Project no.: 015286

CRESMED

Cost Efficient and Reliable Rural Electrification Schemes for South Mediterranean Countries Based on Multi User Solar Hybrid Grids

STREP

Integrating and Strengthening the European Research Area

Final Activity Report

Period covered: from January 2006 to June 2009
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Project coordinator organisation name: Trama TecnoAmbiental

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1 Executive Summary

Rural electrification in southern Mediterranean countries is mostly done with solar home systems, which only provide service for a very limited number of appliances (lights). This service gives an image that “PV is for the poor”, and is not sufficient for the stimulation of economic activities in rural areas. Fuel generators, which are also often used, give more electrical power, but suffer from high maintenance costs, irregular availability of fuel, and are mostly used to give a limited energy service during 6 to 14 hours per day only. The solution is the employment of hybrid systems using a mix of renewable energies and fossil fuels, and by providing energy service for the population of a rural community via a micro grid. The integrated approach for rural electrification using such multi user hybrid grids has been tested for electrification in Europe, but still has to be adapted to the different social, economical and environmental context in southern Mediterranean countries.

The main strategic objectives of the CRESMED (Cost Efficient and Reliable Rural Electrification Schemes for South Mediterranean Countries Based on Multi User Solar Hybrid Grids) project are:

- to apply cost effective RE solutions in order to provide electricity for rural areas and villages produced by multi user solar hybrid systems (MSGs) combining solar and other locally available energy sources using local micro grids, and
- to develop management tools in order to operate rationally a larger number of MSGs in a region by satellite and other communication technologies.

The contractors involved in the project are listed in the following table:

Organisation Legal Name	**Short Form**	**Activity**	**Country**
Trama Tecnoambiental S.L.	TTA	SME	Spain
Transenergie	TRE	RES Company	France
SASSO s.r.l.	SASSO	SME	Italy
Fraunhofer Institute for Solar Energy Systems	FhG	Res. Inst.	Germany
Association pour la Recherche et le Dévéloppement des Méthodes et Processus Industriels	ARMINES	Res. Inst.	France
Agence de l’Environnement et la Maîtrise de l’Energie	ADEME	Agency	France
Centre de Dévéloppement des Énergies Rénouvelables	CDER	Res. Inst.	Algerie
Centre de Dévéloppement des Énergies Rénouvelables	CDER	Res. Inst.	Morocco
Afrisol S.A.	AFRISOL	PV Company	Morocco
Lebanese Solar Energy Society	LSES	NGO	Lebanon
National Energy Research Center	NERC	Res. Inst.	Jordan

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This project deals with the design of rural village electrification technology and schemes for rural communities, schools, or dispensaries in Mediterranean partner countries. The techniques are based on the use of multi-user solar hybrid grids (MSG), which have already been successfully implemented in Europe. For this purpose, this project further develops and adapts an integrated approach, covering all aspects (social, economical, financial and technical) required for long term sustainable energy service achieved with hybrid systems. This approach is elaborated in a common effort between partners in the EU and Mediterranean partner countries (MPC).

Information on the needs for energy service and institutional framework conditions in southern Mediterranean countries is not available or widely dispersed. There is an initial preparation phase addressing research on technological, socio-economic and institutional issues in each target country covered by this project (Morocco, Algeria, Jordan, Lebanon), which are all crucial for successful implementation. In the first year of the project, an in depth analysis of the political and economic situation regarding rural electrification has been done. Moreover a socio-economic and technical summary has been completed of recent electrification projects in their rural regions consisting of grid extension, diesel generator mini-grids as well as solutions with renewable energies. Each MPC partner completed surveys which included technical, social, and economical information about rural electrification projects that use RES. Currently the partners are working on a strategy report for the implementation of MSG in each of the target countries which includes suggestions for the required political framework, the tariff structure, the financial model, and the management and operation model for the systems.

There are few measures to assure the long term sustainability of rural electrification in South Mediterranean countries. For most of the systems, it is not clear how the necessary replacement of the batteries after several years of operation can be financed. This is the problem of rural electrification projects, because no previsions for long term sustainability have been made. Such a result would be typical for a failed project, and the image that “PV does not work”. One objective of this project is therefore to define appropriate models and strategies for the long term sustainability of rural electrification projects in southern Mediterranean countries. The positive experiences made in Europe on these issues will help all project partners to find sustainable solutions and long lasting business models.

Rural electrification programs usually use only one system architecture, independently of the energy needs of the user and the location of the site. This project aims at a more differentiated approach, where users close to the village centre are provided with a micro grid and users which live too far away with small scale autonomous systems. However, a tariff structure which can be applied by the same operator to users of both cases will be developed. It is clear that such a tariff structure and operation scheme has to be adapted to an eventually existing framework, as for example in Morocco, where such a framework has been developed for a rural electrification program, which, however, is only based on solar home systems for village without access to gridlines.

The systems to be developed are adapted to the context in Mediterranean partner countries, such as high robustness, and additional communications for remote monitoring. They are based on a locally appropriate energy mix based on PV plus wind or micro-hydraulic, and fuel, feeding local micro grids. Intelligent energy distribution devices assure reliable energy service for each user so that a high level of energy efficiency and demand side management is achieved during the operation of the systems. At this time the technical experts of the consortium are in the process of specifying the requirements for the components to be used

in the MSG's and deciding which technology would be best suited for the communication between the individual components and the energy management and operation system.

In the second year of the project a guide and software tool for the design of MSG for South Mediterranean countries will be developed based on the following technologies.

Appropriate energy service:
In multi user hybrid systems, the energy provided to every single household should be limited in order to avoid excess consumption. The existing algorithms, which work well in Europe, have to be further developed, so that they are simple enough to be easily understood by the user, and efficient to keep the energy consumption within the tariff contracted.

Guarantee of service:
Solar energy systems for rural electrification use batteries for the intermediate storage of energy for consumption during night time. A guarantee of service would mean that the batteries always provide sufficient energy allowing the user to consume the energy contracted. In the case of low charge state of the batteries, the energy service is interrupted, but it is not clear, whether this has to be attributed to an excess of energy consumption by the users or to a failure of the system. A clear indicator will be developed, which, based on energy metering, is able to indicate whether the system is performing as contracted or not.

Appropriate power conditioner technology:
Typical power conditioners are specified for operation at ambient temperatures of up to 40°C, which is too low for application in Mediterranean partner countries. Objective of this project is to increase the maximum operation temperature to 60°C and improve resistance against dust in order to cope with the heavy duty conditions in the Mediterranean countries. Some modifications have already been made to the power conditioner based on the experiences of the MPC partners and experiences gathered from installations in Europe. The modified power conditioner will be tested in the coming year under real conditions in the MPC country.

Hydro turbines for MSG hybrid systems:
The field of hydroelectric turbines is mature and the technologies for electricity generation have not changed much over the years (dozens of years of application). However, most important developments and efforts done in this field for research and development was for large power plants, and the results cannot be translated to small scale plants (pico and micro applications) in the power range suitable for the integration into autonomous hybrid systems. An aim of this project is to develop a range of small power turbines, which can be easily integrated into multi user solar grids (MSG). On the mechanical side, the mechanical and hydraulic state of the art of pico-hydro systems must be analysed and improved for better reliability and performance. On the electrical side, it is necessary to integrate the turbines into a DC bus, and, finally, to develop a suitable control device focussed on the optimum operation of small turbines.

Wind generators for MSG hybrid systems:
As is the case for hydro turbines, wind generators are highly developed at high power ranges and designed for the connection to the utility grid with a high spinning reserve. In the case of autonomous small scale systems, however, small power turbines are needed. Recent market studies have shown that there is a lack of small wind turbines which are robust, reliable and with low maintenance requirements. Especially turbines in the range between one and a few kW are not available as a standardized product on the market, only specially tailored devices are available. A further aim of this project is to develop a small power turbine, which can be easily integrated into multi user solar grids (MSG). This concerns on the mechanical side the design of a robust system, and on the electrical side the coupling to a DC bus for

integration in MSG systems, and, finally, to develop a suitable a control device for the small power turbines.

Appropriate monitoring and control equipment:

Operators responsible for a larger set of systems dispersed in a region need a tool in order to monitoring and control the state of the system. Usually, monitoring data can be only obtained by direct download from the system. The objective is to develop equipment allowing the monitoring and control of a remote hybrid system via satellite or similar communication technologies.

Communication of system components and load management tools:

For the communication of hybrid system components, there is no common standard. Load management tools, which require system information over long distance call for a simple communication bus with drastically increasing the costs for these devices. Further objectives of this project are to find a cost efficient and robust communication bus and protocol, and to develop prototypes of system components which use this bus for communication. The technical partners have been researching over the course of the past year the various available methods of communication and have decided together on the most suitable solution of the power condition and generating components to be used in this project. In the coming year this solution will be developed and integrated into the hardware for laboratory and field testing.

Once these appropriate technologies have been developed, a field test will be done in a MPC in order to electrify a village in a remote rural area. A long process was required to select an appropriate village that fulfils the institutional, social and economic requirements for the successful and sustainable implementation of an MSG. One of the Moroccan partners presented a village which was then visited by a European partner in order to do a socio-economic survey of the inhabitants. Moreover a needs and demand analysis was done to have an idea about the size of the MSG required for the village. The village has been approved by the consortium and work will begin between the Moroccan partners and the representatives of the village to prepare for the field test in the coming year.

The project foresees dissemination of results using various communication tools. A rural electrification manual will be developed based on the experience of the partners and the knowledge gained in the project for the implementation of MSG as part of rural electrification programmes. Local dissemination actions in each target country will be done in order to inform local policy makers, rural inhabitants and installers. A database of contacts in each MPC that are involved in rural electrification, energy policy and renewable energies has been initiated and will expand throughout the project lifetime. One training seminar and one international conference will target specialists from all Mediterranean partner countries. Preparations for these international events have already begun. A comprehensive internet site will be made public that will showcase the project's objectives and main results, including all deliverables. The site, http://project.cresmed.org, has been developed for internal use between the partners as of now and will provide a public space within the first months of 2007. Look for the CRESMED logo shown below at industry conferences and on the web!

2 Project Objectives and Major Achievements

The following section describes the main objectives of the CRESMED project and the objectives to be achieved in the third reporting period (R3, January 1, 2008 to December 31, 2008). In addition the work progress and major achievements from this reporting period and the problems encountered in completing the work will be discussed.

2.1 Project Objectives

Rural electrification in southern Mediterranean countries is mostly done with solar home systems, which only provide service for a very limited number of appliances (lights). This service gives an image that “PV is for the poor”, and is not sufficient for stimulation of economic activities in rural areas. Fuel generators, also used, give more electrical power, but suffer high maintenance costs, irregular availability of fuel, and are mostly used to give a limited energy service during 6 to 14 hours per day only. The solution, which is applied in this project, is the employment of hybrid systems using a mix of renewable energies and fossil fuels, and by providing energy service for the population of a rural community via a micro grid. This integrated state of the art approach for rural electrification using such multi user hybrid grids has been tested for electrification in Europe, but still has to be adapted to the different social, economical and environmental context in southern Mediterranean countries.

The main strategic objectives of the CRESMED (Cost Efficient and Reliable Rural Electrification Schemes for South Mediterranean Countries Based on Multi User Solar Hybrid Grids) project are:

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- to develop management tools in order to operate rationally a larger number of MSGs in a region by satellite and other communication technologies.

The specific project objectives listed below are to be verified by completed deliverables and disseminated by the end of the project:

- Define appropriate models and strategies for the long term sustainability of rural electrification projects in South Mediterranean countries.
- Elaborate a universal model tariff structure.
- Further develop algorithms for individual load management.
- Develop a scheme for service guarantee with indicators for verification.
- Develop a power conditioning unit resistant against high temperature.
- Develop a small scale hydro turbine.
- Develop a small wind turbine of 1kW.
- Develop a tele-monitoring system.
- Develop a communication bus for energy control in PV hybrid systems.
- Test some components in a pilot plant electrifying a real village.
- Train and disseminate the results according to dissemination plan

2.2 Project Relation to State of the Art

While the current technology already developed and implemented for MSGs is performing well in applications around Europe, the improvements foreseen in the CRESMED project give additional value to both the user and the operator of such state of the art systems. The power conditioning unit will be adapted so that it can perform reliably in the hot and dusty weather conditions of the MPC countries. A remote tele-monitoring system will be developed so that the operation and maintenance can gather data and information for monitoring without having to visit the site as often to ensure reliable performance. The load management system will be adapted to suit the needs of the rural populations of MPC countries. In these ways, once tested and validated in the field supplying an actual rural village, the concept of MSG will be brought to a new level of state of the art.

2.3 Reporting Period Objectives

First reporting period

For the first reporting period (R1, from January 1, 2006 to December 31, 2006) the objectives were the following:

- Determine clearly the requirements for rural electrification of villages in MPC countries.
- Determine a number of villages that would be possible candidates for electrification using MSG. Select one village for the field test of the CRESMED project.
- Create a strategy report for the implementation of MSG for rural electrification in each of the MPC countries.
- Begin the development of the power technologies adapted to the requirements of the MPC countries.
- Determine the requirements for the monitoring system and choose the optimal bus communication system for the components.
- Begin the initial sizing of the generating components for the MSG foreseen for the candidate village.
- Create and implement an internet platform for the partners to use and a public web site to disseminate information.
- Create a database of contacts in the MPC countries who are involved in energy policy making, rural electrification, and renewable energies.
- Carry out two partner meetings: one as the kick-off meeting to the project and a second to update the work progress of the first year.

Second reporting period

For the second reporting period (R2, from January 1, 2007 to December 31, 2007) the objectives were the following:

- Published the Strategy report on Rural Electrification with Multi-User Solar hybrid Grids (MSG) covering each target country.
- Follow and finish the technology adaptation of the power conditioning units and energy and energy dispenser for the use in the South Mediterranean Countries.
- Develop the wind turbine of 1 kW.
- Realize a benchmarking on the hydro solutions for the target countries.
- Define the monitoring requirements
- Select the parameters and requirements for the communication system

- Develop prototypes for the Bus communication and for internet communication
- Develop a MSG software tool as well as a guidelines for the implementation
- Make the pre-sizing of the installation for the pilot project.
- Get the permits and authorizations for the pilot project.
- Use the internet platform for the partners for information and work exchange as well as for dissemination.
- Carry out two partner meetings.

Third reporting period

For the third reporting period (R3, from January 1, 2008 to December 31, 2008) the objectives were the following:

- Finish the development the wind turbine of 1 kW.
- Develop prototypes for the Bus communication and for internet communication
- Make the pre-sizing of the installation for the pilot project.
- Make the feasibility study and the executive technical project for the pilot project.
- Realize a one-day presentation of the project in the Summer School of the UNESCO
- Use the internet platform for the partners for information and work exchange as well as for dissemination.
- Carry out two partner meetings.

Fourth reporting period

For the fourth reporting period (R4, from January 1, 2009 to June 30, 2009) the objectives were the following:

- Finish the development of the prototype for remote communication in order to monitor the performance of the power management unit put in the pilot project.
- Install the PV Hybrid Plant and Micro-Grid in the community of Azaghar, Morocco
- Start up with the electricity service in Azaghar
- Monitor the pilot project
- Realize a 2-days International Conference in Beirut in order to disseminate the results of the CRFESMED project
- Following the dissemination of the project through conferences, papers, seminars, etc
- Use the internet platform for the partners for information and work exchange as well as for dissemination.

2.4 Work Performed, Contractors Involved and Main Achievements

First reporting period

The reporting period began with the project kick-off meeting in Barcelona where the partners met to discuss the work plan, the budget and the consortium agreement. The minutes of this meeting can be found in Appendix I. At this meeting the final details of responsibilities of the Task Organizational Plan (TOP) were clarified and minor changes were made to the allocation of the budget funds. All of the partners participated in the meeting, except for representatives from CDER from Morocco who were unable to attend.

In order to collect the information necessary to apply rural electrification using MSG for this project and for future projects where MSG may be an option, the Fraunhofer Institute (FhG) created an evaluation sheet to be filled out locally (see D1). The sheet consists of questions

relating to the political framework, the economic situation and the social makeup of the potential village. This sheet was given to the partners of the MPC countries, LSES of Lebanon, NERC of Jordan, CDER of Morocco, and CDER of Algeria. These partners used this sheet during visits to villages around their country that had been electrified using renewable energies. In addition each of these partners accumulated data about the energy political situation in their country, as well as the important social and economic factors that need to be considered for rural electrification. This information was gathered and put together by FhG into a document for each MPC country called the Rural Electrification Requirement Report (see D2 to D5).

An important aspect of the research done in Morocco was the selection of a suitable village for the field test of the MSG. The Moroccan partner Afrisol was responsible for this and searched for a non-electrified village that was neither on the list for grid extension by the utility company ONE nor in the electrification plans of another private consortium. Once Afrisol prepared a short list of candidate villages, representatives of FhG paid a visit to the region. In one village a representative from FhG stayed for an extended period of time conducting a socio-economic survey as well as performing an energy needs analysis. This work resulted in the selection of this village, Tiourardersine, which was approved by the consortium at the partner meeting in Amman, Jordan.

The results of this preliminary research by the MPC partners together with FhG served as the basis for the preparation of a strategy for the successful implementation of hybrid systems in these countries. The partner ADEME together with TTA and TRE have begun preparing a report that makes recommendations with regards to the financial structure, operation and management concepts, tariff structure and political framework necessary for rural electrification with MSG. Input from each MPC partner was used in order to ensure that the recommendations are reasonable and practical for their country. The report can later be used by the MPC partners to work towards making MSG a competitive alternative on the political agenda for rural electrification.

On the research and innovation front, preliminary work has begun on the development of the appropriate technologies to be used for MSG in MPC countries. TTA together with CDER of Algeria have begun analysing the requirements necessary for the adaptation of the power conditioners to be used in the harsh conditions of the southern countries. TTA has already begun making adjustments to the power conditioner to improve its robustness. SASSO has begun analysing what range of micro-hydro turbines is most suitable for the DC bus and the power output necessary for small villages. The Jordanian partner NERC has begun design and construction of some of the major components of a 1 kW wind turbine, such as the rotor blades. They are currently in negotiation with various suppliers of suitable DC generators and rectifiers. The partners SASSO, TTA and FhG met in Freiburg, Germany and again in Amman, Jordan to discuss the various options for the bus communication system (see minutes in Appendix II). An exchange of ideas and information about the current technology used and other potential solutions has led to preliminary designs that are being analysed currently.

The project web site (http://project.cresmed.org) has been designed and implemented by the French partners ADEME and Armines. The web site serves as a platform for the partners to exchange documents and to keep each informed about their progress. The coordinator TTA has been using the site also to inform the partners about key events and to provide guidelines used for project reports. The web site will also provide a face to the public, to disseminate information about the results from the project.

A database of contacts from the MPC countries who are involved in rural electrification, energy policy and renewable energies has been initiated by the French partner TRE (see D6). The partners LSES and NERC have provided an extensive list of relevant persons and associations in the industry. It was decided at the Amman meeting that the database will be expanded throughout the lifetime of the project so as to maximize the networks of all the partners involved in the project.

In addition to the kick-off meeting, the second partner meeting was carried out in Amman, Jordan where all partners except for Afrisol and CDER from Morocco were able to attend (see Appendix II for minutes). The meeting gave all partners the opportunity to give an update on their work progress and also to clear up any doubts they had. The Consortium Agreement was also finalized and signed by all partners who attended the meeting. In addition, the meeting was used by the work package leaders to meet with their partners to clear up specific items relevant to their work package.

The following is a summary of the main achievements from the first reporting period:

- The kick-off meeting was successful in that the partners were able to meet for the first time and clarify aspects of the TOP and the budget.
- The Consortium Agreement was finalized and signed by all partners.
- An evaluation sheet for the implementation of hybrid systems was used by the MPC partners to gather data about villages in their countries (see D1).
- The MPC partners carried out thorough research and analysis of the current situation within their countries with regards to rural electrification. These results led to the completion of rural electrification requirement reports for each country (see D2 to D5).
- A village was selected in Morocco as the candidate site for the field test of the MSG. The village was also visited and a preliminary needs analysis was also done.
- A strategy report for rural electrification using MSG in the MPC countries is close to completion.
- A meeting was held between the relevant partners to determine the requirements for the communication and monitoring system to be designed for the MSG.
- The project internet site has been created and is functioning well as a tool for communication between the partners and to the general public.
- A contact database has been initiated and will be expanded throughout the lifetime of the project (see D6).
- A second partner meeting was carried out in Amman, Jordan where an update of the progress of the project was successfully accomplished.

Second reporting period

During the early 2007, the partners meet in Freiburg (Germany) for the third progress meeting in the facilities of FhG. The minutes of this meeting can be found in Appendix III. All of the partners participated in the meeting, included CDER from Morocco who were unable to attend the first two ones.

At this time the WP1 and 2 was already done and the main focus of the meeting was on the R&D WP3 and 4 and also the WP6 concerning the pilot project.

TTA presented the first results of the WP3 which consisted in the adaptation and the improvements of the power conditioning unit for applications in the target countries. The improvements have been done at the hard level (introduction of a dissipation plate, ventilation, etc) and also at the soft level (improvements of the operation functions, algorithms, management control, etc). The D11 sums up the actions realized.

Other R&D activities in this WP have been done by TTA concerning the adaptation of the Energy Dispenser (see D12) and also the individual charge controller (see D13).

During this meeting, it has been decided that the activity of Sasso will be only a benchmarking study on the possible solutions of hydro power for the target countries. It wasn't very clear for them at the beginning because no budget was allocated for material and the global consensus within the partners decided.

A second meeting has been carried out in Algiers, organized by the CDER Al. This meeting was held during a key period for important decisions, mainly concerning the Afrisol situation and its activities (see further explanations). The minutes of the minutes are in the Appendix IV.

This second reporting period was very intense and all the partners had to participate and involve a lot in all the WPs. The description of all the activities performed is detailed in the next section. The following is a summary of the main achievements from the second reporting period:

- Publication of the strategic report on rural electrification (D7)
- Improvements and adaptation of the existing electronic devices by TTA (power conditioning unit, charge controller, energy dispenser)
- Clear benchmarking of the possible hydro power technologies that can be used in the target countries
- The MSG tools (software and manual) have been published successfully.
- Confirmation by the ONE that the candidate village is not included in the plan of grid-extension
- A meeting was held between the relevant partners to determine the requirements for the communication and monitoring system to be designed for the MSG.
- Close contact with the UNESCO for the organization of the training in 2008.
- The project internet site works properly and it is used for exchange of information.
- A second partner meeting was carried out in Algiers, Algeria where an update of the progress of the project was successfully accomplished, and a solution for the unforeseen situation of one of the partners has been found.

Third reporting period

During the month of May 2008, the partners meet in Lyon (France) for the fifth progress meeting in the facilities of Transenergie (TRE) The minutes of this meeting can be found in Appendix V. All of the partners, except LSES, participated in the meeting.

At this time the WP1, WP3 and WP5 were already done. The main focus of the meeting was on the R&D WP3 and 4 and also the WP6 concerning the pilot project.

TTA presented the village location for the pilot project (WP6). At that time, the final decision from the Spanish Cooperation to co-finance the project was not definitive. TTA had already made one field mission and presented the first drawing and pictures to the partners. This was the main milestones of the meeting.

During this meeting, Sasso presented the first results. Important decisions concerning the nature of the devices (Bus, remote communication) have been taken.

This meeting appeared in a right moment for this WP4. Also it was important to be able to present the first elements of the WP6 during this meeting.

A second meeting has been carried out in Rabat, organized by the CDER Mo. The minutes are in Appendix VI. This time only NERC was not able to join us for this meeting, which was a pity because they could have presented the final results of the development of the wind turbine which was almost completed.

The CDER Al presented all the results concerning the tests which have been successfully performed after some delays, and confirmed the compatibility of the electronic devices developed by TTA with the local conditions in Northern Africa.

During this meeting, TTA confirmed the co-financing of the pilot project and presented the first element of sizing. At the same time, one technician of TTA was on the field in Azaghar for the finalization of the system design.

This third reporting period was less intense than the previous one in term of quantity of Deliverables. But the level of requirements was as high as the previous year. It was very important to finish some critical activities in order to follow correctly the project calendar. The other challenge was the research for co-financing, which has been finally made successfully by the coordinator which had to assume the responsibility instead of Afrisol.

All the partners have participated actively and in both meetings 10 out of 11 partners were present. The description of all the activities performed is detailed in the next section. The following is a summary of the main achievements from the third reporting period:

- Finalization of the tests of the electronic devices (WP3) and acceptation of those devices for the local conditions
- Successful development of the devices for the use of the Bus can and the load management devices
- Research and confirmation of co-financing for the pilot project by the Spanish Agency of Cooperation
- Final validation of the Wind turbine by NERC
- Start of the implementation of the pilot project
- Several partners meeting for the WP4 with TTA, Sasso and FhG in Italy.
- Successful implementation of the Summer School of UNESCO I Rabat
- Close contact with the ESCWA for the organization of the international workshop in Beirut in 2009.
- The project internet site works properly and it is used for exchange of information.
- Two progress meetings in Lyon and Rabat where an update of the progress of the project was successfully accomplished, and solution for problems and delays have been discussed.

Fourth reporting period

During the month of February 2009, the partners meet in Beirut for the international conference organized by LSES in cooperation with the ESCWA (United Nations Economic and Social Commission for Western Asia) committee. The programme of the conference is in Appendix. All of the partners, except Sasso, Afrisol and NERC participated to this conference. All the participants presented the state of progress and results of the Work Packages they are in charge. Only WP4 was not fully presented.

This event was one of the main tasks of the WP7 and the last one. With this event WP7 was almost finished as well as WP1, WP2, WP3 and WP5, performed in previous reporting periods.

During this reporting period, Sasso has completed the WP4 by finishing the development of the remote communication via modem in order to be able to visualize and monitor the performance of the equipment in the village.

TTA, with the support of the partners involved in the WP6 (Sasso, FhG and CDER Morocco) finished the implementation of WP6, which is the pilot project in the community of Azaghar. NERC has sent one of the two prototypes of the small wind turbine developed in WP3 in order to be installed in the village as support of the PV hybrid generation.

Another achievement was the organization of a seminar in Morocco regarding the MSG method, developed in the CRESMED project. With the support of the Spanish Cooperation, CDER and a local partner in Chefchaouen involved in the pilot project, TTA has organized this 3-days seminar in Chefchaouen (province where the pilot project is implemented) in late March-early April.

This fourth reporting period was less intense than the previous ones in term of quantity of Deliverables. But the level of requirements was as high as the previous year. It was very important to finish the implementation of the pilot project which represents the accomplishment of the whole project. Also, the dissemination was more intense because all the results were achieved and the impact could be higher.

All the partners have participated actively to the WP7, especially for the conference. Also some other partners have been involved in the two last WP remaining, WP4 and WP6. The description of all the activities performed is detailed in the next section. The following is a summary of the main achievements from the fourth reporting period:

- Successful development of the devices for the remote communication in order to monitor the power management unit in the field
- Sending of the small wind turbine to Morocco by NERC
- Installation of the PV Hybrid plant
- Construction of the road and technical building were the battery and electronic equipments will be located
- Start up, commissioning and test of the MSG in the community of Azaghar, Morocco (pilot project)
- Meeting for WP4 in Cuneo, Italy in Sasso's office
- Successful implementation of the International Conference in Beirut
- Successful implementation of the seminar in Chefchaouen, Morocco
- The project internet site works properly and it is used for exchange of information.

2.5 Problems Encountered and Corrective Action

First reporting period

The completion and signing of the Consortium Agreement between the project partners proved to be a challenge. Several drafts and revisions were required to satisfy the requirements and wishes of all the partners involved. In addition, a change to the contract due to a request from one of the partners delayed the signing of the agreement until the second half of the reporting period. In order to speed up the signing process it was decided that the partners would bring signed originals of the document to the second meeting in Amman. This proved to be successful as all partners that attended the meeting were able to leave with an original copy of the meeting. By the end of the year, all partners had signed and received the agreement.

The selection of a village in Morocco to be the candidate site for the field test required relentless effort by the local partner Afrisol. Due to the political setup in the country with regards to electrification, it is not easy to get the approval of the main utility and to get a list from them of the potential villages to be electrified by grid extension. In addition various private actors are active in the rural electrification program in the country and have their own concessions. Afrisol met with the utility on various occasions and pressured them for a written approval of the chosen village. Meetings with various local organizations and private companies were required to determine which villages were not already contracted for electrification. In the end a meeting with the inhabitants, where also representatives of FhG attended, confirmed their interest and enthusiasm for taking part in the field test.

