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REPORT OF SENEGAL*

Prepared by
the Senegalese delegation**

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* The views expressed in this paper are those of the authors and do not necessarily reflect the views of the UNIDO Secretariat.

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I. ENERGY SAVINGS IN INDUSTRY

Senegal, a developing country, draws on two sources of energy: wood, obtained from the national territory, and imported oil.

Wood consumption is at present estimated to be 1 m^3 per member of the population per year, or about 2.2 million tons of oil equivalent (toe) annually for the whole country.

The import of petroleum products amounted to 850,000 toe in 1981, which represented 50 per cent of our working receipts.

In meeting energy needs, all the wood is used for domestic purposes while the consumption of petroleum products is divided roughly as follows: 40 per cent for the industrial sector, 30 per cent for the transport sector, and 30 per cent for the production of electricity.

The growth rate for the consumption of petroleum products dropped back appreciably during 1981 and 1982, but the growth of the population, which is approximately 2.8 per cent per annum, and the determination to develop the country, are bound to lead to a substantial increase in energy requirements.

These prospects are particularly disturbing because the northern half of the country has been affected by deforestation, leading to desertification.

This situation is now appreciated with such clarity that the energy problem has become one of the Government's major concerns.

Various organizations have been set up:

A National Energy Commission, chaired by the Head of State, which is responsible for defining policy and supervising its implementation.

This Commission has a National Committee which is the agency for carrying out the energy policy; it consists of qualified representatives of the departments concerned.

Under the chairmanship of the Minister for Industrial and Craft Development, the Committee collects and circulates all sorts of information about the progress of studies and operations, and proposes any necessary measures for the implementation of the energy policy.

An Energy Savings Bureau, set up as part of the Energy Directorate, is responsible for appraising possibilities in the various sectors and seeing that they are realized. It has been equipped by the Italian Government with the necessary apparatus to enable it to deal with the ambitious programmes that Senegal has set itself.

To facilitate and ensure control over what is being done to take account of the new prospects, an expert appraisal of the energy situation of 14 enterprises among the country's largest energy consumers was made in 1981 by a Canadian consultant.

The purpose of this study was to evaluate the energy-saving potential within each enterprise and to outline possible courses of action which might lead to reduction of energy consumption.

Leaving aside the National Electricity Distributing Company (Société Nationale de Distribution d'Energie Electrique - SENELEC), the enterprises covered by the study in 1980 consumed 23 per cent of the commercial energy consumed in Senegal.

The industrialists interviewed seemed to be particularly well aware of energy problems, mainly because of the steadily rising cost of energy. Certain enterprises are already strictly controlling their consumption.

The energy-saving measures taken are, however, often very limited in scope, and the efforts embarked on are not sustained.

Two types of problems encountered by the enterprises in their efforts to reduce consumption were noted, relating to:

- The obsolescence of equipment;

- Poor management of equipment.

It is clear that, with the exception of a few enterprises (SAR and SOCOCIM), plant and workshop plans are out of date and have not kept up with developments. Data sheets are seldom available for the equipment and the apparatus for keeping a check on consumption is of a very low order.

The enterprises as a whole have no energy-management structure.

All this suggests that there is no real planning of energy consumption. This results in a failure of general maintenance, which substantially increases consumption, failure to insulate pipework and heating plant, leaking of steam or hot water, poor maintenance of electric motors, a low power factor, beneath the standard required by SENELEC (i.e., 0.87), and the problem to which the lunch-time break in working hours give rise.

The Energy Directorate has come to the conclusion that the energy savings that are technically and economically feasible represent more than 20 per cent of these enterprises' consumption, or about 5.5 per cent of the national consumption of commercial energy.

The consumption of the industrial enterprises which were not covered by the study represents 13 per cent of the national consumption. Savings of approximately 30 per cent would also be achievable by the use of measures necessitating little investment. This would bring the savings feasible in the industrial sector alone to 7 per cent of the national consumption.

From a study made by the World Bank, it would seem that the potential for energy savings lies in three areas:

- The industrial sector;

- Transport;

- Housing.

In the industrial sector:

The potential identified amounts to 29,694 toe, achievable by economy measures producing returns in less than three years. This estimate, which represents 20 per cent of commercial energy consumption in 1987, leaves out of account the considerable potential to be found in the production of energy and the rest of the industrial sector, particularly the small consumers where low consumption goes hand in hand with concern for energy conservation.

