

2018: a year of impressive results for FREED

2018 was a year of actions and results for FREED Project as the six innovative energy solutions supported by the Project since 2016 went through important development and achieved successful objectives. This Newsletter will retrace the stories of each technology and update the reader about the final Partners' decisions and operations for the launch of the future FREED Service.

Supporting Partner	Supported SME	Achievements	
	GREENLED	Greenled got the opportunity to install and test wireless sensor system in one Oulu University auditorium, gathering data and monitoring system performances. The company strongly benefit- ed from new relevant business contacts for future contracts.	
🔅 LIT	Solorgy	Solo Energy improved the TRL of the technology from approx. TRL 3 to TRL 7/8. A pilot installation was successfully developed at Nenagh Library, Co. Tipperary. Solo Energy is now a highly promising SME, recently awarded in many other innovation con- test internationally.	
	ProAir	FREED support allowed Proair to complete formal independent testing of the technology. Further R&D activity has been decided and promising collaborations arose afterthe FREED experience.	
SouthWest College	ireland · asia · europe	Organic Power developed a prototype of their innovation which is being tested at AFBI Research Farm in Hillsborough, Northern Ire- land. Thanks to FREED, the CEO received Business Planning and Marketing support, Monetary Funding and Academia expertise for testing the viability of the innovation.	
Europäisches Institut für Innovation	ENERGY TUBE	Energy Tube improved from TRL5/6 to 8, also achieving the patent for the technology. During FREED collaboration, Energy Tube de- veloped two samples of the technology and improved its mar- keting concept. A pilot installation is fully operating at Crest Cen- tre in Enniskillen.	

GREENLED in partnership with University of Oulu (OU)

Greenled Ltd, is a turnkey lighting solution provider, working on B2B and Public sector. Their business model consists in all-inclusive Lighting as a Service concept covering planning, installation and maintenance, all with in-house designed and made luminaires.

Thanks to FREED, the company installed their technical solution in one auditorium at <u>University of</u> <u>Oulu</u> in 2017 and implemented user training in March 2018 with monitoring data available thereafter. The technical solution included wireless and flexible control system, with 3D UI and extensive sensor network, daylight harvesting and occupancy monitoring, optimization of light levels, and programmable logic controllers.





Fig 2 — Example of data monitoring





Relevant energy savings, amounting to 71% vs. the previous system, have been reached via the control system and new efficient luminaires. University of Oulu represents now a test field in use for Greenled with access to data analytics, reports and end users surveys that have been presented to students of different faculties, University teaching staff, guest lecturers from other HEI's , guest lecturers from industrial stakeholders and maintenance staff in Oulu University.

Some of the next market development identified by Greenled focus on Internet of Energy—incorporation of advanced software platforms and data analytics in energy systems and on a more extended use of lighting control system, e.g. car heating pods.

SOLO ENERGY in partnership with Limerick Institute of Technology (LIT)

Solo Energy Ltd is a new energy-storage-as-aservice business based in Cork (IE) and Edinburgh (UK). The core of their business model consists in the creation of Virtual Power Plants mainly involving two technologies:

Energy Storage — the Company installs free batteries and vehicle-to-grid chargers in homes and business, optimizing the operation of those assets from their FlexiGrid software platform.

Blockchain – developing peer-to-peer trading of renewable energy to share excess.

Prior to FREED, the Company did significant development work but limited deployment in real world environment. Many of the actual business collaborations and network weren't established and additional resources were required to go further.

The benefits coming from FREED collaboration were numerous: further platform development, physical demonstration of algorithms and ancillary service provision to system operators and regulators, recruitment of additional control engineering and programming resources. Furthermore, Limerick Institute of Technology and SOLO Energy collaboration is even continuing on other National projects / initiatives.



Fig 4 — Solo Energy Revenues model





Fig 3 — Pilot installation at Nenagh Library

The technical solution at Nenagh Library includes a 7 kWh Lithium Ion battery integrated to the existing 6 kW solar PV roof mounted installation, an Edge to Cloud communication via private, secure IoT network and a cloud based software platform for the control of the battery. Thanks to Solo Energy solution, the charging of battery is automated and scheduled. Solo Energy can provide ancillary services and remotely control the different operating regimes: self-consumption, peak reduction, grid charging. During the first testing period and monitoring of the installation, a self consumption rate > 92% was recorded in the summer 2018.

Solo Energy is having an impressive growth in the market in UK and Ireland, increasing the number of collaborations with important player in the energy sector. In October 2018, they won the international competition "Solar Power Portal Awards" in UK as Residential Storage Project of the Year'.

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PRO AIR in partnership with the Western Development Commission (WDC)

ProAir Systems is an Irish based manufacturer of high quality Heat Recovery Ventilation units (HRV). They have been developing an innovative air to air heat pump, PAICCS (Proair Indoor Climate Control System), which leverages much higher than normal performance from an air to air plate exchanger. Its coefficient of performance is (greater than) >10, which is more than double its closest competing system.

The innovation factors of PAICCS are that the technology recovers heat energy from waste air in a way that has never been done before and it combines a mini air to air heat pump with heat recovery ventilation in a unique format.



Fig 5 — Pro Air already commercialized products



Fig 6 — Heat Recovery Ventilation concept

FREED support, through The <u>Western Development</u> <u>Commission</u>, was vital to keeping the Pro Air development opportunity alive. The bridge funding at an opportune time allowed the company to complete the formal independent testing necessary to prove the concept beyond doubt.

The R&D activity implemented during the FREED Project and the contacts with the FREED network allowed the Company to move forward their innovative project. Further opportunities arose for the imminent commercialization of the technology after the design and installation of a test facility into a GMIT building, commissioned in January 2019.