Communication between the partners of the project was at times difficult. Since not only countries from Europe are involved, problems with internet access and different cultural holidays and working habits affect the amount and method of communication. In addition the war in Lebanon in the summer affected understandably not only the Lebanese partner but the whole region. The second meeting in Amman served as an excellent opportunity to clear up all miscommunications, misunderstandings and doubts that any of the partners had. On the second day of the meeting the partners were given an opportunity to meet in smaller groups in order to clear up specific problems relevant to the work packages that they are involved in. It was also cleared up between the partners what the best form of communication is for them, for example email or telephone.

Second reporting period

During the first half of the year, the major problem has been an administrative one. It took very long time to accept the cost statements for different reasons: more than 6 month after the presentation.

As it has been informed to the EU in the second semester of 2007, Jurgen Gehr, responsible of Afrisol in Morocco, left us in early September. For all the issues dealing with the CRESMED project, Afrisol was a one-man entity for the partner as he participated alone until this date.

This event has been a shock for everybody and has left the company and the whole consortium orphan. Taking into account that the technical competences have left us with Jurgen Gehr, we have decided during the second meeting held in Algiers in November to modify the budget and shift the rest of the budget from Afrisol to the other partners. It has been decided also that Afrisol will stay in the consortium as a full member but as an observer participating to the meetings and the reviewing of the produced documents.

The rest of budget was distributed into the following WPs:

- WP3: shift to TTA and CDER Al
- WP6: shift to CDER Mo, TTA, FhG and Sasso

The modifications of the budget are represented as it follows:

Mem.months

	Original	Year 1	Year 2	Year 3	Year 4	Total	Remaining	Going to
WP1	2	2	0	0	0	2	0	
WP2	2	1,75	0,25	0	0	2	0	
WP3	1	0	0	0	0	0	1	CDER Al + TTA
WP4	0,5	0	0,5	0	0	0,5	0	
WP5	1,75	0	1,75	0	0	1,75	0	
WP6	6,5	0	1	0,5	0	1,5	5	TTA, CDER Mo, FhG
WP7	0,5	0	0	0	0,5	0,5	0	
	14,25	3,75	3,5	0,5	0,5	8,25	6	
Personal cost (€)	106.778,00	28.099,00	26.225,73	3.746,53	3.746,53	61.817,80	**44.960,20**	

CDER Mo	**TTA**	**FhG**	**CDER Al**	**Sasso**	**Total**
7.508,00	**12.280,00**	**12.520,00**	**4.051,00**	**8600**	**44.959,00**
2 MM	**2 MM**	**1 MM**	**1 MM**	**1 MM**	
all in WP6	2 in WP6 and 0,5 in WP3	all in WP6	all in WP3		

Travel

	Original	Year 1	Year 2	Year 3	Year 4	Total	Remaining	Going to
€	16.000,00	3.300,00	3.000,00	3.000,00	1.500,00	10.800,00	5.200,00	FhG (1.500), CDER Mo(1.200) Sasso (1.000) and TTA (1.500)

Consumables and Subcontractings

	Original	Year 1	Year 2	Year 3	Year 4	Total	Remaining	Going to
€	273.952,00	1.500,00	0,00	0,00	0,00	1.500,00	272.452,00	TTA

The selection of a village in Morocco to be the candidate site for the field test required relentless effort by the local partner Afrisol. Due to the political setup in the country with regards to electrification, it is not easy to get the approval of the main utility and to get a list from them of the potential villages to be electrified by grid extension. Mr. Gehr had a personal relation with a director of the ONE and he was negotiating by his own with him. Afrisol met with the utility on various occasions and pressured them for a written approval of the chosen village. Due to this tragic event, the situation has been blocked because of the lack of direct contact. Finally CDER Mo substituted Afrisol to get the written authorisation.

One other complication we had after the summer was regarding the purchase and the sending of the power conditioning unit to Algeria. Indeed, CDER Al cannot pay with Euro currency. Nevertheless, they had to purchase material to realize their activities of the WP3 which consisted in testing equipments. After many weeks of delay from the manufacturer (around 12 weeks) TTA was able to send the material to CDER. Unfortunately, for unknown reasons, the material was still at the customs at the end of 2007. This will delay the report on testing (D14) but will not affect the other activities.

Communication between the partners of the project was at times difficult. Since not only countries from Europe are involved, problems with internet access and different cultural holidays and working habits affect the amount and method of communication. The two meetings were an excellent opportunity to clear up all miscommunications, misunderstandings and doubts that any of the partners had, and also to take important decisions all together.

Third reporting period

During the third reporting period, the major problem has been an administrative one. It took very long time to send the proper information concerning the costs statements. There were some minor mistakes concerning coherence between the different forms and also missing information concerning the details of the costs. One reason for this big delay has been the difficulty to get the proper information form the partners.

The first mail asking more information was in June and finally in November, all the costs statement have been accepted.

As we mentioned it in the last Activity report (2007) some problems occurred with the delivery of the power conditioning unit to Algeria. In that time the problem was not solved yet. Finally after some months (March 2008) of negotiation and administrative forms, CDER AL could receive the material and perform the test.

One of the main technical delays was the development of the WP4, and especially the remote communication which is not finished yet. The consortium could solve the other technical problems by organizing additional meetings. For example in July, two technicians from TTA and one from FhG travelled to Italy in the Sasso office.

Another problem encountered has been the selection of the village and the research of co-funding. As we have explained, the consortium had to shift the project from the original village to a new one. This took several weeks. After that, TTA had to wait for the final answer of co-funding of the Spanish Agency of Cooperation for starting the field work. The corrective actions were:

- anticipate the decision of AECID (Spanish Agency) and send a technician to the field to start the design study

- start several activities in parallel to gain time
- have a close cooperation with a local NGO helping us in some social, logistic and field activities

Concerning the WP7, no major problem occurred. The UNESCO finally decided to shift the summer school from Paris to Rabat and form July to October. This did not affect us. On the contrary, as it was planned to make one meeting in Morocco, this shift was perfect and allow us to combine this workshop and our progress meeting.

Communication between the partners of the project was at times difficult. Since not only countries from Europe are involved, problems with internet access and different cultural holidays and working habits affect the amount and method of communication. The two meetings were an excellent opportunity to clear up all miscommunications, misunderstandings and doubts that any of the partners had, and also to take important decisions all together.

Fourth reporting period

During the fourth reporting period, the major problem has been an administrative one. It took very long time to send the proper information concerning the costs statements. There were some minor mistakes concerning coherence between the different forms and also missing information concerning the details of the costs. One reason for this big delay has been the difficulty to get the proper information form the partners.

One of the main technical delays was the development of the WP4, and especially the remote communication which has been completed finally in April 2009, just before being sent to the village where the pilot project has been implemented. TTA went to Sasso in June in order to get more information regarding the running of the system.

Another important problem encountered has been the installation of the system in the community. The first step, started in the previous reporting period, was the construction of the road to reach the community. Last winter has been especially rainy and the work had to be stopped for several weeks. This delay has been the cause of all the delays because no other work could be done in parallel. Finally the installation could be done on time but with a huge delay regarding the initial planning of the project.

Concerning the WP7, no major problem occurred. The International Conference took place in Beirut as it was originally planned. In the previous, some doubts existed due to the political and general situation. Most of the WPs were finished so it was interesting to present final results of the CRESMED project in front of a Multilateral Donor which is very active in the target countries of our project.

Communication between the partners of the project was at times difficult. Since not only countries from Europe are involved, problems with internet access and different cultural holidays and working habits affect the amount and method of communication.

3 Work Package Progress of the Period

The following section gives an overview of actions carried out in the whole project during all the reporting periods based on the individual work packages. For each work package (WP), the objectives and the progress towards theses objectives will be stated. Also, any deviations from the initial plan of work will be discussed. A list of deliverables and milestones from the project with their actual and foreseen completion dates.

3.1 WP1: Determination of requirements

Objective

The objective of this work package is to examine the state of the art of rural electrification in the target countries, also considering non technical aspects, and to determine the relevant information for the implementation of rural electrification with renewable energies.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. The leader of this work package is FhG.

Work Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
1.1 Experiences from existing electrification projects	April 2006	April 2006	100%
1.2 Socio economic situation in rural village communities in target countries	Aug. 2006	Aug. 2006	100%
1.3 Determination of load demand according to user category (family, school, dispensary, etc.)	Aug. 2006	Aug. 2006	100%
1.4 Legal and institutional framework	June 2006	June 2006	100%
1.5 Elaboration of rural electrification requirement reports	Aug. 2006	Nov. 2006	100%

1.1 Experiences from existing electrification projects:

In February 2006 Fraunhofer ISE together with Transenergie prepared and sent questionnaires (see Deliverable 1 “Evaluation Sheet for Implementation of Hybrid Systems”) to the project partners in each Mediterranean country. They were requested to gather information about electrification projects which had already been implemented in isolated villages or regions. The question concerning the type of electrification, with regenerative sources or diesel generators, was initially of minor importance. The significant aspects were system design, forms of financing and tariff definition, the usage, acceptance and experience in operating the systems.

These questionnaires were completed by CDER Ma, CDER Al, NERC and LSES by the end of April and returned to FhG for evaluation. The outcome of these questionnaires resulted in parts of the Deliverables 2 to 5, “Rural Electrification Report for Morocco, Algeria, Jordan and Lebanon”, which are further discussed below.

1.2 Socio economic situation in rural village communities in target countries:

In May 2006 FhG prepared a questionnaire (see second part of Deliverable 1 “Evaluation Sheet for Implementation of Hybrid Systems”) for the field study required in WP6. The Moroccan partner Afrisol recommended some villages that could be used for the electrification with MSG. The Moroccan utility ONE (Office Nationale d’Eléctricité) was then asked for approval of the villages and for this they needed some time to confirm that they were not on their list for grid expansion. By the end of July 2006 the Afrisol and Fraunhofer ISE visited the proposed village Tiouardersine in the Southeast of Morocco. A member of Fraunhofer ISE stayed 5 days in the village and made the socio economic survey.

Tiouardersine is located on a high plateau in the central Atlas mountain range. The access route from the nearest larger town is 44 km long, of which 26 km is un-tarred track which can only be accessed by four-wheel-drive vehicles. About 17 families live in the village, i.e. 80 to 100 persons. Their main source of income is nomadic animal breeding. They have the following priorities for the electric power supply: 1) water supply, 2) lighting, 3) television/radio. All details concerning this task are explained in part of the Deliverable 2 “Rural Electrification Report for Morocco”.

The project consortium decided to constrain the real field study to Morocco, because field studies in rural villages of the other Mediterranean partners would have created a false hope for PV electrification of the inhabitants of the investigated villages, which cannot be fulfilled in this project.

1.3 Determination of load demand according to user category:

The result of the interviews in Tiouardersine was a daily energy demand for the private houses of about 10 kWh/d for lighting, TV, Radio, public illumination and one corn mill (see Table 1). There exists no school or dispensary.

Apparatus:	Energy Saving Lamp	TV	Radio	Public Lighting	Corn Mill
Number:	71	24	2	7	1
Power:	12 W	70 W	20 W	23 W	700 W
Daily Time of Use:	2-5 h	1,5-4 h	1-6 h	7 h	3 h
Sum of Apparatus:	2763 Wh	3605 Wh	210 Wh	1127 Wh	2100 Wh
Total	**9805 Wh**				

Table1: Users and daily need in the load course according to the raised data

By assuming the standard dimensioning from the utility ONE for 28 households, the public lighting and one corn mill, the result is about 14 kWh/d (see Table 2).

Apparatus:	Energy Saving Lamp 7 W	Energy Saving Lamp 11 W	TV	Radio	Public Lighting	Corn Mill
Number:	56	56	28	28	7	1
Power:	7 W	12 W	70 W	20 W	23 W	700 W

Daily Time of Use:	3,3 h	3,3 h	3,3 h	2 h	7 h	3 h
Sum of Apparatus:	1294 Wh	2218 Wh	6468 Wh	560 Wh	1127 Wh	2100 Wh
Total:	**13767 Wh**					

Table 2: Users and daily need in the load course according to standard values

For the dimensioning of the PV system it was decided to use the higher value to allow for the possibility of further growth of the village and the energy demand. All details concerning this task are part of the Deliverable 2 “Rural Electrification Report for Morocco”.

1.4 Legal and institutional framework:

The questionnaire that was developed in order to collect information about experiences from existing electrification projects (see sub work package 1.1) contain also questions concerning the legal and institutional framework. This information was also completed by the MPC partners, CDER Ma, CDER Al, NERC and LSES. The results can be summarised in the following way:

- Morocco: There exist many different projects and possibilities (concessions) as well as high interest in the application of renewable energies. No special laws for renewable energies which means that projects depend on good contacts to responsible institutions and a good understanding of the market.
- Algeria: There exists the best legal situation of all the MPC countries. There is a law about premiums and incentives which was passed in 2002, but the implementation regulations are still missing.
- Jordan: There are no special laws for renewable energies applied but concessions are possible. The influence of the government is still great in the energy sector since there has been no complete privatisation as of yet.
- Lebanon: There exist useful legal bills concerning renewable energies which have been designed but have yet to be passed by the government. The overall energy situation urgently needs repair and improvement.

All details concerning this task are part of the Deliverables 2 to 5, “Rural Electrification Report for Morocco, Algeria, Jordan and Lebanon”.

1.5 Elaboration of rural electrification requirement reports

With the aid of the questionnaires from Deliverable 1 as well as further information from the partner organisations and other sources, mainly the gtz Baseline study of the project “Energy Efficiency in the Construction Sector in the Mediterranean Med-Enec” (www.med-enec.com), FhG presented as complete as possible a picture of the electrification and supply/supplier situation in each MPC country. The results are the Deliverables 2-5 “Rural Electrification report for Morocco, Algeria, Jordan and Lebanon” which where finished in November 2006.

Each report contains the following chapters:
1. Introduction
2. Legal and institutional framework
2.1. Actors
2.2. Laws and regulations
3. Electrification
3.1. Electricity generation and consumption
3.2. Tariffs
3.3. Rural electrification
4. Examples of electrified villages

5. Conclusions and recommendations

The report for Morocco contains the additional chapter “Field study Morocco, the village Tiouardersine”.
The electrification situation of the 4 Mediterranean countries can be summarised in the following way. With the exception of Morocco, which also uses coal, electricity generation in the investigated countries is based almost exclusively on gas and oil. Due to the rapidly rising oil prices, and the lack of national oil reserves with the exception of Algeria, there is strong interest in regenerative energy sources.
The potential for photovoltaic village power supplies is particularly high in Morocco with about 4000 villages and in Algeria with about 700 villages that are not connected to the public grid.
In Jordan all villages are connected to the public electricity grid, but about 5000 individual houses with a small energy demand have no grid connection. In Lebanon, all villages are connected to the public electricity grid and only some few single houses have no grid connection. However, the power station and grid capacity in Lebanon is limited or destroyed in some places, so that the power supply is interrupted for several hours on many days throughout the year.

The completion of the reports was delayed three months, since there were some misunderstandings and doubts by the MPC partners with regard to the evaluation sheets and the information that was required. These points were cleared up during the partner meeting in Amman, where FhG was able to speak with the partners directly. Each MPC partner then completed the missing information over the next month after the meeting and then FhG was able to complete the reports. The delay affected the starting time of WP2, since the completed reports are a basis for the development of the implementation strategies.

Conclusion

The milestones and expected results of work package 1, which are:
M1: Clear view on requirements for rural electrification programmes with hybrid systems
M2: Candidate villages for field test system listed,
were successfully achieved in the year 2006.

M1: In Morocco and Algeria there exists a real market for PV hybrid systems for village electrification. In Jordan and Lebanon there exists a small market for Solar Home Systems or small PV hybrid systems for single house electrification. The main task for both of these countries is to establish laws and implementation regulations for grid connected PV.

M2: The Moroccan village, Tiouardersine, is very suitable for the implementation of an MSG hybrid system as part of the CRESMED project. The inhabitants, the community authorities and the utility company are in agreement for this type of electrification of the village.

3.2 WP2: Strategies for Successful Implementation

Objective

The objective of this work package is to develop a strategy for the electrification of the rural regions using hybrid systems with high renewable energy content is developed for each of the target countries. The overall aim of this strategy is to achieve a sustainable operation of the systems providing a long term energy service.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. The leader of this work package is ADEME.

Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
2.1 Proposal of strategic targets for rural electrification based on MSG systems	July 2006	Dec. 2006	100%
2.2 Management models for implementation and operation of MSG systems	Oct. 2006	Jan. 2007	100%
2.3 Economic and financial models	Nov. 2006	Feb. 2007	100%
2.4 Appropriate tariff scheme	Nov 2006	Feb. 2007	100%
2.5 Appropriate legal framework	Nov 2006	Feb 2007	100%
2.6 Elaboration of a checklist and recommended practices	Nov. 2006	Feb. 2007	100%

2.1 Proposal of strategic targets for rural electrification based on MSG systems

Each of the partners from the MPC countries has provided an estimation of how many households exist in their country that still need to be electrified. These values were used by them to determine specific targets for rural electrification using MSG in each country. Each partner used a reasonable estimation that applies to their country to see what the market potential for this technology actually is. This work has been completed and has been integrated into the final strategy report.

2.2 Management models for implementation and operation of MSG systems

TRE has begun preparing a management model for the implementation and operation of MSG systems in each of the target countries. The inputs for these models are based on the experiences made by each of the project partners and on the results of WP1. The model cover the potential role of both private and public investors and operators (energy service company) during the whole duration of projects: definition and design phase, building phase, technical and commercial operation and maintenance, final evaluation and dismantling. They are adapted from one region to another taking account the targeted number of systems and consumers and the possible local involvement of private companies and private and public institutions and agencies. The specific case for the involvement of electric utilities and specific agencies for rural electrification or rural development are also addressed. The work is close to completion and will be integrated into the final strategy report.

2.3 Economic and financial models

ADEME has begun preparing economic and financial models for the implementation and operation of MSG systems in each of the target countries. A specific economic analysis model is being developed to optimise the design of the MSGs systems taking into account specific investment and operating and maintenance costs, local cost of money, and targeted profitability for investors and for energy services companies in charge of commercial

operation of the systems. A financial model has been applied to take into account local financial conditions such as commercial loans conditions and local taxes.

2.4 Appropriate tariff scheme

TTA has begun developing a tariff scheme which is based on the energy service provided to the user. An evaluation of economic and financial tools to lower them has been made from previous project experiences which cover the potential use and the optimisation of soft loans, subsidies on initial investment and on operating expenses and tax credits. In order to lower the risk of low efficient use of energy delivered, the tariff scheme has been designed in order to give a clear incentive for users to use efficiently its power and energy. The tariff scheme also is adapted to the existing tariff framework of each target country. The recommendations are near completion and will be integrated in the final strategy report.

2.5 Appropriate legal framework

TTA has begun making proposals that adapt to the local legal framework for decentralized rural electrification to the specific case of MSGs systems in each target country. If such a legal framework does not exist, proposals were created from past experiences in other counties and programmes will be made. The recommendations are near completion and will be integrated in the final strategy report.

2.6 Elaboration of a checklist and recommended practices

TRE has begun creating a check list of requirements and recommended practices for the successful implementation of multi user solar hybrid grids in each of the target countries. This list summarizes the results of the previous sub-tasks and can be used as a guide for the policy makers and project developers in the MPC countries. The list is near completion and will be integrated in the final strategy report.

Conclusion

The milestone for this work package is to have a clear strategy for the implementation of MSG in each target country (M3). Currently the strategy report is close to completion and will be submitted in the first quarter of 2007. The delay in the report was caused by the slight delays in WP1, since the input for the strategy recommendations depended on the country requirement reports.

3.3 WP3: Developing Appropriate Technologies

Objective

The objective of this work package is to further develop existing technologies for Multi-user Solar Hybrid Grids (MSGs) in order to adapt to the operation conditions in the target countries. Key factors are maximum robustness and reliability of the devices to be employed in the MSGs and the easy management of several MSGs by one single operator.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. The leader of this work package is TTA.

Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
3.1 Power conditioner withstanding high operation temperatures and high dust content	Dec. 2007	Dec.07	100%
3.2 Energy consumption controller	Dec. 2007	Dec.07	100%
3.3 Equivalent service and tariff structure also for individual systems of the MSG	Dec. 2007	Feb.08	100%
3.4 Testing of equipment under real operation conditions in Mediterranean partner country	Dec. 2007	Dec. 08	100%
3.5 Hydroelectric turbines for system integration in MSGs	Dec. 2007	Dec.07	100%
3.6 Wind turbine from local manufacturer in Mediterranean partner country	Dec. 2007	Dec. 08	100%

3.1 Power conditioner withstanding high operation temperatures and high dust content:

The partner TTA has been involved in various rural electrification projects in Northern Africa where their power conditioner (TApS) has been applied in an MSG. Visits to these installations and monitoring of their performance led to a list of improvements to the reliability of the unit that were established for the CRESMED project. In addition discussions with the Algerian partner CDER at the partner meetings, at an installation in Algeria, and by email, gave rise to certain requirements for the hard environmental conditions in the MPC regions. The following improvements have been made to the power conditioner together with the hardware manufacturer in the first and second reporting period:

- Low internal consumption of inverter – An additional power stage of 15W was added so that the operation time of 1200W stages will be reduced, when there is no external consumption. This will increase the lifetime of the power stages and therefore increase the reliability of the unit.
- Improve reaction to power surges – An inductor has been connected to the AC output of the inverter to dampen surge loads. Also an optimisation of the activation of power stages with voltage synchronisation has been implemented. Both these changes improve the power quality of the electricity delivered to the inhabitants of remote villages.
- Reduce failures of control system – The circuit board has been redesigned to increase its robustness, thereby reducing the amount of failures of the control system which interrupt the electrical service.
- Addition of a dissipation metallic plate on the MPPT cards, inverter cards and also the management system card
- Sturdy casing for delivery of control unit – The casing of the control unit has been redesigned in order to enclose the boards, not allowing any foreign elements to interrupt its function.
- Increase temperature resistance of inverter - The inverter internal transistors have been changed to a higher current rating. This will allow the inverter to operate under the hotter conditions in the MPC regions.

- Optimise battery management system – The energy management algorithm has been reworked to provide optional energy deliverability limit of the power system.

Other improvements have been made concerning the software:

- operational improvement
- improvement of the efficiency of the battery charging and voltage limitation
- solutions for stratification and sulfation of the battery
- intelligent algorithm for battery charging
- management of the load disconnection

3.2 Energy consumption controller:

The work package leader TTA has realized modifications after analysing past failures with the energy dispensers. The idea was to adapt some functionality in order to increase the reliability of the components in such applications. TTA has realized a meeting in Freiburg with experts from FhG in electronic to discuss these issues. The little changes to the hardware and software of the energy dispensers have been performed during 2007. The final report on the functionalities has been published in December 2007.

3.3 Equivalent service and tariff structure also for individual systems of the MSG

In order to propose an integral solution of electrification, TTA had to modify the algorithm of the individual charge controller used in SHS. In case of the village with few scattered house, we need to be able to offer the same service as the other connected to the main micro-grid. The D13 shows a description of the charge controller and the strategies of charging and management, based on the same idea of the energy dispenser.

3.4 Testing of equipment under real operation conditions in MPC

After the delay in the reception of the power conditioning unit by CDER Al, finally the tests had been performed successfully, under real desert conditions in order to confirm the robustness of the components before they are installed in the village in Morocco. The activities realized by CDER Al were:

- Installation of the testing bench
- Carrying out testing of the energy dispenser operating under rough conditions (high temperatures) to see the behaviour of the device.

During all this period, TTA and FhG have supported the Algerian research center. The results were very positive.

All the results are included in the Deliverable D14.

3.5 Hydroelectric turbines for system integration in MSGs

The Italian partner SASSO has done a review of the current state of the art in the small hydro power industry. They are now in the process of doing a preliminary design for a turbine suitable for the MPC regions. Sasso will study the optimum hydropower solution in the selected village, with particular attention to the environmental conditions of the zone.

In a rural area, as the zone individuated for the CRESMED project, the best solution for a hydropower plant is a turbine that operates in an AC system. In this way, the choice between different turbine technologies is more ample; also the generators are more available. The

system chosen for the village will be simple both in technology and in maintenance: the choice will be between the “impulse turbines”, i.e. the Pelton and the Cross Flow turbine.

The solution chosen will be equipped with a device for the control of the water flow, in order to optimise the production and reduce the waste of the water. In fact, hydraulic and mechanical turbine speed regulators for power up to 300 kW, in stand-alone applications, can result economically unfavourable. With the electronic speed microprocessor “Tachicontrol”, regulation results faster and linearly consistent. The absence of time reaction constants does not produce disturbances in the grid, which is a particular improvement, above all, where no fly wheel is present. The “Tachicontrol” is equipped with a microprocessor sensitive to frequency (output of 0-10 V – 4-20 mA), that will dissipate by means of dedicated power block, the entire energy or part of the energy produced by the generator to electrical resistances, to keep constant the speed of the machine. The phases are always balanced due to the differential way in which the load is regulated on the ballast. The “Tachicontrol” has a series of alarms that guarantee a higher security level. These alarms could react in a very fast way, to open or close the valve that controls water flow. This property of the system can also be visualized through a sonorous device. It is also possible to transmit the signal of these alarms at long distances. A display with 4 LEDs and 4 buttons permits to have under control all the electrical and mechanical parameters of the turbine-generator system, as well as the on-site configuration and set of the equipment. For a best management of the system, the “Tachicontrol” has been conceived taking into account a distinction between the control and power parts. Both of them are installed on a same modular DIN profile hooked container. It is also possible to project the machine with emergency stops and/or protections.

3.6 Wind turbine from local manufacturer in MPC

NERC did complete the design of all components of the wind turbine prototypes. The design was revised for some technical aspects to simplifying the manufacturing process.

Manufacturing the blades:

The blades were produced based on a procedure that was developed to help the workshop or the local manufacturer produce the blades smoothly with no obstacles and prepare mass production capabilities. The first thing was to manufacture two blades models. Which were manufactured from wood. The models were presented to the workshop that is specialized in Fiber Glass products. According to the models, two molds were manufactured. The molds were used to manufacture the blades. Based on that procedure, the blades were manufacture. The production was carried out with a professional manner. No problems faced the manufacturer since NERC's technical staff was all the time present to follow up the production stages.

Blades Design:

The blade is an aerodynamic body having a special geometry mainly characterized by an airfoil cores section. Extensive calculations are necessary in order to determine the blade parameters such as chord and thickness distributions, twist distribution and taper that is matched with the selected airfoil sections.

The first rotor diameter was calculated to be 3.4 m. A three - bladed rotor with middle tip speed ratio 3.3 was chosen.

The second rotor diameter was calculated to be 2.7 m. A three - bladed rotor with tip speed ratio about 6.3 was chosen. Aerodynamic performance, Balance, stability and system cost represent the three bladed rotors the best trade.

The basic conditions of the design are:

Application of series production components.
Easy assembling.
Easy maintenance.
Long maintenance intervals.
Low components weight.
High reliability of the regulating system.
Long lifetime.

Manufacturing the Tower:

As mentioned in the last year report, NERC designed two types of tower, the tripod tubular tower and the tubular mast. Since the goal was to reduce the cost of manufacturing the wind turbine system and to make the assembly of the system as easy as possible, NERC manufactured the second type, tubular mast. This mast is hinged at the base and supported by four guy wires. It supposes to withstand storm conditions of 40 m/s wind.

The Tower Design:
The strength of tower and supports must be sufficient to resist the maximum expected transient loading (proof load) with adequate safety margin, and the tower stiffness must be determined to avoid tower resonance at the rotor frequencies.

The first prototype of wind turbine has a 9 m tripod tubular tower which is hinged at the base consists of 3- sections all bolted. The tower is supposed to withstand storm condition of 40 m/s winds.

The second prototype of wind turbine has a 10 m tubular mast which is hinged at the base. The mast is supported by four guy wires. It is suppose to withstand storm condition of 40 m/s winds.

Manufacturing the hub:

The hub that was produced was star shape plate that sandwich the blades. It is simple in manufacturing and assembly.

Rotor and Hub:
The first prototype of wind turbine has a hub produced from recycled Aluminum which is available in the market and cheap.

The second prototype of wind turbine has a hub produced from two plates that sandwich the blades at the centre. This type of hub was chosen for simplicity in manufacturing and installation and cheaper in cost.

Manufacturing the Turntable:

The turntable was manufactured from Aluminum Alloy. It is used to connect the generator with vane and the tower. It houses the bearing, the slip rings and the brushes. The slip rings and the brushes were used to avoid the twisting in the cable which might damage it.

