



FREED

Funding Resources for Innovation
in Energy Enterprise Development

FREED Newsletter 3 & 4

FREED Project - Two years of research and innovation and one still left

A major milestone has been achieved by the FREED Project (www.freedproject.eu) Partners.

University of Oulu (UO) as Lead Partner, South West College (SWC), Western Development Commission (WDC), Green Angel Syndicate (GAS), Limerick Institute of Technology (LIT) and European Institute for Innovation (EIFI) have succeeded in identifying **six relevant innovative energy solutions supplied by local SMEs**, each based in a different area of the Northern Periphery and Arctic (NPA) Region.

This newsletter focuses on these 6 innovations and their respective SMEs.

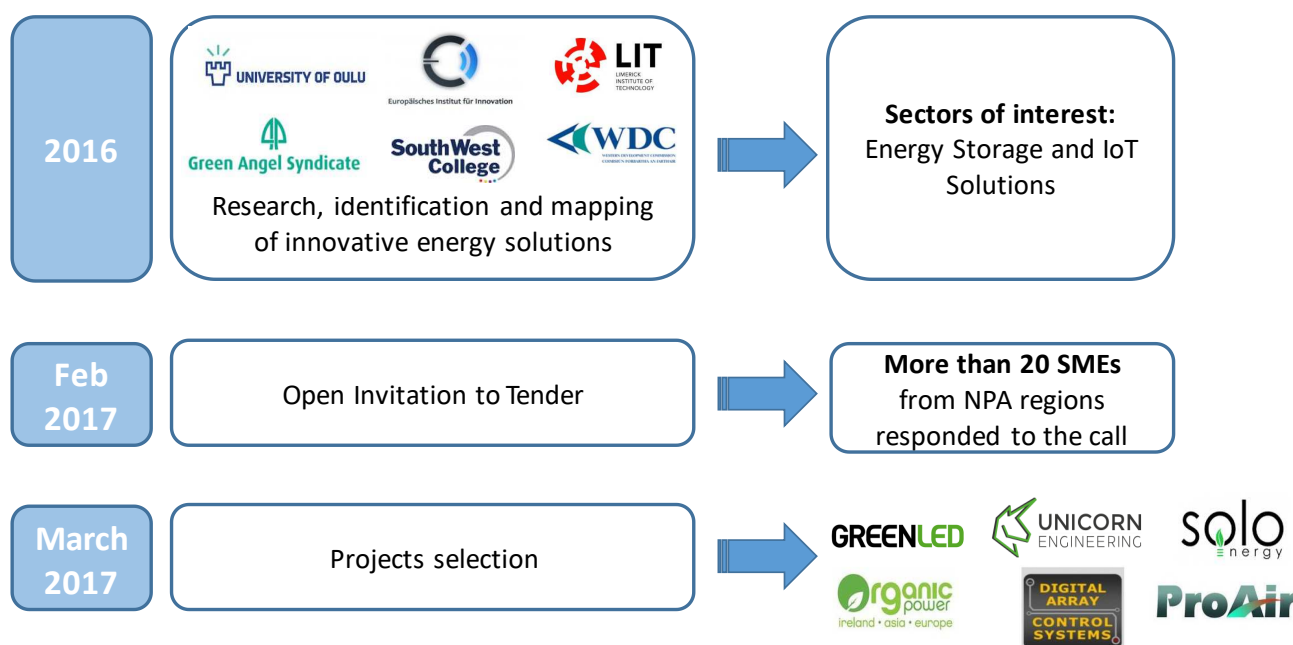
This milestone was reached following three specific phases of activity:

- 1) Research, identification and mapping of the shared innovation needs of each region;
- 2) The Invitation to Tender (ITT) for energy innovations addressed to local SMEs
- 3) The selection of the successful bidders as shown in the reported graph.

The Needs Analysis carried out by each Partner underlined many specific areas for Innovation in Energy Technologies in NPA Region. Two areas were identified as being common to almost all of the Partners: **Energy Storage and IoT Solutions**.