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ENERGY TUBE in partnership with the European Institute for Innovation (EIfI)

Unicorn Engineering GmbH is a German company that designed a multi-purpose battery called EnergyTube that can be integrated into a wide variety of applications and thus replace the multitude of batteries on the market.

The mission of the company consists in engineering new ground-breaking developments to further the e-mobility market, based on IEC standardized design. The products are sold to B2B that want to integrate the EnergyTube in their application and also to end-consumers.

The developed technology, which has been supported by FREED in the improvement from TRL 5/6 to 8, is an universal, optional scalable battery system, based on IEC standards. EnergyTube consists of eight 18650 Li-ion cells giving a capacity of currently 83Wh, integrated NFC-communication, and a battery management system unit.



Fig 7 — EnergyTube possible usages

The European Institute for Innovation provided to the company different kind of supports allowing the development of a new marketing and communication concept to be used on the market and making available a pilot site to test the functionality of EnergyTube.

A 5 kWh Lithium Ion battery storage system has been installed at the Crest Centre in South West College. The technology is integrated with existing solar PV roof mounted installation and connected to an online portal via internet to enable remote control and diagnostics.

One of the current interesting development of the company is the cargo bike. The communication between EnergyTube and an e-bike motor was established and the system was already furthered from TRL4 to TRL7 level. First prototypes powered by EnergyTube have already been tested.

The next important innovative development of the company is the H2 EnergyTube (hydrogen, hybrid or battery in one system).



Fig 8 — H2 EnergyTube



Fig 8 — Installation at Crest Centre in Enniskillen

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ORGANIC POWER in partnership with South West College

Organic Power Ireland Ltd is a renewable energy development company based in Northern Ireland. They have developed a small-scale anaerobic digester (SSAD) capable of transforming livestock waste into biogas. The FREED project has provided the Managing Director, Robert Brennan, with very important support which has helped transform his original innovation idea into a developed prototype.

Anaerobic digestion is widely known for its direct and indirect benefits but is not widely deployed due to its high capital costs. The innovative concept behind Organic Power is that the company aims to deliver a robust, modular, cost-effective small-scale system (circa 20kw/hour) including energy (battery) storage as a cost-effective solution to fulfill the needs of an average sized farm.





The system will be flat packed, and operate inside standard transport containers with no internal moving parts (less to break down). It fits inside two 40ft containers including all pumps, engines and battery to give a plug and play system.

<u>South West College</u> provided Organic Power with financial and technical expertise and it helped provide further key collaborations with different players including Sligo IT, Dublin IT, AFBI, and MCA storage.

A prototype has been installed at the Agri-Food and Biosciences Institute in Hillsborough, Northern Ireland and it in the process of testing before commercialization.



Fig 10 — Organic Power Ireland Ltd anaerobic digestion storage network

FREED Final Conference in Enniskillen

FREED Partners, University of Oulu (UO), South West College (SWC), Western Development Commission (WDC), Green Angel Syndicate (GAS), Limerick Institute of Technology (LIT) and European Institute for Innovation (EIfI) met in Enniskillen on 16th and 17th October 2018 for FREED final conference and the last Partners Meeting after three years of project.

FREED final conference, organized by South West College, took place in Enniskillen in the innovative and high energy efficient building of the <u>Crest Centre</u>. The audience included FREED Partners, different SMEs active in the energy sector and other Institutes of Research from Ireland and UK. The important achievements reached thanks to FREED Project in the last three years have been presented by the SMEs that benefited from FREED support. It was an extremely valuable moment in which the Partners and five innovative SMEs retraced their successful collaboration presenting the results of their efforts and the next steps of their technologies.

One of the most relevant moment of the conference was the launch of the FREED Service which represents the long lasting result of the project. Cara Woods from SWC gave a preview of the digital platform that will be officially available on line before the end of 2018 aiming at ensuring the replicability of FREED best practices even after the formal end of the project. The following pages of the Newsletter will tell more about it.











Fig 11 — FREED Final Conference

FREED Service: the launch of the new platform

The afterlife of FREED Project following its end in December 2018 is represented by the FREED Service Platform which aims to be a useful instrument for innovative SMEs in the energy sector looking for funding opportunities in Europe.

South West College led the development and implementation of the Platform collecting input and resources from all FREED Partners.

The key target groups of the Service are:

i) **SMEs** - They have the opportunity to register on the platform and have access to resources like guidelines for business and marketing plan preparation. They can read about successful stories of SMEs funded by FREED and be inspired by previous best practices. They can get visibility towards investors who also registered on the platform, using the tool as a marketplace.

Ii) **Investors** - After their registration, they can have access to the content provided by the SMEs and evaluate if their appetite for investing matches with the described innovations. The platform could also represent for them a screening of the on-going market trend of the energy sector and innovation in general.

lii) **Enterprise Agencies** - The Platform will help Enterprise Agencies to be more visible for SMEs and investors and present the right instruments in relation to the energy sector to a more specifically interested audience.



Fig 12 — Extracts from FREED Service Platform



FREED Service: the launch of the new platform

The resources available on the platform for the registered organisations consist in different tools and guidelines to fulfil the necessary steps linked to the search of investment by SMEs.

These instruments include: business, marketing and fundraising plans, interactive needs analysis map, mentoring and tutorial videos and the list of funding instruments available in the Regions that were involved in FREED Project.

The FREED Service brings forward the objective of FREED Project and make it available to a larger audience. The main aims are:

- To give visibility to innovative energy technologies;
- To promote the connections between innovative SMEs and investors;
- To facilitate the transfer of technological knowhow in the Regions involved;
- To encourage networking and new collaboration between players of the same sector regionally and internationally.

The official launch of FREED Service Platform will take place in December 2018.









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