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STAFF APPRAISAL REPORT

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

AUGUST 30, 1990

Industry and Energy Division
Country Department II
Europe, Middle East and North Africa Regional Office

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CURRENCY EQUIVALENTS

Currency Unit - Moroccan Dirham (DH)

US\$ 1.00 - DH 8.82 (May 1990)
DH 1.00 - US\$ 0.113

WEIGHTS, MEASURES AND ENERGY CONVERSION FACTORS

1 kilogram (kg)	= 2.206 pounds (lb)
1 ton (metric)	= 1,000 kg
	= 2,206 lb
	= 1.102 short ton
	= 0.984 long ton
1 meter (m)	= 3.281 feet (ft)
1 kilometer (km)	= 1,000 m
	= 3,281 ft
	= 0.6214 miles
1 kilocalorie (kcal)	= 3.968 British thermal units (Btu)
	= 4.187 joules
1 kilowatt hour (kWh)	= 1,000 watt hours
1 Megawatt (MW)	= 1,000 kilowatts
1 Gigawatt-hour (GWh)	= 1 million kilowatt hours
1 kilovolt-ampere (kVA)	= 1,000 VA
1 megavolt-ampere (MVA)	= 1,000 kVA
1 ton of oil equivalent (toe)	= 1 ton of crude oil
	= 1 ton of petroleum products and LPGs
	= 1.79 tons of local coal
	= 1.51 tons of imported coal
	= 1.32 x 10 ⁶ cubic meters of natural gas
	= 3,846 kWh of hydrogeneration
	= 11,630 kWh of electricity
	= 4.00 cubic meters of fuelwood

FISCAL YEAR

January 1 - December 31

- 1 -

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

COSPER	- Comité de Suivi du Programme d'Electrification Rurale
EIB	- European Investment Bank
FDI	- Foreign Direct Investment
HFO	- Heavy Fuel Oil
HV	- High Voltage
ICB	- International Competitive Bidding
LIS	- Limited International Shopping
LRMC	- Long-Run Marginal Cost
LV	- Low Voltage
MARA	- Ministère de l'Agriculture et de la Réforme Agraire
MEM	- Ministère de l'Energie et des Mines
MF	- Ministère des Finances
MI	- Ministère de l'Intérieur et de l'Information
MP	- Ministère du Plan
MV	- Medium Voltage
NREP	- National Rural Electrification Program
NREP1	- National Rural Electrification Program - First Phase
OCP	- Office Chérifien des Phosphates
ONE	- Office National de l'Electricité
PERL	- Public Enterprise Rationalization Loan
SAMIR	- Société Anonyme Marocaine de l'Industrie du Raffinage
SCP	- Société Chérifienne de Pétroles
SNPP	- Société Nationale des Produits Pétroliers
SOE	- Statement of Expenses
USAID	- United States Agency for International Development
VAT	- Value Added Tax

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KINGDOM OF MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

LOAN AND PROJECT SUMMARY

- Borrower:** Kingdom of Morocco.
- Beneficiary:** The Office National de l'Electricité (ONE).
- Loan Amount:** US \$ 114.0 million equivalent.
- Terms:** Twenty years, including five years of grace, at the Bank's standard variable interest rate.
- Project Description:** The proposed project would be a continuation of the first phase of the National Rural Electrification Program (NREP1), initiated with Bank assistance in 1980. It would ensure the connection to the main grid of about 462 new villages located in 34 provinces, and would cover the cost of connecting about 170,000 new consumers, thus increasing the rate of electrification of the rural areas from 25% to about 45%. It would also involve the expansion of ONE's operating facilities and regional offices and would follow up on the institution building efforts initiated under previous and ongoing operations, and aimed at strengthening ONE's planning, distribution and marketing capabilities, and its financial performance.
- Benefits:** The principal benefits of the project would derive from the value attached by rural consumers to the incremental electricity sales, which would either substitute for other less efficient fuels or satisfy their as yet unmet energy needs. Although not easily quantifiable, secondary benefits are expected from improving the well-being of the rural population, promoting economic development of rural areas and stemming rural-urban migration. The internal economic rate of return, excluding these secondary benefits is estimated at about 18%.
- Risks:** Two major project-related risks which might lead to delay in project implementation stem from possible delays by the Government in providing adequate counterpart funds, and possible inadequate coordination between the various entities involved in the project. These were important problems experienced during the implementation of NREP1. These risks will be alleviated by the Government's recent decision to increase the financial resources of the local communities for their development programs by allocating to these programs 30% of the funds collected from the value added tax (VAT), and by the special agreement

entered into between the ministries involved in the project and ONE, and which was executed as condition of Board Presentation.

Maps: IBRD No. 22099
IBRD No. 22100

Project Financing Plan

	US\$ million		
	Local currency	Foreign currency	Total
- Proposed IBRD loan		114.0	114.0
- Government (MI)	97.6 ^{a/}	7.1 ^{b/}	104.7
- ONE		1.3 ^{b/}	1.3
	-----	-----	-----
Total	97.6	122.4	220.0

Disbursements

Estimated Disbursement Schedule

	US\$ million						
	FY91	FY92	FY93	FY94	FY95	FY96	FY97
Annual	1.7	8.7	16.2	27.7	32.1	22.2	5.4
Cumulative	1.7	10.4	26.6	54.3	86.4	108.6	114.0

^{a/} including US\$25.1 million of custom duties and taxes

^{b/} amounts representing the interest during construction

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

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Following a mission to Morocco in October 1989, this report was prepared by: Mrs. Z. Ladhibi-Belk (Sr Power Engineer), and MM. R. Hamilton (Sr Energy Economist) and C. Woodruff (Sr Financial Analyst).

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IBRD Maps No.22099

IBRD Maps No.22100

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

STAFF APPRAISAL REPORT

I. THE ENERGY SECTOR

1.01 Energy Resources. Morocco has a wide variety of energy resources including: oil, natural gas, oil shale, coal, hydro, uranium, biomass, wind and solar energy. However, the currently known reserves are either small or have high per unit costs of production, with the result that there has been only limited domestic commercial energy development. Over the past ten years, imports supplied more than 80% of Morocco's commercial energy demand. Limited reserves of oil and natural gas have been discovered and production is less than 75 thousand tons oil equivalent (toe) per year. Morocco's oil shale reserves are estimated to be over 100 billion tons, containing more than six billion tons of oil. However, the prospects for early development have been dampened by declining international oil prices as well as the discontinuation of significant development of oil shale technology in other countries. Morocco has proven recoverable coal reserves of about 12 million tons in the Jerada Coal basin, 60 km South of Oujda. However, the difficult geological conditions imply that the current production level of about 600,000 tons (used by a mine-month power station) is unlikely to be exceeded during the mine's remaining 15 years of life. The country's hydropower potential is estimated at 4,600 GWh per year (1.1 million toe) under average hydrological conditions. Of this potential, 1,800 GWh has already been tapped and new hydro projects with an annual production of 750 GWh are under construction. Natural forests in Morocco, covering about 5.3 million hectares, are an important source of energy for a large proportion of the population. Fuelwood consumption, estimated at about 3.4 million toe in 1984, is sufficiently high to cause deforestation at a rate of about 20,000 hectares per year. Seven to 10 million tons (60-80 billion toe) of uranium are contained in Morocco's 50 billion tons of phosphate reserves. Extraction, however, is costly with present technology. Solar and wind resources are abundant, but neither is likely to contribute significantly to the country's energy supplies before the 21st century.

1.02 Past Energy Consumption and Supply. Commercial energy consumption grew at an average of 7.4% per year from 1965 to 1980^{1/}, but the growth rate declined between 1980 and 1988 to an average of 2.7% (Table 1.1). This decline exceeded the reduction in economic growth. The ratio of energy growth to GDP growth averaged 1.47 over the period 1965 to 1980, but was only 0.67 from 1980 to 1988. The reduction is due largely to the maintenance of high domestic energy prices (para. 1.08) and implementation of other energy conservation measures (para. 1.06).

^{1/} Source for data prior to 1980: Joint UNDP/World Bank Energy Sector Assessment Program, Morocco: Issues and Options in the Energy Sector (Report No. 4157-MOR), March 1984.

TABLE 1.1

MOROCCO - PAST ENERGY CONSUMPTION AND PRODUCTION (1980-1988)
(Thousand toe)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
<u>Consumption</u>									
Petroleum Products ^{a/}	3,866	3,887	4,086	4,117	4,267	4,296	4,192	4,127	4,449
Coal	371	445	438	560	507	662	900	1,049	1,031
Hydroelectricity	397	268	149	125	95	126	167	215	243
Natural Gas	<u>52</u>	<u>65</u>	<u>60</u>	<u>63</u>	<u>63</u>	<u>73</u>	<u>69</u>	<u>56</u>	<u>63</u>
A. Total	4,686	4,675	4,733	4,865	4,932	5,156	5,328	5,447	5,786
Growth Rate (%)		-0.2	1.2	2.8	1.4	4.5	3.3	2.2	6.2 ^{b/}
<u>Domestic Production</u>									
Coal	352	418	398	374	363	367	360	373	358
Hydroelectricity	397	268	149	125	95	126	167	215	243
Oil and Natural Gas	<u>64</u>	<u>82</u>	<u>74</u>	<u>79</u>	<u>79</u>	<u>93</u>	<u>91</u>	<u>73</u>	<u>83</u>
B. Total	813	766	619	578	537	586	618	661	682
Growth Rate (%)		-5.8	-19.2	-6.6	-7.1	9.1	5.5	7.0	3.2
C. Net Imports (A-B)	3,873	3,909	4,114	4,287	4,395	4,570	4,710	4,786	5,104
In % of Consumption	82.7	83.6	86.9	88.1	89.1	88.6	88.4	87.9	88.2

Source: Ministère de l'Énergie et des Mines, Direction de l'Énergie.

^{a/} Excludes use and losses in refining and non-energy uses (about 11% of petroleum consumption).

^{b/} The jump in 1988 is largely explained by a 10.7% real increase in GDP.

1.03 Most of Morocco's commercial energy consumption consists of oil, nearly all of which is imported. Oil consumption grew from 60% of commercial energy consumption to 83% in 1985 before falling back to 77% in 1988 (4,449 thousand toe). The growth in the share of oil prior to 1985 was due mainly to the drought-induced decrease in hydroelectricity which fell by over two thirds between 1980 and 1985. The fall in oil's share after 1985 was due to an increase in the use of coal as a result of a partial switch motivated by relative price considerations from fuel oil to imported coal for electricity generation, cement production and sugar refining. Hydroelectricity supply also picked up after 1985 as reservoir levels gradually rose following the end of the drought. Domestic commercial energy production, mostly coal and hydroelectricity, declined by 34% between 1980 and 1984 before recovering by 28% in the following four years. This variation is due largely to the changes in hydroelectricity production.

1.04 Morocco's per capita consumption of commercial energy of 239 kilograms of oil equivalent in 1988 was the fourth lowest among EMENA coun-

tries^{1/}. As noted in paragraph 1.01, traditional energy in the form of fuel wood consumption continues to play a large role in Morocco. The energy balance in Annex 1.1 shows that traditional energy accounted for about one-third of total energy consumption in 1988. The energy balance also highlights the importance of energy used for electricity generation, accounting for 56% of heavy fuel oil consumption in 1988, 72% of coal, as well as all the hydroelectricity.

1.05 Energy Sector Organization. The Ministry of Energy and Mines (MEM) is responsible for the overall planning and development of the energy sector. It has tutelage over a number of energy-related public enterprises including: (i) the "Office National de Recherches et d'Exploitation Pétrolière" (ONAREP); (ii) the "Société Anonyme Marocaine de l'Industrie du Raffinage" (SAMIR); (iii) the Société Chérifienne des Pétroles (SCP), which is 75% owned by ONAREP and the Treasury, with the rest being held by local and foreign private shareholders; (iv) the "Société Nationale des Produits Pétroliers" (SNPP), which is the holding company for the 50% of the shares the Government has in the major petroleum distribution companies, the other 50% of which are held by major international oil companies; (v) "Charbonnages du Maroc", operator of the Jerada coal mine; and (vi) ONE. The Ministry of the Interior (MI) has a role in the energy sector by virtue of having tutelage over 15 publicly-owned distribution utilities (Régies), of which 10 distribute electricity in the main urban areas. The 15 Régies are also responsible for water distribution, and the Régie of Casablanca (RAD) is responsible for sewage disposal as well. Other ministries with involvement in the sector include the Ministry of Public Works which constructs dams for hydroelectricity, and the Ministry of Agriculture and Agrarian Reform (MARA) through its responsibility for forest protection and management, the Ministry of Finance (MF), the Ministry of Economic Affairs and the Ministry of Planning (MP).

1.06 Government Energy Policy. The Government's long-term objective is to reduce the current predominant reliance on oil imports while attempting to meet energy needs in a cost-effective way. With respect to energy demand, the Government's objectives include: (a) promotion of energy conservation through price measures (para. 1.08) and non-price measures; and (b) encouragement of economically profitable interfuel substitution. Non-price measures already carried out include energy audits of large industries, a publicity campaign and shortening the work week to five days. A new \$5 million USAID financed program is focussing on energy conservation in agro-industries, the construction industry and hotels. For interfuel substitution, 2x150 MW units at ONE's power station at Mohammedia, some cement plants and sugar refineries were converted to permit the use of coal.

1.07 On the supply side, the Government has sought to increase production of domestic energy resources directly through public enterprises and in recent years by encouraging private initiatives through the use of more attractive new petroleum exploration agreements. Efforts are continuing to develop a wide range of energy resources by constructing additional

^{1/} Morocco's per capita GDP was the fifth lowest.

multipurpose hydro projects, maintaining coal production, continuing exploration for oil and gas, investigating the potential of wind, solar, nuclear energy and oil shale, preparing for a reinforcement of the existing power interconnection with Algeria and examining a possible power interconnection with Spain. Studies are being planned to evaluate a proposal to construct a natural gas pipeline from Algeria through Morocco to Spain. Morocco would receive gas from this line and from a separate line from Algeria to northeast Morocco. The Bank is assisting in this effort through the preparation of a natural gas development plan for Morocco under the auspices of ESMAP. To strengthen its centralized energy investment planning capabilities, MEM has set up a micro-computer-based planning unit with USAID assistance.

1.08 Energy Pricing^{1/} Morocco's domestic prices for petroleum products are on average considerably above their economic costs (Table 1.2). This is the result of a conscious decision in 1986 to maintain domestic petroleum prices at their previous high levels, partly as an incentive for continued energy conservation but mostly because of the need for additional tax revenues for a national exchequer that was - and remains - very stretched. A recent World Bank study examined the impact of these high prices on energy consumers, suppliers, and on Government revenues. It concluded that the high oil prices have a fairly small adverse impact on the competitive position of industry and agriculture, but suggested that if and when it is possible to increase non-energy taxes, taxes on oil should be reduced by a corresponding amount so as to permit the domestic price of heavy fuel oil to be reduced to a level close to the price in other oil importing countries in competition with Morocco^{2/}. The report also recommended changing the structure of petroleum product and coal prices in order to encourage increased economic efficiency. This report has been well received in Morocco, and the Government is currently studying ways to implement its recommendations, with the assistance of consultants financed by USAID.

1.09 Consumers of imported coal pay the international price plus an import tax and an import duty totalling 15% plus a 19% value added tax (VAT). The price for domestic coal of DH 664 per ton (excluding 19% VAT) paid by ONE is estimated by the Bank to be approximately equal to the import cost for anthracite of a quality which can be used in the Jerada power station. It conforms to the agreement under the Jerada Coal Mine Modernization and Expansion Project (Loan 2508 MOR) under which the domestic price should not exceed the opportunity cost.

^{1/} Electricity prices are discussed in para 2.03.

^{2/} World Bank, Kingdom of Morocco - An Approach to Energy Price and Tax Reform, op. cit.

Table 1.2

MOROCCO - PETROLEUM PRICES

	Domestic		Economic Cost				Domestic Price/Cost %
	Retail Price		Price fob Rotterdam	Transport	Distrib- ution	Total	
	DH per liter	DH per ton	US\$ per ton	US\$ per ton	DH per ton	DH per ton	
Super Gasoline	6.05	8,125	205	11	537	2,442	333
Gas Oil	3.45	4,112	165	11	293	1,845	223
Kerosene	3.11	3,856	192	11	305	2,095	184
Jet Fuel	2.09	2,592	192	11	305	2,095	124
Heavy Fuel Oil		1,753	87	14	115	1,005	174
LPGs (bottles < 5kg)		3,050	117	30	1,126	2,423	126

Source: MEM, except where indicated otherwise in footnotes below

-
- a/ Includes value added tax of 7% for all products except heavy fuel oil
 - b/ For all products except LPG's average for the period January 1989 through May 1990 based on Platt's quotations. LPG price is average for butane for the period February through November 1989.
 - c/ Estimates given in the contract programs for SAMIR and SCP
 - d/ Existing distribution margins in 1990, excluding taxes.
 - e/ Fob prices converted at May, 1990 exchange rate of US \$1.00 = DH 8.82

II. THE POWER SUBSECTOR

2.01 Power Subsector Suppliers. The power subsector is composed of: (a) ONE, responsible for nearly all public power generation (about 86% of Morocco's total generation) and transmission, and distribution to all high-voltage customers and to medium and low-voltage customers in some cities and rural areas; (b) ten communal distributicn Régies each responsible for distribution at medium and low voltage in a city plus, in most cases, some surrounding communities; (c) small isolated systems operated by MI; and (d) captive plants operated by industries which occasionally sell electricity to or buy it from ONE; the largest captive plants belong to the OCP group: Maroc Phosphore, Phosboucraa and Maroc Chimie. In June 1988, the interconnection with Algeria was reopened, permitting exchanges of electricity between Morocco and Algeria. The entities' shares of the power market in 1988 are given in Annexes 2.1 and 2.2 and summarized below:

Table 2.1

FINAL ELECTRICITY SUPPLY BY ENTITY (1988)^{a/}

	<u>(GWh)</u>	<u>(%)</u>
ONE (direct sales through interconnected system) ^{b/}	3,102	41
ONE (isolated systems)	30	-
Régies	3,273	43
Ministry of Interior	19	-
Autoproducers' own use	<u>1,210</u>	<u>16</u>
Total	7,634	100

^{a/} Excludes losses in generation, transmission and distribution.

^{b/} ONE also supplies electricity to the Régies, purchases electricity from autoproducers, and trades electricity with Algeria. Net imports from Algeria were 18.2 GWh in 1988.

2.02 On a national level, total generation increased by 7.5% per year from 4361 GWh in 1978 to 8965 GWh in 1988. Data on the growth of the subsector are given in Annex 2.1.

2.03 Electricity Tariffs. Tariff rates are currently greater than long-run marginal costs (LRMC) for all voltage levels and tariff categories (Annex 2.4). The 1988 weighted average revenue for sales to final customers in Morocco of DH 0.82 per kWh was 62% higher than the estimated weighted average LRMC of DH 0.51 per kWh. This discrepancy is due mainly to the difference between the domestic price of heavy fuel oil, which largely determines the level of selling prices, and the much lower economic cost of heavy fuel oil used in the calculation of the LRMC. The recommendation of the Energy Pricing Study to reduce the domestic price of heavy fuel oil would allow the gap between average revenue and LRMC to be reduced (para. 1.08). Morocco's electricity tariff structure has been gradually simplified and improved over

the past decade (Annex 2.3). Regional variations in retail rates have been reduced, and a progressive structure has been introduced for urban and rural household customers. However, differences between tariff rates for different categories of consumption and during different periods of time do not reflect the economic cost differences. The most serious defect is the absence of a separate peak period rate, which would discourage electricity consumption during peak periods, thereby reducing the need for new electricity supply capacity.

2.04 The Government recognizes that these defects need to be rectified and is carrying out a study, financed under the Public Enterprise Rationalization Loan (PERL, Loan 2820-MOR), to develop specific proposals for their resolution^{1/}. The electricity tariff study, expected to be completed by mid-1991, includes calculation of the LRMC, and will recommend a tariff level and structure which would reflect the economic costs as far as possible, subject to constraints imposed by the need to satisfy Government-specified financial objectives.

2.05 The reports prepared by the consultants (some still in preliminary draft form) envisage that introduction for high and medium-voltage consumers of separate energy charges for three periods of the day and two seasons, and demand charges which are partially variable over the same periods. Less complex structures are proposed for low-voltage customers since the benefits attributable to the more complex structures would likely be less for them than the additional costs associated with the sophisticated meters required by these structures. For purposes of the proposed rural electrification project, the most relevant tariffs are those proposed for low-voltage residential customers and medium and low-voltage agricultural customers. Residential customers would pay a demand charge (differing according to subscribed demand) and an energy charge. They could choose between a single energy charge and an option having two different charges, one for day-time hours and the other for night-time hours. For social reasons, there would also be a tariff offered to small users consisting, for the first 50 kwh per month, of an energy charge only, equal to the energy charge for residential users who select the single energy rate option. Additional monthly consumption would be charged a higher rate. Since average monthly consumption of residential customers in the villages to be electrified is forecast to be less than 50 kWh (para 5.01) most of those customers would be able to benefit from the small user option. The proposed low-voltage agricultural tariff consists of a demand charge (differing according to subscribed demand) and an energy charge, which would be much lower in summer than in winter. Most electricity for water pumping, however, is purchased at medium voltage. The structure for medium-voltage agricultural consumers proposed by the consultants consists of a demand charge which depends on the number of hours of use of the subscribed demand per year and on the proportion of subscribed demand used during daytime periods, and an energy charge, differentiated for two periods of the day and two seasons of the year as well as for hours of use of subscribed demand (Annex 2.3).

^{1/} Electricité de France International and the Moroccan group CID are the consultants engaged for this study.

2.06 Although the tariff study is not yet finished, the Government decided, effective May 1, 1989, to implement the new tariff structure proposed by the consultants for medium-voltage agricultural customers. In this structure, the energy rates for the summer period, when most pumping for agriculture occurs, are considerably lower than the winter rates (DH 0.55 per kWh per daytime summer hours compared to DH 0.98 per kWh per daytime winter hours). As a result average electricity costs for agricultural consumers were expected to decrease. The Government simultaneously raised overall low-voltage tariffs by approximately 2% to compensate ONE for lost revenue from agricultural customers. These changes are satisfactory.

2.07 The other preliminary reform proposals of the consultants are also acceptable, and the proposed project provides for technical assistance to the Government to implement tariff reforms (para 3.15). During negotiations, the Government agreed to decide on the basic elements of the new tariff structure by December 31, 1990, and to continue to implement gradually the recommendations of the study, on the occasion of each tariff adjustment, with the objective of implementing a global national tariff policy acceptable to the Bank, starting June 30, 1992 (para 6.02).

2.08 Connection Charges. An important source of funds for ONE and the Régies are revenues obtained from connection charges for new customers. These cover the cost of connection plus 20% for overhead expenses, plus, for some customer categories, a contribution for grid expansion. Connection charges for the separable costs of connection are economically justifiable provided they cover but do not greatly exceed the separable costs. However, these charges are large, particularly when the customer is far from the grid and/or a contribution for grid expansion is required. In the absence of a facility offered by the electricity companies for spreading payments over time, the high charges have probably discouraged new customers in urban and rural areas. Nevertheless, the revenues received by the Régies from connection charges finance more than half of their investment programs, and have enabled them to remain afloat in the past when the Government failed to increase the margins between their selling and buying prices by enough to cover increased costs. Thus the establishment of a facility for spreading out payments of connection charges would be unrealistic for the Régies at the present time and would impose a financial burden on ONE. Hence it is not feasible to generalize a deferred payment system for all ONE or Régies consumers at this time. Nevertheless, to assess the impact of such a system on consumer access and affordability, it has been agreed to introduce it on a test basis for customers who would be served by the proposed project (para 3.07).

ONE . The Executing Agency for the Project

2.09 Organization and Management. ONE was established in 1963 as a Government-owned enterprise when the subsector was nationalized and the generating facilities, together with a number of distribution networks, were transferred to it. ONE's management reports to an eight-member Board under the chairmanship of the Prime Minister, who is usually represented by the Minister of Energy and Mines. The other Board members are representatives of the Ministries of Finance (MF), Planning, Interior and Public Works, and of

management and labor. The Board meets regularly two to three times per year. ONE's management is competent, knowledgeable and strong. The General Manager is ONE's chief executive, and he is assisted by a Deputy General Manager. Day to day business is delegated to four directors who are responsible for five departments: administrative services, finance, planning and equipment, generation and transmission, and distribution. The Director of Finance is also Director of Administrative Services. The existing organizational structure (Annex 2.5) is satisfactory.

2.10 Planning. ONE's planning staff are competent and well-informed. However, there is a need for increasing the number of personnel and computer resources to permit more detailed demand analysis and greater use of planning models. ONE is only in the early stages of implementing systematic procedures for establishing priorities among distribution projects, expenditures on rehabilitation, studies and miscellaneous projects. In general, more attention needs to be paid to coordinating the expenditure programs submitted by the various departments of ONE by ensuring that procedures for handling details such as inflation, interest during construction and physical contingencies are established properly and applied uniformly. Recommendations for strengthening ONE's demand forecasting and planning capability are expected to be made in the context of the electricity tariff study (para. 2.05). ONE has already received, from the consultants doing the study, computer software for load forecasting, distribution system planning and marginal cost calculation. Distribution planning analyses for ONE are to be carried out under the Power Distribution Project (Loan 2910-MOR). Additional computer hardware would be provided under the proposed project (para. 3.03).

