

The Machrek Energy Development - Solar Project

MED-Solar

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Abstract—The aim of this communication is to introduce the project MED-Solar, acronym of Machrek Energy Development. This project is part of the new European Neighborhood Policy (ENP), policy that seeks to reinforce relations with neighboring countries to the east and south in order to promote prosperity, stability and security at its borders. The main objective of this project is the promotion and implementation of innovative technologies and know-how transfer in the field of solar energy, including that stemming from private sector, and that may be implemented in particular or public facilities through public procurement processes.

Index Terms — MED - Solar, PV grid - connected plants, PV autonomous plants, PV back up plants.

I. INTRODUCTION

The MED-Solar project is linked to the multilateral Cross-Border Cooperation in the Mediterranean Sea Basin Program (CBCMED) [1]. This program is part of the new European Neighborhood Policy (ENP) [2] and of its financing instrument, named European Neighborhood and Partnership Instrument (ENPI) [3] for the 2007-2013 period.

The ENPI-CBCMED program has a budget of € 173 million and the Autonomous Region of Sardinia (Italy), as the Joint Managing Authority, is the responsible of its operational and financial management.

As a main objective, the ENPI-CBCMED program aims to promoting and reinforcing the sustainable and harmonious cooperation process between the European Union and partner country regions placed along the shores of the Mediterranean Sea by dealing with the common challenges and enhancing its endogenous potential.

In coherence with the general objective of this program, the 14 participating countries have agreed to define the following four priorities:

1. Promotion of socio-economic development and enhancement of territories, concentrating on innovation and research in key sectors for the cooperation area.
2. Promotion of environmental sustainability at the Basin level, pursued through the preservation of natural common heritage, the reduction of risk factors for the environment, the improvement of energy efficiency and the promotion of the use of renewable energy sources.

3. Promotion of better conditions and modalities for ensuring the mobility of persons, goods and capitals among the territories.
4. Promotion of cultural dialogue and local governance.

In this sense, the MED-Solar project is inscribed in the second priority and, more specifically, in the second measure of this priority, measure devoted to the promotion of renewable energy use and improvement of energy efficiency contributing to addressing, among other challenges, climate change.

This communication is devoted to introduce the MED-Solar project and describes how is organized the partnership of the participants entities, the main objectives proposed, the different tasks organization in order to accomplish this objectives and the main results expected at the end of the project.

II. PARTNERSHIP MEMBERS

Public and private actors, organized in Mediterranean cross-border partnerships, may participate in this program and the main beneficiaries include regional and local public authorities, non-governmental organizations, associations, development agencies, universities and research institutes, as well as private actors operating in the fields of intervention of the Program.

The cooperation area is defined by the 14 participating countries, which represent 76 territories and around 110 million people. These countries are: Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, State of Palestine, Portugal, Spain, Syria and Tunisia. The 76 eligible regions are showed in Fig.1 [4], and the applicant (or lead partner) must be established in the eligible regions.

The lead partner and leader of the MED-Solar project is the Spanish company *Trama Tecnoambiental* (TTA), based in Barcelona, Catalonia (Spain), one of the European eligible regions. TTA is an international consulting and engineering company that specializes since 1986 in distributed generation through renewable energy sources, energy management and efficiency, rural electrification and self-generation through distributed micro-generation, integration of renewable energy in buildings and sustainable architecture, as well as, specialized training and education and technological development.

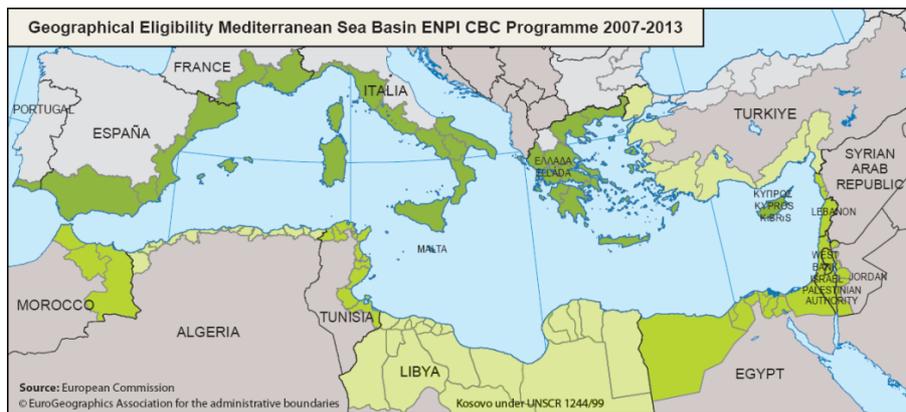


Fig. 1. Regions belonging to cooperation area (<http://www.enpicbmed.eu>)

