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INDUSTRIAL ENERGY MANAGEMENT CONSULTANCY AND TRAINING

DP/PHI/82/002

PHILIPPINES

Report of the evaluation mission*

Prepared in co-operation with the Government of the Philippines,
the United Nations Development Programme and the
United Nations Industrial Development Organization

United Nations Industrial Development Organization

Vienna

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SUMMARY OF THE IN-DEPTH EVALUATION

I. DP/PHI/82/002 Industrial Energy Management Consultancy and Training: Evaluation, 13-27 June 1987

II. Summary of Project Objectives

1) To establish and operate an Energy Management Consultancy Service to conduct energy audits, develop appropriate consultancy methods and prepare recommendations on energy conservation measures;

2) To create a core of technical staff trained in energy conservation studies, related consultancy services, R & D in energy saving technologies and fuel testing, assessing government policies and collecting and disseminating information on energy saving technologies and regulatory measures;

3) To set up a laboratory and procedures for measuring energy efficiency of machinery, appliances and equipment; and

4) To develop standards for energy efficiency.

III. Findings of the Evaluation Mission (summary only, see Chapter IV for more specific details)

1) The Conservation Division/UNDP-UNIDO project has achieved impressive conservation results in industry through audits and technical advice, training of industry staff and general energy management awareness activities.

2) A permanent national capability has been created to perform energy management consultancy work in the Conservation Division.

3) The institutional structure of the Conservation Division and its relation to the private sector needs further definition and review, appropriate modification.

4) Demand for services of the Conservation Division from industry is considerable. The division should charge fees for these services with revenue to accrue to the division for support of its work.

5) The Consultancy Section of the Conservation Division has achieved a high degree of competence in performing audits, but it needs to give greater emphasis to follow-up and implementation, and also needs to improve financial analysis capability.

6) The Fuels and Appliance Testing Section is only partly operational. Some equipment is not yet functioning. Operational and testing procedures are not fully developed and staff is not yet fully trained. The building provided by Government needs substantial improvements.

7) The National Engineering Center contract in support of the Fuel and Appliance Testing and Planning work of the project requires further definition and outside input to ensure that sound and appropriate work is performed.

8) The Training and Education Section is operational with qualified and experienced staff.

9) An excellent and extensive library with energy conservation books and periodicals exists, but this should be better catalogued and publicized.

10) The scope and system of data collection and analysis of the Planning and Evaluation Section should be reviewed and expanded, and better integrated with the audit activity.

11) Computer equipment financed by the project appears too costly and not the best choice. It will also be unnecessarily costly for Government to maintain and operate.

IV. Recommendations of the Evaluation Mission:

To the Government of the Philippines

1. That a comprehensive energy conservation function be retained by Government, and that the present conservation Division/EMCS be constituted into an expanded and enhanced technical and implementation entity.

2. That energy audit work be explicitly designed to stimulate conservation implementation via improved post-audit follow-up, performance of more in-depth audits, and stressing large and energy intensive firms in audits.

3. That the conservation program encourage private sector entities to perform conservation engineering and service work.

4. That financial constraints and innovative financing mechanisms be evaluated as vehicles to stimulate conservation implementation.

5. That priority be given to defining the role and functions of the Testing and Standards Laboratory, fee structure, accreditation of testing work and correction of deficiencies with the physical structure and equipment. It is noted that staff is working hard to deal with these problems.

6. That the Conservation Division establish an economic analysis group located in the Planning and Analysis Section, which would support audit economic analysis, along with its other work.

7. That the scope of data base and analysis activities be further defined and a review of computer requirements be completed before software development work begins under the NEC contract.

8. That future Government conservation policy and plans organize donor support to ensure that such support complements Government goals and objectives.

9. That the management and implementation approach and scope of the Technical Assistance Component of the Structural Adjustment Loan for energy conservation (TAC SAL II) be thoroughly reexamined in light of progress already achieved in energy audits and the strong internal capability of the Conservation Division. This should be a pre-condition to Phase 2 UNDP/UNIDO support.

RECOMMENDATIONS TO UNDP/UNIDO:

1. That no additional funds, beyond minor amounts for resolution of first phase equipment deficiencies, be allocated for Testing and Standards until outstanding issues are resolved and the laboratory is operationalwith present equipment.

2. That a short-term consultancy be provided to assist to define specific NEC Subcontract terms of reference, and also assist in selection of appropriate consultants for implementing these terms of reference.

3. That data and analysis activities of the NEC contract be delayed to allow better definition of analysis goals and computer requirements.

4. That in the future UNDP/UNIDO exercise more effective control management to ensure balanced adherence to both technical and management covenants of the project.

5. That a second phase of the project be funded, and that a formulation mission be fielded for this purpose:

Recommended components might include but not be limited to:

a. Assistance in the design of a revised semi-private and expanded Conservation organization and function.

b. Development of a conservation implementation strategy and specific plan.

c. Stimulation of an expanded capability in manufacturing and engineering conservation services.

d. Further development of financial and economic analysis capability.

e. Support for the Testing and Standards Laboratory function.

f. That in view of the critical problems with electricity supply, the second phase give priorityto cogeneration and electrical energy conservation and load management.

g. That greater priority be given to fuel substitution particularly coal substitution, but also include other conventional and non-conventional fuels.

h. Extension of energy management activities to local offices of BEU in areas of high industrial density.

i. That further studies and analyses be supported with case by case justifications. Potential areas of support may include, among others:

   - Transport energy conservation including studies, vehicle testing and training of mechanics, among other areas.

   - Sub-sector industry studies and conservation implementation activities. For example, sugar industry energy efficiency and cogeneration for electrical power sales.

- Development of practical standards and goals on energy efficiency for industry and other sectors. (See Annex III for more detail on Phase 2)

V. Evaluation Team

Mr. Rosauro C. Aquino	-	Representative of the Government of the Philippines
Mr. Harry G. Jones	-	Consultant and Team Leader representing UNDP
Mr. Adrie W. M. de Groot	-	Representative of UNIDO

Introduction

After the initial oil shock beginning in 1973-74, the Government of the Philippines implemented a number of measures to conserve energy. It was decided to establish with UNDP/UNIDO assistance an Energy Management Consultancy Service (EMCS) within the Conservation Division of the Bureau of Energy Utilization (BEU). The EMCS was intended to assist industrial and non-industrial energy users in identifying the most cost effective options for their operations. The project document for this project (DP/PHI/82/002) was signed in August 1982 and in May/June of 1983 the EMCS started functioning upon the arrival of the Chief Technical Advisor (CTA).

