

Project Proposal (PDF Block B)

Identifiers

Country	Namibia
Full Title:	Barrier Removal to the Development of Commercially, Institutionally and Technically Sustainable Solar Energy Services in Namibia
Acc/Undp Sector And Sub-Sector:	Energy/Environment
Duration:	4 months
Requesting Agency:	UNDP
Executing Agency:	The Ministry of Mines and Energy (MME)
GEF Theme:	Climate Change
Estimated Starting Date:	July 1999
Block A Grant Awarded:	none

Cost and Funding:

GEF	- Project	:		
	- PDF	:	\$	103 000
	- Subtotal GEF	:	\$	<u>103 000</u>

Co-Funding:

	- Government	:	\$	20, 000
	-Subtotal Government	:	\$	20, 000

Total Project Cost			\$	123,000
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Brief Description:

This PDF Block B is designed to identify, evaluate and prioritize the barriers preventing the development of commercially, institutionally and technically sustainable solar energy services in Namibia. In particular, the PDF Block B will evaluate the potential for electricity production (for off-grid lighting, water pumping and refrigeration systems) and water heating through solar energy, the barriers that exist to the development of that potential, and meaningful avenues which can be identified to remove the identified barriers. It is anticipated that the final full-size project to be prepared with this PDF Block B will focus on the removal of the barriers to widespread use of solar energy in Namibia. Thereby transforming the market in favour of a level playing field for the implementation of not only solar energy technologies, but other renewable energy and end-use energy efficiency as well. With the prevalent solar regime, a (draft) energy policy that supports renewable energy and energy efficiency, a firm expressed interest of private sector, the utility and national development organisations/banks, the conditions exist for a successful GEF intervention.

1. Background

Namibia has a strong commercial energy sector. Industry, commerce and population centres are adequately supplied with reliable and affordable commercial energy. However, the majority of Namibia's population lives in rural areas in relative poverty and has yet to fully experience the convenience and utility of modern energy services. Most do not have access to electricity and in many areas population pressures have impacted on sustainable usage of fuelwood resources.

Liquid fuels dominate the Namibian equation in terms of quantity of net commercial energy consumed. They account for 63% of total net energy consumption. Installed electricity capacity (including import from South Africa) amounts to 584 MW. Coal is used by the Van Eck power station amounting to about 12,000 tonnes per annum and biomass is the main fuel of households in the North where most of the population resides.

Of the 254,389 households recorded in the 1991 census, 71% were categorized rural. The census indicates that the majority of rural households (93%) are depending on fuelwood for cooking and that only a small percentage has access to electricity. Paraffin is used to a very limited extent for cooking in urban and rural areas, but is used by nearly half the rural households as their main lighting fuel. The other main light source being candles. Candles supply most non-electrified urban households with light. More than half of urban households do not heat their homes. Of those that do, about 72% use electricity and 24% fuelwood. Most rural households heat their homes with just about all of them using fuelwood as the main fuel. Rough estimates indicate that some 16% of Namibian households have access to electricity.

The electricity sector

Generation and transmission of electricity, including imports and exports, is carried out by the state-owned utility, Nampower, which also supplies bulk energy to local distribution authorities, mines, larger industries and commercial farmers. Smaller consumers and households are supplied by 46 local distribution agencies. The Ministry of Mines and Energy is responsible for policy and regulation of the sector. In general prices are low by international standards, with the costs of supplying electricity to rural areas exceeding the tariffs paid by rural customers. Urban and industrial users have ample reliable supplies and Nampower and the major local distribution agencies are in good financial shape.

The ongoing rural electrification programme has significantly extended the electricity supply to rural areas. However, only a small number of households have actually connected and in general low rural cash income is a main obstacle for rural households in using electricity. For the foreseeable future, supplies of fuelwood, paraffin and candles will be the most important issues related to rural energy provisions.

Future energy supply and demand

Namibia has a high population growth rate of 3.2% per annum. This has three main implications for the energy sector.

Firstly, not only does the backlog in energy services for households need to be corrected but also additional services need to be provided for new households, both in urban and rural areas. Secondly, the Namibian economy needs to grow and energy services will need to

expand to facilitate this growth. The third important consideration relates to the impact of energy on the environment, both in its production and use. Namibia still has a relatively unspoiled natural environment. However, much of Namibia's current energy consumption involves non-renewable hydro-carbon fuels. There is a finite quantity of this resource and burning of these fuels pollutes the environment and can have negative health impacts. Also hydropower generation can involve damage to natural habitats and disruption of human communities.

After a dip in growth in 1992, total energy consumption has grown strongly in past years. Demand for both major commercial fuels, namely electricity and petroleum fuels increased by more than 20% in 1995. Foreign exchange demand to fund petroleum imports is expected to continue to grow rapidly and contributions from petroleum product duties and levies make up more than 10% of fiscal revenues.

