

# Innovate UK

**Results of Competition: Prospering from the Energy Revolution (PFER) - Blue Zone**

**Competition Code: 1703\_CRD1\_ENRG\_ENCATES5\_PFERBZ**

**Total available funding is £4 Million**

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

<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>MOF Technologies Limited</b>	Development of a Prototype MOF Coated Heat Exchanger for Heat Pump Applications	£200,259	£140,181
<b>Project description - provided by applicants</b>			
Awaiting Public Project Summary			

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<b>Eight19 Limited</b>	HALLO - High and Low Light Opv	£145,726	£102,008
Swansea University		£87,513	£87,513
Imperial College London		£58,124	£58,124
<b>Project description - provided by applicants</b>			
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University of Oxford	Multi- Sites, Actors, Vectors, Energy Services (Multi-SAVES)	£105,700	£105,700
Siemens PLC		£105,700	£52,850
<b>Project description - provided by applicants</b>			
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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>Eneus Energy Limited</b>	Advanced Combustion System:	£505,510	£353,857
Energy Technology Centre Limited	Low Emission, Fuel Efficient & Flexible Low Carbon Pwr	£201,423	£201,423
<b>Project description - provided by applicants</b>			
Awaiting Public Project Summary			

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
ITM Power (Trading) Limited	Frankenstack	£168,469	£101,081
<b>Project description - provided by applicants</b>			
Awaiting Public Project Summary			

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Oxford nanoSystems Ltd	CryoHex - Ultra-efficient cryogenic heat exchangers for liquid air energy storage	£153,840	£107,688
University of Birmingham		£113,295	£113,295
<b>Project description - provided by applicants</b>			
Awaiting Public Project Summary			

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
Nemein Ltd	Thermal Energy Storage System (TESS)	£284,021	£198,815
<b>Project description - provided by applicants</b>			
Awaiting Public Project Summary			

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**Results of Competition: Prospering from the Energy Revolution (PFER) - Blue Zone**

**Competition Code: 1711\_MM\_INFRA\_R4\_ST2\_12M\_PFERBZ**

**Total available funding is £4 Million**

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

<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>H2GO POWER LTD</b>	HyStERIAA- Hydrogen Storage to Energise Robotics In Air Applications	£257,115	£179,981
Imperial College London		£109,355	£109,355
<b>Project description - provided by applicants</b>			
<p>Significant emissions reduction coupled with reliable energy supply can only be achieved through increasing the adoption of renewable energy production. Increased penetration of renewable energy will highlight the problem of renewable intermittency. In order to tackle this problem, a reliable energy storage solution is required to enable the sustainable supply of energy at scale and grid reinforcement, drive down the cost of renewable energy deployment systems and indeed reduce emissions significantly. The HyStERIAA project aims to develop a technical and commercial feasibility study into large-scale hydrogen storage system that is safer, lighter and half the volume of commercially available pressure tanks. This will be achieved through the application of a patent pending solid-state hydrogen storage material and innovative additive manufacturing approach to enable early low volume production. This has broad applications in areas from aerial robotics to renewable energy integration. The project therefore targets all three pillars of the energy trilemma, and through addressing specifically the cost reduction and enhancing performance of energy storage, energy security and carbon reduction are addressed.</p>			

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**Results of Competition: Prospering from the Energy Revolution (PFER) - Blue Zone**

**Competition Code: 1709\_EE\_R3\_12M\_PFERBZ**

**Total available funding is £4 Million**

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>INVENTEV TECHNOLOGY LIMITED</b>	A software platform that enables smart charging of electric vehicles	£99,980	£69,986
<b>Project description - provided by applicants</b>			
A software project related to Electric Vehicle (EV) charging.			

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>ENERGY SRS LTD</b>	GENSSIS (Gravitational Energy Storage & Synchronous Inertial Stability) Phase 2	£111,853	£78,297
CALEY OCEAN SYSTEMS LIMITED		£273,706	£191,594
D BAYLISS CONSULTING LIMITED		£149,738	£104,817
P R MARRIOTT DRILLING LIMITED		£434,737	£260,842
UK POWER RESERVE LIMITED		£65,074	£39,044
University of Bristol		£52,448	£52,448

### **Project description - provided by applicants**

Electrical energy is currently the cleanest most versatile form of power that we have, the successful development of technologies which can convert wind and solar energy into industrial quantities of electrical power has now a real potential to start reducing the destructive levels of CO2 that are being discharged into our atmosphere. However, ultimately in order to facilitate a meaningful integration of these, sustainable but non-synchronous, power sources into our distribution networks, further innovative infrastructure systems that support and maintain grid stability are required, this project aims to be part of that solution.

Current power grid balancing systems have the effect of limiting or displacing otherwise viable, sustainable, energy compromising the cost reduction and security of a transitional, low carbon, power integration. Energy SRS was established in 2013 to explore low carbon initiatives that help to support system inertia and secure the increased integration of electrical power from sources such as Wind and Solar Farms.

In parallel with the development of an infrastructure system to provide frequency response within the Ancillary Services Market, Energy SRS has also invested time sourcing the technical knowledge and supply chain expertise that would facilitate the successful commercialisation of this solution.

This has led to the establishment, in 2015, of a team of five UK companies and the University of Bristol to work closely in what is now a multi skilled industrial and academic partnership.

