Impact of European Territorial Cooperation (ETC) on the promotion and use of solar energy in the Mediterranean

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The aim of this paper is to assess the contribution of European Territorial Cooperation (ETC) programmes operating in the Mediterranean area as a supporting way to achieve the renewable energy objectives established in European Union Directive 2009/28/EC. It addresses a combination of impact and thematic assessment applied to projects tackling solar energy over the period 2007–13. Observations indicate that although not always measurable, ETC contributions to the use and promotion of solar energy in the Mediterranean represent a key step forward in higher deployment. The paper also suggest alternatives to improve projects’ outputs to be delivered in the new cycle 2014–20.

Keywords: European Regional Policy; Territorial Cooperation; Impact Assessment; Renewable Energy; Mediterranean

Introduction

European Territorial Cooperation (ETC) is one of the two objectives of European Union (EU) Regional Policy and constitutes a key driver for the reduction of economic, social and territorial disparities in the EU’s territory. The ETC objective, also known as INTERREG, operates through 107 cooperation programmes of interregional, transnational and cross-border dimensions which co-finance projects according to specific priorities and needs of targeted areas.

Projects operating in the ETC framework respond to challenges encountered in diverse territories by implementing joint solutions based on soft actions which are materialized into common methodologies, shared knowledge and exchanges of good practices among others (European Commission DG REGIO, 2011). Taking the example of sustainable energy, over the period 2007–13 the ETC instrument invested about €1.2 billion to support related actions, which meant a contribution of nearly 8.7% of the total European Regional Development Fund (ERDF) (Wergles, 2014). Energy-oriented projects and results are normally aligned with national energy policies and plans (NREPs). Moreover, ETC outputs also integrate shared visions of territorial actors who in the framework of regional, transnational and/or cross-border cooperation give specific added value to the interventions (e.g., MARINAMED, 2014; ELIHMED, MARIE and PROFORBIOMED Projects, 2013).

In contrast, ETC has denoted a lack of effective coordination to find compromises between the requirements of EU regulations and the legal frameworks of the involved
member states (European Commission, 2011b). One of these compromises is linked, for instance, to the achievement of 20% with renewable energy sources (RES) established by EU Directive 2009/28/EC. According to the last progress report on renewable energy published by the European Commission, not all member states are on the way of achieving the established national objectives with RES by 2020. Some EU countries sharing Mediterranean waters (e.g., France, Spain and Malta) will need to assess whether their policies and tools are sufficient and effective in meeting their renewable energy objectives (European Commission, 2015).

Third countries can also benefit from ETC implementation throughout the coexistence of funding allocated to the instrument of pre-adhesion (IPA) or the European neighbourhood instrument (ENI) with ERDF. The cooperation promoted by these instruments and associated funds in the Mediterranean is possible throughout at least 15 different ETC programmes of transnational and cross-border categories covering specific geographical areas (e.g., MED Programme, 2015). According to KEEP (Interact Programme, 2012), in 2007–13 at least 104 projects addressing renewable energy were approved by ETC programmes in the Mediterranean.

As for the programming period 2014–20, a new regulation package aims to maximize the impact of European structural and investments funds (European Regulation, 2013a). A key novelty of this package is the integration of specific regulation for ETC (European Regulation, 2013b) and the definition of thematic objectives (TO) and investment priorities (IP) as a way to respond to the tendencies observed in the period 2007–13 where ETC programmes and projects operated by establishing diverse objectives with few place for synergies.

Therefore, the objective of this paper is to assess the contribution of ETC in the Mediterranean area as a supplementary way to achieve renewable energy objective established in EU Directive 2009/28/EC. The article pretends to give answer to the following research questions by addressing a joint thematic and impact assessment applied to the solar energy sector over the period 2007–13:

1. What are the characteristic outputs delivered by ETC projects addressing solar energy in the Mediterranean basin?
2. What have been the contributions of these ETC projects to the objective of renewable energy set up by the directive 2009/28/EC?
3. Are projects impact well measured in both short- and long-terms?