The 6 different projects supported by the Partners include:

- an intelligent illumination system supported by UO;
- a high performance air-to-air mini heat pump supported by WDC;
- a battery controller technology supported by WDC;
- a small anaerobic digestion plant integrated with batteries supported by SWC;
- a virtual power plant operated by an ICT platform supported by LIT;
- a modular system of battery characterized by high portability and flexibility supported by EIFI.



Project Selection

FREED Project Invitation to Tender (ITT), Selection and Evaluation Process

South West College (SWC) led the **Invitation to Tender (ITT) process** and provided guidelines and support to Partners on the tender call and selection process.

The project Partners in each region launched ITTs in February 2017 in order to **identify a selection of the most relevant energy innovation projects responding to the FREED criteria**.

Project selection was a two stage process ending in March 2017.

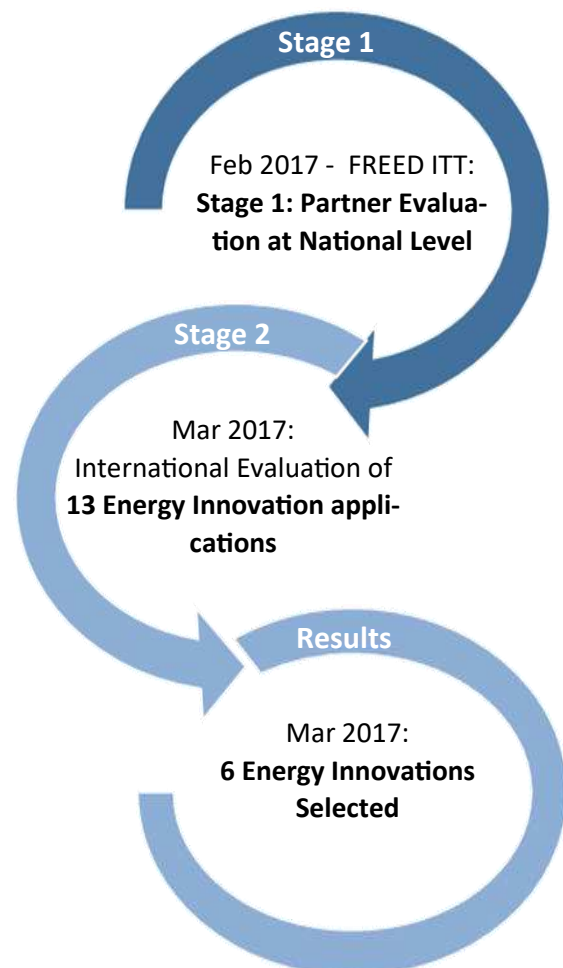


Stage 1: Initial screening and eligibility testing by each Partner. High importance was given both to the relevance / originality of the technology and to the validity of the methodology and planned approach (representing together the 60% of total valuation). The evaluation criteria also included a condition that each innovation must be between TRL level 3 and 6. **Thirteen companies from the Partner Regions were selected and invited to participate in Stage 2 evaluation.**

Stage 2: A transnational evaluation process involving a company pitch to the assessment panel made up of project Partners. A robust scoring was assigned to the individual applications against a set of predefined criteria including: high return on investment, fast upgrade in TRL, strategic importance of the project, internationalization, evidence of well-balanced Partnership and market access potential.

The stage two selection process identified six winners and these have been introduced to the development phase. The average economic value for the development of the technical solution is € 30,000.

The successful applicants are also being provided with R&D, business planning support and a financing service based on private investment funds.



The six winning Energy Innovations

Project Partner: **University of Oulu** (Finland)

Supported Innovation: **Greenled smart lighting solution**



University of Oulu supported Greenled smart lighting solution. This energy innovation consists of a simplified, wireless and expandable lighting control system with multiple control schemes and visual 3D-user interface.