The rest of the partnership is composed by the following organizations:

- *Universitat Politècnica de Catalunya - BarcelonaTECH* (UPC), from Catalonia (eligible region), Spain. UPC is a public institution dedicated to research and higher education, it was established in 1968 and is specialized in the fields of architecture, science and engineering.
- *Solartys*, from Catalonia (eligible region), Spain. It is a non-profit making, voluntary organization, with the purposes of encourage and help the internationalization of Spanish Solar Industry, develop an industry based on technology and innovation, and promote the networking and cooperation among Spanish companies, international companies and institutions.
- *Commissariat à l'énergie atomique et aux énergies alternatives* (CEA), from Rhône-Alpes (adjoining region), France. It is a public body established in October 1945 and leader in research, development and innovation. The CEA mission statement has two main objectives: To become the leading technological research organization in Europe and to ensure that the nuclear deterrent remains effective in the future.
- *Energy Research Center* (ERC), from State of Palestine (eligible region). It was established in 1996 by a decision of the Board of Trustees of An-Najah National University (ANU). The research centre is concerned with research, development, systems design, feasibility studies, training in all conventional and renewable energy fields, energy management and energy conservation.
- *United Nations Development Programme* (UNDP) - Lebanon, from Beirut (eligible region), Lebanon. UNDP has been operational in this country since 1960 and it aims to help in the identification of national needs and priorities, in an often rapidly changing development and security setting, in order to support the achievement of long-term development objectives.
- *National Center for Research and development* (NERC) \Energy Research Program, from Amman (adjoining region), Jordan. It is intended to perform studies, research, and experimental projects in the following

fields: Use of the local new and renewable energy sources to increase their contribution to satisfy the Kingdom's energy needs and to improve methods, incentives and advisory services of efficient energy use to decrease total energy cost on the national level and to protect the environment.

In their respective countries, all the partners are forerunners in the field of solar energy and part of the local dynamics in terms of solar and renewable energy development and implementation. The precise role assumed by each partner in the project development will be described in next sections.

III. PROJECT OBJECTIVES

The main objective of the MED-Solar project can be summarized as the research, promotion and implementation of innovative technologies and know-how transfer in the field of solar energy (specially photovoltaic) including that stemming from private sector, especially from SMEs (small and medium enterprises), and that may be implemented in private or public facilities (hospitals, schools, administrative buildings, etc) through public procurement processes.

The most important project implementations will take place in three partner countries (target countries), which are: Lebanon, State of Palestine and Jordan.

The energetic situation in these three countries is quiet similar because almost all the population is connected to the grid (close to 99.9%) but the electric power quality is very low. This weakness on the grid service (impossibility of having increase in the power supply, frequents interruptions or cuts-off, etc) do not allow neither the security of supply in critical facilities (as hospitals or schools) nor the proper development of the SMEs. In order to assure the electric energy supply to their installations, public and private sectors have to face huge investments in diesel back-up generators, which are extremely costly in terms of operation and provokes a high dependence towards foreign countries. It is possible that some European countries could have to deal with a similar situation in the near future.

The three target countries also have in common similar environmental and climatic conditions and a promising solar resource all the year round.

WP2 – Communication

This is also a transversal work package and, as a consequence it is active throughout the project.

The WP coordinator is *Solartys* and they will coordinate the dissemination activities and will be the responsible of promoting the enterprises and institutions participating in the project among their enterprises networks of European Companies and organizations from the target countries.

Local partners and TTA will identify current experiences that are taking place to look for synergies define standards and share practices. As well as getting benefits from studies already carried out. Local partners also will identify different events for dissemination of the project activities like local conferences and workshops.

This WP is subdivided in three main activities:

- Dissemination of main expected activities. During the course of the project there will be different events where the partners will present the proposal of the project in order to identify local and international participants with interest in the project development that could contribute to scientific discussions.
- Identification of experiences, definition of standard procedures and share practices. The first step for the right project development is the identification of national and international experiences that have been carried out or currently being developed to identify synergies and ensure that MED-Solar will implement the current projects and share practices with them.
- Dissemination of evaluation findings and results. Along the project the different results will be presented in local and international events previously identified by the partners. Once the pilot projects are installed there will be organized institutional and private visits to the implemented plants where stakeholders could observe the efficiency, sustainability and effectiveness of them.