While Namibia has yet to experience a commercial oil discovery and does not have economically exploitable coal reserves it is well endowed with largely undeveloped energy resources in terms of hydro-power (Epupa Falls- 250-500 MW; Kunene-65-240 MW; Popa Falls-15 MW) and natural gas (Kudu gas field). These are well in excess of Namibia's own requirements and may offer significant opportunities for export industries.

Renewable energy

Namibia has some 3,300 hours of sunshine per year, one of the highest figures in the world. This makes the use of photo-voltaic (PV) systems for remote telecommunications, government installations such as schools and clinics, home supplies and water pumping economically feasible in many cases. However, despite the quality of the solar resource, solar home systems (SHSs) are not yet widespread even though most homes are not connected to the electricity grid. The high initial capital outlay in combination with low-incomes and the lack of access to credit are significant barriers. It appears that the local SHS supply industry is competent in terms of ability to supply and install systems. However, standards and on-going maintenance have been identified as another significant barrier to widespread adoption of SHSs.

On the other hand the Government has followed an active policy in terms of use of PV. To date, the main user of PV systems has been the Department of Posts and Telegraphs. An indication of the quality of the solar resource is that the department estimates that savings on diesel costs allow it to amortize the costs of a typical PV energy system within 14-26 months. The Ministry of Wildlife, Conservation and Tourism makes use of PV for pumping, and a number of PV systems for lighting, pumping and vaccine refrigeration have been installed at schools, clinics and other government facilities.

Although also solar water heating could be economically attractive, the relatively low levels of Namibian electricity tariffs combined with relatively high prices of SWHs and an under-developed SWH industry has led to a situation where SWHs are little used.

Experience in other countries has shown that active policies combined with technology/business demonstrations need to be pursued to stimulate the SWH development.

Wind power is the main source of energy for water pumping in the commercial farming sector where about 30,000 wind pumps are estimated to be in operation. Wind speeds in

Namibia are generally below levels currently required to make wind economically attractive for electricity generation. Nevertheless, the municipalities of Luderitz and Walvis Bay are exploring the feasibility for some 30 MW of installed capacity.

Energy and environment policy

Namibia has progressive provisions in its constitution to protect the natural environment. The Cabinet has approved a policy on Environmental Impact Assessments. Although the capacity of local lobbyists is relatively weak, international input is encouraged by the Department of Environment and Tourism (i.e. the GEF Climate Change Focal Point) and in general major energy projects such as electricity generation and natural gas exploitation are receiving comprehensive environmental assessments in their evaluation. The most important energy related environmental problem identified by the Department at present is desertification, although the cause has not been conclusively linked to woodfuel collection. The Department also believes that incentives for energy efficiency and renewables need to be strengthened for their proper economic contribution and their positive impact on the preservation of the environment.

2. The SADC-FINESSE Programme

FINESSE (Financing Energy Services for Small-Scale Energy Users) is a concept that was initiated in 1989 with the objective of identifying and promoting ways to provide technically feasible and economically viable renewable energy and energy efficiency services to residential, commercial, and industrial energy users. The FINESSE proposal resulted from the recognition that traditional energy sector lending by multi-lateral and bi-lateral institutions is biased towards large-scale, supply-oriented fossil and hydro-based projects. FINESSE-supported activities are designed to create the conditions and mechanisms for the credit sector to on-lend to small-scale energy users. For Namibia the SADC-FINESSE team has carried out a country market assessment, short-listed commercially interesting projects and prepared business plans (feasibility studies) for 4 projects. These have been presented at National FINESSE Workshops for review by the various stakeholders, beneficiaries and other actors involved (Energy Departments, private sector, financial institutions, donor community, academia and NGO's). These business plans have been revised as a result of these workshops ensuring that national development priorities, lending criteria and environmental criteria were met before presentation for follow-up investments by development financing institutions.

The proposed GEF activities will build on the outcome of the SADC FINESSE activities in Namibia and it will collaborate closely with the implementation of the business plans in case investments will successfully be found and allocated, which to date has not (yet) been the case.

3. Objectives

Overall objective

To identify, evaluate and prioritise the barriers preventing the widespread adoption of commercially, institutionally and technically sustainable solar energy service systems in Namibia and design activities for their removal.

Specific objective

In particular, the PDF Block B will evaluate the potential for off-grid electricity production (and associated lighting, refrigeration and water pumping services), desalination of brackish water from bore holes by means of solar stills technologies and water heating through solar energy, the barriers that exist to the development of that potential, and meaningful avenues which can be identified to reduce/remove the identified barriers.

