



INNOVATION FUND

Driving clean innovative technologies towards the market

Aquilon: Airborne wind hybrid renewable microgrid with redox flow battery to provide flat renewable energy to an industrial site

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



Project summary

The Aquilon project aims to meet the baseload energy consumption of the Storengy Peckensen underground gas storage site using carbon neutral electricity, therefore avoiding 100% of greenhouse gas (GHG) emissions compared to the reference scenario. The project will combine technologies from renewable energy sources, such as airborne wind energy (AWE), solar photovoltaics (PV) and redox flow battery storage, to produce a novel combined renewable electricity system that smooths power variations and provides ancillary services.

COORDINATOR

Storengy Deutschland

LOCATION

Germany

SECTOR

Wind energy

AMOUNT OF INNOVATION FUND GRANT

EUR 2 024 737

RELEVANT COSTS

EUR 3 374 562

STARTING DATE

01 January 2022

PLANNED DATE OF ENTRY INTO OPERATION

01 January 2024

Airborne wind energy system harvesting wind speed in high altitude to produce renewable power.

An integrated renewable and electricity storage solution

The Aquilon project's innovation lies in the integration of renewable and storage solutions providing flat-profile renewable electricity production. It will be developed based on AWE power generation at pre-commercial scale (between 100 - 300 kW), combined with a PV energy park (300 kWp), a Redox-flow battery (400 kW / 800 kWh) to store energy and a smart energy management system (to optimise the consumption and allow ancillary services to the electricity grid). The project will generate a flat energy profile based on 100% renewable energy sources and will supply 73% of the baseload energy consumption needed at the gas storage facility of Peckensen.

AWE technology exploits wind sources located in the higher part of the atmosphere where more stable wind currents occur. As such, it has the potential to generate a more consistent energy output compared to conventional wind turbines.

A relevant project to make industrials carbon neutral

The Aquilon project will significantly reduce the CO₂ emissions of the Peckensen gas storage site, avoiding 100% of GHG emissions

compared to the reference scenario, without neither creating an extra burden on the electricity grid nor increasing safety risks. This is a significant step to help gas storage become carbon neutral. The avoided net absolute GHG emissions during the first 10 years of operation of the project are estimated to be 1 566 tCO₂e.

The project will also serve as demonstration that a storage solution (Redox-flow battery) can deliver both on-site peak-shaving of renewable energy production and grid-supporting services, rendering an additional financial revenue.

Being a replicable technology, this could help the decarbonisation of several other sectors of the economy as part of the energy transition and trend towards a more distributed energy generation.

A replicable solution in other industrial sites

AWE is a technology with potential for deployment as it has a lower impact on the public (visual impact) and the environment (90% less material needs). At project site level, the capacity of the AWE power generation can be doubled in future developments, enabling the supply of a larger portion of the plant's baseload consumption. The coordinator considers this site as a demonstrator for future replication to similar sites in its portfolio where similar needs and restrictions apply. Other gas storage sites or industrials all over Europe could benefit in the long-term.

The individual components or a similar composition of these components could be deployed to a wide extent, as the AWE technology has a great variety of potential application to other markets (both centralised and decentralised). The redox flow battery can also be implemented in a wide range of high-cyclic applications.