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MAURITANIA: Energy Sector Profile

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Foreword

One of the principal objectives of the Energy Initiatives for Africa project is to identify national energy priorities in each African country and to help focus energy project resources on those priorities.

As a first step in that process, Energy/Development International (the EIA project contractor) has prepared this country energy profile which briefly summarizes the status of energy planning, energy institutions and energy supply/demand balances. Similar energy profiles have been prepared for every AID recipient nation in Africa, as well as for Nigeria and the Ivory Coast.

This energy profile is intended as a discussion document, to be continually refined and updated as better information becomes available. It draws on secondary source information readily available in Washington. For a number of countries, available information is fragmentary or contradictory. Even in such cases, however, it was thought preferable to put down what was known as a first step to clarifying national energy issues.*

Corrections, additions and other comments are actively solicited, both for this and subsequent versions.

*Due to a lack of alternative sources of information, this profile is based entirely on World Bank working documents.

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Foreword

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I. ENERGY SECTOR OVERVIEW

With a GNP per capita of US\$300 in 1979, Mauritania is not classified among the "Least Developed Countries" but faces the same basic constraints to development. Most of the country is desert. Agriculture and livestock herding, which sustain 80% of the 1.6 million inhabitants, are limited to the sub-Saharan and Sahelian southern third of the country, parallel with the Senegal River. Even there rainfall is irregular or insufficient.

During the 1960's, the economy grew at about 10% per year in real terms. This growth was due mainly to the development of iron ore mining and to the rapid expansion of livestock that resulted from a successful animal health campaign. Since then, however, growth has slowed down to less than two % a year mostly due to unfavorable developments beyond the Government's control. All gains in per capita income by the rural population achieved in the 1960s were lost during the drought years. Thousands of farmers and herdsmen who lost their source of livelihood in rural areas migrated to towns. Unable to find work in the modern sector, many turned to the informal sector for income opportunities or remained unemployed. In 1974, economic activity was beginning to return to normal when the doubling of the price of petroleum products, together with rises in other import prices, put pressure on the balance of payments and set the economy on an unprecedented inflationary path.

Since the second half of 1978, Mauritania has succeeded in avoiding financial crisis through government adherence to measures recommended under the Plan, coupled with continued foreign assistance on a substantial scale. Secondly, it has held current expenditure essentially unchanged in nominal terms and approximately at targeted levels.

With the exception of two large infrastructure projects (the Nouakchott port and the Kiffa-Nema road), most of the proposed public investments are now concentrated in the productive sectors in order to broaden the economic base and accelerate structural changes necessary for future growth. Highest priority is given to the continuation of iron ore exploitation, as this activity will remain the primary support of the Mauritanian economy in the foreseeable future.

In the next several years the overall growth of the economy could average more than four % per annum, with iron ore mining being the main motor of expansion. During this period, development of the rural sector will remain moderate because of the long gestation period of agricultural projects. After 1985, the increase in real GDP could be around three % per annum, and should result in a slow improvement in the level of income of the Mauritanian population. Savings outside the mining sector will not increase greatly without reducing private consumption. Indeed, the Government was enough to include in the Rehabilitation Plan only projects that have already attracted the interest of external donors. Prospects for mobilizing the remainder are relatively good, provided the Government improves the balance of payments and budget situation.

Mauritania's energy position is weak because of a narrow energy resource base heavily dependent on imported petroleum products and rapidly depleting forestry reserves. A long-range investment plan for the sector has yet to be prepared and there remain some deficiencies in energy pricing. Mauritania is still the Sahel country most severely affected by drought and environmental degradation. The 400,000 square miles

of territory and its 1.6 million people have suffered the effects of diminishing rainfall, crop desiccation, soil erosion, and the loss of valuable pasture and agricultural land. Deforestation has been particularly severe.

In times of drought, herders stripped trees for forage when nothing else was available for their animals. An expanding urban population is increasing demand for fuel. Trees are being exploited for charcoal production without being replaced through reforestation. As more ground cover and protective tree species disappear, soil erosion accelerates and resource productivity declines dramatically. Many sand dunes, which less than a generation ago were stabilized by trees and other vegetation, have been denuded of all protective covering and are moving into agriculturally productive zones.