This project is collaboratively undertaking the development of a gravitational energy storage system, with the acronym GENSSIS, (Gravitational Energy Storage & Synchronous Inertial Stability). This is a very robust, electromechanical system which can achieve modular utility scaling and which can also be co-located with existing grid infrastructure.

Energy SRS is the lead partner and manager to the project which is presently receiving the support of Innovate UK during this "Phase 1" which has been live since Jan 2017 and will run until March 2018\.

Gravitational Potential Energy is a validated, well established concept, however, the development, construction, testing, and commercialisation of a viable, large scale, utility, installation requires new knowledge, skills and processes.

The project participants are:

- \* UK Power Reserve Ltd
- \* PR Marriott Drilling Ltd
- \* Caley Offshore Systems Ltd
- \* Bayliss Consulting Ltd
- \* Energy SRS Ltd
- \* The University of Bristol

This project represents a Phase 2, development to finalise all designs during 2018, in preparation for a 1.2MWhr, grid connected, prototype to be constructed and tested during phase 3 in 2019/2020

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>Stopford Projects Limited</b>	Low Cost Energy Vectors for a Microwave Induced Plasma Gasification Sytem	£166,266	£116,386
Lancaster University		£73,713	£73,713
Unilever UK Central Resources Limited		£10,000	£0
Ceres Power Limited		£5,000	£0
<b>Project description - provided by applicants</b>			
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<b>Rotor Design Solutions Limited</b>	Cheaper Waste Heat Recovery Through Improved Screw Rotor Technology	£73,844	£51,691
<b>Project description - provided by applicants</b>			
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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
PulsIV Solar Limited	Solar Energy Inverter Maximizer	£228,554	£102,840
Eastmap Limited		£74,153	£33,369
<b>Project description - provided by applicants</b>			
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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>LIGHTBULB ES LIMITED</b>	Developing a Buildings and Energy Data Platform	£117,284	£82,099
University College London		£37,723	£37,723
<b>Project description - provided by applicants</b>			
<p>Igloo Energy is a new energy supplier that is breaking with incumbent business model where more energy sold equals bigger profits. Instead, we are focused on growing through providing energy services helping our customers reduce their energy consumption and profit from participating in the smart grid. While focusing on helping our consumers we are also tackling the energy trilemma, reducing costs and emissions and improving security of supply.</p> <p>The intelligent use of data is key to achieving this. This project will prototype a self learning platform for gathering and processing data in order to support Igloo's business activities in energy efficiency, energy purchasing and demand response.</p>			

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Living Water Ecosystems Ltd	Waste Ammonia to Hydrogen Production using Electrochemical and Ecological Processes (WAHEEP)	£125,144	£87,600
University of Warwick		£86,823	£86,823
<b>Project description - provided by applicants</b>			
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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>C-TECH INNOVATION LIMITED</b>	N-SYNTH	£74,588	£52,212
<b>Project description - provided by applicants</b>			
<p>This project is the result of two separate streams of work being undertaken for purposes at C-Tech Innovation and fits the company strategy for the development of products that will fit the requirements of industry to be flexible, efficient and low carbon. Flexibility is essential in allowing manufacturers operate with fluctuating energy costs that the future renewable energy infrastructure will bring.</p> <p>Nitrogen fixation is a huge industry globally but reliant of large plant expensive reactors and huge natural gas reserves. The development of low cost modular process plant powered by low carbon electricity will provide and alternative route to the manufacture of these vital commodity products.</p> <p>C-Tech will look to develop disruptive technologies that will allow the localised manufacture and use of fertilizer products based on the 40 years of experience in the development of integrated efficient processes.</p>			

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
ALP TECHNOLOGIES LTD	Low Cost Li-Ion Battery Storage from Recycled Cells for Distributed Power Generation Using Renewable Resources	£99,555	£69,689

### **Project description - provided by applicants**

This research project will demonstrate an innovative battery system that utilizes recycled Li-Ion battery cell for energy storage in a small-scale distributed power plant using renewables such as solar, bio-ethanol and biomass. From using recycled cells, we estimate the proposed system will reduce cost by up 80% comparing to similar sized system. Moreover, the novel design and engineering allows for ongoing battery maintenance so the entire battery system never requires complete replacement except for swapping out individual cells that failed periodically. For example, in a battery pack of 3000 cells we would expect 10% or 300 cells requiring replacement by year 3\ . Due to the system design the battery management system can identify the exact cell location and physical cell replacement can be done in under 2 minutes.

The goal of this project is to reuse lithium ion (li-ion) batteries and demonstrate the batteries system for a micro-CHP power plant energy storage application. This project looks to:

- (i) design a suitable battery casing and battery management system for this type of cells to allow for easy cell replacement
- (ii) testing to demonstrate in a real-world distributed generation application from renewables

By using a novel battery casing design and battery management system for easy cell replacement, we expect to lower initial and on-going ownership cost significantly to expand energy storage usage for distributed generation, particularly from renewables. At the same time, this will convert a growing waste stream to a valuable second-life resource to benefit the environment. Other benefits includes: increasing utilisation intermittent renewable energy (e.g. solar and wind), and reduction of e-waste.

The real world environment testing of design is expected to be conducted to test the technical performance of batteries and commercial feasibility of business model.

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i-Renewable Energy Ltd	Smart microgrids in Tanzania	£239,200	£167,440
<b>Project description - provided by applicants</b>			
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ALP Technologies Ltd	Zero Waste Hybrid Biomass micro-CHP	£99,734	£69,814
<b>Project description - provided by applicants</b>			
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