SUPER PV PROJECT – INNOVATIVE & HIGH-QUALITY PV SYSTEMS TO REGAIN LEADERSHIP OF EUROPEAN PV BUSINESSES ON THE WORLD MARKET

Purpose of the Project

Today photovoltaics (PV) has become one of the most cost-effective forms of electricity production globally and in some regions is already the most competitive unsubsidised form of electricity. Despite positive cost and growing developments, European PV manufacturers are facing a decline in production due to competition from third countries. The fragmentation of the value chain compared to competing actors is believed to be the major factor for this decrease in the competitiveness.

SUPER PV is a **collaborative European-funded project** initiated in 2018 by **26 partners** in reaction to this trend. Together, they target a significant LCOE reduction (26%-37%) for European-made PV by adopting a hybrid approach combining technological innovations and data management methods. Introducing superior quality PV systems will create conditions **for accelerating large scale deployment in Europe and help EU PV business to regain leadership on world market.**

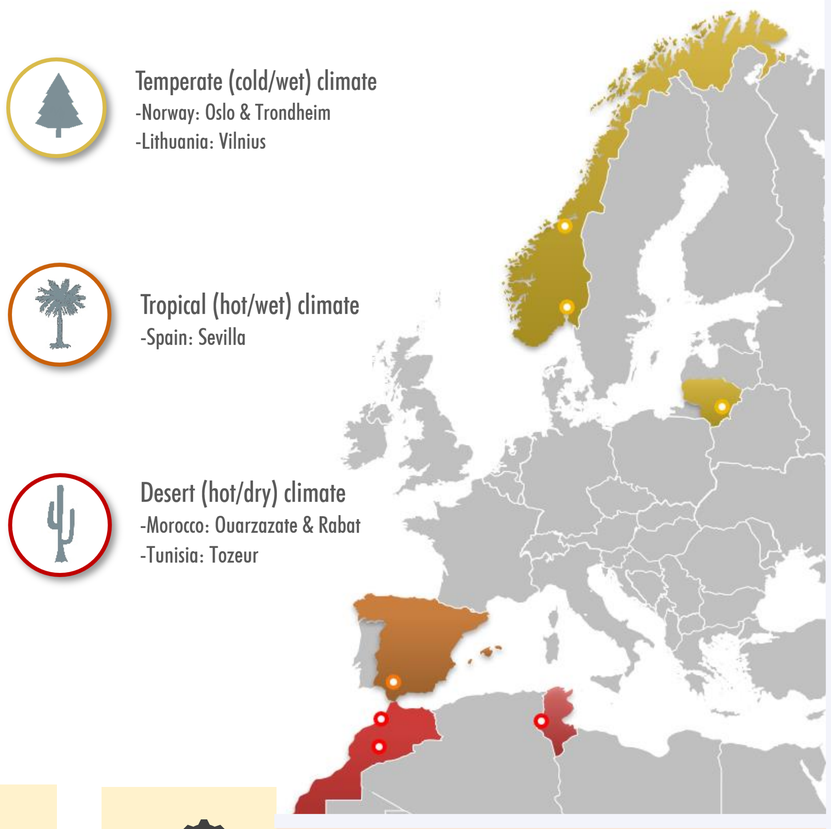
Overall Project Approach

Development of technology innovations and novel data management tools → Testing of the innovations and methods in real conditions → Evaluation of the effectiveness of the proposed solutions

ASSESSMENT OF RESULTS

Project results will be tested and evaluated in demonstration sites in 3 **different climatic regions of extreme conditions and in markets of primary importance** for European PV producers. Techno-economic and environmental assessment of SUPER PV results will be done based on the defined KPI's and the state-of-the-art situation as described in the SUPER PV proposal, submitted in September 2017. Production technologies available for industrial partners were selected to assess innovations in order to provide possibility for comparable analyses.

On the other hand, **monitoring the technology and market** evolution of the PV sector is being a crucial issue, not just from a market competition perspective, but also from a technology development point-of-view. **SUPER PV** technologies, in combination with relevant technologies and practices outside the scope of the project, may form **winning combinations on the market**, driving costs and LCOE further down compared to our benchmark.



