



INNOVATION FUND

Driving clean innovative technologies towards the market

PIONEER: airPort sustainability secONd life battEry stoRage

The Innovation Fund is 100% funded by
the EU Emissions Trading System



Project summary

The PIONEER project involves the design, construction, start-up and operation of a system made up of second-life batteries from the automotive sector for the storage of excess power produced by a 30MW solar photovoltaic plant. The project will be developed at Rome Fiumicino International airport and the energy stored will cover evening peak-demand, while also providing flexibility services to the grid. It is the first of its kind globally: there are no projects of this size that use second-life batteries from multiple Original Equipment Manufacturers (OEMs). An additional innovative feature relates to the development of equipment able to check the state-of-health of the batteries before their connection to the system. The energy storage system will have a rated capacity of 5MW/10MWh. New battery construction will be avoided due to the project. Overall, the project is forecast to avoid 100% of greenhouse gas (GHG) emissions compared to a conventional technology.

COORDINATOR

Aeroporti di Roma (AdR)

LOCATION

Rome, Italy

SECTOR

Intra-day electricity storage

AMOUNT OF INNOVATION FUND GRANT

EUR 3 102 623

RELEVANT COSTS

EUR 5 171 040

STARTING DATE

01 January 2022

PLANNED DATE OF ENTRY INTO OPERATION

31 December 2024

Enel X BESS installation (North America): the system will allow industrial customers to achieve savings in their energy costs, as well as reduce their impact on the environment and provide better energy quality (higher production).

A global first-of-its-kind project at this scale in the use of second-life batteries

Aeroporti di Roma (AdR)'s development plan for Leonardo da Vinci Airport foresees the installation of the largest solar photovoltaic (PV) array (60MWp) inside any airport infrastructure across Europe. The objective of the PIONEER project is to store excess energy produced during the day by the solar PV plant, returning it when most needed to cover the peak demand of airport facilities during the evenings, when solar energy becomes unavailable.

The specific innovation of the project is the integration into a same common power-supply system of second-life batteries from multiple car manufacturers and the application of these for different services (i.e. PV storage, ancillary services, peak load shaving and demand response) in the proposed airport environment. The proposed technical management of such a solution, using batteries of different size, voltages, capacities, brands, technologies and at differing ageing levels, is a significant advancement beyond the current state-of-the-art technologies. The solution will use different battery packs from three different car makers. This has the benefit of reducing supply risk while increasing the system's modularity.

An intelligent optimisation software will maximise the performance and revenue from the batteries. Through advanced machine

learning techniques, the energy needs of the airport will be understood and the battery will be automatically charged and discharged at optimal times to provide the highest possible financial return. An additional innovative feature relates to the development of equipment which is able to check the state-of-health of the batteries before they are connected to the system.

Significant economic and environmental benefits

The introduction of these new energy storage and management systems will allow the maximum use of renewable energy from the solar PV array, to provide balancing services to the National Grid and to reduce the CO₂ emissions of the airport, in line with its targets towards "Zero Net Carbon". Switching to solar power will reduce the required electricity which is current generated by a natural gas-fuelled CHP power plant at the airport. This switch will avoid more than 16 000 tCO_{2e} net absolute GHG emissions during the project's first ten years of operation.

The solution also provides economic benefits. Batteries will be charged when the cost of energy is lowest and discharged when it is highest, providing savings on the overall cost of energy for the airport's infrastructure.

It is estimated that there will be 29 GWh of used electric vehicle batteries available by 2025. This project will therefore demonstrate the use case for second-life batteries as a viable solution for having cheap and effective energy storage.

Scale up potential

Once the project is complete, AdR has already planned to install additional solar PV and storage systems on the same site. The integration of the battery storage sector with other relevant sectors, such as automotive and the energy sector (generation, transmission and distribution) opens new and flexible opportunities. The outcome of the project in the area of integration of storage systems with renewables and other services will provide a positive impact on the European strategic action plan for batteries.