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ENERGY CONSERVATION IN CAMEROON*

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

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I-INTRODUCTION

Energy is to industry what blood is to the human body. Its abondance or scarcity directly affects the growth of industry. In Cameroon. the energy sector ranges from fuel wood .fossil fuel to hydroelectricity [1].[2].[3].The multiplicity of energy forms and the growing rate of industrialisation calls for the setting-up of energy conservation schemes [4] to meet future energy needs. One organ directly concerned with this action is the National Energy Study [5] established in 1987. What this project is all about. how the sector looks like and to what extent conservation schemes have been implemented in the country are major topics developed in this paper [6].[7].[8]. But first a visit to the Cameroons.

II- VISIT CARD FROM CAMEROON

Independent in 1960.Cameroon is a West African Country with strong economic ties with the Central African subregion. Her estimated population of 11.123.700 inhabitants (1988) occupies a surface area of 465400 square kilometres. 37.23% of this population is urbanized [3]. The capital city Yaounde has 759500 inhabitants. For the period 1985-1990 the annual growth rate of the population is 3.06%.

The national economy is strongly influenced by the tertiary sector which accounts for over 40% of the GNP (table 1). This is followed by the primary sector (approximately 35%). The current per capita income is US$ 1000. The growth rate of the petroleum industry and the implantation of the National Refinery (SONARA) in 1981 greatly modified the structure of importation, giving Cameroon a positive balance of trade. With the current slump affecting Third World countries, few projects are being financed by local banks and the Stuctural Adjustment Program (SAP) plans to reduce even further all investments. promote privatisation and cut down on Government spending.

Cameroon is democratic with a single party system. Elections are held every five years

.

III-POLICY AND LEGAL FRAMEWORK

3.1-GOVERNMENT POLICIES:Government policies on energy are twofold:
-1) to develop commercial energy distribution network for electricity and petroleum products. and
-2) to maintain or even improve on the degree of energy self-sufficiency in the country.

This policy is based on the exploitation of the nation's hydroelectricty potential, optimisation of the infrastructure on the hydrocarbon sector, the promotion of renewable energy projects and the development of energy conservation potential.

3.2-INSTITUTIONAL SET-UP:Energy falls within the competence of the Presidency of the Republic (PRC) and the Ministry of Mines. Water Resources and Power (MINMEE).However other State Departments handle problems of pricing, costums and transportation. Petroleum activities are co-ordinated by PRC who alone decides on the creation of national companies in this sector (SONARA.SCDP.SNH. CAMSHIP....) and authorises the signing or conventions between Cameroon and foreign Petroleum Companies (ELF SEREPCA. PECTEN, TEPCAM. ETC). In the petroleum sector. MINMEE plays the role of technical controller and the National Hydrocarbons company (SNH),is the organ of the Presidency charged with the management of State interests.

Electricity is managed by the National Electricity Corporation (SONEL) but placed under the supervision of MINMEE which formulates policy orientations, studies and inspects the construction of major electricity investment projects.

As far as New and Renewable energy is concerned MINMEE works in collaboration with the research institutions in the Ministry of Higher

Education.Scientific Reseach and Computer Services to evaluate and valorise national resources:solar.biomass and small hydropower plants.

3.3-ECONOMIC AND LEGAL SET-UP: Conclusions arrived at by the National Commission for price homologation are submitted to the Presidency for approval. No clear-cut method of pricing is used. The final price is always the result of a compromise between various tendencies such as production or importation cost . support for industrialisation, low prices to meet needs of rural population [1], [2].

3.3.1-Electricity prices vary with the type of subscribers and also among subscribers of the same category (special. high voltage. medium voltage and low voltage subscribers).Differencies also exist as we move from urban to rural areas.

3.3.2-Hydrocarbons: The Government has taken some measures aimed at encouraging private investment and reaching the rural population with these products. They include stabilising the selling price of products through out the distribution network. interproduct and interregional perequation. These measures are aimed at preventing any eventual erratic evolution of prices.