Defined Key Performance Indicators (KPI's)

KPI 1 - Solar module cost reduction
KPI 2 - BoS components costs
KPI 3 - Total installation cost

The module cost and BoS components costs (€/Wp) are technology dependent and subject to the global marketplace, while system installation costs adding up to the final LCOE are more specific to location and segment. Thus, module and BoS components costs will tell whether a technology developed in SUPER PV is competitive at a European level. The LCOE metric on the other hand will tell whether SUPER PV is a viable energy source in different regions of Europe.

KPI 4 - Performance Ratio (PR)

The Performance Ratio (quotient of AC yield and the nominal yield of the generator's [DC]) is a globally accepted indicator to judge the performance of grid connected PV Plants. PR is affected by the solar module's operating temperature, inverter's conversion efficiency, soiling (dust, snow), shading, wiring losses and electrical mismatch between solar cells and between modules.

KP5 - Reduction of lifecycle costs per kWh, expressed by the Levelized Cost of Energy

The LCOE is one of the solar industry's most commonly used metrics and it is also widely used to compare lifetime performance of different electricity generating technologies.

KP6 - Recyclability and environmental footprint of solar modules

Life Cycle perspective approach will be adopted to assess this technology and, specifically, Life Cycle Assessment (LCA) methodology will be applied, following the ISO 14040 and ISO 14044. Special attention will be paid to resources consumption and materials recovery.

Scope of Super PV

To achieve ground breaking impact on cost reduction, the project concept tackles in an **integral way the following three cornerstone** steps impacting PV system performance and, thus, LCOE:

Introducing and combining five PV **module innovations** applied to c-Si based bifacial modules and CIGS modules.

Module Level **Power Electronics** (MLPE) developments ensuring higher power output, performance monitoring and data collection on string level, and long term stability of operation.

PV system integration and process innovation, developing a new digital and holistic process: PIM (PV information Modelling/Mgmt.)

Ambition for Super PV cumulative LCOE reduction

The SUPER PV project aims to demonstrate an innovative PV system **LCOE reduction of 26-37%** by adopting a hybrid approach, combining technological innovations and Data Management methods along the PV value chain.

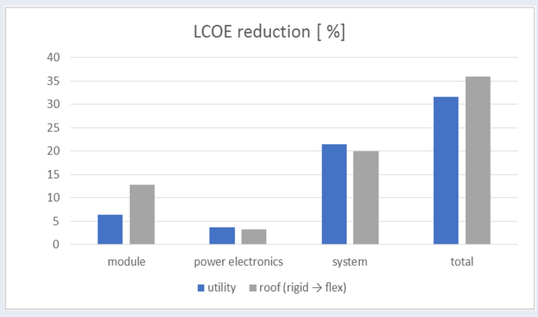
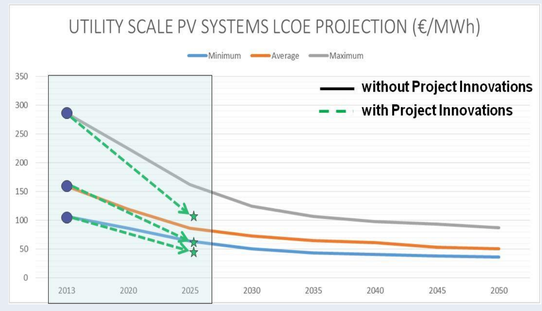


Figure above is presenting cumulative picture of targeted by SUPER PV cost reduction expressed by LCOE relative to reference products reduction for each of value chain steps addressed by the project (PV module, PE and system integration).

Taking into account predictions for PV system cost reduction according to various sources, by the planned end of the project in 2022 SUPER PV systems will be **superior product on the worldwide market,** according to the figure below regarding utility scale. Concerning Rooftop PV systems, a similar impact on LCOE is expected for SUPER PV innovations.



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