UNITED NATIONS PROGRAMME FOR DEVELOPMENT
REGIONAL BUREAU FOR AFRICA
GLOBAL ENVIRONMENT FACILITY

ISLAMIC REPUBLIC OF MAURITANIA

DECENTRALIZED WIND ELECTRIC POWER FOR SOCIAL AND ECONOMIC DEVELOPMENT

(ALIZÉS-ÉLECTRIQUE PROJECT)

MAU/93/G32/A/1G/99

EVALUATION REPORT
AIDE-MEMOIRE

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MAIN RECOMMENDATIONS ISSUED BY THE EVALUATION MISSION

CONTENTS

Exchange rates applied:

- US$ 1 = UM 150
- FF 1 = UM 30
- US$ 1 = FF 5

All financial amounts are expressed in constant money.

Introduction

The development objective of Project Alizés-électrique is stated as follows: "Promoting sustainable development by improving the quality of life and socioeconomic situation of the rural populations through installation and diffusion of small decentralized wind electric equipment at the local and national levels in order to participate in the efforts aimed at mitigating global climate warming".

The evaluation mission showed that most of the main objectives of the pilot phase funded by GEF had been achieved, but that the results were still too recent in order to be permanently acquired. The summary of the aspects reviewed is included in Annex 1. This aide-mémoire discusses the main recommendations issued by the evaluation mission.

The mission was able to confirm that this type of project has indeed essentially a strong social character within an economic context, but that no "profitability" should be expected. Thanks to the active contribution from the population, it has reached and gone beyond operational equilibrium.

The Mauritanian Government has now been provided with the elements required to define a rural electrification policy.

1. An initial unfinished phase

The project was based from the start on rather overly optimistic assumptions. The calendar established for the various stages did not take into consideration the time required to make a number of decisions.

In the present case, the longest delay (4 months) was attributable to the call for bids and bid review process (see Steering Committee report of 25/2/1996).

Nevertheless, it must be emphasized that the project was able to reach most of its objectives only thanks to the results obtained by previous projects (in particular, Alizés-Trarza pumping):

- Familiarity with the playing field
- Knowledge of Mauritanian partners (public and private sectors)
- Technological knowledge in this line
- Presence of an operational logistics base.

The project also benefited from the experience of other similar programmes, e.g. PPER in Morocco, GECO in Côte d'Ivoire, PRS in Mauritania.

Implementation procedures

It should also be stressed that the flexibility of the implementation procedure selected was a highly favorable factor to be credited with the successful achievement of the main objectives.

The selection of an NGO to strengthen project implementation allowed for

* "Greater flexibility in the execution, with time-savings in connection with traditional administrative procedures that are ill-suited to this type of pilot projects";

* Prompt mobilization of partners thanks to its long-standing local presence and its previous work in this thematic area;

* Highly committed action on the part of the concerned population groups supported by a "rear base" in Paris.

To date, the site installation programme is 80 percent completed and it will be fully completed by the end of November 1996. The service is operating adequately on 10 out of the 12 sites, with demand exceeding supply on the two other sites in this low-wind period.

The mission was able to witness the enthusiasm of the local population groups and the quality of the temporary local organization. It noted concretely how the population perceives the availability of electricity as a human development indicator.

Points to be improved:

However, the actual operation of the installed systems is not sufficiently well known to ensure an immediate launch of new installations. It should also be pointed out that a number of assumptions have not been confirmed as yet; this requires continuous use over a one-year period in the villages and collecting the data:

* Service usage: The market study had grossly overestimated the baseline energy consumption at the household level with traditional products and did not adequately factor in seasonal variations (nomadic lifestyle

* The adequacy of the wind-energy potential at each site in relation to actual demand remains to be confirmed, as does the advisability of mixed wind-diesel or wind-solar generation;

* Battery operation within the selected conditions was not sufficiently studied;

* Electric regulation of the wind turbines exploitation can be improved and optimized.

Points to be developed:

In addition, other aspects vital to the launch of large-scale programmes must be put into place:

* Permanent institutional arrangements (framework and financing) at the administration level;

* Legal status of local and federated management, operation and control organizations;

* Actual implementation of maintenance arrangements.