The innovative character of the solution consists of the energy savings achievable via different control methods with comprehensive reports and comparison to the old lighting solutions. This is the first wireless system to be installed in Finland, and completely unique in terms of the scale at which it is being applied.

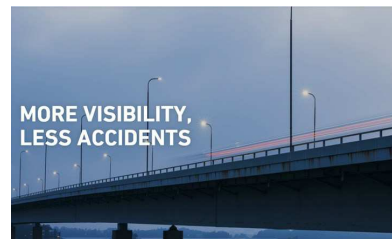
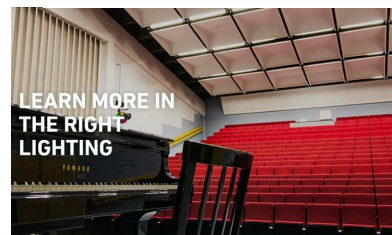
The smart LED illuminations of Greenled Ltd. have now been installed in Auditorium L7 in University of Oulu, Linnanmaa campus. Also the remote presence sensors are connected. The collection of both customer experiences and data of electricity use has started. This information will be used to compare the results to the similar, but not updated, auditorium L8 environment.

The necessary training for the staff in relation to the new system is also ongoing.



Contract signing between University of Oulu and Greenled

GREENLED



Examples of Greenled applications (source: website)

The company: **Greenled Oy**

Greenled Oy is a turnkey lighting solution provider to private and public sector. The company offers lighting solutions with respect to principles of sustainable development and high quality standards. Their activity ranges from supply of single products supply to management and execution of larger-scale lighting projects. Luminaires are manufactured at Greenled factory in Finland, and offices are located in Finland, Germany and Sweden. The company employs approx. 100 people. They completed more than 950 turnkey lighting projects in 10 countries.

Thanks to UO support, Greenled Oy could use University Properties of Finland's building blocks for testing and piloting energy innovations.

Company website: www.greenled.com

Company contact: **Niko Kaivosoja** - niko.kaivosoja@greenled.fi

Partner contact: **Arja Sarpola**

The six winning Energy Innovations

Project Partner: **South West College** (Northern Ireland)

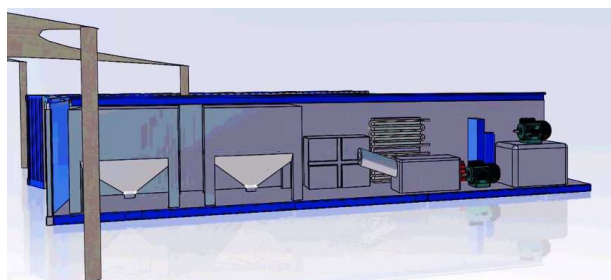


Supported innovation: **Organic Power Ireland Limited**

South West College supported the SME Organic Power Ireland Limited to develop a **small scale Anaerobic Digestion (AD) with energy storage technology** to increase the practicable availability and usage of on-site renewables.

This energy innovation integrates a number of separate systems to deliver decentralised and off grid power availability (from small scale AD) of circa 20kW, 24/7. It is integrated with battery storage to make the available power better suited to meet a typical demand profiles.

The AD system has a 'flat pack' design with no moving parts inside. The standard design will fit inside two 40ft containers including all pumps engines and battery further re-enforcing its innovation as a stand-alone "plug and play" system.



Organic Power plant design



The objective behind the development and testing of this solution is to prove the integrated concept using farm slurries as the feedstock. Future work would then extend the capability to also manage energy crops and other wastes. The full size unit could manage all the slurry from a 200 cow herd housed all year round, or a 400 cow herd housed for 6 months (or equivalent).

The building and assembling of the first prototype is on going. The first installation and the testing phase are expected to take place in the next two months (Feb / Mar 2018).