Manufacturing the vane (Tail):

The vane was manufactured from Aluminum in two pieces. It is assembled on a traverse (beam) hinged to the turn table.

Assembling and testing the Turbine:

The turbine was assembled and erected at NERC testing site at the Southern part of Jordan. The functional test was carried out. Some problems were faced in the dynamic balance of the blades. This problem was solved. Some improvements still needed in the manufacturing process to avoid such problem. The performance test was carried out too. Unfortunately, the wind speed didn't help to test the turbine on the testing range of wind speed, up to 25 m/s. The maximum wind speed reached 10 m/s at the site.

Generators
Two permanent magnet generators (PMG) were chosen to be used for the two prototypes: the first with 200 rated RPM and the second with 400 rated RPM.

Conclusion

The milestone for WP3 was to provide reliable and robust technology available for installation in MSGs in the MPC countries by the end of 2007. The work has suffered delays. Finally at the end of 2008, all the activities have been completed successfully.

3.4 WP4: Communication, Monitoring, and Remote Control System

Objective

The objective of this work package is to develop solutions for the communication, monitoring and remote control of MSGs. The management of several MSGs by one single operator requires a technological solution for the remote monitoring and control of the systems, for example satellite communications. Novel key parameters for monitoring allow a reduction of the amount of data to be collected. The automatic integration of operational data into single management software will allow operators to manage of a set of several MSGs with one single computer (“virtual power plants”). For load management, a communication bus system is selected and adapted which allows the energy management system to control load management devices.

Starting Point
The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. The leader of the work package is SASSO.

Progress
The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Task	Foreseen completion date	Actual completion date	Work Completed
4.1 Definition of requirements for monitoring and system control	July 2006	Sept. 2006	100%
4.2 Requirements and selection of communication system for control and monitoring	Sept. 2006	Sept. 2007	100%
4.3 Bus communication devices for load and generation management	Oct. 2007	Dec. 2008	100%
4.4 Interface for connection with Internet	Oct. 2007	Dec. 2008	100%
4.5 Development of remote monitoring and control system	Dec. 2007	April. 2009	100%

Description of activities

Following is a short description of the activities worked out during the period starting from month 7. A detailed view on the different tasks carried out is presented.

4.1 Definition of requirements for monitoring and system control

In June, 2006, SASSO met together with the other members of the work package FhG and TTA in Freiburg, Germany. The purpose of the meeting was to define the requirements for the monitoring and system control of an MSG. The technology of the power conditioning unit from TTA which is to be used as the central unit for the MSG was presented to the partners. FhG and SASSO presented the different possible options for bus communication systems. The open points of the meeting were then worked upon by the three partners and again discussed and confirmed together with Armines at the partner meeting in Amman, Jordan. Armines presented the typical indicators that are used for monitoring of both MSG and SHS. The completion date of this sub work package was delayed until the agreement of the definition of requirements was taken at the partner meeting in Amman this past September.

4.2 Requirements and selection of communication system for control and monitoring

SASSO has done an analysis of the requirements of the communication system necessary for the control and monitoring of MSG's. The automation system should be made out of distributed devices in order to satisfy the required needs and to achieve a user-friendly installation as well as simple and cheap maintenance, flexibility, in respect to the local safety rules. The following gives an overview of the proposed system: • A central unit connected to the production and distribution network • A field-bus network linking all the sensors • The communication interfaces between sensors and field-bus • The control system is involved in the process of data management: it takes data coming from the distributed devices and useful to their functionality too. Each device has its own interface allowing the transmission of the data. Once data are processed they become useful both for the devices involved and for every other application in order to optimize the global system functionality. • The system will be ruled by a central node giving the user all the information useful to check out its state and permitting a manual intervention in case it runs out of order. • A distributed control capability is on study to make sensors belonging to the same control group able to exchange

information directly and gaining speed in the process of reaching the best functioning state as well as making the sensors network heavily fault-resistant.
Sharing the “intelligence” between the different devices will give the system better strength and power, distributing the work load on several points instead of keeping it only on the central unit. The different communication systems proposed by SASSO to achieve the requirements discussed above are the following:

- Profibus
- Canbus
- Lonworks
- KNX

The advantages and disadvantages have been presented by SASSO to the other partners of the work package, FhG and TTA. The completion date has been delayed since the final decision as to which communication system will be chosen for development has yet to be taken. In order to make a final decision, a meeting is planned in Turin, Italy hosted by SASSO in February, 2007.

4.3 Bus communication devices for load and generation management

The Scientific Responsible brought on his work developing prototypes of CANOpen devices and the communication protocol CANTaps – CANOpen. The aim of the whole activity was to build up the complete system, in cooperation with FhG, integrating CANOpen Master, CANOpen slave and remote control system.

The Technical Expert was in charge of the setup and testing of the whole system. His activity consisted basically in making devices reliable and test the efficiency of the communication system over CANBus at every step.

4.4 Interface for connection with Internet

The development of the remote interface for Internet connection has been tailored by programming an embedded controller connected to the bus and capable of translating all the data on it to a different protocol. In particular, TCP/IP protocol has been addressed to grant visibility of the information on the Internet. Further developments are being carried on to focus on the most suitable communication channel to be used on the foreseen installations.

4.5 Development of remote monitoring and control system

The Technical Experts of Sasso, with the support of TTA, has finally designed the prototype for the remote communication. The idea is to monitor remotely all the data and performance of the electronic equipments based in the technical building in the community of Azaghar, Morocco. Final setup and testing of the whole system have been performed as well.. The activity consisted basically in making devices reliable and testing the efficiency of the communication system over CANBus at every step. In 2009, the focus has been on remote control and checking the most reliable structures on which insert the devices for installation.

Conclusion

The milestones for WP4 are to develop a load management system (M5) and a remote control monitoring system (M6) that will be operative and available for installation in MSGs in the target countries. Deliverables 9 and 10 for the definition of the monitoring system requirements and the choice of remote communication/control and monitoring concept have been done and on their basis an important development has been carried out. D17 and D18

have been completed in the last reporting period and finally, after many delays, the D19 has been completed as well and the prototype for remote communication is working.

3.5 WP5: Development of MSG Design and Implementation Method

Objective

The objective of this work package is to develop a standardised engineering method for the design and the implementation of MSGs. The design phase will deal especially with aspects related to the generation system definition and the components sizing while the implementation phase will consider the electrification schemes and the configuration of the distribution grid.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. The leader of the work package is TRE.

Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
5.1 Generation system	June 2007	July 2007	100%
5.2 Distribution network configuration	June 2007	Aug. 2007	100%
5.3 Standards for micro grids	Aug. 2007	Aug. 2007	100%
5.4 Elaboration of an appliances list	Aug. 2007	Aug. 2007	100%
5.5 Elaboration of engineering guide	Dec. 2007	Dec. 2007	100%

5.1 Generation system

Preliminary sizing of the generation system was begun once the load demand and resource assessment was done in July, 2006 at the selected village Tiouardersine in Morocco. These initial pre-sizing results were presented at the partner meeting in Amman, Jordan by FhG. The outcome of this work will serve as the basis for the exact sizing and simulation of the generation system by TRE in the first half of 2007.

5.2 Distribution network configuration

Armines has begun the development of a method to systematically design a distribution network configuration for MSG's. An initial version of a software tool has been developed by them and was introduced to the partners at the meeting in Amman, Jordan.

To operate successfully an electric power system, certain physical or regulatory limitations must be respected:
- voltage has to remain within the range for which the power system components were designed;
- current in the conductors must not exceed a maximum value to prevent over-heating;

- the power produced by each of the distributed generation sources cannot overcome a given limit.

During the study phase, it is therefore important that the value of each of the power system components variables (voltage -V-, current -I-, active power -P- and reactive power -Q-) can be calculated from given or imposed assumptions, and checked to be sure that they are compatible with their characteristics, in order to guarantee the power quality and the reliability of the distribution to all the users.

For that purpose, a software tool has been developed to undertake these steady-state calculations on a balanced, three-phase network. This could be a mesh network (like a transport network), or another type (such as a distribution network).

This tool can be run completely autonomously. Both the models and the default values of the parameters were chosen with the aim of:
- quick and easy understanding;
- an appropriate balance between the user's needs in terms of accuracy in the simulation, and the information he has got, or can get hold of, on the power system and its components.

In short, the program allows you to:
- Enter a power system using a chart and a box of components. The power system's construction is done by setting down electric symbols on a chart and linking them together using connections without impedance. The characteristics of the different elements are then supplied using dialogue boxes.
- Calculate the apportionment of power flows. It is possible to simulate either a single operating point or a day divided into 24 hourly points.
- Visualise the results. The simulation results are shown directly on the chart: the voltage in each node, the currents in each line and the reactive power flows can be visualised or masked at the user's request.
In the case of a simulation over a 24-hour period, the results appear in the form of curves on a chart, but also show up in a result file in the form of tables giving the power, current and voltage for each component at each hour.

The software has been made available on the partner internet site for testing and to allow the opportunity to make recommendations for improvements. The last version is available on the website.

5.3 Standards for micro grids

This activity has been realized by the French partners (TRE, Armines and Ademe). The document shows a classification of the different technologies for rural electrification through PV hybrid micro-grids. The classification informs on the architecture, characteristics of the equipment used, conditions of exploitation and a reference of cost per category. Finally, for each model, there are examples of possible applications. These information have been used also in the elaboration of the guidelines.

5.4 Elaboration of an appliances list

TRE has performed this activity in coordination with the MPC during the second reporting period. The aim was to identify the offer in these countries of high-efficient devices. The devices can be bulbs, fridges, etc. This study is also part of the manual. This can help future project implementing entities to be aware of this important aspect of a renewable energy

project on the first hand, and to have an updated list available in their country on the second hand.

5.5 Elaboration of engineering guide

The preparation of an engineering guide for the designing and implementation of MSG's was scheduled to begin in the second half of 2007, using the results from the other sub work packages. The report will be prepared by TRE with the assistance of TTA. The work has been done on time. Additionally to the planned activities, FhG added an important chapter in the manual about the design software available on the market. The little study describes each and everyone and makes a comparison between them. It also explains which has to be used according to the application.

Conclusion

The milestone of this work package (M7) is to create a clear set of engineering rules for the design and implementation of MSG's by the end of 2007. The work towards this goal has been performed successfully during the year 2007 without any delay.

3.6 WP6: Field Test System and Study

Objective

The objective of this work package is to implement a field test with the prototype components developed and according to the schemes worked out in previous work packages. As user action is crucial, the field test system is installed in a real village with real users. This system is used for several studies on technical, social, and economic level, which are gathered in one single report.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. The leader of this work package is the Moroccan partner Afrisol.

Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
6.1 Institutional and local coordination	Dec. 2008	Dec. 2008	100%
6.2 Selection of adequate location for field test system	Sept. 2006	Mar. 2008	100%
6.3 Preparatory tasks and system design	Oct. 2007	Oct. 2008	100%
6.4 Installation and set up of the system	Feb 2008	June. 2009	100%
6.5 Set up of the service model	June. 2008	Apr. 2009	100%
6.6 Technical monitoring	Dec. 2008	June. 2009	100%
6.7 Socio economic impact studies	Dec. 2008	June. 2009	100%
6.8 Report on field test system	Dec. 2008	June. 2009	100%

6.1 Institutional and local coordination

The institutional and local coordination is a task that is being carried out by the Moroccan partner Afrisol. This task began immediately after the kick-off meeting, as Afrisol needed to begin negotiating with the national utility ONE in order to make a short list of candidate villages for the rural electrification with MSG's for the field test of the CRESMED project. In addition they are responsible for the coordination with the local authorities of the selected village. The work on this task will continue throughout the coming year, preparing the way for the field test, including the logistics to import the components. The work in this task is scheduled to end once the system has been installed and the monitoring period is over in December, 2008.

6.2 Selection of adequate location for field test system

In the last Activity report, it was explained that a field mission was organized at the beginning of 2008. Unfortunately the visit revealed many failures in the choice of the village. First, most of the population had left the village because it seemed to be abandoned. Then, no co-financing was available.

Finally, TTA could find a co-financing with a programme of the Spanish Cooperation. The consequence has been the change in the location of the village because the Spanish Programme focused only the Northern part of Morocco. Then TTA had to present the project following a formal process which took a long time.

Now all the documents are done. The chosen village is called Azaghar, located close to Chefchaouen. It is located in the same area as Akkan village mentioned several times in CRESMED reports, where TTA has installed another PV Hybrid Micro-Grid.

6.3 Preparatory tasks and system design

TTA had to make some modifications in the system design due to the change of village. Roughly the size of the PV array is similar to the former one. But all the exact measurements and drawings have been modified and adapted. Finally at the end of the year 2008 the technical executive project has been completed and most of the material has been ordered and paid.

The time that all the material be on site, the road is over and the technical building is built, the installation can start.

6.4 Installation and set up of the system

TTA with the support of the other partners involved has followed the implementation of the pilot project and the installation has been done at the end of the fourth reporting period.

- Sending of the small wind turbine to Morocco by NERC
- Installation of the PV Hybrid plant
- Construction of the road and technical building were the battery and electronic equipments will be located
- Electrical installations in all the users' houses
- Building of the distribution network
- Start up, commissioning and test of the MSG in the community of Azaghar, Morocco (pilot project)

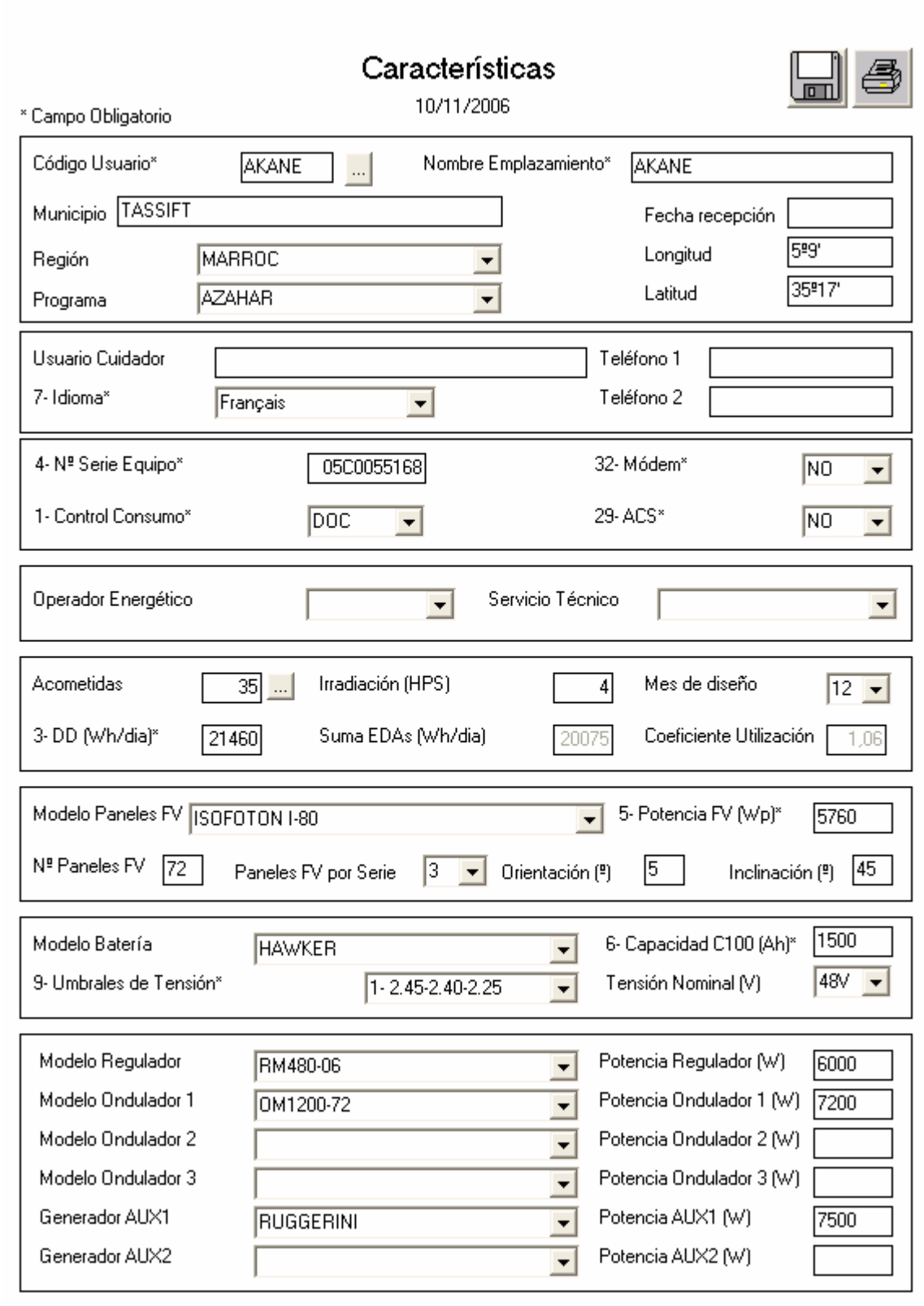
6.5 Set up of the service model

The set up of the service model for the MSG has been done during the installation phase. This work has been done by TTA. Sasso has supported TTA in this activity also, as well as TRE and ADEME using the results from WP2.

The model has been inspired from another community very close to Azaghar called Akhane. This community has a PV hybrid micro-grid running for the last three years. In the second meeting the consortium decided to use this project as a reference concerning implementation and performance. This installation has been visited during the 3-days seminar organized by TTA in Chefchaouen as a site visit in March 2009.

6.6 Technical monitoring

First it is necessary to set the parameters of configuration of the installation as it follows:



Another step is the detailled list of all the users of the community that form the Micro-Grid.

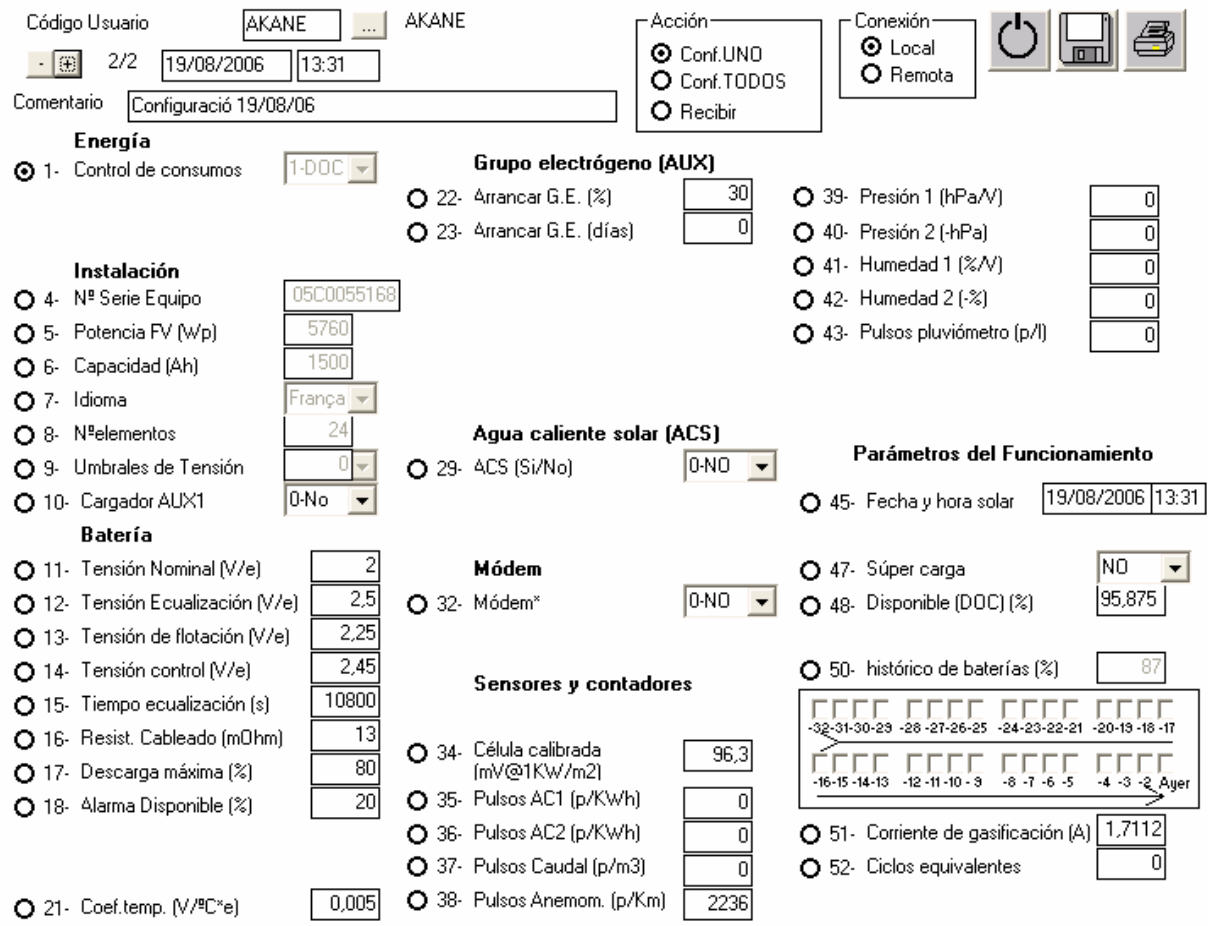
Listado Acometidas

10/11/2006

Código Usuario	AKANE	AKANE		Usuario Cuidador			
Acometidas	35 +	L1		L2		L3	
DD (Wh/dia)	21460	Potencia 1 (W)	7200	Potencia 2 (W)		Potencia 3 (W)	
Suma EDAs (Wh/dia)	20075	Suma Potencia 1 (W)	13475	Suma Potencia 2 (W)	1650	Suma Potencia 3 (W)	3025
Coeficiente Utilización	1,06	Coef. Simultaneidad L1	0,53	Coef. Simultaneidad L2	0	Coef. Simultaneidad L3	0

Nº Acometida	Línea	Usuario Cuidador	EDA Acometida (Wh/dia)	Potencia Acometida (W)
1	3	MOFADAL ABGHI (MOFADAL) -	275	275
2	3	MOHAMED ABGHI (ABDESSALAM) - 1982/207	275	275
3	3	ABDELKADER ABGHI (ABDESSALAM) - LC37072	275	275
4	3	AHNINE ABGHI (ABDESSALAM) - LC79856	550	550
5	3	ABDERRAHMAN ABGHI (ABDESSALAM) - LC1600	275	275
6	3	ALI ABGHI (AHMED) -	275	275
7	3	MOHAMED ABGHI (ELAYACHI) - K328330	275	275
8	2	SAFIA ZARHOUNI (ALI) -	275	275
9	2	RACHID SGHIAR (ADESSALAM) - LC47597)	275	275
10	2	MOFADAL ABGHI (MOHAMED) -	275	275
11	2	ABDELKADER ABGHI (TAIB) - LC158291	275	275
12	1	MOHAMED ABGHI (AHMED) - 1986/477	275	275
13	1	ABDELKADER ABGHI (ABDELKADER) - LC4884	275	275
14	1	MOHAMED ABGHI (ALI) - LC8989	275	275
15	1	SADIK ABGHI (ALI) - LC56394	550	550
16	1	MEKKI ABGHI (ALI) -	275	275
17	1	ABDELAZIZ ABGHI (AHMED) - 1986/481	275	275
18	1	MOFADAL ABGHI (AHMED) - LC54981	275	275
19	1	MOSTAFA ABGHI (ABDESSALAM) - K376251	275	275
20	4	ABDERRAHIM ABGHI (ABDESSALAM) - LC54475	275	275
21	1	IDRISS ABGHI (ABDESSALAM) - K346128	275	275
22	1	MOHAMED ABGHI (ABDESSALAM) - LC45196	275	275
23	1	MOFADAL ABGHI (ELFADEL) - LC79615	275	275
24	2	HASSAN ABGHI (ELAYACHI) -	275	275
25	3	ABDELMAJED ABGHI (AHMED) -	275	275
26	2	MOSTAFA ABGHI (ABDESSALAM) - L285740	275	275
27	1	MOHAMED ABGHI (ELFADEL) -	275	275
28	1	AHMED ABGHI (ELFADEL) - LC40629	275	275
29	1	MOFADAL ABGHI (ELFADEL) - LC79615	275	275
30	1	AHMED ABGHI (MOHAMED) - K104239	275	275
31	1	ABDELKADER ABGHI (ALI) -	275	275
32	5	MESQUITA	550	550
33	3	ESCOLA	550	550
34	6	ASSOCIACIÓ D'USUARIS D'AKANE	1100	1100
35	7	ENLLUMENAT PUBLIC	8800	2200

Finally, we have to configurate the Energy management System, the part of the power management unit which manages the control and the data logger.



