

Enel GP Innovation Competition Regulations

1. Introduction

Enel Green Power S.p.A. (hereinafter "Enel GP"), the Enel Group company dedicated to developing and managing worldwide energy generation from renewable sources is looking for low-cost solutions for technical issues and problems that Enel GP group encounters in its daily renewable energy production activities. To this purpose, effective on 16/03/2018, Enel GP has launched on Enel group Open Innovability platform [www.openinnovability.enel.com] an innovation competition on one (1) issue to be solved (hereinafter the "Competition").

2. Description of the issue

The Competition is relevant to the following issue:

1) An alternative solution for automatic installation of PV modules on tracker structure

Enel Green Power, in order to reduce the installation time of largescale PV plants and to reduce the risks connected to the health and safety of the operators, is working on robotic solutions to install automatically the PV modules on the tracker structure. In order to allow the automatic installation, Enel Green Power is looking for a PV module-to-structure coupling system fit for this purpose.

A complete description of the issue is attached to these Regulations as ANNEX 1.

3. Definition of Submission

The proposer who takes part to this Competition (hereinafter the "Applicant") will submit information through ENEL group Open Innovability platform [www.openinnovability.enel.com] related to the issues described in paragraph 2 (collectively referred to as the "Proposal").

4. Eligibility of participants

Participation is reserved exclusively to natural persons who are employees belonging to Enel companies at the time of the Competition launch, except for i) the people involved in the organization and management of the Competition, ii) the people admitted to the Open Innovability Portal back office, iii) the people that have worked in the past on E&C Revolution project, that work on it at the moment of the completion, or their spouses, partners or any of their relatives up to the fourth grade determined according to Italian law. It is the Applicant's responsibility to verify with the members of his/her kinship or spouse or partners (or with regard to his/her team members') whether any of them is connected in anyway to the Competition or the Open Innovability Portal and request (by e-mail to scouting_innovation_egp@enel.com), if necessary, any additional information to EGP to fulfill such obligation. Single employees as well as teams participated by employees are allowed to participate. In case the participation to the Competition by a team, the Proposal should be submitted by a representative who shall be the only contact person for the team in relation to the Competition and shall have full representation powers and responsibility toward the team. By applying to the Competition, the Applicant represents and warrants (also in representation of the members of his team, if any) that:

- 1) He/she and the member of his/her team are eligible to participate in the Competition.
- 2) All the information contained in his/her Proposal is true, accurate and complete;
- 3) He/she has viewed and accepts the privacy policy of the Enel Open Innovability platform;
- 4) The Applicant has not breached any laws in his/her country of residence regarding the legality of entering the Competition;
- 5) The Applicant is not in a position of conflict of interest with the Competition;
- 6) To his/her best knowledge, his/her Proposal does not: (i) violate the rights — including, but not limited to, copyrights, trademark rights, patent rights, or privacy rights— of any third party; (ii) prominently feature any trademarks or logos;
- 7) The Applicant releases and undertakes to hold harmless Enel GP, and its subsidiaries, affiliates, employees and agents from any and all liability or any injury, loss or damage of any kind arising from or in connection with this Competition or any prize won.

Enel GP reminds all applicants that the Enel GP has adopted and adheres to the principles set out in the Code of Ethics, Zero Tolerance for Corruption Plan and in the Global Compliance program pursuant to Italian Legislative Decree 231/2001 of the Enel Green Power Group, which currently may be found at <http://www.enelgreenpower.it>. The Applicant hereby acknowledges the Code of Ethics of the Enel Green Power Group as binding to them and confirm that they will adhere to it. The Applicant also acknowledges that Enel SpA has approved the Enel Global Compliance program (“EGPG”), which was drafted taking into accounts the main international conventions against corruption (i.e. Bribery Act; Foreign Corrupt Practice Act; etc.) and which shall be adopted by all non-Italian subsidiaries of the Enel Group Enel Group

Enel GP reserves the right to reject any Proposal that does not comply with these Regulations.

