

OFFICE MEMORANDUM

DATE: September 30, 1997

TO: Mr. Al Duda, Operations, GEF Secretariat

FROM: Robin Broadfield, Acting Chief, ENVGC 

EXTENSION: 3-4188

SUBJECT: **CAPE VERDE - Energy Water and Sanitation Renewable Energy Component
PDF Block B Request**

Please find attached one PDF Block B request mentioned above. We would appreciate receiving any comments by **Tuesday, October 14, 1997.**

Distribution:

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PROPOSAL FOR PDF BLOCK B GRANT

Country:	Republic of Cape Verde	
Project:	Energy Water and Sanitation Renewable Energy Component	
Requesting Agency	World Bank	
Block	B	
Amount of PDF Funding Requested	\$230,000	
Component Costs (Privatization and Renewables)	About	US \$29 million
Financing Plan:	IBRD	US \$2 million
	IDA	US \$1 million
	GEF	US \$7 million
	Government	US \$1 million
	Other donors	US \$5 million
	Private Sector	US \$14 million
Focal Area:	Climate Change	
Recipient:	Republic of Cape Verde	
Convention Ratification:	March 29, 1995	
Appraisal:	January 1998	

1. **Block A Grant**

No Block A Grant awarded

2. **Sector Background**

The Government of Cape Verde's Fourth National Plan for 1997-2001 (NDP) has, at its center, policies aimed at achieving sustainable economic growth and social development and at reducing poverty. The strategy to reach these objectives centers on the efficient use of resources and building public-private partnerships. To this end, the NDP emphasizes the need to improve the country's institutional framework, make optimum use of available resources, increase productivity and improve infrastructure. Given the scarcity of public funds for infrastructure development, the NDP places special importance on the need to develop energy, water and sanitation systems with substantial private sector participation. The Government has taken the decision to privatize a number of public enterprises, including Electra, the supplier of electricity and water.

A priority for the Government is to ensure that development of the electricity sector makes best use of resources and does so with minimal environmental impact. A previous IDA credit for a technical assistance project included, as a component, the promotion of indigenous resources of energy. The Government is now concerned with ensuring that reform does not clash with its objectives of ensuring continued growth in the availability of electricity both on- and off-grid. Cape Verde faces physical, technical and

institutional constraints in promoting the development of electricity supply. At the macro level, power development is constrained by the dependence on imported fuel.

The ten islands which constitute the Republic of Cape Verde rely heavily on imported fuel for their electricity needs and for desalinating water. Electra is responsible for providing electricity in the most populous areas of the three islands of Santiago, Sao Vicente and Sal and it also has a long term electricity concession on Boa Vista. At the micro level the state-owned utility, Electra, faces shortages of capital and other financing difficulties. Electra has made losses in every year since its formation in 1982 and there has been no increase in the power tariff since 1985.

Electra also has responsibility for water supply on Santiago, Sao Vicente Sal and Boa Vista and produces a substantial proportion by desalination, as does SEMAP, the municipal producer for Praia. Desalination is energy intensive, using both heat and electricity, which supplies the logic for Electra having responsibility for both services. Most of Electra's power and desalination plant is co-located to optimize energy use. Sanitation services are the responsibility of the municipalities and are limited in scope.

The three main grids are largely diesel-based and are currently experiencing load growth of 8-15% annually. The factors driving this high rate of growth are increasing coverage of the grid, a growing number of customers, especially as the rural population migrates to the cities, and raised levels of individual demand as more appliances are connected. Development strategies for each of the grids are based on expansion plans which call for the ability to meet the expected peak demand plus a reserve margin of 30%. Given the size of the systems, these normally call for capacity additions using diesel sets in the 1-3MW range. Owing to delays in implementation of new plant, the Praia grid faces capacity constraints, while the Sal grid is due for further expansion soon.

A project jointly sponsored by the Danish Aid Agency (DANIDA) and the Government resulted in the building of wind farms in the 600-1000kW range which are now connected to the Praia, Mindelo and Sal grids. Other wind installations exist but are largely out of service, with the exception of a 300kW wind farm on Mindelo which has recently been refurbished by the original donor, KfW. Wind farms contributed up to 14% of the energy supplied to the grids in 1996. These developments have brought a realization of the technical potential for wind to act as a fuel saver and, with the institutional learning that the wind farms created, have resulted in renewed interest in the potential for wind. A study, jointly managed by DANIDA and Electra identified the potential for additional wind farms on the three main grids in the 0.9-1.8MW range. The current expansion plan for Electra anticipates their entering service in 2000-2002. More recent work, undertaken as part of project preparation, suggests that the wind farms could be larger and enter service sooner.