This in-depth evaluation was requested as the project was nearing completion in order to assess whether "(a) the main thrusts of the project, training of EMCS engineers, energy auditing and fuels and appliance testing are to be continued; (b) the envisaged second phase of the project should emphasize other areas of energy management; and, (c) the organization of the project should be modified". Full Terms of Reference for the evaluation are attached as Annex I.

The in-depth evaluation took place from 13-26 June 1987 in Manila. The team consisted of:

Mr. Rosauro C. Aquino	Representative of the Government of the Philippines
Mr. Harry M. Jones	Consultant and Team Leader, representing UNDP
Mr. Adrie W. M. de Groot	UNIDO representative

The evaluation team was briefed by the UNDP staff in Manila, and held meetings with National Economic and Development Authority (NEDA) for the Government of the Philippines, project staff, and officials and staff of the Office of Energy Affairs (OEA), Bureau of Energy Utilization (BEU) and representatives of other relevant national and international organizations, as well as public interest groups and industry representatives. A full list of persons and organizations interviewed is given as Annex II. The team presented its initial findings and recommendations to the Government and UNDP on Thursday, 25 and 26 June and submitted a draft report to UNDP before the departure of the international team members.

The team would like to express its gratitude to all persons and organizations who met with and assisted the team. This support and cooperation greatly facilitated the work of the evaluation team.

LIST OF ABBREVIATIONS USED

GOP	Government of the Philippines
NEDA	National Economic and Development Authority
EMCS	Energy Management and Conservation Service
BEU	Bureau of Energy Utilization
BED	Bureau of Energy Development
NEC	National Engineering Center
ENMAP	Energy Management Association of the Philippines
PNOC	Philippine National Oil Corporation
CTA	Chief Technical Advisor
NPC	National Power Corporation
OEA	Office of Energy Affairs
MBOE	Million Barrels of Oil Equivalent
ERB	Energy Regulatory Board
NEA	National Electrification Authority
NCA	National Coal Authority
NAC	National Alcohol Commission
MERALCO	Manila Electric Company
MOE	Ministry of Energy
ENR	Environmental and Natural Resources
AsDB	Asian Development Bank
TAC SAL II	Technical Assistance Component--Structural Adjustment Loan II
TTEM	Technology Transfer in Energy Management (USAID Project)
RUE	National Utilization of Energy (G.T.Z. Project)

CHAPTER I: PROJECT FORMULATION

A. Objectives of the Project

The development objective given in the project document is as follows:

> "The development (sectoral) objective of the project is to support the Government's development strategy of lessening the dependence on imported fuels by increasing the efficiency of energy usage through conservation and management measures with special emphasis on industry."

The immediate objectives of the project given in the project document are the following:

1. To assist in the establishment and operation of an Energy Management Consultancy Service (EMCS) responsible inter alia for conducting energy audits, developing appropriate consulting methods, and preparing recommendations on energy conservation measures.

2. To create a core of technical staff trained in the following areas:

   a) energy conservation studies,
   b) consultancy services for conservation and management of energy,
   c) R & D in the area of the application of energy saving technologies and the testing of fuel efficiency,
   d) assessment of Government energy policies, and
   e) collection and dissemination of information relevant to energy saving technologies and regulatory measures.

3. To help set up a laboratory and test procedures for measuring the energy utilization efficiency of machinery, appliances and equipment.

4. To develop standards for efficiency of energy utilization.

At the occasion of the first Tripartite Review Meeting in May 1984, at the request of UNIDO it was decided that a working group would revise the project document in order to specify and quantify the above given objectives and the outputs, and build in the experience of the first year of operation. The draft revision of the project document prepared in Manila however, was never approved. The CTA reported to the Tripartite Review in April 1985 (in which UNIDO Headquarters did not participate, apparently due to insufficient forewarning) that the working group considered that a revision of objectives and outputs was not needed. The original project document was never revised except in terms of phasing and inputs.

The objectives in the project document are in harmony with the "functions" of the project as given on the cover page of the document. The primary function is clearly "Institution Building" with the secondary function of "Direct Support" to industry. This second function is not reflected in the stated project objectives but is noted in the output statement.

B. Socio-Economic and Institutional Setting of the Project

The Philippines is classified by the World Bank as belonging to the group of countries considered as lower middle-income economies. Per capita GNP is currently about US$585 per year. The population of the country was about 55 million and growing at a rate of about 2.7 per cent per annum in 1985. The literacy rate of about 80% is one of the highest in Asia.

During the 1970s, the Philippine economy experienced healthy growth, but in the 1980s this growth stalled and was reversed by various factors including political uncertainty, higher international oil prices, and the accompanying economic recession. The overall economic outlook for the Philippines is good at present. Export earnings are growing at over 3.7%, and economic growth in the 3-5% range is forecasted for 1987. The oil import bill is expected to be unchanged in 1987, after falling steeply in 1986 due to lower prices and steady local demand. The trade gap will put the current account back into deficit in 1987, following 1986's surplus of about $400 million. The servicing of a high level of external debt ($27.8 billion) in 1986 required an estimated 60% of foreign earnings and represented a severe burden on the economy. However, agreement by donors to restructure and reschedule debt has significantly mitigated this burden in the immediate term. Prospects for the economy in the long-term appear very favorable as the country has a productive, low wage work force and a competent technical and managerial hierarchy. Table I.1 provides an overview of the key economic indicators for the Philippines.

The present administration is shifting emphasis from two decades of export and industrialization to an agriculture-oriented program more geared toward the domestic market. Food self-sufficiency, job creation, and rural development are top government priorities. In order to achieve these objectives the government is encouraging labor-intensive, and small and medium-sized enterprise, along with comprehensive land reform. Government policy is also to reduce its intervention in the economy, privatize functions where possible, and encourage foreign investment.