This WP is devoted to the identification of the situation, promotion and dissemination of project results and knowledge acquired during implementation. The main expected results of this work package can be summarized as:

- Identification of experiences, share practices and getting benefits from studies already carried out.
- Scientific discussions and exchanges on the development and achievement of the project WPs.
- Identification and recruitment of participants, experts through corresponding member groups, which would benefit from and contribute to the project works.
- Articles published and presented at international conferences and seminars.
- Brochures of the project with its own logo.

WP3 – Capitalization of the results

This is the last transversal work package of the project and it is also coordinated by *Solartys*, and they will organize and coordinate workshops with key national and regional stakeholders. They will also promote the project through the current networks they have.

The partners in the target countries will have a major role in the identification of stakeholders and identification of dates and locations of the dissemination events.

This WP is subdivided in seven main activities:

- Creation of a contact database. During the whole project development, the different stakeholders identified will be set in a database for the current project activities and future programs or projects.
- Creation of cross-border networks. Identifying local and international stakeholders inviting them to the different events.
- Regular Workshops. It is proposed to organize the workshops with the following-up meetings to ensure the participation of all the partners. It is planned to have 50-120 people participating in the four planned workshops.
- Training activities. With the technological development and the pilot plant implantation different training activities will be held to ensure the project sustainability.
- Recommendations on regulation and legal Framework. With the knowledge of different partners in tariff schemes for PV solar energy the needs will be identified and the recommendations will be made following the target countries characteristics.
- Identification and information of financing mechanisms for new investments. In 2010 TTA made a preliminary market analysis to approach the potential that Egypt, Lebanon, Jordan, Israel, Syria and Palestine had regarding the development of PV projects that could attract EU private investment. It analyses both technical and economic aspects of each country, and offered a comprehensive list of benchmark indicators to summarize the current state and future development of PV in each country. This study will be complemented in the target countries during the development of this activity paying special attention on the future possibilities for financing part of the investment in future PV plants.
- Definition of strategy for the use of results in future. With the results of the previous activity, the contact database and the results of the pilot plants implementation by MED-Solar, a strategy will be defined for future implementations.

The main expected results of this work package can be summarized as:

- Bring together the key actors (public and private).
- Commitment of multi-stakeholder partnership.
- Strengthening of the capacities (public administration and civil society institutions) at sub-national level.
- Raise general awareness of the project works.
- Improvement of legal framework for future PV installation.
- Ensure the future project sustainability.
- Creation of a transnational network at the Mediterranean Basin level.

WP4 – Analysis and assessments in the target countries

The coordinator of this WP is TTA because of his experience in the analysis of the different grids in the target countries. TTA and the partners in the target countries will have an important role analyzing the legal framework, the different tariff schemes and the general data of the grids in these countries.

This WP is subdivided in three main activities:

- Analysis of legal framework. After this analysis some recommendations will be done to facilitate the integration of Solar PV to the National Grid and their interconnection. This issue may be the main barrier for the development of such systems.
- Analysis of tariff schemes. The propose of this activity is to identify this tariff schemes in each target country and make some recommendations on them (feed-in tariffs, direct subsidy, indirect financial support or others) to ensure a major implementation of PV in the target countries.
- Analysis of the national grid and characterization of the needs. The aim of this activity is to assess the main characteristics of the electricity grids in each target countries in order to understand the needs and technical constraints.

The main expected results of this work package can be summarized as:

- Accurate analysis of the current legal framework and tariff schemes in the target countries.
- Accurate analysis of the national grids in the target countries.
- Definition of feasible needs.

WP5 – Determination of requirements

The coordinator of this WP will be *Universitat Politècnica de Catalunya - BarcelonaTECH* (UPC) because as university they have a strong experience in technological development and training. This WP will focus on technological development where (TTA and the research centers UPC, CEA and NERC will have the main role in the R&D activities.

This WP is subdivided in four main activities:

- Definition of functionalities. After the previous analysis and assessments of the target countries situation, the technological functionalities of the PV plants will be defined in this activity. This activity will have a lot of local inputs and participation so that the functionalities are following the local requirements and ensure the future sustainability of the project.
- Development of technical specifications. Once the functionalities are identified the technical specifications will be defined during this activity.
- Benchmarking of R&D needs. With the functionalities and technical specifications defined, a benchmarking will be done identifying the R&D needs that have to been developed by the project partners.
- Benchmarking of training needs. First of all, an analysis of the local PV technology knowledge has to be done

between stakeholders. With the new technical specifications and the results of the analysis it will be possible to define the training needs in each target country.

The main expected results of this work package can be summarized as:

- Accurate definition of functionalities.
- Accurate definition of specifications.
- Clear view of the training and R&D needs.

