sustainable, affordable, and secure energy for all. Innovate UK and the Department of Energy and Climate Change (DECC) work together to connect and fund new ideas, technologies, products and services to help companies in their first steps along the innovation journey towards commercialisation.

Through our innovation programmes, we connect and fund hundreds of businesses that address the challenges our energy systems face, whilst also developing significant commercial opportunity for the UK economy.

This directory is a snapshot of companies we have supported over recent years and highlights the diversity of companies who are looking for first customers, new partners and follow on investment. The brief summaries within, written by the businesses, provide an overview of activity and ambition for the future.

If you would like to know more about our programmes or the projects that have been funded then please go to www.gov.uk and search for Innovate UK or DECC innovation.

Innovate UK also has an extended family of support to help you connect with business and develop your ideas; This includes the Catapults (www.catapult.org.uk), Knowledge Transfer Network (www.ktn-uk.co.uk), and the Enterprise Europe Network (www.enterprise-europe.co.uk).

We hope you find value in looking through this directory and that it helps you make profitable new connections as a result.

Rob Saunders

Head of Energy, Innovate UK

Ian Ellerington

Head of Innovation Delivery, DECC

Innovate UK



Department
of Energy &
Climate Change

Introducing the Catapult Network

Catapults are not-for-profit, independent technology and innovation centres that connect businesses with the UK's research and academic communities.

They were established and are overseen by Innovate UK, the UK's innovation agency, to bring together the best people in their fields with world-class facilities and expertise to rapidly advance the UK's research and development (R&D) into global commercial success.

Whether your business is large or small, if you have the ambition to grow, Catapults can bring you new opportunities through innovation.

Each specialises in a different area of technology, but all offer a neutral space with the facilities and expertise to enable businesses and researchers to solve key problems together and develop new products and services on a commercial scale.

For more information on all 11 Catapults please see our latest brochure at <https://www.gov.uk/government/publications/innovate-uk-how-catapults-can-help-your-business-innovate>

The logo for the Catapult Network, featuring the word "CATAPULT" in a bold, orange, sans-serif font. The letters are slightly irregular and have a hand-drawn feel.

ACT Blade Ltd

Engineered Textile Blade

ACT Blade is developing the lightest and most controllable wind turbine blade in the market. Using carbon fibres reinforced structures and textile, ACT Blade reduces the cost of energy by 10% and the CAPEX cost per blade by 90%.

What technical themes at the All Energy event best describes your project?

Onshore Wind and Offshore Wind.

What is the market opportunity that you have identified?

Total Addressable Market values £6.3bn per year. Obtainable market by 2023= £140m.

How will you deliver value from this opportunity?

We envisage two routes to market: direct sale of ACT Blades, and licencing of Intellectual Property to established blade manufacturers. Additional revenues streams will derive from the provision of design service/software tools.

What are you looking for to enable you to take the next steps?

Over the next 3 years, we will design, test and certify a full scale ACT Blade. To deliver this, we are looking for a financial investment of £4.12m and an industry player to support the development.

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Bellrock Technology Ltd

An intelligent decision support platform to advance condition monitoring and asset management of Offshore Wind Farms

Project partners:

University of Strathclyde, ScottishPower and SSE

The project sought to reduce the cost of electricity generated by offshore wind by adapting the company's Lumen analytics platform, originally developed for the power networks industry. It piloted results with Scottish Power and SSE.

What technical themes at the All Energy event best describes your project?

Onshore Wind, Offshore Wind.

What is the market opportunity that you have identified?

Data analytics are a key challenge for many companies and not only energy utilities. Companies wish to use analytics to make faster live operational decisions, which can both increase revenue opportunities and decrease costs. However, deploying models and algorithms for this live use is difficult. There are huge risks in moving innovation to business-as-usual. We have developed a smart software delivery platform for analytics applications that ensures companies can achieve value from their innovations. It supports multiple markets from equipment operations, to asset life extension to energy trading and beyond.

How will you deliver value from this opportunity?

We work in partnership with both developers and end-users to help deliver analytics results for operational use quickly. We commercialise existing analytics by building specific end-user applications within our Lumen analytics platform. We also plan to open Lumen to developers, letting them deliver results directly to end customers.

What are you looking for to enable you to take the next steps?

We wish to engage early-adopter end-users (pilot customers) to work on more real-world applications and inform design of the platform. We also wish to engage the analytics development community and to assist them in delivering innovation results into business-as-usual with our customers.

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Ceres Power Ltd

Assessing the feasibility of internal reforming in the Steel Cell

Ceres Power engaged with Catal International to successfully demonstrate the feasibility of using a simple catalyst for internal reforming with Steel Cell technology; net efficiency raised from 50% to 56% with 15% system cost savings.

What technical themes at the All Energy event best describes your project?

Energy Efficiency.

What is the market opportunity that you have identified?

The Ceres Power Steel Cell technology addresses the domestic and commercial distributed energy markets. With its low emission, high efficiency gas-to-power capability the technology delivers reliable, clean power generation to meet varying or uncertain load requirements. Accessible markets include the combined heat and power (CHP) sectors, as well as power only applications for electrical load support such as datacentres or providing power generation support for renewable energy deployment at or on the local grid. Steel Cell technology is ideal for natural gas today and low or zero carbon gas tomorrow.