Table I.1

PHILIPPINES: KEY ECONOMIC INDICATORS
(All values in US$ million unless otherwise indicated)

Exchange Rates (annual average): 1983-₱11.22; 1984-₱16.70; 1985-₱18.61

Income, Production, Employment	1983	1984	1985 p/	Percent Change a/
GNP at current prices b/	33,744	31,519	31,984	13.1
GNP at 1972 prices b/	8,768	5,506	4,753	(3.8)
Per capita GNP current prices b/	$648	$591	$585	10.4
Personal income-current prices b/	25,803	25,499	26,228	14.6
Average industrial money wage d/	₱42.07	₱48.47	₱57.08	17.8
Money and Prices				
Money supply b/ f/	2,317	2,015	1,925	6.5
Interest rate (%) e/	16.6	28.9 r/	16.2	-
Indices - Manila (12-mo. aver.):				
Consumer prices (1978 = 100)	195.3	291.5	351.9	20.7
Balance of Payments	r/	r/		
Outstanding external debt f/ g/	19,102	19,910	19,988	0.4
(9/85)				
Annual debt service ratio (%) h/	32.7	35.0	34.6	-
Balance of payments	(2,068)	258.0	2,389 i/	-
Balance of trade	(2,482)	(679)	(482)	(29.0)

SOURCES: Central Bank, National Economic and Development Authority, National Census and Statistics Office, Ministry of Labor

a/ Comparison between 1985 and 1984. Percent changes were calculated using peso values, and therefore will be different from dollar comparisons.

b/ Peso values converted to dollars, using average exchange rate for period.

c/ Labor productivity measured in terms of net domestic product per employed person; peso value converted to dollars.

d/ Legislated daily wage rates for non-agricul. establishments in Metro Manila.

e/ Weighted average of money market rates.

f/ End of period.

g/ Excluding foreign borrowings of the banking sector used mainly for liquidity purposes.

h/ IMF method: principal and interest payments as percent of export and services receipts, after rescheduling.

i/ BOP would have shown a deficit of $457 million if adjustment for rescheduling and exceptional financing was excluded.

p/ Preliminary

r Revised.

Energy Sector Overview.

The Philippines experienced severe economic disruption caused partly by higher oil prices in the 1970s and early 1980s. Total oil cost doubled from 1973 to 1974 and again from 1977 to 1980. Payments for oil as a fraction of export revenue increased fourfold from 9.9% in 1973 to 38.5% in 1980, and 43% in 1983. The government has made a concerted effort to stem this rise with aggressive fuel substitution and conservation efforts.

Government Energy Policy Goals are:

a) To ensure the availability of energy to the markets in the country at reasonable prices and reduce power interruptions.

b) To promote the efficient and judicious use of energy.

c) To accomplish the above with minimum adverse effects on the environment.

The major changes in primary energy supply in recent years have been, first, the increase of domestic sources versus imported sources, and second, the shift from oil to non-oil based energy. Relative prices in imported fuels, and sound domestic pricing policies passing along higher prices rapidly, have both stimulated this adjustment. In aggregate, imported energy fell from 71% of the total in 1980 to 55% in 1985. Energy demand is estimated to grow at about 3.8% per annum for the next 5 years, or from 98.52 Million BOE to 123 MBOE in 1992. Table I.2 provides an overview of historical energy mix and changes over time.

Philippine energy pricing policy since the first oil price shock has stressed conservation and fuel substitution goals, and at the same time revenue generation through new energy taxes. More recently, energy pricing policy has been applied to achieve domestic price stability in the face of world oil price declines. In general, Philippine oil pricing has appeared to conform to incremental cost theory and has promoted both energy conservation and economic efficiency. Partial evidence of the impact of pricing policy includes a declining intensity of oil use per unit of value added from 830 to 498 BOE/million pesos from 1979 to 1983 (coal use increased but at a much lesser levels).

A major trend of the present government is the privatization of the energy sector to both local and foreign interests. Investment requirements in the power sector are estimated over $1.0 billion over the next five years, and are beyond the

capacity of the National Power Corporation (NPC) to finance. As a result, in recent years the electric power system has suffered from frequent power cuts. No limits are to be applied to foreign investment in power generation, including geothermal development, while certain limits have been mandated for the petroleum supply sector.

Table I.2

Historic Energy Mix and Growth Rates
(In Million Barrels of Fuel Oil Equivalent)

Year	1980	1981	1982	1983	1984	1985
Indigenous Energy	27.4	26.3	30.2	34.0	39.4	41.7
Conventional	13.9	13.4	16.9	19.4	24.4	24.9
Oil	3.5	1.4	3.0	4.7	3.5	2.7
Coal	1.0	0.9	1.1	2.6	4.1	4.4
Hydro	5.9	6.4	6.7	5.1	9.0	9.4
Geothermal	3.5	4.8	6.3	7.0	7.8	8.4
Non-conventional	13.5	12.9	13.2	14.6	15.0	16.8
Bagasse	5.9	6.2	7.4	5.5	6.6	4.6
Agriwaste	7.6	6.3	5.8	9.1	8.2	12.0
Other	- - -	Negligible	- - -		0.2	0.2
Imported Energy	69.5	67.2	65.4	64.5	54.3	50.7
Oil	69.5	67.2	65.4	63.5	52.7	46.8
Coal				0.9	1.6	3.9
Total Energy *	96.9	93.5	95.6	98.5	93.7	92.4
Growth Rate	-0.5	-3.5	2.2	3.0	-4.9	-1.4

Source: Office of Energy Affairs.

* Some totals may not add due to rounding.

Energy sector management and regulation. The Ministry of Energy was created in 1977 and consolidated previously dispersed functions into one agency. While the Ministry has recently been reorganized into the Office of Energy Affairs, the same basic national goals and objectives remain although uncertainty exists as to their ultimate institutional setting.

Currently, long-term energy planning and preparation of ten-year energy sector targets is done in the Office of Energy Affairs (OEA). Indigenous resource development programs are implemented through the OEA--Bureau of Energy Development (BED). The regulation of importation, refining, marketing and distribution of crude and petroleum products, as well as efficient use of energy were assigned to the Bureau of Energy Utilization (BEU). However, the regulatory functions of the BEU were recently removed to a new Energy Regulatory Board (ERB) under the Office of the President, with the remaining parts of BEU remaining with the OEA. The ERB has related responsibilities for price setting for Meralco but not for the National Power Company (NPC) and the National Electrification Authority (NEA). The ERB has also been made responsible for coordinating activities of the National Power Corporation (NPC), Philippine National Oil Corporation (PNOC), National Coal Authority (NCA) and National Alcohol Commission (NAC). An earlier directive shifting non-regulatory functions in the Ministry of Energy to an expanded Ministry of Energy, Environment and Natural Resources, has been dropped.

Another major institutional change relevant to this project has been the return over the past year of management and senior technical staff from the Conservation Division of BEU back to their original organization, PNOC. Various proposals are under consideration to address both management and staffing issues of the Conservation Division, with reorganization and partial privatization being one option to ameliorate various staffing constraints and facilitate fee assessment for services, among other issues.

Legal Aspects of Energy Management. The Philippines has an extensive history of legislation on energy. These have been codified in various acts dating from about 1976 and include:

1976	-	Coal Development Act
1977	-	Incentives for non-conventional energy projects
1978	-	Petroleum products regulation
1979	-	Tax on power consumption for conservation purposes

1980 - Energy conservation policy, standards, fuel allocation, alcohol regulations, refinery regulation, energy use reporting and energy management

1981 - Energy investment incentives for certain energy conservation and fuel substitution investments

Direct government intervention has been used where energy price incentives were felt to be insufficient. For example, the government mandated 10 per cent reductions in government use of energy in 1975, and again in 1979 and 1980. Additionally, certain non-essential private uses of energy were prohibited, and other uses were prescribed and imports of larger private cars were regulated.

