UNITED
NATIONS

A

United Nations Conference on New and Renewable Sources of Energy

Nairobi, Kenya
10-21 August 1981

Distr.
GENERAL

A/CONF.100/NR/ 47 *

5 June 1981

ARABIC AND ENGLISH ONLY

NATIONAL REPORT SUBMITTED BY

DEMOCRATIC YEMEN**

National reports are reproduced by photo-offset and issued in the languages of
ıbmission only. This document will receive full distribution at Headquarters.
ıly two copies per delegation will be available at the Conference site.

* The designations employed, the presentation of material and the views expressed
ı this paper are those of the submitting Government and do not necessarily reflect
ıe practices and views of the Secretariat of the United Nations in any of these
ıspects.

L-15263

Introduction

Oil derivatives provide approximately 90 per cent of total energy consumed in the People's Democratic Republic of Yemen. Fuel needs are met through the direct importation of crude oil since there is, as yet, no internal source of conventional energy. It goes without saying that dependence on imported oil for purposes of meeting energy needs places a great financial burden on us and has a negative effect on the scale of expenditure necessary for social and economic development projects in the country. The Government is endeavouring to stimulate research and exploration for conventional sources of energy, to rationalize the use of energy and to put an end to wasteful practices with the aim of reducing oil imports without adversely affecting social and economic development programmes.

With a view to realizing our objectives through the elaboration of a comprehensive national energy strategy, to establishing appropriate means for handling this sector and to introducing new concepts for alternative sources, the State promulgated Decision of the Council of Ministers number 35/1980 which called for the establishment of the National Energy Commission under the chairmanship of the Minister of Industry and chairman of the Oil and Minerals Authority. Its membership comprised all institutions concerned with energy matters in the country as well as the University of Aden as a body involved in academic research. The terms of reference of the Commission are as follows:

The functions of the National Energy Commission

(a) The collection, classification and presentation of information on the development of sectoral consumption of energy in its various forms.

(b) The collection, classification and presentation of information on production and reserves of oil, nuclear and other energy resources.

(c) The evaluation of the potentialities of solar energy.

(d) The preparation of projections for sectoral and global energy consumption in the context of the development programme.

(e) Identification of the different national studies and research conducted in the various energy fields with a view to rationalization, in order to reduce duplication, and secure their integration.

(f) The formulation of proposals for the qualitative and quantitative development of national skills.

(g) The formulation of proposals on the appropriate mix of investments necessary for the development of various resources for oil, nuclear, solar and other forms of energy in order to meet present and future consumption needs.

(h) The preparation of national studies and research papers for presentation at the relevant conferences and seminars.

(i) The dissemination of information from abroad on energy-related matters in order to benefit therefrom at the local level.

(j) The determination of the country's representation on councils and committees and at conferences and seminars dealing with energy matters.

(k) The maintaining of contacts with national, regional and international committees and institutions concerned with energy matters, and of co-ordination with them.

(l) The propagation of economic awareness among the masses with the object of rationalizing energy use.

(m) The Commission may, as it sees fit, seek the assistance of local and foreign experts in carrying out its functions.

(n) Bodies active in the energy field and related bodies shall provide the Commission with all the information it requires.

The Decision stipulated that the Oil and Minerals Authority should serve as the Commission's permanent technical secretariat. It required the Commission to submit to the Council of Ministers options and proposals concerning future energy prospects and policies for consideration.

The financial resources necessary for the implementation of the various functions of the Commission were laid down by the Decision in the following manner:

(a) State support from budgetary allocations.

(b) Contributions from national institutions concerned with energy matters.

(c) Revenue from the sale of research papers and publications.

(d) Any other resources decided upon by the Commission.

Present needs for various forms of energy:

It can be seen from the foregoing that the greater part of the energy used in the country is of conventional origin depending basically on petroleum derivatives. Wood, agricultural residue, animal wastes and the like are no longer the major sources of energy. They are being replaced by kerosene and liquified gas because of the growing number of paved roads, the rise in household income and the price factor. The prices of these same derivatives benefit from government subsidy, making them a feasible source of energy. Citizens no longer prefer to use wood because of its expense and scarcity, and agricultural residue is used mostly for purposes of reinforcing the bricks used for construction in rural areas.