How will you deliver value from this opportunity?

Ceres Power has continued testing the deliverables from the project and has developed a roadmap for intended incorporation in its products. A patent has been filed to protect the basis of the application.

What are you looking for to enable you to take the next steps?

Feasibility success has resulted in a next stage development plan that seems ideal for an Energy Catalyst mid-stage award. This funding would enable the development to continue in the UK without risking IP or commercial value restrictions imposed by the alternative, which is development with customer funding.

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Chimney Sheep Ltd

Take Chimney Draught Exclusion Mainstream

The Chimney Sheep® is a novel chimney draught excluder that saves around 4% of heat loss. The project is to undertake appropriate testing for the insulation industry to accept it as a mainstream product.

What technical themes at the All Energy event best describes your project?

Energy Efficiency.

What is the market opportunity that you have identified?

There are around 11 million homes in the UK with open chimneys. If all of these were fitted with a Chimney Sheep®, three power stations worth of energy could be saved per year. There is an international market, with interest already established in the US. There are other chimney draught exclusion products on the market, however Chimney Sheep® is the simplest to install and use. None of the others are undertaking the rigorous testing that Chimney Sheep Ltd is pursuing, placing the Chimney Sheep® as an industry leader.

How will you deliver value from this opportunity?

By joining the National Insulation Association, receiving endorsement from the Energy Savings Trust, and approval by OFGEM for the product to fulfil ECO obligations, Chimney Sheep Ltd will raise the profile of chimney heat loss and be strongly positioned to be the primary provider of a solution to the problem.

What are you looking for to enable you to take the next steps?

As well as developing a marketing strategy, we need support from policy makers to raise the profile of heat loss up chimneys. Home insulation is a priority in the UK, yet chimney draught exclusion is ignored. Having received financial support from DECC we are now seeking political and lobbying support.

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Clicks and Links Ltd

Age of Energy

See <https://vimeo.com/130423771>

We have developed a game that makes it fun for a currently very disengaged target audience (16 to 24 year olds) to start saving energy and change their behaviour for the better.

What technical themes at the All Energy event best describes your project?

Energy Efficiency.

What is the market opportunity that you have identified?

Energy Companies, Cities, Home Energy System suppliers, Housing Associations, Other Member groups e.g. loyalty cards.

How will you deliver value from this opportunity?

Through partners who gain value from engaging game players.

What are you looking for to enable you to take the next steps?

Partners to help deploy the game in UK.

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Connected Energy Ltd

BOSS

Project partners:

EDF, Route Monkey

BOSS demonstrates the E-STOR second life EV battery based energy storage system in an industrial and commercial application. It manages the site energy use factoring in tariff structures, PV generation, grid constraints and EV charging.

What technical themes at the All Energy event best describes your project?

Energy Storage.

What is the market opportunity that you have identified?

Commercial sites need to manage energy and carbon costs, security of supply is a growing concern and network constraints can make expansion difficult and expensive. DNOs and National Grid are seeking innovative approaches to smart network management and at a niche level EV charging infrastructure is now being hindered by expensive connection upgrades. It is now widely accepted that distributed energy storage is a necessary part of the solution. In parallel EV manufacturers are seeking pre-recycling markets for second life batteries that no longer provide the range demanded by drivers.

How will you deliver value from this opportunity?

We will provide E-STOR systems and services to industrial and commercial customers, reducing energy and carbon costs, increasing security of supply and peak shaving. A version provides grid load management for EV charging. Our portfolio aggregation software will also enable the provision of grid services to DNOs and National Grid.

What are you looking for to enable you to take the next steps?

We are looking for an energy sector partner to provide equity investment and industry expertise/market access to accelerate sales and business growth. Investment will enable us to expand our product and service offerings, and increase the capabilities and capacity within our team.

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DuckDuck Innovations

Fridge Demand Response Feasibility Study

Hardware + cloud solution for Demand Response (DR). Electricity users (households, factories, offices) get paid cash to temporarily reduce demand. Prevents network spikes (e.g. TV events, winter afternoons) and to balances out intermittent renewable energy.

What technical themes at the All Energy event best describes your project?

Smart.

What is the market opportunity that you have identified?

The UK electricity supply margin is reducing. To avoid blackouts, more DR is needed (1% of UK demand is flexible, 8% in US), especially with more intermittent wind & solar. High hardware & install costs make smaller loads unprofitable for DR aggregators, clients fear disrupting their business. New frequency management schemes require split-second reaction.

Imperial College says if household fridges were interruptible (food safe for 30 mins), Hinckley C would not be needed. Currently not economical (our original proposition), but we can connect thousands of food outlets, supermarkets, factories, hotels etc.

How will you deliver value from this opportunity?

Cheaper, easier to manage and real-time. One API to measure & control all your interruptible loads within split seconds. Combine smaller loads with wireless switches connected to our central hub to increase revenue per site. Sophisticated control over your business processes. Opex charging model to reduce financial risk.

What are you looking for to enable you to take the next steps?

We have taken requirements from the market (demand response aggregators) and have created a solution to fit their needs.

