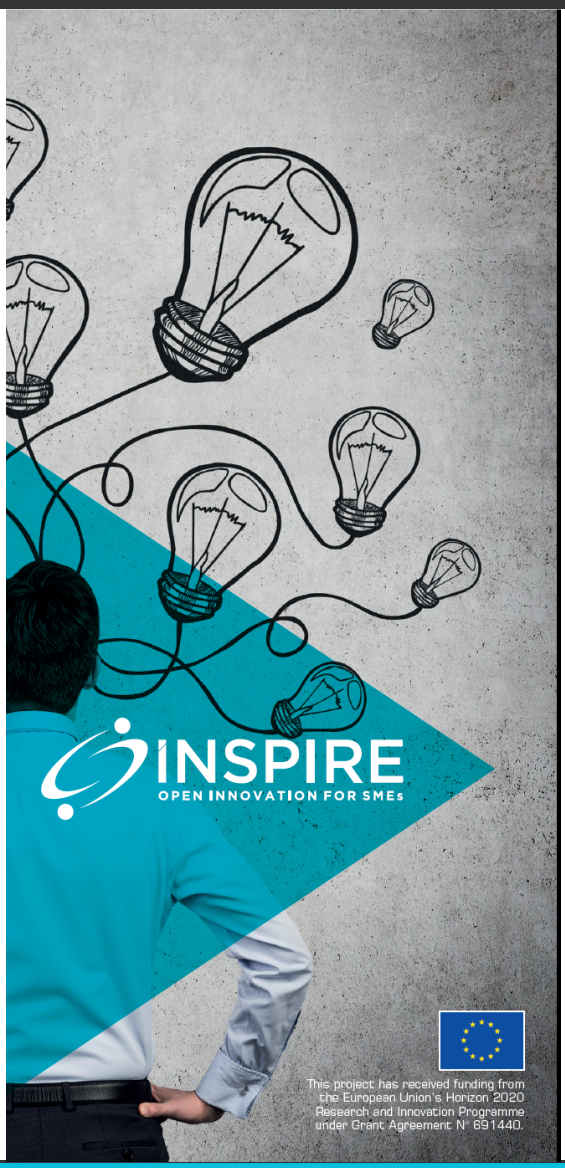

SUNAMP

United Kingdom, www.sunamp.com

Two SMEs with complementary expertise collaborated to develop a new type of technology for an integrated novel solution in a new market. Their plan is to commercialize the result as a joint venture

Executive Summary

Sunamp started in 2005 to address green energy technologies. The company identified that heat storage was an underdeveloped technology and that advances could be made through the use of phase change materials (PCM). Through close collaboration with a local university, the company launched its first product in 2015 which was designed to store excess electricity from solar photovoltaic arrays as heat. The company is now adapting its PCM technology for use in automotive applications.

CASE N°: UKI51

SECTOR: RENEWABLE ENERGY

TECH INTENSITY: HIGH-TECH

LIFE CYCLE STAGE: ESTABLISHED

INNOVATION VECTORS: PRODUCT

OI PARTNERS: LARGE CORPORATION, OTHER SME, LEAD USERS/CUSTOMERS, PPP MEMBERSHIP ORGANIZATION

KEYWORDS: Phase Change Materials (PCM), heat batteries, renewable energy, core IPR developed with university, automotive technology

- BACKGROUND FRAMEWORK
- INNOVATION CHALLENGE & MARKET OPPORTUNITIES
- OI TRAJECTORY
- BUSINESS IMPACT
- LESSONS LEARNED

Sunamp

BACKGROUND

Andrew Bissell, an entrepreneur, started Sunamp in 2005 after successfully founding a medical imaging software company. In his new company he wished to focus on green energy technologies. There were several potential opportunities that he could choose to exploit but he settled on developing solutions in the underdeveloped area of heat storage using phase change materials (PCM). These products are commonly referred to as heat batteries.

In 2012, Maurizio Zaglio joined the company as a chemical and mechanical engineer. At that time the company had four members of staff focused on research and development of prototype systems. He is now the company's international business development manager.

The aims of the company are to expand and develop tailored solutions based on their IPR to address several different markets in key geographical areas of Europe, North America and the Far East.

INNOVATION CHALLENGE & MARKET OPPORTUNITIES

In 2015, SunampPV, the company's first commercial produc,t was launched with sales predominantly in the UK. The company had expanded to 25 people. While the company had originally planned to purchase PCM from third parties, the poor performance and high costs of PCM available had led the company to develop their own patented material with a unique chemical formula.

This was achieved by collaborating closely with the Chemistry Department at the University of Edinburgh. Sponsorship of PhD students within the department had led to one student becoming Sunamp's lead chemist. By this time the company had decided to manage itself the manufacture of their product's components and also undertake the assembly of the final product.

The SunampPV was designed to store excess electricity from solar photovoltaic arrays as heat which could be released at a later point in time to heat water. The installation of this product was expected to be mainly within domestic dwellings. Sunamp started the process of looking for other areas in which their technology could be applied to enable the business to grow. One of the areas of interest was the automotive sector.

Sunamp was invited to attend a number of business mission events in Hong Kong hosted by the Edinburgh Centre for Carbon Innovation (ECCI). The ECCI's remit is to assist Scottish SMEs to develop green and renewable technology by bringing organizations from business, finance and the public sectors together.