5. Payment

The best Proposal will be awarded with 5,000 euro. If no Proposal is deemed deserving by Enel GP’s evaluation committee, no prize will be awarded. If the winning Proposal is submitted by a team, the payment shall be made pro quota to each of its members. If more than one proposal is selected, the prize amount will also be distributed pro quota among the winners (ex-aequo).

Payment will be made in Euros, or if required by the winner’s local law, in its local currency equivalent based on the foreign exchange rate in effect on the date of the communication to the winner of the outcome of the Competition. The above amount represents a complete payment, net of any taxes that Enel GP is required to withhold, for any Accepted Proposal.

6. Application

Proposals will be submitted exclusively online through the Enel Group Open Innovability platform [www.openinnovability.enel.com] and shall be exclusively in English. Proposals submitted by any other means will not be considered. Proposals will be submitted in a single stage, by submitting an online Proposal, which will include:

- 1) Information about the Applicant; in case the Applicant is a team, the person submitting the application shall be automatically treated as the team authorized representative; each team member must meet the eligibility criteria set forth above and must be indicated in an attached file “TEAM Composition”;
- 2) Information about the Proposal [for more details, please read the issue description and the ANNEX 1];
- 3) A list of all rights of ownership and licenses in pre-existing intellectual property rights, when applicable
- 4) Possibility to upload documents for a maximum of 5 files

Applicants are strongly recommended not to wait until the last minute to submit the Proposal. Failure of the proposal to arrive in time for any reason, including extenuating circumstances, will result in rejection of the Proposal.

7. Phases and deadlines

The Competition is structured in the following steps:

Phase 1 – Submission

It will be possible to submit Proposals on the Enel Group Open Innovability platform [www.openinnovability.enel.com] from March 16, 2018 to April 15, 2018 (within 23.59 CET). Enel GP may decide to extend the deadline, for a maximum of additional 30 days.

In order to be eligible for evaluation, Proposals should be complete and submitted before the deadline through the Competition platform; Applicants must accept these Regulations, the Terms of Usage and Private Policy of the Open Innovability platform, as well as declare under their own responsibility, when applicable under the relevant law, the ownership or right of usage of any intellectual property rights involved in the proposal and the absence of conflicts of interest.

Each submission must include the following:

1. Detailed description of the proposed solution that must meet the Solution Requirements

- reported in the description of the Competition (see the platform and Annex 1).
2. Rationale as to why the Applicant believes that the proposed solution will work. This rationale should address each of the Solution Requirements and in general described in the Detailed Description and Background should be supported with relevant examples.
 3. Data, drawings, case studies, references or any additional documents that supports the proposed solution.

Communication to participants: after a formally valid submission, the applicants will receive a confirmation by email.

Phase 2 – Evaluation

Enel GP, availing itself of both internal and external resources, as deemed fit, will evaluate the Proposals from April 16 2018 to May 31, 2018 (within 23.59 CET), with a proportionate postponement in case of extension of the submission deadline. The Proposals must satisfy the requirements specified in ANNEX 1 and they will be evaluated based on the criteria below (in order of importance):

- 1) Technical feasibility and potential: the proposed technological solution can be used and has a high level of quality and distinctiveness
- 2) Economics: Accuracy and credibility of the costs/benefit analysis
- 3) Business Potential: Relevance of the technology proposed to generate economic value
- 4) Applicant credibility: experience in technology or industry, educational qualifications, credentials, team composition (if the proposal is subscribed by a team)
- 5) Presentation of the Proposal: Completeness and clarity of the material.

The Proposals lacking major elements for their proper evaluation or manifestly unsubstantiated will be discarded.

Communication to participants: Specific communication will be sent to the winner and to the unselected applicants.

Phase 3 – Winner Announcement

By July 15, 2018 (within 23.59 CET), with a proportionate postponement in case of extension of the submission deadline, Enel GP will contact the winner asking for some additional information in view of payment which will be made to each winner by Enel GP within approximately 90 days after the completion of Enel GP's verification procedures and the submission by the Applicant of the required declarations. Payment is conditioned upon the winner's cooperation with Enel GP's verification procedures. Moreover Enel GP will ask the winner the tax code (or the VAT number if a legal entity) and a certification of the winner's signature from a Public Notary or its foreign equivalent.