We need to provide them with actual test results that show them how the solution works and what results it can deliver for them.

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Faradion Ltd

Low Cost Storage of Renewable Energy

Project partners:

Moixa Technology, University of Warwick (WMG)

The innovator of sodium-ion battery technology, Faradion, has partnered with smart energy storage specialists Moixa Technology and WMG, to develop sodium-ion cells as a low cost alternative to lithium-ion batteries for solar energy storage.

What technical themes at the All Energy event best describes your project?

Energy Storage.

What is the market opportunity that you have identified?

We're targeting the market for systems and materials used in solar energy storage, so we need to demonstrate that our low cost solution can match the long cycle lives (>1500) needed for this application.

The long-term market share for the technology developed in this project could be 100% of the sodium-ion market, since there are no competitors who are known to have superior technology. In addition to the energy storage market, there will be other outlets for our technologies, for example portable consumer goods, and transport applications.

How will you deliver value from this opportunity?

This project will demonstrate that Faradion's novel low-cost sodium-ion materials can meet the cycle-life requirements of stationary storage systems. Commercialisation of this technology will take place via the licensing of Faradion IP to battery manufacturers and by supplying low cost storage systems through Moixa to end users.

What are you looking for to enable you to take the next steps?

We are looking for potential collaborators and investors to help accelerate the commercialisation of this exciting technology. We are also looking for partners and potential users, to fully define the performance of our novel batteries, and to test prototypes in real life applications.

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Flint Engineering

Active refrigeration shelf with active storage

Using the Flint patented heat mat technology we are developing OEM and retro-fitable shelves for supermarket refrigerators that reduce the running cost by over 20%.

What technical themes at the All Energy event best describes your project?

Energy Efficiency.

What is the market opportunity that you have identified?

There are 44000 retail outlets in the UK alone with refrigerators the largest of these, having in excess of 1,5Km of shelving. Each single cabinet can cost over £1000 a year to run so our technology can save millions in costs and Carbon production.

How will you deliver value from this opportunity?

Working with Sainsburys and other supermarkets in the UK, Europe and the USA we will firstly undertake field trials before selling directly and via distributors.

What are you looking for to enable you to take the next steps?

We are now looking at reducing manufacturing costs and looking for partners with experience either in aluminium extrusion or volume manufacturing.

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High Voltage Partial Discharge Ltd

OLPD-HVDC Cable Condition Monitoring System

The HVDC_OLPD condition monitoring system for high voltage direct current (HVDC) networks has been developed to monitor HVDC converters and HVDC cables, including offshore wind farm export cables.

What technical themes at the All Energy event best describes your project?

Offshore Maintenance and Offshore Wind.

What is the market opportunity that you have identified?

An emerging need for HVDC condition monitoring in the UK was the primary driver. Competitor analysis and market research identified a rapidly growing global HVDC infrastructure with unmet condition monitoring needs. Recent market research by Markets and Markets (2015) predicts the HVDC Transmission Market could reach \$13.54 Billion per annum by 2020, growing at a CAGR of 17.13% from 2014 to 2020. The largest HVDC transmission market is in the Asia-Pacific region (including China, Japan, India, South Korea, and Others) although recently Europe has been growing at the highest CAGR.

How will you deliver value from this opportunity?

The pitch will help to develop interest in pilot projects as well as attracting collaborators for future projects using the developed system or components of it.

HVPD are leaders in the field of condition monitoring and so there may be further business interest from the pitch beyond the OLPD-HVDC project.

What are you looking for to enable you to take the next steps?

We are looking for existing operators interested in field trials and pilot projects and to ensure inclusion of technology in specifications for new HVDC cable projects. Collaboration in other areas such as academia and research institutions is also of interest for further testing and evaluation of the system.

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ICAX Ltd

Balanced Energy Networks

Project partners:

LSBU, Upside Energy, Origen Power, Cranfield

BEN provides low carbon heating by recycling summer solar heat via thermal energy storage in the ground to buildings in winter. BEN also provides cooling on its heat sharing networks.

What technical themes at the All Energy event best describes your project?

Energy Storage and Heat.

What is the market opportunity that you have identified?

District heating and cooling for universities and hospitals in cities – without high upfront investment in insulated pipework, without needing space for an energy centre and without emitting any air pollution.

How will you deliver value from this opportunity?

By providing a low cost flexible heating and cooling service to existing estates under common ownership.

See: www.icax.co.uk/Balanced_Energy_Networks.html

What are you looking for to enable you to take the next steps?

BEN is looking for new customers to service: especially districts that include buildings with overall heating loads and buildings with overall cooling loads so that heat can be shared.

BEN can yield a “heat sharing dividend” to both types of buildings.

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Kite Power Solutions Ltd

KES – Kite Energy System

Project partners:

Artemis Intelligent Power, Banks Sails, National Composites Centre, Keynvor Morlift Ltd, BVG Associates.

To have a 3MW deep water floating kite energy system design complete ready for manufacture supported by practical assessment of a 500kW device durability and reliability and design of the floating system components.

What technical themes at the All Energy event best describes your project?

Offshore Wind.

What is the market opportunity that you have identified?