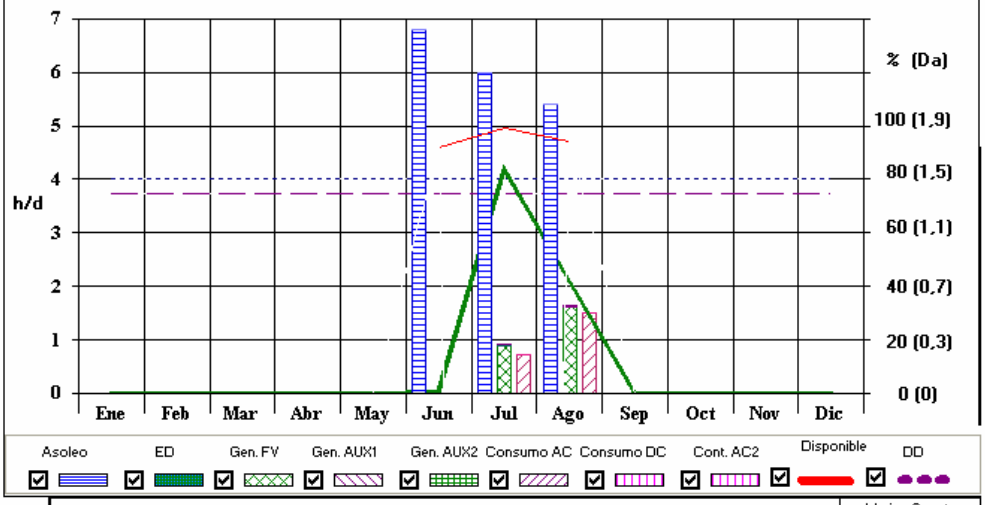
From the staring up of the installation the data logger presents the following information:

Resumen Anual de Funcionamiento

Operador | Código Usuario | AKANE | Año 2006 | Fecha Recepción

Emplazamiento AKANE | Suma EDAs (Wh/dia) 20075 | DD (Wh/dia) 21460 | Horas pico 4 (12)

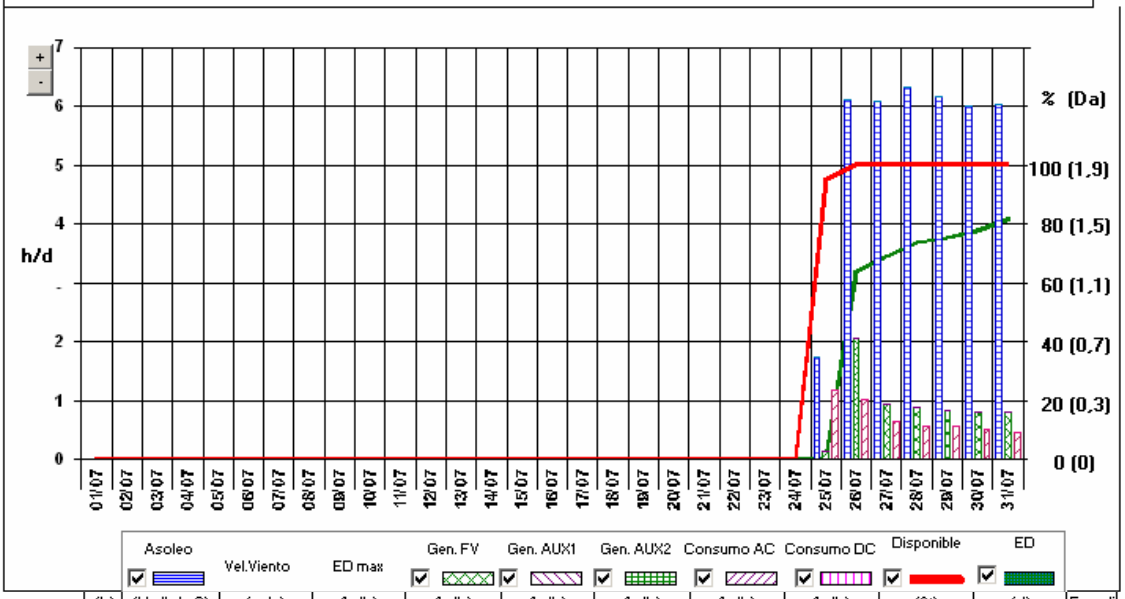
Potencia FV (Wp) 5760 | Potencia AUX1 (W) 7500 | Potencia AUX2 (W) 0 | Capacidad Bat. (kWh) 72



	Datos de monitorización centralita																	Hoja Cont.		
Mes	días	Asoleo(h/d)	Vel.Viento(m/s)	E.D.(kWh)	Gen. FV(kWh)	Gen. AUX1(kWh)	Gen. AUX2(kWh)	Consumo AC(kWh)	Consumo DC(kWh)	Cont. AC2(kWh)	Aprovechamiento(%)	Índice Cobertura(%)	histórico de baterías(%)	Disponible(%)	Temp. Baterías(ºC)	Desc. Exceso Consumo(	Tiempo total desc.(min)	Densidad (1,2,3)	Agua añadida (l)	Satisfacción (0,1,2,3)
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	23	6,8	0	8	0		0			0			4	92	19	0	0	0	0	0
7	6	6	0	205	31	0	1	25	0	0	12	97	100	99	24	24	24	0	0	0
8	20	5,4	0	344	186	1	1	173	1	0	28	99	100	94	21	122	122	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	49	6,1	0	557	217	1	1	197	1	0	13	52	55	94	20	146	146	0	0	0

Resumen Mensual de Energía

Operador	Código Usuario	AKANE	...	Mes	07/06	Fecha Recepción	
Emplazamiento	AKANE	Suma EDAs (Wh/dia)	20075	DD (Wh/dia)	2146C	Horas pico	4 (12)
Potencia FV (Wp)	5760	Potencia AUX1 (W)	7500	Potencia AUX2 (W)	0	Capacidad Bat. (kWh)	72



	(h)	(kWh/m2)	(m/s)	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(%)	(d)	Ecuali
01/07/06												
02/07/06												
03/07/06												
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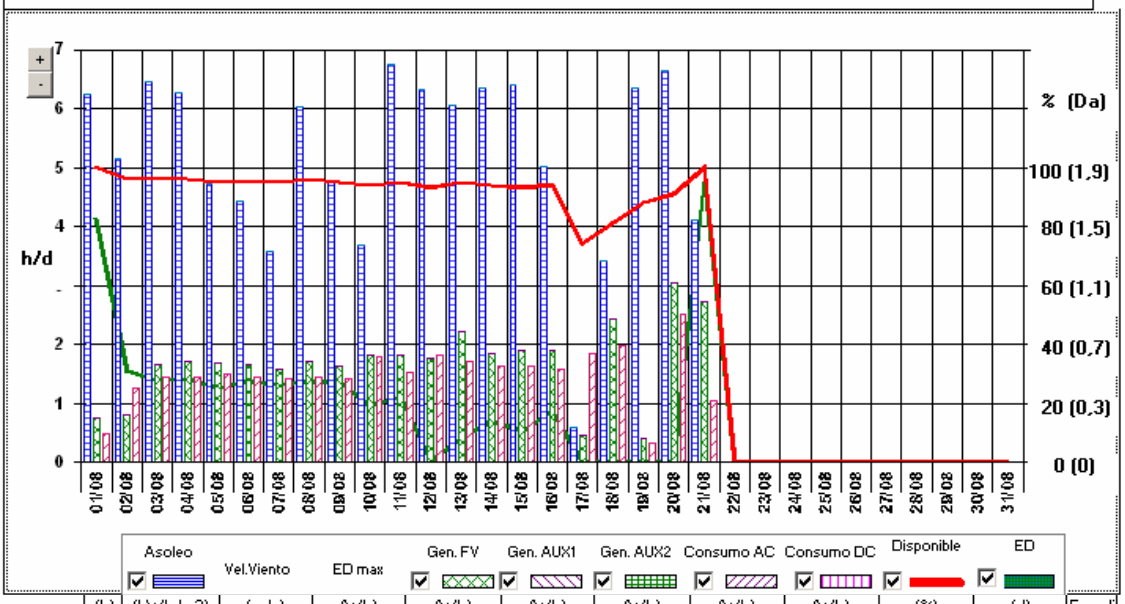
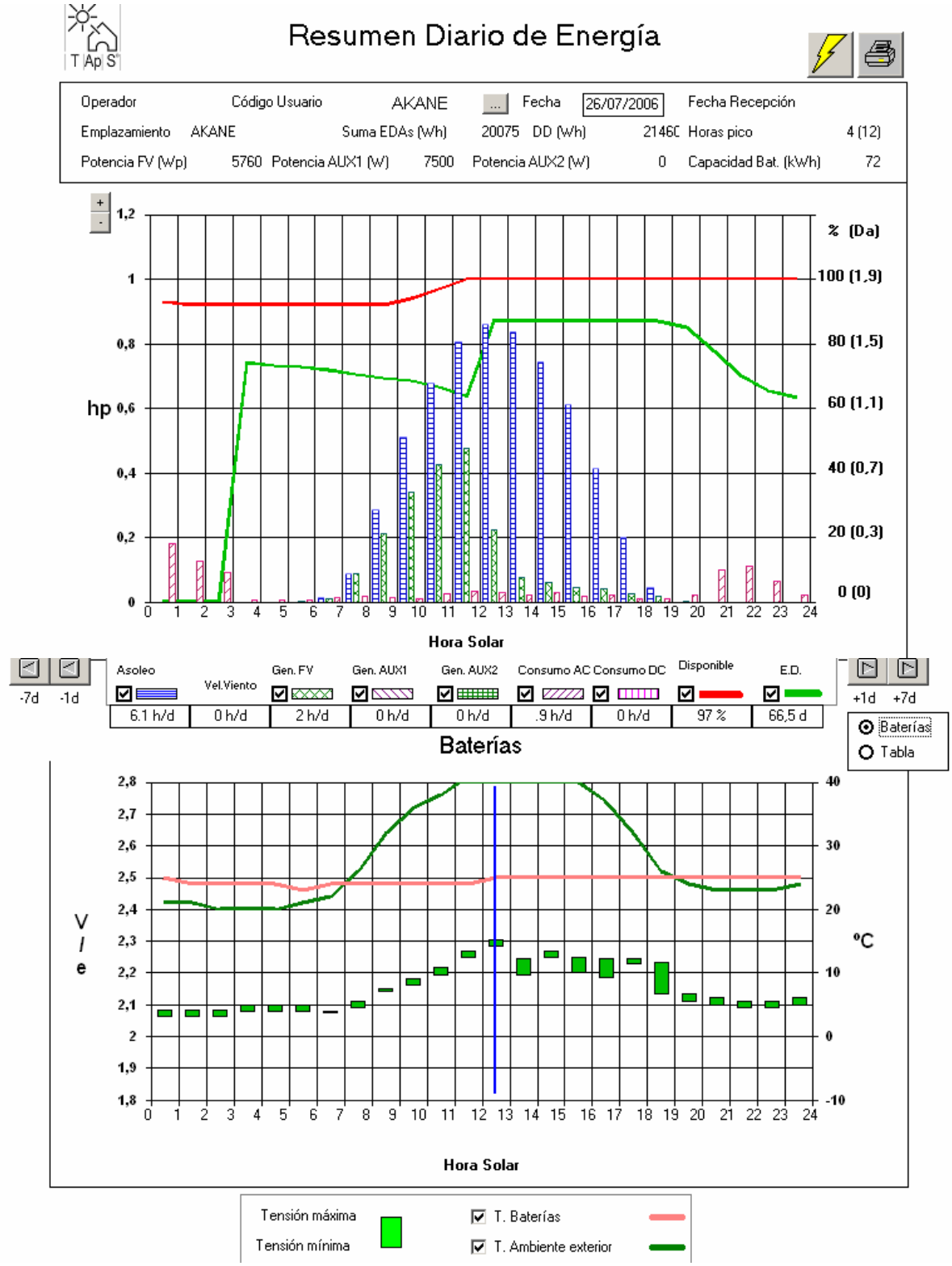
24/07/06												
25/07/06	10	1,74	0	30540	760	0	2	6747	0	95%	0	1
26/07/06	24	6,1	0	35514	11784	0	0	5815	0	100%	1,2	1
27/07/06	24	6,08	0	38042	5324	0	0	3675	0	100%	1,3	1
28/07/06	24	6,32	0	39347	5137	0	0	3300	0	100%	1,4	1
29/07/06	24	6,16	0	39959	4808	0	0	3205	0	100%	1,4	1
30/07/06	24	5,99	0	40285	4666	0	0	2954	0	100%	1,4	1
31/07/06	24	6,03	0	40448	4605	0	0	2699	0	100%	1,5	1
Total		5,82	0	37734	37084	0	2	28395	0	99%	0,8	7

Resumen Mensual de Energía

Operador	Código Usuario	AKANE	...	Mes	08/06	- +	Fecha Recepción		
Emplazamiento	AKANE	Suma EDAs (Wh/dia)	20075	DD (Wh/dia)	21460		Horas pico	4 (12)	
Potencia FV (Wp)	5760	Potencia AUX1 (W)	7500	Potencia AUX2 (W)	0		Capacidad Bat. (kWh)	72	



	(h)	(kWh/m2)	(m/s)	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(Wh)	(%)	(d)	Ecuali
01/08/06	24	6,23	0	40611	4370	0	0	2849	0	100%	1,5	1
02/08/06	22	5,14	0	40611	4590	0	0	7243	1	96%	0,5	1
03/08/06	24	6,47	0	40611	9609	0	0	8329	0	96%	0,5	1
04/08/06	24	6,27	0	40611	9789	0	0	8246	0	96%	0,5	1
05/08/06	24	4,73	0	40611	9753	0	0	8616	0	95%	0,4	1
06/08/06	24	4,42	0	40611	9560	0	0	8241	0	95%	0,5	1
07/08/06	23	3,57	0	40611	9149	0	0	8186	0	95%	0,4	1
08/08/06	24	6,02	0	40611	9871	0	0	8276	0	96%	0,5	1
09/08/06	24	4,76	0	40611	9335	0	0	8198	0	95%	0,5	1
10/08/06	20	3,67	0	40611	10501	0	2	10306	0	94%	0,3	1
11/08/06	23	6,75	0	40611	10493	0	0	8804	0	95%	0,4	1
12/08/06	24	6,31	0	35514	10192	0	0	10410	0	93%	0	1
13/08/06	24	6,07	0	38042	12806	0	0	9917	0	95%	0,1	1
14/08/06	23	6,36	0	40611	10650	0	0	9453	0	94%	0,2	1
15/08/06	23	6,41	0	39959	10975	0	0	9394	0	93%	0,2	1
16/08/06	24	5,03	0	40285	10939	0	0	9142	0	94%	0,3	1
17/08/06	24	0,58	0	25443	2672	0	0	10599	0	74%	0	0
18/08/06	23	3,42	0	20142	13984	0	0	11370	0	81%	0	0
19/08/06	24	6,36	0	32945	2290	1	2	1794	1	88%	0	1
20/08/06	24	6,63	0	36778	17499	0	9	14494	0	91%	0	1
21/08/06	13	4,11	0	38695	15669	0	12	5979	0	100%	1,8	1
22/08/06												
23/08/06												
24/08/06												
25/08/06												
26/08/06												
27/08/06												
28/08/06												
29/08/06												
30/08/06												
31/08/06												
Total		5,47	0	37864	204696	1	25	179846	2	93%	0	19


Resumen Diario de Energía
Operador
Código Usuario
AKANE
Fecha
26/07/2006
Fecha Recepción
Emplazamiento
AKANE
Suma EDAs (Wh)
20075
DD (Wh)
21460
Horas pico
4 (12)
Potencia FV (Wp)
5760
Potencia AUX1 (W)
7500
Potencia AUX2 (W)
0
Capacidad Bat. (kWh)
72
hp
% (Da)
100 (1,9)
80 (1,5)
60 (1,1)
40 (0,7)
20 (0,3)
0 (0)
Hora Solar
Asoleo
Vel.Viento
Gen. FV
Gen. AUX1
Gen. AUX2
Consumo AC
Consumo DC
Disponible
E.D.
6.1 h/d
0 h/d
2 h/d
0 h/d
0 h/d
,9 h/d
0 h/d
97 %
66,5 d
-7d
-1d
+1d
+7d
Baterías
Tabla
Baterías
V
I
e
°C
Hora Solar
Tensión máxima
Tensión mínima
T. Baterías
T. Ambiente exterior

With these reports, we monitor the basic and historical parameters of operation and running: total input and output hourly energy, temperature of battery, solar irradiation of the modules, battery voltage, and availability of energy.

Then, it is quick and easy to know if the efficiency (Performance ratio) is optimum, check if the hypothesis of operation were correct, check if the generation and consumption has reached the expectative, etc.

6.7 Socio economic impact studies

The socio economic study has been started at the end of the previous reporting and finished at beginning of the present one. This document describes the socio-economic situation of the community and the users.

Based to this study, the tariffs have been designed in order to assure the sustainability of the project in long term vision and also to fit with the users' willingness to pay for the electricity service.

6.8 Report on field test system

In order to complete the commissioning of the installation, we have to perform a set of tests and verifications of the operation and running of the system in order to check all the parameters of the system.

The following tables describe all the tests:

MICRORESEAU SOLAIRE HIBRIDE D'AKANE

IDENTIFICACIÓN Y CARACTERÍSTICAS

Versión 1.1
15/08/2006

Emplazamiento: AKANE	**Comuna: TASSIFT**	**Provincia: CHEFCHAOUEN**
Longitud y latitud emplazamiento:	**5°9' / 35°17'**	
Técnico de Mantenimiento:		
Dirección:		**Población:**
Teléfono:		**Fax:**
Proyecto de referencia: **AZAHAR**		

GENERACIÓN:

Num. módulos: **72**	Marca y modelo: **ISOFOTON I-80**
Pot. pico nom. módulo: **80** Wp	Dimensiones ext. módulo: **1,224**m x **0,546**m x **4**cm
Silicio: **mono** / poli / amorfo	Diodos by-pass: **si** / no
Pot. pico instalada: **5.760** Wp	Inclinación: **43°**
Orientación (W-/E+): **+5° S**	

CONEXIONADO DE MODULOS:

CAMPO FV 1:	**8**	series de		**3**	módulos
Cableado interconexión módulos: longitud	**1,5**	m, sección		**2,5**	mm^2
Cableado módulos-caja registro: longitud	**4,5**	m, sección		**4**	mm^2
Cableado caja registro-regulador: longitud	**13**	m, sección		**16**	mm^2
CAMPO FV 2:	**8**	series de		**3**	módulos
Cableado interconexión módulos: longitud	**1,5**	m, sección		**2,5**	mm^2
Cableado módulos-caja registro: longitud	**4,5**	m, sección		**4**	mm^2
Cableado caja registro-regulador: longitud	**11**	m, sección		**16**	mm^2
CAMPO FV 3:	**8**	series de		**3**	módulos
Cableado interconexión módulos: longitud	**1,5**	m, sección		**2,5**	mm^2
Cableado módulos-caja registro: longitud	**4,5**	m, sección		**4**	mm^2
Cableado caja registro-regulador: longitud	**9,5**	m, sección		**16**	mm^2

OTRAS FUENTES DE GENERACION ELECTRICA RENOVABLE: NO

fotovoltaica antigua / eólica / minihidráulica

Potencia: W Marca y modelo:

INFORMACION ADICIONAL

ACUMULACIÓN:

Capacidad batería: **1.500**	Ah en 100h	Tensión nominal conjunto:	**48** V
Marca y modelo: **HAWKER**		Num. elementos: **24**	
Tensión nominal elemento: **2**	V/el	Tensión de gasificación:	**2,45** V/el
Tensión de flotación: **2,25**	V/el	Tensión de ecualización:	**2,50** V/el

Conexión batería: **24** serie, **0** paralelo

Cableado conex. batería - regulador: longitud **3,4** m, sección **70** mm2

Ventilación adecuada sala de batería: **si** / no Visibilidad niveles elecrolito: **si** / no

Accesorios: agua destilada / **densímetro** / embudo / **grasa neutra** / **termómetro**

Seguridad: luces de emergencia / extintores / **señalización** / ...

Mantenimiento: ficha de seguimiento / **cartel conservación básica** / ...

CONTROL, REGULACIÓN Y TRANSFORMACIÓN:

Num. centralita: 05C0055232	**Modelo: SLC-TApS RM480 / OM2300**
Módulos incorporados:	·Ventiladores: **SI**
·Etapas de potencia: **6**	·Supervisor de baterías: **1**
·Rastreador campo FV: **3**	·Control de ondulador: **1**
·Convertidor 48Vcc/12Vcc: **0**	

Configuración centralita (otros parámetros):

1- Control consumos:	**1-DOC**	34- Coef. V Célula calibrada (mV):	**96,3**
7- Idioma:	**2-français**	35- Pulsos AC1 (p/kWh):	**0**
9- Umbrales de tensión:	**0**	36- Pulsos AC2 (p/kWh):	**0**
10- Cargador auxiliar:	**0-NO**	37- Pulsos caudalímetro (p/m3):	**0**
15- Tiempo ecualización (s):	**10800**	38- Pulsos anemómetro (p/km):	**2236**
16- Resistencia cable (mOhm):	**13**	39- Presión 1 (hPa/V):	**0**
17- Descarga máxima (%):	**80**	40- Presión 2 (hPa):	**0**
18- Alarma disponible (%):	**20**	41- Humedad 1 (%V):	**0**
21- Coeficiente Temp. (V/ºC e):	**0,005**	42- Humedad 2 (%):	**0**
22- Arrancar GE (%):	**30**	43- Pulsos pluviómetro (p/l):	**0**
23- Arrancar GE (días):	**0**	47- Función Supercarga:	**NO**
29- ACS (si/no):	**0-NO**	51- Corriente de gasificación:	**1,7112**
32- Módem:	**0-NO**		

Tensión de servicio: **230 Vca**

Otros: NO
Marca y modelo regulador:
Marca y modelo ondulador:

OBSERVACIONES:

SENSORES:

Sensores de temperatura:	**Anemómetro: SI**
T0: Temperatura de la batería	·Marca y modelo: **DAVIS**
T1: Temperatura exterior	**Célula calibrada: SI**
T2:	·Marca y modelo:
T3:	**Módem telefónico interno: NO**
T4:	·Teléfono llamada:
T5:	**Caudalímetro: NO**
T6:	·Marca y modelo:

FUENTE AUXILIAR:

Grupo electrógeno: SI		
Marca y modelo: **RUGGERINI RD290**	Potencia: **7,5**	KVA
Voltage salida: **230Vca monof**	Conexión: **manual / automática**	
Cargador de baterías: NO		
Marca y modelo:	Potencia:	
Tensión entrada:	Tensión salida:	

ELEMENTOS DE PROTECCIÓN:

Diferencial:	40 A,	30 mA	Magnetotérmico general:	40	A
Linea 1:	Magnetotérmico	32 A	Linea 2:	Magnetotérmico	32 A
Linea 3:	Magnetotérmico	32 A	Linea 4:	Magnetotérmico	26 A
Linea 5:	Magnetotérmico	10 A	Linea 6:	Magnetotérmico	10 A
Linea 7:	Magnetotérmico	10 A	Linea 8:	Magnetotérmico	6 A
Protección general alumbrado público:			Magnetotérmico:	16 A	
Línea 1 alumbrado público:			Magnetotérmico:	10 A	
Condiciones de puesta en marcha:			sensor crepuscular + temporización opcion manual + temporización		
Línea 2 alumbrado público:			Magnetotérmico:	10 A	
Condiciones de puesta en marcha:			sensor crepuscular + temporización opcion manual + temporización		
Negativos de placas FV , batería y centralita puestos a tierra:			si / no		
Marco de placas y elementos constructivos metálicos puestos a tierra:			si / no		
Toma de tierra independiente instalaciones interiores:			si / no		

GESTIÓN:

Cuadro de visualizacion remota: si / no	
Num. relés telegestionados: 0	
Funciones seleccionadas relé 1:	aparato gestionado:
Funciones seleccionadas relé 2:	aparato gestionado:
Funciones seleccionadas relé 3:	aparato gestionado:
Funciones seleccionadas relé 4:	aparato gestionado:

APARATOS DE CONSUMO SALAS SOCIALES:

Tipo	Marca y modelo	Potencia	Tensión	CC/CA	Num

COMUNICACIONES:

Teléfono: linea / TRAC / móvil / no / otros	Contestador : si / no
Linea telefónica conectada a centralita: si / no	Nº teléfono:

OBSERVACIONES:

MICRORESEAU SOLAIRE HIBRIDE D'AKANE

ENSAYOS Y VERIFICACIONES

(Debe completarse con la hoja de inspección)

Versión 1.1
15/08/2006

Fecha:	19-08-06	Hora:	10:15	Responsable:	DANI CADILLA

GENERACIÓN:

Medir para el conjunto de la instalación:

(Atención: es necesario que el regulador no esté limitando. Si éste fuera el caso, modificar la fecha (n+1) del micro, o bién bajar Vbat con consumos)

Radiación instantánea sobre los módulos, R: 772 W/m²

Temperatura ambiente, TA: 22 ºC Temperatura módulos, TP: 55 ºC

*(si se desconoce temperatura de módulos, estimar que TP = TA+0,0476*R-4)*

Fracción útil FV indicada en centralita, FU: 77% (Valor correcto = 65 ... 95%)

Medir para cada uno de los campos fotovoltaicos (en caso de existir más de uno):

	Pn Potencia nominal (Wp)	Gs Generación FV (W)	Fuc Fracción útil calculada (%) FUc = 10.000*Gs/[R*Pn*(1-0,005*(TP-25))]
CAMPO FV1	1920	1175	93
CAMPO FV2	1920	1145	91
CAMPO FV3	1920	1130	90

Los datos de generación de todos los campos divididos entre el número de placas de cada uno deberían ser similares para irradiaciones similares. En caso de no ser así, podría ser debido a errores en el cableado de las series de los módulos o a sombras parciales.

DETECCIÓN DE POSIBLES ERRORES DE CABLEADO:

Si un campo presenta datos problemáticos, medir en la caja de conexionado del campo FV y para cada serie la tensión de trabajo en circuito abierto (VCO) y la corriente de cortocircuito (ICC):

	CAMPO FV 1		CAMPO FV 2		CAMPO FV 3	
	R (W/m2):	850	R (W/m2):	810	R (W/m2):	890
	VCO (V)	ICC (A)	VCO (V)	ICC (A)	VCO (V)	ICC (A)
serie 1	58,6	4,08	59,5	3,87	58,5	4,3
serie 2	58,2	4,12	58,6	3,92	58	4,2
serie 3	57,8	4,1	58,3	3,92	57,6	4,17
serie 4	57,3	4,04	58,3	3,88	57,6	4,17
serie 5	58,6	4,1	59,4	4,02	58,5	4,19
serie 6	58,1	4,14	58,9	3,89	57,7	4,27
serie 7	57,4	4,11	58,8	3,95	57,8	4,35
serie 8	57,3	4,07	58,4	3,92	57,8	4,16

Los datos obtenidos deben confrontarse con la curva característica de los módulos.
Localitzar y rectificar las series mal conexionadas

Observaciones:
Aunque los valores són admisibles, se observa que la última fila (series 4 y 8) en general produce menos debido a la suciedad acumulada durante el acabado de la terraza. Se debe liampiar bien las placas.

REGULADOR:

Verificar el ciclo diario de carga de la batería:

Tensión mínima, **Vmin**:	**51,5** V	Tensión ecualización, **Vmax**:	60,5 V
Tensión flotación, **Vflot**:	**55,1** V	*(Vmax no debe sobrepasar los 61 V)*	

Comprovación alarma y desconexión batería baja: **si / no**

Observaciones:
La señal de baja batería se activa por debajo de 30% (mensaje "carga recomendada")
Por debajo del 20% no hay alarma acústica. Por debajo del 15%, mensaje por pantalla "nivel bajo bat.". No se puede llegar a 0% con el Gifa, no se sabe si desconecta.

ONDULADOR:

Comprobar el correcto funcionamiento del control del ondulador y de las etapas de potencia:					
En circuito abierto:		Tensión eficaz alterna:		220 V	
carga 1:	Vbat.: 52,7 V	Vef. alterna:	220 V	Consumos inst. 230 V:	10 W
carga 2:	Vbat.: 51,9 V	Vef. alterna:	221 V	Consumos inst. 230 V:	90 W
carga 3:	Vbat.: 51,8 V	Vef. alterna:	219 V	Consumos inst. 230 V:	220 W
carga 4:	Vbat.: 51,3 V	Vef. alterna:	218 V	Consumos inst. 230 V:	700 W
carga 5:	Vbat.: 51 V	Vef. alterna:	218 V	Consumos inst. 230 V:	1150 W
carga 6:	Vbat.: 50,8 V	Vef. alterna:	216 V	Consumos inst. 230 V:	1400 W
Comprovación alarma y desconexión sobrecarga:			si / no		
Comprobar la correcta desconexión de etapas de potencia al eliminar consumos:					si / no

Observaciones:
No se dispone de aparatos de potencia suficiente para comprobar la sobrecarga.
Con el alumbrado público (1400W) estan conectadas todas las etapas de potencia.

COMUNICACIONES

Sin conexión en el puerto, verificar:	
Vtransm. - massa = V1-3 regleta = 9 V (aprox.)	SI

Observaciones

VISUALIZACIÓN REMOTA

Verificar que todos los indicadores funcionan correctamente) SI

BOTONERA Y DISPLAY

Verificar que funcionan correctamente SI

LÍNEAS DE DISTRIBUCIÓN

Conectar en el último armario de distribución eléctrica de cada línea un consumo cercano a 1.000 W.
Conectar las líneas de alumbrado público.

Medir en bornes de la protección general:
Voltaje salida ondulador, **Vond =** 218,5 V Voltaje línea señal, V_{L8} = 0 V

Medir en fusibles de las cajas de distribución:

	V_L Voltage Lines (V)	CDT_L Caida V Lines $CDT_L = (1-V_L/Vond)*100$ (%)	V_{LA} Volt. Alumbrado (V)	CDT_{LA} Caida tensión Lines $CDT_{LA} = (1-V_{LA}/Vond)*100$ (%)	V_{L8} Volt. Lines Señal (V)
ARMARIO 1	217	0,7	216	1,15	0
ARMARIO 2	217	0,7	216	1,15	0
ARMARIO 3	217	0,7	215	1,6	0
ARMARIO 4	217	0,7	215	1,6	0
ARMARIO 5	-	-	-	-	-
ARMARIO 6	218	0,23	218	0,23	0
ARMARIO 7	218	0,23	217,5	0,46	0
ARMARIO 8	218	0,23	218	0,23	0
ARMARIO 9	218	0,23	216	1,15	0
ARMARIO 10	218	0,23	216	1,15	0

Observaciones
La caja 5 no está instalada.
La línea de señal no funciona debido a avería en placa lateral.