It was overly ambitious, in any event, to think that a decision to undertake a large-scale second phase without adequate feedback, in particular where the use of equipment and ope ation of local structures is concerned, could be made in so little time.

The initial project scheduling with an excessively short pilot phase did not allow for all necessary lessons to be learned in order to proceed with a larger scale diffusion with consolidated, permanent institutional entities.

2. A second phase to be initiated in two stages

Two aspects must be taken into consideration:

* Allowing time to consolidate the results, process and analyze field data and capitalize on them;
* Avoiding a demobilization of the various teams now in place (project, manufacturers) and the partners (State administration, requesting villages, local organizations).

It is therefore essential to provide a transitional 6-month period extending Phase 1 (Phase 1b), where the main objectives will be to consolidate the results obtained during Phase 1 and to prepare for a second phase. The support provided for internalization of know-how and institutionalization of the minimum structures required to establish a national policy in this area could be temporarily extended.

Phase 2 would then be initiated to implement a gradual development programme consisting first of Phase 2a for the consolidation of the still very limited structures and equipment (approximately 10 months for 750 households -15 sites- among which possibly a few solar sites), then of Phase 2b for a much more sustained expansion over a longer period of time (3 years for 6,000 households - approximately 120 sites, of which the final year would be a final follow-up/evaluation period).

Funding for Phase 1b should, in line with Phase 1 and aimed at ensuring a permanent retention of the results, be provided by the donor funding pilot Phase 1, i.e. the Global Environment Facility (GEF). The amount for this extension would be approximately UM 22.8 million --US$ 152,000; FF 760,000-- (see detail in Annex 2).

During Phase 1b, the data collected over a full year of operation could be analyzed, together with the results of the "energy base" tests conducted by the State administration. The lessons learnt from this will serve to make final adjustments in order to proceed with Phase 2a immediately.

The implementation of Phase 2a should validate the presence of various conditions which would allow a successful launching of Phase 2b (diffusion phase) with new structures in place:

* Validation and possible expansion of the range of technical options and guarantee and maintenance procedures.

* Precise definition of control procedures;
* Efficiency of local organizations and established coordination mechanism;
* Required project unit in place and **strengthened human resources;**
* Availability of projected local funding and existence of appropriate utilization procedures;
* Assurance of durability of the entire system in place.

In order to avoid scattering the limited human (and logistical) resources currently available and to gradually scale-up a robust structure, it is essential to focus on the main area of the current project. If the proposed local structures are to reach their viability threshold, they must encompass at least 150 to 200 sites.

A few pilot installations could be introduced gradually in a new area, but the deployment of a more ambitious programme in this area should be postponed until the end of Phase 2, at a time when robust structures and the likelihood of extending this equipment process beyond the completion of the project might ensure their viability.

3. Numerous lessons learnt and appropriate methodology

Within its implementation framework, the programme had to develop an appropriate methodology adapted to the rural Mauritanian context. Based on village level animation activities, the project established the current method jointly with the villagers, after several informational sessions.

The various rules of the game were defined, communicated and accepted by the population:

* Participation of the villages in the initial investment;
* Payment of a monthly fee based on a relatively simple rate structure;
* Agreement to pay for a maintenance contract in advance.

In each village a management structure has been put into place (manager and management committee) and will likely serve as a basis for future cooperatives. It should be added that the work already done with Nassim within the framework of the Alizés-Trarza pumping then ASHYR is an important asset which will contribute to the electrification programme becoming operational more rapidly.

On a broader level, the momentum achieved (local organization, consultation) is an extremely important factor which will have a positive effect on local development.

In the beginning, as a result of choice and financial constraints, not all families were equipped. Even though the long term objective is to provide electrical service to the vast majority of households, initially and in order to firm up the system, it is preferable to reach that objective gradually, for the purpose of creating a form of social pressure that will come into play on the part on the non-customers (this point was brought up at a meeting by one of the members of the provisory council of Nassim).

The record keeping system (cash, customer monitoring, battery monitoring) established in the villages has the advantage of being simple while providing good quality information. The accounting procedure is fairly easy to learn for the managers, after relatively light training.

On the technical level, the project is gradually building up a reference database thanks to the installations put into place and the work performed within the framework of the energy base (in particular the data gathered on wind speed at various sites). This aspect is still inadequately organized and used.