Those parts of Santiago, Sao Vicente, Sal and Boa Vista not served by Electra and the other islands are connected to small grids averaging around 200kW which are operated by municipalities. Water is also supplied by municipalities though more usually

sourced from ground water than from desalination. Some consolidation of the municipal electricity networks on to those operated by Electra has taken place to take advantage of economies of scale in operation. This has yet to be formalized into a strategy.

In 1996, about 43% of all households were electrified, leaving some 30,000 households unelectrified, of which more than 90% are in the rural areas on the three islands of Santiago, Santo Antao and Fogo. It is expected that over the long term about 19,000 households will be connected to a grid, whether run by Electra or a municipality. The time frame for this is uncertain and no firm plan or financing is in place. The remaining 11,000 households will not be connected even over the long term. Government policy is to facilitate the provision of electricity at least cost to those households not yet served and, in keeping with the overall framework of the NDP, seeks to use public-private partnerships. It is clear that there is an opportunity for the private sector but one which has not yet been exploited to any significant degree.

Government options for greenhouse gas (GHG) mitigation are limited. They lie primarily in the transport, power and water sectors. The transport sector is not large and a significant proportion of the transport stock is in private hands. There may be scope for increasing fuel efficiency in that sector but it is likely to be effort intensive. The power sector, and thus the water sector, offers more significant opportunities for GHG mitigation. As it is technically well run, supply-side fuel efficiency is comparatively good and with privatization, there will be an increased incentive and scope for fuel efficiency. Demand-side efficiency may offer some potential. Nevertheless, the most significant opportunity is the direct substitution of non-carbon emitting options for the use of fossil fuel.

3. **Summary of Project Objectives and Description**

Project Objectives: The objectives of the project are (i) to develop the energy, water and sanitation systems; and (ii) promote private sector participation in the provision of those services. The renewable energy component is consistent with those objectives and aims to promote the use of renewables in the national energy balance by removing barriers and reducing implementation costs.

Project Description: The project will have five components: (i) restructuring of the electricity sector and privatization of Electra; (ii) renewable energy development; (iii) Support to municipalities for water supply development; (iv) support to develop an urban sanitation strategy; and (v) consultancy and TA in the development of a regulatory framework and a multisectoral water resource strategy. The component concerning the restructuring and privatization of Electra would have a direct bearing on the renewable energy component since it would promote private participation in the electricity sector as a whole. The challenge is to ensure that incentives are in place to ensure that indigenous resources, particularly wind and solar, are used to their economically optimal extent over the long run. Further deployments of renewables for both on-grid and off-grid applications face substantial barriers and are tied into the restructuring and reform of the

electricity sector. The preparation of the restructuring and renewables components are closely linked and necessarily span them both.

The component dealing with the restructuring of the electricity sector would focus on the privatization of Electra as a single, vertically-integrated company with responsibility for electricity and water. The present scale of operations would be retained and possibly added to by the incorporation of further municipalities' assets. The Bank's main role would be to assist with the privatization through technical assistance (TA) and some investment. It would also include investment in the municipal power systems and may include other TA components.

The renewable energy component would consist of two sub-components: development of grid-connected wind farms and provision of off-grid energy services.

(a) Development of Grid-Connected Wind Farms. This sub-component would assist further development of the wind resource by the private sector. The wind farms would be in the range of 1-3MW on each island and would have the potential to contribute a high proportion of the total energy supplied to the grid. They would not replace or avoid existing diesel capacity but act as fuel savers. This subcomponent would include TA to support the transition from public to private operation of the existing wind farms, ensure continuity in project development and put in place incentives for the privatized Electra to develop the wind resource;

(b) Provision of Off-Grid Energy Services. This sub-component would stimulate the entry of private sector firms, NGOs and cooperatives into the market to meet currently-suppressed demand for off-grid solar and wind electrification (i) at the individual household level; and (ii) for public services such as lighting for schools and dispensaries and pumping. This subcomponent would include TA to support a national project coordinating body.

