

TWELFTH QUARTERLY REPORT

July - September 1985

Djibouti Energy Initiatives Project

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Djibouti

by

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INTRODUCTION

The reporting period was a time of transition for the AID Energy Initiatives Project in Djibouti. Former COP Steve Hirsch and Djiboutian counterpart Abdourahman Farah left Djibouti in May, leaving the project under the temporary supervision of renewable energy technologist Steve McGoff. The new UITA COP, Martin Bush, arrived in Djibouti at the beginning of August, followed by energy conservation specialist Jean-Yves Garnier a few weeks later.

Concurrent with this change of personnel was a shift in project direction and emphasis following the evaluation of the project conducted at the end of 1984.

These changes in programmatic focus are reflected in the wording of the PIOT which has recently been issued by AID. The project will now direct its efforts to two areas of priority: energy conservation, and certain renewable energy technologies for the lifting and pumping of water. The institutional development of ISERST and other related Djiboutian government agencies is also seen as an important task. Under these three programmatic thrusts--energy conservation, renewable energy, and institutional development--a number of specific activities are scheduled to take place. These tasks are outlined below.

Energy Conservation

ISERST will set up an energy conservation unit composed of at least two technicians whose task it will be to implement energy conservation measures. The technicians will be trained and provided with the necessary equipment and instruments. The ISERST energy conservation unit will work in conjunction with technicians from Electricite de Djibouti and Travaux Publics. ISERST will also work with Travaux Publics to develop revised building codes which will encourage, and eventually require, the use of thermal insulation and other energy conservation measures appropriate for Djibouti. Travaux Publics will be responsible for the implementation and eventual enforcement of the new building codes.

These efforts will be supported by a multifaceted publicity campaign intended to introduce Djiboutians to the significant savings that can be realized by the use of energy conservation measures. ISERST, in collaboration with other government agencies, will select a number of buildings for retrofitting and the demonstration of energy conservation techniques. This program will commence towards the end of 1985. At the same time, a program of public information and dissemination will commence. The Jarmul report (Reduire la consommation d'energie dans les batiments--les possibilites de conservation d'energie a Djibouti) will be widely circulated beyond those GRUD officials and private sector individuals who have already received it.

A media campaign will also be organized in an attempt to reach as wide an audience as possible. The campaign will focus on energy conservation in the housing sector and will involve the press, radio, and television.

ISERST will also approach the *Ministere de l'Industrie* and the *Ministere des Travaux Publics* with a view to organizing a seminar on energy conservation for senior policy makers and planners.

Other activities related to this effort include the sponsorship of a national exhibition on energy conservation principles, practice, and benefits--including the display of energy-efficient appliances and equipment; and the preparation of a directory of energy related services and equipment available in Djibouti.

Renewable Energy

ISERST will continue to work with *Genie Rural* on the program to repair and rehabilitate the rural wind pumping machines in Djibouti. Also in collaboration with *Genie Rural*, ISERST will foster the growing cooperative arrangement with AFME concerning the testing, evaluation and development of photovoltaic pumps. The pump evaluation methodology developed by the World Bank and the UNDP will be adopted by ISERST in this program.

ISERST will also discuss with the World Bank the possibility of being included in the windmill pump monitoring network being set up in collaboration with the UNDP.

Unless satisfactory arrangements can be made for their operation and maintenance, most of the *Climatronics* meteorological sensing installations will be dismantled and stored at the new ISERST building. One or two units close to Djibouti, which operate without problems at the present time, may continue to be maintained and operated. In addition, a new station will be set up at the new ISERST building.

ISERST will continue to pursue the development of renewable energy technologies for the pumping of water.

Institutional Development

ISERST will continue to build up the documentation centre. This centre will eventually house the entire ISERST library and will be under the supervision of qualified staff. The workshop facilities at ISERST will also be enlarged and strengthened to permit the repair and maintenance of the renewable energy systems as well as the retrofit work and auditing activities related to the energy conservation initiatives.

The training of ISERST personnel, and other government personnel working in energy-related fields, is considered a major programmatic activity. Training may take place overseas or it may be conducted in Djibouti by VITA personnel in collaboration with Djiboutian instructors from local institutions engaged in related training activities. The goal of the training effort is the institutional development of ISERST's renewable energy and energy conservation section so that it will possess the resources to continue its role as a technical advisory and research institution when VITA's technical assistance project comes to an end.

A brief description of activities which have taken place during the reporting period is given below.