The project will have baseline data available on the entire technological approach, which will enable it to pursue its action and meet the priority needs of the families and the communities during Phase 2.

Finally, it should be noted that the sustainability objective set from the very beginning and more importantly understood by the population will make it possible to fine tune more precisely the pricing system.

4. A monitoring mechanism to consolidate and clarify

The monitoring mechanism would have two components, one to be implemented on an on-going basis in the field, and one consisting of selective external support actions.

Field component

In order to be implemented, this function must be provided with the required means. Monitoring must be a dynamic project component constantly accompanying development. It must provide qualitative and quantitative data on programme activities, thus enabling the management team to make changes and adjust the procedures according to the results obtained, particularly as regards maintenance and pricing.

The mechanism could be the following:

One person could be recruited to perform this function, possibly sharing his/her time between monitoring and community extension, in which case the current extension agent's time would also be divided between these two tasks.

The monitoring mechanism should be determined by formulating the data collection method (existing records, instrumentation) then by selecting the technical, social and economic indicators reflecting project activities, and by providing the villages with the required technical instrumentation. Reference technical data should also be produced by the Energy Base to complement this mechanism.

The executive selected for this task will collect, process and analyze the data regularly and produce summary reports.

Regular monitoring feedback meetings would be held every two or three months, with the participation of all local project partners. Such meetings would provide an opportunity to review the results from the monitoring activities and, should the need arise, to take steps to respond to the new situation.

These meeting would also allow a form of internal training by way of experience sharing between partners. They would also offer an opportunity to monitor the progress made in providing the

necessary tools for decentralized rural electrification.

At these monitoring feedback meeting, an outside point of view would be valuable for the purpose of validating the general orientation, evaluating the results, assess work progress and provide advice as regards the commitments made with the current and future donors.

Should the Caisse Française de Développement wish to participate in Phase 2, it could assume the tasks connected with this monitoring/evaluation support (method, staff selection, funding) in order to ensure that the programme activities are in conformity with the specifications for Phase 1b.

Selective, external support

This support would be provided by the project Technical Assistance, as short-term missions mobilized by the project on an as-needed basis yet fairly regularly The main objective is to provide the field team with methodology support aimed at adapting and improving the system according to the changes as they occur. This support also takes into account the necessary training to be provided to the new staff members hired to reinforce the existing teams.

In this manner, the executives would be trained so that they become more independent and able to perform this function entirely on their own. The volume of the support mission will then gradually diminish as know-how is being transferred.

As a complement and according to needs, studies could also be conducted by local experts (sociologists, economists, etc.), to provide insight on any specific aspect of the project's impact.

5. Institutional tools and funding mechanisms to be established or strengthened

Institutional tools

Currently, none of the components of the institutional apparatus envisioned for Phase 2, and more generally for the diffusion of decentralized electrification projects, is actually in place.

- The cooperatives (which would replace the interim management committees) and cooperative unions are waiting for the bill providing for their transfer from the Ministry of Planning to the Ministry of Hydraulics and Energy to pass in order to complete their legal constitution procedure. It is indeed recommended that the coordination and technical supervision of the cooperatives by the unit in charge of rural electrification be clearly defined as a function and institutionalized.

- The support unit (CELED) remains to be created and the current project unit does not have enough staff members which could be assigned to it. In order to institutionalize this unit, staff should be recruited (also allowing time for training) and this unit should be made entirely autonomous (logistics, offices, etc.)

  This support unit will be the main tool used by the Mauritanian Government to implement its rural electrification policy. It is to be substituted gradually to the current project unit. The operational cost of the unit once it reaches cruising speed would be approximately MUM 26 million (FF860.000 - US$17.000).

Synergistic linkages for logistics and expertise sharing could be advantageously established with the executive unit of the Directorate for Hydraulics and its 4 enhanced local offices, which uses the same sources of energy in certain areas.

- The autonomy of this support unit must be confirmed by the adoption of simple, operational procedures approved by the higher echelons. In order for the institutional apparatus to ensure the durability of the current projects, the support unit will have to be funded on the State budget. The funding sources enabling it to elaborate investment programmes will need to be specified.

This support unit could ultimately become a public establishment which would be the equivalent for rural electrification of SONELEC in urban areas.