Foreign Assisted Projects

A substantial number of donor assisted projects are already underway or are being initiated by the Bureau of Energy Utilization's Conservation Division. These include the following:

- Technology Transfer for Energy Management. This USAID assisted project is designed to promote and demonstrate innovative energy conservation approaches and technologies. Donor funds to be provided are approximately US$5.0 million, of which about US$2.7 million is to be for loans, with the remainder devoted to technical assistance. Several staff have been hired from outside the BEU for the project, with the BEU retaining overall responsibility for project direction and monitoring.

- ASEAN-Australia Non-Conventional Energy Development Project. This project is intended to assist the Government in a number of areas, of which conservation is only one. The conservation related component consists of (a) research on vehicle efficiency and traffic management, (b) research on application of "Second Law Analysis" for energy conservation to the refinery sector, and (c) building energy modeling to study the application of Australian designed computer software to building design and energy management. Total funding for all components is A$231,000.

- ASEAN US Project on Energy Conservation in Buildings. The purpose of this project is to support the Philippine Government in evaluating, developing and implementing programs and policies to increase energy efficiency in buildings. Outputs are intended to be building energy use standards, and also adaptation of the US DOE-2 computer program to Philippine conditions. Funding is US$600,000 primarily for technical assistance.

- Rational Use of Energy. This German Government assisted project is to help develop energy strategies for industrial and commercial enterprises, assist in building institutional capability of the Conservation Division and private groups in conservation, and to provide direct technical assistance through application of an energy bus program, among other related work. Funding assistance is DM 2.0 million for two years.

- TAC SAL II Project. This project is a technical assistance component of the World Bank Structural Adjustment loan to the Philippines. The project is intended to develop a better knowledge of energy intensive industrial sector activities, and develop a national implementation program for energy conservation in selected sectors. Support for the project consists of a loan of about US$650,000.

There are several significant issues with the TAC SAL II Project which are noted by the Evaluation Team. It appears that this project has not been adapted to the changed situation after the original design which pre-dates the UNDP/UNIDO project. Specific issues include inadequately integrating the project activities into the work of the Division and placing additional responsibility for administration on the Conservation Division staff but no substantive technical role. The project approach is to contract with local firms to provide both expert energy management services and overall coordination. Since over 5 years has been devoted to generating this capability in Government and this capability is limited outside, it appears inappropriate both institutionally and technically to initiate such a segregated effort. It is also this type of intensive large energy-user experience which the staff needs to continue their professional development. As no contracts have been signed as yet, it should be possible to modify the project if the Government concurs with these comments.

c. Project Design

The project design was relatively clear as concerns the objectives given in the project document. However, the project outputs, activities and inputs were less well-defined. Outputs were rather unspecific and confused the institution building and direct support functions to industry. At the time of a proposed revision, which was later not implemented, it would have been possible for project outputs, activities and inputs to be made more specific, with benefit to later implementation of the project. Unfortunately no revision was made.

The outputs as specified do not make clear what and for whom the Testing and Standards Laboratory will test, and what the further computerization "for assisting the activities of EMCS and

for establishing a national energy data base" should entail. It is difficult, in general, to relate activities and inputs specifically to the outputs. This lack of clear and consistent design has created problems as will be discussed in the next chapter.

The evaluation team also identified other weaknesses in project design that led to problems in implementation and contributed to current difficulties for the Conservation Division:

1. Institutional Structure. Project assumed that creation of an EMCS within Government was institutionally feasible and appropriate. Subsequent experience has shown that one of the initial and continuing problems of the project was how to establish and operate such a highly qualified technical unit within Government. Specifically, problems included potential attrition of trained staff to higher salaries and private sector posts, the difficulty of a Government entity to interact and providing services to the private sector, problems of service fee implementation and disposition of revenues generated, and potential competition or conflict with similar private engineering organizations. Retention of this function in Government is feasible, but these concerns need to be addressed.

2. Policy Environment. The project was to operate within, and to a limited extent assist in, the development of energy policy by assisting in laws and regulatory review and development. The project plan, however, paid little attention to efforts to stimulate the implementation of energy conservation measures directly.

3. Laboratory and Test Activity. The project provided a large amount of funds for laboratory equipment. Of the total of $622,512, the majority was spent for laboratory equipment, while a small amount was for audit instruments. The laboratory is intended for testing the efficiency of energy utilization in engines, machinery, equipment, and appliances and other devices. Little attention was devoted, however, to the definition of the program for using the laboratory, specifying who it would serve, and under what terms and conditions. Such definition and an initial cost-benefit analysis would have greatly assisted to determine the laboratory priorities.

4. Planning and Analysis. Project support provided was heavily, almost exclusively, technical or engineering in orientation. As noted elsewhere, the quality of this input over the project life was very high. Achieving conservation goals, however, also requires extensive effort in planning and analysis and economic analysis. These latter functions were not adequately defined nor funded in the first phase of the project.

CHAPTER II: PROJECT IMPLEMENTATION

A. Delivery of Inputs

UNDP/UNIDO Inputs

The budget of the project evolved as follows:

SUMMARY OF BUDGET CHANGES

PHI/82/002 Industrial Energy Management Consultancy and Training

Dsk0112-1bd

		BUDGET "A"		BUDGET "N"		DIFFERENCE	
		m/m	$	m/m	$	m/m	$
10	PROJECT PERSONNEL						
11	Int'l. Professionals						
11-01	Chief Tech. Adviser	30.0	219,750	48.2	315,473	18.2	95,723
11-02	Ind. Energy Audit	12.0	88,500	12.0	75,854	0.0	(12,646)
11-03	Thermal & Chemical Energy Proc.	12.0	88,500	Cancelled		(12.0)	(88,500)
11-04	Electr. & Mech. Energy Processing	12.0	88,500	12.0	78,772	0.0	(9,728)
11-05	Fuel & Appl. Testing Consultant	12.0	91,800	3.0	19,350	(9.0)	(72,450)
11-50	Short-Term Consultants	6.0	45,900	8.0	71,833	2.0	25,933
11-99	Sub-Total	84.0	622,950	83.2	561,282	(0.8)	(61,668)
13-00	Support Personnel		41,300		97,255		45,955
15-00	Experts Travel		11,000		12,548		1,548
16-00	Other Personnel Costs		6,000		29,280		23,280
19-00	Component Total		581,250		690,365		9,115
21-00	Subcontract for UN/DTCD Studies		200,000		74,906		(125,094)
29-00	Component Total		200,000		74 906		(125,094)
31-00	Fellowships		60,000		101,293		41,293
32-00	Group Training		60,000		124,237		64,237
38-00	Savings				(9,922)		(9,922)
39-00	Component Total		120,000		215,608		95,608
41-00	Expendable Equipment		580,500		622,512		62,012
49-00	Component Total		580,500		822,512		62,012
59-00	Miscellaneous Component Total		18,000		32,216		14,216
99-00	PROJECT TOTAL		1,579,750		1,635,807		55,857

There were important changes in the allocation of resources as can be seen from the above budgets. The main changes and the reasons for these are summarized here:

The Chief Technical Advisor (budget line 11-01) was extended twice for a total of 18 months beyond the initially planned 30 months. Reasons given at the Tripartite Review where these decisions were taken were mainly that the general delay in implementation required an extension of the CTA.