2.11 Personnel. Between 1981 and 1988 the number of ONE's permanent staff increased from 5,767 to 8,462. In 1988 the number of thermal and hydro production employees per MW of thermal and hydro capacity was rather high, 1.3 and 1.0, respectively, compared to "normal" levels of 0.6 and 0.4, respectively. This is partly due to the fact that ONE has many small diesel stations (18) and a large number of hydro plants in operation (21). The number of connections per employee was modest at 80 (a normal figure would be two-thirds higher) but this is not surprising in view of the fact that most urban centers are served by the Régies.

2.12 ONE has some difficulties in recruiting and retaining suitably qualified staff. The problem is in part general, due to a shortage of technicians in the country, and in part because of the rather low salaries in comparison with the private sector, particularly for new staff. However, career development possibilities in ONE are reasonable, and there are substantial fringe benefits after a minimum number of years of service.

2.13 Training. ONE is fully aware of the importance of training and has an efficient training center in Casablanca with a capacity to train about 400 technicians annually. Trainees are contractually obliged to remain a number of years in the employment of ONE. Assignment to special training abroad, particularly in France, is quite common for higher-level staff. In general, ONE's training activities are satisfactory and efforts are being made to improve them further. The proposed Project includes a component for training in order to strengthen ONE's distribution department in the areas of

engineering design planning and data collection to plan, monitor and implement subsequent plans of the rural electrification program.

2.14 Existing Facilities. ONE's total installed generating capacity in December 1989 was 1963 MW, of which 616 MW was hydroelectric and 1,347 MW thermal (1,185 MW steam, 136 MW combustion turbine and 26 MW diesel - see Annex 2.6). Total installed capacity increased at an average annual rate of 9.8% between 1978 and 1985, but has remained virtually constant since then. During the former period the mix of hydro and thermal plant changed from 43:57 to 31:69. In winter 1988/1989, ONE's available thermal capacity of 1320 MW plus guaranteed hydro capacity of 280 MW was barely sufficient to cover the peak demand on the interconnected system of 1430 MW and to provide for planned maintenance and unscheduled outages, but the interconnection with Algeria provided a back-up source of supply. The major generating stations and load centers are interconnected by a 225-kV grid extending 3143 km (see Annex 2.8 and map). There are also 864 km of 150-kV transmission lines, 6800 km of 60-kV subtransmission lines, and 19,140 km of distribution lines. Maintenance of facilities is generally satisfactory.

2.15 System Losses. In the last 11 years, ONE's losses on its interconnected system, as a percentage of total generation and purchases, averaged 15.1%, including station-own consumption of 7.1% (Annex 2.1). Transmission losses were high at an average of 6.6%, but decreased after 1986 to 5.9% in 1988. The extremely low distribution losses (average 1.3% of total generation plus purchases) reflect the fact that ONE's sales to low and medium-voltage customers (at 22 kV and below) constitute only 21% of its total sales. Distribution losses for medium and low-voltage networks represent about 6.3% of the related generation, a reasonable figure. In the peripheries, nevertheless, where rapid urban expansion has taken place, lines may be too long or overloaded. The Power Distribution Project is addressing this problem through a rehabilitation program which is expected to lead to some loss reduction. In addition, plans are being made to examine the transmission and distribution losses of ONE and the Régies through the UNDP/World Bank Energy Sector Management Assistance Program (ESMAP). The ESMAP study, initiated in early 1990, is expected to be completed in 1991.

2.16 Number of consumers. The number of ONE's consumers increased by 7.4% per year from 331,000 in 1979 to 677,000 in 1988 of which 99%, in 1988, were at low voltage (Annex 2.9). ONE served 4,400 customers in 1988 at medium voltage and 90 at high voltage. The number of rural consumers included in the totals for 1988 was 276,000 (41%).

2.17 Electricity Demand Forecast. Each year from 1984 to 1990 ONE forecast its sales to grow by an average of 7.0% per year. ONE's forecasts are based partly on surveys of large customers and partly on estimates made from a correlation between historical GDP growth and electricity consumption growth. Since actual growth in sales averaged 6.7% per year from the end of 1984 to the end of 1989, and there are no significant changes in trend expected to occur over the next four years, a demand forecast was chosen assuming the continuation of 6.7% growth from 7133 GWh in 1989 to 12,800 GWh in 1998 (Annex 2.10). ONE is in agreement with this forecast. ONE's forecasts of peak demand made between 1984 and 1989 have been very accurate

for the same period. In December 1989 ONE forecast peak demand to grow by 6.7% per year to the year 2000. However, no account was taken of the possible impact of the expected tariff reform on peak demand. The forecast of peak demand shown in Annex 2.11 assumes that tariff reform will reduce the rate of growth from an average 6.7% per year from 1989 to 1992 to 6% per year from 1992 to 1998.

ONE: Investment Program

2.18 Generation. Planned new generating capacity to satisfy demand through winter 1998/99 includes:

- . 6 X 30 MW combustion turbines - end 1991/end 1992
- . 45 MW guaranteed hydropower at Hassan 1st - 1991
- . 224 MW guaranteed hydropower at Matmata - 1993
- . 2 X 300 MW coal power station at Jorf Lasfar - end 1994/end 1995
- . 205 MW guaranteed hydropower at M'Jara - 1997,
- . 64 MW guaranteed hydropower at Dchar el Oued/Ait Messaoud - 1996.
- . 35 MW guaranteed hydropower at M'Dez - 1998

Of these projects the combustion turbines are under construction, financing has been found for Matmata and M'Jara and financial agreements for Jorf Lasfar are being finalized. Projected capacity and energy balances are presented in Annexes 2.11 and 2.12.

2.19 According to a least-cost analysis carried out in the Bank using the Wien Automatic System Planning Package III (WASP III), the combustion turbines and Jorf Lasfar enter the least-cost program. Jorf Lasfar would be needed as early as 1995 even if the rate of demand growth falls to as low as 4.6% per year from 1988. Matmata, M'Jara and Dchar el Oued also enter the least-cost solution, but only the investment costs of the power stations were taken into consideration. Whether these projects would be retained when costs of the dams and other civil works are included depends on whether the surplus electricity benefits, in combination with the non-electricity benefits of these projects, cover the overall civil works costs. A supplementary analysis of this kind suggests that the Matmata project is only marginally economic, unless world energy prices rise faster than currently forecast. A detailed analysis of M'Jara carried out by the Bank in September 1989 found that the overall project, including the hydro power station, is marginally economic. The Bank plans to carry out a detailed study of Dchar el Oued before a final decision is made on its construction. Similar studies will also be done for the proposed hydro-power stations of Ait Messaoud and M'Dez, which on the basis of current available data do not enter the least-cost solution when benefits are evaluated in terms of energy savings valued at oil prices projected by the Bank. These two projects will be re-examined with ONE in the context of the establishment and updating of a coordinated least-cost investment in the power subsector (para. 2.22). The Bank's analysis indicates that the least-cost program would include additional total capacity in the form of combustion turbines. However, the current program proposed by ONE is justified in view of the uncertainty over the rate of growth of demand and of the possibility to decide later to construct additional combustion turbines, for which the construction period is only two years. The Bank's analysis also

indicates a preference for 100 MW combustion turbine units, rather than 30 MW units. Nevertheless, ONE chose the smaller units for locational and supply security reasons. In any event, the difference in costs is small relative to ONE's overall generation investment program. Because of delays in construction of the new combustion turbines and Jorf Lasfar, the projections in Annexes 2.11 and 2.12 show that in some years ONE may not be able to satisfy demand completely from its own power stations. Because of this risk, ONE is currently negotiating to import electricity from Algeria. The proposed contract would provide for net imports by ONE over a period of several years, whereas the existing exchanges with Algeria are designed to leave net trade equal to zero at the end of each year. Total forecast investment expenditures on generation are shown in Annex 2.13.

2.20 Transmission. Forecast transmission expenditures are shown in Annex 2.13. Approximately half of the expenditures are to connect new power stations and to reinforce the 225-kV network. The largest reinforcement/extension projects include: reinforcing the links between Khenifra and Errachidia; a 225-kV line to Tan Tan; and a 225-KV line from M'Jara to Tetouan. The other half of the transmission expenditures are for reinforcing the 60-kV and 22-kV networks.

2.21 Distribution. Forecast distribution system expenditures are shown in Annex 2.13. The projected expenditures to 1995 are mainly to implement the Power Distribution Project supported by World Bank loan 2910-MOR.

2.22 Coordinated Investment Program in the Power Subsector. The electricity tariff study (para 2.05), includes the preparation of a least-cost power investment program coordinating the programs of ONE and the Régies. This program is to be updated each year by a technical committee with representatives from ONE, the Régies and the Government and submitted to the Bank for review before implementation, as agreed under the Power Distribution Project.

RURAL ELECTRIFICATION

2.23 Under its normal activities, ONE stands ready to provide electricity to rural customers if requested by those potential customers, who would have to pay for the connections. However, as in most countries, most rural communities are far from existing distribution lines, so that individuals or villages, acting independently, are not able to afford the costs of the long distribution lines and transformers needed to obtain electricity. In 1977, the Government, aware of the very limited extent of rural electrification in Morocco, began plans for a National Rural Electrification Program (NREP) under which it would pay the capital cost of constructing medium and low voltage facilities to connect targeted villages to ONE's integrated national grid. Individual customers would still be required to pay in advance for connections to the village networks as well as for internal wiring. They would also purchase electricity at the prevailing tariff rates, which are the same for rural and urban areas.

2.24 Phase I of the program was carried out between 1980 and 1986 with financial assistance from the Bank (Loan 1695-MOR), and brought electricity to 286 villages containing approximately 60,000 consumers. A study of the socio-economic impact of the first phase found that the benefits of electrification have been substantial, particularly through transforming many of the electrified villages into economically thriving rural centers which have attracted migrants from non-electrified rural communities^{1/}. Even before this study was finished, the Comité du Suivi du Programme de l'Electrification Rurale (COSPER), created in 1986, with representatives from MI, MEM, and ONE, began work on the selection of villages for Phase II.

2.25 Selection of Villages for the Second Phase of the NREP. Morocco is divided into 42 provinces, (see Map IBRD No.22099) each containing a small number of "cercles". Within each "cercle" are several "caidats" each of which in turn extends over several "communes". A commune may include a number of villages. The provincial governors are appointed by the King, while the heads of "cercles" and caidats are officials appointed by the Government. The commune head is elected by the commune's inhabitants.

2.26 The geographical center targeted for electrification in Morocco is the village. Approximately 1,700 villages previously identified by ONE were surveyed in order to determine priorities for electrification under the second phase of the NREP. The choice of the villages to be included was made following two approaches. First, the 1700 villages were ranked in accordance with criteria approved by COSPER both globally and by province (Annex 2.14). While these criteria give some weight to villages which are administrative centers (chef lieux de commune or chef lieux de caidat), a much larger weight in aggregate is given to the criteria relating to the economic costs and benefits of electrification. This point is shown by the calculations presented in Annex 2.14 for two hypothetical villages. Under the second approach, the Governors of the provinces submitted their own lists of villages ranked according to their own priorities. There was a large correspondence between the rankings of the two lists. Where differences emerged, the villages in question were examined and discussed in more detail by COSPER until agreement was reached on a definitive list of 600 villages in 34 provinces. The Bank considers that the two-fold procedure used by the Moroccan authorities incorporates a satisfactory blend of economic, administrative and regional considerations.

2.27 The above-mentioned list of 600 villages was subsequently approved, and included in the Government's 1988-1992 plan for economic and social development (para 3.11). Because of the favorable impact of the first phase and the fact that there has been some delay in starting the second phase, the Government and the local communities assign a high priority to the proposed project and have demonstrated their seriousness by preparing a comprehensive plan for the second phase and by taking several important

^{1/} SIGMA TECH, Royaume du Maroc, Ministère de l'Energie et des Mines, Direction de l'Energie, Etude de l'impact socio-économique du PNER, 1987.

decisions which will avoid some difficulties experienced during the implementation of Phase I (para 3.16).

2.28 Rural Development Plan. The Government recognizes that rural electrification should be coordinated with investments in other rural infrastructure projects such as for roads, schools, water and health. In the past, limited resources have constrained both rural investment expenditures and the capacity for rural development planning and coordination. From now on there will be fewer constraints as a result of the Government's decision to allocate 30% of revenues from value-added taxes to the local communities (para. 3.06). Accordingly the Government has indicated its intention to implement measures to achieve the necessary coordinated development.

PAST BANK LENDING TO THE ENERGY SECTOR

2.29 The Bank has supported the Government's efforts to expand domestic energy production and exploit energy resources efficiently through a series of loans to the energy sector. These include: the Petroleum Exploration Project (Loan 518-MOR signed in 1980) which led to the discovery of the Meskala gas field; the Petroleum Exploration and Appraisal Project (Loan 2271-MOR signed in 1983) which financed development drilling of the Meskala gas field; the Jerada Coal Mine Modernization and Expansion Project (Loan 2508-MOR, 1985) intended to increase coal production; and the Oil Shale Engineering Project (Loan 2114-MOR) which financed studies to assess the technical and economic viability of commercial exploitation of the Timhadit oil shale deposit.

2.30 Four Bank loans have been made to help expand the power subsector in Morocco. The first -- 936-MOR, made in October 1973 -- was for US\$ 25 million and financed the foreign cost of 2x20 MW combustion turbines plus transmission system investments. The Project Performance Audit Report (1982) concluded that the physical facilities were successfully completed with only minor delays and within the SAR cost estimates. However, ONE met the main financial covenant only in the final years, reaching self-financing levels of 24% of investment in 1978 and 22% in 1979, and the covenant requiring that government bills be paid within 90 days was not met. A study of power subsector organization was carried out, but the recommendations were not implemented. The second loan -- 1299-MOR, made in July 1976 -- was for US\$ 49 million and financed part of the foreign cost of the multipurpose Sidi Cheho-Al Massira Hydro Project including a 120-MW power station and 200 km of 225 kV transmission line. The Project Completion Report prepared in 1984 noted that the physical facilities were completed on time. ONE's financial and accounting organizations were improved. However, from 1980 on, ONE failed to meet the covenant requiring self-financing of 20% of the investment program because of the Government's failure to raise electricity rates to compensate fully for fuel price increases in 1980, and the severe drought conditions in 1981 and 1982. Accounts receivable increased to four months of sales by October 1982. The Government also failed to take action to improve the organization of the power subsector.

2.31 The third loan -- 1695-MOR, made in April 1980 -- was for US\$ 42 million to finance the first phase of the National Rural Electrification

Program. The Project Completion Report prepared in 1987 concluded that the project was successfully executed, and at a substantial cost underrun because of the appreciation of the dollar. However, completion was delayed by 2 1/2 years largely because of changes in the centers to be electrified and the Government's slowness to ratify the agreement with the executing agency (ONE), to make local funds available and to grant import licenses for equipment also manufactured in Morocco. ONE met the 20% cash generation covenant only in 1986. The fourth loan -- 2910-MOR, signed in June 1989 -- is for US\$ 90 million to finance rehabilitation and expansion of the distribution systems of ONE and the Régies of Casablanca, Meknes, Kenitra, Fes and Tetouan. Performance relative to the financial covenants under this loan is discussed in detail in Chapter IV which deals with the financial aspects of the project.

2.32 The Bank has contributed jointly with the UNDP to three studies of the energy sector: "Morocco: Issues and Options in the Energy Sector" (March 1984), "Morocco: Energy Assessment Status Report" (January 1986); and a "Household Energy Strategy Study", now underway with assistance from USAID. A "Power Subsector Study" was completed in 1984, and an Energy Pricing Study in 1989 (para. 1.08).

BANK ASSISTANCE STRATEGY FOR THE POWER SUBSECTOR

2.33 The Bank supports the Government's objectives: (i) to encourage the power subsector to satisfy growing electricity demand caused by economic growth at least cost and without deterioration in quality of service; (ii) to achieve financial and managerial autonomy for ONE and the Régies; and (iii) to reduce Government contributions to ONE.

2.34 Three recent lending operations, PERL, the Power Distribution Project (Loan 2910-MOR) and the National Water Supply Rehabilitation Project (Loan 2825-MOR) provide a coordinated approach to assisting the Government to realize these objectives. Under PERL general policy and operational measures were taken affecting all public enterprises (e.g., accounting, liberalization of controls). At the same time specific measures concerned ONE. ONE's tariffs were raised to allow it to achieve a satisfactory cash generation and to do without Government contributions except for special programs such as the NREP carried out at the Government's request. Major progress was made towards paying off Government arrears on electricity bills (para 4.05). A comprehensive contract - program was signed by ONE and the Government, and the electricity tariff study is being carried out. The Power Distribution Project is the first Bank operation to assist some of the Régies' electricity departments, and as such is designed to ensure their financial viability, eliminate their financial arrears to ONE, strengthen their investment planning and managerial performance, and improve coordination with ONE. This project also follows up on agreements under PERL affecting ONE's financial position and planning performance. The measures under the National Water Supply Project to strengthen the financial performance of the Régies' water departments and improve their accounting and managerial performance will benefit the Régies' electricity departments, especially by reducing the need to use electricity revenues to finance water expenditures.

2.35 The proposed project would complement these three operations as well as follow up on the First Rural Electrification Project. The Bank's involvement would help ensure efficient implementation of the proposed project. Experience from the first phase shows the importance of the following measures which will be taken under the proposed project (Chapter VI): a signed agreement defining clearly the responsibilities of the various entities involved in the project and the definitive list of villages to be electrified as a condition for Board presentation; procedures to facilitate the connection of customers soon after each village is connected to the national grid; release of the first set of bidding documents before Board presentation of the loan; measures to avoid delays in granting import licenses for imported equipment, to make available funds to cover local expenditures, and complete procedures needed prior to making disbursements; assurance that the rural electricity networks will be properly maintained and expanded after project completion; the maintenance of detailed separate records on electricity sales resulting from the project (at medium as well as low voltage), and regular collection of data needed to evaluate the costs and benefits of the project and to design subsequent phases of the NREP. The proposed project would also permit follow-up on the institutional efforts initiated under the previous and ongoing operations aimed at strengthening ONE's planning and marketing capabilities, and its financial performance.

III. THE PROJECT

3.01 Project Setting. Morocco's rural population represents about 60% of the total population, and only 25% of the agglomerated rural population has access to electricity^{1/}. Most of the energy needs of the rural population without access to electricity are being met by fuelwood and charcoal, aggravating problems of deforestation, and by petroleum products such as kerosene, diesel oil and butane gas. These forms of energy frequently provide services of poorer quality and at a higher cost to the economy than the same services based on electricity. Therefore judicious substitution of electricity for other energy forms would enhance the economically efficient use of energy, by reducing per unit energy costs for rural customers. In addition, it would provide rural customers with access to a range of new services that would improve their living conditions. It would contribute to increasing productivity in the agriculture sector, and create decentralized economic activities leading to increased employment opportunities and reduced migration of families to urban areas. Towards these ends, rural electrification has become a key part of the Government's policy for rural development.

3.02 Project Objectives. The proposed project is the second phase of the NREP initiated in 1980 with Bank support (para. 2.31). The main objectives of the proposed project are to: a) expand electricity supply to the rural areas; (b) improve the reliability and quality of service of the existing rural distribution network; (c) strengthen the administrative, planning and financial capabilities in the power subsector; (d) implement institutional reforms aimed at delineating and streamlining the responsibility for planning, implementing, operating and managing the rural distribution system; and (e) encourage further reforms in the electricity tariff structure. The proposed project would also contribute to the Government's policy of improving the efficiency of energy consumption.

3.03 Project Description. The proposed project would connect to the main grid about 462 villages located in 34 provinces, and would cover the cost of connecting about 170,000 consumers. The proposed project would involve in particular:

- a) the construction of about 5850 km of medium-voltage (MV) and low-voltage (LV) lines, and distribution transformers with a total installed capacity of about 70MVA;
- b) the construction of about 170,000 consumer connections;
- c) the construction of operating buildings (regional offices) containing about 10,000 m² of floor space;

^{1/} Compared with 70% in Algeria and 60% in Tunisia.

- d) the supply of vehicles and specialized equipment for operating and maintaining the distribution network in the newly electrified villages; and
- e) a technical assistance component including:
 - i) consultancy services for a stock management study;
 - ii) consultancy services for an integrated works management study;
 - iii) consultancy services for defining and implementing a national tariff policy;
 - iv) training of ONE's staff in distribution network engineering design and marketing; and
 - v) supply of computer software and hardware for implementing the recommendations of the above-mentioned studies and the training component.

By the completion date of this project, electrification of the rural population living in concentrated areas will have increased from 25% to 45%. Annex 3.1 gives a detailed description and the location of the proposed project and Maps IBRD No. 22100 and No. 22099 indicate the main generation and transmission system and the economic regions and provinces of Morocco, respectively.

3.04 Project Costs. The estimated cost of the proposed project including physical and price contingencies is about DH 1,900.8 million (US\$ 211.6 million). The total financing required, inclusive of interest during construction of (US\$8.4 million), is about DH 1,972.2 million (US\$ 220.0 million) of which DH 1096.2 million (US\$ 122.4 million) would be in foreign exchange. The cost estimates include custom duties and taxes estimated at about DH 225.6 million (US\$ 25.1 million). These estimates are based on May 1990 prices derived from quotations received recently by ONE for similar goods and services. Given the advanced stage of project design and the repetitive and routine nature of the work, physical contingencies are assumed at: (a) 7% for the construction of the main network (LV and MV) including the consumer connections; and (b) 5% for the operating facilities and the technical assistance component. Price contingencies have been computed assuming an implementation period consistent with the relevant Bank standard sectoral profile, and specific annual increases for domestic and international prices as follows:

	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Local (%)	6.2	5.6	5.4	4.4	4.9	5.5	4.2	5.6
International (%)	4.9	4.9	4.9	4.9	4.9	4.9	3.7	3.7

Total price contingencies amount to about 22% of the base cost and physical contingencies. Details of the cost estimates are given in Annexes 3.2, 3.3 and 3.4 summarized in Table 3.1 below.

Table 3.1

SUMMARY OF PROJECT COST ESTIMATES

	DR million			US \$ million		
	LC	FC	TC	LC	FC	TC
A. Engineering services						
Detailed engineering design	2.5	11.1	13.6	0.3	1.3	1.6
ONE's administration of the project	110.0	0.0	110.0	12.5	0.0	12.5
B. Equipment for LV & MV network	0.0	204.1	204.1	0.0	23.0	23.0
C. Installation & erection works (including poles)	320.8	401.3	722.1	36.3	45.5	81.8
D. Consumers connections	42.0	117.9	159.9	4.8	13.4	18.2
E. Specialized equipment	0.0	14.8	14.8	0.0	1.7	1.7
F. Vehicles	0.0	5.3	5.3	0.0	0.6	0.6
G. Operating buildings	12.0	8.5	20.5	1.4	1.0	2.4
H. Technical assistance	3.0	10.6	13.6	0.3	1.2	1.5
I. Custom duties & taxes	170.0	0.0	170.0	19.3	0.0	19.3
TOTAL BASE COST	660.3	773.6	1,433.9	74.9	87.7	162.6
Physical contingencies	46.0	53.4	99.4	5.2	6.0	11.2
Price contingencies	169.7	187.8	367.5	17.5	20.3	37.8
TOTAL PROJECT COST	876.0	1,024.8	1,900.8	97.6	114.0	211.6
Interest during construction	0.0	71.4	71.4	0.0	8.4	8.4
Total financing required	876.0	1,096.2	1,972.2	97.6	122.4	220.0

3.05 Project Financing Plan. According to the agreement between the Government and ONE regarding the implementation of the NREP, ONE is responsible for the execution of the program but need not use its own financial resources to implement it. This agreement was applied during the implementation of the first phase of the NREP (NREP 1), will be extended for the proposed project, and ONE will not be involved in the financing plan of the proposed project, with the exception of the foreign costs of consumers' connections (para 3.07).

3.06 During the implementation of NREP 1, financed by the Bank, Government financing was made from budgetary allocations channelled through the MEM and the MI. During the preparation of the 1988-1992 Orientation Plan for economic and social development, and in line with its policy of decentralization, the Government decided to increase the financial resources of the local authorities (provinces and communes) to enable them to implement

their social development programs. To this end 30% of the funds collected from the value-added tax (VAT) are being made available to the local authorities. In return, these communes will be responsible for the budgetary allocations for implementing their development programs, among which is the proposed project. Therefore, and in order to ensure full financing for the proposed project and its efficient implementation, the Government agreed during negotiations to provide or cause to be provided funds necessary to cover the entire financing of the proposed project and any cost overruns which might arise in respect of foreign or local expenditures (para. 6.02).

3.07 The project cost estimate includes also the cost of consumer connections for low-voltage users covering the supply and installation of the service drop and entrance equipment. This cost is estimated at about US\$ 23.7 million (excluding duties and taxes estimated at about US\$ 4.6 million), of which US\$ 17.5 million would be in foreign currency and are included in the proposed Bank loan. During implementation of NREP1, the financing of the consumer connections was the responsibility of the customers through a connection fee paid to ONE in advance covering the actual cost (para. 2.08). Based on the experience gained during the implementation of NREP1, and in order to accelerate the pace at which new consumers would be connected to the grid in the villages to be electrified under the proposed project, ONE agreed, during negotiations, to waive the requirement that each new consumer pay a connection fee in advance, and to recover these costs through installments to be paid by the consumers with each electricity bill, and for an amount equal to at least 1.5% of the connection cost (para 6.04). The local part of the consumer connection costs would therefore be prefunded by the Government, through the local authorities, and a portion of the proposed Bank loan, estimated at about US\$ 17.5 million, would be on-lent to ONE by the Government, to finance the foreign exchange component of the consumer connection costs. This onlending arrangement would be made on the same terms as the Bank loan and ONE would assume the foreign exchange and interest rate risks on its share.

