Two years of PV-Hybrid Stand Alone Systems on the island of Kythnos: A socio-technical analysis

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0. Summary

One year after the installation of two PV Hybrid systems on the island of Kythnos (Greece), that were financed by the European Commission, two interlinked activities - a socio-technical evaluation, as well as a technical modification - took place in May 2003. Technical improvements and their impact on the system will be discussed in more detail later on. The focus of this presentation is on the socio-technical and socio-economical evaluation study, realized by the University of Magdeburg, financed by ISET e.V. and University of Magdeburg and supported by CRES.
In the field study, social data about users´ satisfaction with the system, the performance of payment, further energy needs and future demands, etc. were collected. The end-users and the institutions participating in the project were actively involved in the process of data analysis: We gave a feed-back to the end-users and discussed the preliminary results and recommendations of the study with the technical professionals in two workshops in order to utilize our results for the continuing sustainable use of the systems.

In the joint analysis of the process five phases could be verified and will be described in detail during the presentation: Preparation Phase, Construction Phase, Optimisation Phase, Operation Phase and Sustainable Use. The actual state of art will be presented and recommendations for the sustainable use of the PV-Hybrid-system will be given.

1. Introduction

The location: Kythnos is a small island situated in the Aegean Sea which belongs to the Cyclades prefecture. From Athens it can be reached in three hours by ship. Approximately 1500 inhabitants are living in five villages. In the high season from May to September mainly Greek tourists come to the island [see also contribution of M. Vandenberg et al. in the same issue & 1].

Three experimental stand-alone PV hybrid systems on Kythnos: In 2001, two small stand-alone modular PV hybrid systems were installed in one location, one with diesel back up and one without [2]. Each household can have lighting, a refrigerator and small electrical appliances. From the beginning on the residents were asked to use high-performance appliances like fluorescent lamps and refrigerators with good energy values. The central element of these systems is the bi-directional battery inverter Sunny Island (SMA), which assures the AC-coupling, therefore normal 230 Volt energy devices can be used. In Summer 2003, these micro grids were parallel coupled for the common supply of the whole site.

2. The socio-technical investigation study

In the framework of the planned technical modifications, the responsible person for the project from ISET e.V. contracted social scientists from the Otto-von-Guericke-University Magdeburg / Germany in order to realize a social evaluation study on the German-Greek-PV Hybrid System including a field investigation on Kythnos. The study took place three weeks before the modification of the two PV hybrid systems, planned and realized by SMA, ISET e.V. and CRES. The objectives of the socio-technical study were worked out in a preparation meeting between the University of Magdeburg and ISET. We agreed to carry out the first part of the three proposed actions: (1) Diagnostic, (2) Intervention and (3) Evaluation.

The objectives of the first part of the study were:

1 Socio-organisational support for the extension and coupling of the two hybrid systems of Gaidouromandra (Kythnos / Greece)

2 Detection of potentials for the extension of the systems, for financing and for integrating further end-users
3 Analysis of the actual situation, like organisation of energy use, demands for extensions and possibilities for the reduction of energy consumption
4 Inquiry of the existing ideas about the future of the PV hybrid system (e.g. extension to the local grid) and the ownership of the system (the users' community itself)
5 Understanding of the different partners' perspectives on the technical and the organisational system
6 Elaborate how social aspects could help to facilitate a sustainable use of the PV hybrid systems

The realization: In order to collect the required data, we realized interviews with end-users, the local technician, the operator of the systems, the Mayor of Kythnos and one representative of the public utility (PPC) on Kythnos. After finishing the data collection and preliminary data analysis we realized two workshops for the involved professionals from CRES, ISET and SMA in order to present and discuss the results of the social study and recommendations. Supported by CRES we prepared a feed-back for the end-users afterwards.

3. Results of the study

Results from the social side: (A) Involvement of the users: A great sensitivity for the matters was shown by the end-users. People in the project are very engaged and interested in resolving upcoming difficulties. End-users were informed by distributed leaflets and they were invited to user-meetings. **(B) Organisation of the neighbours:** The neighbours affirm their good relationship with other inhabitants. They help each other and have common activities (e.g.: beach parties). Two years ago some neighbours founded a neighbours association, an informal group in order to negotiate with the Municipality about matters of infrastructure, like the road or the beach. This organisation is not yet registered and therefore could not take over the technical system at the moment. **(C) Integration of new users:** The users would accept the integration of new end-users in their system, with the condition that the

energy supply will be assured and the capacities of the system (available energy and power) will allow their integration. **(D) Wishes of end-users:** The end-users would like to have an extension of the system, but above all they asked for a guarantied energy supply 24 hours a day. They favour an energy consumption concept based on the principle of equality. In order to maintain the good relationships between the neighbours they asked for a technical limitation and protection of the system to prevent over-use.

Results on the socio-economical side: (E) Willingness to pay: The end-users know that after a period of two years, which is just finished, they have to pay a yearly fee and the costs for consumed kWh. They have no objections to pay and they are waiting to get the bills. In general terms, the willingness to pay is correlated positively to the assured energy supply. **(F) Financing:** There is a need for further development of a financial plan for the system.

Results on the socio-technical side: (G) Energy supply concept: There are still different energy supply concepts existing in the minds of the involved players. A joint concept would increase the probability of a sustainable use over a longer period. **(H) Quality of the energy supply:** The users complained about shutting downs of both systems. End-users attributed the failures to the improper utilization behaviour of some users (e.g. use of unauthorized appliances, use of water pumps in the morning etc.). This attribution is favourable for the prestige of the system, but includes a high potential of social conflicts. **(I) Rules of usage:** The end-users are well informed about the rules of the usage of this system. Some users don't respect the rules; now, it is the question of how the community reacts to this. For a sustainable use, it is important that controls and sanctions will take place, if one breaks the rules.

Results on the organisational side: Responsibilities: The EU projects PV-Mode and More were finished successfully. Actually, the distribution of tasks and responsibilities between the involved partners ISET, SMA and CRES will be newly discussed and fixed, which is very important for the sustainability of the whole system. **Local technician:** The contribution of the local technician is a crucial

element for the smooth functioning of the system. Fortunately, there exists a local technician, who is very engaged and disposed to solve emerging problems of the system. It is important to keep him working in such a good way and to maybe find a second person, who will help and replace him in case of his “dropping-out”.

Final remarks

At the moment – despite the really valuable efforts in the right direction - the project is considerably technically-centred, in comparison with a people-centred approach. This is the way that EU-projects are planned: the technical installation stays in the centre of the project. We are all aware that there is no financing foreseen for the preparation of such projects or for the follow-up. The installation of the technology is seen as a single event and after the inauguration the project is done. But we are also aware that this perspective doesn’t reflect our reality and practical experiences.

The first part of our study, the “diagnostic” investigation, fortunately took place before the technical modification of the system. These circumstances gave us the opportunity to integrate some elements from the planned second part, the “interventional” part of the study, like for instance the workshops in Athens and Kassel. Due to financial reasons, it was not possible to realize a preparatory intervention with the end-users. For completing the intervention cycle it would be important to continue the work with all involved institutions, but also with the end-users.

References

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