ENGLISH TRANSLATION OF THE STAP TECHNICAL REVIEW

CAPE VERDE

ENERGY, WATER AND SANITATION PROJECT

1. General comments

1.1. The two components for which **the Global Environment Facility** (GEF) is requested - grid connected wind and decentralized electrification - are in principle eligible for the GEF.

1.2. It must be noted that the two applications are very different: substitution of energy for electricity production in the first case, establishment of a rural service in the second case. Both are to be classified in the "win-win" technology category: they are more economical than the traditional solutions (central thermal system in the first case[4], small energy consumables in the second case), both of them having lower greenhouse gas (GHG) emissions.

The GEF subsidy is justified by the removal of obstacles blocking their development (which implies that the obstacles should be clearly specified as well as the solutions proposed to remove them).

1.3. The project comprises several overlapping points of application, and combines a series of actions in different sectors: electricity (centralized and decentralized, water and sanitation).

Such an **integrated** approach can probably be justified in the case of Cape Verde, but it is complex to implement. It implies a good coordination of personnel and investments, in clearly defining the terms and stipulations of operations. The document sheds no light on these points. The summarized tables indicate the participation of 10 cofinanciers, in addition to contributions from IDA, GEF and the private sector, as well as the implication of the involvement of seven reputable Cape Verdian agencies.

The document is not quite explicit on the diagnostics of the different sectors, the nature of the ongoing activities of the different financiers, the adjustment of institutional reforms and physical investments.

It would be advisable to have thorough description of the project as a whole to understand how the "Renewable Energy" component will be incorporated in the provisions.

1.4. The diagnostics of the electrical sector on the whole, centralized or decentralized must be thoroughly examined. The sector is centered around three types of systems: the "**big**" **networks** (Praia, Mindelo, Sal, bestowed with some MW; **the small local networks** (secondary centers with about ten to a hundred kW); the isolated plants (with about ten to a hundred Watts). Sectoral reform means an analysis and an examination of each type of system to ensure some coherence in the whole sector.

The analysis seems incomplete (or its results are not indicated). The project makes some points about the big networks and the treatment of isolated plants, completely ignoring the case of secondary centers and mininetworks, which to us seem to be a determinant link.

It should be noted that the French Development Fund and the French Global Environment Fund are engaged in a program for the secondary centers, in studying appropriate financing (based on the municipalities) and in examining the possibility of introducing private operators. The project is behind schedule on technical questions pertaining to wind turbines (wind

[4] if the characteristics the wind resource are good.

turbine being only a tool and an element in the electrical framework). The European Union is also working on centers like these in the island of Maio.

The project description must clearly take these actions into consideration as well as those scheduled to be dealt with on a short term basis.

1.6. The financial tables and investment indicators - tangible and intangible must be more precise and clear. It is not very clear who finances what and on what terms. The applications envisaged are more cost effective, very different, and need different financial requirements (private loans, concessional loans, subsidies, GEF support...).

From our point of view, to ensure coherence in the integration of the GEF components, for such a complex project, identification must be more elaborated/forthright.

1.7. The effective energy indicator in Cape Verde is probably an area of GHG reduction as significant as the introduction of renewable energy. This indicator also needs to be examined.

2. **Specific Comments**

Grid-connected wind component

2.1 ELECTRA is starting a privatization process the terms of which remain to be defined. At this stage of the process, it is difficult to know how the "grid-connected wind" component will be integrated into this privatization (in which the management of the production units only has one element, an element which is no doubt the most critical).

First of all, would it not be better to clarify the terms for implementing this privatization before introducing the wind component.. The investment plan which must be part of this privatization should already be defined, with the integration of wind turbines constituting a variant, to be categorized in the investment priorities). For example there is a contradiction between the introduction which indicates a "a BOO sponsored by Electra's private partner" and the annex which indicates that the production by the wind turbine will be overseen by this partner, thus excluding an IPP.

2.2 With reference to the wind turbines, Cape Verdians (ELECTRA in particular) have real experience with more than 2.4 MW of installed capacity and the results of the feasibility studies implemented to decide on extending this solution. It would be useful to know the conclusions drawn from evaluations of this experience and how the project proposes to integrate them. This evaluation would be useful for defining the scope of GEF support (which depends on prevailing conditions at project start-up date).