A. Energy Resources

Forests covering 1,500 square kilometers in the south (or 1.3% of the national territory) are the most important known domestic energy source. Drought and growing over-exploitation have reduced the area along the Senegal river formerly devoted to *Gonakier Acacia nilotica* trees (ideal for producing charcoal) by almost a third from 20,204 hectares before 1970. Protection and reforestation activities will be needed to assure the adequacy and durability of continued charcoal production.

Biomass potential is difficult to tap because of the wide expanse of the country's territory. Total cultivated area is about 140,000 hectares and goats, sheep, camels and other animals number about 4.0 million UBT. Wind energy is potentially significant since wind velocity along the coast and in a few interior regions often exceeds five meters per second, but trials during the 1950's failed because of improper maintenance. Three stations are now performing an evaluation of wind energy potential in Aleg, Mederdra and Keur Massene in the southern part of the country and an aerogenerator has been set up in the national coastal park, with a rated power of one kilowatt. With 3,000 hours of sunlight per year, the potential of solar energy is great and is being tested in several sites. A one-kilowatt solar pump, a Rankine thermodynamic system with a capacity of 50 cubic meters per day, has been installed at Chinguetti. A 12 kW pump, financed by a grant of \$500,000 from the European Development Fund, has also been installed to provide irrigation for a rice field of 22 hectares, located along the Senegal river. This pump has a capacity of 200 cubic meters per day. There has also been installed at N'Taket a one peak kilowatt photovoltaic-powered pump with a capacity of 25-30 cubic meters per day. During the early 1960's, a desalting plant was installed in Nouakchott, when an abundant fresh water source was found by Chinese experts in 1962, some 40 kilometers east. A UNDP-funded feasibility study is evaluating the prospects of small solar stills to help solve the water supply problem for fishermen along the sea coast.

Hydropower potential exists along the Senegal river, some 500 kilometers away from the major load center. Mauritania is considering participation in the Manantali dam scheme on the Mali frontier but serious questions need to be resolved about its timing and economic viability. Minor hydrocarbon deposits have been encountered on- and off-shore, but more exploration is needed to assess the country's potential.

The World Bank is assisting the Mauritanian government's efforts to induce multinational firms to participate in intensified hydrocarbon exploration and such efforts have already led to a couple of contract signings and other expressions of serious interest on the part of multinational firms. Private enterprise is also a significant factor in the

production and distribution of wood and charcoal involving several hundred private entrepreneurs.

B. Energy Consumption

Overall energy consumption was estimated at 320,000 tons of oil equivalent in 1979 or 207 kilograms per capita. Imported petroleum products account for 40% of overall energy consumption and wood and charcoal for 60%. Electricity use, some 106 kWh in 1979, is equivalent to about 16% of final energy use. Generation is based entirely on small diesel units with an installed capacity totalling about 60 MW, of which about 25% is captive.

Domestic consumption of petroleum products was about 137,000 tons in 1980. Demand increased during the period 1971-77 by about 3.5% per annum. In 1978-79, demand fell by nearly 15% per annum because of the closure of a copper mine and Mauritania's withdrawal from the Western Sahara war, but in 1980, demand resumed its growth at 5.6% per annum. Gasoil is by far the most important product, accounting in 1979 for over 70% of petroleum product consumption. Among end-users of petroleum products, transportation accounts for 48%, mining and industry 31%, power generation 19% and residential/commercial use two %. While the cost of petroleum product imports averaged \$20-25 million per year over the 1975-78 period, this cost jumped to \$37 million in 1979 and perhaps \$56 million in 1980 (or 25% of Mauritania's export earnings).

Total removal of wood during 1980 for such uses as cooking, charcoal, timber poles, housing, fencing and nets was about 730,000 tons. Some 700,000 tons was used for cooking purposes alone, divided into 300,000 tons of firewood and 79,000 tons of charcoal (the wood equivalent of 395,000 tons.)

