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PA3.2 Task 5: Test under real conditions of innovative products for the building sector

Performance analysis and experimental data collection on photovoltaic arrays installed on building Q in the AREA Science Park campus of Basovizza

EXECUTIVE SUMMARY

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Release	**Description**	**Authors**	**Review**

1. INTRODUCTION

One of the activities carried out by the laboratory EnesysLab for the MARIE project is to monitor the performance of photovoltaic arrays (PV) installed on the roofs of three buildings of the district of Area Science Park in Basovizza (TS). The aim of this report is to verify the performance of PV systems with CIGS modules installed on the roof of the building Q whose monitoring is active since August 2012 and the presentation of some results obtained through a tool developed to make the comparison between the performance of technical - economic in real operating conditions and those expected based on the nominal data of the photovoltaic modules installed.

2. PILOT ACTION DESCRIPTION

The action involves the evaluation of the performance of photovoltaic modules with which are equipped the considered arrays. It has been possible to check in particular the efficiency of the modules under real operating conditions and estimate the extent of performance degradation over time. Furthermore, the action gives the possibility to access the experimental data to the sector workers, and the SW, which is calibrated on this experimental data, could give the possibility of evaluate the integration of this kind of systems also to the manufacturer of other technologies.

2.1 OBJECTIVES

The activity is driven by motivations that are both technical and economic, which are:

- the assessment of the performance of the system and its components;
- the assessment of the system efficiency through the correlation between the actual measurement of the solar radiation and the energy produced;
- the assessment of the degradation of components and performance;
- the assessment of the real efficiency under real conditions;
- the identification of the most suitable and more cost effective solution for the production of electricity by small plants (software ENPAT).

2.2 PILOT ACTION'S INDUSTRIAL FALLOUT

The pilot action is intended to serve the realization of a tool/database focused on performance and reliability of energy systems which enable researchers, manufacturers, installers, policy-makers and the public to obtain useful comparative information, from a large and significant number of distributed systems of primary energy production. The laboratory will provide a technical and scientific platform capable of activating public and private partnerships and business ventures in terms of energy efficiency and use of renewable resources. The pilot action, supported by the key actors involved, will be able to promote the marketing of new products and services to support a more efficient and rational use of energy.

2.3 ENVIRONMENTAL IMPACT

From the social point of view photovoltaic systems reduce the demand for energy from other traditional sources contributing to the reduction of air pollution. Nevertheless, we must remember that the massive use of the energy produced by the photovoltaic involves very serious problems in the management of electricity distribution networks and existing power plants. So a massive and irrational use of photovoltaic energy may lead to a real increase in emissions of carbon dioxide rather than to reduce them.

3. MAIN RESULTS

The analysis carried out on the considered photovoltaic arrays has allowed:

- to assess the influence of the temperature of the modules on the performance;
- to compare the on field average efficiency of the module with the manufacturer specifications. For the Q photovoltaic array in real operating conditions the measured efficiency was 10.5% and the manufacturer specification is 12.6%;
- to implement the experimental data in the energy performance software tool ENPAT.

4. CONCLUSIONS AND TECHNICAL-ECONOMIC FEASIBILITY

The efficiency of the panels is close to that of the specification and over a period of 8 months performance has not changed. Nowadays, as the installation of PV is given small or no economic incentives, there is the need to identify with accuracy the investment pay-back period. The energy performance analysis software tool developed, allows to assess the pay-back period in different scenarios and system configurations. Therefore, the outcome of the study can be used to determine future economic incentive schemes.