- In addition, there is still no implementation decree for the law allowing permanent exemption of the equipment allowing rural electrification through renewable energies. The status shift from an externally funded (exempt) project to a common law project would result in an unacceptable upward revision of unit costs.

Therefore, it is essential that the Mauritanian Government make a firm commitment to implement a rural electrification policy (all technologies grouped) extending the pilot phase by instituting the entity in charge of this thematic area and by mobilizing the resources required to allow minimal access to the Mauritanian population groups and businesses in this sector.

Local structures' financial balance

The current pricing (average UM 900/month/customer) covers all of the operations and the current replacement costs: manager's salary, maintenance, regular battery and user kit replacement, electronic regulator replacement. It does not, however, cover entirely the other initially projected expenses: replacement of equipment with long service life (wind generator, etc.) and operations of the collective entity (union of cooperatives).

A balance can be reached only:

- either by increasing the rental price of the charge system (wind turbine and regulator) from UM 12,000 to UM 19,000 per month,
- or by decreasing the amount allocated to the reserve for the wind turbine alone and therefore of the ability to provide for the ultimate replacement and refinancing ability on these sole resources.

Reality will fall between these two options, taking into account a simplification of the proposed systems (doing away with the buffer batteries in particular): the rental price for the charge system could be increased to UM 13,000/month and the reserve for turbine replacement divided by three, with the difference being paid for by the national contribution to the rural electrification fund described below, within the framework of the rural-urban equalization.

According to the model as presented, the operating costs of the collective entity (union) must be spread over at least 200 to 250 systems, and this entity must therefore be established both for the water and electricity systems. This entity will be responsible for the durability of the operations.

In addition, household participation in the investment is currently set at 4 percent. With a systematic incorporation of the premises (UM 1000,000), and 2 months' advance on operations, household participation in Phase 2 will increase to approximately 9 percent of the investment. The involvement and motivation of the customers will thus be tested.

General funding mechanisms:

The funding mechanisms must contribute to the expansion of the decentralized rural electrification process to the entire Mauritanian territory. **The current project was limited to establishing a mechanism for those application zones selected for Phase 2.**

The funding mechanism to sustain the electrification process over the entire territory should be set up as a **Decentralized Rural Electrification Fund** reserved for that use and managed independently by the specialized institution created for that purpose (CELED in the proposed scheme).

Such a fund would provide for new investments with the contribution of external funding and for the replacement of long service life assets.

This fund could be capitalized through:

- An initial contribution by the Government aimed at sustaining the structure and encouraging new investment (Consolidated Investment Budget - Ministry of Planning)
- A tax on petroleum products (or a set share of the Support Fund for the Development of Energy - Ministry in charge of Energy) within the framework of the **equalization of urban and rural areas,** in the event where such equalization could not be assured by the national electric power company.
- A portion (1/3rd) of the depreciation value of the long-life equipment (wind turbines, PV panels, etc.) against a guarantee from the Government to assume part of the corresponding replacement expense within the framework of the above-mentioned urb n/rural equalization.

General funding scheme

With an investment goal of 2.000 households - i.e. 40 villages - per year, the total investment cost would amount to approximately UM 150 million (FF 25 million; US$ 5 million). Assuming an external contribution of 65 percent where the villages and households would support 10 percent of the initial financing and the rural electrification fund 25 percent, the fund should be provided with an annual capital of UM 37 million.

In the event where no external funding would be available, this fund would allow the electrification process to proceed without interruption and a dozen villages to be equipped.

The long-term equilibrium of the ongoing process is assured with the continuation of the national contribution in the amount of UM 37 million.

6. Phase 2 stages and prerequisites for success

The main objective for Phase 2 is to ensure the durability of the rural electrification process initiated by the Mauritanian Government with GEF/UNDP support.