3.4-ENERGY SECTOR CHALLENGES:The main energy challenges have been identified at a very preliminary level by MINMEE.

a)-Shortages in firewood. Though exact data does not exist on this sector. MINMEE holds that the present trend of deforestation is due more to agriculture than to energy needs. Small quantities of wood charcoal of low carbonisation efficiency are used . In the urban centres. firewood prices now reflect the long distances covered to fetch it.

b)-Developments on the consumption of Electricity and hydrocarbons: This is a heavy investment sector but MINMEE would like to see improvements in the management and exploitation of the existing

network.

c)-Saturated refinery: The refinery, designed to handle two million tons of crude per year, will be saturated by 1990. Presently Butane is insufficient while gas oil is produced in excess.

d)-Drop in oil production: While the demand for this commodity is increasing in transportation and industry, the national crude oil production is falling. It is even estimated that in about 10 years Cameroon may become an importer of petroleum products.

e)-Poor Management: Several energy companies are unable to maintain financial self-sufficiency owing to inefficient management. Competent authorities would like to see this obstacle removed before new investments are made.

f)- The absence of a National Energy Plan and concerted action among Ministries concerned with this sector constitute obstacles that must be overcome.

IV- ENERGY SITUATION AND THE NATIONAL ENERGY STUDY

4-1:CAMEROON'S ENERGY SITUATION: Cameroon's sixth five year plan for the period 1986-1991 specifies several priorities for energy sector development. In 1984, total commercial energy production was 6.654 thousand metric tons of oil equivalent (toe) of which 97% was petroleum and electricity 3% . This same year commercial energy consumption was 3.026 thousand toe in the proportion 94% and 6% for petroleum and electricity respectively. With respect to traditional sources of energy fuelwood was estimated at 1830 thousand toe and bagasse 320 thousand toe. MINMEE estimates that if charcoal estimates are included, commercial and tradition energy shares would be around 40% and 60% respectively.

Crude oil production for the period 1979 to 1988 shows an annual growth rate of 16.46% (table 11).Petroleum products consumption showed

the following growth rate:

Aviation gasoline	3.0%
Motor gasoline	8.0%
Jet fuel	-3.2
Gas/diesel oil	4.5%
Fuel oil	6.3%
others	17.6%

Electricity production and consumption for the period 1976 to 1988 show an average annual growth rate of 5.41% and 4.93% respectively (table iii).

One of the key priorities of the government in this sector is strenthening the capabilities of national staff in the following areas

a)-analysis of national energy situation:

b)-planning for future energy needs and for the resources necessary to meet those needs:

c)-fostering energy conservation and efficiency.

In this respect and in accordance with provisions made in the fifth five year plan. an outline of a national energy plan describing appropriate techniques.scope and requirements of the plan was prepared by MINMEE in April 1984.

4.2;THE NATIONAL ENERGY PLAN (NEP): This plan which is aimed at modeling an energy blue print for Cameroon consists of two phases:

4.2.1: Phase I:involves (a) energy data collection seperated into end-use in industry. transport, household. commerce and agriculture;

(b)-construction of a microcomputer-based energy data base;

(c)-energy pricing and forecasting ;

(d)-a preliminary energy conservation study covering the overall potential for energy conservation in Cameroon together with two industrial sector energy audits.

4.2.2;Phase II: The key objectives of phase two include;

(a)-a detailed energy sector analysis:

(b)-wider energy conservation programme in industry. and transportation.

(c)-institutional and contractual issues involved in energy sector management, development and conservation ;

(d)-training of national personel in energy planning techniques.

The project is currently in its first phase.

V- ENERGY CONSERVATION PROGRAMMES

It was rentioned before that a study was to be done on the overall National energy conservation potential together with two industrial sector energy audits. Then will follow the design and implementation of several energy audits in the industrial. transport and residential sectors.So far two energy audits in industry have been carried out. The data obtained are presently stored in computer data-bases pending close analysis . design and implementation.

In addition, MINMEE, in an effort to develop and set-up a national conservation programme, invited a Canadian consurtium (ADS et Associe's) to lay the groundwork for that policy.

In this light. the Presidency of the Republic, in February 1989. dispatched a press release [8] inviting the Energy Department to formulate strategies to cut down Government spending on energy. In reply, MINMEE proposed that (1) Government officers be sensitized to reduce unnecesary wastage in energy. (2) timer systems be set in Government buildings to turn off lights after work, (3) guidelines for choosing and installing new energy consuming equipment be formulated .