3.08 In view of the scattered responsibilities of Government agencies involved in the subsector at the time of the implementation of NREP1, a Special Agreement was established between MF, MI, MEM and ONE, to define the final list of the villages included in that project, and the provisions for project financing, implementation, and ownership, operation and maintenance of project facilities. Ratification of this agreement was the only special condition of effectiveness. The same procedure will be extended to the proposed project with some differences regarding mainly project financing and ownership (paras. 3.05 and 3.16). In addition, and in order to avoid recurrence of the delays experienced in NREP1 implementation, due to the compliance with the condition of effectiveness, the Special Agreement between MF, MI, MEM and ONE for the proposed project was executed as condition of Board presentation.

3.09 The proposed project would therefore be financed as follows:

- a) the proposed Bank loan of US\$ 114.00 million would cover about 52% of the total financing required for the proposed

project and 100% of foreign cost net of interest during construction; and

- b) the remaining US\$ 106.0 million would be covered by the concerned local authorities which are under the tutelage of MI, for an amount of US\$ 104.7 million and by ONE for an amount of US\$ 1.3 million.

A summary of the project financing plan is given in Table 3.2 below:

Table 3.2

PROJECT FINANCING PLAN
(US\$ million)

	Local currency	Foreign currency	Total
IBRD loan	-	114.0	114.0
Government (MI)	97.6	7.1(a)	104.7
ONE	-	1.3(a)	1.3
	<u>97.6</u>	<u>122.4</u>	<u>220.0</u>

(a) This amount represents the interest during construction.

3.10 Lending Arrangements. The proposed Bank loan would be made to the Government for a term of 20 years including a grace period of five years, at the current variable Bank interest rate. Further to the Loan Agreement between the Government and the Bank, which would specify that US\$ 96.5 million of the proposed Bank loan would be made available to ONE as an equity contribution, the legal documents would also include a Project Agreement between the Bank and ONE which would be the Project Executing Agency (para 3.12), and the subsidiary loan agreement between the Government and ONE which would specify the conditions on which US\$ 17.5 million would be onlent to ONE(para 3.07). Signing of the subsidiary loan agreement would be a condition of loan effectiveness (para 6.05). The foreign exchange and interest rate risks on the portion of the loan made available to ONE as an equity contribution would be borne by the Borrower.

3.11 Project Preparation, Engineering and Implementation. After the completion of NREPl, and in anticipation of the proposed project, the COSPER, assisted by ONE's distribution department compiled information relating to the rural areas in Morocco not yet electrified. By the end of 1987, about 1700 villages had been surveyed and information pertinent to their electrification collected. On the basis of this information, and following the Government's request, the COSPER prepared a detailed program for the electrification of 600 villages selected among the 1,700, on the basis of criteria which have been reviewed by the Bank and found satisfactory (para 2.26). Implementation of this program is part of the Government's 1988-1992 Plan for economic and

social development and the proposed project would assist the Government in electrifying about 462 villages (electrification of the remaining 138 villages has been initiated with the assistance of the European Investment Bank). The physical quantities and the types of equipment and material required for the proposed project were derived from the information collected by ONE and have been found to be reasonable.

3.12 The proposed project would be implemented by ONE, in accordance with the project implementation schedule given in Annex 3.5. Detailed project engineering design has been already initiated. However, given the volume of work involved, the task is expected to continue to end 1992, and ONE would be assisted by engineering firms to be selected in accordance with Bank procurement guidelines for use of consultants. The proposed project would therefore include about 180 man-months of consulting services for project engineering design at an estimated cost of about US\$ 1.90 million. In order to avoid delay in project implementation ONE agreed, during negotiations, to complete the detailed engineering design for the first 200 villages by March 31, 1991, and for the remaining villages by December 31, 1992 (para. 6.04).

3.13 The distribution equipment and materials to be used by ONE as well as typical construction designs for distribution facilities are standardized, but some adjustments to these standards were introduced in the proposed project in order to reduce the costs of the rural distribution system as compared to the costs of urban distribution systems, without lowering the quality of service. Therefore detailed technical specifications of equipment and materials to be used for the proposed project are already available. In addition, ONE is using, under the ongoing Bank-financed Power Distribution Project, a sample bidding document which has been approved by the Bank and which will continue to be used for the proposed project. Therefore it is expected that the first set of bidding documents for the proposed project would be issued before October 1990.

3.14 Installation and erection of the facilities would start in early 1992, and the proposed project is expected to be completed by December 31, 1996. Contrary to the procedure used during NREPl, ONE will not require technical assistance for supervising the erection works and providing overall coordination vis-à-vis the Bank. These tasks will be performed by ONE's distribution department. This department is well staffed and its performance has proven satisfactory. In addition, and in order to further strengthen this department's capabilities in project management, the proposed project would include an Integrated Works Management study to assist ONE's distribution department in defining and implementing an adequate system for monitoring and controlling project costs, expenditures and implementation.

3.15 Consulting services. Implementation of the technical assistance component of the proposed project would require about:

- (a) 45 man-months of consulting services to carry out the above-mentioned Integrated Works Management System study (para. 3.14) at an estimated total cost of about US\$ 0.70 million of which US\$ 0.55 million would be in foreign currency;

- (b) 55 man-months of consulting services to assist ONE in the inventory control and materials management system study (para. 4.35), at an estimated total cost of about US\$ 0.80 million, of which US\$ 0.60 million would be in foreign currency; and
- (c) 20 man-months of consulting services to assist the Government in implementing a national tariff policy in the power subsector, at an estimated cost of US\$ 0.20 million.

3.16 Ownership, Operation and Maintenance. Under NREPI, all project facilities were transferred to ONE's ownership with the exception of the low-voltage network which is owned by the communes, and its operation and maintenance entrusted to ONE within the framework of a special agreement between ONE and MI, and numerous contracts between the communes and ONE, for managing the network. This led to a situation where: (i) ONE was not compensated for the losses it incurred when maintaining the low-voltage network; and (ii) the extension and development of the electrified centers were not implemented adequately, and when requested by the customers. Recognizing the weaknesses of this arrangement, and for a more efficient operation and development of the rural areas, ONE and MI agreed that all facilities of the proposed project including the low-voltage network, would be owned, operated and maintained by ONE, and they also agreed to extend this new arrangement to the rural centers electrified under NREPI.

3.17 After the commissioning of the project facilities, ONE's rural distribution network would be largely extended and ONE's regional offices would require additional facilities and equipment to operate and maintain this network adequately. The construction of new operating buildings and the acquisition of vehicles and specialized equipment included in the proposed project would assist ONE in achieving this objective.

3.18 Project Monitoring. ONE would submit to the Bank quarterly reports covering the work of consultants, physical progress, project costs, financing, disbursement and administrative aspects of the Project. ONE would also undertake to prepare and furnish to the Bank, within six months after the loan closing date, or such later date as might be agreed for this purpose, a Project Completion Report of such scope and detail as the Bank shall reasonably request. Furthermore, and in order to establish a sound basis for planning future stages, ONE confirmed during negotiations that it would collect regularly and maintain data on the socioeconomic characteristics of the villages electrified under the proposed project. These data include: electricity consumers; electricity consumption at low and medium-voltage by type of end user; revenue, investment and operating costs of electricity supply to each village. Further details are given in Annex 3.6.

3.19 Procurement. ONE has grouped the goods and services required for the proposed project in 15 packages to be procured each in different stages. Annex 3.7 gives the details of these packages and their estimated procurement schedule. All items to be financed by the Bank would be procured in accordance with the Bank's procurement guidelines.

3.20 Items (a) through (k), and the bulk of item (m) (see para 3.22 below), related to goods, specialized equipment and vehicles, installation and erection works, and construction of regional operating facilities, would be procured through international competitive bidding (ICB) in accordance with Bank procurement guidelines. For procurement of goods through ICB, local suppliers would be allowed a margin of preference equal to the existing rate of custom duty applicable to non-exempt importers or 15% of the cost-insurance-freight (CIF) price, whichever is lower. Furthermore, and in order to ensure efficient implementation of the proposed project, the Government and ONE confirmed during negotiations their intention to implement adequate measures for prompt granting to ONE of import licenses for goods required for the project as an alternative to goods also manufactured in Morocco, (para. 6.02).

3.21 The goods and works required for the consumers' connections would also be procured through ICB, either as a separate package for the supply of meter boxes and meters, or as a sub-item included in a single responsibility main package for the supply of cables and installation and erection.

3.22 Procurement of item (m) related to installation and erection of the main network, and construction of consumer connections, would also involve numerous small sub-projects which are scattered throughout the country, labor-intensive and with works spread over time, constraining their being packaged to attract foreign bidders. Furthermore, the experience under NREP 1 demonstrated that foreign bidders had limited interest in participating in the bidding procedure. Therefore, these small contracts, totalling about US\$20.0 million, and not exceeding US\$500,000 per contract, are expected to be won by local contractors and they would be awarded following local competitive bidding procedures (LCB) which are in any case open to interested foreign bidders. These LCB procedures were agreed on during negotiations, and outlined in a Supplemental Letter.

3.23 Items (n) and (o), which relate to the detailed engineering design of the project and the technical assistance component, would be procured in accordance with the provision of the Bank's guidelines for use of consultants. Training manuals and other training aids would be procured through international shopping; for such items ONE would obtain written price quotations from at least three qualified suppliers.

3.24 All bidding and contract documents for works, equipment and materials to be financed by the Bank, and costing over US\$ 500,000 each, would be subject to prior Bank review. Other Bank-financed contracts costing less than this threshold value would be subject to post-award Bank review.

3.25 Table 3.3 below summarizes the procurement arrangements for the proposed project:

TABLE 3.3

**PROCUREMENT ARRANGEMENTS
(US\$ Million)^{1/}**

Project Elements	<u>Procurement Arrangements</u>			Total <u>Cost</u>
	<u>ICB</u>	<u>LCB</u>	<u>Other</u>	
A. <u>LV and MV network</u>				
. Equipments and materials	30.20 (30.20)			30.20 (30.20)
. Installation and erection including poles and operating buildings	89.70 (49.40)	20.00 (11.00)		109.70 (60.40)
. Engineering services			1.80 ^{2/} (1.50)	(1.80) (1.50)
. ONE's administration of the project			16.30 ^{3/}	16.30
B. <u>Consumers connections</u>	23.70 (17.50)			23.70 (17.50)
C. <u>Others</u>				
. Specialized Equipment and vehicles	2.90 (2.90)			2.90 (2.90)
. Computer soft & hard.	0.20 (0.20)			0.20 (0.20)
. Technical assistance			1.70 ^{2/} (1.30)	1.70 (1.30)
. Custom duties and taxes			25.10	25.10
TOTAL	<u>146.70</u> (100.20)	<u>20.00</u> (11.00)	<u>44.90</u> (2.80)	<u>211.60</u> (114.00)

^{1/} Figures in parentheses indicate the amount to be financed by the Bank

^{2/} According to Bank's procurement guidelines for the use of consultants

^{3/} Force accounts, not to be financed by the Bank

3.26 Disbursements. The disbursements from the proceeds of the proposed Bank loan would be made for:

- (a) 100% of the foreign expenditures for directly imported equipment and materials and 100% of local ex-factory prices of equipment and materials manufactured in Morocco; and 78% of local expenditures for previously imported equipment procured locally;
- (b) 56% of total expenditures for civil works and installation and erection;
- (c) 100% of total expenditures for services of consultants; and
- (d) 100% of foreign expenditures for training.

3.27 The estimated disbursement schedule for the proposed Bank loan is shown in Annex 3.8 and has been computed on the basis of the EMENA Region standard profile for similar power projects. Annex 3.9 gives a comparison with the actual disbursement of the First Rural Electrification Project (Loan 1695-MOR). The closing date of the proposed loan would be June 30, 1997, six months after the project completion date.

3.28 Disbursement requests would be fully documented except for claims for expenditures under contracts whose value is less than US\$ 200,000 equivalent. These claims would be subject to presentation of a Statement of Expenditures (SOEs) for which the supporting documents would be retained by ONE for audit purposes, and reviewed periodically by the Bank. This documentation, in addition to being held for one year after the audit for the year in which the last withdrawal from the loan proceeds is made, would be examined by auditors acceptable to the Bank, and made available for review by Bank representatives upon request. In order to facilitate project implementation two special accounts, one to be administered by ONE in respect of consumer connections and the other to be administered by MF in respect of the balance of the proposed project, may be established on terms and conditions satisfactory to the Bank. The amounts of authorized allocations would be US\$ 0.90 million and US\$ 5.0 million respectively. During negotiations, the Government agreed to have these accounts and the SOEs audited by independent auditors acceptable to the Bank (para 6.02).

3.29 Retroactive Financing and Advanced Contracting. No retroactive financing or advanced contracting is involved in the proposed project.

3.30 Environmental Impact. The proposed project would have a beneficial impact by improving the well-being of the rural population, promoting economic development and contributing to an improved standard of living in rural areas. The project would have no significant negative impacts on the environment. ONE would coordinate the routing of the lines with local authorities to minimize their impact and provide compensation when land is required for supporting facilities. Equipment provided under the project would have limited noise level, adequate safety standards to minimize the risk of electrocution and transformers used would not contain PCB's (polychlorinated biphenyls). Proper occupational health safety practices

would be used in the installation and maintenance of project facilities. The project would have limited aesthetic impacts on the landscape.

3.31 Project Risks. Two major project related risks, which could lead to delay in project implementation stem from: (a) possible delays by the Government in providing adequate counterpart funds; and (b) possible lack of coordination between the various entities involved in the definition, financing and implementation of the project. (This was an important problem experienced during the implementation of NREP 1). These risks will be alleviated by: (a) the Government's recent decision to increase the financial resources of the local communes for their development programs by allocating to these programs 30% of the funds collected from the (VAT) (para. 3.06); and (b) by the special agreement which was executed between MF, MI, MEM and ONE, as condition of Board Presentation (para. 3.08). A further risk is that households and other potential customers would not start using electricity as soon as their villages are connected to the national grid. This risk will be reduced by providing for the consumer connections to be made automatically at the same time as the village networks are constructed and by providing for the connection costs to be recovered from consumers through installments to be paid with each electricity bill rather than in advance of the connection (para. 3.07).

IV. FINANCIAL ASPECTS

A. ONE - Recent Financial Performance

4.01 Financial Results 1983-89. Details concerning ONE's financial results for the period 1983-89 are presented in Annex 4.1. The key financial indicators for the period are presented in the Table 4.1 below.

Table 4.1:

ONE - KEY FINANCIAL INDICATORS, 1983-89

	1983	1984	1985	1986	1987	1988	Prelim. 1989
Return on Sales - %							
- Operating Income	2.2	(4.3)	3.0	14.4	1.5	17.3	16.4
- Net Income	(5.8)	(14.7)	(7.6)	5.7	(11.5)	8.4	0.9
Internal Cash Generation to Fixed Investment -%	(8.8)	(11.6)	19.1	52.4	35.8	108.6	26.3
Debt Service Coverage	0.8	0.6	1.6	2.1	1.3	3.0	1.5
Debt:Equity Ratio	1.2	1.4	1.8	2.1	2.0	1.6	1.8
Current Ratio	1.2	1.0	1.0	1.0	1.1	1.3	1.1

As shown in this table, in recent years ONE's financial situation has generally improved following a prolonged period of considerable distress due to problems largely beyond its control. These included rapidly increasing oil prices over the period 1979-84, major losses of hydropower generation due to the drought conditions which prevailed from 1982-85 and exchange rate losses related to ONE's foreign borrowings. It is also notable that because of Morocco's domestic energy pricing policies(para 1.08), ONE has not benefited from the low world oil prices prevailing since prices collapsed in 1986.

4.02 Thus, the period prior to 1985 was characterized by losses, low or negative rates of internal cash generation as a percent of fixed capital investment, inadequate debt service coverage and deteriorating debt to equity ratios. In 1986, with a return to more normal rainfall and the start-up of two coal-fired generating units, ONE benefited from increased hydro-power production and lower fuel costs, thus permitting ONE to report a net profit. Certain extraordinary charges in 1987, including deferred depreciation and exchange losses on foreign debt, resulted in ONE reporting a loss in that year. As the result of tariff increases of 5% in May 1987 and August 1988, ONE was again profitable in 1988. In addition to the tariff increases, a rescheduling of ONE's debt during 1988 resulted in a large reduction in its debt service load. The combination of these events increased ONE's internal cash generation ratio in 1988 to over 100%.

4.03 Compliance with Financial Covenants under Previous and Ongoing Projects. For the reasons outlined above, prior to 1985, ONE was unable to comply with its Agreements with the Bank under Loans 1299-MOR and 1695-MOR, under which ONE was required to achieve a net internal cash generation ratio of at least 20% in 1980 and thereafter. Taking into account the adverse hydrological conditions and recognizing that ONE's financial situation might

take several years to redress, the Bank agreed in 1983 to waive the cash generation covenant for three years up to and including 1986.

4.04 The Agreement under the ongoing Power Distribution Project (Loan 2910-MOR, signed in June 1989), increased ONE's required internal cash generation ratio to 25% in 1989 and 1990 and 30% in 1991 and thereafter. The Agreement also restricts ONE's future borrowings if its debt service coverage ratio falls below 1.5. In 1983, 1984, 1987, 1988 and 1989, Morocco's foreign debts, including ONE's, were rescheduled. Assisted, in part, by these reschedulings, ONE was able to achieve, in 1989, adequate results in terms of its debt service coverage ratio and internal cash generation ratio.

4.05 Public Sector Arrears. ONE experiences significant delays in receiving payments from many public sector customers and thus, in turn, is slow in paying for its purchases of fuel oil. Of greatest concern are the arrears of the Régies, Government departments, and Local Authorities, which account for around 50%, 2.7% and 1.3%, respectively, of ONE's total sales. At the end of 1988, these public sector customers had accounts payable to ONE amounting to DH 2.2 billion, of which DH 1.6 billion was overdue. These amounts are very high relative to ONE's sales for the year which were DH 4.5 billion. A summary of the situation is given in Table 4.2 below.

4.06 As shown in Table 4.2, measures taken under PERL have substantially reduced the arrears which had accumulated prior to the end of 1986. However, for the Régies, accounts receivable related to current year's sales, after declining from 7.9 months at the end of 1986 to 3.1 months at the end of 1987, have been rising again in 1988 and 1989 and were back up to 8.2 months of sales at the end of September 1989. The receivables from the Government and local authorities, expressed in months of sales, though reduced from 12 to 9.4 months, also remain unacceptably high. For compliance with covenants established under the Power Distribution Project, accounts receivable from the Régies should not exceed 3 months of sales, while those from Government and local authorities can be as high as 6 months of sales, but should not exceed 4 months at year end.

4.07 Under the Power Distribution Project, all accounts due to ONE by the Régies, Government and local authorities, as of July 31, 1988 are required to be paid off in five equal annual installments, with the first installment being paid no later than September 30, 1988 and the last no later than September 30, 1992. Even though the first two installments were not paid as required, other arrangements, have been agreed to by ONE, the Régies and the Government and are being implemented. These arrangements are considered satisfactory since they require the Régies to pay off these arrears in 18 monthly installments for RAD and 24 for the other Régies starting June 1989, and would therefore result in the settlement of the Régies' arrears earlier than September 30, 1992. In addition, most of the Government arrears covering this period would be paid off during 1990 except for a small disputed amount of DH 66 million.

Table 4.2:

**ONE: PUBLIC SECTOR ACCOUNTS RECEIVABLE AND ARREARS
(DH Million)**

Item	Period Ending			
	December 31		Sept 30	
	1986	1987	1988	1989
Annual Sales				
- Government Departments	257	119	129	140
- Local Authorities	46	48	60	65
- Régies	1,786	1,882	2,210	1,946
- Total	2,089	2,149	2,399	2,151
Accounts Receivable				
- Government Departments	582	429	330	312
- Local Authorities	129	147	170	173
- Régies	1,189	1,572	1,735	1,924
- Total	1,899	2,148	2,235	2,408
Portion in Arrears				
- Government Departments 1	409	349	244	242
- Local Authorities 2	98	115	130	140
- Régies	743	1,077	1,183	1,245
- Total	1,250	1,541	1,556	1,627
Aged Accounts Receivable				
1. Régies				
- 1986 and prior years	1,189	1,052	790	533
- 1987		520	65	
- 1988			880	59
- 1989				1,331
- Total	1,189	1,572	1,735	1,924
- Current Years Receivables				
- in Months of Sales	7.9	3.1	4.6	8.2
2. Government and local authorities				
- 1986 and prior years	710	420	177	102
- 1987		158	111	82
- 1988			211	141
- 1989				160
- Total	710	576	500	484
- Current Years Receivables				
- in Months of Sales	12.0	11.2	13.4	9.4

Source: ONE

4.08 Under the Power Distribution Project, the Régies are required to pay their electricity bills no later than 60 days after the date of the bill which is equivalent to 3 months of electricity purchases. As indicated in the table above, several Régies are having serious difficulties in complying with this covenant, largely due to the fact that they were owed around DH 700 million by Government and local authorities for billings prior to the end of 1988. RAD, in particular, can only pay off its old arrears by falling farther behind in paying its recent billings.

4.09 Also under the Power Distribution Project, Government departments and local authorities are required to pay their bills promptly in accordance

with guidelines defined by a circular issued by the Government in May 1984. Pursuant to this circular, ONE is to receive, from each Government department and local authority, by the end of February of each year, an advance payment equal to 50% of the amount contained in the budget for electricity consumption by the department or local authority for the year ending the following August 31. This payment should approximate the cost of the power consumed during the previous 6 months ending February 28. A second payment is supposed to be made in November of each year to cover actual consumption for the 12 month period ending on the previous August 31, less the amount of the February advance. However, this system has not functioned properly because not all of the Government departments and local authorities have budget allocations sufficient to make the necessary payments, even though under that project, the Government is required to provide budgets to each of its administrative subdivisions which are adequate to permit them to fulfil their obligations defined by the circular.

4.10 To address the problem of discrepancies between amounts budgeted and actual consumption, the Government carried out, in August 1989, an analysis of actual electricity consumption versus budget allocation for each Government department and local authority. As a result of this analysis, in 1990, the pro-rata share of each department or local authority of the total amount budgeted for electricity will more closely reflect its pro-rata share of actual consumption. Also to address the issue of the new arrears accumulated in 1988 and 1989 the Government issued on December 20, 1989 a decree requiring all its departments to examine the situation and present by September 1, 1990 an accounting of such arrears.

4.11 Prior to 1987, as a result of the delays in settlement of billings to its public sector customers, ONE had to limit its payments to its fuel oil suppliers. The pre-1987 arrears are being paid off as ONE collects its arrears from its public sector customers. However, ONE's current accounts payable for fuel oil, at the end of September 1989, represented two months of consumption, which means that ONE is still not able to pay its bills within 30 days of billing as required under the Power Distribution Project. ONE could readily comply with this requirement if all the Régies could pay ONE within a 60-day period.

4.12 As it is important to the sector that Government departments and local authorities pay their current electricity bills in a timely manner and at the same time pay off their arrears, agreements were reached during negotiations similar to those under Loan 2910-MOR. Thus, the Government agreed to ensure that: (a) all accounts due to ONE and the Régies by the administrative subdivisions of the Government for electricity consumed and related works carried out through December 31, 1990 shall be paid in three equal annual installments during 1991, 1992 and 1993 (para. 6.02); (b) any amounts due to ONE and the Régies by its administrative subdivisions on account of electricity and related works shall be paid promptly in accordance with guidelines satisfactory to the Bank (para. 6.02); and (c) starting with fiscal year 1991 budgetary allocations shall be made for each fiscal year in the relevant budget of its public agencies in amounts sufficient to ensure these agencies meet their obligations in (a) and (b) above (para. 6.02).

B. ONE's Projected Financial Performance

4.13 ONE's future financial structure and performance will largely depend on five revenue and cost flows. These are: (i) the revenue from electricity sales; (ii) the cost of generating electricity; (iii) the cost of future investments; (iv) the revenue from debt and equity financing; and (v) the cost of debt service. Relevant information concerning the first three items has already been provided in Chapters 1 and 2 of this report which discussed future electricity demand (para 2.17), the price of fuels used for power generation (para 1.08), and ONE's investment program (para 2.18). The other key flows, debt and equity financing and debt service, will depend on ONE's past and future financing strategies and the future constraints governing the availability of funds from various sources. The final important variable, the average selling price of electricity, can be thought of as a dependant variable whose value can be determined by taking into account the demand forecast and the other financial variables and constraints as well as the financial targets established for ONE as measured by certain financial ratios.

4.14 Projected Results 1990-98. Projected financial results for the period 1990-98 are summarized in Annex 4.2 along with audited results for 1988 and preliminary results for 1989. Proforma statements of net income, cash flow and balance sheet position for the period 1990-1998 are shown in Annexes 4.3-4.5. Highlights of ONE's projected financial performance, through 1998, are presented below in Table 4.3.

4.15 The forecasts are based on the following underlying assumptions: (i) the electricity demand forecast presented in para 2.17; (ii) average rainfall and hence normal hydro power generation; (iii) continuation of the existing energy pricing system described in para 1.08 (i.e. constant nominal domestic fuel oil prices at the December 1988 level through 1996 with small increases thereafter); (iv) imported and domestic coal prices changing in line with the Bank's forecast for the international prices of coal; (v) a financing strategy described in para 4.17; (vi) maintenance of the financial targets established for ONE under the power distribution project with respect to internal cash generation and debt service coverage ratios (para 4.04); (vii) the tariff increases discussed para 4.27 which are necessary given ONE's financing strategy and financial targets; and (viii) other miscellaneous assumptions presented in Annex 4.9.