The following conditions must be met for this objective to be achieved:

- By the end of 1996, the Mauritanian Government must confirm its commitment to create the tools for a rural electrification policy and mobilize the counterpart contribution for 1997;
- By 31/12/1996, financial support must be provided to draw the lessons of the pilot phase (GEF) at least for the first half of 1997 and the project team must finalize the enhanced monitoring-evaluation process;
- By 31/12/1996, a request must be formulated and a statement of interest by a donor must be secured for Phase 2;
- During the first half of 1997, the expected legal/regulatory decisions (authority over cooperatives, exempt status for decentralized electrification equipment, etc.) must be made and the national support unit must be set up with implementation and control procedures;
- During the first half of 1997, the commitment to fund Phase 2 must be obtained of a donor, with prompt implementation of an initial tranche (2a) as early as the 2nd half of 1997, and the counterpart contribution must be made available;
- During Phase 2a, the support unit and the union of cooperatives of Trarza (Nassim) must be operationalized, with appropriate control and monitoring procedures, and the current project area must be essentially equipped;
- During Phase 2a, the national rural electrification fund must be established and its operation and control procedures must be defined;
- During Phase 2b, project implementation must be ensured by the support unit, with a gradual decrease of external technical assistance, and equipment of a new area must be initiated gradually.

ANNEX 1

SUMMARY OF EVALUATION FINDINGS

1 PHASE 1 EVALUATION

1.1 ASSESSMENT OF RELEVANCY OF THE PROJECT'S IMMEDIATE OBJECTIVES

- Are the immediate objectives compatible with GEF objectives?
  Yes, as they contribute to improving the human development indicator by reducing current CO2 emissions (total elimination of the consumption of candles, oil and gas for lighting for these households).

- Is the project in line with the Mauritanian Government's sectoral initiatives?
  Yes: The development of rural electrification and mobilization of renewable energies are a government priority

- Existence of a policy in the area of decentralized electrification:
  Commitment on the part of the government to bring the services linked to electrification to the rural population.

- What are the resources devoted by the government to achieve project objectives?
  Counterpart in-kind budget, including providing a technical director and resources for an experimental base.

1.2 ASSESSMENT OF OUTPUTS

1.2.1 MARKET STUDY

- Selection of areas:

  Coherent with GRET's implantation (local presence) and suppliers' implantation (maintenance already organized). To be maintained during Phase 2a. Area closer to capital city for interventions.

- Selection of villages:

  Appropriate (strong mobilization level), representative (average 50 households) and in line with project objectives.

- Selection of families:

  Representative of the intervention environment: individual decision to pay for participation after animation: 80 percent with numerous new requests received.

1.2.2 TECHNOLOGY CHOICES

- Relevancy of marked trend in favour of wind generation?

  The advantages of wind-energy systems over solar systems have not been demonstrated in the project area due to the lack of detailed knowledge of wind resources (consecutive number of days without sufficient wind).

  However, for equal cost and equivalent production, the stronger local integration and prior local presence of technology are arguments in favor of wind-energy for this area.

- Other distribution systems:

  Photovoltaic chargers will find an application in less windy areas.

  Solar photovoltaic kits will have a more limited application in view of the low level of consumption generally observed (one single bulb).

  Mini-networks with generator sets will be of interest for groups of villages, businesses and larger villages (> 100 households).

- Advantages and disadvantages of associating different technologies

  Currently available data is not sufficient to evaluate the relevancy of this type of association with any degree of accuracy. Modular association of smaller simple wind systems (70 to 90 W) and solar systems (50 W) appear justified for some small villages in the area.

  The interest of associating diesel and wind generation cannot be taken for granted. It will be possible to justify the higher cost of wind power generation only after the demand for service and the wind resource have been evaluated, to consider subsequent introduction. The lack of reliable diesel fuel deliveries in enclosed areas is in any event an obstacle to be taken into consideration.

1.2.3 TECHNICAL SYSTEMS ASSESSMENT

- Actual electrification rate:

  The actual electrification rate is currently 50 percent (over 50 percent in 12 of the 16 villages) and will reach 75 percent with the requests received.

- Cost/Quality of services provided:

  Too early to determine. The cost/quality ratio seems good and accepted by the population at this time, but it reaches a limit which should not be exceeded.

  The current charge regulation arrangement (2 series-connected batteries in 4

parallel sets) does not make it possible to check the quality of charge of each battery. A cascade arrangement would be more advisable.

The discharge regulation is not set at the correct threshold and does not protect the batteries (recommended threshold > 11.5 volts).

DC/DC converters for radios (justifying the purchase of the connection) are being introduced.