WP6 – Development of appropriate technologies

TTA together with CEA will be the coordinators of this WP as they have experience and knowledge in the coordination of projects with PV technology development.

This WP is subdivided in three main activities:

- Simulation and validation of concepts. Before the fabrication of the electronic equipment for control and management, it is mandatory to realize a complete simulation of the behavior of such system in the different possible configurations.
- Technological development. Once the simulation has validated the new system architecture and the specifications of the Energy Management System, the technological development will start in order to have a prototype ready for testing, and then, used in the pilot projects.
- Laboratory tests. Once the technology is manufactured there will be a validation phase (activity 6.3) wherein the test of the technology will be done to ensure the proper running and the good functionalities of the devices.

The main expected results of this work package can be summarized as:

- Innovation in technology development.
- Successful testing and simulation of developed technology.
- Prototypes for Energy Management System which will be used in the pilot plants.

WP7 – Implementation of pilot projects

ERC and UNDP-Lebanon will coordinate this WP as they will be responsible of the pilot projects locally. They know the local needs and will identify the possible beneficiaries of the four pilot plants.

This WP is subdivided in four main activities:

- Institutional and local coordination. The aim of this activity is to define the coordination for the local installation of the pilot plants. During the development of this activity special attention will be paid to crosscutting issue of the equality of opportunity, non-discrimination, and respect for human rights.
- Selection of adequate site and beneficiary. An accurate process for the selection of the beneficiary will be done during this activity. Each partner in charge of the pilot project will have to determine selection criteria in order to select the adequate beneficiary.

- Procurement process. To ensure the sustainability of the project there will be defined a plan for the procurement process. A tender will be prepared for each activity or purchase that needs to be subcontracted to ensure the equality of opportunity and for the purchasing of equipment the “national rule” will be followed.
- Installation and set up of systems. Within this activity the pilot projects will be installed. In consequence with the needs of each beneficiary, there will be different points defined during this activity:
 - The sizing of the local pilot projects.
 - The site preparation and infrastructure.
 - The installation of pilot project.

The local partners have the main role to ensure effectiveness, efficiency and sustainability during the implementation.

The main expected results of this work package can be summarized as:

- Selection of adequate beneficiaries and site for the pilot plants.
- Definition of the design and size of the pilot plants.
- Accurate procurement process definition.
- Installation and commissioning of the pilot plants.

WP8 – Test and monitoring

NERC will be the coordinator of this WP as it is the main responsible of the final tests on the systems.

This WP is subdivided in three main activities:

- Technical monitoring. After the installation, the technical monitoring of the pilot plants will be done. The monitoring process will be used as well for training activities in the operation and maintenance of the pilot plants to ensure their future functionality.
- Socio-economic impact study. After the pilot plants are installed and commissioned, a socio-economic impact study should be conducted to demonstrate the cost-effectiveness and impact of the pilot plants, as well as the improvement of the situation of the target groups.
- Report on field system. With the monitoring and the impact study, a final report with the obtained results will be completed.

The main expected results of this work package can be summarized as:

- Visibility of the monitoring process.
- Ensure the correct development of the pilot plants.
- Ensure the right operation and maintenance of pilot project.
- Positive socio-economic impact.
- Final reports with results of the project.

V. CONCLUSIONS

As is reflected among the activities to be developed in the work package devoted to communicate the proposal of the MED-Solar project (WP2), this paper introduces what are main objectives, key activities and expected results of this project.

Taking into consideration the following issues:

- The current situation of the electric sector in the three target countries (State of Palestine, Jordan and Lebanon), which has led industries and public facilities to ensure their energy supply in order to assure the continuity of their activity along all the workday.
- The main solution implemented for palliate this situation has been the installation of diesel generators, because they can be used as back-up system during power outages and they increase the power capacity available for the factory or facility when the electricity distribution company is unable to increase the contracted power.
- This situation will not be easily solved in the coming, because the trend of the electric sector in the target countries points to an increase on the energy demand and on the oil cost, which have as a result a large increases on the National electricity bill and on the dependence towards others countries.

This project can become a tool to support industries and public facilities located in the target countries in order to find solutions to those problems that impede their proper operation and development.

Finally, this communication can be considered as one step more towards the construction of a transnational network, at the Mediterranean Basin level, where organizations of different nature (research and/or training centers, public administrations, manufacturing, distribution and/or installation companies, etc.) could collaborate under the frame of PV energy applications or, more generally, in the field of the renewable energies utilization.

REFERENCES

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