4.16 Because the price of fuel oil is already fixed at a high level, the average cost of fuel per kWh is expected to decrease in real terms through 1996, thus contributing to an improvement in ONE's operating cost structure. However, the dominant factor in ONE's future financial situation is the fact that investment expenditures, net of consumer contributions, are expected to average DH 4.4 billion per year over the period 1990 through 1998, compared with DH 0.8 billion per year over the period 1983 through 1989. However, given ONE's continued access to external financing, which seems reasonably assured with the recent financing package obtained for Jorf Lasfar, and given future tariff increases which are adequate to permit ONE to attain its financial performance targets, ONE should be able to finance its investment program as discussed below.

Table 4.3:

ONE - KEY FINANCIAL INDICATORS, 1989-98

<u>Item</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1996</u>	<u>1998</u>
Ratios								
Income to Sales - X								
- Operating Income	14.8	17.5	27.1	30.2	26.5	19.2	28.5	27.9
- Net Income	1.1	4.4	11.4	11.7	10.2	4.7	8.9	8.8
Internal Cash Generation								
to Fixed Investment (%)	36.6	27.8	29.9	31.4	48.0	47.8	53.7	65.6
Debt Service Coverage	1.7	1.8	1.5	1.6	2.0	1.9	1.7	1.8
Debt:Equity Ratio	1.8	1.7	1.9	1.8	1.8	1.7	1.5	1.4
Current Ratio	1.1	1.1	1.3	1.2	1.0	0.8	0.7	0.9
Other Flows - DH billions								
Fixed Investment	1.4	2.3	4.0	4.3	4.9	4.2	4.8	3.7
Long Term Financing								
- Internal Cash Generation	0.2	0.3	0.8	1.0	1.3	1.5	1.6	2.0
- External Loans	0.7	2.0	3.7	2.2	2.6	1.5	2.3	1.5
- Bonds Issued in Local								
Capital Market	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0
- Government contributions	0.0	0.1	0.1	0.1	0.3	0.4	0.3	0.0
- Total	1.0	2.6	4.6	3.4	4.2	3.7	4.3	3.6
Associated Tariff Increase - X		4.5	13	3	0	0	0	0

4.17 Financing Strategy. In the past, in order to finance its investment program, ONE has relied on five sources of financing: (a) the surplus cash generated by its operations, including the Special Fund (para 4.19); (b) external borrowing in the form of suppliers' and bilateral credits; (c) external loans from multinational financial institutions such as the World Bank and the African Development Bank (ADB); (d) local borrowing; and (e) Government contributions. The financing plan, summarized below in Table 4.4, assumes that ONE's traditional sources of financing would be adequate, without Government contributions, beyond those required for PNER and similar projects, to finance ONE's general investment program.

4.18 Traditional Sources of Financing. The amounts available from the various lenders are assumed by ONE to be governed by the following constraints:

- (i) suppliers' and bilateral credits, are assumed to be available in amounts sufficient to cover up to 120% of the direct foreign exchange cost of future power generation and transmission investments and ONE has routinely used foreign loans to finance interest during construction related to these loans as well as a portion of the local costs.
- (ii) loans from multinational financial institutions generally cover the entire foreign exchange cost, both direct and indirect, for power transmission and distribution investments. In the past, ADB loans have covered both foreign and part of local components of expenditures

Table 4.4:

ONE - FINANCING PLAN 1989-98

<u>Sources of Funds</u>	MDH	MUSS	%
<u>Internal Cash Generation</u>			
Total Income Before Interest	14,774	1,643	34.3
Plus Non Cash Expenses:			
- Depreciation	11,488	1,277	26.7
- Exchange Losses	1,765	186	4.1
- Special Fund Contributions	3,388	401	8.4
Less: Non Cash Income	0	0	0.0
- Amortized Customer Contributions	(1,531)	(170)	(3.6)
	-----	-----	-----
Internal Cash Generation	30,094	3,347	69.8
Less: Debt Service			
Interest	7,951	(866)	(18.5)
Amortization			
- Project Loan	(8)	(1)	(0.0)
- Other Loans	(9,409)	(1,049)	(21.9)
- Bonds	(620)	(69)	(1.4)
	-----	-----	-----
Debt Service	(17,988)	(2,005)	(41.8)
	-----	-----	-----
Net Internal Cash Generation	12,106	1,342	28.0
<u>Contributions</u>			
Government Contributions			
- General Program			0.0
- The Project	1,646	183	3.8
- Other	224	25	0.5
Consumers Contributions	2,228	249	5.2
	-----	-----	-----
Total Contributions	4,108	458	9.6
<u>Borrowing</u>			
Advances on Consumption	113	13	0.3
Project Loan	157	17	0.4
Other Loans	19,858	2,216	46.2
Rescheduled Interest	103	12	0.3
Rescheduled Principal	592	69	1.4
Bonds	377	42	0.9
Overdraft	86	10	0.2
	-----	-----	-----
Total Borrowing	21,285	2,379	49.7
Increase (Decr. in Accounts Payable)	5,483	611	12.8
	-----	-----	-----
Total Sources	42,983	4,791	100.0
<u>Applications of Funds</u>			
<u>Investments</u>			
- General Program	34,403	3,833	80.0
- The Project	1,901	212	4.4
- Other	2,452	274	5.7
- Interest During Construction	2,054	229	4.8
	-----	-----	-----
- Total	40,810	4,548	94.9
<u>Working Capital</u>			
- Accounts Receivable	295	34	0.7
- Inventories	1,467	164	3.4
	-----	-----	-----
- Total	1,761	198	4.1
	-----	-----	-----
Total Applications	42,572	4,745	99.0
	-----	-----	-----
Net Cash Flow	411	46	1.0

1/ Includes DR 191.3 million in NREP I assets transferred to CBE

- (iii) local long-term financing has been available from the Caisse de Depot et de Gestion (CDG) which has purchased ONE's 15 year notes. However, the supply of such notes is limited, and for planning purposes, ONE assumes that a maximum of DH 300 million per year is available from this source.

4.19 In order to finance the rehabilitation and expansion of networks in rural areas electrified before the NREP was established, ONE is permitted each year to make a tax deductible contribution from its operating income to a "Special Fund" an amount up to 4.5% of its gross revenues. During the first half of the 1980's, ONE had no surplus from which to make such a contribution. However, the special fund is now projected to grow rapidly, accumulating DH 4.2 billion over the period 1989-98. This would be far in excess of the requirements for expenditures in the villages electrified before NREP. Thus ONE is currently planning to use the Fund to finance major distribution and transmission expenditures, and the extension and rehabilitation of existing electrified rural areas including those electrified during NREP I (Annex 2.13). For the purpose of the financial projections, it has been assumed that the Fund would be available to help finance any of ONE's other investments.

4.20 Through 1986, Government contributions financed 25% of ONE's General investment program, i.e., investments excluding those financed by customers' contributions or special projects carried out on behalf of and funded by the Government. Under PERL, Government undertook to eliminate its contributions to ONE's general investment program for the years 1987 and 1988, and there was no contribution in 1989. However, Government contributions for rural electrification and projects in certain regions have continued.

4.21 Other Sources of Financing. If, due to unforeseen circumstances, ONE is unable to obtain from its traditional sources of debt financing the amounts assumed in the above plan, its options, outside of increasing cash generation through tariff increases or other measures, are extremely limited. Beyond the traditional sources of debt financing as described above, the only other potential source, in the absence of direct foreign investment, is the local capital market, where, since there is no bond market, the only source of long and medium term credits is the banking system. However, under the normal credit ceilings set by the Government, the banking system provided no medium and long term credits during 1989. All lending, under the ceiling, was short term, usually lines of credit which normally revolve every 30 days. The only long and medium term credits provided by the banks were those requiring prior approval from the National Bank for Economic Development (BNDE) and targeted for eligible investments by industry. Almost none of this lending is funded from deposits and is mainly back to back lending from special resources including Financial Intermediation Loans from the Bank. Furthermore, these credits do not reduce the liquidity of the lending banks as they are eligible for refinancing by the Central Bank. At the end of 1989, the total amount of such credit was DH 8.9 billion, an increase of DH 2.6 billion from the end of 1988.

4.22 The only other potential source of capital, outside the ceiling on bank credit, is the commercial paper market, where the "billets de trésorie", with maturities ranging from 3 to 9 months, are issued by enterprises,

guaranteed by the banks and purchased by institutions such as insurance companies. As this paper is often rolled over by the issuing enterprises, it, in fact, constitutes a source of medium term credit. Currently the amount of such paper outstanding is limited by Government to DH 6.0 billion.

4.23 Thus, the local supply of long and medium term credit is limited and excessive recourse to this market by ONE could quickly crowd out other borrowers. On the other hand, commercial paper issued by ONE would be very attractive to certain financial institutions who could probably earn a higher rate of interest buying such paper directly from ONE. It is our opinion that ONE could probably issue a total of around DH 600 million in commercial paper without adversely affecting the ability of other enterprises to satisfy their financing needs.

4.24 Given the magnitude of the increase in ONE's future need for financing and the problems that would be associated with any financing gap, during negotiations, the Government and ONE agreed that before October 31 of each fiscal year, ONE will review with the Bank the adequacy of ONE's proposed pluri-annual investment program and on the basis of such review, ONE shall take, if necessary, the measures required to ensure that the available financing is sufficient to cover the cost of such investments (para 6.03).

4.25 Other Operating Costs Based on past performance, it is assumed that other operating costs, the most important of which are payroll costs, will increase, in real terms, at the same rate as power sales. As these costs should not be purely variable, there may be some scope for achieving a lower rate of increase. It is noted that exchange losses, related to ONE's foreign debt, are expected to recur over the forecast period, as the DH slowly depreciates against the US\$ in order to correct for a local rate of inflation which is expected by the Bank to be slightly higher than the Bank's forecast for the international rate of inflation.

4.26 ONE's Financial Performance Targets Given the importance that ONE maintain adequate internal cash generation and debt service coverage ratios, during negotiations, the Government and ONE agreed to maintain the ratios required under the Power Distribution Project, so that:

- (i) ONE will take measures to produce funds from internal sources related to its operations equivalent to not less than 25% for 1990 and 30% for each of its fiscal years thereafter, of the annual average of ONE's capital expenditures related to electric power operation incurred, or expected to be incurred for that year, the previous fiscal year and the next following year (para. 6.03);
- (ii) before October 31 in each of its fiscal years, ONE will review the adequacy of its revenues to achieve the agreed net internal cash generation ratio for such year and the following year, and on the basis of such review ONE shall take, if necessary, the measures required to achieve the agreed ratio (para. 6.03); and
- (iii) ONE shall not incur any long-term debt without Bank approval unless a reasonable forecast of its projected net revenues for each year

during the term of the debt to be incurred shall be at least 1.5 times the projected debt service requirement in such year on all debt of ONE (para. 6.04);

4.27 Future Tariff Increases. As shown at the bottom of Table 4.3, it is projected that ONE will require a significant tariff increase in 1991 if it is to meet the assumed targets for financial performance without any Government contributions, other than those for rural electrification. Under its contract-program with the Government, ONE proposed increases of 5% in 1989, 1990, 1991 and 1992. However, as the Government did not approve the proposed increase for 1989, and for 1990 approved only an increase of 4.5%, effective June 1, a tariff increase of 13% would be required on January 1, 1991 followed by an increase of only 3% on January 1, 1992, in order for ONE to achieve the required cash generation and debt service ratios. Furthermore, and given the uncertainties surrounding ONE's financial projections for 1990, submission by ONE of satisfactory financial projections indicating that ONE will comply with the cash-generation covenant in 1990, was executed as condition of Board Presentation (para. 6.01).

C. Impact of the Proposed Project on ONE's Financial Performance

4.28 In order to determine the impact of the proposed project on ONE's future financial performance, proforma financial statements, including profit and loss, cash flow and balance sheet, have been prepared for the project itself for the period 1991 to 2010 and are presented as Annexes 4.6, 4.7 and 4.8, respectively. The projections attempt to capture all financial flows associated directly with the project which impact on ONE's accounts, with the exception of any investment costs associated with providing additional electricity generation or transmission capacity to support the load generated by the project. As the project on the average, through 1998, consumes less than 1% of ONE's total power generated, ONE's investment program through 1998 is unlikely to change, with or without the project. Beyond 1998, rather than accounting specifically for generation and transmission investment costs assignable to the project, whose timing and amounts are difficult to predict, an attempt is made, instead, to determine whether or not the project generates enough surplus cash to cover its share of any future investments in power generation or transmission.

4.29 The proforma profit and loss statement in Annex 4.6 shows that though the project would reduce ONE's recorded profits in each year until 2008, most of this loss is due to the depreciation of the project assets, all of which are on ONE's books, even though these assets are to be paid for by the Government and the local authorities as detailed in Chapter 3.

4.30 From the proforma cash flow statement in Annex 4.7, it is noted that when non-cash expenses, including depreciation, are added to the projected operating losses, the project would contribute to ONE's net cash flow in all years but 1992. From the proforma balance sheet in Annex 4.8, it is projected that by 2010 the project would accumulate a cash surplus of DH 1,339 million, before accounting for any project related investments for power generation and transmission. This amount would be roughly equivalent to US\$ 89 million in January 1990 US\$. Thus, it may be concluded that the revenues

from the project more than cover the direct recurrent operating costs, and there is no intention to repeat, under the proposed project, the arrangements between ONE and the local authorities regarding the operation of NREP 1 facilities whereby these authorities were to compensate ONE for any losses it might incur. Furthermore, the contract program already provides for ONE to be compensated by the Government if ONE incurs losses as a result of carrying out projects which are decreed by the Government. Finally, the financial surplus generated by the project would make a substantial contribution to the additional investment in new generating capacity required as a result of the project.

D. Accounting, External Audits, Insurance and Stock Control

4.31 Accounting. ONE's financial staff is good. The Finance Department has highly competent and dedicated management who have considerably improved the quality of ONE's accounts and financial analysis techniques, including introduction of the use of micro-computers for financial projections. Major accounts are computerized and monthly and quarterly statements are prepared. ONE's recent introduction of microcomputers in several departments has considerably speeded up the preparation and analysis of accounts. Computerized financial forecasting models are now used on a routine basis for the purposes of financial planning.

4.32 Under PERL, the current system of a priori control of commitments and expenditures by the Financial Comptroller and Government Accountant (both representatives of the Ministry of Finance) has been made more flexible with the introduction of a Contract Program to govern ONE's financial operations.

4.33 External Auditing. Under Loan 2910-MOR, ONE agreed to have its financial statements audited by independent auditors acceptable to the Bank and send a copy of its financial statements and the audit reports to the Bank no later than six months after the end of the fiscal year, December 31. These arrangements have worked well and during negotiations ONE has agreed to maintain them for the proposed project (para. 6.04).

4.34 Insurance. ONE carries insurance for workman's compensation and third party liability. However, since it terminated its coverage with commercial insurers in the early 1970's, ONE, with the consent of the Government, assumes the risks of fire, explosions and natural calamities. Under the Power Distribution Project, ONE was required to undertake an analysis of the appropriate measures to take concerning insurance of its assets, including among others the option of setting up a reserve. The analysis, carried out by ONE and accepted by the Bank, recommended that ONE continue to assume the above mentioned risks.

4.35 Though this policy may have been acceptable in the past, it is now not clear whether a major loss could readily be covered by external loans or Government contributions since Morocco's ability to obtain new external debt is now severely constrained as are Government's budgetary resources. Thus, ONE and the Government agreed during negotiations that a new study be carried out to help ONE to decide on a satisfactory arrangement which would consist either on a continuation of the existing policy or obtaining local insurance backed

by external reinsurance, or building up and maintaining a reserve for losses (para 6.04).

4.36 Stock Control. In 1987 and 1988, ONE's stocks of materials, other than fuel, represented about 9 months of annual consumption. While this does not seem excessive for Morocco, given the lead time required for the delivery of imported materials, it nonetheless represents an annual carrying cost of around DH24 million. In order to reduce this cost, the proposed loan will cover the cost of designing a comprehensive stock control system as well as the cost of computer hardware and software required to implement the system.

V. ECONOMIC JUSTIFICATION

5.01 Sales Forecast. Projections of demand in kilowatt hours were made separately for low voltage sales and medium voltage sales from 1992 to 2010, on the basis of experience with the first rural electrification project and of a survey carried out in late 1989 of a sample of 20 villages electrified before implementation of the NREP. For purposes of the low-voltage demand projection, cumulated connection rates for electrifiable households are assumed to be 35% in the first year after the arrival of electricity in each village included in the project, 50% in the second year and 70% in the third year. This assumption takes into account the arrangements proposed in para. 3.07 for connecting households at the same time as the distribution networks are constructed, but it allows for possible delays in internal wiring of customer facilities. Consumption per household is assumed to be 250 kWh in the first year, 325 kWh in the second and 500 kWh in the third year. Electricity consumption at the low-voltage level for non-household use is assumed to be 96% of household consumption in the first year, 82% in the second and 61% in the third and subsequent years. Public lighting is assumed to remain constant from the first year on, while industrial and commercial consumption are assumed to remain equal to each other and grow at the same rate. After the third year of electricity supply, total low-voltage consumption for each village is assumed to grow at 15.7% per year until the tenth year on the basis of the village survey. From the tenth year until 2010 consumption is projected to grow by 10% per year. These growth rates are made up of an assumed 8% per year increase in connections with the rest of the increase attributable to increased consumption per customer. Medium-voltage sales were projected on the assumptions of 1.6 medium-voltage users per village, gradually connected over a 10 year period, who consume an average of 191 MWh per year per customer. The number of customers per village and the timing of their connections were determined from the 20 village survey (excluding the data for one atypical village with 24 very large agricultural customers). The annual consumption per customer is equal to the 1988 average for ONE's rural medium-voltage customers in 1988. The medium-voltage sales estimates are considered to be conservative since they are less than half the projected low voltage sales, whereas ONE's total medium-voltage sales in rural areas are nearly 2 1/2 times its low-voltage rural sales. Total low and medium-voltage sales in the villages to be electrified under the project are projected to grow from 5 GWh in 1992 to 169 GWh in 1998 and 614 GWh in 2010 (Annex 5.02, Attachment 1).

5.02 Least-Cost Analysis. Assessment of the least-cost alternative for rural electrification involves the comparison of the cost of connecting each village to the national grid (centrally supplied) with the cost of installing a local generator (isolated system). Analyses were carried out to determine the distance from the existing grid at which the cost of the two alternatives would be the same (Annex 5.01). This distance depends on the cost per kilometer of the connecting facilities and on the electricity demand in the village. Each village in the proposed project was examined using this analysis. It was found that connections to the national grid would be the least-cost alternative for all but eight of the 462 villages. Electrification by diesel unit is the least-cost option for the eight villages. If ONE confirms this finding by a more detailed analysis, the eight villages will be

electrified by means of diesel units. The project thus constitutes a least-cost investment for electrifying the 462 villages.

5.03 Rate of Return Analysis. The return on the project is the discount rate which equates the present value of the streams of measurable costs and benefits associated with the project. The cost streams are: (a) the capital cost of the project which includes physical contingencies but is net of taxes, customs duties and price contingencies; and (b) the long-run marginal cost of power delivered to the rural distribution network plus losses in the distribution network; and (c) distribution operating costs. The benefit streams are: (a) revenue from electricity sales at existing tariff rates assumed to remain constant in real terms; (b) estimated consumers' surplus for households who would use electricity as a replacement for butane, kerosene, candles and batteries (for television sets) and for small industries at low-voltage and all medium-voltage customers who would use electricity produced by small diesel generating units. All costs and benefits are expressed in May 1990 prices. Detailed assumptions are given in Annex 5.02.

5.04 Based on the benefits listed above, the estimated real return is 17.8%. The economic profitability of the project is very robust with respect to changes in the major variables concerned. Sensitivity tests yielded the following results in terms of changes which would cause the economic rate to decline from 17.8% to the opportunity cost of capital, estimated to be 10%:

Project costs	+ 75%
Low-voltage sales	- 73%
Medium-voltage sales	- 95%.

VI. AGREEMENTS REACHED AND RECOMMENDATION

6.01 During negotiations agreement was reached that conditions for Board Presentation will be that: (i) the Special Agreement between MF, MI, MEM and ONE (para. 3.08) will be executed; and (ii) satisfactory financial projections showing that ONE will be able to comply with the cash-generation covenant in 1990 will be submitted to the Bank (para 4.27). These conditions were subsequently met.

6.02 During negotiations, the Government agreed:

- (a) to decide , not later than December 31, 1990 on the basic elements of the national tariff structure, and to continue to implement gradually, and at the occasion of each tariff adjustment, the recommendations of the tariff study as shall have been agreed between the Borrower and the Bank, with the objective of implementing a global national tariff policy starting June 30, 1992. (para. 2.07);
- (b) to provide or cause to be provided, all funds necessary to cover the entire financing of the proposed project and any cost overruns which might arise in respect of foreign or local expenditures (para. 3.06);
- (c) to open and maintain two special accounts A and B of US\$ 0.90 million and US\$ 5.0 million respectively, to cover all categories of expenditures for the consumer connections for the special account A, and for the remaining of the proposed project for the special account B, on terms and conditions satisfactory to the Bank, and to have these accounts and SOEs audited by independent auditors acceptable to the Bank (para. 3.28);
- (d) to ensure that all accounts due to ONE and the Régies by the administrative subdivisions of the Government for electricity consumed and related works carried out through December 31, 1990 shall be paid in three equal installments during 1991, 1992 and 1993 (para. 4.12);
- (e) to ensure that amounts due to ONE and all Régies by its administrative subdivisions shall be paid promptly in accordance with guidelines satisfactory to the Bank (para. 4.12); and
- (f) that the budgetary allocations shall be made for each fiscal year in the relevant budget or budgets of its public agencies in amounts sufficient to ensure that these agencies meet their obligations (para. 4.12).

6.03 During negotiations, the Government and ONE agreed:

- (a) for ONE to review with the Bank, by October 31 of each of ONE's fiscal years, the adequacy of ONE's proposed pluri-annual investment program, and on the basis of such review ONE shall

take, if necessary, the measures required to ensure that the available financing is sufficient to cover the cost of such investments (para 4.23);

- (b) for ONE to produce funds from internal sources related to its operations equivalent to not less than 25% for its fiscal year 1990, and 30% for each of its fiscal years thereafter, of the annual average of ONE's capital expenditures related to electric power operation incurred, or expected to be incurred for that year, the previous fiscal year and the following year (para. 4.26); and
- (c) that before October 31 in each of its fiscal year ONE shall review with the Bank the adequacy of its revenues to achieve the agreed net internal cash generation ratio for such year and the following year, and on the basis of such review ONE shall take, if necessary, the measures required to achieve the agreed ratio (para. 4.26);

6.04 During negotiations, ONE agreed to:

- (a) waive the requirement that each new low-voltage consumer pays a connection fee in advance, and to recover these costs through installments to be paid by the consumers with each monthly electricity bill and equal to at least 1.5% of the connection cost (para. 3.07);
- (b) complete the detailed engineering design for the first 200 villages by March 31, 1991 and for the remaining villages by December 31, 1992 (para. 3.12);
- (c) not incur any long-term debt without Bank approval unless a reasonable forecast of its projected net revenues for each year during the term of the debt to be incurred shall be at least 1.5 times of the projected debt service requirement in such year on all debt of ONE (para. 4.26);
- (d) have its accounts audited by independent auditors acceptable to the Bank and its financial statements and audit reports furnished to the Bank within seven months after the end of each fiscal year (para. 4.32); and
- (e) carry out a study in order to decide on a satisfactory arrangement which would consist either on a continuation of the existent policy or obtaining local insurance backed by external reinsurance, or building up and maintaining a reserve for losses (para 4.34).

6.05 With the above agreements, the proposed project would be suitable for a Bank loan of US\$ 114.0 million, for a term of 20 years at the standard variable interest rate, including a five-year grace period to the Kingdom of Morocco. Signing of the Subsidiary Loan Agreement between the Government and ONE would be a condition of effectiveness (para 3.10).