Website: www.freedproject.eu/organic-power-ireland-limited

Company contact: **Robert Brennan** - robert.brennan@organicpowerireland.com

Partner contact: **Cara Woods**

The six winning Energy Innovations

Project Partner: **The European Institute for Innovation**
(Germany)



Europäisches Institut für Innovation

Supported Innovation: **EnergyTubes**

The European Institute for Innovation supported Unicorn Engineering GmbH in the development of its innovative EnergyTubes, **a modular energy storage system (ESS) which is small-scalable, mobile and multi-usage**. It is feasible to assemble between 1 up to 120 EnergyTubes leading to an accumulated stored energy of between 100Wh and 12kWh. The number of EnergyTubes can be adjusted depending on the energy producer or the energy consumer.

The EnergyTubes system can be connected directly to varying applications, preconditioned that they are having a rated voltage of 48 V d.c. and 36 V d.c. respectively. It can represent an energy storage system for PV systems, windmills or water power plants and, above all, a solution for all NPA countries needing decentralized energy storage systems.



Contract signing between Elfi and Unicorn Engineering

As the maximum capacity of one EnergyTubes is limited to 100 Wh, it is extremely transportable (by air, water, or land). In addition, the voltage of an EnergyTubes is limited to max. 60 V, which is considered as touchable voltage.

This innovative energy solution represents a radical way of decentralization given its scalable nature and its swappable battery system with 100 Wh. EnergyTubes can be used for street lights thanks to their energy buffer for WLAN-hotspots.

It is characterised by self-regulation capabilities depending on grid voltage and remote control via graphical user interface.

At the moment, the company is setting the last technical specifications to prepare the installation which will take place in March / April 2018.



Energytubes applications

The company: **Unicorn Engineering GmbH**

Unicorn Engineering GmbH is the legal succession of an originally founded GmbH in 2002.

The engineering company develops groundbreaking storage and electrical engine systems, as well as charging facility elements for the electrical technology market.

The development spectrum of the company encompasses the mechanical, electrical, as well as the software and hardware elements. The Unicorn Engineering GmbH performs the development work beginning with the first idea up to the production of functioning prototypes.

Company website: www.energytube.de

Company contact: **Felix Freiderich** - felix.friederich@unicorn.engineering

Partner contact: **Chris Ashe**

The six winning Energy Innovations

Project Partner: **Limerick Institute of Technology**
(Ireland)



Supported Innovation: **FlexiGrid platform by Solo Energy**

LIT is working with Solo Energy and have deployed an energy storage system (7 kWh Lithium Ion battery) at Nenagh Library, the host demonstration site, enabling the further development of [Solo Energy's FlexiGrid platform](#) and the trialling of the provision of flexibility services to the Distribution System Operator, ESB Networks.

The installation was completed in August 2017 and included the energy storage system, the establishment on full Edge (site) to Cloud communications, the development of a cloud based software platform for the control of the battery installation and the development of control algorithms (charge, discharge profiles, ancillary service provision).

The system allows 278kWh of battery charging (night rate grid charge and 55 kWh solar PV charge) producing a savings of 45c – 50c/day, approx. 220€/year.



Installation at Nenagh library



Solo Energy solution scheme



Contract signing between LIT and Solo Energy

The company: **Solo Energy Ltd**

Solo Energy is a provider of smart energy storage solutions founded in 2015.

They deployed advanced lithium ion batteries for homes and businesses using an innovative battery leasing model.

Solo's FlexiGrid software platform aggregates network of customer batteries to operate as a centrally controllable Virtual Power Plant (VPP). The system charges the network from the grid during periods of peak renewable generation and low demand when wholesale electricity market prices are typically lower, and from onsite solar PV / wind generation where present. When wholesale market prices increase, the device allows the switch from grid supply to battery supply, delivering low-cost electricity stored in the battery, rather than high cost electricity from the grid.

Solo's software platform seamlessly manage the process for the customers.

Solo's FlexiGrid platform also operates the VPP to deliver flexibility/balancing services to system operators such as frequency response, voltage stabilisation, demand response, and operating reserve. It incorporates a SCADA control system which communicates in real-time across a private IoT network to energy storage assets across the grid.