The Thermal and Chemical Energy Processes Expert (11-03) was dropped at the first TPR in May 1984 as he "was no longer necessary." No further explanation exists in the file. It is argued that the post was designed to be mainly active in detailed audits and was eventually too specialized for the needs of EMCS. The first duty of this expert listed in the project document, however, concerned development of laboratory and test procedures for fuel testing. These functions are today still required. The dropping of this post, therefore, appears unwarranted.

The Fuel and Appliance Testing Consultant (11-05) post was shortened from 12 to 6, then to 3 months. It was explained that this is partly due to the "fuel" portion of the work being dropped. It is not clear, however, why the remaining post for appliances was, thereafter, further shortened to 3 months. This level of input is considered insufficient given the present status and situation in this area. (see next chapter).

Short-Term Consultants (11-50) were increased by 2 months, or about 30%. Overall, however, the professional staff input component was decreased by about 10 percent.

The UN/DTCD Subcontract (budget line 21-00) for $200,000, was included on specific suggestions of a DTCD adviser to cover the study and development of standards of energy utilization in buildings and air conditioning systems, and the construction of a computer model to evaluate energy efficiency. This was later dropped as DTCD considered they were not competent in this subject. Other bilateral projects later took over this element. Part of the funds released were subsequently used for subcontracts with the National Engineering Center. Initially, two subcontracts were awarded to produce a total of four manuals on energy conservation topics. A third subcontract, signed in May 1987, is covering the development and operation of a computerized energy data base for the HP 1000, and bringing into operation the fuel and appliance laboratory testing facilities and providing training on operation of electronic and calibration instruments.

The Training Component (budget lines 31, 32) increased from $120,000 to $215,508. The originally planned 24 m/m was considerably exceeded; approximately 45 m/m of fellow ships and study tours were implemented. The training component was well-utilized with relevant subjects, and many of the staff participated in 2-3 month fellowships and study-tours.

The Equipment Component (budget line 41) increased from $560,500 to $622,512. In general terms this is in line with the project design, although more than planned was spent on the computer hardware. (see Chapter III for review.)

The increase in the "Miscellaneous" component is due to the increased duration of the project.

Overall, the budget increased from $1,579,750 to $1,635,607, an increase of less than 4%. This means that the various project changes were financed largely from the allocations between budget components.

Government Inputs - The project document specified the following inputs:

- a Project Director
- 15 national counterparts and technical personnel support personnel
- offices at BEU for EMCS
- classrooms for training and library
- a fuel and appliance testing laboratory building
- operating expenses, travel and communications

As the project basically adopted an existing operation of the Conservation Division of BEU, the national staff was almost immediately available. Actually the full staff of the conservation division are considered to be the national counterparts. Already in 1983/1984 the project director and 16 staff members were available, as well as support staff. Also, offices at BEU and training and library space were available.

The building for the testing and standards laboratory, in contrast, had to be constructed. This eventually caused some delay, with the building partly available in early 1985. An extension of the building that will house the standards laboratory is being completed. There are numerous problems with the quality and suitability of the building (see Chapter III).

The only other relatively minor shortcoming in Government inputs is the operating expenses. For example, insufficient funds were cited as available to finance audit activities outside Metro Manila.

B. Implementation of Activities

Project activities are discussed below by Section.

Engineering and Consultancy Section

The CTA, upon his arrival, focused major attention on the carrying out of preliminary energy audits. In most cases, these involved about three or so division engineers under the guidance of the CTA going into a plant and spending one to two days identifying immediate conservation potential. These results were then presented to and discussed with plant management. A report outlining the identified areas of savings was sent several weeks or sometimes several months later. The report was normally drafted by the engineers concerned and reviewed by the CTA and the Head of the Conservation Division. This preliminary audit activity has been carried out continuously during the project. A total of about 200 audits have been completed to date.

In addition to this "on-the-job" training, carried out as regular work, the CTA held many in-house lectures and other training activities. Some of the engineers were also trained using overseas fellowships. (See Annex V for a full listing.)

In addition to the involvement of the CTA, a one-year post for an Industrial Energy Audit expert (11-02 Cunningham) and a short-term consultant with the same title (11-57 Robinson) were provided to support the audit work. Experts were involved in actual audit work and internal training activities, as well as external seminar activities.

The Fuels and Appliance Testing Laboratory.

Activities related to the laboratory were seriously delayed. The main problem was the selection of the expert(s). The two experts in thermal and chemical energy processes (11-03) and electrical and mechanical processes (11-04) that were to assist with the development of laboratory and test procedures (an important first step before equipment can be ordered) were either canceled (11-03) or did not perform this function (11-04). The Fuel and Appliance Testing Consultant (11-05) was seriously delayed (arriving only in April 1987), and his assignment was abbreviated to include only appliances. A short-term consultant for the "appliance testing laboratory" selected by the national Project Director was available only after long delays in the summer of 1986 for two weeks. Another post with the same title (11-51) was filled for 2 months in early 1986.

Equipment was selected and ordered by the national Project Director and the CTA. The CTA was not involved in specifying or supervising the building construction for the laboratory facilities. Various problems with the building are described in Chapter III.

Due to the above described situation, the project had insufficient laboratory resources operational to train national staff, and develop testing and operating procedures, etc. Until the arrival of the fuel and appliance testing expert this year, only one short-term expert made a start with these key activities. It is apparent that necessary activities were only partially implemented. Completion of these activities is now expected by the end of the year under the recently signed subcontract with NEC.

During the life of the project the laboratory has performed a limited number of useful activities, both in fuel as well as in appliance testing. These will be discussed further in Chapter III.