MOROCCO

 SECOND RURAL ELECTRIFICATION PROJECT

 Energy Balance, 1988

 (thousand toe)

	Traditional Energy	Commercial Energy														Total	TOTAL			
		Crude	Propane	Butane	Super	Regular	Kerosene	Jet fuel	Gas oil	HFO	Other FO	Maptha	Paraffin	Dom. coal	Imp. coal			Nat. gas	Hydro	Elec.
Primary production	3378	20		186										356		63	243		682	4060
Imports		5050											4	707					5947	5947
Exports														-5					-319	-319
Stock change and statistical diff.																				0
		74		61	-3	-2	4	-4	-32	-127	40	-9	2	-27					-23	-23
Total energy consumption	3378	5144	0	247	-3	-2	4	-4	-60	-127	40	-295	6	324	707	63	243	0	6287	9665
Oil refining		-5144	46	213	266	99	46	216	1544	1895	13	295	10						-501	-501
Elec. gen.									-7	-989				-256	-482		-243	647	-1330	-1330
Final energy consumption	3378	0	46	460	263	97	50	212	1477	779	53	0	16	68	225	63	0	647	4456	7834

Sources: Commercial energy: MEM
 Traditional energy: Joint UNDP/World Bank Energy Sector Management Assistance Program, Activity Completion Report No.048/86, Morocco: Energy Assessment Status Report, January 1988
 The estimates given in this report were held constant to 1988

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

Electricity Sales, Losses, and Generation (1978-1988)

(Gwh)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
<u>ONE</u>											
<u>Interconnected</u>											
<u>System</u>											
<u>Sales:</u>											
To Own Customers	1,421	1,644	1,805	1,934	2,078	2,305	2,405	2,604	2,783	2,977	3,102
To Régies	<u>1,970</u>	<u>2,105</u>	<u>2,289</u>	<u>2,390</u>	<u>2,528</u>	<u>2,668</u>	<u>2,735</u>	<u>2,890</u>	<u>3,092</u>	<u>3,276</u>	<u>3,543</u>
Subtotal	3,399	3,749	4,094	4,324	4,606	4,973	5,140	5,494	5,875	6,253	6,645
<u>Losses and Own Use</u>											
ONE's Dist. Network	62	50	52	86	63	91	87	110	101	62	81
Transmission	275	302	310	379	404	393	418	413	450	454	452
Power Stations	<u>258</u>	<u>266</u>	<u>301</u>	<u>351</u>	<u>415</u>	<u>442</u>	<u>462</u>	<u>498</u>	<u>511</u>	<u>532</u>	<u>533</u>
Subtotal	595	618	663	816	882	926	967	1,021	1,062	1,048	1,066
% of Gen. & Purchases	14.9	14.2	13.9	15.9	16.1	15.7	15.8	15.6	15.4	14.4	13.8
<u>Generation & Purchases</u>											
Hydro	1,416	1,582	1,515	1,024	573	481	367	486	643	825	936
Thermal	2,551	2,744	3,213	4,068	4,880	5,384	5,719	6,005	6,273	6,418	6,582
Purchases ^{a/}	<u>27</u>	<u>41</u>	<u>29</u>	<u>39</u>	<u>26</u>	<u>22</u>	<u>8</u>	<u>5</u>	<u>21</u>	<u>57</u>	<u>192</u>
Total	3,994	4,367	4,757	5,131	5,479	5,887	6,094	6,496	6,937	7,300	7,710
<u>Isolated Systems</u>											
Sales	2	3	4	12	15	18	19	26	28	30	30
Losses	1	1	1	3	3	4	3	4	5	7	8
Purchases	-	-	-	8	9	12	13	18	21	23	23
Generation	<u>3</u>	<u>4</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>10</u>	<u>9</u>	<u>12</u>	<u>12</u>	<u>14</u>	<u>15</u>
<u>Ministry of Interior</u>											
Sales	10	12	12	17	18	18	19	18	18	19	19
Losses	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>5</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>6</u>
Generation	13	15	16	21	22	22	24	22	23	25	25
<u>Autoproducers^{a/}</u>											
Own Use	351	398	441	512	586	721	760	777	858	1,016	1,210
Supply to ONE	<u>27</u>	<u>41</u>	<u>29</u>	<u>48</u>	<u>35</u>	<u>34</u>	<u>21</u>	<u>23</u>	<u>42</u>	<u>57</u>	<u>197</u>
Generation	378	439	470	560	621	755	781	800	900	1,073	1,407
<u>Total Generation</u>	4,361	4,764	5,219	5,680	6,105	6,652	6,900	7,324	7,852	8,355	8,965

Source: ONE

^{a/} Includes net purchases from Algeria in 1988 of 18.2 GWh.

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SECOND RURAL ELECTRIFICATION PROJECT

ONE and the Régies

Breakdown of Sales by Economic Sector (1978-1988)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
(GWh)											
<u>Medium and High Voltage</u>											
Agriculture, fisheries	121	130	164	253	247	292	295	318	347	369	364
Potable water dist.	48	162	188	205	201	230	226	243	250	267	254
Coal mining	47	44	47	47	51	53	61	67	70	71	70
Phosphate mining	286	301	299	309	313	319	327	337	354	377	415
Other mining	122	128	137	141	165	168	191	203	160	160	217
Mech. & elec. indus.	67	71	78	92	97	100	103	110	147	151	188
Cement industry	324	322	340	347	358	386	376	391	402	430	451
Other material indus.	73	89	103	103	98	91	94	102	106	107	146
Chemical industry	142	201	216	206	210	220	251	254	336	343	254
Canning & preserving industry	221	238	248	261	247	261	272	279	326	341	338
Textile industry	224	244	273	272	282	320	357	341	359	374	418
Woodworking, plastic industry	156	170	182	191	186	216	228	215	233	239	252
Railways	103	97	106	109	104	114	115	150	153	165	183
Comm., other transport	50	50	53	53	65	71	72	74	90	90	75
Hotels, catering	178	175	203	187	239	269	223	253	276	292	292
Radio, TV, gvt.	154	173	188	206	209	234	250	288	287	288	334
Subtotal	2,316	2,595	2,825	2,982	3,072	3,344	3,441	3,628	3,895	4,067	4,250
Annual Growth (%)	9.0	12.1	8.8	5.6	3.0	8.9	2.9	5.4	8.4	4.4	4.5
<u>Low Voltage</u>											
Domestic use, private and admin. lighting	823	888	983	1,027	1,197	1,276	1,326	1,461	1,555	1,746	1,893
Public lighting	72	77	80	86	92	108	111	128	139	158	168
Power	66	65	67	64	73	77	77	87	94	87	93
Subtotal	961	1,030	1,130	1,177	1,362	1,461	1,514	1,676	1,788	1,990	2,154
Annual Growth (%)	9.2	7.1	9.7	4.1	15.8	7.2	3.7	10.6	4.6	11.3	8.2
Total Final Sales:											
ONE and Régies	3,277	3,625	3,955	4,159	4,434	4,805	4,955	5,304	5,683	6,057	6,404
Annual Growth (%)	9.0	10.6	9.1	5.2	6.6	8.4	3.1	7.0	7.2	6.6	5.7
Total Sales by ONE, excl. to Régies	1,424	1,647	1,809	1,939	2,085	2,313	2,413	2,613	2,783	3,007	3,123
Total Sales by Régies	1,853	1,978	2,146	2,220	2,348	2,492	2,543	2,691	2,900	3,050	3,273
Losses Régies	117	127	143	170	179	176	193	199	220	226	270
Percent of ONE Sales to Régies (%)	5.9	6.0	6.3	7.1	7.1	6.6	7.0	6.9	7.0	6.9	7.6

Source: ONE

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SECOND RURAL ELECTRIFICATION PROJECT

ELECTRICITY TARIFFS

Bulk Supply Tariffs (for Sales to the Régies)^{a/}

(Effective from May 1, 1989)

	Demand Charge ^{a/} <u>(DH/kVA/year)</u>	Energy Charge ^{b/} <u>Day</u> (7 a.m.-10 p.m.)	(DH/kWh) <u>Night</u>
Casablanca	97.21	0.698	0.559
Fes	96.11	0.690	0.552
Kenitra	94.27	0.677	0.542
Tetouan	93.37	0.670	0.536
Meknes	93.11	0.668	0.535
Safi	92.80	0.666	0.533
Marrakech	88.94	0.638	0.511
Tanger	88.19	0.633	0.507
Rabat	86.80	0.623	0.498
El Jadida	79.34	0.570	0.456

^{a/} Some Régies buy electricity under several tariffs. The tariffs included here are representative.

^{b/} Excludes value added tax equal to 7% of revenue.

^{c/} For subscribed or actual demand in excess of 2,000 kVA. Every one of the Régies has a demand far in excess of 2,000 kVA. There are different and higher rates for each of five blocks of consumption less than 2,000 kVA.

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SECOND RURAL ELECTRIFICATION PROJECT

Very High and High Voltage Tariffs for sales by ONE^{a/}

(Effective May 1, 1989)

<u>Subscribed Demand^{b/}</u> <u>Charge (DH/kVA/year)</u>	<u>Energy Charge^{a/} (DH/kWh)</u>	
	<u>Day</u>	<u>Night</u>
235.00	0.6783	0.54264

Special Tariffs^{c/}

Maroc Chimie	DH 0.68342
Maroc - Phosphore I	DH 0.68342
SNEP	DH 0.60756

^{a/} Includes value added tax equal to 7% of revenue.

^{b/} The charges are progressively higher depending on the stage of transformation and the distance from generating stations.

^{c/} ONE buys electricity from these autoproducers at 10% of the sales price during the period March through May and at 50% at other times.

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SECOND RURAL ELECTRIFICATION PROJECT

Medium-Voltage Tariffs (ONE and Régies)^{a/}

(Effective May 1, 1989)

Non-Agricultural Customers

<u>Subscribed Demand</u>	<u>Energy Charge (DH/kWh)</u>	
	<u>Day</u>	<u>Night</u>
<u>Charge (DH/kVA/year)</u>		
248	0.85105	0.68084

Agricultural Customers

	<u>Reference</u>	<u>Winter</u>	<u>Summer</u>	<u>Winter</u>	<u>Summer</u>
	<u>Fixed Charge</u>	<u>day^{a/}</u>	<u>day^{a/}</u>	<u>night^{d/}</u>	<u>night^{d/}</u>
	<u>(DH/kW/year)</u>				
Very long use of subscribed demand ^{b/}	1701.10	0.48607	0.45555	0.38748	0.3874
Medium use ^{b/}	765.47	0.97652	0.54858	0.44298	0.38748
Short use ^{b/}	340.16	1.46683	0.64147	0.49834	0.38748
Coefficient of reduced demand ^{e/}		1	0.25	0.05	0.05

^{a/} Includes value added tax equal to 7% of revenue.

^{b/} Very long use: > 5,500 hours per year; medium use: 2,500 - 5,500; short use: < 2,500.

^{c/} 7 a.m. - 12 p.m.; Sundays: 5 p.m. - 10 p.m. Winter extends from November 1 to March 31.

^{d/} 12 p.m. - 7 a.m.; Sundays: 10 p.m.

^{e/} Subscribed demand for periods other than winter day in excess of subscribed demand during winter day is charged at reduced rates according to the formula: $DC = DC^1 [r_1 D_1 + r_2 (D_2 - D_1) + r_3 (D_3 - D_2) + r_4 (D_4 - D_3)]$ where: DC = total subscribed demand charge per kW per year; DC¹ = reference fixed charge for the option; D₁ = subscribed demand in period 1 (winter day = 1, summer day = 2, winter night = 3, summer night = 4). For a temporary period until new meters are installed, subscribed demands will be maintained the same for day and night, but may be differentiated between summer and winter. New meters are expected to be installed by October 1990. r₁ = coefficient of reduced demand for period 1.

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SECOND RURAL ELECTRIFICATION PROJECT

Low-Voltage Tariffs (ONE and Régies)

(Effective May 1, 1989)^{a/}

Private Lighting (DH/kWh)

	<u>0 - 500 kWh/month</u>	<u>>500 kWh/month</u>
Normal tariff	0.75	0.90
Tariff without minimum consumption	0.90	1.080

Household Tariff^{b/} (DH/kWh)

<u>Fixed Charge (DH/month)</u>	<u>0-200 kWh/month</u>	<u>201-500 kWh</u>	<u>7500 kWh</u>
2.93	0.620	0.700	0.900

Commercial and Administrative Lighting (DH/kWh)

With minimum	0.90
Without minimum	1.080

Public Lighting (DH/kWh)

0.730

Agricultural, Industrial, Motive Power Uses (DH/kWh)

With minimum	0.820
Without minimum	0.984

^{a/} Includes value added tax equal to 7% of revenue. Excludes television tax of DH 0.05/kWh for consumption in excess of 50 kWh/month to a maximum of DH 10/month.

^{b/} Available to consumers justifying a substantial demand for non-lighting uses. The fixed charge varies with the number of rooms in the dwelling. The charge shown is for dwellings with 1-4 rooms.

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SECOND RURAL ELECTRIFICATION PROJECT

Average Revenue Compared to Economic Cost for 1988

(cDH/kWh)

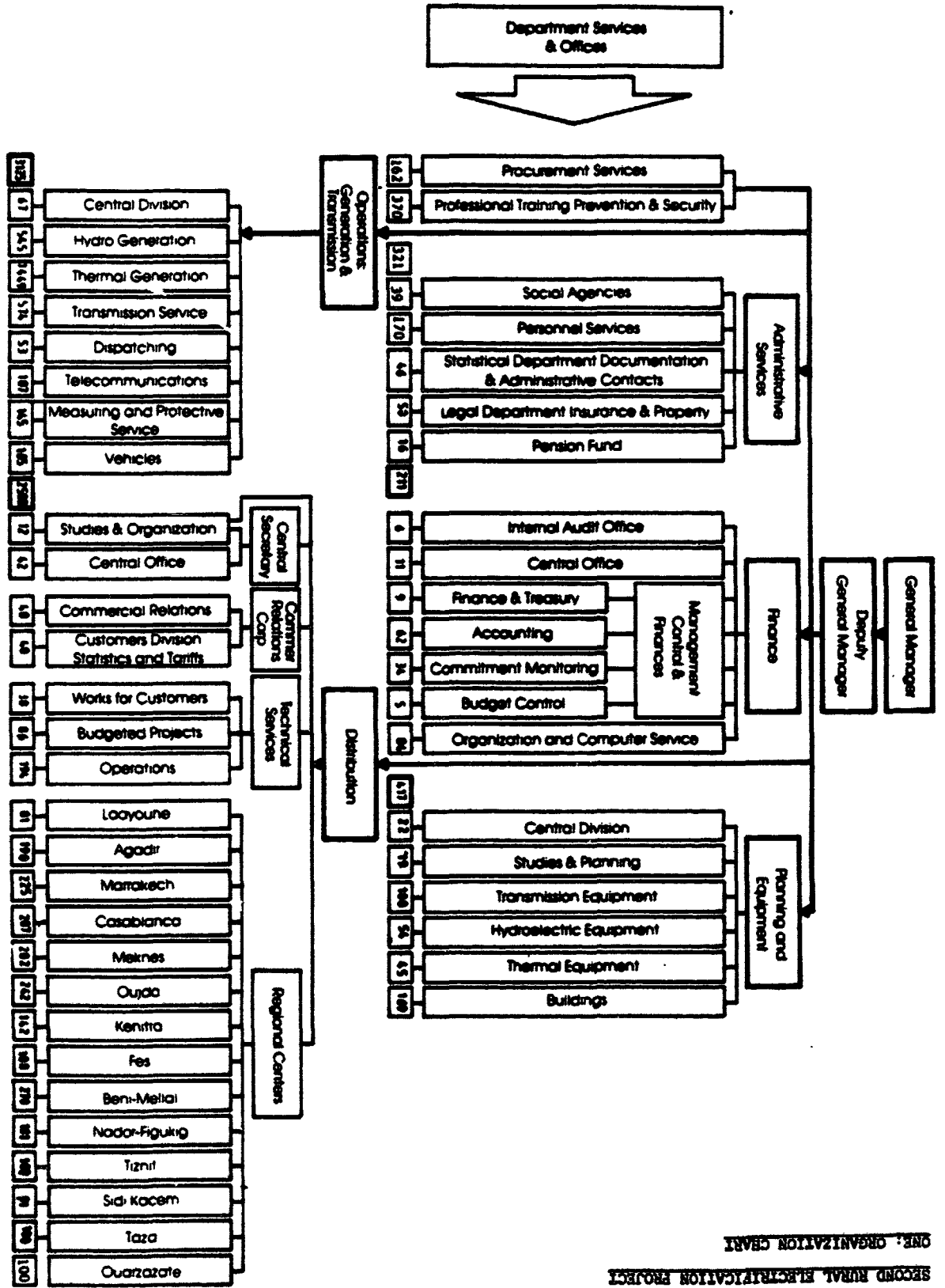
<u>Customers</u>	<u>Economic Cost 1995 Base</u>	<u>Economic Cost 1988 Base</u>	<u>Average Revenue (1988)</u>	<u>Average Revenue Economic Cost 1988 Base (%)</u>
<u>Very high voltage</u>	45.19	37.4]— 71.9	177
<u>High voltage</u>	49.45	41.4		
<u>Régies (for purchases from ONE)</u>	50.09	42.0	66.2	158
Casablanca	50.02	41.9	67.6	161
Rabat	50.82	42.7	62.1	145
Kenitra	49.74	41.5	67.6	163
Meknes	49.86	41.8	66.5	159
Fes	49.11	41.0	69.2	169
Tanger	49.24	41.1	64.5	157
Tetouan	50.18	42.1	66.9	159
Marrakech	51.02	42.9	63.1	147
Safi	50.86	42.8	66.8	156
El Jadida	51.45	43.4	56.1	129
<u>Medium Voltage</u>	59.88	51.4	94.6	184
<u>Low Voltage</u>	65.95	56.8	71.0	125
Private lighting	73.85	64.7	73.3	113
Household tariff	65.70	56.6	63.1	111
Public lighting	63.96	54.8	68.1	124
Commercial, industrial and agricultural use	57.58	48.4	86.7	179
<u>Weighted average for sales to final customers of ONE and the Régies</u>	59.10	50.5	81.8	162

Sources

Economic Cost, 1995 Base: EDF International, CID, Royaume du Maroc, Etude de Tarification de l'Energie Electrique, Mission IV, Passage des Coûts aux Tarifs Structure, Rapport Final, June 1989, pp. 48-49, and p. 25.

Economic Cost, 1988 Base: The consultants projected a fuel oil price in 1995 of DH 1195/ton and a coal price of DH 460/ton, both in constant 1988 prices: EDF International, CID, ibid. Mission II A. Calcul des coûts Marginaux, Rapport Final, June 1989, p. 12. Actual cif prices plus distribution costs at the end of 1988 were DH 800/ton for fuel oil and DH 432/ton for coal. The consultants' marginal cost estimates were adjusted downwards on the basis of formulas provided in Mission II, p. 25, and estimates of losses at each stage of transmission and distribution, p. 14.

Average Revenue (1988), EDF International, CID, ibid, Mission V, Application des Coûts Marginaux, Incidence Financière, Rapport Provisoire, March 1989, p.14. Estimates of average revenue of individual low voltage tariff categories were supplied by ONE and concern ONE sales only. The average revenue estimates include the 7% value added tax.



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 SECOND RURAL ELECTRIFICATION PROJECT
 ONE: ORGANIZATION CHART

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SECOND RURAL ELECTRIFICATION PROJECT

Maximum Demand and Installed Capacity of Generating Plants (ONE)

		(MW)											
		Year of commissioning											
		1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Maximum Demand ^{a/}		765	827	863	903	994	1,014	1,046	1,148	1,246	1,277	1,393	1,393
Installed Capacity													
Hydro Plants													
B. El Ouidane	1953/54	135	135	135	135	135	135	135	135	135	135	135	135
Afourer	1955	94	94	94	94	94	94	94	94	94	94	94	94
Im Fout	1947/49	31	31	31	31	31	31	31	31	31	31	31	31
S. Said Maachou	1929	21	21	21	21	21	21	21	21	21	21	21	21
Daourat	1950	17	17	17	17	17	17	17	17	17	17	17	17
El Kansera	1935	14	14	14	14	14	14	14	14	14	14	14	14
Lau	1939/42	11	11	11	11	11	11	11	11	11	11	11	11
K. Zidania	1935/36	7	7	7	7	7	7	7	7	7	7	7	7
Taurart	1951	2	2	2	2	2	2	2	2	2	2	2	2
Fes Aval	1934	2	2	2	2	2	2	2	2	2	2	2	2
Fes Amont	1925	1	1	1	1	1	1	1	1	1	1	1	1
Taza	1929	1	1	1	1	1	1	1	1	1	1	1	1
Meknes	1925	1	1	1	1	1	1	1	1	1	1	1	1
Mohammed El Khemis	1967	23	23	23	23	23	23	23	23	23	23	23	23
Bou Areg	1969	6	6	6	6	6	6	6	6	6	6	6	6
Moulay Youssef	1974	24	24	24	24	24	24	24	24	24	24	24	24
Mansour El Dhabl	1973	10	10	10	10	10	10	10	10	10	10	10	10
Idriss Ist	1978	40	40	40	40	40	40	40	40	40	40	40	40
Oued Makhazine	1979	-	36	36	36	36	36	36	36	36	36	36	36
Al-Massira	1980	-	-	128	128	128	128	128	128	128	128	128	128
Takerkoust	1984/87							6	6	6	12	12	12
Total Hydro-Plants		440	476	604	604	604	604	610	610	610	616	616	616
Thermal Plants													
Jerada (coal)	1971/72	165	165	165	165	165	165	165	165	165	165	165	165
Casablanca (coal-60 MW, fuel oil)	1968/75	152	152	152	152	152	152	120	120	120	120	120	120
Kenitra (fuel oil)	1978/79	75	300	300	300	300	300	300	300	300	300	300	300
Oujda (fuel oil)	1949/51	17	17	17	17	17	-	-	-	-	-	-	-
Mohammedia (300 MW coal)	1981/85	-	-	-	150	300	300	450	600	600	600	600	600
(300 MW fuel oil)													
Total Steam Plants		409	634	634	784	934	917	1,035	1,185	1,185	1,185	1,185	1,185
Combustion Turbines													
Sidi Kacem	1967	16	16	16	16	16	16	16	16	16	16	16	16
Agadir	1975/77	40	40	40	40	40	40	40	40	40	40	40	40
Tanger	1975/77	40	40	40	40	40	40	40	40	40	40	40	40
Tetouan	1975/77	40	40	40	40	40	40	40	40	40	40	40	40
Total Combustion Turbines		136	136	136	136	136	136	136	136	136	136	136	136
Diesel													
(interconnected grid)		21	21	18	18	18	10	9	9	11	11	11	11
(isolated networks)		8	10	11	13	14	13	14	15	15	15	15	15
Grand Total		1,014	1,277	1,403	1,555	1,706	1,680	1,804	1,955	1,957	1,963	1,963	1,963

^{a/} Highest quarter hour demand during the year.

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SECOND RURAL ELECTRIFICATION PROJECT

ONE

Gross Generation and Fuel Consumption of Generating Plants on Interconnected Systems

(GWh)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	Fuel Consumption in 1988 (tons/GWh)
Hydro												
Commissioned before 1965	1,246	3,401	110	764	410	364	245	364	394	519	647	
Mohammed El Khamis	49	70	52	21	20	27	7	12	44	60	29	
Bou Areg	21	20	15	8	4	5	3	3	10	19	7	
Moulay Youssef	44	44	53	23	7	2	6	16	15	19	54	
Mansour El Dhabl	28	31	50	34	14	3	2	7	5	7	40	
Idriss Ist	28	61	19	7	-	1	1	2	26	50	26	
Oued Makhazine		16	46	29	36	30	88	36	84	63	30	
Al Massira			170	138	81	49	14	46	65	88	103	
Subtotal Hydro Plants	1,416	1,582	1,515	1,024	572	481	366	486	643	825	936	
Steam												
Oujda: Local coal	31	15	23									
Heavy fuel oil				2								
Casablanca: Local coal			93	23	21	3	3		4	146	88	0.512
Imported coal					46	213	142	3	62	-	22	0.493
Heavy fuel oil	845	741	613	669	442	381	389	366	571	388	489	0.274
Jerada: Local coal	1,218	866	864	1,167	1,040	1,056	1,013	1,049	961	962	817	0.561
Imported coal						47	55					
Kenitra: Heavy fuel oil	122	1,012	1,566	1,807	1,392	1,428	1,895	1,580	1,034	1,200	1,533	0.263
Mohammedia: Heavy fuel oil				121	1,884	2,138	1,930	2,939	2,537	1,985	1,653	0.228
Mohammedia: Imported coal									1,076	1,640	1,806	0.372
Subtotal: Local coal	1,249	881	980	1,190	1,061	1,059	1,015	1,049	965	1,108	905	
Subtotal: Imported coal					46	260	198	3	1,138	1,640	1,828	
Subtotal: Heavy fuel oil	967	1,752	2,179	2,598	3,718	3,947	4,215	4,884	4,142	3,573	3,675	
Subtotal: Steam	2,216	2,633	3,159	3,788	4,825	5,267	5,428	5,963	6,245	6,321	6,408	
Combustion Turbines (heavy fuel oil)												
Sidi Kacem	8	3		11	1	1	13			-	1	
Agadir	110	46	29	93	20	46	107	36	13	35	60	
Tanger	114	34	12	96	18	37	81	18	9	30	57	
Tetouan	97	27	13	77	16	33	87	15	7	31	55	
Subtotal: Combustion Turbines	329	110	54	277	55	117	287	68	29	96	173	0.441
Diesel (Gas oil)	6	2	-	3	-	-	4	-	-	14	16	0.306
TOTAL	3,967	4,327	4,728	5,092	5,452	5,865	6,085	6,490	6,917	7,255	7,533	

Source: ONE

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SECOND RURAL ELECTRIFICATION PROJECT

Office National de l'Electricité (ONE)

Networks Inventory

	<u>1981</u>	<u>1984</u>	<u>1987</u>	<u>1988</u>
Length of Transmission Lines (km)				
225 kV	2,186	2,436	3,069	3,143
150 kV	1,183	1,088	937	864
60 kV	5,697	6,122	6,537	6,800
30 kV	164	169	78	9
22 kV	7,855	9,019	10,386	10,854
Number of Transformers				
225/150 kV)	32	35	49	51
225/ 60 Kv)				
150/ 60 kV)	22	23	15	15
150/MV				
60/MV	224	232	254	262
Installed Capacity (MVA)				
225/150 kV)	2,855	4,595	4,855	4,995
225/ 60 kV)				
150/ 60 kV)	810	830	570	570
150/MV)				
60 MV	6,193	2,804	3,058	3,190
Length of Distribution Lines (km)	3,781	4,888	8,002	8,286
Length of Connections (km)	5,156	5,958	7,949	9,172

Source: ONE

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SECOND RURAL ELECTRIFICATION PROJECT
Office National de l'Electricité (ONE)
Number of Consumers

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
<u>Low Voltage</u>											
Domestic	72,345	77,216	84,339	93,421	102,815	112,215	115,310	121,402	127,325	133,216	139,592
Private											
Lighting	240,376	206,910	221,139	235,680	248,465	262,932	285,737	315,228	350,252	382,627	409,638
Commercial		51,702	54,845	58,589	62,597	67,473	74,574	76,494	83,000	91,841	91,841
Government											
Administ.	6,565	6,892	7,081	7,453	7,705	8,050	8,534	8,336	8,667	9,132	9,735
Public											
Lighting											
Power	<u>8,438</u>	<u>8,857</u>	<u>9,060</u>	<u>9,553</u>	<u>9,957</u>	<u>10,377</u>	<u>10,796</u>	<u>11,017</u>	<u>11,474</u>	<u>12,009</u>	<u>12,394</u>
Subtotal	<u>328,784</u>	<u>352,722</u>	<u>377,707</u>	<u>406,055</u>	<u>433,079</u>	<u>462,711</u>	<u>496,821</u>	<u>534,498</u>	<u>582,979</u>	<u>631,375</u>	<u>672,723</u>
<u>Medium Voltage</u>	1,826	2,030	2,180	2,454	2,790	3,092	3,339	3,600	3,853	4,164	4,402
<u>High Voltage</u>											
Régies	23	25	26	26	28	28	28	28	29	26	29
Industrial	55	53	59	56	60	66	67	67	67)	
Other	6	9	9	9	10	10	17	17	19)	62
Subtotal	<u>84</u>	<u>87</u>	<u>94</u>	<u>91</u>	<u>98</u>	<u>104</u>	<u>112</u>	<u>112</u>	<u>115</u>	<u>88</u>	<u>90</u>
Total Number of Consumers	<u>330,694</u>	<u>354,839</u>	<u>379,984</u>	<u>408,600</u>	<u>435,967</u>	<u>465,907</u>	<u>500,160</u>	<u>538,210</u>	<u>586,947</u>	<u>635,627</u>	<u>677,215</u>

Source: ONE

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SECOND RURAL ELECTRIFICATION PROJECT

Forecast Demand for Electricity (ONE)

GWh

	Actual 1989	Forecast								
	-----	1990	1991	1992	1993	1994	1995	1996	1997	1998
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sales to Regies(a)	3820	4062	4378	4664	4958	5282				
Sales to other large users(a) of which:	1550	1644	1853	1970	2092	2284				
Mining:		578	712	759	808	819				
OCP		391	511	534	547	547				
Jerada		70	81	84	87	87				
Others		117	120	141	174	185				
Other industry/ commerce:		1066	1142	1212	1285	1466				
OCP		55	69	70	74	74				
Cement		434	449	475	518	547				
ONCF		188	205	222	240	257				
SNEP		115	125	130	130	170				
ONEP		88	87	100	103	104				
Other		186	207	215	220	314				
Other ONE sales(b)		1943	2079	2224	2380	2547				
Total ONE sales	7133	7649	8310	8858	9430	10113				
Adjusted forecast		7611	8121	8665	9245	9865	10526	11231	11984	12787
Transmission and distribution losses		617	658	712	749	799	852	910	971	1036
Power station use, losses		540	576	605	657	700	748	797	850	907
Gross generation and purchases (ONE)	8217	8768	9355	9982	10651	11364	12126	12938	13805	14730
% growth		0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067

(a) Users covered by ONE's annual survey.