1. INFORMATION ACQUISITION AND DISSEMINATION.

1.1 The program of meteorological data collection has been curtailed after a 2-year run of data collection. Recent problems with the operation and maintenance of these units have imposed considerable demands on project staff time and resources. It was, therefore, decided to limit this activity to the operation of only one or two units, one of which will be set up on the new building.

It has been proposed that the Civil Aviation and Meteorological Service take over the operation and the maintenance of the Climatronics units. Discussions are taking place with a view to perhaps transferring the supervision of the majority of the Climatronics units to this Service.

1.2 Work has commenced using the Apple computer to process the meteorological data so far gathered. A spreadsheet program is being used to calculate daily, monthly, and annual means of windspeed, ambient temperatures (maximum and minimum), and global insolation levels on a horizontal surface. The data for 1984 are being tabulated and printed out for each of the sites where the Climatronics units were located. A brief report presenting the data and commenting on their significance will be prepared in the near future. The intention is to tabulate the data and to publish them in a form more suitable for the evaluation and design of renewable energy technologies and for the calculation of building cooling loads and other simulation studies related to the conservation of energy in buildings.

1.3 Work on the computer is also continuing in translating the wind energy technology simulation program written in BASIC. User interaction will henceforth be conducted in French rather than English.

2. PILOT INTERVENTIONS AND PROTOTYPE RESEARCH

2.1 The photovoltaic pump at Obock--a temporary installation--has been operating successfully for several months. Work is now underway to permanently install the panels and pump. While at Obock in early September, the ISERST renewable energy team dismantled the Climatronics installation and returned the equipment to the ISERST workshop.

2.2 Work continues on the construction of the testing rig for photovoltaic pumps at the new ISERST building. Within the next few weeks four photovoltaic pumps are scheduled to arrive from France for testing by the ISERST renewable energy team.

2.3 Agreement has been reached between ISERST and Genie Rural concerning the repair and possible relocation of several of the windmill pumps located in the rural areas of Djibouti. This program of windmill repair and rehabilitation, which will include the training of ISERST and Genie Rural technicians, is expected to commence in the near future in collaboration with Genie Rural.

2.4 One of the new Nova inverters was connected to the building photovoltaic system in early July. The photovoltaic system powers office lights, outside night lights, office machines, ceiling fans, and a small refrigerator. However, technical problems continue to occur from time to time with the system. The new inverter appears to be unable to cope with the power transients caused by the operation of the refrigerator compressor.

2.5 A 350 Watt (peak) AEG-Telefunken photovoltaic pump was tested by ISERST technicians at the request of Project de Developpement Rural (PDR) Sud, a branch of Genie Rural. The output of the pump was measured at various levels of insolation, and the performance data was passed on to Genie Rural personnel.

2.6 The second shipment of tools arrived for the ISERST workshop. The shipment included a welding machine, a drill press, and a hydraulic press. These machines have been set up in the ISERST workshop and ISERST technicians have been instructed in their use and maintenance.

3. ENERGY CONSERVATION

3.1 The ISERST energy conservation team has been making contact with local businesses and agencies in Djibouti with the aim of presenting the new energy conservation team, informing the organizations of the energy conservation initiatives soon to commence, exploring areas of possible collaboration, gauging the level of local understanding of the principles and practice of energy conservation measures, and assessing the availability, efficiency, and other technical characteristics of such items as household appliances, air-conditioning units, building insulation, etc.

3.2 The energy conservation team has also been making initial contact with government agencies in Djibouti involved with energy supply, building practice, and public works. The aim is to try and forge a consensus concerning the need for energy conservation in Djibouti, and to formulate a workplan in collaboration with these agencies for the introduction of energy conservation measures in new and existing buildings.

3.3 As a first step, a short media campaign was organized by ISERST project personnel in an attempt to persuade Djiboutians to turn off office air-conditioning units during the mid-day lunch break. The new office hours, which came into force on the first day of October, include a 3 hour break for lunch. If office air-conditioners are left running during this period calculations show that the additional demand for energy placed upon the electrical generating system of Djibouti could well rise to substantially elevated levels. A short article was prepared for the local newspaper La Nation by project personnel and a brief communique was written for Djibouti radio and television. The communique was aired for several days just before the commencement of the new office hours. At the request of the Government of Djibouti, ISERST prepared a brief memorandum, circulated to all government ministries and agencies, requesting that all air-conditioning units be switched off during the mid-day interlude, and asking that government workers make every effort to reduce electrical energy consumption in their offices.