**Methodology**

The adopted methodology includes four steps: (1) desk research to obtain legal, policy and scientific references; (2) sample definition consisting of a selection of 14 projects co-financed by seven different ETC Programmes addressing solar energy in the Mediterranean; (3) data analysis and assessment of quantitative and qualitative aspects leading to the measurement of the relevance of results as a supporting way for the achievement of the renewable energy objective; and (4) validation of the obtained results through a survey addressed to several experts on ETC and solar energy.

**Type of ETC outputs assisting solar energy deployment in the Mediterranean**

ETC projects typically aim at tackling common challenges from several angles. Concerning the solar sector in the Mediterranean, analysed projects were oriented, for
instance, towards socio-economic aspects of solar energy sector (SHAAMS Project, 2014); policy and methodologies (REGIONS4GREENGROWTH, 2013); smart energy management (PV-NET Project, 2012) solar cooling systems (EMILIE Project, 2013) and solar power concentration systems (SOLEFLEX Project, 2012).

Although observed projects were framed in varied types of approaches, related outputs can be grouped according to three main categories: (1) diagnosis and common strategies; (2) demonstrative actions; and (3) transferability and capitalization. According to the analysis, 60% of assessed projects focused mostly on categories (1) and (2). Key outputs oriented to stimulate solar energy in the region were, for instance, the elaboration of databases; state-of-the-art reports; the design of common approaches and strategies; and the establishment of networks (category 1), virtual platforms, public consultations, energy plans, design of tools and pilot activities (category 2) and procedures, agreements, regulatory proposals, memorandum of understandings and policy recommendations for category 3.

What projects were delivered?

According to the analysis, 80% of projects focused on the solar energy sector as a whole (including all typologies: thermal, photovoltaic (PV) and solar thermoelectric). In addition, 60% of these projects also integrated energy efficiency and/or supplementary actions (e.g., mobility) into their working plans.

The fact of associating several solar sector typologies or associating them with other thematics may be justified with the risk of ignoring potentialities derived from hybrid systems or the shared infrastructure necessary for the maximization of the use of solar energy (e.g., smart grids, buildings).\(^5\) The nature of partnerships, which are highly represented by public authorities, also justifies the general choices made within local contexts under holistic approaches.* In contrast, projects opting for a more specific thematic (e.g., solar PV) normally would achieve a higher impact as they target more specific stakeholders and deliver more concrete results.* Also, projects tackling more explicit issues can contribute to a higher development of the related economic sector in the territories of reference.*

The assessment of the projects sample evidenced positive results obtained from a diversified typology of interventions which were addressed as a response to specific needs and challenges mostly identified at the local and regional levels. Accordingly, ETC contributed, inter alia, to develop skills in several types of public targets through training sessions; to define case studies to identify common and good practices; to support the energy-planning process of municipalities and regions; to raise awareness among stakeholders; and to conduct peer review of existent procedures and methodologies (Table 1).

On the other hand, as ETC programmes of the Mediterranean usually operate by addressing heterogeneous objectives and consequently limiting the establishment of synergies (Gomez Prieto, 2015), the analysis found that some projects also worked in isolation with little room for interactions among their related activities. Capitalization strategies were identified in just 40% of screened projects being weakly materialized through the establishment of punctual (rather than continuous) synergies with other ETC projects. To a lesser degree, 35% of analyzed projects developed joint activities with projects sponsored by the Intelligent Energy Programme. Finally, about 10% of projects
Table 1. Contributions of European Territorial Cooperation (ETC) projects addressing solar energy in the Mediterranean.