It can be seen, therefore, that energy needs are progressively growing and expanding together with the expansion of social and economic development projects. Consequently, the introduction of new energy sources has now, for a number of complementary reasons, begun to assume great importance in planning and development. Nevertheless, in the absence of a central planning framework concerned with energy matters in the past, and in view of the lack of relevant statistics, there was considerable delay of and little inducement for research and practical application in the field of exploitation of new and renewable sources of energy. The achievements to date have been confined to a number of of individual initiatives on the part of some institutions concerned with energy-related matters. However, after the establishment of the National Energy Commission, it is hoped that it will be a motivating factor in stimulatir the search for new and renewable sources of energy.

New and renewable sources available

On the basis of the preliminary information available it can be stated that many new and renewable sources of energy exist in the People's Democratic Republic of Yemen. With increased research and investment it will be possible to replace a part of the conventional energy presently in use by energy generated from new and renewable sources, particularly in meeting the requirements of remote rural areas as a first stage preparatory to extending this concept to other areas of the country.

It would be useful at this stage to review some of the activities which have so far taken place in the development and exploitation of new and renewable sources of energy.

Geothermal energy

Examination of the geographical position of the country, its structural relation to the great African Rift Valley system and the geological formation of the country reveals areas of recent volcanic rock and others which show

evidence of hot springs in a number of places over an area of approximately 130,000 square kilometres. These areas are likely to provide a source of high and medium-level geothermal energy. The Oil and Minerals Authority has conducted a number of exploratory field studies on locating such areas, which have yielded encouraging results and point to their possible commercial exploitation for the generation of energy. However, a more detailed and profound study will be conducted in such areas in order to identify the promising locations. Development of such sites will begin once the necessary financing becomes available.

Wind power

The People's Democratic Republic of Yemen has known this type of energy since the beginning of the present century when windmills were used to pump sea water to feed the salt pans at Aden. In the 1950s, however, this kind of technology soon began to give way to electric and diesel pumps owing to their convenience and cheapness. In recent years, with increasing need to develop and exploit a variety of energy sources, the Public Electric Power Authority, in co-operation with the Danish Organization for Co-operation between Peoples, has set up a windmill for the direct generation of electricity. The experimental model, which was installed in Aden in 1979, is capable of generating a maximum power estimated at 18 kilowatts when the generator is operating at a speed of 750 r.p.m. When the windmill was put into operation a direct electrical current was obtained, sufficient to supply four consumers connected in series or in parallel, in the following manner:

First consumer:	approximately two kilowatts
Second consumer:	approximately four kilowatts
Third consumer:	approximately four kilowatts
Fourth consumer:	approximately eight kilowatts

With the appropriate wind speed, the current to the first consumer is at a tension of 180 volts when the generator is turning at 600 r.p.m. With tension at 200 volts and revolving speed of about 700 r.p.m. current reaches the second consumer and the first and second consumers are supplied with the same tension. When tension is raised to 230 volts, with the generator revolving at 725 r.p.m., current reaches the third consumer. The fourth is supplied with tension at 240 volts and the generator at 750 r.p.m. The wind velocities required to turn the windmill in order to generate the power needed are as follows:

For 2 kw -- 10 knots/5 meters per second

For 6 kw -- 12 knots/6 meters per second

For 10 kw -- 15 knots/7.5 meters per second

For 18 kw -- 20 knots/10 meters per second

From experience, the Public Electric Power Authority has not encountered any major operational difficulties. There remain, however, a number of obstacles to be overcome before the experiment can be extended to remote rural areas. The main difficulties are: The conversion of the electricity generated from direct to alternating current in a practical and cheap manner, and an economical way of storing power for use at times in which the windmill is not working or when the wind velocity is not sufficient to generate the power required by the consumers. Those overseeing the experiment in the Public Electric Power Authority are very optimistic that these difficulties will be solved in a way which will enable them to benefit from this experience in a practical manner.