4. Eligibility

Cape Verde ratified the Framework Convention on Climate Change on March 29, 1995. Under a UNDP-sponsored activity, the Government is preparing First National Communication in Response to Its Communication to the UNFCCC.

5. National Level Support

The proposed project is endorsed by the Ministry of Economic Coordination and by the GEF Focal Point in the Ministry of Agriculture, Nutrition and the Environment. See Annex 1 (Endorsement from the Government of Cape Verde for Global Environmental Facility Block B support to prepare the proposed Energy, Water and Sanitation Project). The project has the strong commitment of Electra in relation to the grid-connected wind farms. The sub-component relating to the provision of off grid

energy services has the support of the government, the National Institute of Energy (INERG) and those municipalities with which the topic was discussed.

6. **Justification for GEF Funding of the Project and the Preparatory Work**

The renewables component of the project are both fully consistent with GEF Operational Program #6 (promoting the adoption of renewable energy by removing barriers and reducing implementation costs). GEF support will be required for the sub-components to overcome the barriers to their commercial viability.

(a) **Development of Grid-Connected Wind Farms.** Since the wind farms will operate as fuel savers the baseline project is to continue to provide power from the current generation mix (85-90% diesel). Early indications are that additional wind capacity operating in this role is not economic owing to:

(i) The small size of the wind farms resulting in high transaction costs and the shortage of necessary institutional and technical ability to operate them commercially, which are problems specific to Cape Verde;

(ii) The lack of experience worldwide and concerns over system stability and reliability will tend to result in the windfarms being sized conservatively so that the proportion of energy supplied from wind does not exceed some arbitrarily-set maximum. Maximizing wind farm size is economically attractive but technically risky. This project offers a unique opportunity to provide global learning effects on the levels of wind penetration that are acceptable on systems;

(b) **Provision of Off-Grid Energy Services.** The baseline project for those households and public amenities that will not be reached by the grid is the provision of electricity supply at their own cost using sources which are currently available. For the better-off, this would be by diesel or gasoline generators in the 1-5kW range. For the less well off it is likely to be continued reliance on dry cells, automotive batteries and substitution of other fuels for electricity. Neither the public sector nor households have access to SHS or WHS since there is an almost complete absence of any kind of delivery mechanism. Further study is required to define better the optimum way to tackle this barrier and to understand the other barriers. It is expected that these will include a lack of suitable financing and the high first cost of systems.

The PDF work would be designed to understand better the barriers and the most cost-effective way to overcome them. The subsequent GEF cofinancing of the proposed project will thus be able to create the climate in which to make both grid connected wind farms and the provision of off-grid energy services commercially viable. The PDF work

would be complemented by preparation for the privatization of Electra, for example in developing financial, commercial and technical management systems and structures.

7. **Description of PDF Activities by Sub-Component**

(a) **Development of Grid-Connected Wind Farms.** Because the baseline project is, in effect, to do nothing, expenditures relating to preparation for the proposed investment in the wind farms are specific to the GEF alternative. The incremental costs of preparation originate in the activities listed below:

GEF funded activities:

- Preparation of outline design for the wind farms and directly related investments such as data collection systems;
- Technical assistance and support to Electra for the specialized aspects of preparing, issuing and evaluating bids for wind projects;
- Technical assistance and support to Electra to deal with the specialized legal and regulatory aspects of wind projects;
- Development of operating strategies to maximise wind contribution.
- Preparation of estimates of global warming impacts and GEF incremental costs.

Co-funded activities:

- Prefeasibility study for wind farms;
- Preparation of strategy for privatization to include wind as a major contributor in the planned generation mix, including legal, regulatory and technical packages governing Electra and future private operators;
- Technical assistance on Electra's forward investment plan;
- Preparation of calls for proposals for Electra;

(b) **Provision of Off-Grid Energy Services.**

GEF funded activities:

- Preparation of project sub-component;
- Development of the institutional framework for the project;
- Preparation of estimates of global warming impacts and GEF incremental costs.