The Education and Training Section

Primary project activities in this area were fellowships and study tours for the national staff. In addition, the CTA and other experts have participated in numerous public seminars and workshops. Many public workshops were undertaken in cooperation with the NEC and Energy Management Association of the Philippines (ENMAP). Technical manuals were also produced (under subcontract with NEC) and a large number of books and periodical subscriptions were provided by the project. The education and training section has been active in publishing and distributing a number of brochures, as well as their own periodical which includes abstracts on selected publications in the energy area.

The Planning and Evaluation Section

The project's activities in this area were limited. No short-term experts were provided and only limited training activity occurred. Two fellowships on energy systems planning and modeling were implemented. The section collects energy use data, computes energy use indices,and has a limited feedback system to industry regarding reports. However, apart from regular reports and the annual awards for energy conserving companies, current use of data appears very limited. The HP1000 computer procured by the project is not yet fully operational and software is yet to be developed under a project subcontract. Neither the Chief Technical Advisor nor any other experts have been deeply involved in the development and operation of this section.

Implementation Difficulties. The main implementation problem encountered with the project was the recruitment of experts other than the CTA and post 11-04. Although for most of these posts numerous candidates were submitted, most did not receive the endorsement of the national project authorities. For several posts the project authorities themselves had identified the experts they wanted. However, when contacted these proved not available. In spite of this, the project authorities did not select other experts until 1985. After a special UNIDO mission delivered a large number of additional CV's and discussed problems, these were basically resolved. The Evaluation Team review indicates that several of the proposed experts were fully qualified.

A second problem area, although less serious, was the identification and procurement of equipment. With the initial batches of equipment, there were some problems with local suitability and some equipment ordered was later determined to be inappropriate (amounts involved about $13,000). Procurement problems were corrected later, with equipment cleared for local suitability by the project before procurement by UNIDO.

Another problem with the equipment component concerned the computer required for the data base and related work. The project management specified that an HP1000 be purchased. The UNIDO backstopping officer attempted at various occasions to convince the project to order a different computer at lower cost, which would also be appropriate as the data processing requirements consisted (and consist) mainly of data base management and statistical analysis. In spite of this, the project management insisted on the HP1000, partly because sophisticated scientific analysis was said to be required, although no such analysis actually have taken place nor is contemplated in the near-term. (see further discussion in Chapter III).

After limited initial delay, the large training component was implemented smoothly.

The Tripartite Monitoring System

Apart from the problems outlined above, no other significant problems were encountered with the backstopping of the project. The mission does consider, however, that the tripartite monitoring and review system did not adequately deal with a number of issues including:

- The required revision of the project design, proposed by UNIDO and agreed to in the 1984 Tripartite Review, never materialized.

- An early evaluation was discussed and agreed to in principle, but then postponed.

- Disagreements in suitability of experts between UNIDO and BEU were not resolved in a timely fashion.

- The disagreement on the choice of a computer, also between the UNIDO backstopping officer and the project management, were not resolved satisfactorily.

CHAPTER III: PROJECT RESULTS AND ACHIEVEMENT OF OBJECTIVES

A. Outputs

The project has produced both direct support outputs in industrial and commercial energy savings, as well as institution building outputs. Each is discussed here separately for each of the four sections of the Conservation Division, referred to hereafter as Energy Management and Consultancy Services (EMCS).

Consultancy and Project Engineering Section (CPES)

Present status: The section has, at present, a total of 12 staff members, four of which are trainees that will leave after having been trained. One staff member is abroad on a fellowship. At least 5 of the staff members are considered fully trained in energy audits which form their main activity. At present, the section expects to perform about 60 preliminary audits per year, as well as two more in-depth audits. The section is fully equipped with all equipment needed to perform detailed in-plant energy analysis measurements and audit activities. The EMCS was initially expected to be able to perform detailed cost-engineering and feasibility studies, but although these capabilities have in-principle been developed, there was a lack of project emphasis and experience on these subjects. A related recurring problem has been the lack of adequate up-to-date information on the cost of equipment required for energy conservation investments.

Based on results of survey questionnaires, it is clear that there is considerable industry demand for in-depth audit work. This demand has not yet been met. This has been detrimental to both the training and motivation of the staff. Robinson, for example, recommended in 1985 that the staff was ready to take on more detailed energy management work and training. Also noted as a concern was the potential for more experienced staff to leave the conservation division unless salaries could be improved. UNIDO responded with a request that more in-depth analysis be undertaken and that organizational options be studied to provide higher salaries and allow for fees to be charged. These recommendations are still being considered.

A strategy still needs to be developed to stimulate the private sector's role in commercial implementation activities, e.g., selling equipment and services to conserve energy, encouraging the local manufacture of conservation equipment, etc. The project has provided some service to companies trying to identify vendors of specific equipment.

An outstanding library including equipment brochures, etc. is available although not very accessible to the public nor used frequently by external visitors.

Good experience has been reported with commercial buildings and hotels implementing simple measures with large pay-back, e.g., chiller scale removal, air infiltration, etc. Good results have apparently also been achieved by convincing firms of the net economic benefits of conservation, e.g., through technical bulletins and training.

Additional Needs for the Section

Economic Analysis. While the technical quality of audit work is generally very good, the scope, content and presentation of financial and economic results is not yet fully developed. The need for additional work in this area has been recognized by the Acting Officer in charge of the Conservation Division. However, the definition of remedial steps has not yet been made. While a definition of these activities is beyond the scope of this evaluation, certain options are noted below which could be addressed in the second phase of this project or by other means.

The Conservation Division is made up almost entirely of certified engineers. While the staff has been trained in engineering-economics, they lack experience in economic analysis or business experience needed to perform more in-depth financial analyses. This contributes to two related problems, first, the financial analysis presented tends to be circumscribed, and second, the presentation is not sufficiently convincing to management and accounting staff. The scope of analysis also does not include an implementation or constraint identification and resolution component.

Training. The staff have received extensive on-the-job, classroom and in-plant training in preliminary audit work. Fellowships are listed in Annex V. The scope of training relevant to this unit included engineering design and audit studies, cogeneration, and industry and utility conservation; and for management staff study tours in energy management, industry and utility conservation. The staff members, however, have not had extensive in-plant experience before hiring, nor full-time in-industry training. Such experience could have been gained by industrial secondment. This deficiency is partially a function of the inability to hire more experienced staff into Government, partly due to insufficient numbers of staff to assign them for secondment experience, and partly due to pressure to continue to perform large-numbers of preliminary audits and delay more in-depth audit services.

Audit Work Performed during the Project

During the project about 200 audits have been performed (many of commercial buildings), as well as 5 more in-depth audits. In order to give an indication of the results and impact of these activities, information from the 1986 accomplishment report of EMCS is summarized below.