(b) Projections made on the basis of statistical analysis of historical trends.

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SECOND RURAL ELECTRIFICATION PROJECT

ONE - PROJECTED CAPACITY BALANCES

(INTERCONNECTED GRID)

(MW)

Item	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99
Maximum demand	1355	1430	1530	1630	1740	1840	1955	2070	2195	2330	2470
Hydro capacity guaranteed											
In service in 1988	280	280	280	280	280	290	290	290	290	290	290
Messan 1				51	49	47	45	45	45	45	45
Matmata						224	224	224			
Dchar el Oued/Ait Messaoud									64	63	62
M'Jaara										198	190
Sidi Driss									1	1	1
M'Dez											35
Total hydro	280	280	280	331	329	561	559	559	624	821	847
Existing thermal:											
Jerada coal	165	165	165	165	165	165	165	165	165	165	165
Casablanca coal	60	60	60	60	60	60	60	60	60	60	60
Mohammedia coal	300	300	300	300	300	300	300	300	300	300	300
Steam turbines - oil	660	660	660	660	660	660	660	660	660	660	660
Combustion turbines	135	135	120	120	120	120	120	120	120	120	120
Total existing thermal	1320	1320	1305	1305	1305	1305	1125	1125	1125	1125	1125
New combustion turbines				90	180	180	180	180	180	180	180
Jorf Lasfar coal							300	600	600	900	900
Total thermal	1320	1320	1305	1395	1485	1485	1605	1905	1905	2205	2205
Total capacity	1600	1600	1585	1726	1814	2046	2164	2464	2529	3026	3052
Provision for:											
Scheduled maintenance	75	75	75	135	135	135	225	225	225	225	225
Unscheduled outages	150	150	150	150	150	150	150	300	300	300	300
Margin	20	-55	-170	-189	-211	-79	-166	-131	-191	171	57

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

PROJECTED BALANCES OF ENERGY

(GWh)

Item	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Gross generation	8217	8768	9355	9982	10651	11364	12126	12938	13805	14730
Hydro generation guaranteed In service in 1988	1030	690	800	800	800	830	830	830	830	830
Hassan I				45	45	45	45	45	45	45
Matmata						210	210	210	210	210
Dchar el Oued/Ait Messaoud									143	143
M'Jara									60	120
Sidi Driss								10	10	10
M'Dez										5
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total hydro guaranteed	1030	690	800	845	845	1085	1085	1095	1298	1363
Existing thermal										
Local coal	1170	1245	1245	1245	1245	1150	1150	1150	1150	1150
Imported coal	2100	2170	2200	2200	2200	2100	2100	2100	2100	2100
Steam turbines (oil)	4620	4620	4620	4620	4620	4620	4620	4620	4620	4620
Combustion turbines	600	600	600	600	600					
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total existing thermal	8490	8635	8665	8665	8665	7870	7870	7870	7870	7870
New combustion turbines			50	450	900	900	900	900	900	900
Jorf Lasfar coal							2500	4200	5100	6000
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total energy available	9520	9325	9515	9960	10410	9855	12355	14065	15168	16133
Margin over gross generation demanded	1303	557	160	-22	-241	-1509	229	1127	1363	1403

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT

Office National de L'Electricité

Investment Program 1987-98

(DH millions)

Item	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Hydro Generation												
Hessan Ier (mid 91)	205	163	294	132	52	0	0	0	0	0	0	0
Matmata (end 93-mid 94)	0	58	184	365	466	384	325	100	0	0	0	0
Dchar el Oued (end 95)	0	0	0	0	0	0	130	137	231	154	0	0
Ait Messaoud (end 95)	0	0	0	0	0	0	39	64	106	41	0	0
Sidi Driss (end 95)	0	0	0	0	0	0	30	53	42	0	0	0
Mjaara (mid 97)	0	0	31	0	0	0	276	291	468	363	200	0
M'Dez (end 98)	0	0	0	0	0	0	0	0	101	143	184	174
El Mrnzal (end 99)	0	0	0	0	0	0	0	0	307	512	484	695
Other Works	2	4	12	0	0	0	0	0	0	0	50	153
Hydro Studies	11	10	1	9	11	8	8	9	9	9	10	10
Total	218	235	522	505	530	392	808	653	1,264	1,222	928	1,032
Thermal Generation												
Laayoune (end 88)	30	163	38	4	0	0	0	0	0	0	0	0
Mohammedia Conversion	33											
T.G Mohammedia (end 91)	0	0	77	277	302	98	0	0	0	0	0	0
T.G TAM TAM (mid 92)	0	0	44	159	458	236	0	0	0	0	0	0
Jorf Lasfar (300 MW end 94, 300 MW la	0	0	0	0	1,360	2,074	2,346	1,100	360	100	0	0
Jorf Lasfar 2*300 (mid 97)	0	0	0	0	0	0	0	434	969	1,545	1,832	1,021
other	0	2	0									
Thermal Studies(Gen.)	9	13	33	39	21	24	25	27	28	29	31	32
Thermal Studies(Shale)	0	0	0	0	0	0	0	0	0	0	0	0
Total Generation	290	413	714	984	2,670	2,824	3,179	2,213	2,621	2,897	2,791	2,086
Transmission	133	124	298	536	605	617	678	782	778	737	710	752
Distribution	58	51	54	151	104	91	124	136	141	147	154	163
Other	91	143	172	214	166	111	190	202	218	229	245	264
Total General Program	572	731	1,237	1,885	3,544	3,642	4,172	3,334	3,758	4,010	3,899	3,265
Special Fund	1	29	72	150	182	208	138	153	169	186	195	205
Consumers	0	155	157	172	193	208	222	236	250	264	263	265
Sahara Provinces	0	2	0	71	20	18	17	18	19	19	20	22
The Project	0	0	0	0	46	128	270	463	535	371	88	0
Total Direct Investment	573	917	1,466	2,278	3,984	4,204	4,819	4,203	4,731	4,850	4,466	3,756
Interest During Construction	34	36	63	165	177	255	340	270	194	176	179	235
Total	607	953	1,529	2,443	4,161	4,459	5,159	4,473	4,925	5,026	4,644	3,991

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

Criteria for Village Choice

<u>Criterion</u>	<u>Number of Points</u>
I.1 Number of households	2/household
I.2 Degree of dispersion of households	grouped 200 medium grouped 100 dispersed - 60
I.3 Material of dwelling unit construction	solid 1 for each percent solid mixed 1/2 for each percent mixed earth 0
II Chef lieu de commune	400
Chef lieu de Caidat	250
III Commercial activities:	
souk	60
commercial establishments	60
workshops	60
irrigation wells	60
dispensary	40
school	40
mill	30
oil press	30
potable water well	<u>20</u>
Total	400
IV.1 Distance from existing medium voltage network	-10/km MV line
IV.2 Electrification capital cost per person	300 - (0.075 x cost/person)
IV.3 Number of villages grouped together	8/village in the group
V Existence of a village development plan	80

Illustratory Point Assignments for Hypothetical Villages

<u>Criterion</u>	<u>Number of Points</u>	
	<u>200 household village</u>	<u>50 household village</u>
I.1 Number of households	400	100
I.2 Assume medium grouping	100	100
I.3 Assume 50% solid, 50% mixed	75	75
II Assume each is a chef lieu de commune	400	400
III Commercial activities		
souk	60	-
commercial establishments	60	-
workshops	60	-
irrigation wells	60	-
dispensary	40	40
school	40	-
mill	30	-
oil press	30	30
potable water well	30	30
IV.1 Distance from existing MV networks	-50	-50
IV.2 Cost per person, DH 3000 for the bigger village, DH 20,000 for the smaller village	75	0
IV.3 Each village is in a group of six villages	48	48
V Neither has a development plan	<u>0</u>	<u>0</u>
Total	1458	823

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

PROJECT DESCRIPTION

A. Project location and description

Region	Province	Centers	Population served	22 kv lines (km)	Equipment Transformers Substation	Low-voltage lines (km)
. South	Agadir	23	34265	145	28	91
	Guelmin	5	11560	49	8	22
	Ouerzazate	23	81300	333	46	172
	Taroudoute	15	29200	133	24	95
	Tiznit	14	46350	143	34	130
. Tensift	K.Sraghna	29	56750	233	47	182
	Essaouira	11	11650	86	12	41
	Marrakech	47	81110	329	65	176
	Safi	10	7410	93	15	50
. Centre	Azilal	28	42109	142	43	158
	Beni Mellal	24	65400	74	44	193
	Ben Slimane	6	6500	39	8	32
	Casa-Anfa	4	2210	8	4	15
	El Jadida	3	1600	23	3	11
	Khouribga	3	500	43	3	12
	Settat	24	26558	111	31	125
. Northwest	Chefchaouen	9	13941	87	12	46
	Kenitra	13	65000	41	23	91
	Khemisset	5	9000	18	6	24
	Sidi-Kacem	10	24130	24	17	55
	Tanger	2	2200	20	3	9
	Tetouan	9	13167	30	14	21
	Larache	2	1506	17	2	8
	Skhirat Temara	1	2000	1	2	6
. Central	Al Hoceima	8	7300	55	9	33
Northern	Boulemane	13	26400	255	16	56

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SECOND RURAL ELECTRIFICATION PROJECT

PROJECT DESCRIPTION

A. Project location and description

	Fes	14	16900	84	23	79
	Taounate	12	18678	48	19	48
	Taza	13	15100	130	17	62
. Eastern	Nador	31	98200	150	60	240
	Oujda	12	12550	114	22	84
. Central-	Errachidia	16	52012	105	29	110
Southern	Khenifra	10	12390	62	13	48
	Maknes	13	17720	41	16	37
TOTAL	34	462	912600	3284	720	2580

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SECOND RURAL ELECTRIFICATION PROJECT

Yearly breakdown of project costs
(in DH million)

	Local currency costs							Foreign currency costs							Total cost		
	1991	1992	1993	1994	1995	1996	1997	1991	1992	1993	1994	1995	1996	1997	L/C	F/C	SUM
A. Engineering services																	
Subtotal base cost	3.8	8.6	17.4	27.7	30.8	19.8	4.4	2.2	3.9	3.9	1.1	0.0	0.0	0.0	112.5	11.1	123.6
Physical conting.	0.3	0.6	1.2	2.0	2.2	1.4	0.3	0.2	0.3	0.3	0.1	0.0	0.0	0.0	7.9	0.8	8.7
Price conting.	0.2	0.9	2.9	6.4	9.1	7.2	1.9	0.1	0.4	0.7	0.3	0.0	0.0	0.0	28.6	1.5	30.1
Subtotal A	4.3	10.1	21.5	36.1	42.0	28.4	6.6	2.5	4.6	4.8	1.4	0.0	0.0	0.0	149.0	13.4	162.4
B. Supply of equipment & installation works for the network																	
Subtotal base cost	9.6	26.7	54.4	90.7	100.3	66.1	14.9	19.1	53.3	108.5	180.9	199.9	132.0	29.8	362.8	723.4	1086.2
Physical conting.	0.7	1.9	3.8	6.4	7.0	4.6	1.1	1.4	3.7	7.6	12.7	14.0	9.2	2.1	25.4	50.7	76.1
Price conting.	0.6	2.9	9.2	20.8	29.5	24.0	6.5	1.2	5.7	18.4	41.5	58.8	48.0	12.9	93.5	186.4	279.9
Subtotal B	10.9	31.4	67.5	117.8	136.9	94.8	22.5	21.6	62.7	134.5	235.0	272.7	189.1	44.9	481.7	960.5	1442.1
C. Operating facilities & vehicles																	
Subtotal base cost	0.0	1.2	1.8	3.0	3.0	2.4	0.6	0.6	2.3	4.3	7.1	7.7	5.3	1.2	12.0	28.6	40.6
Physical conting.	0.0	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.1	0.2	0.4	0.4	0.3	0.1	0.6	1.4	2.0
Price conting.	0.0	0.1	0.3	0.7	0.9	0.9	0.3	0.0	0.2	0.7	1.6	2.2	1.9	0.5	3.1	7.3	10.3
Subtotal C	0.0	1.4	2.2	3.8	4.0	3.4	0.9	0.7	2.6	5.2	9.1	10.4	7.5	1.8	15.7	37.2	52.9
D. Technical assistance																	
Subtotal base cost	0.0	0.3	0.5	0.8	0.8	0.6	0.1	0.0	1.1	1.6	2.7	2.7	2.1	0.5	3.0	10.8	13.6
Physical conting.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.5	0.7
Price conting.	0.0	0.0	0.1	0.2	0.2	0.2	0.0	0.0	0.1	0.3	0.6	0.8	0.8	0.2	0.8	2.7	3.5
Subtotal D	0.0	0.4	0.6	1.0	1.0	0.9	0.2	0.0	1.2	1.9	3.4	3.6	3.0	0.7	3.9	13.8	17.7
E. Custom duties & taxes																	
Subtotal base cost	5.1	11.9	25.5	42.5	47.6	30.6	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	170.0	0.0	170.0
Physical conting.	0.4	0.8	1.8	3.0	3.3	2.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	0.0	11.9
Price conting.	0.3	1.3	4.3	9.7	14.0	11.1	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.7	0.0	43.7
Subtotal E	5.8	14.0	31.6	55.2	64.9	43.8	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	225.6	0.0	225.6
F. Total cost(A+B+D+E)																	
Total base cost	18.5	48.6	99.6	164.7	182.5	119.5	28.9	21.9	60.5	118.3	191.8	210.3	139.4	31.6	660.3	773.6	1433.9
Total physical conting.	1.3	3.4	6.9	11.5	12.7	8.3	1.9	1.5	4.2	8.2	13.3	14.5	9.8	2.2	46.0	53.4	99.4
Total price conting.	1.1	5.2	16.9	37.7	53.7	43.4	11.7	1.3	6.5	20.0	43.9	61.8	50.6	13.7	169.7	197.8	367.5
TOTAL PROJECT COST	20.9	57.2	123.4	213.9	248.8	171.3	40.4	24.8	71.1	146.4	248.9	286.7	199.6	47.4	876.0	1024.8	1900.8

MOROCCO
SECOND RURAL ELECTRIFICATION PROJECT
Project cos. estimate by nature of goods & services
(in US \$ million)

	Total base cost			Physical conting.			Price conting.			Total cost		
	LC	FC	TC	LC	FC	TC	LC	FC	TC	LC	FC	TC
A. Engineering services												
Detailed engineering desi	0.28	1.26	1.54	0.02	0.09	0.11	0.03	0.14	0.17	0.33	1.49	1.82
ONE's administration	12.47	0.00	12.47	0.88	0.00	0.88	2.93	0.00	2.93	16.28	0.00	16.28
of the project												
B. Equipment for LV & MV netwo	0.00	23.15	23.15	0.00	1.61	1.61	0.00	5.41	5.41	0.00	30.17	30.17
C. Installation works including												
the poles	36.37	45.50	81.87	2.55	3.19	5.74	8.50	10.64	19.14	47.42	59.33	106.75
D. Consumers connections	4.76	13.37	18.13	0.33	0.93	1.26	1.13	3.16	4.29	6.22	17.46	23.68
E. Specialized equipment & veh	0.00	2.28	2.28	0.00	0.11	0.11	0.00	0.53	0.53	0.00	2.92	2.92
F. Operating facilities	1.36	0.96	2.32	0.07	0.05	0.12	0.32	0.22	0.54	1.75	1.23	2.98
G. Technical assistance	0.34	1.20	1.54	0.00	0.06	0.06	0.07	0.27	0.34	0.41	1.53	1.94
H. Custom duties & taxes	19.27	0.00	19.27	1.34	0.00	1.34	4.51	0.00	4.51	25.12	0.00	25.12
TOTAL BASE COST	74.85	87.71	162.56	5.19	6.04	11.23	17.49	20.37	37.86	97.53	114.12	211.65
Total physical conting.	5.19	6.04	11.23									
Total price conting.	17.49	20.37	37.86									
TOTAL PROJECT COST	97.53	114.12	211.65									

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SECOND RURAL ELECTRIFICATION PROJECT

Project cost estimate by contract packages
(in US \$ million)

	Total base cost			Physical conting.			Price conting.			Total cost		
	LC	FC	TC	LC	FC	TC	LC	FC	TC	LC	FC	TC
A. Engineering services												
Detailed engineering design ONE's administration of the project	0.28	1.26	1.54	0.02	0.09	0.11	0.03	0.14	0.17	0.33	1.49	1.82
	12.47	0	12.47	0.88	0	0.88	2.93	0	2.93	16.28	0	16.28
B. Equipment for LV & MV network												
Wood poles	0	3.17	3.17	0	0.23	0.23	0	0.74	0.74	0	4.14	4.14
Cables	0	11.38	11.38	0	0.79	0.79	0	2.65	2.65	0	14.82	14.82
Insulators & accessories	0	3.62	3.62	0	0.26	0.26	0	0.85	0.85	0	4.73	4.73
Protective & tripping equip	0	0.96	0.96	0	0.06	0.06	0	0.22	0.22	0	1.24	1.24
Accessories for bunched cab	0	0.3	0.3	0	0.02	0.02	0	0.08	0.08	0	0.4	0.4
Distribution transformers	0	0.9	0.9	0	0.06	0.06	0	0.21	0.21	0	1.17	1.17
Public lighting equip.	0	2.52	2.52	0	0.18	0.18	0	0.59	0.59	0	3.29	3.29
Diesel groups	0	0.29	0.29	0	0.01	0.01	0	0.07	0.07	0	0.37	0.37
C. Consumer connections												
Meters	0	1.1	1.1	0	0.07	0.07	0	0.25	0.25	0	1.42	1.42
Meter boxes	0	3.47	3.47	0	0.25	0.25	0	0.81	0.81	0	4.53	4.53
Works and other equip.	4.76	8.8	13.56	0.33	0.61	0.94	1.13	2.1	3.23	6.22	11.51	17.73
D. Installation & erection	36.37	45.5	81.87	2.55	3.19	5.74	8.5	10.64	19.14	47.42	59.33	106.75
E. Specialized equipment	0	1.68	1.68	0	0.08	0.08	0	0.39	0.39	0	2.15	2.15
F. Vehicles	0	0.6	0.6	0	0.03	0.03	0	0.14	0.14	0	0.77	0.77
G. Operating facilities	1.36	0.96	2.32	0.07	0.05	0.12	0.32	0.22	0.54	1.75	1.23	2.98
H. Technical assistance	0.34	1.2	1.54	0	0.06	0.06	0.07	0.27	0.34	0.41	1.53	1.94
I. Custom duties & taxes	19.27	0	19.27	1.34	0	1.34	4.51	0	4.51	25.12	0	25.12
TOTAL BASE COST	74.85	87.71	162.56	5.19	6.04	11.23	17.49	20.37	37.86	97.53	114.12	211.65
Total physical conting.	5.19	6.04	11.23									
Total price conting.	17.49	20.37	37.86									
TOTAL PROJECT COST	97.53	114.12	211.65									

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SECOND RURAL ELECTRIFICATION PROJECT

Guidelines for Monitoring the Project

The following data should be collected for each village electrified under NREP II and for all low-voltage customers connected to the power facilities constructed under NREP II:

- (i) for each year, from the first year of service, the number of customers classified according to their end uses of electricity, e.g., at low-voltage level, residential, public lighting, administrative lighting, etc. and at the medium-voltage level, agricultural and other;
- (ii) total annual consumption in kWh of each consumer class;
- (iii) the average annual load factor of each village;
- (iv) annual revenue from electricity sales, and separately revenue from meter rentals and connection charges for each class of consumer;
- (v) data on transformers, feeder lengths, capacities, etc. for each village electrified;
- (vi) costs of these facilities for each village;
- (vii) average connection costs for the various consumer classes;
- (viii) estimates of internal wiring costs for each consumer class based on a sample survey;
- (ix) annual operating and maintenance costs for the consumers served in the project area;
- (x) number of households, and details on infrastructural services and industrial and agricultural activities; e.g. existing and proposed roads, water supply systems, canals, rivers, wells, schools, health centers, grain mills, etc. This information should be collected at the time of electrification and in the final year of the project;
- (xi) the amount of gas oil used by each agricultural, industrial or other motive power customer in the year before the customer's connection to the electricity network. The nature of the business activity of the customer should be identified. This information should be obtained at the time the customer is connected; and

- (xii) the amount of butane and kerosena, and the number of candles used by a random sample of 1,000 households (at least two from each village electrified) during the year preceding electrification. The number of television sets should also be determined from this sample.

MOROCCO
SECOND RURAL ELECTRIFICATION PROJECT
Estimated Procurement Schedule^{1/}

	Bid Documents Completed	Submission of Bid Documents	Approval by Bank	Release of Bid Documents	Bids Opening	Bid Evaluation to Bank	Approval Contract	Award of Contract	Contract Completion
I Equipment and materials									
(a) Wood Poles	02/90	05/90	06/90	09/90	12/90	01/91	02/91	02/91	06/92
(b) cables	02/90	05/90	06/90	09/90	12/90	01/91	02/91	02/91	07/92
(c) Insulators and accessories	04/90	05/90	06/90	10/90	12/90	02/91	03/91	04/91	08/93
(d) Protective and tripping equipment	10/90	11/90	12/90	01/91	04/91	07/91	08/91	09/91	09/92
(e) Distribution transformers	08/90	09/90	10/90	11/90	03/91	06/91	07/91	08/91	09/93
(f) Meter boxes	08/90	09/90	10/90	11/90	03/91	06/91	07/91	08/91	09/93
(g) Public lighting equipment	09/90	10/90	11/90	12/90	03/91	06/91	07/91	08/91	06/93
(h) Diesel groups	20/91	03/91	04/91	04/91	06/91	10/91	11/91	12/91	02/92
(i) specialised equipment	07/90	08/90	09/90	10/90	01/90	04/91	05/91	06/91	06/93
(j) Vehicles	07/90	08/90	09/90	10/90	01/90	04/91	05/91	06/91	06/93
(k) Meters	08/90	09/90	10/90	11/90	03/91	06/91	07/91	08/91	09/93
(l) Computer soft. & hard				Limited international shopping					
II Works and other equip.									
(m) Instal. & erection works incl. Operation facilities consumer connection	12/90	01/91	02/91	03/91	06/91	09/91	10/91	11/91	12/98
III Consulting Services									
(n) Detailed engineering design	09/89								12/91
(o) Technical assistance	During project implementation and in accordance with the Bank guidelines for use of consultants.								

^{1/} Each package will be procured in two stages, dates indicated for award of contract relate to the first stage and those indicated for contract completion relate to the second stage.