CONEXIONES A TIERRA

Comprovar la conexión a tierra de:	
negativo de baterías: **si** / no	estructuras soporte del campo FV: **si** / no
chasis centralitas: **si** / no	marcos módulos FV: **si** / no
negativo de los campos FV: **si** / no	chasis grupo electrógeno: **si** / no
Observaciones	

GRUPO ELECTRÓGENO:

Arrancar el grupo electrógeno y comprobar su correcto funcionamiento al conectar una carga importante (por ejemplo el alumbrado público)

Verificar que el selector de tres posiciones funciona y está señalizado correctamente

Verificar:

En circuito abierto:	Tensión eficaz:	**230** V	Frecuencia:	53 Hz
En carga:	Tensión eficaz:	**230** V	Frecuencia:	53 Hz

Observaciones:

ensayo sobre una reactancia de alumbrado público:

t (min)	I (A)	V (V)	pot. Indicada en centralita (W)
0	1,06	230	100
1	1,04	224	88
2	1,02	224	97
3	0,96	224	109
4	0,9	224	121
5	0,89	224	123
10	0,88	226	126
15	0,88	226	125
250	0,66	226	95

MICRORESEAU SOLAIRE HIBRIDE D'AKANE

HOJA DE INSPECCIÓN

Versión 1.1
15/08/2006

Fecha: 18-08-06 **Hora:** 15:30 **Responsable:** DANIEL CADILLA

Motivo Inspección:
☐ Inspección regular ☐ Cambio de micro ☐ Estudio: _____
☐ **Recepción de obra** ☐ Volcado de datos ☐ Avería: _____
☐ Otro: _____

OBRA CIVIL Y ESTRUCTURA:

Inspeccionar la obra civil:
Se detectan fisuras, lesiones o otras anomalías? ☐si /☐no

Inspeccionar la estructura metálica de soporte el campo FV:
Se detectan flechas excesivas? ☐si /☐no
Se detecta alguna anomalía o lesiones? ☐si /☐no
Es necesario el repintado de la estructura? ☐si /☐no

Observaciones:
Falta un acabado de pintura

GENERACIÓN

Estado de los módulos y sus conexiones : ☐correcto /☐deficiente

Comprobar la ausencia de sombras sobre el campo FV: ☐correcto /☐deficiente

Funcionamiento Generación
(Atención: es necesario que el regulador no esté limitando. Si éste fuera el caso, modificar la fecha (n+1) del micro, o bién bajar Vbat con consumos)
Radiación instantánea sobre los módulos, R: **886** W/m2
Fracción útil FV, **FU:** **75** % (Valor correcto = 65 ... 95%) ☐correcto /☐deficiente

Observaciones:

ACUMULACIÓN:

Inspección mecánica:
Comprobar que los aprietes de los tornillos de todas las pletinas y conexiones son correctos

Inspección eléctrica:
Tensiones de batería en el último día: **Vmax =** 60,6 V / **Vmín =** 50,6 V
Índice de baterías, ID: 95 % T = 17,9 °c
Conectar baterías, desconectar placas, medir, poner descarga fuerte y constante

	0 Min.	1 Min.	2 Min.	3 Min.	4 Min.	5 Min.
Tensión de batería (V)	51,2	51	51	50,9	50,8	50,8
Corriente de carga (A)	-4,5	-22	-24	-25	-26	-26,5

Medir de cada uno de los vasos: tensión V (en Voltios) y luego densidad D (en g/cm3).

V	D	V	D	V	D	V	D
1 (+) 2,09	1,23	7 2,10	1,23	13 2,09	1,23	19 2,09	1,22
2 2,09	1,23	8 2,10	1,23	14 2,09	1,22	20 2,09	1,22
3 2,09	1,23	9 2,09	1,23	15 2,09	1,23	21 2,09	1,23
4 2,09	1,23	10 2,09	1,23	16 2,09	1,23	22 2,10	1,23
5 2,09	1,23	11 2,10	1,23	17 2,09	1,23	23 2,10	1,23
6 2,10	1,23	12 2,10	1,23	18 2,09	1,23	24 (-) 2,10	1,23
						1 (+) 1,23	Repetición

☐correcto /☐deficiente *Ahora se puede desconectar la corriente de descarga*

Inspección óptica:	
Sedimentos visibles *(en mm, indicar vasos)* :	NO
Cristales entre las placas en los vasos *(indicar vasos)* :	NO
Corrosión visible de las placas en los vasos *(indicar vasos)* :	NO
Hay vasos con menos agua que los otros? *(indicar vaso)*	NO
Quien ha puesto agua la última vez?	INSTALADOR
Se ha llenado el agua al mismo nivel? □si / □no / □no sé	SI
Litros de agua destilada añadidos en esta inspección:	0
Bornes de baterías: □limpios □**oxidados** *(engrasar los bornes si es necesario)*	
Hay bidón agua destilada: □si / □**no** Hay densímetro: □**si** / □no	
Bornes bien protegidos contra objetos metálicos **si**/no	□correcto /□deficiente

REGULADOR:

Volcar los datos registrados al ordenador portátil	
Nº días que finalizó correctamente el ciclo de carga en el último mes:	87%
Comprobar / corregir los valores de configuración de la centralita:	□correcto /□deficiente
Observaciones:	

SENSORES:

TO:	17,5 ºC	T4:	ºC	Velocidad viento:	1,8 m/s
T1:	29,8 ºC	T5:	ºC	Dirección viento:	N,**NE**,E,SE,S,SW,W,NW
T2:	ºC	T6:	ºC	Asoleamiento:	646 W/m2
T3:	ºC			Caudal:	- l/min

Observaciones:
La dirección del viento no parece correcta

□correcto /□deficiente

ONDULADOR:

Comprobar que arrancan todas las etapas de potencia	SI
Observaciones:	

□correcto /□deficiente

VISUALIZACIÓN REMOTA

línea de señal estropeada

Todos los indicadores del cuadro de visualización remota funcionan	□no /□si

SEGURIDAD:

Fecha caducidad extintor sala equipos:	NO HAY	□correcto /□deficiente
Fecha caducidad extintor sala batería:		□correcto /□deficiente
Fecha caducidad extintor salón comunal:		□correcto /□deficiente

GRUPO ELECTRÓGENO:

Arrancar el grupo electrógeno y comprobar su correcto funcionamiento		SI
Verificar nº horas de funcionamiento del grupo:	1,68	
Cambio de aceite :	□procede /□**no procede**	
Cambio de filtro de aceite:	□procede /□**no procede**	

Observaciones:
falta hacer la salida de humos

ALUMBRADO PÚBLICO:

Con los conmutadores en modo manual comprovar:
Se encienden todas las lámparas del alumbrado: □si /□no
El temporizador desconecta en el tiempo previsto: □si /□no

Con los conmutadores en modo automático y cubriendo el relé crepuscular, comprovar:
Se encienden todas las lámparas del alumbrado: □si /□no
El temporizador desconecta en el tiempo previsto: □si /□no
A las 4h de la conexión la potencia de las lámparas se reduce al 75% de la nominal: □si /□no

Si alguna de las comprovaciones fuera negativa, proceder a la reparación necesaria

Es necesaria la limpieza de las luminarias? □si /□no
(en cualquier caso, usar detergentes ni muy alcalinos ni muy ácidos)

Observaciones:

LÍNEAS ELÉCTRICAS:

Comprobar en cada uno de los armarios de distribución eléctrica el estado de los fusibles y que la tensión llega correctamente:

	Tensión de Línea	Estado de los fusibles de línea distribución	Tensión Línea Alumbrado	Estado de los fusibles de Alumbrado público	Tensión de Línea de Señal
ARMARIO 1	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 2	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 3	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 4	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 5	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 6	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 7	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 8	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 9	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no
ARMARIO 10	□si /□no	□correcto /□deficiente	□si /□no	□correcto /□deficiente	□si /□no

Observaciones:
Línea de señal no funciona por avería en placa lateral
Caja 5 aún no instalada

EQUIPOS COMUNIDAD (EN CASO DE EXISTIR):

Alumbrado:
Accionar todos los interruptores y comprovar:
Se encienden todas las lámparas del alumbrado: □si /□no
Es necesaria la limpieza de las luminarias? □si /□no
(en cualquier caso, usar detergentes no y limpiar en seco)

Consumos:
Comprobar el correcto funcionamiento de todos los aparatos
Comprobar el correcto cierre de puertas, ventanas y bombines

Se ha añadido algún consumo desde la última inspección?

Tipo	Marca y modelo	Potencia	Tensión	CC/CA	Num
					□no /□si

Observaciones:

MICRORESEAU SOLAIRE HIBRIDE D'AKANE

HOJA DE INSPECCIÓN

Versión 1.1
15/08/2006

Fecha: 18-08-06 **Hora:** 15:30 **Responsable:** DANIEL CADILLA

Motivo Inspección:

- ☐ Inspección regular
- ☐ Cambio de micro
- ☐ Estudio: _____
- ☐ Avería: _____
- ☐ **Recepción de obra**
- ☐ Volcado de datos
- ☐ Otro: _____

OBRA CIVIL Y ESTRUCTURA:

Inspeccionar la obra civil:
Se detectan fisuras, lesiones o otras anomalías? ☐si /☐no

Inspeccionar la estructura metálica de soporte el campo FV:
Se detectan flechas excesivas? ☐si /☐no
Se detecta alguna anomalía o lesiones? ☐si /☐no
Es necesario el repintado de la estructura? ☐si /☐no

Observaciones:
Falta un acabado de pintura

GENERACIÓN

Estado de los módulos y sus conexiones : ☐correcto /☐deficiente

Comprobar la ausencia de sombras sobre el campo FV: ☐correcto /☐deficiente

Funcionamiento Generación
(Atención: es necesario que el regulador no esté limitando. Si éste fuera el caso, modificar la fecha (n+1) del micro, o bién bajar Vbat con consumos)

Radiación instantánea sobre los módulos, R: **886** W/m2

Fracción útil FV, **FU**: **75** % (Valor correcto = 65 ... 95%) ☐correcto /☐deficiente

Observaciones:

ACUMULACIÓN:

Inspección mecánica:
Comprobar que los aprietes de los tornillos de todas las pletinas y conexiones son correctos

Inspección eléctrica:
Tensiones de batería en el último día: **Vmax =** 60,6 V / **Vmín =** 50,6 V
Índice de baterías, **ID**: 95 % **T =** 17,9 **°c**
Conectar baterías, desconectar placas, medir, poner descarga fuerte y constante

	0 Min.	1 Min.	2 Min.	3 Min.	4 Min.	5 Min.
Tensión de batería (V)	51,2	51	51	50,9	50,8	50,8
Corriente de carga (A)	-4,5	-22	-24	-25	-26	-26,5

Medir de cada uno de los vasos: tensión V (en Voltios) y luego densidad D (en g/cm3).

V	D	V	D	V	D	V	D
1 (+) 2,09	1,23	7 2,10	1,23	13 2,09	1,23	19 2,09	1,22
2 2,09	1,23	8 2,10	1,23	14 2,09	1,22	20 2,09	1,22
3 2,09	1,23	9 2,09	1,23	15 2,09	1,23	21 2,09	1,23
4 2,09	1,23	10 2,09	1,23	16 2,09	1,23	22 2,10	1,23
5 2,09	1,23	11 2,10	1,23	17 2,09	1,23	23 2,10	1,23
6 2,10	1,23	12 2,10	1,23	18 2,09	1,23	24 (-) 2,10	1,23
						1 (+) 1,23	Repetición

☐correcto /☐deficiente *Ahora se puede desconectar la corriente de descarga*

Also, it is important to check users by users:

MICRORESEAU SOLAIRE HIBRIDE D'AKANE

DISPENSADOR Y CUADRO DE PROTECCIÓN INDIVIDUAL
ENSAYOS Y VERIFICACIONES

Versión 1.1
15/08/2006

Fecha:	19/08/2006	Hora:	17:00	Responsable:	DANI CADILLA

A. Comprobar las conexiones en cada dispensador:
ND (azul): neutro distribución — FD (negro): fase distribución
NU (azul): neutro usuario — FU (negro): fase usuario
DOM+: positivo bus domótico — DOM-: negativo bus domótico

B. Comprobar que corta el consumo cuando se desconecta la FEDI

C. Con la FEDI conectada y sin consumo, comprobar que hay un incremento constante en la ED (Energía Disponible).

D. Con la FEDI conectada y consumiendo, comprobar que hay un descontaje en la ED (Energía Disponible).

E. Con la FEDI conectada y un consumo mayor que el límite de potencia asignado a la FEDI, comprobar que el dispensador desconecta.

F. Comprobar que se activan los estados en el dispensador de restricción y bonificación cuando el índice de disponibilidad de batería en la centralita es inferior al 20% y cuando se ha completado la ecualización de las baterias y estan en flotación.

G. Comprobar la existencia de toma de tierra independiente para la instalación interior de cada usuario.

H. Comprobar el correcto precinto de la caja del dispensador, impidiendo acciones fraudulentas

I. Comprobar el correcto funcionamiento de los magnetotérmicos y fusibles del cuadro de protecciones.

C: CORRECTO
I: INCORRECTO

	nombre	ensayo A	ensayo B	ensayo C	ensayo D	ensayo E	ensayo F	ensayo G	ensayo H	ensayo I
usuario 1	Mofadal Abghi	C	C	C	C	-	I	I	C	C
usuario 2	Mohamed Abghi	C	C	C	C	-	I	I	C	C
usuario 3	Abdelkader Abghi	C	C	C	C	-	I	I	C	C
usuario 4	Ahnine Abghi	C	C	C	C	-	I	I	C	C
usuario 5	Abderrahman Abghi	C	C	C	C	-	I	I	C	C
usuario 6	Ali Abghi	C	C	C	C	-	I	I	C	C
usuario 7	Mohamed Abghi	C	C	C	C	-	I	I	C	C
usuario 8	Safia Barhoui									
usuario 9	Rachid Sghiar	C	C	C	C	-	I	I	C	C
usuario 10	Mofadal Abghi	C	C	C	C	-	I	I	C	C
usuario 11	Abdelkader Abghi	C	C	C	C	-	I	I	C	C
usuario 12	Mohamed Abghi	C	C	C	C	-	I	I	C	C
usuario 13	Abdelkader Abghi	C	C	C	C	-	I	I	C	C
usuario 14	Mohamed Abghi	C	C	C	C	-	I	I	C	C
usuario 15	Sadik Abghi	C	C	C	C	-	I	I	C	C
usuario 16	Mekki Abghi	C	C	C	C	-	I	I	C	C
usuario 17	Abdelaziz Abghi	C	C	C	C	-	I	I	C	C
usuario 18	Mofadal Abghi	C	C	C	C	-	I	I	C	C
usuario 19	Mostapha Abghi	C	C	C	C	-	I	I	C	C
usuario 20	Abdelrahim Abghi	C	C	C	C	-	I	I	C	C
usuario 21	Idriss Abghi	C	C	C	C	-	I	I	C	C
usuario 22	Mohamed Abghi	C	C	C	C	-	I	I	C	C
usuario 23	Mofadal Abghi	C	C	C	C	-	I	I	C	C
usuario 24	Hassan Abghi	C	C	C	C	-	I	I	C	C
usuario 25	Abdelmajed Abghi	C	C	C	C	-	I	I	C	C
usuario 26	Mostapha Abghi	C	C	C	C	-	I	I	C	C
usuario 27	Mohamed Abghi	C	C	C	C	-	I	I	C	C
usuario 28										
usuario 29										
usuario 30										

Conclusion

The work towards the milestones of WP6 has begun and the field test system in Morocco has been installed and operative (M8) at the end of the last reporting period with an important delay. The system is now operating and the experiences from the field test can be shared (M9). All the information is included in both reports D26 and D27.

3.7 WP7: Dissemination of the MSG Method

Objective

The objective of this work package is to carry out dissemination activities that will address the broadest range of stakeholders and general public in the target countries. The first step is an implementation manual for MSGs, leaflets, a web site and appropriate actions in each target country. In addition, CRESMED will co-ordinate an international training session that will be carried out in a UN agency in Paris, France during the Solar University for developing countries and an international conference located in a UN agency in Beirut for targeted countries. These UN agencies involved support this action without funds coming from EC. Attendance of the partners at external conferences is also included. This will help raise awareness of existing networks and links of national programmes and policies with international initiatives.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period. This work package is led by LSES.

Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. The progress in each of these sub work packages are then later discussed in detail.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
7.1 Edition of the MSG design and implementation manual	Feb. 2008	March 08	100%
7.2 CRESMED Web site	Dec. 2006	Dec. 2006	100%
7.3 Creation of a contact database	June 2009	Jun. 09	100%
7.4 Local dissemination actions	June 2009	Jun. 09	100%
7.5 Dissemination through the EU	June 2009	Jun. 09	100%
7.6 Liaison with key multilateral donors	June 2009	Jun. 09	100%
7.7 An international training	Dec. 2008	Oct. 08	100%
7.8 An international workshop	June 2009	Feb. 09	100%

7.1. Edition of the MSG design and implementation manual

This manual has been finalised at the beginning of 2008 and is available on the CRESMED website. It gathers WP1 to WP5 results and is based on the MSG manual (D22). It was used for the training sessions presentations and will be distributed during the international workshop to be held in Beirut on February 4th, 2009. This document is also available on the project website.

7.2. CRESMED Website

As a contribution to the dissemination activities of the CRESMED project, Armines has developed the CRESMED portal: http://project.cresmed.org. The partners TRE and ADEME collaborated together with Armines to design the site and decide what contents the site should have. TTA as the coordinator has been working closely with the web master from

Armines in testing the site and managing the content. The basic CRESMED portal structure is as follows:

There are currently two public sections namely "Consortium" and "Project Objectives". These sections will be fed by the CRESMED manager, through document creation process made in the private workspaces. Once created, documents will need to be published in order to be viewable. This publication process is made upon validation by a moderator. The moderator role is granted by the portal manager to one or more members. One can have different moderators according to the portal sections. The moderation process guarantees a reviewing process of documents that will be public. Moderators are warned by email that a new document is pending. He can then validate, reject, edit or comment the document. The public section will continue to be expanded as the project goes on and more publishable information is available.

There is one private section that is only visible after an authorization process. This is the "Official Document section". This section has been fed by the CRESMED project manager (TTA) and contains official documents throughout folders and sub-folders ("Meetings", "Consortium Documents", "Reference Documents").

Once connected, there are also two main private workspaces namely "CRESMED-Workspace" and "Private space"". The "CRESMED-Workspace" workspace currently contains 2 sub-folders, namely "Work packages" and "Deliverables". The "Work packages" folder contains sub-folder (WP1 to WP8 and Steering Committee) which can be accessed according to rules that have been applied to each partner by the portal manager. These access rules match the work packages description of the CRESMED proposal. Access is given to the WP's you are involved in. The "Deliverables" folders are accessible by all the CRESMED members. Any partner is invited in these workspaces by the portal manager with the "Member" status. This means that everybody can start working on a collaborative basis and is able to create, modify and delete contents (documents and folders) inside these workspaces. Other such statuses as "Manager" and "Reader only" are available to access workspaces, which can be granted upon request by the portal manager.

"Private space" shares the same approach as the "CRESMED-Workspace". The difference is that if you have not been invited by the portal manager, you don't have the "Member" status. Any partner inherited this workspace upon account creation. Each partner has in his private section the "Manager" status. This means that he can, like the "Member" status, create modify and delete folders and documents, but he also can share some content with others portal members. To do so he will need to grant access to members on a folder basis. This gives a possibility of working with one or more members in an area where he decides who will come and what actions might be performed by his guest(s).

The internet site has achieved the objective of this sub work package to serve as a file sharing platform between the partners and to disseminate information about the project to the public.

7.3. Creation of a contact database

The database had already been elaborated and filled with Southern and Eastern Mediterranean partners contributions. It is regularly re-circulated in order to allow the partners to update it when necessary.

7.4. Local dissemination actions

A paper untitled "Promoting cost efficient and reliable rural electrification schemes for South Mediterranean countries through a global Multi user Solar hybrid Grid: the CRESMED approach" has been submitted for the CIER Conference to be held in Marrakech in January 2008. This event will gather key actors of rural electrification.

Also TTA and ADEME participated to the conference held in Athens about the PV Hybrid Micro-Grids. ADEME made an oral presentation about CRESMED and TTA one about the experience in the village of Akkan which is a reference for the CREMED project.

7.5. Dissemination through EU

A presentation of the project was performed on May 30th 2008 by ADEME in the framework of the PV-Hybrid conference which was held in Athens. The aim of this Conference was to review the recent progresses and achievements on PV system components and design development, with emphasis on hybrid mini-grid system for rural electrification. The event was accompanied by an industrial exhibition. About 300 persons attended this event supported by the Alliance for Rural Electrification (ARE), the European Photovoltaic Industry Association (EPIA), the European Renewable Energy Research Centres Agency (EUREC) and the International Energy Agency (IEA).

A paper was also published in the proceedings of this conference.

An article presenting the CRESMED project approach and main results was prepared and will be published on different information platforms about renewable energies:
- RIAED (Réseau International d'Accès aux Energies Durables), the International network for sustainable energies access, an initiative supported in its three first years by the Intelligent Energy Europe programme. This highly consulted website (up to 60 000 monthly visitors) gathers broad information about rural electrification, in particular in African countries;
- Club-ER.org, the website of the Club of National Agencies and Structures in charge of Rural Electrification. The latter gathers representative organisms from African countries, among which Morocco and organise different workshops, expert meetings and information sharing about rural electrification.
- Mediaterre, the first worldwide French speaking website disseminating information about sustainable development issues.
Those websites address most of all decision makers and specialists of the renewable energy field.
The publication dates will be summer 2009. It will assure the project's results visibility even after its completion.

7.6. Liaison with key multilateral donors

It has been decided that a new section will be added to the database. It will include the local contacts of the main multilateral donors in the Southern and Eastern Mediterranean countries and will be fed by the CRESMED Southern and Eastern Mediterranean partners. On its side, Morocco has been in contact with UNDP.

7.7. International Conference

ADEME has participated to the organisation of a CRESMED international training session which objective was to present the CRESMED project achievements to date and to foster knowledge transfer with key actors in charge of rural electrification. It was decided to organise this event in cooperation with the United Nations Educational, Scientific and

Cultural Organisation (UNESCO). Armines was the official contact between UNESCO and the consortium partners.

This training session was first supposed to be organised in July in Paris during a UNESCO summer university about solar. But this event was not held this year because of logistic problems.

As a consequence, the CRESMED international training session was organised on the occasion of a regional expert meeting organised by the UNESCO and the Islamic Educational, Scientific and Cultural Organisation (ISECO) in Rabat, Morocco, in October 2008 about "Renewables development strategies and perspectives in Maghreb countries". Several countries such as Morocco, Algeria, Tunisia, Mauritania, Burkina, Mali, and Guinea were represented during this meeting.

Approximately 20 persons attended the one and half day CRESMED training session held on 21st and 22nd of October 2008.

On this occasion, ADEME has presented a one hour and half lecture about the "strategies for a successful implementation" taking advantage in particular of the WP2 results.
The complete programme of the training session is available hereunder in English:

Tuesday 21st October 2008

14.00 – 15.00	Welcome and introduction of the seminar (UNESCO, CDER, CRESMED)
15.00 – 15.45	Solar radiation assesment – Available databases (D. Mayer – Armines)
15.45 – 16.30	Determination of requirements (G. Bopp – Fraunhofer ISE)
16.30 – 17.00	Communication, monitoring and control systems (A Sasso – SASSO)
17.00 – 17.30	Discussion

Wednesday 22nd October 2008

9.00 – 10.00	Developing appropriate technologies (X. Vallvé – TTA)
10.00 – 10.45	Hybrid systems. Design, sizing and implementation (N. Adra - Transénergie)
10.45 – 11.15	Coffee break
11.15 – 12.30	Strategies for a successful implementation (C. Colleu – ADEME)
12.30 – 13.00	Discussion
Lunch	
14.00 – 15.15	Field experiences: Moroccan and Algerian examples (X. Vallvé – TTA)
15.15 – 15.45	Importance of training in rural electrification programmes (M. Garoum – Agdal University/AMFREE)
15.45 – 16.15	Experiences feed-back (Mrs. Vernay – EauSoleil)
16.15 – 17.00	Discussion

A project leaflet was also conceived and distributed on this occasion.

7.8. International workshop

ADEME worked in close cooperation with LSES (Lebanon) for the organization of a regional workshop which was held on February 4th 2009 in Beirut in the framework of a regional experts meeting of the United Nations Economic and Social Commission for Western Asia (ESCWA) about "Renewable energy best practices ".

ADEME prepared with LSES and TTA the event agenda as well as the different document to be distributed on this occasion: project leaflet and MSG design manual. ADEME participated

also in the event as a speaker with a presentation about successful strategies for the implementation of MSG projects. All the presentations performed were gathered on a CD-Rom which was distributed as the proceeding of this event. The programme and presentations are also available from the project website.

3.8 WP8: Coordination and Management

Objective

The objective of this work package is to maintain an efficient management of the project and activities of all partners involved.

Starting Point

The work contained in this work package was initiated after the kick-off meeting in February, 2006 of this reporting period.

Progress

The following is a list of the sub work packages along with their progress towards the foreseen date of completion. Further details about the coordination and management of the consortium are given in Section 4 Consortium and Management of this report.

Sub Work Package	Foreseen Completion Date	Actual Completion Date	Work Completed
8.1 Coordination of overall project	June 2009	June 2009	100%
8.2 Regular project meetings	Various	June 2009	100%
8.3 Financial audit	June 2009	June 2009	100%
8.4 Reporting and contacting with European Commission	June 2009	June 2009	100%

8.1 Coordination of overall project

The main tasks for the coordination of the project were:

- the partner meetings,
- the completion of the Consortium Agreement,
- the ensuring of the start of all the work packages,
- the revision of the deliverables
- the ensuring of the on-going of all the work packages,

During the first year the Consortium Agreement was completed and signed by each of the partners by the end of the year. The agreement was delayed due to various revisions of the text, an official change to the EC contract that took six months, and the coordination of all the official signatures.

During the second year, the consortium had to manage with unforeseen events which have modified a lot the distribution of the work. This has been an important task of the coordinator to re-organize and find agreement and consensus between the partners.

During the last two years, the activity of the Coordinator has been less than the former year, where TTA had to work a lot to re-distribute and re-organize part of the consortium. Some work packages had some delays.

The communication between the partners has been done mostly by email but as well by phone and by meetings of the team members. The revision of the completed deliverables was done by the coordinator TTA.

8.2 Regular project meetings

First reporting period

The kick-off meeting of the project was organized and hosted by TTA in Barcelona. Along with having the opportunity to get to know each other partners personally, the main task was the finalization of the project budget and work schedule. A second partner meeting of was organized and hosted by NERC in Amman, Jordan, with the assistance of TTA. There, an update of the progress of each of the work packages was given by their leaders and the partners had the opportunity to discuss the details of the work together.

Second reporting perdiod

In 2007, two meetings have been organized: one in Freiburg in March and one in Algiers in November. The consortium tries to organize meeting every 6 months. This represents enough time to be able to present new results and inputs in each meeting. And it is better to see us twice a year than only one because with 11 partners, this represents a great opportunity to solve pending misunderstandings or difficulties.

Third reporting period
In 2008, two meetings have been organized: one in Lyon in May and one in Rabat in October. The consortium tries to organize meeting every 6 months. This represents enough time to be able to present new results and inputs in each meeting. And it is better to see us twice a year than only one because with 11 partners, this represents a great opportunity to solve pending misunderstandings or difficulties.

Fourth reporting period

In 2009, no official meeting was held. All the partners were present to the International Conference in Beirut (except three of them). Nevertheless this was the opportunity to discuss the last pending issues. Most of the partners stayed several days and the conference lasted two days (one day were ESCWA presented their mission and projects and one day dedicated to the CRESMED project).

Apart from this meeting, several meetings took place involving two or three partners like a meeting with TTA, Sasso and Fraunhofer for WP4 and also one in Morocco with TTA and CDER Morocco in April 2009.

8.3 Financial audits

At the end of the project, most of the partners were required to present an external financial audit. All of them were done and the original report sent to the coordinator. Also each partner has prepared a Form C that is submitted with the Periodic Management Report, along with a summary of these forms. Each partner has completed their Form C for 2009.

8.4 Report and contacting with European Commission

Contact with the EC was required for a change to the project contract which was requested by one of the partners of the consortium. The financial and technical officers of the EC were invited to attend most of the partners' meetings but they were unable to attend them. The periodic reports were prepared by the coordinator TTA with the input of all the partners of the consortium.

There have been quite few contacts in the last two years with the EC in order to solve some difficulties. TTA had a permanent contact with the Financial Officer during all the years for solving all the problems of justification of the year 2007 and 2008. Also, some requests have been made by TTA and other partners concerning minor changes or shift in budget.

Conclusion

The coordination of the overall project has been completed in June 2009. The responsibilities of the coordinator for the project were fulfilled with support by the consortium partners and will continue in the coming years in order to ensure a smooth and successful completion of the project objectives. Some delays have been observed in the WP4 and WP6. Finally all the activities have been completed. Regarding the WP6, the very special situation of Afrisol has created many changes (change of village, new full feasibility study, etc).

3.9 Deliverables

The following table lists the deliverables to be submitted throughout the lifetime of the CRESMED project.