The global onshore and offshore market for wind energy is well established. The existing offshore wind energy market is predominantly focused on shallow water opportunities in Europe and China with USA opportunities developing. Globally there are numerous options being developed for floating Horizontal Axis Wind Turbines.

The Kite Power Solutions (KPS) technology has the ability to halve the project LCOE for deep water wind projects.

The KPS systems do not need specialist vessels for installation and maintenance, readily available work boats and tugs can be used.

With a cost of energy that competes with the lowest fossil fuel energy products, an ability to deploy and maintain in deep water without specialist vessels, the KPS technology can address a global offshore wind energy market.

How will you deliver value from this opportunity?

KPS will develop a 3MW floating kite energy system product for a global offshore wind energy market. The key customers will be offshore wind array developers, which are predominantly utilities.

KPS will develop the technology and business opportunity to sufficient maturity and then target a sale to an OEM to expand and meet the market demand.

What are you looking for to enable you to take the next steps?

KPS is seeking funding to support the project development over the next 5 years. KPS is currently negotiating heads of terms with several equity investors with a Round A requirement of £5.6M to close by the end of 2016.

In addition to investment, KPS is seeking collaborators to develop a global portfolio of projects for onshore to commence construction in 2019 and floating arrays 2020/2021.

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Millennium Natural Resources Ltd

Millennium NRL – Insitu-Biological Coal Conversion (ISBC)

The development and establishment of a pilot methane production facility using insitu microbial coal conversion. This is effectively anaerobic digestion of organic matter underground through the injection of natural nutrients/microbes into a recirculating water system.

What technical themes at the All Energy event best describes your project?

Bio Energy.

What is the market opportunity that you have identified?

The market opportunity is significant with stranded coal resources across Europe in their giga tonnes due to environmental constraints for extraction and utilisation. Specifically we have identified circa 1 billion tonnes of resources that can be developed to provide a >20 year commercial project life. Modelled production costs are 45 to 50 pence per therm, which sits below Government forecast prices going forward, as we become greater dependent on imported gas.

How will you deliver value from this opportunity?

Value is delivered through the secure supply of low cost natural gas into the regional gas distribution network, due to the technologies having low capital and operating cost. It's environmentally passive nature (US EPA validated), also establishes it as a robust bridging technology for development of clean sustainable energy production.

What are you looking for to enable you to take the next steps?

We are looking for a partner who can provide £4million to facilitate the three year programme of works to completion of knowledge transfer and pilot project; and the foundation of a commercial expansion opportunity.

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Moixa Technology Ltd

Maslow – distributed energy storage

Moixa developed and installed 250, 0.5MWh of Maslow energy storage systems and demonstrated aggregate benefit for network service alongside customer solar and night shift benefits.

What technical themes at the All Energy event best describes your project?

Energy Storage.

What is the market opportunity that you have identified?

Deploy GW scale storage in UK by 2020 by installing Maslow systems as retrofit to existing 750k solar homes, new solar and social housing to deliver aggregate network services and customer and grid scale benefits.

How will you deliver value from this opportunity?

Demonstrate value to various grid participants and work with utilities, DNO and national grid on bilateral agreements for storage service benefits, to finance storage as emerging asset and deploy into million U.K. Homes via installers and utility deals for flexible tariffs.

What are you looking for to enable you to take the next steps?

Raising £2-3m A round to scale commercial team, sales and inventory working capital.

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Oaktec

Bio-gas EDGE

Bio-gas EDGE enabled development of the novel Pulse-R engine to be fuelled by raw bio-gas direct from an AD plant. Test results were exceptional and a new engine prototype has been designed and built.

What technical themes at the All Energy event best describes your project?

Bio Energy and Energy Efficiency.

What is the market opportunity that you have identified?

There is considerable interest in Pulse-R both in the UK and Asia, and in particular India. Oaktec has a signed MOU with a major global off-highway engine supplier and we are jointly investigating several markets including for clean standby power. There is considerable global interest in Pulse-R for telecom mast back-up and primary power using clean low-cost gas fuels. Pulse-R has created OEM interest for small vehicle engines especially for Indian markets where CNG is an established fuel.

How will you deliver value from this opportunity?

Oaktec is working on a strategy with our engine supplier partner to service the many market opportunities. Funding is being sought to prepare a first Pulse-R gas engine product for market for sub 10kW generators which are partner will introduce to market. Further IP is being developed, and manufacturing partners are being investigated.

What are you looking for to enable you to take the next steps?

Oaktec is currently pre-investment and pre-revenue. We are investigating both public and private sector funding opportunities, and will also consider collaborations and JV's. £500k -£1m is being sought for the first round of investment and £2.5m to get a first product to market.

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OE Systems Ltd

eLansys – energy local area network systems supply chain

eLansys creates energy networks, with unprecedented protection, monitoring and control of energy consumption and use of assets, appliances and devices; through distributed intelligent switches that directly replace standard circuit protection; circuit breakers (MCB) and fuses.

What technical themes at the All Energy event best describes your project?

Energy Efficiency and Smart.

What is the market opportunity that you have identified?