II. PETROLEUM SUBSECTOR ISSUES

About a third of petroleum product imports come from the Dakar refinery. The rest is purchased on West European markets. Importation and distribution of petroleum products are carried out by the government-owned Societe Mauritanienne de Commercialisation des Produits Petroliers (SMCPP), which accounts for 75 % of imports. Two private companies, BP and Mobil, share equally the remaining market. SMCPP was created in April 1981 to take over SNIM's activities in petroleum. Distribution by road and rail is satisfactory although some shortages developed in 1979 when purchases on the open market were difficult. Domestic distribution costs for more distant destinations amount to the equivalent of up to 10% of CIF import costs, and are reflected in differential retail prices.

A one million ton per year, US\$130 million refinery at Nouadhibou has remained idle since its completion in 1978 because of a technical and legal dispute with the contractor, difficulties in obtaining the Algerian crude for which it was designed and consequent uncertainties about its viability. A preliminary review of the refinery situation has been financed through IDA. Meanwhile an agreement has been in negotiation with Algeria for the supply of suitable crude and financial support for the start-up of the refinery. Although short-term financial support is thus being provided, the longer-term economics of the refinery operation will depend on, inter alia: (i) the relative costs of importing and refining crude versus the cost of importing petroleum products; (ii) future domestic demand; and, (iii) the scope for re-exports of petroleum products to regional markets.

Mauritania has two major sedimentary basins: the coastal basin covering 200,000 km² onshore and offshore, and the onshore Taoudeni Basin which is shared with Mali and extends for about 600,000 km² in Mauritania. The offshore portion of the coastal basin has been explored since 1966. No exploration of the onshore portion of the basin has yet taken place. A total of 22,000 km of seismic lines have been shot and eight wells drilled, all with oil and gas shows. The last well was completed in early 1980 in about 1,000 m of water at a cost of over US\$20 million, by the Seagap group¹ which holds a 24,300 km² concession in the northern part of the offshore. The well brought positive information and Seagap is now considering the drilling of a further well. The Taoudeni Basin (onshore) is the largest basin in West Africa. It was explored between 1970 and 1975 and two wells were drilled, one with a gas show.

Limited as they are, past exploration efforts bear out the fair potential of the Mauritanian offshore. The Taoudeni Basin, made up of older sediments, is significantly less attractive, but warrants additional promotional efforts by the Government.

¹A consortium including Hispanoil (Spain), Agip (Italy), Phillips (U.S.), and Exxon (U.S.).

III. ELECTRIC POWER SUBSECTOR ISSUES

Mauritania is a desert country with virtually no indigenous sources of commercial energy. The present electricity supply is provided by several oil-fueled diesel stations serving the urban areas. Due to the limited size of loads precluding shifting to coal-fired steam stations and the long distances and therefore high cost of transmission of hydro-power from neighbors to the south, Mauritania is probably destined to remain dependent on imported oil for electricity production for the period of this forecast (through 1995). However, a study should be made of hydropower importing prospects as an alternative. General institutional strengthening is also required.

IV. ENERGY PRICING

Petroleum product prices in recent years have largely moved in line with international prices and are relatively close to international levels. Rapid increases in CIF import prices in 1979/80 were passed on with little delay to consumers because ex-depot and retail prices are usually revised every three months. However, because of the dollar appreciation in 1980/81, the rate of price increases slackened somewhat in dollar terms. Nonetheless, fuel prices still reflect opportunity cost. Retail prices for regular gasoline and gasoil, in July 1981, were US\$2.63 and US\$2.12 per gallon equivalent, respectively. There is also a proliferation of preferential prices. Government entities and the power companies are exempt from fuel taxes altogether and diesel for fishing vessels costs less than two-thirds the full retail price. For social and industrial policy reasons, kerosene and gas oil bear lower taxes than gasoline and their retail price amount to 70% and 83%, of the gasoline retail price respectively, even though they are in heavy demand and their CIF import prices are higher than that of gasoline. Present electricity tariffs, ranging from US\$0.13 to US\$0.20 equivalent per kWh, do not cover the operating costs of the power utility which consists of small systems and is suffering from weak management. It sustained a UM 71 million (US\$1.5 million) loss in 1979 and anticipated losses of UM 115 million (US\$2.5 million) for 1980.