Deliverable No.	Deliverable Title	WP	Partner Responsible	Delivery Month	% Complete	Submission Date
D 1	Evaluation sheet for implementation of hybrid systems	1 (FHG)	FHG	Aug. 06	100%	Feb. 07
D 2	Rural electrification requirement report for Morocco	1 (FHG)	AFRISOL	Aug. 06	100%	Feb. 07
D 3	Rural electrification requirement report for Algeria	1 (FHG)	CDER AL	Aug. 06	100%	Feb. 07
D 4	Rural electrification requirement report for Jordan	1 (FHG)	NERC	Aug. 06	100%	Feb. 07
D 5	Rural electrification requirement report for Lebanon	1 (FHG)	LSES	Aug. 06	100%	Feb. 07
D 6a	Creation a an extensive database in relationship with rural electrification in Algeria	7 (LSES)	CDER AL	Aug. 06	100%	June 09
D 6b	Creation a an extensive database in relationship with rural electrification in Morocco	7 (LSES)	CDER MA	Aug. 06	100%	June 09

D 6c	Creation a an extensive database in relationship with rural electrification in Jordan	7 (LSES)	NERC	Aug. 06	100%	June 09
D 6d	Creation a an extensive database in relationship with rural electrification in Lebanon	7 (LSES)	LSES	Aug. 06	100%	June 09
D 7	Strategy report on rural electrification with Multi User Solar Hybrid Grids (MSG) covering each target country	2 (ADEME)	ADEME	Dec. 06	100%	March 07
D 8	Web site pages of the CRESMED project	7 (LSES)	ADEME	Dec. 06-Jun. 09	100%	Feb. 07
D 9	Monitoring system requirements report	4 (SASSO)	FHG	Feb. 07	100%	June 07
D 10	Remote communication/control and monitoring concept	4 (SASSO)	SASSO	Mar. 07	100%	June 07
D 11	2 Power conditioning stations adapted to the special requirements of MSGs in the target countries	3 (TTA)	TTA	Dec. 07	100%	Feb. 08
D 12	20 Energy dispenser adapted to the special requirements of MSGs in the target countries	3 (TTA)	TTA	Dec. 07	100%	Feb. 08
D 13	Individual PV system adapted to the special requirements of MSGs in the target countries	3 (TTA)	TTA	Dec. 07	100%	July 08
D 14	Test report on power conditioning station, energy dispenser, and individual solar system	3 (TTA)	CDER AL	Dec. 07	100%	Dec.08
D 15	Hydroelectric turbine	3 (TTA)	SASSO	Dec. 07	100%	Feb. 08
D 16	2 Wind turbine Prototypes 1kW	3 (TTA)	NERC	Dec. 07	100%	Dec. 08
D 17	10 prototypes of load / generator management devices	4 (SASSO)	SASSO	Dec. 07	100%	Oct. 08
D 18	2 prototypes of interface for energy management system	4 (SASSO)	SASSO	Dec. 07	100%	Oct. 08
D 19	2 prototypes of interface for internet connection	4 (SASSO)	SASSO	Dec. 07	100%	May. 09
D 20	2 prototypes of remote monitoring and control system with remote communication	4 (SASSO)	TTA	Dec. 07	100%	May. 09
D 21	MSG Software tool	5 (TRE)	TRE	Dec. 07	100%	Feb. 08
D 22	MSG system engineering guide	5 (TRE)	TRE	Dec. 07	100%	Feb. 08

D23	Socioeconomic study including tariff scheme and techno-economic viability report (pilot village)	6 (Afrisol)	TTA	Dec. 07	100%	Jan 09
D24	Leaflet regarding the training in Paris (Mid project)	7 (ADEME)	ADEME	Dec.07	100%	Oct. 08
D 25	Edition of the MSG design and implementation manual (paper and/or CD-ROM versions)	7 (LSES)	ADEME	Jan. 08	100%	April 08
D 26	Field test system erected in Morocco, PV-power 10kW	6 (Afrisol)	TTA	May. 08	100%	June 09
D 27	Lessons learned report on field test system in Morocco	6 (Afrisol)	TTA	Dec. 08	100%	August. 09
D 28	Proceedings of the conference in Beirut (end of the project)	7 (LSES)	LSES	Jun. 09	100%	Mar 09
D29	3 yearly progress reports and a final report at the end of the project	8 (TTA)	TTA	Jun. 09	100%	September 09
D30	Financial audits from all project partners	8 (TTA)	TTA	Jun. 09	100%	September 09

Milestones

The following table lists the milestones set out throughout the lifetime of the CRESMED project.

Milestone No.	Milestone Title	WP	Partner Responsible	Delivery Month	% Completed	Achievement Date
M 1	Clear view on requirements for rural electrification programmes with hybrid systems	1	FHG	Jun. 06	100%	Nov. 06
M 2	Candidate villages for field test system listed	1	FHG	May. 06	100%	Sep. 06
M 3	Clear strategy for rural electrification with MSG	2	ADEME	Dec. 06	100%	March 07
M 4	Reliable and robust technology available for installation in MSGs in target countries	3	CDER AL	Dec. 07	100%	March 08
M 5	Load management operative and available for installation in MSGs in target countries	4	SASSO	Dec. 07	100%	April 08
M 6	Remote control monitoring system operative and available for installation in MSGs in target countries	4	SASSO	Dec. 07	100%	May 09
M 7	Clear engineering rules for the design and implementation of MSGs	5	TRE	Nov. 07	100%	Dec.07

M 8	Field test system in Morocco installed and operative	6	TTA	Feb. 08	100%	June 09
M 9	Experiences with field test system in Morocco ready to be shared	6	TTA	Dec. 08	100%	Jun. 09
M 10	MSG design and implementation method disseminated in Mediterranean partner countries	7	LSES	Jun.09	100%	Dec. 08
M 11	Positive results of MSG field test system disseminated in Mediterranean partner countries	7	LSES	Jun.09	100%	June. 09
M 12	Successful execution of the CRESMED project	8	TTA	Jun.09	100%	Jun. 09

4 Consortium Management

This section summarises the status of the project, its management and follow-up activities, including information on:

- Consortium management tasks and their achievement; problems which have occurred and how they were solved
- Project timetable and status,
- Budget changes occurred during this second reporting period due to “force majeur” event.

4.1 Consortium Management and Coordination Tasks

First reporting period

The main task of the consortium management during the first reporting period of the project CRESMED, led by the project coordinator TTA, was to ensure a positive begin to the project work. This was achieved during the kick-off meeting in Barcelona hosted by TTA at the beginning of February, 2006, where all partners met and clarified points within the budget and work schedule. The minutes of this meeting can be found in Appendix I. The signing of the Consortium Agreement was to be completed shortly after the kick-off meeting; however it was delayed until the end of the year, due to a change request to the contract and revisions requested by the contractors. The process was completely as quickly as possible by the coordinator, by ensuring that all signed originals were brought to the next partner meeting in September.

The second partner meeting took place in Amman, Jordan which was hosted by the local contractor NERC. The meeting agenda was prepared by the coordinator and each of the work package leaders had the opportunity to give an update as to the work progress. The meeting was a success in that the partners had a chance to work out any confusions and doubts they had with regard to their responsibilities and timelines. The members of each work package team also had the chance to sit together and discuss details and make important decisions. The minutes of this meeting can be found in Appendix II.

The next partner meeting was scheduled for the end of March 2007, at the Fraunhofer Institute in Freiburg, Germany. It was decided to have the meeting early in the year instead of later since the second year of the project involves the designing and procurement of the test field, as well as other testing procedures, which require a smooth coordination between the partners.

Another task of the consortium management was the revision of the deliverables that were due during the reporting period. This consisted of a constructive interaction between the contractors responsible for the creations of the reports and the coordinator. Some of the input responsibilities required from the MPC partners were not clear and lead to some misunderstandings in the formulation of their work. However these issues were cleared up when the contractors met together with the coordinator at the second partner meeting in Amman, which led to a successful completion of the deliverables.

The communication between partners was mostly done by email however it was often necessary to discuss certain important issues by telephone. The internet platform created for the partners as a way to exchange data has been used more as time has gone on. At first not all partners were comfortable using this platform, but by the end of the year the

coordinator was posting information only on the web site, instead of by emails, in order to ensure that everyone was using the site. This has proved to be successful, as it ensures that all partners have access to the same version of files.

Second reporting period

The main task of the consortium management during the second reporting period of the project CRESMED, led by the project coordinator TTA, was to ensure the follow-up of the activities. Most of them had begun during the first year but also most of them ended in the second year. The second was a critical period where a strong effort was asked to all the partners. Even if most of the activities were quite independent which allows the partners to work in parallel, some activities of the WP3 and WP4 were sequential. This explains the delay in some Deliverable.

Two meetings were organized in this period and in both occasion, the consortium had to take important decisions. The frequency of the meeting was fine. Each time it corresponded to critical periods where a two days meeting with all the members was required.

The next partner meeting is scheduled for the beginning of May 2008, at Transenergie in Lyon, France. We have tried to organize a system which allows the consortium to have meeting ion all the countries involved in the project.

Another task of the consortium management was the revision of the deliverables that were due during the reporting period. This consisted of a constructive interaction between the contractors responsible for the creations of the reports and the coordinator. Some of the input responsibilities required from the MPC partners were not clear and lead to some misunderstandings in the formulation of their work.

The communication between partners was mostly done by email however it was often necessary to discuss certain important issues by telephone. The internet platform created for the partners as a way to exchange data has been used more as time has gone on. At first not all partners were comfortable using this platform, but by the end of the year the coordinator was posting information only on the web site, instead of by emails, in order to ensure that everyone was using the site. During the meeting in Algiers, Armines made a presentation of the website and answered the questions and doubts that the partners have after some months of utilization of the platform.

Third reporting period

The main task of the consortium management during the third reporting period of the project CRESMED, led by the project coordinator TTA, was to ensure the follow-up of the activities. Almost half of the project, in term of men.months and effort, has been completed during the first two years. But some activities, mainly technological activities have suffered important delays. It was very important to finish all those activities before the end of the year for two reasons:

- be able to present all the results during the international workshop in Beirut
- be able to install all the developed technologies in the pilot project

Two meetings were organized in this period and in both occasion, the consortium had to take important decisions. The frequency of the meeting was fine. Each time it corresponded to critical periods where a two days meeting with all the members was required.

The next partner meeting is scheduled for the beginning of February 2008, in Beirut, Lebanon. It will be held at the same time as the International Workshop. We have tried to organize a system which allows the consortium to have meeting in all the countries involved in the project. After the meeting in Lebanon, all the countries involved would have organized a meeting, except Italy, where only small meetings relative to a WP have been organized (mainly WP4 with FhG and TTA).

Another task of the consortium management was the revision of the deliverables that were due during the reporting period. This consisted of a constructive interaction between the contractors responsible for the creations of the reports and the coordinator.

The communication between partners was mostly done by email however it was often necessary to discuss certain important issues by telephone. The internet platform created for the partners as a way to exchange data has been used, even if it has been used perhaps less than during the second reporting period. The fact that less Deliverables have been done the year 3 could be part of the explanation.

Fourth reporting period

The main task of the consortium management during the fourth reporting period of the project CRESMED, led by the project coordinator TTA, was to ensure the follow-up of the activities. Almost all the project, in term of men.months and effort, has been completed during the first three years. Only few activities were remaining but some activities of them were critical and the technological activities have suffered important delays. It was very important to end up with all those activities at the beginning of the year 2009 for two reasons:

- be able to present all the results during the international workshop in Beirut
- be able to install all the developed technologies in the pilot project

The pilot project represents the achievement of the whole project and the implementation on time was mandatory in order to reach all the objectives of the project.

In term of meeting, as the remaining activities were very few and also because some partners were not involved anymore in the remaining activities, it has been decided not to organize a formal meeting with all the partners. Most of the partners were present at the International Conference organized by LSES in Beirut and this was a good opportunity to discuss about the last pending issues. After that, as it has been said before some meetings were held involving 2 or 3 partners regarding concrete issues (WP4 and WP6).

Another task of the consortium management was the revision of the deliverables that were due during the reporting period. This consisted of a constructive interaction between the contractors responsible for the creations of the reports and the coordinator.

The communication between partners was mostly done by email however it was often necessary to discuss certain important issues by telephone. The internet platform created for the partners as a way to exchange data has been used, even if it has been used perhaps less than during the previous reporting period.

4.2 Project Timetable and Status

While the project officially began on January 1, 2006, the kick-off meeting at the beginning of February, 2006 marked the beginning of the project work phase. After two years, the project

has managed to meet its initial objectives, with only minor changes to the actual project schedule. Below, explanations to the various changes to the timetable according to work package are given.

WP1: Determination of requirements

Done on time.

WP2: Strategies for Successful Implementation

WP completed with a little delay which didn't affect the other tasks.

WP3: Developing Appropriate Technologies

The main delay is due to the delivery of material. NERC had to wait much time to get part of the turbine that they were working on. Finally NERC could finish everything in late 2008. At the beginning of 2009, NERC followed some field additional test before sending one model to Morocco in order to be installed in the pilot project location. Also for CDER Al, the administrative complication for the exportation of material has complicated the delivery of the equipments for the testing activities. By the end of 2008 all the activities had been completed correctly with the results in the Deliverables D11 to D16. Those delays haven't affected other activities.

WP4: Communication, Monitoring, and Remote Control System

The whole activity has been delayed due to a first delay in the definition of requirements (D9). The partners involved have been able to submit during the right reporting period D9, and D10. D17 and D18 have been completed by the end of 2008. D19 which deals with the remote communication (GSM) has been finished in April 2009. The complete set of electronic devices have been sent to TTA for assembly and then sent on site in Morocco for their installation in the community where the pilot project is implemented.

Those delays could have affected the WP6 but finally it didn't have any impact. As it is explained below, the WP6 has been delayed for other reasons and the delay in D19 and D20 was not critical so far.

WP5: Development of MSG Design and Implementation Method

The work for WP4 has begun as scheduled and has been done on time.

WP6: Field Test System and Study

The process has been delayed due the reasons exposed before. The delay is very important now. The work on site has finished just before the end of the project with several months of delay. The reasons have been exposed already in this report and the previous one.

WP7: Dissemination of the MSG Method

The work for WP7 has begun as scheduled and has progressed as planned. In 2009, the International Conference took place in Beirut as initially planned even if the year before some doubts existed regarding the local and political situation. The WP7 has finished on time. We could also add that TTA presented a paper for the European Photovoltaic Conference in

Hamburg and has finally been selected to make an oral presentation on the CRESMED project in September 2009.
WP8: Coordination and Management

The work for WP8 has begun as scheduled and has started on time at the end of the fourth reporting period (June 2009).

4.3 Budget

Partner	Expenditure Type	Budget	Budget New
P1: TTA	Total Person-months	28,30	28,30
	Personnel	120 519,78	154 819,78
	Travel	20 704,00	20 704,00
	Equipment	226 000,00	193 000,00
	Consumables	39 372,00	39 372,00
	Subcontracting	37 500,00	19 050,00
	Other	30,00	30,00
	Overheads	60 259,89	77 409,89
	Adjustment		
	Total Costs	504 385,67	504 385,67
P2: TRE	Total Person-months	10,50	10,50
	Personnel	93 350,78	95 450,78
	Travel	13 400,00	11 300,00
	Equipment	0,00	0,00
	Consumables	0,00	0,00
	Subcontracting	2 500,00	2 500,00
	Other	0,00	0,00
	Overheads	74 681,00	74 681,00
	Adjustment		
	Total Costs	183 931,78	183 931,78
P3: SASSO	Total Person-months	15,00	15,00
	Personnel	111 915,81	111 915,81
	Travel	11 276,00	11 276,00
	Equipment	0,00	0,00
	Consumables	5 000,00	5 000,00
	Subcontracting	3 400,00	3 400,00
	Other	0,00	0,00
	Overheads	24 683,00	24 683,00
	Adjustment		
	Total Costs	156 274,81	156 274,81
P4: FHG	Total Person-months	14,75	14,75
	Personnel	86 297,69	86 297,69
	Travel	10 699,00	10 699,00
	Equipment	0,00	0,00
	Consumables	0,00	0,00
	Subcontracting	2 500,00	2 500,00
	Other	0,00	0,00
	Overheads	103 047,80	103 047,80

	Adjustment		
	Total Costs	202 544,49	202 544,49
P5: JRU (ARMINES+ENSMP)	Total Person-months	6,25	6,25
	Personnel	37 895,21	37 895,21
	Travel	9 076,40	9 076,40
	Equipment	0,00	0,00
	Consumables	0,00	0,00
	Subcontracting	2 500,00	2 500,00
	Other	0,00	0,00
	Overheads	36 000,00	36 000,00
	Adjustment		
	Total Costs	85 471,61	85 471,61
P6: ADEME	Total Person-months	5,50	5,50
	Personnel	43 912,00	43 912,00
	Travel	10 870,00	10 870,00
	Equipment	0,00	0,00
	Consumables	2 000,00	2 000,00
	Subcontracting	2 500,00	2 500,00
	Other	0,00	0,00
	Overheads	44 572,33	44 572,33
	Adjustment		
	Total Costs	103 854,33	103 854,33
P7: CDER-Al	Total Person-months	20,00	20,00
	Personnel	81 021,50	81 021,50
	Travel	15 842,00	15 842,00
	Equipment	0,00	0,00
	Consumables	36 000,00	36 000,00
	Subcontracting	4 300,00	4 300,00
	Other	0,00	0,00
	Overheads	0,00	0,00
	Adjustment		
	Total Costs	137 163,50	137 163,50
P8: CDER-Ma	Total Person-months	9,50	9,50
	Personnel	27 974,43	34 474,43
	Travel	13 420,29	9 920,29
	Equipment	0,00	0,00
	Consumables	1 000,00	1 000,00
	Subcontracting	4 300,00	0,00
	Other	1 544,71	1 544,71
	Overheads	7 688,67	8 988,67
	Adjustment		
	Total Costs	55 928,10	55 928,10
P9: AFRISOL	Total Person-months	8,75	8,75
	Personnel	61 817,80	61 817,80
	Travel	10 800,00	10 800,00
	Consumibles/Sub-contracting	1 500,00	1 500,00
	Equipment	0,00	0,00
	Consumables	1 500,00	1 500,00
	Subcontracting	0,00	0,00

	Other	0,00	0,00
	Overheads	0,00	0,00
	Adjustment		
	Total Costs	75 617,80	75 617,80
P10: LSES	Total Person-months	12,00	12,00
	Personnel	43 024,57	55 573,40
	Travel	12 999,90	12 999,90
	Equipment	0,00	0,00
	Consumables	1 000,00	3 900,00
	Subcontracting	29 813,10	12 982,16
	Other	0,00	0,00
	Overheads	8 802,00	10 184,11
	Adjustment		
	Total Costs	95 639,57	95 639,57
P11: NERC	Total Person-months	22,75	22,75
	Personnel	90 489,79	90 489,79
	Travel	13 999,70	13 999,70
	Equipment	0,00	0,00
	Consumables	20 807,00	20 807,00
	Subcontracting	3 000,00	3 000,00
	Other	0,00	0,00
	Overheads	72 391,00	72 391,00
	Adjustment		
	Total Costs	200 687,49	200 687,49
Total	Total Person-months	153,30	153,30
	Personnel	798 219,36	853 668,19
	Travel	143 087,29	137 487,29
	Equipment	226 000,00	193 000,00
	Consumables	106 679,00	109 579,00
	Subcontracting	92 313,10	52 732,16
	Other	1 574,71	1 574,71
	Overheads	432 125,69	451 957,80
	Adjustment	0,00	0,00
	Total Costs	1 799 999,15	1 799 999,15

5 Annexes

Appendix I : Minutes Kick-off meeting
Appendix II : Minutes of the meeting of Aman
Appendix III : Minutes of the meeting in Freiburg
Appendix IV : Minutes of the meeting in Algiers
Appendix V : Minutes of the meeting in Lyon
Appendix VI : Minutes of the meeting in Rabat
Appendix VII : Programme of the UNESCO seminar in Rabat
Appendix VIII: Programme of the international conference in Beirut

APPENDIX I: Minutes of kick-off meeting

Meeting
CRESMED-1

Objective of the meeting
- Formal beginning of the CRESMED project.
- Agreements on substantial aspects of the CRESMED internal management procedures.
- Agreements on substantial aspects of the CRESMED work plan.

Place
Col.legi d'Enginyers Industrials de Catalunya
Via Laietana 39 - Barcelona, Spain

Attendants

No.	Name	Institution	Assistance
1	Didier Mayer (R)	Armines	6/01/06 - 7/01/06
2	Bassam OUAIDA	Transénergie	6/01/06 - 7/01/06
3	Jean-Christian MARCEL (R)	Transénergie	6/01/06 - 7/01/06
4	Andrea Sasso	Sasso srl	6/01/06 - 7/01/06
5	Elena Coppa (R)	Sasso srl	6/01/06 - 7/01/06
6	Khaled Daoud (R)	NERC	6/01/06 - 7/01/06
7	Georg Bopp (R)	Fraunhofer ISE	6/01/06 - 7/01/06
8	Mathias Vetter	Fraunhofer ISE	6/01/06 - 7/01/06
9	Abderrahmane HAMIDAT (R)	CDER Al	6/01/06 - 7/01/06
10	Stéphane Pouffary (R)	ADEME	6/01/06 - 7/01/06
11	Walid El Baba (R)	LSES	6/01/06 - 7/01/06
12	Jürgen Gehr (R)	Afrisol	6/01/06 - 7/01/06
13	Ingo Vosseler	TTA	6/01/06 - 7/01/06
14	Xavier Vallvé	TTA	6/01/06 - 7/01/06
15	Antoine Graillot	TTA	07-01-06
16	Gemma Díaz	TTA	06-01-06
17	Oriol Gavaldà (R)	TTA	6/01/06 - 7/01/06

Revised meeting planning

Day: *Monday February 6th, 2006*

Hour	Content	Responsible
9:00	Welcome and presentation of partners	TTA
10:00	Overall project objectives, workplan etc.	TTA
10:30	*Coffee break*	
11:15	Internal project management (I and II)	TTA
13:30	*Lunch*	
15:00	WP 1	FhG-ISE
16:15	WP2	ADEME
16:50	WP3	TTA
18:00	*End*	

Day: *Tuesday February 7th, 2006*

Hour	Content	Responsible
8:30 - 15:45	Concrete planning of work (18 first months)	
9:00	WP 4	SASSO
10:00	WP 5	TRE
11:00	*Coffee break*	
11:25	WP 6: planning of identification of sites, determining risks and strategies for implementation	Afrisol
12:30	WP 7: Creation of web-site and contact database.	LSES
14:00	*Lunch*	
15:00	*End*	

Main points of the meeting

Welcome and presentation of partners

- Every partner gave a short presentation (5 min.) of its institution and person in charge.
- The CDER Marroc was not able to attend the meeting due to visa problems.

Overall project objectives, workplan etc

- The workplan will be moved two months because WP1 will start later

Internal project management

- It is agreed by unanimity that there is no need for bank guarantee of the private partners
- It is agreed by unanimity that 50% of the advance payment will be sent inmediately and the rest after 9 months. The work progress will be discussed in the following meeting.
- It is agreed by unanimity that TTA stays with 1.5% of the EC contribution of each partner.
- It is agreed by unanimity that the revision delay for publications is changed from 30 days to 15 days. The same delay will be applied for abstracts.
- Intellectual property rights don't seem an issue. However, if any partner is interessed, a list of previous knowledge can be added to the agreement.
- A special clause will be included as an ammendment to the contract after the requirement of Armines.
- The role of the co-leader has to be included in the Agreement. It is the main assistance of the Work Package leader.
- Comments to the draft must be sent before 15/03/06.
- The 11 copies of the final version must be sent for the signature-tour before 22/03/06.

Work Package 1

- The range of the households must be limited according to two criteria : low voltage grid and less than 50 kVA.
- Because of the late start of the project and the intensity of work, it is agreed by unanimity to move the end of Work Package 1 two months later.
- Work Package 1 will work hand in hand with Work Package 6. The project will try to find a village where hybrids are possible.
- An initial pilot study will be done in a Moroccan village, where methodology will be analysed, and applied to the rest of villages in the MPC.

Work Package 2

- It is agreed to reduce the scope of part of the financial analysis of the microgrids referring to carbon credit schemes
- Inputs for WP2 will need inputs from WP1but as part of the work can be already began in parallel, initial time-schedule can be kept

Work Package 3

- The electronic equipment from TTA will be adapted to be able to regulate wind turbines and hydro turbines with the same modular scheme it is based on.
- The hydro turbine will be kept in the low power range(150-1000W) , although it will be necessary to have inputs from WP1 to know the real needs of the communities.
- The hydro turbine will be mainly working against battery, not to provide basic power load.
- Currently NERC has developed a 500 W wind turbine, and they want to develop a 1000 W turbine. They need electric generator suppliers.
- LSES would like to be involved in WP3 as they want to study the performance of wind turbines in Lebanon.

Work Package 4

- The option of using a radio/wireless bus for the communications will be studied and evaluated.
- The definition of requirements will not need the WP1 and can be started in month 4 and finished in month 9.
- The ISPRA group for monitoring mentioned in the proposal doesn't exist. However, Dr. Schulz might have budget for monitoring guidelines development. It would be good to contact him.
- Inputs from PV-performance EU project will be obtained, since Armines is involved.
- There will be a meeting of WP4 in June/July.

Work Package 5

- The finish date must be moved two months, because of the delay in WP1.
- Armines will be leader for task 5.2 instead of TRE.
- TRE will be leader for task 5.4 instead of Armines.
- In task 5.3, instead of developing standards for microgrids, a list of guidelines will be elaborated, based on a collection of existing standards.

Work Package 6

- An official document of the project leader must be sent to present to Moroccan authorities together with a short project summary.
- The equipment will be directly paid to the suppliers, instead of going through Afrisol.
- The web site will be divided into an internal part of the site and an external one. For the former, emphasis will be given to practicality. For the latter, the main target population will be decision-makers. It will be in English and French.

Work Package 7

- It is agreed to evaluate firmly the possibility of preparing an internal platform to share documents, which will be managed by Armines.
- Armines and ADEME will make a proposal for the web page design.
    - Armines will evaluate the costs and send an e-mail to the partners confirming i)the possibility of managing it and ii) the necessary costs.
    - The name will be booked a.s.a.p.
    - ADEME will design the external web page.
    - TTA will be in charge of the management of contents.
- In reference to the international training, Didier confirms that most of the funding for the organisation of the seminar will come from UNESCO, so Armine's budget from CRESMED is enough. Some partners have budget to participate as trainees.
- As for relationship with multilateral institutions, LSES has already contacted ESCWA and an official letter from the project coordinator must be sent to confirm the beginning of the project, as for Morocco.
- The international workshop will be re-designed as an international seminar. LSES will fine-tune the planning and present a more ellaborated draft for the next meeting. The main characteristics will be :
    - It must be a scientific event, it must be a one day seminar more than a workshop. Only breakfast and lunch will be served.
    - The target population must be multilateral institutions and one member of important stakeholders for rural electrification issues of each MPC, to a maximum of 50 invited participants
    - More actors can come as long as they pay for their trips and their participation in the seminar, proposed by trainees.

Summarised agreements

A_1 There is no need for bank guarantee of the private partners (UNANIMITY)
A_2 50% of the advance payment will be sent inmediately and the rest after 9 months. The Work progress will be discussed in the following meeting.(UNANIMITY)
A_3 TTA stays with 1.5% of the EC contribution of each partner (UNANIMITY)
A_4 Revision delay for publications is changed from 30 days to 15 days. The same delay will be applied for abstracts (UNANIMITY)
A_5 A special clause will be included as an ammendment to the contract after the requirement of Armines(UNANIMITY).

Pending work

Work Package	Description	Responsible	Deadline
All	Send work package structure with budget breakdown per tasks and partners	Work Packages leaders	20/03/2006
WP7	Book web page name	Armines	20/02/2006
WP7	Make a budget proposal for internal web page management	Armines	20/02/2006
WP8	Send minutes of the meeting	TTA	20/02/2006
WP8	Send presentations of the meeting	TTA	20/02/2006
WP8	Transfer 50% of initial EC payment to the partners	TTA	20/02/2006
WP8	Send new Consortium Agreement	TTA	20/02/2006
WP8	Send new TOP and Gantt	TTA	20/02/2006
WP8	Send financial sheets per partner	TTA	20/04/2006
WP8	Send official letters to LSES and Afrisol	TTA	20/02/2006
WP8	Send comments to minutes, Consortum Agreement, TOP and Gantt documents sent by TTA	All partners	15/03/2006

Next meeting

It will be held in Amman, Jordan, coinciding with the Global Conference on Renewable Energy Approaches for DEsert Regions [GCREADER]. It keeps subject to NERC approval.