3.4 ISERST personnel have reviewed the plans for the Urban Development Project low-cost housing complex to be built with World Bank and AID funding at Salines Ouest on the outskirts of Djibouti ville. A number of recommendations related to the design of the housing units have been made to the administrators of this development project in line with the recommendations set out in the report written by architect Dan Dunham and published by U11A earlier this year. Although several suggestions made by Dunham are incorporated in the existing designs, a detailed examination of the plans revealed that many key recommendations have been omitted. These omissions have been pointed out to the Urban Development Project director who has agreed to consider the revisions recommended by ISERST.

3.5 ISERST personnel have also reviewed the architectural drawings for the new ISERST building soon to be constructed adjacent to the renewable energy building housing the Energy Initiatives Project. It was discovered that the architectural plans for this large building made few provisions for the installation of thermal insulation. After consideration of the case put forward by project personnel, who argued strongly for the use of thermal insulation in the new building, ISERST has agreed to consider revising the architectural plans in a way which will improve the thermal efficiency of the building.

3.6 In line with one of the recommendations put forward in the 1984 National Energy Assessment, Electricite de Djibouti (EdD) is in the process of switching to a heavier grade of petroleum fuel for its diesel generators. The investment costs associated with this interfuel substitution are expected to be recovered within a year. EdD is also working to reduce its significant transmission losses by laying several additional high tension transmission lines, and by operating parts of the distribution system at higher voltage.

4. COLLABORATION WITH OTHER DONORS

4.1 The ISERST project team continues its efforts to strengthen the links between ISERST and agencies in France involved with renewable energy, energy conservation, energy efficient building practice, and energy policy and planning. Jean-Yves Garnier spent several days in France in early August and discussed areas of possible collaboration and cooperation with several French agencies including Agence Francaise pour le Maitrise d'Energie (AFME), Centre Scientifique et Technique du Bâiment (CSTB), Ministère de la Coopération, Rexcoop, and Bois de Feu.

4.2 The four photovoltaic pumps offered to the project by AFME are now expected at the end of the year. The pumps are manufactured by Total Energie Développement and are all floating units suitable for open wells and low head operation. Two of the pump systems include batteries for electrical energy storage.

4.3 A French expert in photovoltaic pump technology will travel to Djibouti after the pumps have been tested at ISERST. He will direct a short training program in solar pumping principles and practice which will be presented to technicians from ISERST and other Services interested in water pumping technology.

5. OTHER ACTIVITIES

5.1 A French language version of the summary of the recommendations made in the Djibouti National Energy Assessment has been prepared. This document presents 26 recommendations intended to improve the supply, distribution, and utilization of energy in Djibouti. Each recommendation is accompanied by a brief explanation of the technical and economic background, an estimate of the cost of implementing the recommended action, and an estimate of the economic returns which might be expected. This report is to be presented to senior policy-makers and planners in the Government of Djibouti in the near future.

6. PROBLEMS AND ISSUES

6.1 As mentioned earlier in the report, the NOVA inverter installed in July is not operating in a satisfactory manner. Although capable of handling the average power demands of the building load, it apparently cannot cope with the transient power surges caused by the refrigerator compressor. Technical discussions will commence shortly with ARCO Solar with a view to rectifying this problem.

6.2 An inspection of the ISERST renewable energy building has revealed a number of problems which have developed since the building was constructed a few months ago. The most serious problem is the degradation of the paint on the roof of the building. The paint is cracked, eroded, and flaking off from the concrete. The contractor responsible for this work has been contacted and the manager has inspected the roof. UITA will ask the company involved to strip off the old paint and to repaint the roof. Less serious problems which have recently appeared include minor plumbing problems, and loose and fallen tiles in one of the washrooms. The contractors responsible for this work will be required to rectify these problems.

7. NEXT QUARTER ACTIVITIES

7.1 The amended contract between AID and UITA will be signed, and the detailed workplan prepared by ISERST, in collaboration with UITA, will be presented to AID for discussion and approval.

7.2 Four photovoltaic pumps will be received from AFME in Paris. The pumps will be tested and evaluated by ISERST technicians. A French photovoltaic engineer will arrive in Djibouti and ISERST/UITA will organize a number of workshops for ISERST and Genie Rural technicians which will present both the technical principles and the practical aspects of photovoltaic pumping technology.

7.3 The Climatronics meteorological units will remain shut down in the field until suitable arrangements can be made for their disposition. One of the units will be erected at the ISERST renewable energy building and data will be continue to be collected at that site.

7.4 Work will continue in collaboration with Genie Rural to repair and rehabilitate several windmill pumps in the rural areas of Djibouti.

7.5 The photovoltaic pump at Obock will be installed, tested, and formally presented to its new proprietor. The photovoltaic pump at As Eyla will also be formally handed over to the agricultural cooperative now responsible for its operation.