We live in an age of technology and information, despite this we have to manually turn the power back on when a light blows or overload condition/fault occurs. eLansys is transforming the passive circuit protection market from an inefficient, industrial intensive model to an energy systems platform that enables new business models and added value products and services. The systems approach of eLansys ensures flexibility and scalability in extending its network as simply as changing a fuse or circuit breaker without the requirement of specialist training, processes or standards.

How will you deliver value from this opportunity?

eLansys active protection devices do not rely on temperature to switch, saving up to 93% in efficiency gains at high current ratings of 30A and 96% at low current ratings of 1A. The key technology, allows operation from a single positive power line, with no return line or consumable parts/batteries.

What are you looking for to enable you to take the next steps?

This feasibility study allowed eLansys to be developed and tested in a Laboratory (TRL 4) and is actively seeking a number of pilot customers to accelerate towards commercialisation. A company has been formed, eLansys Ltd to commercialise the outcomes of this project and attract the right investors and partners.

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Origen Power

Balanced Energy Networks

Origen Power uses natural gas to generate electricity in a way that removes CO₂ from the atmosphere. For each kWh of electricity generated 400-840g of CO₂ are removed (net) from the air.

What technical themes at the All Energy event best describes your project?

Other.

What is the market opportunity that you have identified?

Origen Power addresses the energy trilemma delivering cost-effective carbon-negative baseload power. It enables the use of natural gas to generate electricity in a way that counteracts climate change.

How will you deliver value from this opportunity?

Origen Power aims to license intellectual property related to the innovative process that it has developed.

What are you looking for to enable you to take the next steps?

We are about to start a two-year project to demonstrate the process at scale. We are looking for funding to accelerate the development and partners to collaborate with in the following sectors: energy generation, lime manufacture and high-temperature fuel cells.

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Powerline Technologies Ltd

Synchronous Analysis Protection System (SYNAPS)

SYNAPS will provide real-time visibility of LV Network operational and maintenance status, and advanced protection and network reconfiguration. By integrating modern IC technology, state-of-the-art machine learning algorithms with advanced power semiconductors and switching technology.

What technical themes at the All Energy event best describes your project?

Energy Efficiency and Smart, Other.

What is the market opportunity that you have identified?

LV Networks are currently built with outdated technology and managed by expensive, labour intensive processes. Underground Low Voltage Network faults account for 80% of operator LV costs and 50% of customer minutes lost. Failure to meet CML targets can cost DNOs in excess of £500,000 per minute in penalties. Individual operators spend in excess of £10 million annually repairing consac cable. One UK operator estimates that the cost of replacing fuses alone is over £1.48 million annually, based on a cost of £500 per fuse replacement. Western European LV networks contain more than four million networks & three million Km of underground cable and the UK has 650,000 LV networks (340,000km of underground cable).

How will you deliver value from this opportunity?

SYNAPS provides early visibility of faults enabling routine preventative maintenance before faults cause power failures, significantly reducing customer outages and associated costs.

SYNAPS supports the introduction of new services: solar energy & electric vehicles.

SYNAPS provides a significant payback for operators: less penalties, lower cost of ownership and extension of life of assets.

What are you looking for to enable you to take the next steps?

Powerline Technologies is looking for support from Distribution Network Operators (DNO) and independent DNO for technical input, demonstrations, field trials & deployments. Support from the Smart Grid industry to develop business partnerships to introduce SYNAPS to the DNO.

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Recycling Technologies

Commercialisation of plastic waste derived fuel for generating electricity

Our project is a large scale demonstrator for converting end of life mixed plastic waste into a fuel that can be used in an engine to generate electricity.

What technical themes at the All Energy event best describes your project?

Other.

What is the market opportunity that you have identified?

In the EU, in 2012, 25.2Mt of post-consumer plastics ended up in the waste stream. Of this, 18.6Mt was sent to landfill and Energy from Waste (EfW) plants and only 6.5Mt was recycled. Disposal of plastic waste in landfills and EfW plants has a significant cost and is a waste of a valuable resource. The plastic waste generation is expected to increase and at the same time there is increasing regulatory pressure to divert plastics from landfills. Hence, there is significant opportunity, not only in the EU but globally, to provide a better solution to the plastic waste.

How will you deliver value from this opportunity?

Recycling Technologies has developed a technology that recycles end-of-life mixed plastic waste into a commercially valuable hydrocarbon product called Plaxx™. The technology has been incorporated into a modular machine, the RT7000. Plaxx™ is a substitute for crude oil derived Low Sulphur Heavy Fuel Oil [LSHFO] that can be used in industrial burners, marine vessels and electricity generation.

What are you looking for to enable you to take the next steps?

Presently, the technology is being demonstrated at a commercial scale which will alleviate the risks and make it ready for market rollout. The next step for us is to install the first commercial machine for which we are seeking £5 million finance to fund the machine and provide the working capital.

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RE Hydrogen Ltd

Integrated Closed Loop Cycle for Energy, fuel, and bio-fertiliser from waste

This project will demonstrate the commercial viability of converting the flared/ wasted biogas into valuable biomethane fuel, and converting the CO₂ into bio-fertiliser. Biomethane will be used for generating electricity and heat, and refuelling of vehicles.

