Update April 2022

European Commission

INNOVATION FUND

Driving clean innovative technologies towards the market

TANGO: ITaliAN PV Giga factOry

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

Project summary

The TANGO project will develop an industrial-scale pilot line in the South of Italy for the manufacture of innovative, high-performance photovoltaic (PV) modules, increasing production capacity by 15 times, from 200 MW to 3 GW per year. Production will include bifacial heterojunction (B-HJT) PV cells, which offer a very important effective efficiency improvement of up to 20%, relative to current state-of-the-art cells, and an innovative module design called “Tandem” structure. The modules produced in one year (3 GW) will have the potential to generate 5 445 GWh of renewable electricity per year. Once installed, all the modules produced over the first ten years of operation have the potential to avoid up to 25 Mt CO_2eq emissions. The main innovation lies in scaling up production of these cells to a gigawatt scale – a key goal for the European PV industry. The gigawatt-scale factory will foster European technology leadership in the manufacture of next-generation PV modules, thereby contributing to the reduction of energy dependency in Europe and improving European competitiveness in PV manufacturing.

COORDINATOR
Enel Green Power Italia SRL

LOCATION
Catania, Italy

SECTOR
Solar energy

AMOUNT OF INNOVATION FUND GRANT
EUR 117 675 100

ESTIMATED CAPEX
EUR 592 471 577

GHG EMISSION AVOIDANCE
25 Mt CO_2eq

STARTING DATE
01 January 2021

PLANNED DATE OF ENTRY INTO OPERATION
Q4 2023

Climate Action

The first European industry-scale manufacturing of high-performance PV modules

The TANGO project is the first Multi GigaWatt realisation of the manufacturing process of PV panels based on HJT G12 bifacial cells, which maximize the average production of energy compared to standard PV technology and minimize the levelized cost of electricity. Such high-performance PV cells can respond to light on both front and rear surfaces, therefore capturing more sunlight. This unique feature offers an effective efficiency improvement of up to 20%, by increasing the energy output from a given module area without any major additional cost. Moreover, the project intends to apply the Tandem structure to B-HJT solar cells; this innovative structure combines cells with different spectral band gaps in one module. The spectral band gap is the minimum energy required to excite a current by a photon. Combining cells with different band gaps allows the efficiency limit of conventional modules, imposed by the cell's band gap, to be overcome.

The introduction of a completely automated system will help scale-up the production. This automation includes innovative techniques, such as automated in-plant assembly of PV panels, distributed electronic solutions for plant performance optimisation, automated systems for plant monitoring during construction and operation, as well as predictive maintenance of the plant.

A project to foster renewable energy production in Europe

Renewable energy sources and technologies are the backbone of the European Green Deal strategy aiming at a climate neutral economy. The EU is committed to becoming a world leader in renewable energy, both in terms of the share of renewable energy consumed (27% in 2030) and the development of next generation renewable energy technologies. The TANGO project will contribute to the deployment of renewable energy at the gigawatt scale, helping to reach Europe's 2030 target while invigorating the European supply chain of the photovoltaic industry. Furthermore, the project will reduce the environmental impact of PV production, creating direct and indirect jobs in the local economy.

The project will have an annual production capacity of 3 GW, which represents the potential to generate 5 445 GWh of renewable electricity per year[1], sufficient to cover the annual consumption needs of more than two million Italian households[2]. The cumulated PV modules produced by the TANGO project over the first ten years of operation and scheduled to be installed in EU (estimated at more than 15 GW in 2030) will potentially avoid 25 Mt CO_2eq of absolute GHG emissions[3]. This is equivalent to more than 30% of the 2019 GHG emissions from public electricity and heat production in Italy[4]. Moreover, the implementation of best practices for energy efficiency within the factory – such as the reduction of machine idling time and optimised factory layouts – will also support the creation of a less CO_2-intensive PV manufacturing site.

The project will also support the reduction of the environmental impacts of the overall PV value chain. It will contribute to circularity in the value chain by developing new recycling processes for end-of-life PV modules (e.g. recovering and reusing materials), and it will reduce the use of resources in the manufacturing phase. For example, decreasing the wafer and glass thickness and switching to smart-/multi-wire technology will save up to 70% of the consumption of silver paste, a key material in the production of PV cells. Thanks to the automation and optimisation of the production processes the amount of cell line scraps will also decrease, from 5% to 2% by 2030, achieving an overall less wasteful production process.

The project will also have a positive impact on the local economy, especially during the factory construction phase. It will contribute to the creation of both direct jobs (estimated to grow to around 1 000 jobs, including current ones, in 2024), and indirect jobs.

A technology with high potential for scalability at site and sector level

The TANGO project has high potential for scalability at project-level as it foresees further expansion of the production capacity, by installing additional production and assembly lines in existing buildings and constructing a new industrial building on the site. The European Green Deal has among its main objectives to achieve ~500 GW of European PV capacity by 2030, and the TANGO project can become a model for other gigawatt-scale PV factories to be developed in Europe over the coming years, highlighting its high potential for scalability at the sector level.

Overall, the TANGO project will reinforce the value chain in the upstream European PV industry, as the set-up of other gigawatt-scale factories in Europe will boost the production of raw materials and components (i.e. glass, plastic, aluminium, wafers and ingots). Thanks to its replicability and gigawatt-scale production of PV panels, TANGO will lead the way in the renewal of the European photovoltaic industry – an industry based on competitive next-generation PV technology and high environmental standards.

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1 Using a factor of 1 815 MWh / MW installed.
2 In 2019, the average consumption of a household in Italy was 2 633 kWh.
3 Using the Innovation Fund methodology LSC-2020.
4 The public electricity and heat production sector in Italy produced 66.9 Mt CO_2eq in 2019 https://climate-energy.eea.europa.eu/topics/climate-change-mitigation/greenhouse-gas-emissions-inventory/intro