

Topic: 4 - Field Experiences  
Presentation: Oral

## **HIGH STANDARD ENERGY SERVICE BY MULTI-USER PV HYBRID GRIDS (MSG): AN INTEGRATED APPROACH IN “VEÏ NAT DE CAL PERAIRE”, CATALONIA, SPAIN**

**I. Vosseler, E. Ramírez** - Trama TecnoAmbiental S.L. - Ripollés, 46 - 08026 Barcelona – Spain

Tel 34 93 446 32 34 - Fax 34 93 456 69 48 - e-mail: [tta@tramatecnoambiental.es](mailto:tta@tramatecnoambiental.es)

**S. Will, G. Vogt** – Fraunhofer - Institut für Solare Energiesysteme ISE – Heidenhofstr. 2 – 79110 Freiburg – Germany -Tel 49 761 4588 5228 – Fax 49 761 4588 9217 – e-mail: [will@ise.fhg.de](mailto:will@ise.fhg.de)

**A. Joyce, C. Rodrigues**– Instituto Nacional de Engenharia e Tecnologia Industrial – Estrada do Paça do Lumiar, 22 - 1649-038 Lisboa – Portugal – Tel 351 21 712 7237 – Fax 351 21 712 7195 – e-mail: [antonio.joyce@ineti.pt](mailto:antonio.joyce@ineti.pt)

**T. Ejarque** – Asociación SEBA – Mallorca, 210, 1r, 1ª - 08008 Barcelona – Spain

Tel 34 93 446 32 32 – Fax 34 93 456 69 48 – e-mail: [sebaasoc@suport.org](mailto:sebaasoc@suport.org)

In multi-user PV hybrid grids (MSG) the adequate distribution of the available energy among the users is one of the main challenges for success of these systems. The interaction between village community and technical system (use of the common resource) is a challenge for the implementation of Multi-user Solar Hybrid Grids (MSG). These issues have led to the failure of many MSGs for rural village electrification in the past.

To overcome this problem an integrated approach that has mainly two vectors is indispensable: an adequate methodology of introduction of new technologies in a social system – the users and their environment – and technical solutions that on the one hand are able to do load management and on the other hand are suitable to the users' needs.

In the scope of the EU project MSG<sup>1</sup> these challenges were tackled. An integrated methodology was developed to bring into line social and technical aspects. It optimises each step of introduction of this technology on social level in order to improve user satisfaction and system performance. This reduces costs due to optimised sizing and reduction of failures due to inadequate user behaviour. Based on this integrated approach the development of an intelligent “Energy Dispenser / Meter” (patented) gives a solution to the energy distribution in the community by controlling the individual energy consumption behaviour of each user. The methodology was developed based on detailed survey for several MSG's in Spain. A set of tools (“herramientas”) has been developed that support the planning and installation companies of the MSG's.

This integrated approach was applied for the MSG in “Veï nat de Cal Peraire”(5,400 Wp PV generator + 5 kW backup genset) providing electrical energy to 6 users. In this paper we present the experience based on concrete data from the MSG installed. The adopted approach can be summarised as follows: Tariff system based on an EDA (Energy Deliverability Assured) controlled by the dispenser. Each user has a guarantee for an available amount of energy according to the contracted tariff (most users contracted 134 kWh/month, that is a living standard of a normal urban family caring about RUE)

- Demand assessment, design, implementation and user training thanks to continuous social interventions with posterior evaluation of results.
- Analytical monitoring of the PV hybrid system and data acquisition (five-minute-intervals) of energy consumption of each individual user.

The preliminary results are the following:

- The “Energy Dispenser / Meter” is considered by the users as a crucial device for improved energy service. Main reason for the high acceptance is the flexibility of energy use even if energy is limited.
- Users make very good use of their available energy, their consumption matches well with the estimations done previously, leading to high satisfaction with energy service.
- The applied monitoring approach has offered very detailed insight in the energy flows in an MSG.

The project shows: A successful implementation of MSG is possible. The mainly non-technical problems can be solved by a combination of improved social embedding of the project and sophisticated and user oriented technical solutions. This is an important step forward to the mass-implementation of MSG's.

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<sup>1</sup> The European project MSG is founded in parts by the European Commission under the contract number NNE5-1999-483