Co-funded activities:

- Assessment of the demand for rural electrification services and initial project development (including donor coordination);
- Detailed energy planning for off-grid service provision;

- Training and capacity building in rural energy issues for implementing bodies;

8. **Items to be Financed by the PDF**

(a) **Development of Grid-Connected Wind Farms.** Funding of \$140,000 is requested for this sub component. It will be used to finance international and local consultants for those activities related directly to the development of the proposed wind farms;

(b) **Provision of Off-Grid Energy Services.** Funding of \$70,000 is requested for this subcomponent. It will be used to finance international and local consultants to assist in preparing the project and developing the framework for implementing it;

(c) **Estimates of Global Warming Impacts and GEF Incremental Costs.** Funding of \$20,000 is requested for international consultants to estimate the expected global warming impacts as well as the incremental cost associated with the two subcomponents. Consultants will also be responsible for initial drafts of these sections of the Project documentation.

9. **Cost Table: Project Preparation Financing Requirements**

Item	GEF PDF	Government (PPF)	Other Co-Funders	Total
Grid Connected Wind Farms				
Outline design	42,000			42,000
Bidding	67,000			67,000
Legal & regulatory	17,500			17,500
Operating strategies	13,500			13,500
Prefeasibility study			250,000	250,000
Privatization strategy		100,000		100,000
Forward investment plan		25,000		25,000
Calls for proposals for Electra		30,000		30,000
Total: Grid Connected Windfarms	140,000	155,000	250,000	545,000
Off-grid Energy Services				
Preparation of sub-component	40,000			40,000
Define institutional framework	30,000			30,000
Assessment of demand for RE			30,000	30,000
Detailed energy planning			80,000	80,000
Training/Capacity building		39,000		39,000
Total: Off-Grid Energy Services	70,000	39,000	110,000	219,000
Global Warming Impacts and Incremental Cost Estimation	20,000			20,000
Total	230,000	194,000	360,000	784,000

10. **Output**

(a) **Development of Grid-Connected Wind Farms.** The output of this task will be a bidders' package for optimally sized grid-connected wind farms on Santiago, Sao Vicente and Sal. The package will include an indication of the level of subsidy that the bidder can expect to receive for producing wind-generated energy on the grids;

(b) **Provision of Off-Grid Energy Services.** The output of this task will be the completed project preparation for provision of off-grid energy services. The staff and institution will be in place to implement the project;

(c) **Estimates of Global Warming Impacts and GEF Incremental Costs.** The output of this task will be estimates of the global warming impacts and GEF incremental costs for each of the above sub-components.

	Activity	Int Cons	Dom Exp	Office log	Trg etc	Total	
		650	250				
Wind Farms							
	Preparation of outline design	30	50	5000	5000	42000	
	TA to Electra to prep bidding documents	50	98	10000		67000	
	Legal and regulatory package		50	5000		17500	
	Op strats to maximise wind cont	10	20	2000		13500	
						140000	
	Estimates of GWI and incremental costs	12	20	2200		15000	
Off Grid							

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TO 012024776391-

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Rec'd. AFC14 9/26/97

to: Richard Spanner 522 3483

ANNEX 1

To: P. Durand - ACTION

Republique du Cap Vert
Ministère de l'Agriculture, de l'Alimentation et de l'Environnement
Secretariat Executif pour l'Environnement

cc: P Harold / M Ayoub
J. Leygonie

Endorsement from the Government of Cape Verde

AIS C

Praia, le 26 Septembre 1997

AFC14(2)

To: Mr. Mahmood Ayub
Director, AFC14
The World Bank
1818 H Street NW
Washington DC 20433
USA

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DP N	Date	5-29	Log #
Action	NO	cc	
FILE (Co/alpha/Prname or #) Ln/Cr GR/TT ESW Co/Rg Adm Proc			
Energy/water			

Object : Avis favorable pour l'application du PDF Block B

Concernant l'application pour une subvention pour le PDF Block B pour GEF au montant de \$230,000 se rapportant au projet Energie, Eau et Sanitation de la Banque Mondiale, cette application est faite afin de couvrir les coûts additionnels pour la préparation des éléments des énergies renouvelables.

Au nom du gouvernement du Cap Vert, nous endossons cette application et vous serions reconnaissants de lui porter attention particulière.

Nous vous prions de croire, Monsieur, à l'expression de notre haute considération.