In 1986, the EMCS, with the international experts of the project, performed 43 preliminary audits. These audits identified relatively easily implementable energy saving measures that could save approximately 45 million fuel oil equivalent liters of energy calculated to be worth about US$3.8 million (at an average CIF fuel oil price of US$13.71). The EMCS also carried out a survey of 48 companies that were audited in previous years. This was accomplished through 14 plant visits and 34 mailed questionnaires. It was found that of the total of 228 energy conservation measures proposed, 132 (58%) had been implemented. The 26 companies that reported their estimated annual savings due to the conservation measures carried out indicate an annual savings actually realized of over 22 million pesos (equivalent to over US$1 million).

Fuels and Appliance Testing Laboratory

Present status: The laboratory, currently headed by a Chemical Engineer, is composed of three units, namely: Fuel Testing, Appliance Testing, and Calibration. Each unit is headed by a trained engineer. The laboratory as a whole is manned by a total of thirteen technical personnel--ten engineers, two chemists, and an economic researcher.

Seven out of the thirteen have permanent positions and were trained under the project, while the remaining six are contractual employees. The specialized training and experience acquired by contractuals may be lost unless they be given permanent positions. The team was informed that a proposal that would ensure this is expected to be approved in the next few months. It is further desirable that due to the highly technical nature of the work, all members of the staff be given special consideration in compensation to ensure their staying with the project.

The fuel and appliance testing laboratory is well-equipped in terms of hardware but has so far hardly begun operating. There are ninety-seven (97) pieces of testing and analysis equipment of various types worth US$622,512 which were purchased for the project. Most of this equipment exists also in other laboratories: NPC's in Bataan, U.P.'s in Los Banos, PNOC-ERDC's in Diliman, and testing laboratories of Shell, Caltex, PNOC, and NSTC of NSTA.

Although most of the equipment are identical with those of other laboratories in the Philippines, the equipment for this project will specifically provide service to industrial companies and other interested parties. The laboratories of the above-mentioned other companies and institutions render services primarily to their respective organizations. Of the total equipment twenty units worth more than $21,112.10 were assigned to the Energy Audit Group. Four units worth US$13,177.90, were incorrectly ordered and/or unsuitable for the purpose; and two need additional accessories.

Although basic administrative and laboratory operating procedures have been developed, they have not been fully tested. In the same way, as several pieces of equipment are not yet operational, the staff is not fully trained. Actually only the newly appointed head of the laboratory (transferred from Education and Training) and one other staff member are trained in operation of the more expensive and sophisticated pieces of test equipment (Perkin Elmer elemental analyzer and Fisher coal analyzer).

The fuels and appliance testing laboratory building, from actual visual inspections made at the premises of the building and information gathered from UNIDO working consultants under the project and laboratory personnel, apparently is nearly complete. However, the building has no fire fighting facilities such as fire extinguishers or fire escapes. There are no first aid kits available nor shower rooms needed in case of emergencies in the laboratory. In addition, tanks of inflammable gas were observed to be inside the laboratory. The electrical installation also does not comply with the Philippine Electrical Code (PEC). The building is also notably energy inefficient.

At present, the appliance testing laboratory has only a calorimeter room for air conditioner testing. Although this facility needs maintenance, it is basically operational. It has already tested and certified a number of air-conditioners (17 models). This section has also tested five different "gadgets" that were claimed by local vendors to save energy. The negative test results on these led to the issuance by the Ministry of Trade and Industry of "cease and desist" orders. In addition, oil samples were analyzed for three companies in 1983.

Due to the high level of expenditure for testing and standards equipment and comprehensive and largely appropriate equipment selection, a major laboratory resource is potentially available. However, there is a need for further definition of program goals, objectives, users, and operational plans for the Testing and Standards Laboratory. A good start has recently been made in this area by laboratory staff. An advisory group is recommended to assist in defining and monitoring this program.

In addition, as correctly delineated in consultant Jackson's report, the GOP must make numerous improvements in the existing laboratory structure and facilities to bring it up to an appropriate standard. In retrospect, the repeated delays in retaining short-term expert support has been very serious in delaying operation of the laboratory for approximately two years. Furthermore, the procurement of large quantities of equipment without planned phasing-in meant that a gradual build-up of staff capability was not feasible, and management of a very large equipment resource was required before staff were trained.

Planning and Evaluation

Energy Consumption and Utilization Reporting and Analysis. Under Philippine law, "Batas Pambansa 73," all industrial, commercial and transport establishments annually consuming or using more than one million fuel equivalent liters of energy are required to submit quarterly energy reports on production and sales to the Bureau of Energy Utilization. In addition, all similar firms consuming or using over 2 million liters equivalent per year, are required to employ an energy manager who will prepare an energy management plan, submit data and energy management reports, and coordinate training. The Planning and Analysis Division of the Conservation Division is responsible for data reports definition, solicitation, review and analysis, and report preparation.

Both the law and the scope of data activities for industrial conservation are exemplary and more extensive than those of most countries. Various suggestions and recommendations are offered to enhance and expand this activity, recognizing that more in-depth review is still required.

Reporting-quality. Data currently received from reporting firms require more extensive verification in order to ensure reliability. Field verification either by sampling or by visits to all firms would be appropriate. In other countries it is common for Government statistical agencies to maintain enumerators for site visits and surveys. Assuming this facility exists in the Philippines, this may offer an inexpensive means to verify non-technical data and increase compliance. While the usefulness of energy consumption/production indices is not questioned, it is unlikely that the index computed by survey is appropriate for standard setting nor given problems of multiple products, diversity of process, etc., for overall sectoral industry analyses. On the other hand, assuming validation is possible, the index may be very useful for monitoring and advising individual reporting companies by historical comparison with their own data. A better basis for actual standards setting and analysis of energy efficiency would be the results of actual audits. These audit data should be more fully incorporated into the planning and evaluation activity for this purpose.

Contents. Data collected is generally appropriate. However, it would be advisable to add the firms' respective capacity utilization level to the required information and consider other minor additions. In addition, it would be of great value if major electrical sales data such as that of Meralco were classified by specific industry sector codes, e.g., textiles, refining, etc. It is strongly recommended that BEU request that this customer sales information be coded by Meralco to differentiate according to industrial classification.

Compliance. The quality of the data base is a function of validation, as noted above, but equally important is compliance. While 300 companies reported using over 50% of industrial energy in 1985, this had fallen to 138 firms in 1986, accounting for about 25% of energy use. Following the general rule-of-thumb that a relatively small number of large firms normally consume the majority of energy, data reporting is deficient. In order to help address this problem, BEU should both publicize the benefits to companies from reporting and develop a compliance activity to better enforce the legal requirement, and emphasize large firms or organizations in this activity. As noted above, it may be possible to do this without significant cost through oordination with other government statistical activities.

