



Aerial view of the project

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INNOVATION FUND

Driving clean innovative technologies towards the market

CO₂-FrAMed: Free Agriculture for the Mediterranean region

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



Project summary

The CO₂-FrAMed project will build approximately 12 stand-alone large-power photovoltaic irrigation systems (PVI) that do not require back-up batteries and significantly reduce risks related to the integrity of the water distribution infrastructure. This solution is a suitable alternative to conventional electric and diesel-based pumping systems. It brings environmental benefits in terms of CO₂ emission reduction and economic benefits in terms of lower costs for farmers. Overall, the project will reduce Greenhouse gas (GHG) emissions compared to a conventional technology by 100% and farmers will benefit from zero-carbon irrigation at a competitive price.

COORDINATOR

Acciona Generacion Renovable S.A.

LOCATION

Ebro River Valley, Northeast of Spain

SECTOR

Solar energy

AMOUNT OF INNOVATION FUND GRANT

EUR 4 356 000

RELEVANT COSTS

EUR 7 498 008

STARTING DATE

01 January 2022

PLANNED DATE OF ENTRY INTO OPERATION

Q3 2024

Innovation in the technology and in the way to finance it

The project's innovative elements are threefold: a new technology, an advanced monitoring system and an innovative financing model.

1. The PVI technology was developed within Horizon 2020 to solve the intermittency problem of photovoltaic power sources. Intermittency can cause overvoltage and water hammers, which can seriously damage the irrigation infrastructure and dramatically reduce its lifetime. The PVI technology allows for the integration of the hydraulic components, the PV generators, and the frequency converters and it guarantees that the pressure remains always within optimal operational values. Such a solution avoids the need to use expensive backup batteries.
2. The advanced monitoring and automated analysis of key system parameters is a breakthrough in the farming sector, also enabling fault detection, diagnosis and reporting for high performance of the large-power PVI systems.
3. The innovative business model proposed for the project builds on the work of the H2020 ResFarm project, which developed a framework to ease the access of on-farm renewable energy sources to capital market funding. The business model of CO₂-FrAMed is based on the commercialization of PV electricity through a pool of power purchase agreements (PPAs) totalling 7.35 MW capacity. The model also enables the reduction of financing costs of the PVI projects, by showing that they qualify as collateral for high-quality financial instruments (green bonds).

Multiple technical, environmental and economic benefits for the farmers

The project will deploy zero-carbon irrigation systems, avoiding a total of 17 700 tCO_{2e} during the first 10 years of operation, which corresponds to 100% of GHG emissions compared to a reference scenario, while also tackling many of the technical, economic, and

administrative challenges faced by farmers.

The project aims to demonstrate that PVIs are well suited for medium-large irrigation applications. They can replace conventional electric (grid connected, or using batteries as back-up) and diesel-based pumping systems, and can work as stand-alone installations without the need for batteries or a connection to the grid.

Introduction of advanced monitoring and analysis features will ensure optimal performance, minimise operational expenses, and reduce the cost of the electricity paid by the farmers. The project will also have a positive impact on circular economy by reducing the consumption of water in the farming sector by up to 30% without increasing GHG emissions.

The pooled PPA approach significantly reduces financial and transaction costs for the PVI installations and prevents Operations & Maintenance costs and burdens from falling on farmers.

In addition, the project will have a significant impact on agricultural activities in the region, contributing to a substantial increase in agricultural production.

High scale-up potential in the irrigation sector worldwide

The potential for expanding the project on site and transferring the technology to other sites with similar conditions is very high. The availability of a cost-effective 100% renewable and independent energy solution for irrigation systems opens sizeable opportunities worldwide, particularly in locations lacking a reliable electric grid.

The introduction of concepts and practices from the securitization industry into the origination of PVIs will allow for the introduction of liquidity in PVI investments. This will significantly increase the appeal of this asset class to investors and will have a positive impact on further PVI developments. For example, the origination and asset management practices developed can be applied in future PVI projects.