

CALL FOR START - UP

Enel is about to launch a global Call for startups to select innovative projects in the field of the Renewable Energies.

Applications are accepted from any country and can be submitted from the 27 of September to the 15 of November through the site Open Innovability ([http\:\: www.openinnovability.enel.com](http://www.openinnovability.enel.com))

1. Target

The call is open to both individuals and companies that have developed a new product/service that could be of interest for the ENEL Group, pertaining to one or more of the following technology strategic priorities:

- New module technologies for solar generation
- Components and devices for optimizations of the performances of renewable plants
- Automation and artificial intelligence for construction and maintenance of renewable plants
- Hybrid generation systems from renewable sources
- PV Floating solutions
- New technologies for augmented reality and increased safety
- Innovative digital services for energy (IoT, Big Data Analytics, Predictive and automatic O&M)

The innovative solution must have a solid technical and scientific background and it should have been already demonstrated, even at a preliminary stage, in an operational environment, (from 6 to 8 in a TRL scale). The applications will be also evaluated in terms of business potential and quality of the team. IP protection and availability of early stage customers are considered valuable assets.

2. Topics

Below the details of what Enel is looking for:

New module technologies for solar generation

Enel needs to evaluate new potential disruptive technologies in the field of PV modules technologies, with the aim to increase the performances of photovoltaic plants and reduce the Levelized Cost of Energy (LCOE). We are willing to scout both the most promising technologies of solar panels on market scale for competitive installations and components/materials for integration in the new module that is being developed in our factory.

Components and devices for optimizations of the performances of renewable plants

Enel has the goal to integrate new devices and plant architectures for cost reduction and performances optimization. An example in this field is related to the maximization of the efficiency of power generation plants from renewable sources through distributed power electronics. We are searching for feasible, scalable and cost-effective solutions, almost ready for testing on a full scale.

Automation and artificial intelligence for construction and maintenance of renewable plants

Enel is looking at integrating autonomous operative robots/drones/vehicles and algorithms for robot navigation and control (based on machine learning and artificial intelligence techniques) for industrial applications. In particular, the robots will support construction and/or maintenance/inspection/cleaning of renewable power plants in order to reduce time and costs of operating workers on field (enabling technology for Digital transformation and Increase intrinsic safety level of O&M and construction activities).

Hybrid generation systems from renewable sources

Enel needs to scout, develop and install hybrid generation systems from renewable sources. On this item, we are searching for quickly deployable and competitive solutions of hybrid systems for the production of energy from combined renewable sources (eg solar PV + solar thermal + wind + geothermal+ hydro+ marine energy). The proposals must be already successful tested on a lab/reduced scale. Furthermore, the hybridization aimed at producing at the same time electric power and thermal energy from renewables will be considered. The possibility to cover the load in particular cases (e.g. mines) with, for example, hybrid redeployable systems.

PV Floating solutions

Enel is considering to install PV Floating systems in the areas in which no land or dry surface is available; various advantages are envisaged (e.g. the possibility to reduce the water evaporation from the water basin). Moreover, the possibility to consider water basins for other uses (e.g. Hydroelectric) is under evaluation. We are searching for quickly deployable and competitive solutions for PV Floating plants.

New technologies for augmented reality and increased safety

Enel aims to reduce the risk of accidents of operators by enhancing operations ergonomics, both in operating sites and in shipyards, adopting smart solutions (for example by automating some operations or including smart aides tools such as augmented reality).

In this frame, the goal is to develop smart technologies and innovative systems to improve workplace safety by using wearable smart sensors connected to IoT platforms, apps on smartphones, smartwatches or other smart devices. The solutions must be certified products.

Moreover Enel is looking for development of solutions of Increased Reality Techniques / Virtual Reality and their Applications in Renewable Systems in the Field, in order to optimize the activities, reducing the costs and increasing the safety (Operation and Maintenance, training, shipyard activities -inspections, engineering activities)

Innovative digital services for energy (IoT, Big Data Analytis, Predictive and automatic O&M)

Enel needs to increase the ability to make diagnosis and predict failure conditions on components and systems in renewable Power Plants. Therefore, the goal is to integrate Big Data Analysis techniques and IoT infrastructures (collecting data by the distributed sensors) for applications such as maximizing the production/operational efficiency and predictive maintenance of power plants. In particular, we need to measure on field all the parameters, analyze the correlation between the factors affecting the performances of the plant through Big Data Analysis, automatically detect the anomalies/underperformances and at the end perform predictive maintenance of the plants.

3. Enel's value proposition

The selected teams will have access to the acceleration program at the Enel Innovation Lab (EIL) of Catania (Italy). Each team will be hosted in an independent incubation module. All the tenants will be allowed to use the common areas and facilities of the EIL devoted to the acceleration program. A comprehensive support program will be activated for each team:

- EIL indoor and outdoor technical facilities, as testing fields, measurement and qualification labs, experimental setups, will be available for the improvement of the innovative products and for their certification process;
- ENEL will introduce the tenants into its the global technical and commercial ecosystem, promoting innovation partnerships and commercial opportunities; also synergies with other innovators hosted by the worldwide ENEL Innovation Hub network will be pursued EIL;
- dedicated showcase events will be organized to promote the accelerated companies;
- a dedicated coaching program will be delivered by senior professionals to address the fundamental challenges of the start-up to scale-up process (value creation, sales process, business model, organization of the production, market strategy); teams will be also supported in searching investors and accessing European public funds for innovation specifically available in the region and in the other EU programs.