4. Solar energy focus areas

The GEF assistance will focus on the following 5 areas:

1. Photovoltaic pumping of water for irrigation, livestock and human consumption;
2. Solar electricity for income generating activities (rural 'cuca' shops, refrigeration, battery charging);
3. Solar home systems for rural (medium/high income) households;
4. Solar water heaters for urban and peri-urban areas; and
5. Solar stills to desalinate brackish water.

5. Barriers to the widespread adoption of solar energy resources

A number of barriers to the widespread utilization of commercially, institutionally and technically sustainable development of solar energy resources in Namibia have been identified. Barriers relate to both the supply-side of RE/EE technologies as well as the demand-side (end-users being provided with a RE/EE energy service) These include, but might not be limited to:

Financial barriers

- No dedicated regional/local financing for RE/EE activities exists with commercial banks and/or development banks (with the exception of a solar home system pilot project);
- In the absence of dedicated financial mechanisms, the high up-front costs of RE/EE technologies prevent large potential end-user groups to purchase such technologies that on the longer-term might very well be cheaper than alternative options providing similar energy services;
- The capacity in financial institutions and the power utilities to appraise RE/EE proposals where this does not exist;
- Unbalanced subsidies favor extension of the national electricity grid;
- Low electricity tariffs not reflecting the full cost of supply, transmission, distribution and externalities;
- Mechanisms do not exist to underwrite the foreign exchange risks in case international capital is required do not exist;
- Mechanisms do not exist to underwrite demand side loans (with the exception of the successful example of the MME facility employed by the NDC), such as guarantee funds, acceptance of the RE technology as a collateral or a combination of the two;
- Limited knowledge exists on the affordability of the technologies and the sensitivity of the market to variable up-front deposit rates;
- Import duties on RE/EE technologies (such as CFLs) do not favor their uptake; and
- Down payments insisted on by the NDC slows uptake of the SHSs.

Institutional barriers

- Limited coordination on RE/EE activities between various government agencies, research and academic institutions, NGO's, financial institutions and the private sector;
- No techno-economic research institution exists in Namibia;
- Although a national energy policy, including favourable attention for RE/EE technologies, is currently under preparation, policy changes with the entities involved with implementation; e.g. power utilities, financial institutions, NGO's and private sector are still lacking;
- Limited regional spatial distribution of technical/supplier and financial institutions limit Namibian's access to the RE/EE technologies;
- Policy does not yet recognise the externality or long run marginal costs in the pricing of non-renewable energy sources; and hence the delay of required policy changes in favour of RE/EE development; and
- The electricity regulatory framework is not in favour of the development of RE/EE technologies on a larger scale.

Technical barriers

- Norms and standards in terms of RE/EE performance, manufacture, installation and maintenance are weak and/or non-existing;
- Heavy reliance on the importation of RE/EE technologies due to the limited local manufacturing capacity and infrastructure;
- Small and dispersed size of the Namibian market for RE/EE technologies does not facilitate benefits such as economies of scale;
- Support for local manufacturers of RE/EE technologies is lacking;
- Conclusive data comparing energy technologies for equivalent services has not been developed (for example, with water heating and pumping technologies) is lacking;
- Limited availability of adequately trained person power at all levels in the public sector (MME), financial sector, academia, NGO'S and private sector; and
- Bulk procurement of RE/EE technologies is limited due to the current small market for RE/EE services. Hence the (technical) infrastructure to support RE/EE development has not yet been built up yet.

Communication , Education and Training Barriers

- Limited access to necessary information and dissemination of existing information;
- Limited knowledge on RE/EE markets, including energy needs and the ability to pay for RE/EE services of target groups;
- Lack of public awareness on RE/EE technologies, including the fact that life cycle costs of RE/EE technologies are often lowest cost options;
- Insufficient consideration of RE/EE technologies in primary and secondary education;
- No empirical knowledge of the costs and benefits of the range of technologies available for water heating; water pumping etc.;
- Limited availability of adequately trained person power at all levels in the public sector (MME), financial sector, academia, NGO's and private sector;
- Lack of the capacity for RE/EE project development thereby encapsulating the private sector, financial institutions and end-user groups' criteria for successful involvement in the RE/EE development; and
- Theft of PV systems hinders penetration of the technology

6. Brief description of the PDF Block B activities and budget

The PDF Block B activities will carefully evaluate these barriers, design activities that support removal of these barriers and develop a full-size project with the main objective of undertaking activities to remove these barriers. Possible other barriers will be identified during the PDF Block B phase and added to the ones indicated above. Furthermore the indicators for monitoring and evaluating the GEF intervention will be determined as well as the monitoring and evaluation methodology that will be used during the implementation of the full-size project.

The total budget for this PDF Block B is US\$103,000 and are presented here in four categories, where travel and other logistical costs are included. All costs are indicated in US Dollars.