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

Estimated Disbursement Schedule

<u>Bank Fiscal Year and Semester</u>	<u>Cumulative Disbursement at end of Semester</u> (US\$ million)	<u>Cumulative Disbursement Profile</u> %
<u>1991</u>		
June 30, 1991	1.7	1.5
<u>1992</u>		
Dec. 31, 1991	5.7	5
June 30, 1992	10.4	9
<u>1993</u>		
Dec. 31, 1992	17.1	15
June 30, 1993	26.6	23
<u>1994</u>		
Dec. 31, 1993	34.2	30
June 30, 1994	54.3	48
<u>1995</u>		
Dec. 31, 1994	68.4	60
June 30, 1995	84.4	74
<u>1996</u>		
Dec. 31, 1995	102.6	90
June 30, 1996	108.6	95
<u>1997</u>		
Dec. 31, 1996	111.7	98
June 30, 1997	114.0	100

MOROCCO

SECOND RURAL ELECTRIFICATION PROJECT

Comparison of Disbursement Profiles

	<u>Year from Date of Approval</u>							
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Proposed Loan	2.4	9	23	48	74	95	100	
Actual Morocco First Rural Electrification Project (Loan 1695-MOR) ^{a/}	0	0.2	0.2	18	31	47	73	86 ^{b/}
Typical Power Project in EMENA Region	3	10	25	50	78	96	100	

^{a/} Source: Related PCR.

^{b/} US\$ 5.7 million of Loan 1695-MOR were cancelled.

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT
 Office National de l'Electricité
 Past Financial Performance 1983-88
 (DH Millions)

Year	1983	1984	1985	1986	1987	1988
Sales - GWh	4,973	5,140	5,507	5,903	6,283	6,674
- % Increase		3.4	7.1	7.2	6.4	6.2
Tariff Change Required - %						
Date	Sep 16	May 1	May 1	Aug 1	May 1	Aug 1
Amount	(1)	(1)	10.0	3.8	5.0	5.0
Average Tariff Change - %						
Nominal	21.4	17.2	10.0	4.6	5.4	3.6
Real	13.0	3.1	0.4	(3.0)	5.0	2.4
Average Tariff - DH/kWh						
Nominal	0.46	0.54	0.59	0.62	0.65	0.67
DH Constant Jan 1, 19	0.63	0.65	0.65	0.63	0.67	0.68
Hydroelectric Power - TW	0.48	0.37	0.49	0.64	830	900
Average Fuel Cost - DH/kWh						
Nominal		378.04	393.51	365.53	0.39	0.38
DH Constant Jan 1, 1988		458.96	435.96	375.54	0.40	0.38
% of Tariff		704.31	666.30	591.54	0.59	0.56
Income Statement						
Revenues	2,371	2,888	3,390	3,928	4,307	4,914
Expenses						
- Fuel Costs	1,633	2,162	2,363	2,293	2,316	2,381
- Other Operating Co	406	525	548	621	1,336	959
- Depreciation	281	324	376	450	478	501
- Interest	188	301	362	341	358	411
- Exchange Losses					116	66
- Special Fund	0	0	0	0	184	203
- Income Taxes	0	0	0	0	0	0
Net Income	(137)	(424)	(259)	223	(482)	392
Sources of Funds						
From Operations						
- Before Debt Servic	304	169	442	824	1,097	1,670
- Debt Service	376	265	269	394	1,199	970
- After Debt Service	(72)	(96)	173	430	(102)	700
Customers	162	135	126	137	125	155
Government						
- The Project					0	0
- Other	132	238	270	222	0	2
Borrowing						
- External	341	511	235	381	570	720
- Local	240	183	0	171	10	12
Accounts Payable	505	326	936	732	622	(748)
Overdraft					22	29
Cash Reserves	40	0	28	0	0	0
Total Sources	1,420	1,393	1,595	1,643	1,246	870
Uses of Funds						
Fixed Assets						
- the Project					0	0
- Other	804	830	857	1,031	572	1,033
Interest During Const	40	49	64	51	34	36
Working Capital	576	455	674	530	631	(293)
Total Uses	1,420	1,334	1,595	1,612	1,238	775
Net Cash Flow	0	59	0	31	9	95
Balance Sheet						
Current Assets	1,390	1,926	2,412	3,058	4,529	4,313
Fixed Assets	4,629	5,134	5,626	6,201	6,918	7,344
Total Assets	6,057	7,116	8,108	9,235	12,257	12,516
Current Liabilities	1,613	2,018	2,395	3,103	4,113	3,324
Long Term Debt	1,443	1,941	2,611	2,897	3,714	3,932
Other Liabilities	190	216	244	277	386	443
Equity	2,811	2,941	2,858	2,958	4,043	4,816
Ratios						
- Net Income to Sales - (5.8)	(14.7)	(7.6)	5.7	-11.5	8.4	
- Internal Cash Generation to Fixed Investment - (8.8)	(11.6)	19.1	52.4	35.8	108.6	
- Debt Service Coverage	0.81	0.64	1.64	2.09	1.31	3.03
- Debt:Equity	1.15	1.42	1.84	2.12	2.03	1.60
- Current	1.16	1.05	0.99	1.01	1.10	1.30

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT

Office National de l'Electricité

Future Financial Performance 1990-98

(DH Millions)

Year	Actual	Prelim.	Projected								
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sales - GWh	6,674	7,133	7,611	8,121	8,665	9,245	9,865	10,526	11,231	11,984	12,787
- % Increase	6.2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Tariff Change Required - %											
Date	Aug 1		Jun 1	Jan 1	Jan 1	Jan 1	Jan 1	Jan 1	Jan 1	Jan 1	Jan 1
Amount	5.0	0.0	4.5	13.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Tariff Change - %											
Nominal	3.6	3.2	2.6	15.1	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Real	2.4	(1.1)	(3.3)	8.7	(2.4)	(4.7)	(4.4)	(4.9)	(4.6)	(4.7)	(5.3)
Average Tariff - DH/kWh											
Nominal	0.67	0.70	0.71	0.82	0.85	0.85	0.85	0.85	0.85	0.85	0.85
DH Constant Jan 1, 1988	0.68	0.68	0.65	0.71	0.69	0.66	0.63	0.60	0.57	0.55	0.52
Hydroelectric Power - GWh	900	1,157	1,028	1,261	1,860	1,860	2,120	2,120	2,137	2,716	2,765
Average Fuel Cost - DH/kWh											
Nominal	0.38	0.42	0.41	0.41	0.42	0.44	0.45	0.36	0.33	0.32	0.33
DH Constant Jan 1, 1988	0.38	0.41	0.38	0.36	0.34	0.34	0.34	0.25	0.23	0.21	0.20
% of Tariff	0.56	0.61	0.58	0.50	0.49	0.52	0.53	0.42	0.39	0.38	0.39
Income Statement											
Revenues	4,914	5,233	5,682	6,962	7,672	8,225	8,812	9,430	10,067	10,734	11,456
Expenses											
- Fuel Costs	2,381	2,776	2,933	3,124	3,162	3,606	3,865	3,342	3,367	3,352	3,653
- Other Operating Costs	959	973	1,077	1,138	1,318	1,471	1,626	1,834	2,038	2,296	2,589
- Depreciation	501	575	590	707	757	827	1,467	1,525	1,596	1,674	1,770
- Interest	411	537	388	591	632	682	866	1,015	1,084	1,089	1,066
- Exchange Losses	66	96	200	165	121	100	82	119	188	306	388
- Special Fund	203	222	245	300	330	352	376	401	428	457	487
- Income Taxes	0	0	0	157	468	364	125	419	492	566	518
Net Income	392	54	249	779	883	825	405	776	873	994	985
Sources of Funds											
From Operations											
- Before Debt Service	1,670	1,348	1,585	2,440	2,603	2,646	3,038	3,656	3,968	4,296	4,451
- Debt Service	1,005	1,155	1,248	1,639	1,604	1,354	1,563	2,249	2,340	2,425	2,411
- After Debt Service	665	193	337	800	999	1,292	1,475	1,407	1,628	1,871	2,040
Customers	155	157	172	193	208	222	236	250	264	263	265
Government											
- The Project	0	0	0	44	107	234	401	468	317	74	0
- Other	2	9	71	20	18	17	18	19	19	20	22
Borrowing											
- The Project	0	0	0	1	13	22	38	41	33	8	0
- Other External	758	737	2,037	3,682	2,210	2,627	1,481	2,064	2,280	1,893	1,541
- Bonds	12	11	122	12	10	10	263	21	13	14	14
- Commercial Paper											
Accounts Payable	(869)	415	474	280	446	690	250	639	734	774	781
Overdraft	29	86	0	0	0	0	0	0	0	0	0
Total Sources	751	1,608	3,213	5,031	4,012	5,114	4,161	4,910	5,288	4,918	4,663
Uses of Funds											
Fixed Assets											
- Project	0	0	0	46	128	270	463	535	371	88	0
- Other	917	1,466	2,278	3,938	4,075	4,549	3,740	4,196	4,479	4,378	3,756
Interest During Constr.	36	63	165	177	255	340	270	194	176	179	235
Working Capital	(414)	195	413	189	257	87	(148)	(18)	203	288	296
Total Uses	538	1,724	2,856	4,350	4,715	5,246	4,325	4,907	5,229	4,932	4,288
Net Cash Flow	213	(116)	357	682	(703)	(131)	(164)	3	59	(14)	376
Balance Sheet											
Current Assets	4,192	4,307	5,077	5,948	5,502	5,457	5,145	5,130	5,392	5,666	6,338
Fixed Assets	7,344	8,262	10,114	13,568	17,269	21,601	24,607	28,008	31,438	34,409	36,630
Total Assets	12,395	13,395	15,931	20,169	23,337	27,538	30,145	33,444	37,050	40,208	43,015
Current Liabilities	3,203	4,021	4,576	4,709	4,778	5,402	6,087	6,632	7,313	7,946	7,210
Long Term Debt	3,932	3,738	4,956	7,747	9,332	11,830	12,721	13,800	14,575	16,419	16,419
Other Liabilities	443	459	573	654	742	843	956	1,085	1,230	1,394	1,581
Equity	4,816	5,177	5,826	7,059	8,485	9,996	11,273	13,007	14,707	16,292	17,805
Ratios											
- Net Income to Sales - %	8.4	1.1	4.4	11.4	11.7	10.2	4.7	8.4	8.9	9.5	8.8
- Internal Cash Generation to Fixed Investment (%)	121.2	36.6	27.8	29.9	31.4	48.0	47.8	53.4	53.7	59.8	65.6
- Debt Service Coverage	3.04	1.65	1.77	1.49	1.62	1.95	1.94	1.63	1.70	1.77	1.85
- Debt:Equity	1.57	1.59	1.73	1.86	1.75	1.75	1.67	1.57	1.52	1.47	1.42
- Current	1.31	1.07	1.11	1.26	1.15	1.01	0.85	0.77	0.7	0.71	0.88

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT

Office National de l'Electricite

Income Statement 1988-98

(DH millions)

Item	Actual	Prelim.		Projected							
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sales (GWh)	6,674	7,133	7,611	8,121	8,665	9,245	9,865	10,526	11,231	11,984	12,787
Growth in Sales (%)	6.2	6.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
Net Production (GWh)	7,246	7,745	8,119	8,817	9,407	10,037	10,710	11,453	12,222	13,041	13,915
Yield Factor (%)	92.10	92.10	93.74	92.11	92.11	92.11	92.11	91.91	91.89	91.89	91.89
Tariff Increase (%)	5.00	0.00	4.50	13.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Price/kWh Sold (DH/kWh) a/											
Average By Voltage											
HT to Regies	0.6258	0.6458	0.663	0.763	0.785	0.785	0.785	0.785	0.785	0.785	0.785
Other HT	0.6641	0.6853	0.703	0.809	0.833	0.833	0.833	0.833	0.833	0.833	0.833
MT	0.8391	0.8659	0.889	1.022	1.053	1.053	1.053	1.053	1.053	1.053	1.053
LT	0.6779	0.6996	0.718	0.826	0.851	0.843	0.821	0.821	0.821	0.821	0.821
Average											
Beginning of year	0.6631	0.6962	0.696	0.822	0.847	0.847	0.847	0.847	0.847	0.847	0.847
End of year	0.6962	0.6962	0.728	0.822	0.847	0.847	0.847	0.847	0.847	0.847	0.847
Year	0.6746	0.6962	0.714	0.822	0.847	0.847	0.847	0.847	0.847	0.847	0.847
Operating Revenues											
Sales of Energy	4,503	4,927	5,438	6,676	7,337	7,828	8,353	8,913	9,510	10,148	10,828
Project Surcharge				4	11	28	52	70	67	51	46
Other Operating Revenues	144	171	157	182	203	230	248	268	288	312	337
Total	4,647	5,098	5,595	6,858	7,551	8,086	8,653	9,251	9,865	10,510	11,210
Fuel costs b/											
Fuel Oil	1,759	2,165	2,081	2,279	2,293	2,740	2,991	1,907	1,630	1,478	1,552
Local Coal	297	288	406	468	496	525	556	559	478	399	425
Imported Coal	302	290	412	679	680	682	681	1,261	1,680	1,910	2,158
Other	23	33	28	17	17	17	17	17	17	17	17
Less VAT		(267)	(283)	(319)	(324)	(359)	(380)	(402)	(437)	(451)	(500)
Total	2,381	2,776	2,933	3,124	3,162	3,606	3,865	3,342	3,367	3,352	3,653
Gross Margin	2,266	2,322	2,662	3,734	4,390	4,481	4,788	5,909	6,498	7,159	7,558
Operating Expenses											
Labor	462	534	589	675	760	846	947	1,068	1,188	1,339	1,510
Other Operating Expenses	416	374	488	443	559	625	679	765	850	957	1,079
Operating Income	1,387	1,414	1,585	2,596	3,071	3,010	3,162	4,075	4,460	4,863	4,969
Plus Other Income	267	135	87	103	121	139	159	180	202	223	246
Less Non-Operating Expenses	81	65	0	0	0	0	0	0	0	0	0
Income Before Fixed Charges	1,573	1,484	1,672	2,700	3,192	3,149	3,321	4,255	4,661	5,086	5,214
Depreciation	501	575	590	707	757	827	1,467	1,525	1,596	1,674	1,770
Interest											
- Project Loan					1	2	4	7	10	11	11
- Other Loans	447	600	553	768	887	1,020	1,132	1,202	1,250	1,257	1,290
- Less Capitalized Portion	36	63	165	177	255	340	270	194	176	179	235
- Interest Expensed	411	537	388	591	632	682	866	1,015	1,084	1,089	1,066
Exchange Losses											
- Prior Years	87	87	87	87	87	87	87	87	87	87	87
- Current Years	(21)	9	114	79	34	13	(5)	32	101	219	302
Total Fixed Charges	979	1,208	1,179	1,464	1,510	1,608	2,415	2,659	2,868	3,069	3,224
Special Fund Contribution	203	222	245	300	330	352	376	401	428	457	487
Income Before Taxes	392	54	249	936	1,351	1,188	530	1,195	1,366	1,560	1,503
Income Taxes	0	0	0	157	468	364	125	419	492	566	518
Net Income	392	54	249	779	883	825	405	776	873	994	985

a/ Excluding Taxes
 b/ Excluding Taxes in 1988 and 1989, taxes included thereafter

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT

Office National de l'Electricite

Cash Flow Statement 1988-98

(DH millions)

Sources of Funds	Actual 1988	Prelim. 1989	Projected									
			1990	1991	1992	1993	1994	1995	1996	1997	1998	
Internal Cash Generation												
Total Income Before Interest	803	591	637	1,370	1,516	1,506	1,272	1,791	1,958	2,083	2,051	
Plus Non Cash Expenses:												
- Depreciation	501	575	590	707	757	827	1,467	1,525	1,596	1,674	1,770	
- Exchange Losses	66	96	200	165	121	100	82	119	188	306	388	
- Special Fund Contributions	203	222	245	300	330	352	376	401	428	457	487	
- Deferred Depreciation	0	0	0	0	0	0	0	0	0	0	0	
Less: Non Cash Income												
- Amortized Customer Contribution	60	72	87	103	121	139	159	180	202	223	246	
- Other	(157)	63	0	0	0	0	0	0	0	0	0	
Internal Cash Generation	1,670	1,348	1,585	2,440	2,603	2,646	3,038	3,656	3,968	4,296	4,451	
Less: Debt Service												
Interest	411	537	388	591	632	682	866	1,015	1,084	1,089	1,066	
Amortization												
- Project Loan									1	2	5	
- Other Loans	594	564	806	986	910	615	642	1,163	1,183	1,265	1,276	
- Bonds	incl	54	54	62	62	58	54	71	72	68	64	
Debt Service	1,005	1,155	1,248	1,639	1,604	1,354	1,563	2,249	2,340	2,425	2,411	
Net Internal Cash Generation	665	193	337	800	999	1,292	1,475	1,407	1,628	1,871	2,040	
Contributions												
Government Contributions												
- General Program												
- The Project				44	107	234	401	468	317	74	0	
- Sahara	2	0	71	20	18	17	18	19	19	20	22	
Consumers Contributions	155	157	172	193	208	222	236	250	264	263	265	
Total Contributions	157	157	243	257	334	473	654	737	600	358	286	
Borrowing												
Advances on Consumption	12	11	6	12	10	10	11	12	13	14	14	
Project Loan			0	1	13	22	38	41	33	8	0	
Other Loans	302	397	1,682	3,682	2,210	2,627	1,481	2,064	2,280	1,893	1,541	
Rescheduled Interest	121	59	44	0	0	0	0	0	0	0	0	
Rescheduled Principal	335	281	311	0	0	0	0	0	0	0	0	
Bonds	0	0	116	0	0	0	252	9	0	0	0	
Total Borrowing	770	748	2,159	3,694	2,233	2,659	1,782	2,127	2,326	1,915	1,556	
Increase (Decr. in Accounts Payable	(869)	415	474	280	446	690	250	639	734	774	781	
Other Sources												
Total Sources	722	1,513	3,213	5,031	4,012	5,114	4,161	4,910	5,288	4,918	4,663	
Applications of Funds												
Investments												
- General Program	760	1,309	2,035	3,726	3,849	4,310	3,487	3,927	4,196	4,094	3,470	
- The Project				46	128	270	463	535	371	88	0	
- Other	157	157	243	212	226	239	253	259	283	284	286	
- Interest During Construction	36	63	165	177	255	340	270	194	176	179	235	
- Total	953	1,493	2,443	4,161	4,459	5,159	4,473	4,925	5,026	4,644	3,991	
Working Capital												
- Accounts Receivable	(415)	118	313	12	82	(153)	(310)	(129)	42	152	167	
- Inventories	1	78	100	177	174	240	162	111	161	136	129	
- Total	(414)	195	413	189	257	87	(148)	(18)	203	288	296	
Total Applications	538	1,688	2,856	4,350	4,715	5,246	4,325	4,907	5,229	4,932	4,288	
Net Cash Flow	184	(175)	357	682	(703)	(131)	(164)	3	59	(14)	376	
Change in Overdraft	29	86	0	0	0	0	0	0	0	0	0	
Change in Cash Reserves	78	(80)	357	682	(703)	(131)	(164)	3	59	(14)	376	
Commercial Paper	0	0	0	0	0	0	0	0	0	0	0	
Ratios												
Cash Generation:Fixed Investment	121.2	36.6	27.8	29.9	31.4	48.0	47.8	53.4	53.7	59.8	65.6	
Debt Service Coverage	3.04	1.65	1.77	1.49	1.62	1.95	1.94	1.63	1.70	1.77	1.85	

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT
 Office National de l'Electricite
 Balance Sheet 1988-98
 (DH millions)

ASSETS	Actual 1988	Prelim. 1989	Projected									
			1990	1991	1992	1993	1994	1995	1996	1997	1998	
Fixed Assets												
Gross Fixed Assets in Service	9,518	10,080	13,746	15,029	16,344	19,600	29,605	32,887	36,631	38,647	40,413	
Less: Accumulated Depreciation	4,076	4,651	5,241	5,949	6,706	7,533	9,000	10,524	12,120	12,794	15,544	
Net Fixed Assets in Service	5,442	5,429	8,504	9,080	9,638	12,068	20,605	22,363	24,511	24,853	24,869	
Work in Progress	1,902	2,833	1,610	4,488	7,631	9,534	4,003	5,645	6,927	9,556	11,781	
Total Fixed Assets	7,344	8,262	10,114	13,568	17,269	21,601	24,607	28,008	31,438	34,409	36,630	
Other Non-Current Assets												
Foreign Exchange Losses	708	636	549	463	376	290	203	116	30	(57)	(143)	
Other (Net)	151	190	190	190	190	190	190	190	190	190	190	
Current Assets												
Cash	120	40	397	1,079	376	244	80	83	143	129	504	
Receivables - Energy	2,896	3,122	3,231	3,202	3,044	2,849	2,720	2,599	2,732	2,873	3,025	
- Works	144	130	159	179	193	206	218	232	244	244	245	
- Other	481	387	562	584	810	839	645	624	521	531	545	
- Total	3,521	3,639	3,952	3,964	4,046	3,894	3,583	3,455	3,497	3,649	3,816	
Inventories - Fuel	212	247	261	278	281	321	344	297	300	298	325	
- Other	339	382	468	627	798	998	1,137	1,295	1,453	1,590	1,693	
- Total	551	629	728	905	1,079	1,319	1,481	1,592	1,753	1,889	2,018	
Total Current Assets	4,192	4,307	5,077	5,948	5,502	5,457	5,145	5,130	5,392	5,666	6,338	
Total Assets	12,395	13,395	15,931	20,169	23,337	27,538	30,145	33,444	37,050	40,208	43,015	
LIABILITIES												
Equity												
Government Equity	879	879	879	879	879	879	879	879	879	879	879	
Government Contributions												
General Program	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956	2,956	
PNER and Sahara	461	461	533	597	722	973	1,392	1,879	2,215	2,310	2,331	
Customers Contributions	981	1,066	1,151	1,240	1,327	1,410	1,487	1,558	1,620	1,660	1,679	
Rural Electrification												
Special Fund	466	688	932	1,233	1,563	1,915	2,291	2,692	3,120	3,577	4,064	
Retained Earnings	(927)	(873)	(624)	155	1,038	1,863	2,268	3,044	3,917	4,911	5,896	
Total Equity	4,816	5,177	5,826	7,059	8,485	9,996	11,273	13,007	14,707	16,292	17,805	
Long-Term Debt												
Project Loan				1	14	36	74	116	148	154	149	
Other Loans	3,937	4,119	5,464	8,238	9,573	11,599	12,433	13,367	14,565	15,412	15,979	
Bonds (local borrowing)	534	479	541	479	417	359	557	495	423	355	291	
Total Long-Term Debt	4,471	4,598	6,005	8,718	10,004	11,994	13,063	13,977	15,135	15,921	16,419	
Less Current Portion	539	860	1,049	971	672	696	1,234	1,256	1,336	1,345	0	
Net Long Term Debt	3,932	3,738	4,956	7,747	9,332	11,297	11,830	12,721	13,800	14,575	16,419	
Advances on Consumption	117	128	134	146	155	166	177	189	202	216	230	
Retirement Fund	327	331	439	508	587	677	779	896	1,028	1,179	1,331	
Current Liabilities												
Suppliers - Oil	913	796	758	469	191	220	249	159	136	123	129	
Coal	143	121	171	265	268	271	273	467	500	670	755	
Other	533	779	1,132	1,381	1,556	1,752	1,752	1,752	1,752	1,752	1,752	
- Total	1,589	1,696	2,061	2,116	2,015	2,251	2,275	2,378	2,488	2,545	2,636	
Current Portion of Long Term Debt	539	860	1,049	971	672	696	1,234	1,256	1,336	1,345	0	
Overdraft	177	263	263	263	263	263	263	263	263	263	263	
Commercial Paper			0	0	0	0	0	0	0	0	0	
Other	898	1,203	1,203	1,359	1,827	2,191	2,316	2,735	3,227	3,793	4,311	
Total Current Liabilities	3,203	4,021	4,576	4,709	4,778	5,402	6,087	6,632	7,313	7,946	7,210	
Total Liabilities	7,579	8,219	10,105	13,110	14,852	17,542	18,872	20,437	22,343	23,916	25,209	
Total Liabilities and Equity	12,395	13,395	15,931	20,169	23,337	27,538	30,145	33,444	37,050	40,208	43,015	
Ratios												
Debt:Equity	1.57	1.59	1.73	1.86	1.75	1.75	1.67	1.57	1.52	1.47	1.42	
Current	1.31	1.07	1.11	1.26	1.15	1.01	0.85	0.77	0.74	0.71	0.88	

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT

Office National de l'Electricité

Project Profit and Loss 1991-2010

(DH millions)