The acceleration path will be modulated accordingly with the profile of the new venture, and it will be periodically revised and optimized. A typical duration will be of 12 months.

Innovators from non-EU countries will be supported to access the Start-up VISA program by the Italian Ministry of the Economic Development.

In relation to the technical and testing areas, Enel will offer the access to the following facilities and equipment. The Lab is accredited according to the ISO IEC 17025 and CEI EN 61215 - 61646 standards for PV modules qualification.

PV Indoor LAB

In the indoor laboratory, accelerated ageing tests are carried out for analyzing PV modules reliability and durability. The equipment generate highly stressing conditions simulating in a short period of time an outdoor exposure equivalent to the lifetime of the module, to allow a quick assessment of the reliability and durability of solar components. Main equipment are climatic chambers controlling temperature and humidity, UV chamber, equipment for mechanical stress test, salt mist corrosion chamber.

PV Outdoor LAB

Innovative solutions for both components and systems are tested on outdoor structures: module cleaning systems, protective coatings and antisoiling, soil coatings designed to improve plant performance. Moreover, the best photovoltaic technologies are compared in a test bench station through tests under real operating conditions. The main equipment are: outdoor fixed structures for mounting and testing experimental PV strings with electronic loads, bi-axial solar tracker with electronic loads, PV modules test bench with inverters, area for future installations.

Solar Simulator

The equipment allows to estimate the performance PV modules and cells. The system measures the power generated by a photovoltaic module with great precision under controlled conditions, at different irradiance levels and it is able also to measure the spectral response of a module. It allows to verify the rated power declared by the manufacturer and to detect and measure the power reduction of modules due to aging processes.

Electrical tests Lab

The equipment measures with high accuracy the electrical resistance between the frame and the cells of a PV module both in dry and wet conditions according to the current standards. Evaluation also of the electrical continuity of the module frame toward ground.

Radiometric station

The main climatic variables and the solar radiation of the site are continuously and accurately monitored in this station. Historical data sequences are generated for the analysis of the performances of solar devices. Main equipment are: biaxial tracker with high precision with pyreliometer and pyranometers for measuring the components of solar radiation (global, direct, direct normal and diffuse horizontal irradiance), radiometers UV A and UV B, instrumentations for the measure of pressure, humidity, temperature, wind speed and direction.

Electroluminescence LAB

The equipment allows to detect visible and not visible defects in solar modules (such as cell micro breakage, faulty connections, defects of the process, shunt, areas of high resistance to the current). Main equipment are: bench for visual inspection test, Electroluminescence (EL) device, thermography camera. During EL test, constant current source is connected to the module's contacts and a highly sensitive cooled CCD camera is used to record the luminescence emissions from the PV device.

Storage/Microgrid LAB

Different configurations of storage + photovoltaic systems for residential applications are studied, with the aim of finding the most suitable, stable and secure configurations to meet the needs of the end customer. In addition, home automation systems are being studied which will allow the customer to manage energy and load production, making it potentially autonomous from the network. Software platform for aggregation of DER (distributed energy resources) are also studied and tested in a proper scenario (that can be simulated through the Microgrid equipment).

Main equipment are:

- Residential Batteries + related inverters
- Small controllable Electronic loads (1,8kW 1-phase / 5,4 3-phase)
- Working stations for hardware/equipment control
- 1-phase wireless meter + control/monitoring platform
- Microgrid Electric simulator (capable to simulate off-grid/on grid scenario and connect up to 20 different devices to the same network)
- 1 Genset 60kVA
- 1 Controllable 3-phase Electronic load 40kVA
- Dedicated subnet to manage the installed devices/hardware/end-points

Spectrophotometer laboratory

An UV-VIS-NIR spectrophotometer (280 nm-2300 nm) is available in the optical laboratory. The equipment allows the measurement of the spectral optical properties of the material surfaces. Namely, the equipment measures the spectral solar absorptance and transmittance and the solar reflectance at different angle of incidence.

Outdoor test station for Solar concentrating Systems (CPV – CSP)

An outdoor area and facilities, equipped with a meteo radiometric station for the accurate measurement of the electric and thermal performance of concentrating solar systems (HCPV systems - High Concentration PV systems; CSP).

The testing facility is also designed to measure the performance of co-generative systems based on parabolic dish sterling engine or CPV technology able to produce both electric and thermal energy; also little hybrid systems could be installed and tested.

PV Floating

The tests on PV Floating systems can be carried out using:

- The test facilities present in the lab (e.g. solar simulator);
- The water basin present in the area; this is equipped with a floating platform in order to support and make easier the tests execution in the basin

New technologies for Augmented Reality and increased Safety

The Lab is equipped with appropriate spaces to test advanced safety systems, devices based on smart technologies, and innovative systems to improve workplace safety by using wearable smart sensors, apps on smartphones, smartwatches or other smart devices, as well as Augmented Reality systems.

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