PDF Block B activities	MME (in-kind)	GEF
1. Evaluation of solar energy markets and barriers to its development	5,000	20,000
2. Design of activities for removal of the identified barriers, including the prioritisation, costing, time schedule and implementation arrangements	5,000	35,000
3. Development of indicators/methodology for monitoring and evaluation	-	10,000
4. National Workshops to initiate and review the proposed programme	10,000	25,000
5. Preparation of a project brief and project document	-	10,000
Subtotal		100,000
Executing Agency Support Costs (3%)		3,000
TOTAL	20,000	103,000

7. Outputs

The outputs of this activity are fourfold, namely:

1. UNDP/GEF Project Brief for a full-size project;
2. UNDP/GEF Draft Project Document for a full-size project;
3. Indicators and a methodology for monitoring and evaluation of the GEF intervention; and
4. Workshop/s to initiate, review and revise the (draft) project brief.

8. Expected date of PDF Block B completion

The duration for the implementation of this project is four months.

9. Justification and eligibility

The Government of Namibia ratified the United Nations Framework Convention on Climate Change (UNFCCC) 16 May, 1999. The proposed project is consistent with the GEF Climate Change Operational Programme 6 'Promoting the adoption of renewable energy by removing barriers and reducing implementation costs'. Furthermore, with the prevalent solar regime, a (draft) energy policy that supports renewable energy and energy efficiency, a firm expressed interest of private sector, the utility and national development organisations/banks the conditions exist for a successful GEF intervention.

10. Parallel activities

Solar Home Systems Revolving Fund Programme

This project, initiated by the Namibian Ministry of Mines and Energy (MME) has entered a second phase after a successful pilot phase in which 95 solar home systems (SHS) were installed in off-grid rural and peri-urban Namibia. A total of 250 SHS were installed so far. The project is administered by the Namibian Development Corporation (NDC) and initially relied on grants by the MME and Renewable Energy for African Development (REFAD) which were put on deposit in a bank. The REFAD part of the deposit was used as a guarantee against default. The guarantee funds have not yet been touched as there has been collectively more than 100% repayment of the loans.

The success of the project has led to the development of a second phase in which NORAD and MME have together contributed a further N\$2.2 million until the end of the 1998 financial year. The second phase, which began with a marketing campaign, has offered SHS an average price of N\$6,000. The middle of the range system includes PV cells, battery, battery box, regulator, a solar gauge four 9W fluorescent lamps and a 12V jack for the connection of a radio or TV (neither of which are part of the SHS). The aim of the 1998 financial year. Successful applicants for the financing of systems are required to make a 20% down payment and pay the loan off over a 5 year period. In addition to sales of SHS a network of certificated solar technicians have been trained. Throughout Namibia a choice of three systems and gas cooking apparatus available (supplied through Afrox) have been offered. The second phase had seen a slow uptake, which has been attributed to the size of the down payment.

The project can co-finance GEF activities by providing an affirming demonstration project, training solar technicians, conducting mass media education programmes, all of which complements the full scale project.

Technology Transfer Office (TTO)

Currently a proposal for a Technology Transfer Office (TTO) on RE technologies is being discussed with the Ministry of Mines and Energy. The main components such as the TTO will most likely get involved in are intended to remove a number of technology transfer barriers that are also recognised as barriers in the GEF context:

- a) development of test procedures for performance tests of RE system's components;
- b) set-up of national standards (adopting international standards) for these components;

- c) elaboration of product reports, including economic analysis and performance records, to promote the best quality/price products;
- d) development of syllabi in RE and EE for various levels of education and training;
- e) design of training programmes for teachers, lecturers in collaboration with institutions involved.

The first rough draft of the proposal entitled 'Strengthening of the Multidisciplinary Research Centre (University of Namibia) in the field of technologies for energy, water, agriculture and manufacturing' dates back to November 1997. Total budget for this 3-year programme is estimated to be in the range of US\$2 to 2.5 million, for which financial resources are currently being sought.



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for Mr Adei

SUPPORT FOR GEF MEDIUM SIZED PROJECT – IMPROVEMENT OF RURAL WATER SUPPLY BY PHOTOVOLTAIC PUMPS

A proposal has been received from the Ministry of Mines and Energy for a project entitled "Improvement of Rural Water Supply by PV Pumps".

The Ministry of Environment and Tourism, as the GEF focal point in Namibia, hereby supports the proposal and trusts that it will be favorably received by the GEF.

Yours sincerely,

Director
Focal Point

Date received 1999-02-19			
File No. 2-013011 Water			
	Action	Info	Initial
RR		✓	AT
DRR			3
SR. ECON			
UNFPA			
ARR(P)		✓	
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Discuss