On two of these missions both Sunamp and Route Monkey, a UK-based SME developing fleet routing optimization solutions, were present. Sunamp became aware through initial discussions that an issue for fleet operators adopting electrical vehicles (EV) was caused by the need for the vehicles' lithium batteries to be used for two purposes. These were (1) heating the vehicles on cold days and (2) providing electrical energy to power the vehicles' drivetrains. In winter this reduced the potential mileage a vehicle could cover on a single charge. Sunamp believed that their heat battery technology could be integrated into a vehicle to increase the mileage it could cover by reducing or removing the need to use the lithium battery for heating purposes.

OPEN INNOVATION TRAJECTORY

Concept development

Further discussions with Route Monkey centred on merging their respective technologies to enable food distribution fleets to adopt more EV in their fleets, rather than using diesel vehicles, especially for 'last-mile' deliveries in cities and towns.

Following the launch of the Integrated Delivery Programme 12 (IDP) funding competition by the Office for Low Emission Vehicles (OLEV), the Department for Business Energy and Industrial Strategy (BEIS) and Innovate UK, Sunamp and Route Monkey looked for other partners to submit a proposal for a collaborative project.

Paneltex, a EV supplier, and the Low Carbon Vehicle Partnership (LCVP), a public-private partnership with the mission to accelerate a shift to the use of lower carbon vehicles in the UK, joined the project consortium. The proposal involved developing a prototype vehicle incorporating the partners' technologies which could be tested to assess their effectiveness in 'last-mile' delivery vehicles. The funding application was successful and enabled Sunamp to secure £1.15 million in March 2016.

The development process, IPR and competition strategy

At the time of writing, the project in still under-way with the prototype system in development and an expectation that it will be ready for testing in 2018. Paneltex is modifying one of its all-electric trucks on a 5.5t Isuzu chassis for the project. A large fleet operator has shown interest in testing the vehicle over a period of one year, as part of the project.

The technical challenge during the development process is to meet the targets of demonstrating that an EV can consistently cover 100-120 miles per charge compared to the current limitations of approximately 80 miles per charge.

Both Sunamp and Route Monkey are utilizing their own IPR during the project development.

The key competitive strategy for the outcome of the project is to highlight its advantage over current lithium chemistry-based battery-only solutions. It is expected that the outcome will demonstrate that EVs can get consistently higher mileage with the heat battery. While energy densities for lithium-based batteries are expected to increase, Sunamp believes that it will be many years until an EV solution with ranges of 100-120 miles is achieved.

Commercialization and follow-up

Sunamp owns their IP which is protected by a patent. However, the expected outcome of the project will make use of a combination of IP from Sunamp and Route Monkey. Ownership of IPR is expected to reside solely with each partner following the project's completion. As a result, the partners plan to continue to work together to commercialize the outcome of the project. Currently, efforts are being made to disseminate information about the project and find potential future customers.

Several challenges are expected in rolling-out and scaling-up the project outcomes, including:

- the need to standardize components;
- the need to create a retro-fittable solution for markets other than just the UK;
- the need to refine the technology to meet all parameters required for automotive use, including safety regulations and cost limitations;
- the ability to manufacture 100 000s of units per year;
- finding a suitable large customer upon completion of the project.)

To benefit from the opportunity the project creates, a new manufacturing line will need to be created in collaboration with partners. It is also expected that commercial partners may need to be found in other territories and the marketing department expanded.

Sunamp is already speaking to previous partners and customers about the project.

BUSINESS IMPACT

It is expected that the project will result in a new product prototype and the launch of a new automotive product. Interim benefits from the project have already included testing new heat battery configurations that may also be suitable in non-automotive markets and applications. A further benefit is that the project has highlighted new opportunities in other application areas in which the heat battery technology can be used for cooling, e.g. air conditioning.

Already within the project the company has learnt how to select relevant project partners more effectively and manage collaborative projects. Sunamp is providing the overall project management for this project. The company has also improved its approach to accessing new market segments and potential customers.

LESSONS LEARNED

In terms of advice for SMEs managing the OI process, Maurizio Zaglio emphasized the need to find an expert who can assist in each aspect of a project prior to starting, e.g. an expert in legislation. He also advocated support to help facilitate strategic collaborations with external partners. This could include:

- a tool to find suitable good partners at the proposal stage of a project, as this was challenging and time consuming;
- support with writing or at least guidance on what to focus on for applications in specific funding calls; this could be extended to provide a review function prior to submission.

This case shows how an SME can collaborate with another SME in developing a different type of technology to achieve an integrated novel solution for a new market with an expectation from the outset that any commercialization will be the form of a joint venture. It is of note that the company's core IP for the project was created previously through a close, on-going collaboration with a local

public research organization.

The case also highlights the emphasis that the company has placed on finding appropriate experts in several aspects of the project from the outset, including a public-private partnership that can assist on matters of legislation.

Main lessons learned:

1. It is important to find project partners (or support associates) from the outset of the project who can assist in non-technical areas, which may initially be seen as peripheral to the project but can have a fundamental impact on the ability to commercialize its outcomes.
2. The integration of two or more distinctly different technologies can yield benefits for the project partners that neither could achieve independently, leading to a novel solution.
3. A strong project management process is required for the complete OI project life cycle with a single senior project manager providing overall management of all partners, particularly when there are many types of partner involved.
4. Upfront discussions between OI partners regarding IP may lead to an agreement to commercialize the successful outcomes of a project in the form of a joint venture.