Use of the service is generally limited (under 800 Wh/household/month in 4 villages analyzed, i.e. an average 2.3 hours/day/household approximately). Over 25 percent of the households are thought to use the service less than 1.5 hours/day.

- Difference between assumed and actual costs

The very rough initial assumption was for 40 individual systems of under 100 W at a unit cost of US$ 1.150 and 15 systems of 1 to 2 kW at an average cost of US$ 19,000 with a few additional pieces of test equipment. Total: US$ 353,000.

The orders concerned 16 villages (of which 1 renovation) for 40 households per village on the average: 25 semi-collective (8 households) systems of 120 W (wind-solar), 13 systems of 1 kW and 1 system of 2.5 kW.

Final equipment was actually for 50 households per village, for a total cost of US$ 437,000.

Other external funding sources (villages: 2.3 percent; decentralized cooperation: 3.8 percent) contributed in part to the funding of equipment in certain villages.

- System reliability

Overall reliability has been good so far. Returns of batteries or bulbs are insignificant. Manufacturing defect on the wind turbine regulator cards (which had previously undergone 3 years' testing successfully) being fixed. New regulators to be produced (see above).

Price is justified for the quality except for the bulbs (33 to 50 percent too expensive).

Probable life of equipment meets the objectives provided the battery discharge regulation is corrected.

1.2.4 PRICING ASSESSMENT

- Appropriateness of pricing adopted:

The pricing structure is relatively simple and understood by the villagers.

However, the consumption fee (battery charge) selected for each price category (fixed) should be reduced to match the actual total energy available; also, specify significant indicator cost for additional consumption.

- Evaluate access cost vs. users' ability to pay

Subscription, a regular, fixed expense, is substituted for a variable expense. It may still be a little high. Excessive threshold effects for passage from one level to the other should be reduced.

The minimum initial contribution (one bulb, 62 percent of the households) is UM 2,000 (FF 67; US$ 13). It could be raised by an advance on service paid for 2 months prior to hook up. It remains reasonable.

The initial contribution is not a problem. However, 20 percent of the households are still without access to the service.

The monthly rates are UM 900/month/household (FF 30; US$ 6). This corresponds more or less to a unit cost of UM 14 (FF 0.45; US$ 0.09) per service hour (lighting), which is fairly high.

The minimum rate for the 62 percent least equipped households (1 "share" or 1 bulb) is UM 400 to 700/month (FF 13 to 23; US$ 2.7 to 4.7).

- Evaluate invoice cost vs. actual cost

Current rates (UM 900/household/month) cover the actual operating costs, including charges for the cooperative structure. Even long term replacement is partly (33 percent) covered.

By comparison, the cost of service with candles is less than UM 10/hour (FF 0.33; US$ 0.07) with a quality of service which cannot be compared. But the equivalent PPER service at a price of UM 5.5 (FF 0.18; US$ 0.04) lower in cost, although with an initial contribution three times as high for greater quantities of energy consumed.

Compared to other similar programmes (PRS, PPER), the State contribution does remain lower.

1.2.4 LOCAL MANAGEMENT

- Efficiency of local management and collection

Uneven but overall effective, regular support is still necessary.

- Outstanding payments

  None at the end of September. Service was cut off to two villages then reconnected after they paid their arrears (1.5 months) and the penalty (UM 5,000; FF 167; US$ 33).

- Accounting management

  Overall good and even very good quality; varies according to the managers; a continuous training programme should be organized.

- Quality of accounting records

  Good quality, simple while maintaining good information level.

1.2.6 MAINTENANCE AND OPERATION CONTRACTS

- Efficiency of private operators

  Too early to tell. The contract does set forth the duties and obligations of the operators (intervention within 3 days; penalties of UM 3,000/day in case of non compliance). Small teams but growing.

- Cost of maintenance

  Appropriate cost: UM 22,000/year (FF 773; US$ 147) i.e. UM 1,830/month.

1.2.7 PROJECT EXECUTION

- Role of project execution at central level

  Steering committee: should provide oversight and ensure that project objectives are met.
  Coordination committee: should assist the project in decision-making.
  For this first phase, it appears that both committees dealt with the same themes, actually with a degree of redundancy.

  Scientific and Technical Expert Council: its actions do not appear to have contributed to the progress of the project as expected in the initial document.