What technical themes at the All Energy event best describes your project?

Bio Energy, Energy Storage, Low Carbon Transport, Heat and Sustainable Cities.

What is the market opportunity that you have identified?

RE Hydrogen converts surplus biogas into biomethane for vehicles, power generation and heating. REH's 100Nm³/h plant will save up to £375,000/year from an existing biogas plant out of the 15,000 plants in the EU representing £3 billion market.

The REH's typical gas upgrader system would run for about 6130 hours (i.e. 70% time of the year) to produce 350,000m³ (250,000 kg) biomethane (of 98% methane purity). The 250,000kg biomethane will be equivalent to 1650,000 miles/year driving by a Mercedes Sprinter van @6.6miles/kg CNG. This will save 82,500 Gallons (374,550 litres) of diesel @20miles/gallon.

How will you deliver value from this opportunity?

REH will collaborate with large industry players to exploit the technology via partnerships, direct sales, business to business model etc. REH will also have Build, Own, Operate model to sell the gas.

What are you looking for to enable you to take the next steps?

We are looking for likeminded business to business partners and end use customers.

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Samad Power

Turbo Green boiler

Project partners:

Johnson and Starley

The company has developed a compact micro CHP boiler for domestic users, which is capable of producing up to 2KW of electricity and 15 to 30kW of heat to be used in 5+ bedroom houses and small commercial buildings.

What technical themes at the All Energy event best describes your project?

Energy Efficiency, Heat.

What is the market opportunity that you have identified?

The volatile fossil fuel price, environmental concerns and EMR are the main market drivers for Turbo Green Boiler (TGB). The design characteristics, particularly the power and heat output, mean that the TGB is most suitable for use in large detached houses, commercial premises, schools, supermarkets, hospitals, care homes. Samad's research suggests that there are 2.1m appropriate sites in the UK spread across a number of different site uses, and equating to a total annual EU market size of £1.5bn.

How will you deliver value from this opportunity?

TGB provide financial benefits for the end users, significantly reduces the CO₂ emission and alleviates the cost and demand on the electricity grid. Therefore it qualifies for public financial support. It generates revenue from the requiring data sale taken from its online condition monitoring system.

What are you looking for to enable you to take the next steps?

We are looking for partners who are happy to purchase the product for the field trial and pilot launch. Also we are looking for investors who would like to join us on this project and the next generation of compact micro turbine CHP boiler.

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Sharp Labs Europe

Zero carbon retro-fit residential heating system

Sharp has developed a new residential heating solution using photovoltaic thermal panels and a novel heat pump. This project has culminated in field testing of the system in two houses, in the UK and Germany.

What technical themes at the All Energy event best describes your project?

Energy Efficiency and Heat.

What is the market opportunity that you have identified?

Sharp has demonstrated the lowest running cost of any known residential heating system for space heating and hot water. All space heating and hot water needs of the UK test house have been met at approximately 1/3 of the running cost of a gas boiler. Data from the test installations has been used to verify the predicted performance, energy usage, cost and CO₂ savings, and initial data shows that the actual performance has the potential to make a step change in house energy efficiency and hence country CO₂ emissions.

How will you deliver value from this opportunity?

Value will be delivered from a new solutions business comprising sales of PV-thermal heating systems and service & maintenance contracts. Other business models such as contract for heat through energy service contracts are also being explored.

What are you looking for to enable you to take the next steps?

The next stage in bringing the system to market will be to conduct wider field testing in houses with different demographics and occupancy profiles. Partners are sought who can offer trial sites, investment to help enable the trials, or a new route to market for the system.

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Connected Home is a new development enabling the Connected Community for Energy, mobility and wellbeing. Working in collaboration between, large corporate, local government and SME's to create new jobs and strong new communities.

What technical themes at the All Energy event best describes your project?

Energy Efficiency, Energy Storage, Solar Energy, and Smart, Sustainable Cities.

What is the market opportunity that you have identified?

Use existing technology and in particular IoT solutions and new business models, to offer communities new and established better control of their energy generation and usage. Explore opportunities with new business models for these communities. Which technologies will be accepted and embraced by the communities and what reservations and changes will the need to see before wider deployment? What are the behavioural changes to expect and the best way to achieve them?

How will you deliver value from this opportunity?

Demonstrate in this 'living lab' environment and test which technologies offer the best efficiency and acceptance and then scale them across UK and globally.

What are you looking for to enable you to take the next steps?

We will be taking the next steps as we have planned but would like to hear from new innovators and disruptors in the energy, IoT, wearables and community engagement areas.

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Solaris Photonics

Low-Cost Alkaline Solar Cells

Our aim is to lower the cost of conventionally generated electricity at point of use, this is achieved through reducing production cost of Solar Cells down to \$0.13/W by simplifying solar cells manufacturing steps.

What technical themes at the All Energy event best describes your project?

Solar Energy.

What is the market opportunity that you have identified?

Alkaline Photovoltaics (APV) aims at very low cost electricity generation that is competitive with the cost of conventionally generated electricity at point of use. APVs offer following advantages over existing PV and other renewable energy technologies:

1. high sustainability utilising low cost inorganic materials and reliable supply chain
2. high performance PV cells, with higher efficiencies (20-30%)
3. utilising current manufacturing facilities (no need for substantial capital investment)
4. lower process temperatures
5. non-toxic constituents and unrestricted end-of-life
6. compatibility of APVs with a wide range of substrates.