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sales (GWh)	0	5	20	38	66	97	131	169	207	246	289	331	366	400	434	465	497	532	571	614
Net Production (GWh)	0	6	24	45	77	113	153	197	240	285	335	384	425	464	503	540	578	619	665	716
Yield Factor (%)	85.8	85.6	85.6	85.6	85.7	85.8	85.9	86.1	86.2	86.3	86.3	86.3	86.3	86.2	86.2	86.1	86.0	86.0	85.9	85.8
Tariff Increase (%)	10	1	0	0	0	0	0	0												
Price/kWh Sold (DH/kWh) excl. VAT																				
Constant Jan. 1990 DH																				
MT	0.88	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
LT	0.72	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Current DH																				
MT	1.06	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
LT	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Operating Revenues																				
Sales of Energy																				
- Medium Voltage	0	1	4	7	14	22	36	55	76	95	114	130	139	146	151	154	154	154	154	154
- Low Voltage	0	4	15	28	47	67	87	105	120	140	162	186	210	234	259	285	314	344	379	417
Project Surcharge		2	7	16	28	39	45	46	46	46	46	46	46	46	46	46	46	46	46	46
Project Administration Fee	4	9	20	36	42	28	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	4	16	46	87	130	157	174	205	242	280	322	362	394	425	456	485	513	544	578	616
Fuel costs excl. VAT																				
- Gas Turbines		1	4	7	12	18	27	38	46	55	65	75	82	90	97	104	111	119	128	137
- Case Fuel Oil		2	10	18	32	46	68	96	116	138	162	186	206	225	244	262	281	301	324	348
- Total		3	14	26	44	65	95	134	163	194	228	261	288	315	342	367	392	420	451	485
Gross Margin		13	33	61	86	92	79	72	79	87	94	101	106	110	114	118	121	124	127	131
Operating Expenses		4	9	17	30	37	40	43	43	43	43	43	43	43	43	43	43	43	43	43
Operating Income		9	24	44	57	55	39	29	37	44	52	58	63	68	72	75	78	81	85	89
Margin on Connections	0	1	1	2	2	3	4	9	7	8	7	6	6	6	6	6	6	7	7	8
Depreciation	3	13	33	69	113	148	162	167	170	174	177	179	179	172	154	120	79	47	36	34
Interest	0	1	2	4	7	10	12	12	11	11	10	9	8	7	7	6	5	4	3	3
Exchange Losses		1	0	(0)	0	1	2	1	0	0	0	0	(0)	0	(0)	(0)	0	(0)	0	0
Special Fund Contribution		0	1	2	3	4	6	7	9	11	12	14	16	17	18	20	21	22	24	26
Income Before Taxes	(3)	(5)	(11)	(29)	(65)	(105)	(138)	(149)	(146)	(143)	(140)	(138)	(133)	(122)	(101)	(65)	(20)	15	29	34
Income Taxes	(1)	(2)	(5)	(13)	(28)	(45)	(59)	(64)	(63)	(61)	(60)	(59)	(57)	(53)	(43)	(28)	(9)	6	12	15
Net Income	(2)	(3)	(7)	(17)	(37)	(60)	(79)	(85)	(83)	(81)	(80)	(79)	(76)	(70)	(58)	(37)	(12)	8	16	20

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT

Office National de l'Electricité

Project Cash Flow 1991-2010

 (DM millions)

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006*	2007	2008	2009	2010
Sources of Funds																				
Internal Cash Generation																				
Net Income	(2)	(3)	(7)	(17)	(37)	(60)	(79)	(85)	(83)	(81)	(80)	(79)	(76)	(70)	(58)	(37)	(12)	8	16	20
Plus Non Cash Expenses:																				
- Depreciation	3	13	33	69	113	148	162	167	170	174	177	179	179	172	154	120	79	47	36	34
- Exchange Losses	0	1	0	(0)	0	1	2	1	0	0	0	0	(0)	0	(0)	(0)	0	(0)	0	0
- Special Fund Contributions	0	0	1	2	3	4	6	7	9	11	12	14	16	17	18	20	21	22	24	26
Internal Cash Generation	2	11	27	54	79	93	91	91	96	103	109	115	119	119	115	103	88	77	76	79
Government Contributions	44	107	234	401	468	317	76													
Consumers																				
- low voltage								22	17	18	20	21	23	25	27	29	32	34	37	40
- medium voltage	2	3	3	8	9	15	21	23	20	21	17	9	8	6	3	0	0	0	0	0
Project Loan	1	13	22	38	41	33	8													
Increase (Decr. in Accounts Payable)		0	1	1	2	2	2	3	2	3	3	3	2	2	2	2	2	2	3	3
Total Sources	48	135	287	501	600	460	197	139	135	145	149	148	152	152	147	135	122	114	116	122
Applications of Funds																				
Investments																				
- The Project	46	128	270	463	535	371	88													
- Other	2	3	3	8	9	15	21	45	37	40	37	31	31	31	30	29	32	34	37	40
- Total	47	131	273	470	545	386	109	45	37	40	37	31	31	31	30	29	32	34	37	40
Repayment of Debt	0	0	0	0	0	1	2	5	8	10	11	11	11	11	11	11	11	11	11	11
Working Capital																				
- Accounts Receivable	0	2	4	5	5	3	2	4	5	5	5	5	4	4	4	4	4	4	4	5
- Inventories	0	0	1	1	2	2	2	3	2	3	3	3	2	2	2	2	2	2	3	3
- Total	0	2	5	6	7	5	5	7	7	7	8	8	6	6	6	6	6	6	7	8
Total Applications	48	133	277	476	552	392	116	57	52	57	55	49	48	48	47	46	48	51	54	58
Net Cash Flow	1	1	10	25	48	68	81	82	83	88	93	99	104	103	100	89	74	63	61	64

MOROCCO - SECOND RURAL ELECTRIFICATION PROJECT
 Office National de l'Electricité
 Project Balance Sheet 1991-2010
 (DN millions)

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ASSETS																				
Fixed Assets																				
Gross Fixed Assets in Service	38	153	397	829	1,359	1,778	1,944	2,007	2,044	2,084	2,120	2,151	2,182	2,213	2,243	2,273	2,304	2,338	2,375	2,415
Less: Accumulated Depreciation	3	16	49	118	231	380	542	709	879	1,053	1,230	1,409	1,587	1,759	1,913	2,033	2,112	2,159	2,195	2,229
Net Fixed Assets in Service	35	137	348	711	1,128	1,399	1,403	1,298	1,165	1,031	891	742	594	454	330	239	192	180	181	187
Work in Progress	9	26	54	93	107	74	18	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Fixed Assets	44	163	402	804	1,235	1,473	1,420	1,298	1,165	1,031	891	742	594	454	330	239	192	180	181	187
Current Assets																				
Cash	1	2	12	37	85	154	235	317	400	488	581	680	784	888	989	1,077	1,151	1,214	1,275	1,339
Receivables - Energy	0	2	6	11	16	20	22	26	30	35	40	45	49	53	57	61	64	68	72	77
Inventories - Fuel	0	0	1	2	4	5	8	11	14	16	19	22	24	26	28	31	33	35	38	40
Total Current Assets	1	4	19	50	105	179	264	353	444	539	640	747	857	968	1,074	1,168	1,248	1,317	1,385	1,457
Total Assets	45	167	421	854	1,340	1,652	1,685	1,652	1,608	1,570	1,531	1,489	1,452	1,422	1,404	1,408	1,440	1,497	1,566	1,643
LIABILITIES & EQUITY																				
Equity																				
Government Contributions	44	152	386	786	1,255	1,572	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646	1,646
Consumer Contributions	2	5	8	15	24	40	61	106	143	183	220	250	281	312	342	372	403	438	474	514
Special Fund	0	0	1	3	5	9	15	22	31	41	54	68	84	101	119	139	160	182	206	232
Retained Earnings	(2)	(5)	(11)	(28)	(65)	(125)	(203)	(289)	(372)	(453)	(533)	(612)	(688)	(757)	(815)	(852)	(864)	(853)	(839)	(819)
Total Equity	44	152	383	776	1,220	1,496	1,519	1,486	1,448	1,417	1,386	1,353	1,323	1,302	1,293	1,305	1,346	1,411	1,488	1,573
Long-Term debt																				
Project	1	15	37	75	117	150	158	155	147	137	126	115	104	94	83	72	61	51	40	29
Less Current Portion	0	0	0	0	1	2	5	8	10	11	11	11	11	11	11	11	11	11	11	11
Net Long Term Debt	1	15	37	75	116	148	153	147	137	126	115	104	94	83	72	61	51	40	29	19
Current Liabilities																				
Suppliers - Oil	0	0	1	2	4	5	8	11	14	16	19	22	24	26	28	31	33	35	38	40
Current Portion of Long Term D	0	0	0	0	1	2	5	8	10	11	11	11	11	11	11	11	11	11	11	11
Total Current Liabilities	0	0	1	2	5	8	13	19	24	27	30	32	35	37	39	41	43	46	48	51
Total Liabilities	1	15	38	77	121	155	166	166	160	153	145	137	128	120	111	103	94	86	78	70
Total Liabilities and Equity	45	167	421	854	1,340	1,652	1,685	1,652	1,608	1,570	1,531	1,489	1,452	1,422	1,404	1,408	1,440	1,497	1,566	1,643

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ANNEX 4.8

MOROCCO
SECOND RURAL ELECTRIFICATION PROJECT
ONE

Notes and assumptions on the financial statements

1. Inflation Rates and Exchange Rates

The projections for inflation rates and exchange rates are given in the table below. The exchange rate is expected to fluctuate according to the differential between international and domestic exchange rates.

Item	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Inflation - %										
International	(0.4)	4.9	4.9	4.9	4.9	4.9	4.9	3.7	3.7	3.7
Local	6.1	6.2	5.6	5.4	4.4	4.9	5.5	4.2	5.6	5.7
Exchange Rate										
Mid-Year - \$US/DH	8.50	8.71	8.91	8.94	8.98	8.97	8.97	9.01	9.09	9.27

2. Income statement

Sales of energy are based on ONE's forecast which is presented in Table 1.2. Tariffs and Sales revenues are net of the 7% Value Added Tax.

Other operating revenues include ONE's mark-up on works performed by customers for themselves, sales of scrap, meters, and investment income.

Fuel-oil prices include all taxes and assume that in real terms the price will remain constant at the December 1988 price. Local coal prices (Casablanca and Jerada, separately) include all taxes and are based on December 1988 prices indexed by the cost of imported coal. Imported coal prices are based on the price per ton FOB in constant US\$ as forecast by the Bank and converted to current DH. ONE receives VAT tax rebates on all purchases of fuel used for power generation.

Fuel Consumption and Costs are based on hydro power potential and a merit order dispatching of each thermal power plant during each of eight periods of the year, including the needle, peak, intermediate, and base periods for the Jan-Sept season and the Oct-Dec season. Hydro power potential is projected as per the table below:

Item	hours	Average Load in MW										
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Jan-Sept	needle	279	252	306	440	440	443	507	507	651	796	940
	peak	813	252	306	440	440	443	507	507	651	796	940
	int	3354	132	161	230	230	232	266	266	341	417	493
	base	2130	71	86	124	124	125	143	143	184	224	265
Oct-Dec	needle	91	198	241	346	346	349	399	399	512	626	739
	peak	273	198	241	346	346	349	399	399	512	626	739
	int	1116	61	74	107	107	107	123	123	158	193	228
	base	702	26	32	46	46	46	52	52	67	82	97

It is assumed that thermal plants are dispatched in the order shown in the table below.

Plant	MW	year avail.	x	Fuel Cons. tons/GWh	Fuel Cost dh/ton	Unit cost (net) dh/Mwh
Jorf Lasfar (Import. Coal)	600	1985	0.80	0.381	570	217
Jorf Lasfar (Import. Coal)	600	1997	0.80	0.381	570	217
Mohammedia (Imp. Coal)	300	1988	0.80	0.389	617	240
Jerada (Local Anth. Coal)	165	1988	0.76	0.648	690	448
Mohammedia (Oil)	300	1988	0.85	0.246	1875	461
Casa (Import. Anth. Coal)	55	1988	0.80	0.557	860	479
Kenitra (Oil)	300	1988	0.85	0.285	1922	549
Casa (Oil)	60	1988	0.85	0.300	1887	567
Gas Turbines I (3x30)	90	1991	0.90	0.471	1925	908
Gas Turbines II (3x30)	90	1992	0.90	0.471	1975	931
Gas Turbines	108	1988	0.90	0.471	1975	931

Salaries: indexed on electric power sales and local inflation.

Depreciation: Production assets 5.1%, transmission assets 4.5, distribution assets 7.2%. Studies are expensed after five years.

Income tax: 40% of net income before tax minus Special Fund allocation. The income tax credit carry over will be exhausted in 1991.

Other taxes: patente and property taxes.

Other operating expenses: split into those indexed on yearly investment (TFSE) and those indexed on gross fixed assets in service and inflation, both on a 1986 basis.

Other income: amortization of consumers' contributions. The contributions existing on 12/31/86 are amortized over four years for tax purposes. The future ones are amortized over fourteen years. Allocation of net income to Special Fund: 4.5% of sales net of VAT.

3. Sources and applications of funds

Rescheduled interest: The three reschedulings in 1987, 1988 and 1989 have been considered as postponement of debt service payment. Accordingly, the rescheduled interest has been accrued.

Contributions: Government contributions to the Project cover 100% of the rural electrification construction program. The assets of the program enter into ONE's assets. Consumers' contributions include ONE's mark-up of 20% on works performed by ONE for customers.

Borrowing: the structure of ONE's borrowing is determined by the nature of its investment program, which provides an upper limit to the amount of (foreign) loans and suppliers' credits. The balance of borrowing is ensured by the issuance of bonds in the local market.

Proposed Bank Loan: 7.72%, 20 years including 5 years of grace

Production loans: 9%, 15 years including 5 years of grace

Other loans: 9%, 5 years, no grace

Bonds: 13%, 15 years, no grace

4. Balance Sheet

Gross fixed assets in service: unvalued

Work in progress: transferred after completion according to ONE's investment program.

Other non-current assets

- (a) Government bonds: issued after PERL debt consolidation in 1987 and reimbursable over five years by equal installments starting in 1987.
- (b) Other: studies, expensed after five years.

Receivables

- (a) Energy (after the 1987 PERL settlement) - administrations and local authorities: 4.0 months of sales. Regies and Offices: 3.0 months of sales. Private consumers: 1.5 month of sales.

Inventories

Oil: 1.5 months of consumption

Local coal: 1.0 months of consumption

Imported coal: three months consumption

Other: indexed (basis 1988) on gross fixed assets in service and inflation.

Consumers' contributions: they are amortized (see other income)

Other long-term liabilities: pension fund. Increases by 4% of salaries (interest 9%)

Suppliers (after 1987 PERL settlement):

oil and local coal: one month purchases
imported coal: four months purchases
other: indexed on inflation (1988 basis)

Other current liabilities

Line of credit: DH140 million from 1989
Interest payable: indexed on interest expense
Income tax payable: see income statement
Other: 10% yearly increase.

5. Financial Impact of Project on ONE

In determining the cost of fuel used to generate power to supply the demand created by the project, it is assumed that all power supplied during peak periods will be generated by gas turbines and that off-peak power, at the margin, would come from one of the less-efficient fuel-fired generating stations such as that in Casablanca. Load curves were used to determine the split between peak and off-peak consumption for low and medium-voltage consumers. Operating and maintenance costs for the distribution network were taken from the economic analysis but converted to current DH through 1998 and constant 1998 DH, thereafter.

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SECOND RURAL ELECTRIFICATION PROJECT

Least-Cost Analysis

A least-cost analysis was carried out in order to show whether electrification by means of the national grid is less costly than electrification by isolated diesel units for each village included in the project.

Cost of Electricity from a Diesel Unit

The economic cost of electricity produced from isolated diesel units was calculated as follows:

In order to deliver a kWh under the same quality of service, we assume two diesel units each with 100 kW installed capacity, 90 kW net, and power factor of 0.85. The second unit serves as reserve for the first.

Investment cost: (June 1990 prices)

Equipment (excluding taxes)	DH 500,000
Civil works	175,000
Accessories and installation	<u>190,000</u>
	DH 865,000

Assuming a 10 year lifetime, and a discount rate of 10%, the equivalent annual cost is DH 140,700.

Personnel:

1 specialized worker	DH 4,200/month
1 ordinary worker	3,600
General expenses (40%)	<u>3,120</u>
Total	10,920/month

Including a thirteenth month of pay for vacation, the total is:
10,920 x 13 = DH 141,960 per year.

Stock of Gas Oil:

Deliveries would be made in loads of 15,000 liters. Therefore the average stock on hand would be 7,500 liters. With the economic cost (import price plus distribution margin excluding taxes) of gas oil equal to DH 1.53/liter, the cost of the stock is 7,500 x 1.53 = DH 11,500. Assuming a 10% discount rate and a ten year life for the project, the annual cost is DH 1,870.

Total fixed annual cost = DH 140,700 + DH 141,960 + DH 1,870 = DH 284,530.

Variable Cost:

Fuel cost: 0.51 liter/kWh x DH 1.53/liter = DH 0.78/kWh
Oil and spare parts (10%) DH 0.08/kWh
Total variable cost DH 0.86/kWh

The cost of one kWh produced by a diesel unit is

$$C_1 = 0.86 + \frac{284,530}{q}$$

where q is the annual consumption of the village in kilowatt hours.

Cost of Grid-supplied Electricity

Investment cost: the cost of 1 kilometer of 22 kV distribution line to connect the village to the existing network in Almelec of 34 mm² section on flat land is DH 98,978 x 0.10608 = DH 10,500/km/year assuming a 10% discount rate and a 30 years life.

The cost of a transformer is DH 45,300 x 0.106 = DH 4,805/year.

The total annual investment cost for the village to be considered is DH 10,500L + 4,805 where L is the length of connecting line in kilometers.

Other costs: The LRMC of electricity supplied to the entrance of the village is DH 0.465/kWh (Annex 5.02 and excluding low voltage losses of 9%).

The total cost of one kWh supplied to the village through the national grid is:

$$C_2 = 0.465 + \frac{10,500L + 4805}{q}$$

Break-even Distance from the Existing Networks

When $C_1 = C_2$, a value for L can be determined which measures the break-even distance of the voltage from the existing network. For distances less than L, electrification by the grid would be the least-cost solution. For distances greater than L, electrification by diesel units would be the least-cost solution.

The break-even distance is given by:

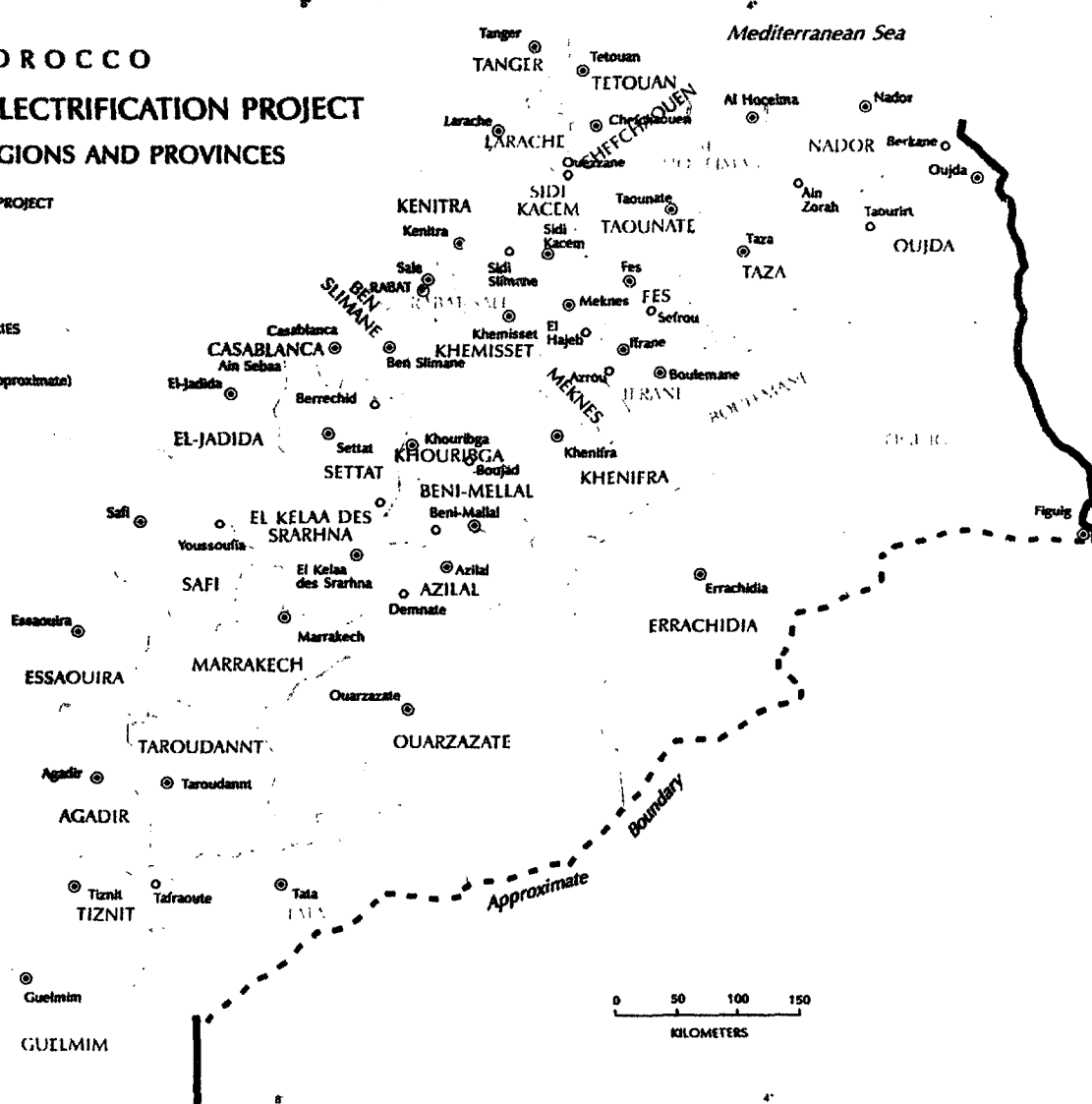
$$L = 26.6 + \frac{0.395q}{10,500} \text{ kilometers.}$$

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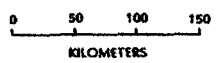
SECOND RURAL ELECTRIFICATION PROJECT

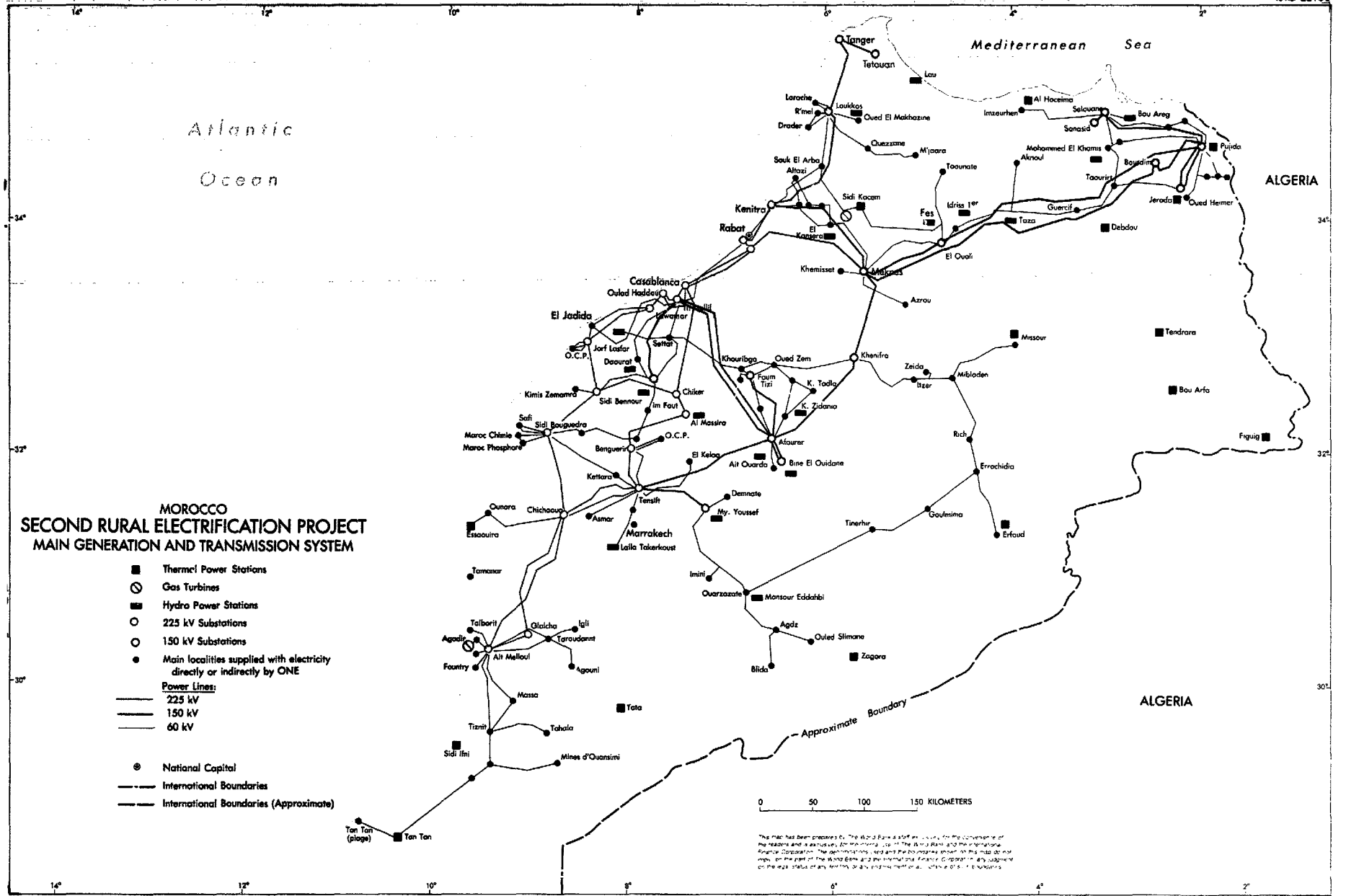
ECONOMIC REGIONS AND PROVINCES

- TIZNIT PROVINCES COVERED BY THE PROJECT**
- ⊙ PROVINCE CAPITALS
 - ⊙ NATIONAL CAPITAL
 - TOWNS AND CITIES
 - PROVINCE BOUNDARIES
 - - - ECONOMIC REGION BOUNDARIES
 - INTERNATIONAL BOUNDARIES
 - - - INTERNATIONAL BOUNDARY (approximate)



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SECOND RURAL ELECTRIFICATION PROJECT
MAIN GENERATION AND TRANSMISSION SYSTEM**

- Thermal Power Stations
- ⊙ Gas Turbines
- Hydro Power Stations
- 225 kV Substations
- 150 kV Substations
- Main localities supplied with electricity directly or indirectly by ONE
- Power Lines:**
- 225 kV
- 150 kV
- 60 kV
- ⊙ National Capital
- International Boundaries
- International Boundaries (Approximate)

0 50 100 150 KILOMETERS

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