After the payment to the winner, Enel GP will publish the name and the details of the winner of each issue with a description of their Proposal and the reasons for their choice on the Open Innovability platform, Enel.com and enelgreenpower.com websites and Enel Group's social channels (Facebook, LinkedIn and twitter).

8. Intellectual property rights

8.1 For the purpose of these Regulations, "Intellectual Property Rights" also abbreviated "IPRs" means rights in, to and under:

- i. inventions, patents, patent applications and statutory invention registrations;
- ii. know-how such as any information, including, without limitation, product designs, processes and processing methods, apparatus specifications, production specifications and techniques, raw material specifications and sources, test methods and standards, manuals, invention records,

formulae, calculations, research records and reports, and marketing surveys and reports, which are possessed and known in any form whatsoever, whether communicated orally or embodied in plans, drawings, photographs, tapes, discs, memoranda, notes, reports, studies, or samples, and whether such information is patentable or not patentable;

8.2 With the exceptions of those instances where the ownership of all the rights, including, but not limited to, all intellectual property rights is reserved to the Applicant's company employer under the applicable law, the Applicant, by submitting the application, ensures and guarantees that he/she owns and/or has obtained any and all consents, approvals, or licenses required in order to make the Proposal and by participating to the Competition and that no third party rights are breached; in such latter event, Enel GP is not requested to verify the authenticity of the ownership of the rights of the proposal and any issues derived from third party claims that may arise are the solely responsibility of the Applicant; nonetheless, Enel GP reserves the right to disclose the identity of the Applicant to any third party claiming that the material posted or uploaded by the Applicant to the Competition platform [www.openinnovability.enel.com] constitutes a violation of their IPRs, or their confidentiality/privacy rights. Enel GP reserves the right to ask for additional evidence or documents to validate that all information supplied by applicants is true and complete;

8.3 Applicant is aware that participation in the Competition does not grant any protection to intellectual property rights ("IPRs") disclosed by the Applicant. Although the Proposals may refer to an innovative and creative use of already existing tools that cannot be protected as an intellectual property right, it is possible that IPRs are involved in the Proposal. In such case, Enel GP recommends that Applicants provide adequate protection to their IPRs prior to submission of the Proposal, as following the submission or any relevant information published on the Enel Open Innovability platform (including information about the winner) the IPRs may enter the public domain, thus losing the chance of being protected. Enel GP waives any liability connected to the use of unprotected IPRs by the Applicants.

Where industrial and intellectual property rights, including rights of third parties, exist prior to the Competition ("pre-existing intellectual property rights"), Applicants shall establish a list which shall specify all rights of ownership and use in the pre-existing intellectual property rights and must submit this list when the Proposal is submitted as its attachment. No Proposal will be awarded in case such third parties have been granted exclusivity rights to use and further develop such Proposal.

The information submitted will not prevent Enel GP from independently developing the same or similar expertise or physical assets and offering their services to any other party

9. Enel GP rights on submissions

By entering this Competition It is also understood and accepted that, in any event,

- 1) Enel GP has the right to (and is licensed to with no extra charges) (i) use, review, assess, test, and otherwise analyze Proposals and all their contents in connection with this Competition; and (ii) feature Proposals and all their contents in connection with this Competition (including but not limited to internal and external presentations, tradeshow, and screen shots of the Competition entry process in press releases) in all media (now known or later developed);
- 2) The Applicant agrees to sign any necessary documentation that may be required for Enel GP and its designees to make use of the rights granted above;
Enel GP may have developed or commissioned materials similar or identical to the Proposal and any claims resulting from any similarities to the Applicant Proposal is waived;
- 3) Enel GP cannot control the incoming information disclosed to Enel personnel in the course of entering the Competition, or what Enel personnel will remember about any Proposal. It is also understood and accepted that Enel GP will not restrict work assignments of the personnel who have had access to the Proposal. By entering this Competition, the Applicant agrees that Enel GP cannot be held liable under this section or copyright or trade secret law for the use of information which Enel personnel may retain in their memories while developing or deploying our products or services;

- 4) After the winner announcement, Proposals may be posted on a website selected by Enel GP or viewing by visitors to such website. Enel GP is not responsible for any unauthorized use of the Proposal by visitors to such website. While Enel GP reserve these rights, is not obligated to use the Applicant's Proposal for any purpose, even if it has been selected as a winning Proposal.