The 1979-80 international price increases of crude oil had a severe impact on Mauritania's balance of payments. While over the 1975-78 period, the cost of petroleum product imports averaged US\$20-25 million (or about 13% of earnings from exports of goods and nonfactor services), in 1979 it jumped to US\$37 million, or 20% of foreign exchange earnings, despite a 13% drop in the volume imported. In 1980, petroleum imports approached US\$56 million (or 25% of the expected export earnings). On the assumption that energy-intensive projects (such as the Guelbs project) are completed on schedule, and that other increases in energy consumption can be held at four % per annum through appropriate pricing and demand management policies and that no indigenous petroleum is being produced by then, petroleum imports by 1985 should reach about US\$150 million at current prices, absorbing a substantial share of foreign exchange earnings.

V. ENERGY SECTOR INSTITUTIONS

Responsibility for administration of the sector lies largely with the Ministry of Mines and Energy (MME). Its Directorate of Mines and Geology (DMG) is in charge of hydrocarbon exploration and supply. The Energy Unit (Cellule de l'Energie, CE) is in charge of renewable energy and energy planning. The Ministry of Environment and Hydrology supervises the State Power and Water Utility Company, SONELEC. The Ministry of Economy and Finance monitors investment programs in the sector and coordinates external financing for energy projects. Decisions on energy pricing, including taxation, are taken by the Council of Ministers acting on recommendations from the MME and energy enterprises. The policymaking process has been hampered by a poor data base, insufficient staffing of the agencies in charge and inadequate communication among concerned Ministries.

Responsibility for hydrocarbon exploration rests with the DMG, which also supervises all geological mining and quarrying activities in the country. Past exploration contracts were granted under the concession law of 1961 which provided for exploration periods up to 15 years. In the case of production, royalties of up to 12.5% on oil and 6.25% on gas, as well as income taxes of 55% were due. The exploration law is in the form of general enabling legislation which authorizes the state to issue reconnaissance, exploration, and exploitation permits and to enter into contracts with national or foreign companies for the purpose of petroleum exploration and development. Nonexclusive reconnaissance permits for an initial period of three years allow their holders to carry out only surface exploration. Exclusive exploration permits for an initial period of three years, with the possibility of two subsequent extensions, allow their holders to carry out drilling. There is an automatic right to a development permit for an initial term of 25 years in the event of commercial discovery. The law provides for application of the general business income tax to petroleum income at a rate not less than 50% and authorizes introduction of an oil surtax and levying of signature and production bonuses. A contract between the state and each permit holder defines in detail the rights and obligations of the parties, including royalties, the nature and extent of state participation, and priority to local consumption requirements. This law should be attractive to oil companies while safeguarding the country's interest.

VI. ENERGY INVESTMENT PROGRAMS

Energy-related investment for the 1981-85 period is expected to amount to US\$75 million (in 1980 prices), mostly financed by foreign aid. About 80% of the investments will be in the power sector where projects underway include the installation of 32 MW of additional diesel-based generating capacity in Nouakchott (financed by French assistance) and at the Guelbs iron mines (partially financed by the World Bank). These investments will, over the medium term, result in an increase in the country's petroleum or petroleum product imports.

In the absence of other readily exploitable energy sources, the Government attaches high priority to the search for hydrocarbons and wishes to attract more foreign companies to undertake petroleum exploration. It is following a systematic approach to promote its petroleum potential with the funds provided under two advances from the PPF amounting to US\$800,000.

USAID is in the processing of preparing a US\$4 million project focussing largely on solar and wind resources.

VII. SUMMARY OF ENERGY ISSUES AND STRATEGIES

Mauritania's energy position is weak because of a narrow energy resource base with heavy dependence on imported petroleum products, rapidly depleting forestry reserves for meeting energy demand, relatively high consumption due to an energy-intensive industrial sector, a weak sector administration and an ineffective policy-making process. Because of the 1979-80 petroleum price increases the cost of petroleum product imports rose from US\$37 million in 1979 to US\$56 million in 1980 (or about 25 percent of export earnings projected for that year). If present levels of wood and charcoal consumption continue, forestry reserves will soon be exhausted unless a major reforestation effort is undertaken. These weaknesses are compounded by inadequate energy administration, resulting in the lack of an energy development strategy or coherent energy policies. An investment plan for the sector should be prepared and deficiencies in energy pricing removed.