| Project                                      | Outputs                                                                 | Project                                      | Outputs                                                                 |
|----------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------|
| RETS ([www.rets-project.eu/](www.rets-project.eu/)): improves the knowledge of local and regional policy-makers in renewable energies | Good practices transferred, renewable energy watch system, collaborative articles, training activities | DIDSOLIT-PB ([www.didsolit.eu/](www.didsolit.eu/)): implementation of decentralized solar energy-related innovative technologies for public buildings | Comparative economic and technological review of solar cooling systems, training sessions, pilot applications of innovative solar systems in buildings, database on energy data, recommendations for local and regional governments on policies and regulatory frameworks |
| RELS ([www.projet-rels.eu](www.projet-rels.eu)): energy renovation through the promotion of RES | Database of good practices, implementation model of energy renovation, pilots, public consultations, case studies | MEDEEA ([www.interregmedeea.eu/index.php](www.interregmedeea.eu/index.php)): European energy awards and Sustainable energy action plans (SEAPs) | Catalogue of good practices, guidelines for municipalities, joint policy recommendations, database on energy data, signature of sustainable energy plans, SEAPs |
| REGIONS4GREENGROWTH ([www.regions4greengrowth.eu/](www.regions4greengrowth.eu/)): regional policy instruments to improve access to finance sustainable energy projects | Good practices, peer-review methodology: how to simulate investments in sustainable energy, action plans | SHAAMS ([www.shaams.org](www.shaams.org)): strategic hubs for the analysis and acceleration of the Mediterranean solar sector | Reports on the state of the art of solar renewable energy, best practices identification, stakeholders consultation, action plans, training activities, education plans, institutional agreements |
| SOLEFLEX (Soleflex_project): roadmap Andalucía–Morocco for thermolectric solar power development | State of the art on solar concentration power technologies, roadmap implementation of solar thermolectric energy in Morocco, indicators and support for policy-makers in decision-taking | ZEROCO2 ([www.medzeroco2.eu](www.medzeroco2.eu)): public–private partnership (PPP) scheme to achieve the zero-emission communities | Guidelines for setting up of PPPs, guidelines energy action plans, SEAPs, set of structural intervention |
| TEENERGY SCHOOLS ([http://teenergy.compla.com](http://teenergy.compla.com)): energy efficiency in schools | Energy audits in schools, action plans for public authorities, pilot activities in school buildings, technical guidelines, training | FOSTERinMED ([www.fosterinmed.eu](www.fosterinmed.eu)): fostering solar technology in the Mediterranean area | Context analysis reports in Mediterranean cities, training activities (technicians and students), pilot projects on solar PV as photovoltaic, OK as edited? photovoltaic (PV) installation, policy papers |
ENERMED (www.enermedproject.eu): Mediterranean renewable energies. Promotion of RES at the regional level
RESÍ (www.resiproject.eu): mainstreaming the use of solar energy on islands
Common methodology for RES promotion in regions Database of good practices Feasibility studies for future deployment of RES Database on renewable energy Solar energy atlas Good practices identification Action plans Renewable energy points
PV-NET (www.pvnetmetering.eu): promotion of PV energy through net metering optimization
ADRIACOLD (http://adriacold.eu): ‘Diffusion of Cooling and Refreshing Technologies using the Solar Energy Resource in the Adriatic Regions’
Best practices identification Pilot actions (solar PV) Evaluation and recommendations Work plans Performance assessment of existent plants (solar thermal and PV) Database of enterprises operating in the territories of reference Demonstrative pilot plants (small scale) Guidelines architectonical integration of solar plants Cross-border cluster
showed a certain interest, rather than concrete actions, in aligning activities with European Investment Bank (EIB) requirements/possibilities.

**Measuring the impact in the short- and long-terms**

Projects impact assessment was focused on the short- and long-terms. The first corresponds to project interventions normally carried out from the beginning of activities till the end of grants, while long-term is the period between the end of funding till 2020. Four variables commonly used for sustainable energy projects (Intelligent Energy Europe, 2013) were analyzed as follows:

- **Amount of reduced emissions of CO$_2$** (measured in tons-equivalent of petroleum – Toe). In 60% of cases, for both short- and long-terms, it was impossible to estimate or measure the project contributions to this variable. As for the remaining projects of the sample (40%), project interventions represented a reduction of CO$_2$ emissions between 100 and 1000 Toe in the short-term and up to 100,000 Toe in the long-term (i.e., to 2020).