10. Changes to Regulations

BY submitting the Proposals, Applicants acknowledge and accept that Enel GP could vary these Regulations at any time. This includes changes to dates for deadlines and events, locations or specifications of the Competition.

Enel GP will post any change to these Regulations on the Competition platform [www.openinnovability.enel.com]. Applicants should regularly visit the Competition platform to check if any update of the Regulations has been posted.

11. Conflict

In the case of any conflict between the terms of these Regulations and the Terms of Usage of the Open Innovability platform, these Regulations shall prevail

12. Cancellation, changes or suspension of the Competition in case of irregularities in the Competition

If someone cheats, or a virus, bug, internet bot, catastrophic event, or any other unforeseen or unexpected event that cannot be reasonably anticipated or controlled (also referred to as force majeure) affects the fairness and/or integrity of this Competition, Enel GP reserves the right to cancel, change, or suspend this Competition. This right is reserved whether the event is due to human or technical error. If a solution cannot be found to restore the integrity of the Competition, Enel GP reserves the right to select winner from among all eligible entries received before Enel GP had to cancel, change or suspend the Competition. If any Applicant or member of a team attempts to compromise the integrity or the legitimate operation of this Competition, or if Enel GP has reason to believe that an Applicant or member of a team have compromised the integrity or the legitimate operation of this Competition by cheating, hacking, creating an internet bot or other automated program, or by committing fraud in any way, Enel GP may seek damages to the fullest extent permitted by law. Further, Enel GP may disqualify and ban any unfair participant from any future competition.

13. Costs and taxes

Any cost and tax relevant to the participation to the Competition or the receipt of payment shall be exclusively borne by the Applicants. Applicants are requested to check the applicable costs, duties and taxes according to the laws of the jurisdiction where they reside or where are otherwise obliged to pay taxes.

14. Limitation of liability

In addition to any other limitation of liability contained in these Regulations, Enel GP is not liable for possible deficiencies of the platform. Enel GP is not responsible for problems regarding computers, networks or any other reasons that may lead to lost, damaged or late entries.

15. Future collaborations

Winning the Competition does not give any other right than receiving the payment. Nevertheless, Enel GP may, at its sole discretion, negotiate with winner and other Applicants future agreements.

16. Governing law and jurisdiction

The Competition is ruled by Italian law. Any disputes shall be exclusively set by the Courts of Rome.

ANNEX 1 Competition Description.

TITLE: An alternative solution for automatic installation of PV modules on tracker structure

ABSTRACT

Enel Green Power, in order to reduce the installation time of large scale PV plants and to reduce the risks connected to the health and safety of the operators, is working on robotic solutions to install automatically the PV modules on the tracker structure.

In order to allow the automatic installation, Enel Green Power is looking for a PV module-to-structure coupling system fit for this purpose.

SCENARIO

The cost of large-scale PV plant has dropped dramatically in recent years.

These reductions are driven in large part by economies of scale as well as technological improvements and lower-priced panels manufactured in China. The result is falling solar panel prices, inverter prices, and “soft costs” related to sales, permitting inspection, connection to the electricity grid, and the profit margins of retailers and installers.

In this scenario an important key factor to reduce costs and to be more competitive in the different tenders around the world is the reduction of the installation time.

Taking into account that large scale PV power plants are under construction in different countries in the world often in challenging environmental conditions (i.e. desert) and that installation is currently completely manual with potential risks for the operator health, it is under analysis and study the adoption of automatic systems to use during the erection.

The largest part of large scale PV plants under construction use the tracker technology with the goal to follow the sun during the day and to increase the production of PV modules.

The main models of trackers selected by EGP for his project up to today are characterized as follow (rif. Att.1):

- Primary structure composed by piles supporting a torque tube
- Secondary structure composed by module supports (brackets)

The movement of the tracker is realized with a motor-actuator system led by a control system.