Mauritania's most formidable obstacle meeting the energy needs of well-prepared projects. Administrative services are inadequately staffed for project preparation and analysis and many rural sector projects selected by the Government need additional work to make them acceptable. Equally critical has been the lack of project execution capability.

The Government has yet to elaborate a strategy for tackling sectoral priorities, i.e., development of domestic energy resources and the efficient use of energy throughout the economy. Sectoral issues should be adequately analyzed and appropriate investment and pricing policies developed.

Petroleum development is an option to be pursued in view of the interest of foreign oil companies in investing risk capital in exploration. The geology of the offshore area is promising and even a small commercial discovery would meet the country's hydrocarbon needs and could generate significant foreign exchange through exports.

The Government's approach to hydrocarbon exploration has been cautious. Its success will depend heavily on DMG's having access to, and using, professional advice from qualified technicians in its negotiations with oil companies. Donors should assist in: (a) providing DMG with the expertise needed to negotiate equitable contracts with petroleum companies, monitor the activities of operating companies and integrate the data they collect with knowledge of the country's petroleum potential; and, (b) strengthening Government's capability in preparing energy-related projects.

A viable long-term sectoral investment strategy should be developed to consider alternatives to traditional energy sources (imported petroleum products and forests). A first effort should include: investigating the feasibility of shifting to cheaper sources of commercial energy e.g., fuel oil or coal instead of diesel oil; identifying the elements of a reforestation program and studying the potential for increasing the efficiency in transformation and use of wood and charcoal; inventorying renewable resources such as agricultural residues, eolian and solar energy; and, defining the scope for more efficient energy use by major industrial enterprises.

VIII. POSSIBLE NEXT STEPS UNDER EIA

- (A) The UNDP/World Bank will be performing a national energy assessment in the latter part of 1983. It is recommended that EIA activity in Mauritania await the results of this study to allow a determination of national energy priorities--a prerequisite to EIA funding.
- (B) Mauritania is a Sahelian country and therefore subject to funding agreements other than those that apply to countries under the AFR/RA umbrella. For this reason, EIA is proscribed from giving direct subproject grants to Mauritanian proposers. It is, however, possible to fund studies and project development activities that lead to funding through alternative AID mechanisms or by other donors. These may include: investment strategies, resource development/utilization studies, determining the potential for energy conservation, etc.
- (C) EIA will also sponsor training workshops/seminars drawing from a series of cross-country technology assessments performed over the course of the project. Three assessments are currently underway including agroforestry, private sector initiatives and energy conservation in the industrial, commercial, public and transport sectors. Training activities will be open to Africa-wide participation. Information generated by project-sponsored studies, assessments, evaluations, etc. will be freely distributed.