2.3 A specific problem in Cape Verde pertains to the high rate of penetration expected for the wind turbine (20 to 30% in relation to the scope/capacity/capability of the network. In Mindelo, a record rate of nearly 54% is even predicted). To the best of our knowledge, there are no big networks working with such a wind turbine proportion. The objective is interesting but are we sure we can reach it? It seems necessary to specify how this problem will be dealt with and what methods would be used to solve it. (This question, which is only brought up in the annex, is pertinent not only for the big plants but for the small ones as well, and it raises several questions for the stability and management of the networks as well as the mechanical standard of the turbines).

2.4 Justification for the subsidy requested from GEF for this component seems to have been reviewed (cf infra paragraph 3 on the calculation of the incremental cost). It is indicated that the project must find the means to attract the private operator to invest in wind turbines" p. It seems that the project is not expecting any other loans than that of the GEF, which is substantial for this type of investment: more than 3.6M$ for less than 10 M$ worth of investment more than 35% of the loans? This amount will only be justified if it is shown that for future investments, the costs would have been

sufficiently lowered so that the operator could make the same decision. (The main conditions for financing the investment should also be revealed).

If it is logical for the wind turbine variant to benefit from GEF support, it must be prescribed on a global investment plan and take into consideration the experience gained on the subject in Cape Verde.

For that type of loan, a justification higher than the differential between the costs of the wind turbine and the thermal alternative (on the basis of a 12% ERR). If not the GEF risks financing many wind turbine projects which are not profitable and which would never become profitable.

Decentralized Electrification Component

2.5 For the isolated plant, photovoltaic equipment is actually well adapted and small battery operated wind turbines could be competitive in relation to small diesel groups for isolated hamlets.

2.6 The means for introducing these individual equipment need to be specified. The PCD gives few other indications (the sentence indicating that the project includes "provisions for stimulating entry into private sector enterprises, by NGOs and cooperatives in the local markets and public services is very vague, the compatibility of these three types of intervention not being evident a priori). Some elements are given in the annex relative to the calculation of the incremental cost where the possibility of rural concessions is indicated (probably 2). The principles needed to be developed: intervention/claim perimeter, terms for equipment financing and cost recovery, contractualisation.

The ESCO idea is indicated in the annex, for a duration of five years, then an opening of the market for competition, which seems in contradiction with the notion of concession in the electrical sector where amortizations are long (This does not seem viable except with a high volume of initial bids and/or a significant payment capacity for private use or the terms for resale of equipment when the concession issued).

2.7 As indicated in subpara. (1.5), with reference to secondary centers, the introduction of private operators is expected. How will the link be drawn between these operators and those expected for the isolated plant. This point is not mentioned.

2.8 The sentence in the annex indicating that bidders could only introduce renewable energy equipment is dangerous. The small diesel groups, (with a wind turbine complement for certain sites) keep their justification.

3. Analysis of incremental cost

It is quite logically divided up into two clauses for each of the two subcomponents

3.1 For the wind turbines in the network, the GEF loan includes: a 3.5 M$ share on equipment and an accompanying 0.45M$ clause. The equipment share is divided up as 2.3 M$ to Praia for an investment of 5.6 M$, (with a wind turbine rate of 28%, 0.26 M$ to Mindelo (2.9 M$, for 54% wind turbine) and 0.9M$ to Sal (an investment of 1.7 M$ and 32% wind turbine). The justification given is the differential between the actual costs of the wind pump solution and the saved fuel.(with an ERR of 12%).

The argument must be revisited. If in Sal and Praia between 40 and 50% of the GEF investments have to be financed by GEF (on a technology already proved and validated in Cape Verde) there is a need to debate on the pertinence of the wind investment in this case. It must be noted that with the principle of calculation adopted, one can arbitrarily reduce (or increase) substantially the loan requested from GEF by dividing (or by multiplying) by two the rate of penetration of the wind pump in Praia and Sal (for example 56% or 14% in Praia).

A more complete and legible investment package, and its financing is necessary to evaluate the level of subsidy acceptable and by whom it must be supported.

As indicated in the subparagraph, it is probably quite justifiable to develop and pursue measures to extend the networks, aiming at a more elevated rate of penetration. The savings from the speed pump solution and the incentive mechanism , associating the GEF and the other financiers must be elaborated.