The framed PV modules anchoring system to the module supports (rif. Att.2), is currently mainly based on two different systems:

- Bolts and nuts
- Rivets

Both abovementioned elements connect the frame of the panel to the module support profile (usually the bracket).

The module support profile is designed to fulfill the following requirements:

1. Support the PV modules

2. Resist to the wind loads acting on the tracker structure
3. Allow the manual installation as easy as possible

The implementation of these requirements means module supports with very small thickness and significant flexibility. This situation is advisable for the manual installation, but it does not match the requirement of automatic installation, which needs high stiffness of module supports and small installation tolerances allowed.

THE CHALLENGE

Enel Green Power is looking for a modules-to-structure coupling system fit for purpose to be used with robotic solution installing the modules.

Any proposed solution should address the following **Solution Requirements**:

1. The proposed solution must allow the robot to install the PV modules automatically, without using bolting or riveting, or any other consumable, minimizing the movements and actions to be done as well as installation time (i.e.: the robot arm has to place in the right installing position the PV modules and then has to be allowed to fix them easily, for example with a slight movement and a light pressure on the modules)
2. The proposed solution must allow the robotic system to install the PV modules on the tracker. In particular, geometrical and dimensional tolerances (in the order of 1/2 cm) of the tracker should be compensated.
3. The proposed solution should be integrated as much as possible in the module support profile of the tracker, minimizing additional assembly activities on site, like bolting and riveting, coupling, jointing. No special process (e.g. welding) is allowed on site
4. The proposed solution has to guarantee the modules to be fixed without clearances (gap) between PV module frame and tracker secondary structure.
5. The proposed solution has to guarantee the respect of mechanical stress level allowed for the modules, during the installation phase and the operational one, according to the maximum load foreseen for the module (see Att. 3), in order to avoid damages (e.g. to the frame, the glass, the cells and the interconnections).
6. The proposed solution has to guarantee the respect of mechanical strengths required against external forces to properly fix the modules at the tracker (i.e. mechanical stress due to the action of the wind) in all the direction (i.e. the sliding effect has to be taken into account) See Att. 3
7. The proposed solution has to be fit for purpose for the entire lifetime foreseen for the trackers and the modules (i.e. 25 years) in harsh environmental condition; in particular, in case non-metallic materials are proposed, the ageing effect has to be taken into account
8. The proposed solution has to guarantee the electrical continuity between the modules metal frame and the structures

9. The proposed solution should allow the manual dismounting of the modules from the structure. The dismounting phase must not damage the modules and the structures. If possible, this phase should not require any special tool.
10. The proposed solution might include slight design change regarding the secondary structures (only the module supports). The tracker weight increase, transportation constraints, production technologies and overall costs, have to be assessed and reduced as much as possible
11. The proposed solution must consider the robotic solution has only one arm able to manipulate the PV modules from the upper side. No additional arms and no different manipulation approaches are possible
12. The proposed solution must be economically efficient when considering all costs (e.g. cost of device, installation of the device on the tracker, installation of the modules on the tracker, maintenance costs) in order to be amenable to mass deployment in PV solar plants. Additional costs when compared to the current market solutions should not be greater than 1 USD per panel.
13. The solution must be easy to install also manually. No maintenance should be required.
14. The proposed solution must be easily adaptable to typical solar trackers available on the market
15. The solution must use no toxic chemicals or have any negative impact on the environment
16. The proposed system should offer the Seeker “freedom to practice” or be available for potential licensing. There should be no third party patent art preventing the use of specific equipment and materials for their commercial application.

The submitted proposal should include the following:

1. Detailed description of the proposed solution that can meet the above **Solution Requirements**.
2. Rationale as to why the Solver believes that the proposed solution will work. This rationale should address each of the **Solution Requirements** described in the Detailed Description and should be supported with any relevant examples, cost analysis, simulations or technical assessment as deemed relevant by the Solver.
3. Data, drawings, case studies, patent and journal references or any additional material that supports the proposed solution.

Details of trackers and modules to be considered are available in the attached Regulation, as att. 1 and 2.