TABLE I. Consumption of Energy 1973-77

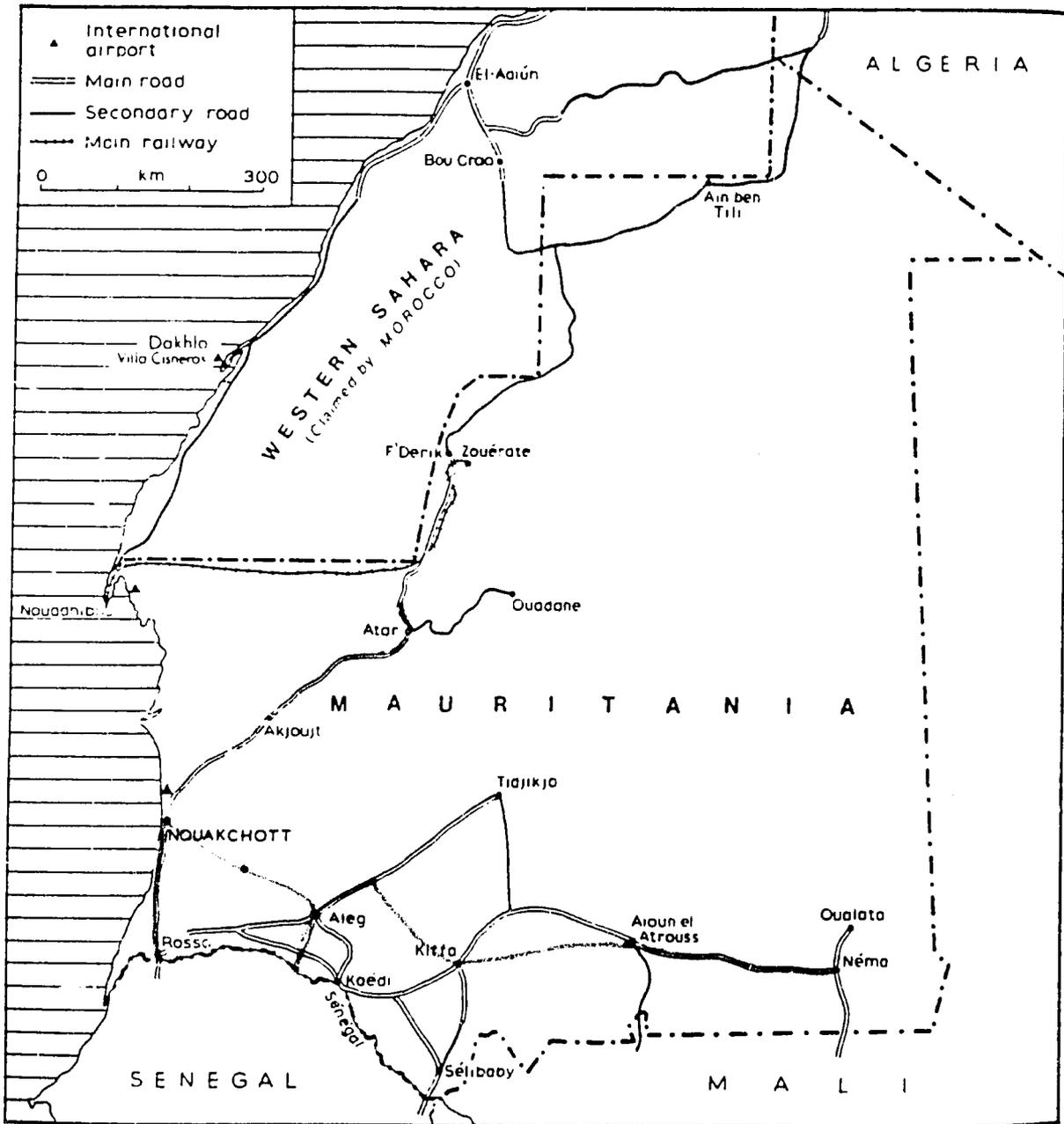
	1973	1974	1975	1976	1977
<u>(In millions of kilowatt hours)</u>					
Electric Power	78.8	87.7	77.4	136.4	139.0
<u>(In thousands of metric tons)</u>					
Petroleum Products					
Gasoline for planes	2.9	2.0	1.7	1.9	2.4
Kerosene	7.7	7.9	7.4	2.4	3.1
Gasoil	81.0	85.2	81.8	103.9	111.5
Gasoline for cars	13.6	10.8	17.7	20.5	25.2
Fuel oil	45.4	44.9	17.6	30.2	27.7
Diesel oil	<u>3.0</u>	<u>4.7</u>	<u>5.1</u>	<u>5.6</u>	<u>8.0</u>
Total	153.6	155.5	131.3	164.5	177.9

TABLE II. Production of Electrical Energy 1973-77

	1973	1974	1975	1976	1977
<u>(In thousands of kilowatt hours)</u>					
Installed capacity	38.0	40.0	42.5	44.0	45.5
<u>(In millions of kilowatt hours)</u>					
Production	79.4	92.5	79.5	151.4	154.6

Table III. Electricity Supply Forecast

	<u>1980</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
<u>Installed Capacity, MW</u>				
Oil thermal	55	70	100	120
<u>Gross Production, GWh</u>	100	140	200	280
Oil thermal				
5-Year Average Annual				
Growth Rate, %	7.0	7.0	7.0	7.0
Annual Capacity Factor, %	21	23	23	27
Annual Oil Requirement, ktoe	25	35	50	70



Mauritania and part of Western Sahara (claimed by Morocco).

Africa South of the Sahara: 1980-81 (tenth edition).
 London: Europa Publications Limited, 1980. p. 658.