- Operating costs for this project execution

  Practically none (except for the experimental base with 1.25 executives); only time spent for preparation and drafting of reports. One engineer made available for project management (project unit).

- Assessment of ability to ensure the continuation of the project

  For the continuation of the project, in order to improve efficiency, the project execution team could be limited to the steering committee, conceivably with broader representation.

  Need to strengthen the project management team.

- How necessary is technical assistance?

  Still necessary with gradual decrease during Phase 2.

1.2.8 OPERATIONAL EQUILIBRIUM OF SYSTEMS IN PLACE

- What is the financial equilibrium level of the proposed system?

  The system, at the level of the villages and cooperative structure, is capable of reaching financial equilibrium. Heavy equipment (wind turbines, etc.) replacement is ensured by village participation for up to 30 percent.

- What is its capacity to sustain itself as is?

  The population groups participate directly towards approximately 80 percent of the equipment replacement. In the absence of a capital development fund, long term replacements will need to be envisioned.

1.2.9 SOCIO-ECONOMIC IMPACT

The population groups are genuinely interested; improved living conditions; dynamic local organization; basic financial system is operational.

1.3 PROJECT EFFICIENCY

1.3.1 THE MEANS AND THE BUDGET

- Appropriate means

  Yes. However, the means provided and the project budget did not factor in to a sufficient extent the time and human resources required for the technical and socio-economic Monitoring & Evaluation of all aspects of the service provided. On the other hand, some initial studies and analyses appear disproportionate and likely to fuel discussions between the partners.

- Counterpart budget

  The counterpart budget (in-kind, essentially by providing 2.25 executives and associated logistical support) has been provided.

1.3.2 GREEN HOUSE GAS REDUCTION OBJECTIVE

The near total replacement of petroleum fuels (candles, oil, gas) by a form of energy without impact is confirmed and meets the objective.

1.3.3 IMPLEMENTATION ARRANGEMENTS

- Role of each partner

  Defined in project document and respected.

- Joint Government-NGO implementation

  Good and productive as a result of good coordination between the Energy Directorate and GRET

1.3.4 APPROACH

- The programme was able to develop an approach suited to the rural Mauritanian context. On the basis of village animation, after several information meetings, the project established with the villagers the type of approach adopted at present.

  The mission observed the high level of interest of the population and the quality of the temporary local organization.

- Expert missions

  Numerous and justified mainly by the introduction and local adaptation of a new technology.

- GRET support team

  Methodology support and support for team animation and accounting management.

1.3.5 MECHANISM FOR RURAL ELECTRIFICATION MANAGEMENT

- The tools required for institutionalization are not in place yet but will need to be for Phase 2.

1.3.6 STRENGTHENED NATIONAL IMPLEMENTATION PROCEDURE

- The flexibility of the selected implementation arrangement was a very positive factor as regards the successful achievement of the major objectives. The choice of an NGO to reinforce the implementation made it possible to obtain a willing participation of the local population.

1.3.7 OBSTACLES AND DIFFICULTIES

- The longest delay (4 months) was attributable to the call for bids and bid review process (see Steering Committee report of 25/2/1996).

  As a result of the suspended programming of Phase 2 as initially planned, the project was not able to consolidate the results achieved and to draw the expected lessons gradually after a significant period in operation.

1.3.8 PROJECT REPLICABILITY

- Too early to evaluate.

2 RECOMMENDATIONS FOR CONTINUATION AND EXPANSION OF THE PROJECT

2.1 ADVISABILITY AND LEVEL OF EXPANSION

2.1.1 ADVISABILITY OF EXPANSION (see §§ 2 and 4 of the aide-mémoire)

- In view of the results achieved to date and the analysis of the situation performed by the mission, it is recommended to proceed with an initially moderate expansion (Phase 2a) followed by more sustained activities (Phase 2b).

  However, a reinforced Monitoring & Evaluation exercise is required at the end of the current Phase 1.

2.1.2 LEVEL OF EXPANSION

- In order to secure a balance of the structures being currently established, it is proposed that 6.750 households (approximately 100 to 135 villages) be equipped.