3.2 Decentralized electricity, the methodology is quite explicit. The method dwells on the analysis of a differential of actual costs between different photovoltaique systems and the traditional systems. Assistance costs are logically added to the work plan and support to the bidders for the development of the market. This finally goes to equipment loans of 500,000$ for domestic use 230,000$ for public lighting, 50,000$ assistance to INERG (half of the cost it seems) and 400.000$ in aid to the launching of concessionaires (for two?), for a total of 1.17M$.

The methodology used to evaluate the incremental cost of this component is interesting. However, it can be seen that the pv solution is modulable and can therefore be sized/dimensioned by means of the payment capacity of the user (A 30Wc domestic kit adapted to the Cape Verdian context renders a service quite superior to the actual solutions and at a cost less than the 50Wc kit, used in reference). In fact making the GEF loan prompt resizing of installations should be avoided. The method adopted can lead to this drift).

3.3 The terms of application for subsidies for equipment seem to be more debatable. In this sector a more complete analysis of the investment and cost recovery process is necessary, to determine loans, distinguishing between those which should normally be attributed (especially to the equalization .and equity) and those more conjunctual to help the implementation process set up by GEF (GEF cannot be substituted to states, to investors and users to resolve questions pertaining to rural electrification).

In conclusion, the grid connected wind turbines and the ERD diffusion form two components which present a significant stake for Cape Verde, and which are eligible for GEF support. However, it is necessary to elaborate on the project identification as well as on these two components, in order to be able to apportion the amounts, to determine the application criteria for GEF, and to specify formulation of plans with the other investors who have already made prior commitment to finance these sectors.

January 1998.

Cape Verde: Energy Water and Sanitation Project
Response to GEF STAP Review

General

The request for greater detail about the project must be balanced against the need for brevity in the project documentation submitted. The Project Concept Document (PCD) is a summary of the overall approach and is not a final project document. The PCD is supported by more detailed studies and, since the project is still under preparation, some of these are not yet complete and donor coordination for the parallel financing is also incomplete. Equally, details of implementation have yet to be finalized and will be during appraisal. The final project document will contain the detail requested. Inconsistencies noted by the Reviewer have been corrected.

Grid-Connected Wind Farms

The major issues raised in the grid-connected wind farms concerns their size, the level of subsidy and the experience from existing installations. Overall penetration of wind energy on the grid with the proposed project would be in the range of 31-42% (not as quoted which is the capacity factor of the proposed wind farms). This level is consistent with results from system stability, reliability, economic and financial studies which themselves build on the experience with the existing wind farms and on the associated studies for their extension.

The high levels of penetration envisaged would: (i) reduce Electra's aversion to risk and thus create an acceptance of high levels of penetration in the future. In common with many utilities, ELECTRA is reluctant to accept high levels of penetration of wind, particularly because of the perceived technical immaturity and suspicion of an intermittent resource; (ii) permit future increments of wind capacity to be larger and installed later thus reducing future implementation costs; (iii) help build institutional capacity and skills more rapidly as wind will be a more significant part of Electra's business and will be operating in a fully commercial context; and (iv) provide global benefits by demonstrating the feasibility of high levels of wind penetration on small grids, hence offering substantial GHG mitigation potential through replication.

The absolute level of subsidy could be reduced by reducing the size or number of wind farms. The fixed costs in building a wind farm are significant through design and engineering work while, purchasing, shipping and construction offer economies of scale. Operating costs are also non-linear due to the need for spares holdings and skilled staff. The consequence of reducing the number or size of the wind farms would be to raise the cost per unit of capacity installed while significantly reducing the ability of the project to reduce the domestic barriers at which it is aimed. Moreover, the different conditions to be found on each island (for example capacity factor, wind regime and level of penetration by energy and capacity) broaden the relevance of the project at the global level and thus increase the potential for replication.

Decentralized Electrification

Comments as to the precise mode of implementation are well taken: this sub-component is still in preparation and much will to be completed during appraisal. A comment on the incremental cost analysis concerns the system sizes. System size was chosen based on survey work carried out on the islands on which the majority of the unelectrified population live. The actual sizes and the costs of systems that will be supplied by the concessionaire may vary, in which case the first cost grant size will be adjusted accordingly. The final comment concerned the need to ensure that the GEF subsidy as a first cost grant did not cause systems to be over dimensioned.. This problem should be avoided as the grant offers the same amount for a 20Wp system as for a 50Wp system. The system sizes used in the incremental cost analysis.