APPENDIX II: Minutes of the meeting in Amman

Meeting
CRESMED-2

Objective of the meeting
- Signing of Consortium Agreement
- Update of work package progress including deliverables
- Discussion about web site
- Update of time plan
- Budget and payment discussion

Location
Radisson SAS - Amman Hotel, RUM Hall #1, Amman, Jordan

Date
September 20-21, 2006

Attendants

No.	Name	Institution	Attendance
1	J.C. MARCEL	TRE	20-21/9/2006
2	Andrea SASSO	SASSO s.r.l.	20-21/9/2006
3	Steven XUEREB	TTA	20-21/9/2006
4	Xavier VALLVE	TTA	20-21/9/2006
5	Kamel ABDELADIM	C.D.E.R Al	20-21/9/2006
6	Georg BOPP	Fraunhofer ISE	20-21/9/2006
7	Carolin SCHENUIT	Fraunhofer ISE	20-21/9/2006
8	J.C. MARCEL*	ADEME	20-21/9/2006
~~9~~	~~Mohammed BAKRI~~	~~CDER Ma~~	~~20-21/9/2006~~
~~10~~	~~Abdelouahad ACHARAI~~	~~CDER Ma~~	~~20-21/9/2006~~
~~11~~	~~Jürgen GEHR~~	~~AFRISOL~~	~~20-21/9/2006~~
12	Chafic ABISAID	LSES	20-21/9/2006
13	Didier MAYER	ARMINES	20-21/9/2006
14	Khaled DAOUD	NERC	20-21/9/2006
~~15~~	~~Nasser El Hak Rachid~~	~~CDER Ma~~	~~20-21/9/2006~~

*Transenergie officially represented ADEME at the meeting

Meeting Plan (*Revised*)

Day: ***Wednesday, September 20th, 2006***

Hour	Content	Responsible
9:00 – 9:30	Welcome and brief update	TTA
9:30 – 10:30	Consortium Agreement – read through and sign	TTA
10:30 – 11:00	*Coffee break*	
11:00 – 13:00	WP 1 – update, deliverables (D1, D2-5) and site selection, discussion	FhG-ISE
13:00 – 15:00	*Lunch*	
15:00 – 16:00	WP 2 – update, deliverables (D7), discussion	ADEME (TRE)
16:00 – 17:00	WP 3 – update, deliverables (D12-16), discussion	CDER Al
17:00 – 18:00	WP 4 – update, deliverables (D9,D10, D17-20) , discussion	SASSO
18:00	*End*	

Day: ***Thursday, September 21st, 2006***

Hour	Content	Responsible
9:15 – 9:30	Evaluation of the solar resource	ARMINES
9:30 – 10:45	WP 6: Discussion about management of field study in Morocco	All
10:45 – 11:00	*Coffee break*	
11:00 – 11:30	WP 7: Discussion about web-site and contact database, deliverables (D6a-d, D24,D25,D28), discussion	LSES
11:30 – 13:00	WP 5 – update, deliverables (D21, D22)	TRE
13:00 – 13:30	Budget discussion – preparation for financial statements, discussion	TTA
13:30 – 15:00	*Lunch*	
15:00	*End*	
15:00 – 18:00	Work group meetings for WP3 and WP4	WP Leaders

Main Points of the Meeting

Welcome of Partners

- Representatives of CDER Ma and Afrisol did not arrive to participate in the meeting
- X. Vallve welcomed the partners with a brief presentation
- Each representative introduced themselves to the group
- X. Vallve presented results from a TTA project in Morocco called Akkane

Internal Project Management

- Consortium agreement:
  - All partners have brought their signed copies, except for Armines and the Moroccan partners Afrisol and CDER Ma
  - Armines will be able to sign the agreement next week and will send the signed original copies to TTA
  - Communication, other than purely administration information, to the partners not present at the meeting will be stopped until they have signed the agreement
  - All present partners have agreed to continue with the signing of the agreement
  - Each partner received an original copy of the CA with the signatures of all partners other than those mentioned above

Work Package 1

- FhG presented the progress and results achieved in WP1
- Evaluation sheets (D1) have been received fully from Lebanon but have not been fully completed by the other three MPC partners
- CDER Al presented possible villages for rural electrification
  - CDER Al will try to get information about the number of non-grid connected villages – very difficult due to deserts and nomad communities. No information provided by utility companies.
  - CDER Al will also try to get energy consumption values, also if only grid-connected values are available
- Jordan has about 99,5% grid connection – there are no non-electrified houses that are not on the list for grid connection
  - NERC will try to get more information regarding energy consumption and number of isolated electrification systems
- In Lebanon, there exists a shortage of electricity generation compared to demand – for these shortages diesel generators are used
  - LSES will try to estimate how many villages are using a backup generator
- Drafts of end reports will be provided at end of meeting to each partner for review and comments
- According to WP1.2 in Annex 1, an investigation of two villages in each country should be done, however it was decided this is not practical, since it would only bring false hope to villages that are not part of the project. Therefore a socio-economic study will only be done for the village used in the field study. Extra village visits will only be done to find information still required which is missing for D2-5
- The village that was visited in Morocco was presented by FhG – also a pre-dimensioning of the system was done
  - Wind data is lacking from the site – closest village with data 200km away
  - 10 year simulation was done
  - Solar water pumping not designed since information from suppliers was not yet available
  - Other small village 20km away would be possible to provide with SHS – however it must be verified if a concession from ONE was given to another company
  - Water source is about 5m deep – current method is use of a bucket
  - This village is definitely not on grid extension list

- The fax proposal of ONE for this village of Tioudersine is seen as enough of an approval for the installation of MSG
- Discussion ensued as to whether using solar water pumps as an independent system or to include water pumping as a load in MSG
  - It was decided to include in the design step (WP5.1) a comparison of both systems as well as a direct driven wind pump (NERC can provide assistance) and decide later on the most reliable solution
- Member of village is available for simple maintenance
- Further maintenance and repairs are only possible with long-term agreement with regional technical organisation, such as Afrisol
- Armines reminded the group that the chosen village must be representative of all objectives of project
- The partners approved unanimously the selection of Tioudersine for the field study
- TTA proposed using an additional site (Akkane) for further verification of some components before the actual village is ready

Work Package 2

- TRE presented the status of the work package on behalf of the ADEME
- The result of WP2, which is deliverable D7, is due in December, 2006.
- The work in this package has not yet begun and therefore must be completed in the next two and a half months
- Two strategic models will be developed: one for Lebanon/Jordan (since they have a very high rate of grid connection) and, one for Algeria/Morocco (which have a high proportion of non-grid connected villages)
- Armines asked to clarify their role in this work package and it was agreed that they shall give input to the revision of the final deliverable
- As input for this work package, WP1 deliverables must be completed and reviewed and in the hands of ADEME along with the reports from the MCP countries (WP2.1) by the end of October
- WP2.2, 2.3, 2.4, 2.5 must be finished by the end of November

Work Package 3

- TTA presented the objectives and status of the work package
- It was clarified that TTA is the leader of the WP with CDER Al as the co-leader
- CDER Al will send TTA information regarding their testing facilities
- LSES would like to provide one new wind turbine prototype – requiring approximately five man-months. LSES will provide a proposal for this work and the Steering Committee will then decide how the budget can be re-distributed
- NERC stated their need for assistance in finding a permanent magnet generator in the range of 200rpm and 48DCV output
- TTA sat together with FhG, NERC and CDER Al discussing the responsibilities of each partner in the work package
- FhG will provide CDER Al with testing and quality assurance forms
- CDER Al will send information regarding environmental specifications for electrical components in desert regions

Work Package 4

- SASSO presented the status of the work package
- Armines has monitoring information from IEA PVPS Task 2 available which they will make available to FhG, SASSO and TTA
- Minutes of meeting in Freiburg available in Italian – English version will be sent to WP4 partners
- SASSO sat together with Armines, TTA and FhG discussing the responsibilities of each partner in the work package

- SASSO will send a questionnaire of information that they require
- TTA will send SASSO the specification of the TApS central control unit

Work Package 5

- TRE presented the tasks of the work package
- No progress has been made yet in the work package; work will begin this month
- Recommendations for a standard for the distribution in micro grids will be developed as an alternative to the criteria necessary for national distribution grids (WP5.3)
- ARMINES presented a software tool they have developed for distribution network configurations in a mini-grid – this tool will be verified and used for WP5.2
- The manual for the software is already available in French and will be translated into English
- ARMINES will make the software and manual available on internal web site for all partners to be tested

Work Package 6

- TTA briefly reviewed the tasks of the work package and the responsibilities of the local partners of the field test study
- A group discussion about the management, organisation and co-financing of the test site
- It was agreed that Afrisol representatives must meet with the Co-ordinator as soon as possible to discuss these issues

Work Package 7

- LSES expressed concerns about ways to communicate with other partners regarding information necessary for deliverables
- The internal web site (http://project.cresmed.org) prepared by Armines is functional and all partners are requested to begin using it
- Login for reading only: *visitor1* password: *cres958* – the password will be changed in the coming days for security reasons
- Each partner will receive their own user password
- TTA will update the files on the internet site and will in the future make common documents available only there and not through email
- The public web site will be developed by Armines using information prepared by TRE/ADEME – this will be given to ARMINES at a meeting on 25.10.2006
- Each partner must provide their logo, web site, and brief description to ADEME
- There is already an agreement with them for the international workshop
- The summer school training in 2007 is planned but it still needs to be decided about the content
- All partners are asked to give a draft, idea for a project logo – ADEME will make final suggestion which will be voted upon by all partners
- Contact database preliminary draft has been prepared by ADEME/TRE
- Each MCP will take a copy of the database at the end of the meeting and will begin to fill it out which will then be put together by LSES
- TRE suggests to include in contact database all participants of Aix-en-Provence to have a who's who of the rural electrification world – Armines will try to provide the information
- TRE presented a draft of the work package breakdown – to be commented and decided by the other partners of the WP

Work Package 8

- TTA presented the financial situation of the project
- All partners must provide cost statements to the Co-ordinator by January 15, 2007
- The second payment (Tranche 2) will be given once the cost statements have been reviewed instead of in November

- The partners that have not received Tranche 1 will have the money transferred as soon as possible
- Form C for the cost statements will be made available on the internet site
- All partners received electronic copies of the presentations at the meeting

Evaluation of the Solar Resource (D. Mayer)

- Armines gave a presentation about the methodology developed in IEA PVPS Task 2 for the evaluation of solar irradiation
- Information about the project along with solar irradiation data can be found on the internet site: www.soda-is.com
- Data for the CRESMED project will be made available without cost

Next Meeting

- First choice: Last week of March in Algiers – to be confirmed by CDER Al
- Second choice: Last week of March in Freiburg – to be confirmed by FhG
- The group decided to have the next meeting in the first quarter of next year in order to monitor the progress of the project more closely
- Algiers was made the first choice since the total costs for each partner are not greater than if the meeting was at a European site and since it provides the opportunity to see the CDER Al test facilities

Summarised Agreements

A_1 Continue with signing of the Consortium Agreement in the abscence of two partners – unanimous
A_2 WP1.2 will only concentrate on the village to be chosen for the field study – unanimous
A_3 Tioudersine is to be the site of the field-test village – unanimous
A_4 Akkane will be used as an additional site for validation of technology – unanimous
A_5 Co-ordinator must meet with Afrisol to discuss solutions 1 and 2 – unanimous
A_6 Tranche 2 to be paid once the year-end cost statements have been reviewed – unanimous

Pending Work

Work Package	Description	Responsible	Deadline
WP8	Sign CA and send 10 original copies of signature to TTA	Armines/Afrisol/ CDER Ma	27.9.2006
WP1	Estimate number of non-grid connected villages and consumption	CDER Al/ NERC	15.10.2006
WP1	All partners are to review, correct and expand D2-5	All partners	15.10.2006
WP1	Check if concession already given to 2nd nearby village for SHS	TRE/FHG/ Afrisol	15.10.2006
WP2	Completed deliverables from WP1 must be given to ADEME	FhG/TTA	31.10.2006
WP3	Make a work proposal for development of a wind turbine	LSES	15.10.2006
WP3	Send information to TTA regarding test facilities	CDER Al / NERC	15.10.2006
WP3	Send information to TTA regarding environmental conditions in desert regions	CDER Al	15.10.2006
WP3	Testing forms adapted for desert regions will be sent to CDER Al	FhG	31.10.2006
WP4	Send monitoring data from Task 2 of PVPS to other partners	Armines	30.9.2006
WP4	Send minutes of WP4 meeting in Freiburg to other partners	SASSO	30.9.2006
WP4	Send latest specifications of TApS unit to SASSO	TTA	30.9.2006
WP4	Send questionnaire of requirements to TTA	SASSO	15.10.2006
WP5	Place J-PELEC software on internet site – testing and verification by all partners	Armines/All partners	15.10.2006/ on going
WP6	Meeting between TTA and Afrisol	Afrisol/TTA	31.10.2006
WP7	User name and password for each representative	Armines	27.9.2006
WP7	Change general vistor password	Armines	27.9.2006
WP7	Provide partner description with logo and description to ADEME	All partners	20.10.2006
WP7	Drafts of logo and final decision for logo	All partners	20.10.2006
WP7	Fill in contact database and send to LSES	MPC partners	31.10.2006
WP7	Provide participation list of Aix en Provence conference	Armines	31.10.2006
WP7	Send comments of WP7 breakdown to TRE once reviewed by Co-ordinator	TTA / All partners	15.10.2006
WP7	Send completed WP7 breakdown to LSES	TRE/ADEME	31.10.2006
WP7	Upload common files such as CA, contract, TOP	TTA	15.10.2006
WP8	Names of officers to all	TTA	15.10.2006
WP8	Make Form C available to all on internet site	TTA	15.10.2006
WP8	Review Annex 1 and TOP (specifically budget changes in WP7)	TTA	15.10.2006
WP8	Transfer money to TRE, ARMINES, FhG, CDER Al	TTA	15.10.2006

APPENDIX III: Minutes of the meeting in Freibourg

Meeting
CRESMED-3

Objective of the meeting

- Review of the documents sent to the Commission
- Review of the budget issues (first cost statement, budget remaining, etc)
- Update of work package and deliverables progress
- Final discussion about web site
- Update timetable
- Set the next date and place of the next meeting

Location
Frauhnofer Institute, Freiburg, Germany

Date
March 26-27, 2007

Attendants

No.	Name	Institution	Attendance
1	J.C. MARCEL	TRE	26-27/03/2007
2	Elena COPPA	SASSO s.r.l.	26-27/03/2007
3	Stefano QUARANTO	SASSO s.r.l.	26-27/03/2007
4	Xavier VALLVE	TTA	26-27/03/2007
5	Antoine GRAILLOT	TTA	26-27/03/2007
6	Mustapha ENZILI	CDER Ma	26-27/03/2007
7	Georg BOPP	Fraunhofer ISE	26-27/03/2007
8	Matthias VETTER	Fraunhofer ISE	26-27/03/2007
9	Nadège LEFEVRE	ADEME	26-27/03/2007
10	Jurgen GEHR	Afrisol	26-27/03/2007
11	Didier MAYER	ARMINES	27/03/2007
12	Abderrahmane HAMIDAT	CDER Al	26-27/03/2007
13	Khaled DAOUD	NERC	26-27/03/2007

Meeting Plan (*Revised*)

Day: ***Monday, March 26th, 2007***

Hour	Content	Responsible
9:30 – 10:00	Welcome and brief update	TTA-FhG
10:00 – 10:30	Review of documents sent to the EU	TTA
10:30 – 11:00	*Coffee break*	
11:00 – 13:00	WP 2 – update, deliverables (D7), discussion	ADEME (TRE)
13:00 – 15:00	*Lunch*	
15:00 – 16:30	WP 3 – update, deliverables (D12-16), discussion	CDER Al
16:30 – 18:00	WP 4 – update, deliverables (D9,D10, D17-20) , discussion	SASSO
18:00	*End*	

Day: ***Tuesday, March 27st, 2007***

Hour	Content	Responsible
9:15 – 10:45	WP 5 – update, deliverables (D21, D22)	TRE / ARMINE
10:45 – 11:00	*Coffee break*	
11:00 – 12:00	WP 6: Discussion about implementation of demo system (additional financing) in Morocco	Afrisol
12:00 – 13:00	WP 7: Discussion about web-site and contact database, deliverables (D6a-d, D24,D25,D28), discussion	LSES
13:00 – 13:30	General discussion	TTA
13:30 – 15:00	*Lunch*	
15:00	*End*	
15:00 – 18:00	Work group meetings for WP3 and WP4	WP Leaders

Main points of the meeting

Welcome of partners

- Representatives of LSES did not arrive to participate in the meeting
- Georg Bopp and Antoine Graillot welcomed the partners with a brief presentation
- Each representative introduced themselves to the group
- A. Graillot presented the documents which have sunbmitted to the EC for the first year

Adminsitrative aspects

- Cost statement:
  - Celina Pastor-Rubio, financial officer of the project at the EC, has sent a message just before the meeting to point out that some cost statements (Forms C) were not dully completed.
  - Some of the partners have brought their signed copies of From C, except for Ademe, CDER Ma, CDER Al and Transenergie.
  - Armines brought the documentation which were missing

Work Package 1

- FhG presented results achieved in WP1
- This WP is finished and the deliverables have been sent to the commission. So there were no discussions about this issue.
- NERC confirmed the figures about the non-electrified villages
- CDER Ma stated that they were no official figures about the state of the electrification but confirmed that there were less than 4.000 villages without electricity in Morocco.
- CDER Al stated that 1.300 villages do not have electricity (700 in the South part and 600 in the North part) but that there are many illegal connections.

Work Package 2

- TRE presented the status of the work package on behalf of ADEME
- The result of WP2, which is deliverable D7, is finished.
- There was a liitle delay due to the delay of the WP1.
- Two strategic models will be developed: one for Lebanon/Jordan (since they have a very high rate of grid connection) and, one for Algeria/Morocco (which have a high proportion of non-grid connected villages)
- The draft of D7 will be send next week to all the partners for the final revision and then put on the website.

Work Package 3

- TTA presented the objectives and status of the work package
- TTA presented the improvments realized of the Power conditionning unit concerning the hardware, the sofware and the algorithms
- CDER Al made a presentation about the environmental conditions
- They also exposed their capacity for testing with some doubts about their capacity for the hot weather simulation in laboratory
- The partners decided that the tests with hot temperature simulation will be made outdoor near Alger.
- NERC stated their need for assistance in finding a permanent magnet generator in the range of 200rpm and 48DCV output
- FhG and Afrisol gave some contact of german manufacturers

- Concerning the blades, everything is OK and the fabrication will start soon
- FhG showed the testing forms and gave them to the CDER Al
- It has been decided that CDER Al will buy a complete centralita for the tests with a configuration similar to the one which will be installed in Morocco

Work Package 4

- SASSO presented the status of the work package and their vision of the technological development of the WP
- FhG and Sasso made a technical presentation about the communication system
- The CAN bus will be the solution that we are going to adopt for communication protocole
- There is also the possibility to adopt for Ethernet but the distances of communication will be too important for this kind of system
- TTA send the kind of protocole for transmission and the type of information

Work Package 5

- TRE presented the tasks of the work package
- TRE presented the different typologies of PV hybrid systems
- Afrisol commented that usually the people do not accept a solution for elevtrification which foresee only few hours of energy supply per day
- Concerning the list of the forbiden appliances, the MPCs stated that for exemple there is no rice cooker (important load) and the appliances are more or less efficient because the products come from Europe
- TRE will send all the partners an excell matrix for each country that everybody will have to fill in with local exemples of configuration and typology
- ARMINES will make the software and manual available on internal web site for all partners to be tested. They also will validate the software with the data of Akkan, project implemented by TTA which is part of the references of the CRESMED project
- For the moment there is only the option of making simulation with 3 phases grids. They have to add the single phase option
- The difficulty of evaluate the power load per household has been pointed out by TTA
- TRE and TTA pointed out the necessity to have the load profile of the typical rural households in the Mediterranean countries (MPCs)

Work Package 6

- Afrisol exposed the progress of the WP
- Meeting with ONE
  - ONE is willing to leave the consortium implement the pilot project
  - They need an accurate description of the technical solution and the organisation scheme
  - They do not understand why the consortium want to implement a wind turbine without wind data: the decision was taken that the CDER Ma will install a tower for wind measurement in order to have at least 6 months of data at the moment of the installation
  - Discussion ensued as to whether using solar water pumps as an independent system or to include water pumping as a load in MSG
  - As soon as the tower is installed and the document which describe the solution are ready, Afrisol will organize a meeting with ONE for the final decision
- The partners have raised the problem of co-financing of the test site. It has been decided that the CDER Ma will try to find solution within the frame of other project in which they are involved with European donors
- Further maintenance and repairs are only possible with long-term agreement with regional technical organisation, for exemple Temasol, which has the concession of all the region

Work Package 7

- Ademe presented the state of the WP7 as leader of this activity
- D6 and D8 are on progress; a draft version has been sent to the EC with the anual reports
- TRE presented the database completed by NERC and LSES and the decision have been taken that we will include a European Database (based on the Otti database)
- Everybody has to send picture of other exemples and not forget to give the references of these pictures
- TTA has to send more picture of Akkan
- Everybody has to send their logo and a brief description of their activity in order to put on the web site
- Armine has to check if they put the two names of Armines and Ecole des Mines which compose the JRU, partner of the project
- Stefano Quaranta and Mustapha Enzili will receive their password as new members
- Armines has contact with the persons in charge of the suummer school training in Paris (Unesco) and it seems that there will be a possibility to organize a seminar for the summer 2008
- Concerning the atlas of solar radiation, all teh data are available on the SODA web site, host by Ecole des Mines

Work Package 8

- TTA presented the financial situation of the project
- The second payment (Tranche 2) will be given once the cost statements have been reviewed by the financial officer
- All partners received electronic copies of the presentations at the meeting

Next meeting

- Proposal: November the 6th and 7th in Algiers
- All the partners agreed this proposal

Pending work

Work Package	Description	Responsible	Deadline
WP2	TRE has to sent the final version of D7	TRE	10/04/2007
WP2	All the partners have to make the final comments	All	20/04/2007
WP2	TTA has to put the pdf version of D7 on the website	TTA	25/04/2007
WP4	TTA has to send documents of monitoring to Armines	TTA	10/04/2007
WP4	FhG has to sent us the draft of D9	FhG	16/04/2007
WP4	Sasso has to complete the D10 with the information of D9	Sasso	07/05/2007
WP4	TTA has to check the sequences of the mesages of information and also the lenght	TTA	16/04/2007
WP4	TTA has to send to Sasso information about the free slot of the “centralita” to connect a modem	TTA	16/04/2007
WP4	TTA has to send to Sasso the manual of the centralita in English	TTA	16/04/2007
WP5	Armines has to put the J-PELEC software on-line with the manual	Armines	20/04/2007
WP5	CDER Ma and CDER Al have to fill the contact database	CDER Ma and CDER Al	14/05/2007
WP5	Armines has to fill the European database (based on OTTI database)	Armines	14/05/2007
WP5	First draft on typology report of generation syst		
WP5	TTA has to send the data of Akkan for the software J-PELEC validation	TTA	23/04/2007
WP5	All the partners have to review the excell matrix send by TRE and give inputs for appliances	All	14/05/2007
WP5	Afrisol has to send the load profile of a tipical village of Morocco	Afrisol	30/04/2007
WP5	The MPCs have to send the shape of typical load profile for rural electrification	MPCs	30/04/2007
WP6	TTA has to complete the description of the technical solution for the village	TTA	30/04/2007
WP6	CDER has to install a tower for wind measurement	CDER Ma	30/04/2007
WP6	CDER has to have a look to the possibility to get a co-financing for the equipment thanks to their contacts	CDER Ma	30/04/2007
WP6	The distribution lines have to be detailled for the pre-sizing that will be givento ONE	TTA	30/04/2007
WP7	All the partners have to send their logo and a short description of their company/organization	All	30/04/2007
WP7	Armines has to explain how to use the private space on the web site	Armines	30/04/2007
WP7	All the partners have to find related publications and send them to TTA to put on the web site	All	31/05/2007
WP7	All the partners have to sent pictures and references to the web master	All	31/05/2007
WP8	Some partners have to send to TTA the new signed Form C	TRE, Ademe, CDER (Ma & Al), LSES	15/04/2007

APPENDIX II: Minutes of the meeting in Algiers

Meeting
CRESMED-4

Objective of the meeting

- Review of the documents approved by the Commission
- Review of the budget issues (first cost statement, budget remaining, etc)
- Update of work package and deliverables progress
- Discussion about the partcipation of Afrisol and the new distribution of the budget
- Update timetable
- Set the next date and place of the next meeting

Location
Hotel El Aurassi, Algiers, Algeria

Date
November 6-7, 2007

Attendants

No.	Name	Institution	Attendance
1	J.C. MARCEL	TRE	06 and 07/11/2007
2	Bassam OUAIDA	TRE	06 and 07/11/2007
3	Andrea SASSO	SASSO s.r.l.	06 and 07/11/2007
4	Andrea AVERAME	SASSO s.r.l.	06 and 07/11/2007
5	Stefano QUARANTO	SASSO s.r.l.	06 and 07/11/2007
6	Xavier VALLVE	TTA	06 and 07/11/2007
7	Antoine GRAILLOT	TTA	06 and 07/11/2007
8	Mustapha ENZILI	CDER Ma	06 and 07/11/2007
9	Georg BOPP	Fraunhofer ISE	06 and 07/11/2007
10	Charlotte COLLEU	ADEME	06 and 07/11/2007
11	Salwa AL MOUSSAOUI	Afrisol	06 and 07/11/2007
12	Lionel MENARD	ARMINES	06 and 07/11/2007
13	Abderrahmane HAMIDAT	CDER Al	06 and 07/11/2007
14	Kamel ABDELADIM	CDER Al	06 and 07/11/2007
15	Khaled DAOUD	NERC	06 and 07/11/2007
16	Chafic ABI SAID	LSES	06 and 07/11/2007

Meeting Plan

Day: ***Tuesday, November 6th, 2007***

Hour	Content	Responsible
9:30 – 10:00	Welcome and brief update	TTA-CDER Al
10:00 – 10:30	Review of documents sent to the EU	TTA
10:30 – 11:00	*Coffee break*	
11:00 – 12:30	WP 3 – update, deliverables (D12-16), discussion	CDER Al
12:30 – 14:00	*Lunch*	
14:00 – 16:00	WP 4 – update, deliverables (D9,D10, D17-20) , discussion	SASSO
16:00 – 18:00	WP 5 – update, deliverables (D21, D22)	TRE / ARMINE
18:00	*End*	

Day: ***Wednesday, November 7th, 2007***

Hour	Content	Responsible
9:00 – 11:00	WP 6: Discussion about implementation of demo system (additional financing) in Morocco	Afrisol
11:00 – 11:15	*Coffee break*	
11:15 – 12:30	WP 7: Discussion about web-site and contact database, deliverables (D6a-d, D24,D25,D28), discussion	LSES
12:30 – 13:30	General discussion	TTA
13:30 – 15:00	*Lunch*	
15:00 – 16:30	Visit of the CDER laboratory	
16:30 – 18:00	Working group for the WP3 and WP4	

Main points of the meeting

Welcome of partners

- Representatives of Afrisol was late and did not participate to the first half-day of meeting
- Dr Belhamel and Xavier Vallvé welcomed the partners with a brief presentation
- Each new representative introduced themselves to the group
- A. Graillot presented the documents which have approved by the EC for the first year

Adminsitrative aspects

- Cost statement:
  - Elisabeth Von Molkot, financial officer of the project at the EC, has sent a message just before the meeting stating that the first costs statements have been accepted as well as the second advanced payment.
  - The distribution of the coming payments has been discussed. The coordinator has to send the table for final approval by the partners.
  - Concerning the payment of the material, it has been decided that the coordinator will transfer the money only when we will be in the process of purchase and not in November-December, since it represents an important amount of money.

Work Package 3

- TTA presented the objectives and status of the work package
- TTA present the project of Akkane which is part of the project as reference since the meeting in Amman.
- The equipment for the CDER for testing hasn't arrived yet. It will be in Algiers during the month of November. CDER will realize preliminary test in order to produce a report before the end of the year. The full test report will be delivered during the third year of the project.
- Sasso is doing the benchmarking for the use of the micro-hydro in the target countries. It has been added a task which is the redaction of a little guidelines for the use and operation of micro-hydro.
- NERC is about to finish the development of the wind turbine. Finally the generator will be a 400 rpm one. The blades are ready and the wind turbine will be ready by mid-December. The running tests are short and normally the deliverable will be sent on time.

Work Package 4

- SASSO presented the status of the work package and their vision of the technological development of the WP
- SASSO has already developed devices (gateway RS232/Can, load management device).
- FhG has developed another interface Can/Taps bus.
- The number of prototypes (Deliverable 17) has been reduced from 10 to 2 because each device will have 8 outputs.
- Some delays have been exposed concerning the D18 and D19: until may-june 2008.
- TTA will send a centraleta to Sasso (the one which will be sent to the village after) to validate in laboratory the devices developed.
- Concerning the remote communication system, it has been agreed that the communication mode will be through GSM (and land line)

Work Package 5

- TRE presented the tasks of the work package
- TRE presented the different typologies of PV hybrid systems and the main Deliverable which is the D22.