Company website: www.solo-energy.com

Company contact: **Liam Breathnach** - liam@solo-energy.com

Partner contact: **Derek Blackweir**

The six winning Energy Innovations

Partner: **The Western Development Commission (Ireland)**



Supported Innovation: **Proair Heat Recovery Ventilation Systems**

The [Western Development Commission](#) supported [Proair Indoor Climate Control System \(PAICCS\)](#). It is an **air to air mini heat pump which leverages much higher than normal performance** from an air to air plate exchanger. Pro Air system combined the functionality of the company's traditional Heat Recovery Ventilation (HRV) system with an air source heat pump producing a coefficient of performance of (greater than) >10. This is more than double its closest competing system. This highly innovative concept can revolutionise how houses are heated and ventilated and be disruptive to traditional systems such as radiators and under-floor. Pro Air installed their innovative solution in their own facility in Galway. The tests on the system and the collection of data/results are on going. The Company began structuring their strategy for future commercialization.



Contract signing between WDC and Pro Air

The company: **Pro Air System**

Pro Air Systems is a Galway based manufacturer of high quality Heat Recovery Ventilation units (HRV) with over 25 years of experience. The Company designs, supplies and installs Heat Recovery Ventilation Systems throughout Ireland and the UK primarily to residential and small commercial markets. Their ventilation technology recovers the heat from the exhaust air from wet areas transferring it to the incoming fresh air destined for the living sections of your house. They have installed approx. 3,000 units in both Ireland and UK.



Pro Air Technical solution



Company website: www.proair.ie

Company contact: **David McHugh** – proair@proair.ie

Partner contact: **Mary Keaveney**

The six winning Energy Innovations

Project Partner: **The Western Development Commission**
(Ireland)



Supported Innovation: **DACS - BAMS Battery Control Technology**

The [Western Development Commission](#) also supported Digital Array Control Systems (DACS Ltd), which has developed a **battery controller technology that changes the way groups of battery packs / cells are linked and operated**. The system can increase the efficiency and longevity of arrays and so make battery storage a cheaper and more effective option for renewable energy storage / EV power packs. The BAMS technology allows a pack to be remotely monitored and controlled if needed, extending service intervals from 3 months to 12months +. Coupled with local renewable power generation such as solar and wind, the remote station will no longer need a diesel generator and so be cheaper and easier to operate.



Contract signing between WDC and DACS Ltd



With support of the FREED Project three new 10kW 2.5kWhr packs were built, installed and run to test a networking feature DACS have optimised where power can now be shared between local storage systems, allowing small users to benefit from local surplus and to reduce grouped cost of renewable generation investment. This test system has been installed on the Aran Islands, demonstrating new innovative technology in remote locations.

Three houses, within 100 metres of each other could share the benefit of new solar and wind inputs via a linked storage system across the three properties.

DACS could use this test to monitor the real-world use of power in different types of home (young family, B&B, single elderly occupant). The results of this test will allow the refinement of protocols and methods by which power is used, stored and distributed across DC lines.

Website: www.freedproject.eu/digital-array-control-systems-dacs

Company contact: **John D Byrne – john@dacs.ie**

Partner contact: **Mary Keaveney**

FREED Business Development Workshops

The FREED project aims to support the start-ups/SME's involved with energy innovation in their business development phase to successfully attract financial resources from the private sector and commercialize their innovative solutions on the market. Green Angel Syndicate (GAS) led various initiatives on these subjects: Nick Lyth, founder of GAS, was one of the invited speaker on this topic to the Industrial Summit 2017 in Oulu, Finland (<https://industriysummit.fi>) in October 2017.



In relation to FREED project, a first seminar was organised by GAS during the Partners meeting in Enniskillen on 8 December 2016. It was also livestreamed to Finland for an off-site and keen audience.