Solar energy

The country, by virtue of its geographical position within the sun belt, enjoys a high proportion of sunshine and favourable climatic conditions. Those elements which obscure the sun (such as clouds, fog, dust, humidity) are present only for a few days each year. In spite of advantageous circumstances

the exploitation of solar energy for purposes of generating power has not been given the attention it deserves. The only exception may be the direct exploitation of the sun's rays in drying agricultural produce and fish and in processes involving the evaporation of sea water in a conventional manner to produce salt. However, this process has not been used to produce water fit for human consumption. Nor was the difference in temperature in the pans themselves utilized for generating power. The efficacy of the latter process has been demonstrated by a number of studies.

The Ministry of Industry has recently undertaken a preliminary study to identify those fields in which the sun may be exploited for the generation of power, the desalination of sea water, the operation of small communications stations, etc. It is hoped that such studies will be pursued and diversified when the necessary financing is found.

Biomass energy

The rural population has, since ancient times, made use of wood, either by direct combustion or by transforming it into charcoal, or a principal means of meeting its energy requirements. Human and animal wastes are used directly as organic fertilizers. The single instance in which wood is used for industrial purposes is in transforming limestone into lime (the lime industry). However, with the availability of petroleum derivatives, their cheapness and the scarcity and expense of timber, a great part of the rural population has gone over to the use of kerosene and liquified gas as sources for the energy necessary for cooking, lighting, heating and refrigeration (refrigerators operating on kerosene and gas). Thus the use of biomass sources is now confined to remote desert areas. However, a return to the use of their source and to the use of human and animal wastes would, in our view, be possible with the introduction of small and simple distillation units which could play an important role in rural development and bring about a great saving in the expenditure on the purchase and transportation of petroleum derivatives.

Obstacles to the use of new and renewable sources of energy

In spite of the existence of the appropriate prerequisites for the development of new and renewable sources of energy and their use in the various spheres of economic activity in the country, such development has not met with propitious circumstances and has therefore been obstructed. The most important obstacles can be summed up as follows:

1. The absence, in the past, of a central institutional framework concerned with energy-related matters in all aspects.

2. The lack of funds necessary to support research, study and scientific experiments in the field in view of the limited financial resources available, which had to be allocated to the financing of projects of high economic and social priority within the development plan.

3. The lack of expertise and of trained local personnel in touch with recent developments in the field of new and renewable sources of energy.

The development of alternative sources of energy

At the national level, we are seriously considering the development of this sector by providing the conditions favourable to such development, whether in terms of finding the necessary financing or the necessary personnel. A general and comprehensive survey will be undertaken for the precise evaluation of present potentialities in the field of new and renewable sources of energy which will cover, by way of example, the following points among others:

1. The collection of statistical information and the basic data required for this sector.

2. The measurement of solar radiation at selected sites in the country.

3. The measurement of wind velocities and wind direction at certain locations in the country.

4. A survey of geothermal energy.

5. The elaboration of a design for a model village in which power will be generated from new and renewable sources as a pilot project for subsequent large-scale applications.

6. The propagation of the necessary awareness of alternative sources of new and renewable energy at the decision-making level and the level of the masses.

Prospects for regional and global co-operation

On both the national and international planes, we consider that co-operation should take place at the following levels:

1. The creation of an optimum model of co-operation for the establishment and operation of an institutional framework for scientific research at the University of Aden in co-operation with similar centres in other Arab countries.

2. The training of local cadres in existing research centres in Arab and other friendly countries.

3. The exchange of visits and expertise together with the examination of the experiences of other countries with similar social and economic circumstances and the adoption of appropriate aspects thereof.

4. The establishment, in co-operation with fraternal and friendly countries, of a pilot project (of an experimental nature) at a selected site in the country, in which new and renewable sources will be used to generate power.

xxxxxxxxxxx