- **Installed power with solar energy** (measured in megawatts – MW). For the short-term, 20% of projects contributed to installing power capacity in a range between 1 and 100 MW, corresponding mostly to demonstrative power plants (pilots). As for the long-term, 10% of projects estimate up to 1000 MW of installed power if proposed measures are implemented after the end of grants. Commonly to both short- and long-terms, 40% of projects did not contributed to this variable, while for the other 40% the variable remains impossible to calculate.

- **Renewable energy production triggered** (Toe). For project interventions framed in the short-term, these contributions referred normally to energy production of pilot power plants. Contributions were situated in from 1 to 100 Toe for 10% of cases. For 70% of projects it was impossible to calculate the amount of renewable energy, while for the remaining 20% there was no contribution. Concerning the long-term impact, estimations amount up to 100 Toe for 15% of projects, 1000 Toe for 10%, and 100,000 Toe for the other 10%. In 65% of cases, it was impossible to calculate.

- **Investments triggered** (€). In the short-term, one-third of projects triggered investments ranging from €100,000 to €1 million. In contrast, for the remaining 70% of projects, this variable was impossible to calculate. Looking to the long-term, investments could represent between €100,000 and €1 million for 20% of projects and more than €1 million for 10%.

In general, considering that 90% of analyzed projects did not integrate measurement of quantitative impacts in their working plan and about 70% of them included pilot power plants or demonstrative installations, the vision of consulted stakeholders suggests that every pilot activity carried out within a project should always include performance measures, otherwise the concept itself of pilot experience would be lost.* Measurement of key variables should be mandatory in all ETC projects.* Moreover, key performance indicators (KPI) and life cycle assessment approaches were also suggested to complement the measurement of projects’ impact.
Conclusions
ETC projects addressing renewable energy allow the coexistence of a multilevel governance around supplementary visions and objectives. This coexistence applies, for instance, in the interaction of EU policies, directives and initiatives (e.g., EU Regional Policy, Renewable Energy Directive and Covenant of Mayors Initiative), which motivate changes in member states on a mandatory or a voluntary basis (e.g., national renewable action plans and national policies) and are also supported by sub-national levels with specific actions developed in regions and municipalities (e.g., sustainable energy action plans – SEAPs).

The outputs delivered by ETC projects constitute a key step towards bigger investments leading to the increased use and promotion of solar energy in the Mediterranean. These outputs should be considered as the interface of new interventions in the same or similar targeted territories rather than disposable elements produced once with no links to the future. The optics of continuity, transferability and capitalization are necessary to enrich, improve or adapt the achieved results in a more effective way.

Measurement of projects’ impact should be better cared for by programmes and projects. Integration of key indicators and numeric values related to solar energy interventions (e.g., installed capacity and energy produced) would facilitate a more comprehensive assessment in quantitative terms. While new regulation for the period 2014–20 already provides a key framework to facilitate the measurement of these impacts, programmes and projects should define what and how to measure according to their specific and, hopefully, more tuned strategies.

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Notes
1. Soft actions is a generic terminology covering strategies, action plans and tools (mainly information technology tools). It does not include investments in infrastructure.
2. Screened programmes were: 2007–13 Greece–Cyprus (EL-CY), 2007–13 Greece–Italy (EL-IT), 2007–13 INTERREG IVC, 2007–13 Italy–France ALCOTRA (IT-FR), 2007–13 Italy–France Maritime (IT-FR), 2007–13 Italy–Malta (IT-MT), 2007–13 Italy–Slovenia (IT-SI), 2007–13 Programme MED, 2007–13 Slovenia–Croatia (SI-HR), 2007–13 South West Europe, 2007–13 Spain–External Borders (ES), 2007–13 Spain–France–Andorra (ES-FR-AD), and 2007–13 Spain–Portugal (ES-PT).
3. The programmes included were INTERREG IVC, MED Programme, ENPI-CBC-MED Programme, Adriatic–Ionian, POCTEFEX, Italy–Malta CBC and Italy–France ALCOTRA CBC.
4. The profiles achieved through the survey were, _inter alia_, lead partner representatives of projects in the sample, managers of projects out of the sample, project officers at the joint technical secretariats of related programmes, and experts on solar energy.
5. Experts’ view, hereafter referenced with an asterisk ‘*’.
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