5.1- ENERGY CONSERVATION IN INDUSTRY: From two energy surveys carried out in industries. most of them do not have a programme for energy conservation. None-the-less they are interested in starting one. The potential for energy savings exist and only requires to be

exploited.

To estimate this p o t e n t i a l, commercial and self generated electricity and petroleum products consumption for some industries were evaluated. Of the six industries surveyed in November 1987 (SOPECAM.CHOCOCAM, CICAM, SCM, SOCAVER.ALUBASSA) the following results were obtained.

INDUSTRY AUDITS

ENERGY CONSERVATION POTENTIALS IN TOE

INDUSTRY	ELECT PRESENT CONSUMPT.	PETROL	ELECT CONSERVATION POT.	PETROL	ELECT % SAVINGS	PETROL
SOPECAM	52.7	0.0	8.0	0.0	15.2	0.0
CHOCOCAM	269.8	428.9	30.0	60.0	11.5	14.0
CICAM	286.6	4794.6	40.0	910.0	14.0	19.0
SCM	188.3	0.0	25.0	0.0	13.3	0.0
SOCAVER	602.0	9914.6	50.0	1450.0	8.3	14.6
ALUBASSA	28.1	15.1	1.0	4.0	3.6	26.5
TOTAL	1427.5	15153.2	154.0	2424.0	10.78	15.9

It is seen from the table above that more than 10% of electrical energy can be saved in four of six industries surveyed . For hydrocarbons , as much as 26% could be saved in ALUBASSA and 19% in CICAM. These figures, obtained from a preliminary stu.y will have to be compared with those of another survey to have them validated.

5.2-CONSERVATION POTENTIAL IN ELECTRICITY; By b r e a k i n g up electrical energy by sector and by activity the following potential was obtained in 1984.(For explanation on 'sector' and 'branch' see table 1). The table gives medium voltage energy conservation potential. These figures are still to be up-dated.

MEDIUM VOLTAGE ENERGY CONSERVATION POTENTIAL-1983/84

SECTOR	BRANCH	CONSUMPTION(KWH)	POTENTIAL(KWH)	% ECONOMY
	1	194256	0	0
	2	9441234	106308	11.26
1	3	698245	19655	11.26
	4	831515	46814	11.26
	5	239070	13459	11.26
2	6	4202755	0.	0
	7	11200314	630577	11.26
	8	5180249	291648	11.26
	9	1723934	155291	11.26
	10	9347768	526279	11.26
	11	60770092	1710678	11.26
	12	39415694	4138647	10.5
	13	2727560	286393	10.5
3	14	14519863	1437460	11.0
	15	1828442	118483	8.1
	16	11659632	802765	8.1
	17	8446581	342086	8.1
	18	8656726	1146150	13.24
	19	10351887	624995	8.05
	20	5537865	609165	8.05
	21	731599	78495	8.05
	22	12287586	675817	8.05

On average. 11% of medium voltage consumption could be saved.

Technical and economic feasibility analysis and financial implications are still to be done. Some measures to be considered will include:

-recycling of waste material:

-improved energy use management:

-integrated design of processes:

-improved equipment maintenance in industry;

-fuel substitution possibilities:

-improved control on air-conditioning;

-more efficient cooking appliances/stoves

-improved road and engine maintenance and driver training:

-improved insulation:

-improved boilers:

-lighting efficiency.

VI- FUNDING

So far funding for the national energy plan project and the energy conservation subprogramme are provided partly by the Government of Cameroon and by the Canadian International Development Agency (CIDA). However , uptil now, only funds for phase I of the NEP project are completely available.Negotiations for funding for the second phase are still going on. As for the energy conservation subprogramme. funding is provided by CIDA on behalf of ADS et Associe's . More funds will be needed for programme development at the level of industries where there is a need but a lack of means . to effect the programme.

VII- BARRIERS TO ENERGY SAVINGS

The major barrier to energy saving is the absence of co-ordinated action between Minstries and Companies concerned with energy conservation . Even with the creation of the NEP project, there is no free flow of information amongst the Ministries.