In the transport sector:

A potential of 26,000 toe was identified, partly in the modes of transport themselves (600 toe in SOTRAC) but mainly in the general introduction of a continuous working day (4,000 toe) and transfers from one mode of transport to another:

- Transfer to public transport 8,000 toe
- Transfer from road to rail transport 9,000 toe
- Establishment of a suburban train system 4,400 toe

This figure represents an appraisal, in default of the real potential, for there are also further possibilities, such as the transport of oil products, for example, which is done by road whereas a combination of road and rail would certainly be more economical.

In the housing sector:

A potential of at least 14,000 toe was found in active air conditioning, and of 200 toe in the solar heating of domestic hot water.

The achievement of all these savings, and the identification of the potential existing in other sectors of consumption, call for a considerable amount of work to provide information and encouragement by way of:

- Promotion of awareness of the problem;
- Sectoral information and training activities;
- Contacts with agencies specializing in energy saving;
- Carrying out of energy audits and studies on particular points;
- Help in finding finance for the carrying out of the work;
- Setting up of a statistical infrastructure;
- Promulgation of a national energy-saving plan;
- Evaluation of the progress achieved;
- Promotion of Senegalese energy-saving work.

All this will involve a considerable amount of work which will, in the medium term, call for substantial financial resources to be made available.

II. WORK DONE

2.1 Expert report on the energy situation in 30 industrial enterprises

Energy saving in industry began in 1981 with the expert study of the energy situation in 14 enterprises among the country's largest energy consumers.

This expert study showed that the consumption of the enterprises covered by the study represented 23 per cent of the country's whole energy consumption. The potential economies in the enterprises amounted to 24 per cent of their consumption.

2.2 Campaign to make people aware of energy-saving possibilities

Two campaigns to make people aware of energy-saving possibilities have been carried out (in 1982/1983 and 1984) with resources made available by the National Energy Fund (Fonds National de l'Energie - FNE) amounting to 110 million CFA francs.

2.3 Expert study of 24 administrative buildings (1983/1984)

This study showed the possibility of an annual saving of 35 million CFA francs for an investment of 10 million CFA, francs recoverable within three and a half months.

2.4 Italo-Senegalese project

This project, the purpose of which was to strengthen the Energy Savings Bureau, was carried out in 1984/1985 with an Italian grant-in-aid amounting to 210 million CFA francs.

It made it possible:

- To train the officers of the Energy Savings Bureau;
- To equip the Bureau with logistic requisites;
- To carry out two diagnostic energy audits at SOTIBA-SIMPAFRIC and SARDINAFRIC, a textile firm and a cannery.

2.5 Establishment of the "Energy Saving in Industry" project

This project was carried out with a grant-in-aid of $US 399,000 over a period of three years.

With the assistance of UNDP/IBRD, the project made it possible:

- To carry out a study of the institutional environment, which defined the framework for the structural reorganization of the Energy Savings Bureau (ESB) and its field of action, and to reinforce its technical and financial resources;
- To work out a programme for energy saving in industry;
- To carry out a survey of energy consumption in 125 industrial enterprises, with the object of listing the consumption of petroleum products and defining objective criteria for the selection of the enterprises for priority audit.

2.6 First phase of the Canadian contribution to the Energy Saving in Industry Project

In 1986/1987, with the help of a grant of $Can 1,100,000 from the Institutional Support Fund, some 10 enterprises were audited over a period of 12 months

2.7 Second phase of the Canadian contribution

In 1987/1988, Canada made a grant of $Can 3,100,000 for the second phase.

The object of this phase is:

- To audit some 20 enterprises;

- To provide logistic support for the ESB;

- To train the officers of the ESB.

2.8 Organization of an "energy saving in industry" seminar

This seminar, which had the title "STRATEGY, SCHEME AND MACHINERY FOR FINANCING THE ENERGY SAVING IN INDUSTRY PROJECT" was designed to provide opportunity for an exchange of views between the Directors of the industrial companies which had been audited, the representatives of the Government and the financial backers (IBRD, UNDP, CIDA, etc.)

III. RESULTS ACHIEVED

The objectives set for the Energy Savings Bureau in 1981 have been achieved so far as industry is concerned:

- The energy rationalization strategy has been introduced under the title of the ESIP;

- The officers of the ESB have had the necessary training to carry out energy audits and to direct and supervise the application of the measures proposed.

3.1 Technical and financial balance sheet

- The campaigns to make people aware of the need for energy saving and its possibilities (1982/1983 and 1983/1984) have enabled the State to save about 2 milliard CFA francs;

- The energy-saving potential in 24 administrative buildings has been investigated; the investment necessary amounts to 10 million CFA francs for an annual saving of 35 million CFA francs;

- The continuation of the energy survey carried out in 1985 in 125 industrial enterprises has made it possible to institute a data bank containing the information available on energy consumption.