How will you deliver value from this opportunity?

1. Far higher energy return on investment due to reduced production cost of APVs compared to existing PVs
2. A reduction in energy bill that will increase disposable income as well as contribute to overall GDP
3. Reduced energy cost will have a positive impact on the UK manufacturing industry.

What are you looking for to enable you to take the next steps?

We are looking for strategic partners to accelerate our route to market and provide:

1. funding, to build a manufacturing plant or to subcontract manufacturing
2. market access, industrial partners for joint-venture, joint development and with established sales channels.

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Soltropy Ltd

Low Cost Solar Thermal System

Reducing solar thermal system cost by utilising standard mass production techniques and modularisation, coupled with patented “Ice Immune” technology that allows the use of the existing hot water tank, drastically reducing cost and disruption.

What technical themes at the All Energy event best describes your project?

Heat and Solar Energy.

What is the market opportunity that you have identified?

Averaged over the last ten years the annual growth in Europe was 7.6%. Assuming an average panel is 4 m2 this equates to over 11 million installation with a value of around £3B of newly installed per year. This market has grown to the size that it is with “old style” solar panels at substantially higher cost than our system. The market potential is huge and is still untapped. Drastically reducing the cost of this technology should see an increase in the market.

How will you deliver value from this opportunity?

This opportunity will identify potential partners that we would normally find difficult and costly to engage with. We will develop relationships with them resulting in large scale pilot schemes in real world situations proving this technology.

What are you looking for to enable you to take the next steps?

Partners to develop proposals for large scale pilot schemes to prove this technology.

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SPECIFIC – Swansea University

Sustainable Product Engineering Centre for Innovative Functional Industrial Coatings (SPECIFIC)

Project partners:

Tata Steel Europe; NSG Pilkington; BASF

SPECIFIC combines applied R&D, pilot manufacturing, systems integration and building demonstration to create solar energy innovations that generate, store and release electrical and heat energy at the point of use, creating ‘Buildings as Power Stations’.

What technical themes at the All Energy event best describes your project?

Energy Efficiency, Energy Storage, Heat and Solar Energy.

What is the market opportunity that you have identified?

SPECIFIC’s approach applies to all building types. There are >20m buildings in UK, (80% still in use by 2050). Opportunities exist for new and retrofit solutions as the construction sector is forecast >23% by 2018. In non-domestic buildings the market for innovative products is £488bn globally (£200bn accessible to the UK). According to TINA there is £1.7bn in additional value to the UK. In domestic buildings the market for innovative products is worth £620bn globally to 2050. Of this, innovative products can provide an additional £1.7bn value to the UK.

How will you deliver value from this opportunity?

SPECIFIC’s principal challenge and purpose is proving the technology potential and affordability through building demonstration projects; domestic, commercial and industrial for new and retrofit; e.g. 10% new homes built to holistic ‘Buildings as Power Stations’ approach – annual business created = £1.8bn (Retrofit >> addressing the £5,000bn UK building stock).

What are you looking for to enable you to take the next steps?

Aligned to our challenge and purpose (above) we are seeking innovative UK collaboration partners through various UK and EU Collaborative R&D programmes in developing innovative building scale opportunities e.g. those that embrace combinations of solar thermal and heat storage with PV and electrical storage – commercialisation through demonstration.

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TetraFloat Ltd

TetraFloat: Floating Tetrahedral Structure for Offshore Wind Turbines

TetraFloat is a floating wind turbine platform, well suited to deeper waters where fixed foundations cannot compete. With an innovative lightweight structure and excellent dynamics, TetraFloat reduces the cost of offshore wind.

What technical themes at the All Energy event best describes your project?

Offshore Wind.

What is the market opportunity that you have identified?

Currently, floating wind turbine platforms are regarded as an exciting possibility for offshore wind in locations where the water depth is simply too great for conventional seabed-fixed foundations. As some of the best wind resource both in the UK and globally occurs at these depths, there is a large incentive to open up this market.

However, most floating wind platforms do not work well in water shallower than 80m, which includes much of the UK's wind resource.

TetraFloat offers a low-cost solution to this issue.

How will you deliver value from this opportunity?

For those looking to develop sites of 50-80m water depth, TetraFloat is a new floating wind platform that reduces capital costs by 30% and levelised costs by 20% compared to alternative sites and technologies [source: BVG Associates assessment]. This opens up new mid-depth sites close to shore.

What are you looking for to enable you to take the next steps?

TetraFloat is now preparing to test at 80kW scale at sea. Once this short-term testing has been completed, we will pursue a demonstration project with a 2MW machine. We will seek partners and investors to help us do so.

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Upside Energy Ltd

DECC – openVES; Innovate UK – Upside

Project partners:

Sharp, Enlight, University of Manchester

Upside is developing a cloud service that coordinates energy stored through tens of thousands of small batteries, enabling domestic and small business sites to deliver demand side flexibility to the grid.