Secondly no well-defined and publicised energy policy exists. Maybe the results of the NEP project will provide one.

Thirdly, the implementation of conservation techniques, even though this will stabilise and improve on the services of the Electricity Corporation , may reduce that company's returns from production. Many industries would rather continue to pay penalties for power factor failures than invest on compensators to corect this factor.

The end-users of energy are today more concerned with enjoying the benefits of energy than trying to know what can be done to economise it. This perhaps is the most important obstacle. It may require huge investments on education and information campaigns to have the masses understand what enegy conservation is . This may be hard to get to unless heavy taxes are imposed on violators of any such schemes. On the other hand, subsidies on prices should be removed so that commodities can sell at opportunity cost prices.

One last barrier, even though the list is not exhusted, is that technical know-how defficiencies exist in this field and it must be corrected.

CONCLUSION

There is a high potential for energy conserevation in industry in Cameroon. There also exists technical and environmental benefits. However, programmes may not be implemented unless they are found to be economically attractive. For example, unless the payback period for the project is reasonable (~5 years) energy users may loose interest in conservation programmes . However with the setting-up of the NEP project in Yaounde, there is a grain of hope that energy conservation will gain grounds in the country and play a significant role in redressing Cameroon's turbulent economic situation

ANNEX

Table i: GNP contribution by sector (%)

SECTOR	1977/78	1981/82	1984/85
PRIMARY	30.9	37.6	34.7
SECONDARY	15.3	18.8	17.4
TERTIARY	46.9	38.3	43.3
IMPORT $ TAXES	6.9	5.4	4.7

SOURCE: COMPTES NATIONAUX DU CAMEROON

Table ii: Crude oil production

1979/80	2472 thousand metric tonnes
1980/81	3572 thousand metric tonnes
1981/82	4737 thousand metric tonnes
1982/83	5610 thousand metric tonnes
1983/84	7243 thousand metric tonnes
1984/85	8778 thousand metric tonnes
1985/86	8942 thousand metric tonnes
1986/87	8662 thousand metric tonnes
1987/88	8365 thousand metric tonnes

SOURCE: UNITED NATIONS DEPARTMENT OF CO-OPERATION FOR DEVELOPMENT

Table 111:Production and Consumption of Electricity (GWH).

YEAR	production		TRANSMISSION		FINAL CONSUMPTION
	HYDRO	THERMAL	HYDRO	THERMAL	
75/76	1282	76	1260	74	1274
76/77	1250	71	1228	66	1238
77/78	1210	66	1200	67	1200
78/79	1313	74	1298	75	1308
79/80	1306	82	1292	50	1249
80/81	1561	94	1545	91	1518
81/82	2043	105	2016	100	1979
82/83	2055	106	2025	101	1991
83/84	2118	39	2082	38	2011
84/85	2319	65	2284	64	2149
85/86	2457	41	24	41	2246
86/87	2420	51	2433		2197
87/88	2496	61	2440	58	2271
AAG RATE %	5.7	-0.02	5.7	-0.02	4.9

N.B: AAG =AVERAGE ANNUAL GROWTH

SOURCE: SONEL

Table iv:Branches of main activity sector

SECTOR	BRANCH	
	NO.	DEFINITION
	1	FOOD CROP FARMING
	2	AGRO INDUSTRIES
1	3	LIVESTOCK .HUNTING
	4	FISHING
	5	FORESTRY
2	6	MINING
	7	CEREALS AND VEGETABLE
	8	AGRO TRANSFORMATION
	9	BAKERIES
	10	FOOD INDUSTRIES
	11	BREWERIES AND TOBACCO FACTORIES
	12	TEXTILES
	13	LEAD SHOE FACTORIES
3	14	WOOD INDUSTRY
	15	PAPER PULP
	16	CHEMICALS
	17	PLASTICS
	18	BUILDING MATERIALS
	19	METALLURGICAL
	20	ELECTRICAL AND MECHANICAL EQUIPMENT
	21	TRANSPORT EQUIPMENT
	22	OTHER MANUFACTURING
4	23	ELECTRICITY WATER AND GAS

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