ETIP SNET

EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM

SMART NETWORKS FOR ENERGY TRANSITION

ENERGY STORY:

A sustainable second chance for batteries

The ELSA project demonstrates that the life cycle of electric vehicle batteries does not need to end after replacement – they can have a second life and a second chance to support the energy system.

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Energy storage is an essential accessory for an efficient use of electricity, allowing prosumers[1] to store part of their energy production throughout the day and distribute it according to their needs. Thanks to the acknowledgement of the role of storage for the energy transition, the production and use of batteries are increasing at a high speed in Europe. How can their use be optimised in order to allow a better penetration of renewable sources in the energy system?

A Second Life for Electric Vehicle Batteries: the ELSA Project

The H2020 project ELSA (Energy Local Storage Advanced systems) offers an answer to such query, looking at a specific type of batteries – the ones used in electric vehicles. The electric vehicle sector is growing in Europe, with global forecasts suggesting 100-200 million vehicles in circulation by 2030[2], , which poses a question: what can be done with the batteries after the vehicle is not in use anymore.

The life of an electric vehicle and the life of its battery do not always coincide. Used overtime, a battery can lose power and needs to be replaced. This does not mean that it becomes useless: it can be separated from the vehicle and keep performing the same service, but with another scope – having a "second life".

The ELSA project, started in 2015, collected used electric vehicle batteries and installed them in buildings to optimise the use of energy from the grid or from solar panels. Batteries for mobile and stationary storage use the same technologies and materials; their difference lies in the voltage that they are able to support. Electric vehicle batteries have a lower voltage than the electricity that comes from distribution grids, which required building new, specific suited converters that could adapt the electricity flow for the second life batteries that were installed.

Each of the six pilots that ELSA managed throughout Europe was unique. The Ampere building in Paris, France, has installed second life batteries coming from Renault Kangoo cars to support its solar panels, which helped the facility to win an award for being a "Smart Building". The Gateshead College in Sunderland, United Kingdom, has seen three batteries coming from Nissan Leaf cars able to support 191 solar panels in the building's rooftop. The European office of Nissan in Paris, France, required 6 power converters, and was essential to test the scalability of the ELSA system. Six Renault Kangoo second life batteries support a set of solar panels and a small wind turbine at

[1] The term comes from the merge of the words "consumers" and "producers", indicating those actors of the energy system who consume energy coming both from the distribution grids and from their own production through solar panels.
[2] *Global EV Outlook*, International Energy Agency, 2018

the E.On Energy Research Center building in Aachen, Germany. The city of Kempten, Germany, runs mostly on renewables; the project pilot took place in a residential area of 81 houses and involved six Renault Kangoo second life batteries. In the city of Terni, Italy, a similar configuration helped support a solar panel farm.

The project has seen batteries performing at 70% of their capacity after the reinstallation in the pilots, a high rate for batteries which have already performed for 6 years on average as electric vehicle batteries. After they are installed as second life batteries, it is estimated that they will last for additional 10 years.

Impact

ELSA brings many advantages to the energy system: first, it supports the management of the energy demand of a certain site and the penetration of renewable energy sources. Second, it finds a sustainable destiny for used electric vehicle batteries: their dismantling is a necessary process that allows to repurpose some of its materials which are finite, such as lithium and cobalt. By reinstalling them in buildings, they are used thoroughly, avoiding unnecessary costs and waste.

Project benefits

- Improved network management
- Decreased carbon emissions
- Reduced energy bills
- Improved social acceptance

It has also had a positive societal impact: the people involved directly in the pilots - workers, citizens, students - have well-received the idea of having a refurbished storage system in their buildings. One potential worry from the project's stakeholders was safety: however, because the second life batteries of ELSA come from electric vehicles, they are completely safe (impact-resistant) and have gone through additional checks by local fire departments. In some pilots, ELSA has also installed charging points for electric vehicles and low-consumption LED lighting systems – incentivising more conscious behaviour. The project has also allowed consumers to lower their electricity bills – and contributed to the overall reduction of CO2 emissions.

ELSA has found some obstacles to overcome. Throughout the European Union, there is no unified regulation for the installation and use of energy storage; for every pilot, permits from national and local authorities were required. Nevertheless, the project offers a reduction of costs and the facility in replacing the reinstalled batteries with other second life ones, making it a self-standing initiative with a potential to be replicated.

ELSA puts together two worlds, offering a solution that is in full compliance to the circular economy: giving a second life to electric vehicle batteries in an environmentally friendly manner, while supporting an efficient deployment of renewable energy.

Keywords: stationary energy storage, second life batteries, buildings, renewable energy

More info at: https://www.elsa-h2020.eu/Home.html + video

Note: Project benefits based on specific criteria outlined in ETIP SNET monitoring exercise

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