What technical themes at the All Energy event best describes your project?

Energy Efficiency and Energy Storage.

What is the market opportunity that you have identified?

On 4 March, a report from the National Infrastructure Commission identified that increased demand side flexibility could deliver £8bn p.a. to the UK energy system. That's what our "virtual energy store" does.

National Grid spent £850m on balancing services in 2014. That's projected to triple by 2025. In June 2015, they announced plans to buy 50% of these services from demand side. We are focused initially on services for frequency regulation, which currently comprise 15% of this market but are projected to grow rapidly.

How will you deliver value from this opportunity?

By enabling domestic and small business sites to deliver demand side flexibility, we smooth the flow of energy across the grid. People pay less for their energy, CO₂ emissions are reduced and the grid runs more reliably. A recent Carbon Trust report assessed this value at £50 per household p.a.

What are you looking for to enable you to take the next steps?

We are seeking industrial partners and pilot sites to help us scale up from field trials to a full commercial service for launch in 2017. We are also seeking investors.

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VerdErg Renewable Energy Ltd

Exploration of bi-directional VETT configuration

Explore and evaluate the potential and technical feasibility of Venturi-Enhanced Turbine Technology (VETT) for tidal applications using Computational Fluid Dynamic (CFD) modelling.

What technical themes at the All Energy event best describes your project?

Hydropower, Wave & Tidal.

What is the market opportunity that you have identified?

There is growth in the tidal power market due to the national and international climate change and sustainability targets driving renewable energy deployment. The UK's tidal hydropower potential of 45GW, generating 96 TWh/year is nearly untapped (The Crown Estate, 2012). The International Energy Association is estimating that there is a worldwide potential of 1,200 TWh/year (Ernst & Young, 2013), or 571 GW* installed capacity. A bi-directional VETT can unlock this resource and potentially become the leading tidal hydropower technology for the future, securing energy to our growing population and industries and enhancing the UK's, as well as the worlds, socio-economic development.

How will you deliver value from this opportunity?

By raising the profile of a low-cost low-head sustainable hydropower technology that will transform the tidal power sector by commercialising otherwise uneconomic sites.

What are you looking for to enable you to take the next steps?

Create new and enhance existing collaborations with industry and academia to support the prototype development and laboratory and in situ operating trials scheduled to follow this year. In particular, VerdErg will look to work with turbine suppliers to gain a better understanding of the integration of this equipment with VETT.

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Wind Farm Analytics Ltd

Steered LIDAR Resource Performance and Condition Monitoring For Optimising Offshore Wind Infrastructure

Rotor mapping intersecting beam light detection and ranging (LIDAR) technology provides advance warning of incoming wind fields, better measurement of overall rotor wind direction, power curve performance measurement, reduced cost of components and reduced cost of operation and maintenance.

What technical themes at the All Energy event best describes your project?

Onshore Wind and Offshore Wind.

What is the market opportunity that you have identified?

Variation in wind field is visible across a large tree but wind turbine rotor diameters can be ten times bigger. The market opportunity is to account for this variation across the rotor instead of relying on single point nacelle instrumentation. Three intersecting laser beams enable reconstruction of the three-dimensional velocity at chosen local measurement points. By scanning the beams to a succession of measurement points we can construct a wind field map. The market opportunity is all large wind turbines, estimated at 8000 units per year for 30 years.

How will you deliver value from this opportunity?

Innovate UK-funded feasibility and demonstrator projects identified value mechanisms. Turbines are protected from damaging wind fields such as extreme gusts or turbulence by advance warnings to control systems which can then act to eliminate damaging loads. This extends wind turbine lifetime and reduces operational expenditure. Better yaw control yields more revenue.

What are you looking for to enable you to take the next steps?

In November 2015 Wind Farm Analytics Ltd was granted a patent covering the intersecting beam LIDAR concept and seeks investors who recognise the potential of this technology. Also sought are wind turbine manufacturers, owners or operators who can engage in trialling this technology on an operational UK wind turbine.

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WITT Ltd

The capability of the WITT Wave Energy Converter to generate megawatts of offshore power at a competitive LCOE

WITT won an Innovate UK award to work on a Wave Energy Converter (WEC) project with Gibbs Gears, Mojo Maritime, OREC, DNV GL, and Universities of Bristol, Plymouth & Southampton.

What technical themes at the All Energy event best describes your project?

Wave & Tidal.

What is the market opportunity that you have identified?

The WITT technology has global potential as it can harvest all 6 degrees of motion and turn it into useable power, it can be built from cm to metres and it is completely enclosed within a sealed sphere. The possibilities are as good as your imagination, from navigational buoys to autonomous vessels and all other marine needs. Please check our website for endorsements from major organisations especially marine safety, lifeboats etc.

How will you deliver value from this opportunity?

We will supply an affordable totally green solution in energy harvesting in water, sea river or tidal. We are engaging with major global organisation who see the potential and we are already working with them to create a 'fit & forget' solution.

What are you looking for to enable you to take the next steps?

WITT are seeking to raise awareness, and also talk to organisations that may have interest in licensing, and this will cover a wide sector from sub sea oil & gas needs to power for desalination. If there is water motion the WITT can harvest it!

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