Furthermore, Nick Lyth led two important workshops about business and financial planning for FREED participants. The first workshop was held in Enniskillen, Northern Ireland on 27th June 2017.



Nick Lyth, founder of GAS during Enniskillen meeting

The focus of this workshop was on the four key elements to create a solid business model for a technology solution:

- working team and responsibilities
- market research
- business planning
- financial assumptions / projections.

Before analysing the future market for the innovative technology, it is essential to define the manager who will take responsibility for the business, to define how he/she will be paid and to have a clear vision of the corporate governance and board structure/composition.

The manager in conjunction with the chosen team, has to analyse the potential markets both in the NPA perimeter and in other 'similar' regions in different countries.

The main goal is to identify realistic market opportunities: the action to do consists in analysing the types of potential customers, the replacing products, the switching costs in case the customers change supplier, the price level etc.

All these analysis are preparatory for the complete business plan activity which has to give a full vision of the start-up/company from the inside (team, product, target profitability, realistic revenues and costs analysis) and from the outside (focus on the market, competition, sales channels, suppliers network). During this phase, it is also extremely important to be aware about the value of the innovation and think about the best way to protect it from copying.

The last section was dedicated to the financial projections which is the only instrument to analyse the viability of the business and to identify the fund-raising requirement.

The entrepreneur must constantly keep in mind that the business plan has to be presented to potential investors, then it has to be accurate, realistic and able to attract funding resources.

FREED Business Development Workshops

On 25th October 2017 in Dumfries, a second open to public workshop was held by GAS. The main aim of the workshop was to provide the companies attending with a route map leading to access to funding.

GAS put the attention on the high competitive process of investment fund-raising during which the start-ups are competing against all different kind of companies to win investors' cash, not only rival products.



Dumfries workshop.

The entrepreneurs need to sell the idea of investment in their business. In order to do that they have to carefully prepare the pitch documents, consisting in sales and marketing materials about their business model not about their products.

The corporate marketing “package” should include website, 2 pages teaser, pitch deck, introductory email and business plan.



The entrepreneurs need to sell the idea of investment in their business. In order to do that they have to carefully prepare the pitch documents, consisting in sales and marketing materials about their business model not about their products.

The corporate marketing “package” should include website, 2 pages teaser, pitch deck, introductory email and business plan.

The search for a private investor has to be conceived as a process, a sale campaign which has to be managed and carried out through target list preparation, conversations and presentations, due diligence processes.

All this should be addressed to the right public. Angels and angel syndicates have usually specific investment criteria and sector preferences: the business pitch must be presented to those funds interested in the specific technology and market.



Project Team Contacts

Partners		
Finland		
University of Oulu	Eva Pongrácz	eva.pongracz@oulu.fi
	Niko Hänninen	niko.hanninen@oulu.fi
	Arja Sarpola	arja.sarpola@oulu.fi
Northern Ireland		
South West College	John Harrison	john.harrison@swc.ac.uk
	Cara Woods	Cara.Woods@swc.ac.uk
Scotland		
Green Angel Syndicate	Nick Lyth	nick@greenangelsyndicate.com
	Steve Taylor	steve@ideeas.net
Republic of Ireland		
Western Development Commission	Mary Keaveney	marykeaveney@wdc.ie
	Ian Brannigan	ianbrannigan@wdc.ie
Limerick Institute of Technology	Seamus Hoyne	seamus.hoyne@lit.ie
	Derek Blackweir	derek.blackweir@lit.ie
	Carola Bosio	carola.bosio@lit.ie
Germany		
European Institute of Innovation	Chris Ashe	c.ashe@eifi.eu
	Benjamin Daumiller	b.daumiller@eifi.eu



<http://freedproject.eu>



[@freedproject](https://twitter.com/freedproject)



<https://www.facebook.com/FREEDproject/>



www.linkedin.com/company/freed-project



**Northern Periphery and
Arctic Programme**
2014–2020



EUROPEAN UNION

Investing in your future
European Regional Development Fund