- One part has been added in the D22 about the existing software tools. FhG will be in charge of developing this part.
- TRE will have to add a configuration which is the micro-grid grid-connected, which has been the strategy developed in the D7 for Lebanon and Jordan.
- FhG stated that it could be interesting to know the brand of the appliances. Finally the consortium agreed that it is not a critical issue since the important issue is to point out the availability of efficient devices in the target countries.
- TTA suggested to add a chapter in the D22 about the loads.
- ARMINES will make the software and manual available on internal web site for all partners to be tested.
- TTA presented the results of the comparison between the micro-grid of Akkane and the results form the JPELEC simulation. The results are very similar.
- ARMINES will have to modify the tool because it is only available for three-phase applications and generally for small micro-grids the generation and distribution is single-phase.
- TRE and TTA pointed out the necessity to have the load profile of the typical rural households in the Mediterranean countries (MPCs) during the last meeting and TRE is still waiting for the shapes from the MPCs partners.
- TRE will send to the partners the link for a guideline found on-line from the NRECA.

Work Package 6

- Due to the fact that Juergen left us two months ago, Afrisol has lost its technical capacity to assure its activities.
- Afrisol will send an official letter to the coordinator stating and explaining the new situation.
- The consortium voted (unanimity vote) that Afrisol will let the responsibility of the WP6 to the CDER Morocco and will stay in the consortium providing logistical support and fulfilling the other tasks.
- The new distribution of the budget will be sent to the partners.
- The consortium is still waiting for the final authorization of the ONE, even if ONE proposed themselves the village (fax from August 2006).
- Concerning the co-financing, the options are the following:
  - ADEME and CDER Morocco will participate to an international conference in January in Marakech in which they will present the project CRESMED. This could be the opportunity to find financial partners.
  - CDER Morocco has contact with UNDP but they want the report of wind measurement after one year of data collection (installed in May 2007)
  - TTA will present a proposal to the Spanish Cooperation in January-February.
- CDER Morocco presented the wind data collected after 6 months of operation in the village. The results are good and let the consortium the possibility of installing a complementary wind turbine for the generation. As NERC has to supply two prototypes of wind turbine, one will be send to the village of Tiouadersine.

Work Package 7

- Ademe presented the state of the WP7 as leader of this activity
- The manual of design of MSG will be a simplified version of the D22 with pictures and explainations
- Lionel Mernard has made a presentation of the web site to remind to everybody the basic functions of this tool. He also made a practical session after for the partners who had doubts and questions.
- Concerning the European contacts for the database, OTTI gave us the agreement to make diffusion among its contacts. The idea agreed during the meeting is the redaction of a letter presenting the project that OTTI will send to all its contacts.

- ADEME and CDER Morocco will participate to the conference in Marakech and make an oral presentation of the CRESMED project and the first results. As we said in the WP6, this could be useful to find co-financing for the pilot project.
- At the international level, some partners will be present in the PV hybrid Mini-grid conference in Athens in May 2008. At least TTA, TRE and FhG will represent the CRESMED consortium and present a poster or an oral presentation.
- In order to complete the database, it has been decided that all the MPCs partners will have to provide contacts of potential donors and multilateral institutions in their country.
- It has decided that the leaflet for the summer school training will be done at the beginning of the next year because we still need to finalize a close agreement with UNESCO before delivering it.
- Finally, concerning the last workshop supposed to be held in Lebanon, the consortium will decide to maintain it there during the next meeting.

Work Package 8

- TTA presented the financial situation of the project
- TTA will put on the website all the presentations done during the meeting
- TTA will contact the EC in order to know if we need to present an amendment for the budget shift in the WP6 due the new situation of Afrisol.

Next meeting

- Proposal: May the 5th and 6th in Lyon
- All the partners agreed this proposal

Pending work

Work Package	Description	Responsible	Deadline
WP3	TTA has to finalize the delivery of the centralita to the CDER Al	TTA	15/11/2007
WP3	NERC has to sent the report D16 by December the 15th	NERC	15/12/2007
WP3	Sasso has to sent to TTA the report D15 on bench marking	Sasso	15/12/2007
WP4	TTA has to send a centralita to Sasso (the one which will go to the village after)	TTA	20/12/2007
WP4	Sasso has to send report on D17	Sasso	15/12/2007
WP4	Sasso has to send report on D18	Sasso	15/12/2007
WP4	Sasso has to send a report explaining the reasons of the delay of D19 and the estimation of final delivery	Sasso	15/12/2007
WP5	FhG has to complete a part in D22 about the software tools	FhG	30/11/2007
WP5	TTA has to complete in D22 the part about lessons learnt	TTA	30/11/2007
WP5	Armines has to write the letter that OTTI is going to diffuse	Armines	15/12/2007
WP5	Armines has to translate the JPELEC in English	Armines	15/01/2008
WP5	Armines has to check the possibility to propose the single phase application in the software JPELEC	Armines	15/12/2007
WP5	TRE has to send the web link of the US guidelines for micro-grids	TRE	30/11/2007
WP5	The MPCs have to send the shape of typical load profile for rural electrification	MPCs	30/11/2007
WP6	Afrisol has to send to TTA a letter stating that the are no longer responsible of the WP6	Afrisol	15/11/2007
WP6	CDER Mo has to communicate to TTA that they accept to lead the WP6	CDER Morocco	15/11/2007
WP6	CDER Mo has to contact ONE and get the written authorization for implementing the project in Tiouadersine	CDER Morocco	15/12/2007
WP7	Armines has to get the formal agreement with UNESCO for the Summer School	Armines	31/12/2007
WP7	TTA has to make the consultancy to the EC to know the necessity of presenting an Amendment	TTA	15/11/2007
WP7	All the partners have to find related publications and send them to TTA to put on the web site	All	15/12/2007
WP8	TTA has to propose a new distribution of the costs in the budget	TTA	15/11/2007
WP8	All the partners have to start preparing the contribution report for the second year	All	01/01/2008
WP8	All the partners have to start preparing the Form C for the second year	All	01/01/2008

APPENDIX V: Minutes of the meeting in Lyon

Meeting
CRESMED-5

Objective of the meeting

- Review of the documents approved by the Commission
- Payment of the Second Cost Statement and second advanced payment
- Update of work package and deliverables progress
- Discussion about the proposal for co-financing of the equipment (WP6) presented by TTA
- Discussion about the Summer School of UNESCO
- Discussion of the location of the final workshop
- Update timetable
- Set the next date and place of the next meeting

Location
Transenergie, Lyon, France

Date
May 5-6, 2008

Attendants

No.	Name	Institution	Attendance
1	J.C. MARCEL	TRE	05 and 06/05/2008
2	Bassam OUAIDA	TRE	05 and 06/05/2008
3	Antoine GRAILLOT	TTA	05 and 06/05/2008
4	Andrea AVERAME	SASSO s.r.l.	05 and 06/05/2008
5	Stefano QUARANTO	SASSO s.r.l.	05 and 06/05/2008
6	Georg BOPP	Fraunhofer ISE	05 and 06/05/2008
7	Mustapha ENZILI	CDER Ma	05 and 06/05/2008
8	Nezha KADIRI	CDER Ma	05 and 06/05/2008
9	Abdelmoula NAYSSA	CDER Ma	05 and 06/05/2008
10	Charlotte COLLEU	ADEME	05 and 06/05/2008
11	Salwa AL MOUSSAOUI	Afrisol	05 and 06/05/2008
12	Didier Mayer	ARMINES	05 and 06/05/2008
13	Khaled DAOUD	NERC	05 and 06/05/2008

Meeting Plan

Hour	Content	Responsible
Day:1	***Monday, May 5th, 2008***	
14:30 – 14:45	Welcome and brief update	TTA-TRE
14:45 – 15:15	Review of documents sent to the EU	TTA
15:15 – 16:00	WP 3 – update, missing deliverables (D13-D14), discussion	CDER Al
16:00 – 16:30	*Coffee break*	
16:30 – 18:00	WP 4 – update, missing deliverables (D17-20) , discussion	SASSO
18:00	*End*	
Day:2	***Tuesday, May 6th, 2008***	
9:00 – 11:00	WP 6: Discussion about implementation of demo system (additional financing) in Morocco	TTA / CDER Ma
11:00 – 11:15	*Coffee break*	
11:15 – 12:30	WP 7: Discussion about the course (Summer School), discussion	TRE / ADEME
12:30 – 13:30	*Lunch*	
15:00 – 16:30	WP 7: Discussion about the rest of the activities (workshop, etc), deliverables, discussion	TRE / ADEME
16:30 – 18:00	General discussion	

Main points of the meeting

Welcome of partners

- Representatives of LSES didn't attend the meeting because of problem with the Agenda
- Representatives of the CDER Al couldn't attend this meeting because they couldn't get the visa
- Bassam Ouida welcomed the partners
- Each new representative introduced themselves to the group
- A. Graillot presented the documents which have approved by the EC for the first year

Adminsitrative aspects

- Cost statement:
  - The new Financial Officer, Mr Thierry Callens made some comments abouit the costs statements (Forms C) but everything has been corrected before the meeting.
  - The distribution of the coming payments has been discussed. The coordinator has to send the table for final approval by the partners.
  - The next payment, which is the 50% of the second advanced payment, will be made during the month of May.

Work Package 3

- The Deliverables D11, D12, D15 and D16 have been sent to the Commission.
- The equipment for the CDER for testing arrived in April. They started the testing but there is no result yet for the moment. The full test report will be delivered once the tests are performed. We have to foresee at least two months.
- NERC has finally received the generator after having waited many months. The following steps are the assembly of the wind turbines and the complete set of tests. The report will be completed in September 2008.
- The issues of the control and regulation have been discussed. NERC has to implement a mechanism which fulfils this requirement in order to assure the regulation in case of overvoltage or overload.

Work Package 4

- SASSO presented the status of the work package and their vision of the technological development of the WP
- SASSO has announced that the development of the following devices is done: gateway RS232/Can, gateway Can/Taps, load management device.
- FhG asked some questions about the technical aspects and also about the possibility to shift a part of the budget from personal cost to consumables in order to fabricate more prototypes.
- Some delays have been exposed concerning the D18 and D19: until june-july 2008.
- TTA has proposed a technical meeting in the Sasso office in July with the different partners involved in the WP4 (FhG, Sasso, TTA) for a demonstration of the equipments.
- FhG has proposed to Sasso and TTA to join the working group CIA dedicated to the Can protocols and their applications in the PV hybrid sector. FhG will send information about that.

Work Package 5

- TRE made a brief summary of the task which has been completed on time in December.
- There is only few internal tasks to realize (see pending works table)

Work Package 6

- .Concerning the co-financing, the actions done until are thefollowing:
  - ADEME and CDER Morocco tried to find a way to find a co-financing through the global agreement existing between the two entities. No results.
  - TTA presented a proposal to the Spanish Cooperation (AECI). The two conditions from the AECI were the location of the project (Northern Morocco) and the organization of a seminar at the same time about Rural Electrification in Chefchaouen before the end of 2008. The idea could be to combine this seminar with the Summer School (see next chapter). The answer will be known during the month of May. The new village has been identified already by TTA and his local counterpart in this area: ADL (Moroccan NGO).
- CDER Morocco will shift the wind measurement system from Tioudersine to Azaghar.

Work Package 7

- Ademe presented the state of the WP7 as leader of this activity
- The point of discussion were about the following issues:
  - description of each partner on the website,
  - registration for visitors if they want to download documents,
  - data available about data of other projects like Akkane which is a reference project.
- Concerning the European contacts for the database, OTTI gave us the agreement to make diffusion among its contacts. Armine is going to modify the draft letter prepared at the beginning of the year that OTTI will send to all its contacts.
- At the international level, some partners will be present in the PV hybrid Mini-grid conference in Athens in May 2008. At least TTA, ADEME, TRE and FhG will represent the CRESMED consortium and present a poster or an oral presentation. Also TTA has presented an abstract for the European PV conference in Valencia which has been accepted.
- It has been decided that Ademe will put the excel sheet for the contact database on the website so that the partners could fill in it continuously. Additionally to the target countries, one sheet will be dedicated to the international donors.
- The main point of discussion was the Summer School in partnership with the UNESCO. Armine explained that they won't organize any Summer School this year in Paris but one option could be to organize one in Morocco in autumn. During this month of May, Armine will try to organize it.
- Finally, concerning the last workshop supposed to be held in Lebanon, the consortium will decide to let it open until the next meeting due to the complicated situation in Lebanon. In case we could organize it in Beirut, ESCWA will support LSES for the organization.

Work Package 8

- TTA presented the financial situation of the project
- TTA will put on the website all the presentations done during the meeting
- TTA.

Next meeting

- Proposal: The proposal is Morocco in November. The place is not defined yet and will depend on the Summer School date and place and the date of seminar in Chefchaouen (if AECI gives the approval for the project). The two potions are Marrakech or Chefchaouen and it seems that it will be hold in November. One day meeting will be enough.

Pending work

Work Package	Description	Responsible	Deadline
WP3	TTA has to finalize the delivery of the centralita to the CDER Al	TTA	Done
WP3	CDER Al hs to perform the tests of the centralita	CDER Al	30/06/2008
WP3	NERC has to sent the report D16 by December the 15th	NERC	Done
WP3	NERC needs to do the testings of the wind turbine	NERC	30/09/2008
WP3	Sasso has to sent to TTA the report D15 on bench marking	Sasso	Done
WP3	NERC has to check the availability of the regulation device for wind turbine	NERC	31/05/2008
WP4	TTA has to send a centralita to Sasso (the one which will go to the village after)	TTA	Done
WP4	Sasso has to send report on D17	Sasso	15/06/2008
WP4	Sasso has to send report on D18	Sasso	15/06/2008
WP4	Sasso has to send report on D19	Sasso	31/07/2008
WP4	Technical meeting in Cuneo with Sasso, TTA, FhG (perhaps ADEME and ARMINE)	Sasso	21/07/2008
WP4	Ask Sasso and TTA is they would participate to the CIA	FhG	15/05/2008
WP4	Check the price and feasibility of Repeater and /or Amplifier for GSM	Sasso	31/05/2008
WP5	FhG has to complete a part in D22 about the software tools	FhG	Done
WP5	TTA has to complete in D22 the part about lessons learnt	TTA	Done
WP5	Armines has to modify the draft the letter that OTTI is going to diffuse	Armines	31/05/2008
WP5	Armines has to translate the JPELEC in English	Armines	Done?
WP5	Armines has to check the possibility to propose the single phase application in the software JPELEC	Armines	On-going
WP5	TRE has to send the web link of the US guidelines for micro-grids	TRE	Done
WP5	The MPCs have to send the shape of typical load profile for rural electrification	MPCs	Done
WP6	Afrisol has to send to TTA a letter stating that the are no longer responsible of the WP6	Afrisol	Done
WP6	CDER Mo has to communicate to TTA that they accept to lead the WP6	CDER Morocco	Done
WP6	CDER Mo has to contact ONE and get the written authorization for implementing the project in Tiouadersine	CDER Morocco	Done
WP6	TTA has to send pictures and explanations to the EC for the village modification	TTA	15/05/2008
WP6	CDER Mo will change the location of the wind measurement to the new village (Azaghar)	CDER Mo	30/06/2008
WP6	TTA has to send to partners involved the final budget distribution	TTA	15/05/2008
WP7	Armines has to get the formal agreement with UNESCO for the Autumn School	Armines	30/05/2008

WP6	TTA has to make the consultancy to the EC to know the necessity of presenting an Amendment	TTA	Done
WP7	All the partners have to find related publications and send them to TTA to put on the web site	All	On-going
WP6	TTA has to propose a new distribution of the costs in the budget	TTA	Done
WP7	Once we have the approval of the EC, put the Deliverables on the website	TTA	?
WP7	ADEME has to add a new contact sheet (multilateral donors) and send to ARMINE for publication on the website	ADEME	31/05/2008
WP7	ARMINE has to create the on-line registration for downloading documents	ARMINE	30/06/2008
WP7	The abstracts, papers and presentations have to be put on the website	All	On-going
WP7	TTA has to put a pdf report on the data of Akane	TTA	31/05/2008
WP7	Afrisol has to send the logo to ADEME and TTA	Afrisol	15/05/2008
WP8	TTA has to make the money transfer	All	31/05/2008
WP8	Set up place and date of the next progress meeting	TTA	30/06/2008
WP8	Ask to the Commission to shift personal costs to Consumables	TTA	15/05/2008

APPENDIX VI: Minutes of the meeting in Rabat

Meeting
CRESMED-6

Objective of the meeting

- Review of the documents approved by the Commission
- Payment of the Second Cost Statement and second advanced payment
- Update of work package and deliverables progress
- Discussion about the International workshop
- Update timetable
- Set the next date and place of the next meeting

Location
Rabat, Morocco

Date
October the 23rd, 2008

Attendants

No.	Name	Institution
1	Nadine ADRA	TRE
2	Bassam OUAIDA	TRE
3	Antoine GRAILLOT	TTA
4	Xavier VALLVE	TTA
5	Andrea AVERAME	SASSO s.r.l.
6	Stefano QUARANTO	SASSO s.r.l.
7	Filipo ..	SASSO s.r.l.
8	Georg BOPP	Fraunhofer ISE
9	Mustapha ENZILI	CDER Ma
10	Nezha KADIRI	CDER Ma
11	Abdelmoula NAYSSA	CDER Ma
12	Aatimad KABOUSS	CDER Ma
13	Charlotte COLLEU	ADEME
14	Salwa AL MOUSSAOUI	Afrisol
15	Abderrahmane Hamidat	CDER Al
16	Chafic Abisaid	LSES

Meeting Plan

Hour	Content	Responsible
Day:1	***Thursday, October the 23rd, 2008***	
09:00 – 09:15	Welcome and brief update	TTA-CDER
09:15 – 09:45	Review of documents sent to the EU	TTA
09:45 – 10:30	WP 3 – update, discussion	CDER Al
10:30 – 11:00	*Coffee break*	
11:00 – 12:30	WP 4 – update, discussion	SASSO
12:30 – 14:00	*Lunch*	
14:00 – 15:30	WP 6: Discussion about implementation of demo system (additional financing) in Morocco	TTA / CDER Ma
15:30 – 17:00	WP 7: Discussion about the rest of the activities (workshop, etc), deliverables, discussion	TRE / ADEME
17:00 – 18:00	General discussion	

Main points of the meeting

Welcome of partners

- Representative of NERC didn't attend the meeting
- Each new representative introduced themselves to the group
- A. Graillot presented the documents which have been sent to the EU during the third year and the report sent for the justification of the second year

Adminsitrative aspects

- Cost statement:
  - The new Financial Officer, Mr Thierry Callens made some comments about the costs statements (Forms C) but everything has been corrected before the meeting.
  - The distribution of the coming payments has been discussed. The coordinator has to send the table for final approval by the partners.
  - The next payment, which is the 100% of the second advanced payment, will be made during once the EU approve the Cost statement and report for the second year

Work Package 3

- The Deliverables D11, D12, D15 and D16 have been sent to the Commission.
- The equipment for the CDER for testing arrived in April. They started the testing but there is no result yet for the moment. The full test report will be delivered once the tests are performed. We have to foresee at least two months.
- NERC has finally received the generator after having waited many months. The following steps are the assembly of the wind turbines and the complete set of tests. The report will be completed in September 2008.
- The issues of the control and regulation have been discussed. NERC has to implement a mechanism which fulfils this requirement in order to assure the regulation in case of overvoltage or overload.

Work Package 4

- SASSO presented the status of the work package and their vision of the technological development of the WP
- SASSO has announced that the development of the following devices is done: gateway RS232/Can, gateway Can/Taps, load management device.
- FhG asked some questions about the technical aspects and also about the possibility to shift a part of the budget from personal cost to consumables in order to fabricate more prototypes.
- Some delays have been exposed concerning the D18 and D19: until june-july 2008.
- TTA has proposed a technical meeting in the Sasso office in July with the different partners involved in the WP4 (FhG, Sasso, TTA) for a demonstration of the equipments.
- FhG has proposed to Sasso and TTA to join the working group CIA dedicated to the Can protocols and their applications in the PV hybrid sector. FhG will send information about that.

Work Package 5

- TRE made a brief summary of the task which has been completed on time in December.
- There is only few internal tasks to realize (see pending works table)

Work Package 6

- .Concerning the co-financing, the actions done until are the following:

    - ADEME and CDER Morocco tried to find a way to find a co-financing through the global agreement existing between the two entities. No results.
    - TTA presented a proposal to the Spanish Cooperation (AECI). The two conditions from the AECI were the location of the project (Northern Morocco) and the organization of a seminar at the same time about Rural Electrification in Chefchaouen before the end of 2008. The idea could be to combine this seminar with the Summer School (see next chapter). The answer will be known during the month of May. The new village has been identified already by TTA and his local counterpart in this area: ADL (Moroccan NGO).
- CDER Morocco will shift the wind measurement system from Tioudersine to Azaghar.

Work Package 7

- Ademe presented the state of the WP7 as leader of this activity
- The point of discussion were about the following issues:
    - description of each partner on the website,
    - registration for visitors if they want to download documents,
    - data available about data of other projects like Akkane which is a reference project.
- Concerning the European contacts for the database, OTTI gave us the agreement to make diffusion among its contacts. Armine is going to modify the draft letter prepared at the beginning of the year that OTTI will send to all its contacts.
- At the international level, some partners will be present in the PV hybrid Mini-grid conference in Athens in May 2008. At least TTA, ADEME, TRE and FhG will represent the CRESMED consortium and present a poster or an oral presentation. Also TTA has presented an abstract for the European PV conference in Valencia which has been accepted.
- It has been decided that Ademe will put the excel sheet for the contact database on the website so that the partners could fill in it continuously. Additionally to the target countries, one sheet will be dedicated to the international donors.
- The main point of discussion was the Summer School in partnership with the UNESCO. Armine explained that they won't organize any Summer School this year in Paris but one option could be to organize one in Morocco in autumn. During this month of May, Armine will try to organize it.
- Finally, concerning the last workshop supposed to be held in Lebanon, the consortium will decide to let it open until the next meeting due to the complicated situation in Lebanon. In case we could organize it in Beirut, ESCWA will support LSES for the organization.

Work Package 8

- TTA presented the financial situation of the project
- TTA will put on the website all the presentations done during the meeting

Next meeting

- Proposal: The proposal is to make the Meeting after the International Workshop in Lebanon depending of the dates. If the workshop is held in March, it is a good option. One day meeting will be enough.

Pending work

Work Package	Description	Responsible	Deadline
WP3	TTA has to finalize the delivery of the centralita to the CDER Al	TTA	Done
WP3	CDER Al hs to perform the tests of the centralita	CDER Al	30/06/2008
WP3	NERC has to sent the report D16 by December the 15th	NERC	Done
WP3	NERC needs to do the testings of the wind turbine	NERC	30/09/2008
WP3	Sasso has to sent to TTA the report D15 on bench marking	Sasso	Done
WP3	NERC has to check the availability of the regulation device for wind turbine	NERC	31/05/2008
WP4	TTA has to send a centralita to Sasso (the one which will go to the village after)	TTA	Done
WP4	Sasso has to send report on D17	Sasso	15/06/2008
WP4	Sasso has to send report on D18	Sasso	15/06/2008
WP4	Sasso has to send report on D19	Sasso	31/07/2008
WP4	Technical meeting in Cuneo with Sasso, TTA, FhG (perhaps ADEME and ARMINE)	Sasso	21/07/2008
WP4	Ask Sasso and TTA is they would participate to the CIA	FhG	15/05/2008
WP4	Check the price and feasibility of Repeater and /or Amplifier for GSM	Sasso	31/05/2008
WP5	FhG has to complete a part in D22 about the software tools	FhG	Done
WP5	TTA has to complete in D22 the part about lessons learnt	TTA	Done
WP5	Armines has to modify the draft the letter that OTTI is going to diffuse	Armines	31/05/2008
WP5	Armines has to translate the JPELEC in English	Armines	Done?
WP5	Armines has to check the possibility to propose the single phase application in the software JPELEC	Armines	On-going
WP5	TRE has to send the web link of the US guidelines for micro-grids	TRE	Done
WP5	The MPCs have to send the shape of typical load profile for rural electrification	MPCs	Done
WP6	Afrisol has to send to TTA a letter stating that the are no longer responsible of the WP6	Afrisol	Done
WP6	CDER Mo has to communicate to TTA that they accept to lead the WP6	CDER Morocco	Done
WP6	CDER Mo has to contact ONE and get the written authorization for implementing the project in Tiouadersine	CDER Morocco	Done
WP6	TTA has to send pictures and explanations to the EC for the village modification	TTA	15/05/2008
WP6	CDER Mo will change the location of the wind measurement to the new village (Azaghar)	CDER Mo	30/06/2008
WP6	TTA has to send to partners involved the final budget distribution	TTA	15/05/2008
WP7	Armines has to get the formal agreement with UNESCO for the Autumn School	Armines	30/05/2008

WP6	TTA has to make the consultancy to the EC to know the necessity of presenting an Amendment	TTA	Done
WP7	All the partners have to find related publications and send them to TTA to put on the web site	All	On-going
WP6	TTA has to propose a new distribution of the costs in the budget	TTA	Done
WP7	Once we have the approval of the EC, put the Deliverables on the website	TTA	?
WP7	ADEME has to add a new contact sheet (multilateral donors) and send to ARMINE for publication on the website	ADEME	31/05/2008
WP7	ARMINE has to create the on-line registration for downloading documents	ARMINE	30/06/2008
WP7	The abstracts, papers and presentations have to be put on the website	All	On-going
WP7	TTA has to put a pdf report on the data of Akane	TTA	31/05/2008
WP7	Afrisol has to send the logo to ADEME and TTA	Afrisol	15/05/2008
WP8	TTA has to make the money transfer after the final approval of the EU	All	31/12/2008
WP8	Set up place and date of the next progress meeting	TTA	31/12/2008

Cost efficient and reliable rural electrification schemes for South Mediterranean countries based on multi user Solar Hybrid grids

UNESCO Seminar
Rabat-Morocco, 21th and 22nd of October 2008

United Nations Educational, Scientific and Cultural Organization

The CRESMED project

Based on the successful implementation of multi-user solar hybrid grids (MSG) in Europe, this project deals with the design of rural village electrification technology and schemes for rural communities, schools, or dispensaries in Mediterranean partner countries.

This approach is elaborated in a **common effort** between partners in the European Union and Mediterranean partner countries.

The chosen approach is **an integrated approach**, covering all aspects required (social, economical, financial and technical) for long term sustainable energy services.

The strategic objective of the project is **to promote cost-efficient and reliable renewables** for rural areas in particular through:
- Renewable energy electricity produced from multi user solar hybrid systems (MSGs) including a high share of renewables (solar and other locally available energy sources) on local micro grids.
- Management tools to operate rationally a larger number of MSGs in a region by satellite and other communication technologies.

Seminar content

Based on the project work packages, the partners present the main results of their work. The Seminar is organised as following :

1. Introduction
2. Solar energy resources estimation – available data bases
3. Determination of requirements
4. Strategies for successful implementation
5. Developing appropriate technologies
6. Design, sizing and implementation
7. Filed test examples

The consortium

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http://www.cresmed.org/

CRESMED project international workshop on Multi-user Solar hybrid Grids

Organised by the Lebanese Solar Energy Society (LSES)

in collaboration with the United Nations Economic and Social Commission for Western Asia (UN-ESCWA)

in the framework of the CRESMED project

Beirut, Lebanon – 4th of February 2009

Session 1	
	CRESMED project overview and achievements (TTA)
	Requirements and strategy in Lebanon (LSES)
	Requirements and strategy in Jordan Development of a 1kW wind turbine (NERC)
	Requirements and strategy in Algeria Testing of equipments under high temperatures (CDER Algeria)
	Requirements and strategy in Morocco (CDER Morocco)
	Hybrid systems: Design, sizing and implementation (Transénergie)
	Discussion and conclusion of the session
Session 2	
	Developing appropriate technology: PV-hybrid microgrids experience in Morocco (TTA)
	Determination of requirements (Fraunhofer Institut)
	Strategy for a successful implementation (ADEME)
	Solar radiation assessment and dissemination(ARMINES)
	Communication, monitoring and control systems (Sasso)
	Discussion and conclusion of the session