2.2 PROPOSED OPTIONS

2.2.1 SELECTION OF AREAS

- It is recommended that the effort during Phase 2a and the early stages of Phase 2b remain focussed on the Trarza region in order to reach a critical mass to balance the local organization and maintenance costs.

- The current teams (project, suppliers, etc.) are very sparsely staffed and can only gradually be reinforced, then duplicated.

- However, a few pilot sites could be tested in other areas to determine local feasibility and to prepare for an expansion in these new areas at the end of Phase 2b (50 villages).

2.2.2 EQUIPMENT LEVEL

- The level of equipment in demand appears to be generally 1 or 2 light bulbs per household, i.e. 27 Wh/day/household or less than 2000 Wh for a village with 50 households.

2.2.3 TECHNOLOGY CHOICES

See 1.2.2

2.3 FINANCIAL EQUILIBRIUM AND ARRANGEMENTS

2.3.1 CONTRIBUTIONS

- On investment (UM 489 million; US$ 3.3 million; FF 16.3 million)
  Villages: 8.7 percent; State: 25 percent; Donors: 66.3 percent

- On total project, except technical assistance (UM 646 million; US$ 4.3 million; FF 21.5 million)
  Villages: 6.4 percent; State: 22.9 percent; Donors: 70.6 percent
  Technical assistance (UM 108 million; US$ 0.7 million; FF 3.6 million) is funded by donors.

- Public inputs

  The concept of a rural electrification fund was favorably received. Its provisioning by way of budget appropriation initially, then by allocation of a share (10 percent?) of the Development Support Fund of the energy sector (tax on sale of petroleum products, UM 300 million per year) seems feasible.

- Private inputs

  There are already being provided by way of the absorption of initial costs by the households. This type of contribution is current practice for some urban households of village origin, which helps in making this initial participation acceptable. However, when this contribution is made by a limited number of individuals (elder, ...) it does not always solve the problem of recurring costs.

2.3.2 LENDING MECHANISM

- The introduction of a lending mechanism is premature. It could be considered for the replacement of some types of equipment insofar as the union of cooperatives practiced good management. It should be noted however that, so far, rural banks do not show any interest in rural communities.

2.3.3 PRICING STRUCTURE

- See § 1.2.4

2.4 INSTITUTIONAL ARRANGEMENTS

2.4.1 ROLE OF PRIVATE OPERATORS

- The example provided by PRS shows that for private operators to become interested in operating the systems the operation margin must be relatively high: UM 15,000 to 25,000 per month on average for the statutory company, plus UM 6,000 per month to the manager and on average UM 2,000 per month to the installer, for a total of at least UM 30,000 per month (US 200; FF 1,000).

  Where electric power is concerned, the quality of service is more difficult to control and the small economic size of each village system requires the establishment of a local and regional organization which is too complex to involve the maintenance company at the present stage and pays too little to involve another private entity.

  This type of organization does not allow for as strong an involvement of the local population to make the service sustainable and to ensure its necessary local regulation.

2.4.2. INTERACTION BETWEEN NATIONAL AND LOCAL LEVELS

- See § 5 of the Aide-mémoire

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DECENTRALIZED WIND ELECTRIC POWER FOR SOCIAL AND ECONOMIC DEVELOPMENT

(ALIZÉS-ÉLECTRIQUE PROJECT)

MAU/93/G32/A/1G/99

EVALUATION REPORT
ANNEX TABLES

PRELIMINARY DRAFT No.3

Vincent BUTIN
Gilles GOLDSTEIN

November 1996

Annex 2

PHASE 1B BUDGET

Rates of exchange used: US$ 1 = UM 150 FF 1 = UM 30 US$ 1 = FF 5	Phase 1B		
	Amount in UM '000	Amount in US$ '000	Amount in FF '000
Project unit operations	9,300	62	310
Technical director	975	7	33
Animators	600	4	20
Administrative team	675	5	23
Training	750	5	25
Operations	5,250	35	175
Technical experimentation	1,050	7	35
Technical assistance	13,484	90	449
GRET Advisor	10,800	72	380
Junior expert	2,100	14	70
External expertise	300	2	10
Miscellaneous and contingencies	284	2	9
TOTAL	**22,764**	**152**	**759**
Support mission for monitoring/evaluation*	2,400	16	80

* Budget for 3 short-term missions to be mobilized as needed.

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