7.6 The ISERST energy conservation team will continue its work in collaboration with other Djiboutian government agencies in order to develop revised building construction standards which include the use of thermal insulation.

7.7 Decisions will be taken regarding the prototype systems to be purchased, installed, and tested by ISERST project personnel. Systems under consideration at the present time include windmill pumps, photovoltaic pumps, and photovoltaic refrigeration systems.

7.8 The energy conservation campaign will commence. Radio et Television de Djibouti has agreed to help ISERST produce a series of televised scenarios where viewers are challenged to spot actions which obviously waste energy. Prizes will be offered in the hope of encouraging widespread interest and participation.

7.9 ISERST will begin a brief study of the energy savings to be gained by the insulation of household refrigerators. The small refrigerator in the ISERST renewable energy building will be insulated, and the resulting reduction in energy consumption will be measured.

7.10 The ISERST energy conservation team will begin discussions with a number of institutions and industries in Djibouti ville, and will recommend energy conservation measures to those organizations which express an interest in reducing their energy consumption.

Attachments: Article from La Nation

*Copies: Anis Abdallah, ISERST
USAID/Djibouti
USAID/Mali-Leso
USAID/Khartoum
USAID/Mogadishu
USAID/Gaborone
USAID/Maseru
VITA/Roslyn
REDSO/Nairobi*

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La valse des kilowatts

Le passage annuel de l'horaire d'été à celui d'hiver est devenu une procédure courante dans plusieurs pays situés au nord des tropiques. Il est motivé par un souci d'économie en énergie : faire coïncider au maximum la lumière du jour avec le temps de travail de façon à utiliser le moins possible d'électricité. A Djibouti, l'adoption des nouveaux horaires pour la saison fraîche ne répond pas au même souci d'économie mais à d'autres raisons, comme par exemple la baisse de la consommation de khat et l'activation de la dynamique de travail chez les agents de l'Etat. Ce n'est pas pour autant que ce changement n'aura pas de conséquences importantes sur la facture énergétique de l'Etat.

Si l'on tient compte de l'habitude de gaspillage des fonctionnaires, peu soucieux de la chose publique, on peut prévoir, sans trop se tromper, que les nouveaux horaires se traduiront par une importante consommation d'électricité et par quelques problèmes techniques pour l'EDD (Electricité de Djibouti). Nous nous sommes amusés à faire un petit calcul pour avoir une idée de cette augmentation. Pour cela nous avons choisi un exemple caractéristique : la Cité ministérielle, fourmillière administrative, avec son parc d'environ 130 climatiseurs.

Considérons une puissance moyenne installée de 2,5 KW par appareil, soit une demande totale d'électricité de 325 KW ($130 \times 2,5 = 325$ KW).

LE CIVISME A L'ORDRE DU JOUR

Comptons 190 jours effectifs de travail durant la période dite "d'hiver" (octobre à mi-mai). Si les climatiseurs en charge maxi-

male ne sont pas arrêtés durant la pause de la mi-journée, entre midi et 15 h 30 (ce qui est très probable si chaque service ne prend pas de dispositions pour cela), on aura une consommation supplémentaire de plus de 216.000 KW/h (190 jours \times 3,5 heures \times 325 KW). A 46 francs le KW/h, la note d'électricité s'élèvera à plus de 10 millions de francs.

Si l'on ajoute les autres sources d'utilisation électrique (éclairage, photocopieuses, machines électriques) et si l'on étend ce calcul à l'ensemble des bâtiments administratifs, la facture dépassera la centaine de millions de francs...

Ce qui est une somme non négligeable surtout en cette période d'austérité budgétaire où le moindre gaspillage ne devrait être toléré.

Mais si des dispositions sont prises au niveau de chaque service pour contrôler l'utilisation de la climatisation, les nouveaux horaires peuvent même se traduire par une économie d'énergie. Comment ? Si entre midi et 15 h 30 les climatiseurs sont arrêtés la durée journalière de climatisation pourrait être réduite de 1 h 30, au minimum. Pour la Cité ministérielle, la consommation hivernale d'électricité baisserait, environ, de 90.000 KW/h soit une économie de plus de 4 millions de francs. Ce qui n'est pas mal accepter un accroissement très lourd de la facture de fonctionnement des bâtiments administratifs ou bien profiter des horaires d'hiver pour réaliser des économies sur le poste "énergie" au profit des postes budgétaires prioritaires ? Voilà posées en termes financiers et clairs les conséquences de notre attitude lors du passage à l'horaire d'hiver. Le civisme est plus que jamais à l'ordre du jour.