Analysis Hardware. The choice of an HP1000 mini-computer for the Conservation Division appears questionable in retrospect. While this issue was raised by UNIDO as far back as May 1984, the BEU persisted in their request for this equipment. There followed various problems with the specification, local serviceability and the BEU budget allocation for this computer. Even as of June 1987 this computer is still not fully operational.

Several significant issues remain. First, the ability of BEU to continue to afford the cost of service and obtain both parts and support at reasonable cost locally; second, software costs for the system are very high in comparison with (for example) with the more common MS-DOS IBM computers, thereby constraining utilization; third, software written for this machine will not be compatible with the more common and widespread MS-DOS machines; and fourth, specialized training will be required for the application of the HP1000 distinct from the other (primarily) IBM compatible computer systems already operational in the BEU. Consideration of whether or not this computer would be better transferred to another agency, or disposed of and replaced, is warranted.

Regardless of the hardware configuration utilized by BEU for planning and analysis, the scope of data and analysis is still of greatest importance. At the present time even with the recently approved NEC contract to support computerized application of data

to analysis, there is inadequate definition of the type of analysis to be performed and the questions to be addressed. Under Batas Pambansa 73, rather extensive reporting requirements are provided for, and energy utilization standards are contemplated. These need to be translated into feasible goals, with analysis designed to monitor and measure achievement of these quantitative goals, and address policy questions which should begin to be posed.

Given the current data base and objectives, there appears to be little additional value in the computer support to be provided by the NEC contract. It is unclear what additional data base and analysis activities are planned that cannot easily be provided by available software and simple programming which the BEU staff should be able to perform. It would be advisable that the scope of analysis be further defined and questions to be addressed be made more explicit before NEC attempts to prepare additional software. This will avoid the contract resulting only in a mere transferring of data from one computer to another and introducing a somewhat more refined data base manipulation software, while substantially more important questions remain unaddressed.

Assistance in the defining scope of analysis may be available through the TTEM project and partly through the NEC contract. Areas of further possible utilization include (1) development of a conservation equipment and related cost and local availability data base. This activity has been initiated but appears to require greater definition in terms of data.* And 2, data for monitoring voluntary industrial sector energy utilization goals, among other areas.

A second area noted elsewhere is the deficiency in current financial analysis. Given the analytical aspect of the Planning and Analysis unit responsibility, it would be appropriate for the unit to be given the responsibility for financial and general economic analysis supports for the CPES. This would ensure full employment of economists hired, and allow both better data analysis and support audit related financial analyses. Further study of this area is required however.

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* For example, a cost estimation system allowing input of parameters such as flow rate, temperature, and process description, would allow vendors quotes and better costing service for the EMCS.

Education and Training Section

Education and information dissemination is oriented toward providing training and public information of a general promotional nature and technical information. The training component of the activity has sponsored a substantial number ofenergy management short-courses for private companies and government bodies, as well as those in engineering schools. In addition, the section produces the "Energy Conservation Booklet" series, and has produced two editions of an "Energy Conservation Journal." This unit also maintains the Bureau's library.

For example, in 1986 the Education and Training Section reported 12 courses were held on Energy Management, with over 400 participants, and 600 copies of the Energy Conservation Journal were distributed.

Cooperation with other Organizations. Assistance in the implementation of energy efficiency measures was provided through public relations and information and training activities discussed below. In addition, the EMCS was instrumental in setting-up and providing technical support and encouragement to the Energy Management Association of the Philippines (ENMAP). ENMAP is a private professional organization of primarily industrial energy managers with the goal of institutionalizing energy efficiency practices, assisting in government-private sector interaction, and assisting in training and dissemination of conservation information to members. ENMAP has no professional technical staff or capability to perform engineering services in and of itself, but has creatively involved members in training and is soliciting support to become more of a technical service organization.

In addition, the National Engineering Center (NEC) of the University of the Philippines has been an important input in the energy management training area supportive of energy audit and project engineering work. The NEC has also been funded by the project to prepare technical publications on energy conservation.

B. Achievement of the Immediate Objective

The project has had substantial success in terms of establishing and operating the EMCS responsible for conducting energy audits, developing consulting methods and preparing recommendations as energy conservation measures. While the capability and approach to preliminary audits is fully established and effective, certain other functions are only partly established and operational. A core technical staff has been created that are able to perform key functions and are actually performing them. However, some of the functions

mentioned in the project document are not fully established and others such as assessment of Government energy policies is not clear.

While a laboratory has been constructed and equipped, and some of the work is carried out, no complete operating and test procedures are available. The fourth sub-objective, develop standards for efficiency of energy utilization was never clearly defined.

It is clear that the Conservation Division has established very good relations with industry, as well as other energy users such as large commercial building operators. Clients do have confidence in the abilities of the division as witnessed by the high number of requests for in-depth audits following initial audits. The division has also established good links with various other organizations involved in energy conservation.

In summary, the institution building objective has fully been achieved for only a part of the planned EMCS. The project has however achieved the unstated direct support objective of saving energy in industry and other sectors. As a result of audits done and recommendations made by the EMCS the project has achieved savings of well over P 22 million (US $1 million). However, the Evaluation Team believes that this figure could have been higher if more directed and detailed audits and follow-up had been performed under the project. There also remains a problem with definition of energy management services other than audits, and a lack of adequate follow-up and implementation activities.

C. Contribution to the Achievement of the Development Objective

It is clear that the project has significantly contributed to the government objective of "increasing the efficiency of energy usage through conservation and management measures." Already the Conservation Division of the BEU and the project have achieved savings in energy use of over a million dollars. With continued operation of the Conservation Division's work and expansion into in-depth audit work, potential savings in energy that are much larger than the ones achieved so far are within reach provided the right environment exists for industry to implement the required investment in energy saving equipment and process modifications.

CHAPTER IV: CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

The Philippines has an impressive energy policy with a number of related measures and laws. The organizational infrastructure for the energy sector however, is not clear as reorganization decisions have not yet been finalized. It is important to clarify this situation as early as possible.

The Conservation Division/UNDP-UNIDO EMCS project has achieved impressive results in terms of reducing energy consumption in industry through audits and technical advice, training of industry staff and general energy management awareness activities. The actual annual savings reported by only a part of the industry assisted runs to over 22 million pesos (one million US dollars).

Important results have also been achieved by creating a permanent national capability to provide energy conservation related support to industry and other sectors. However, several related issues require resolution. These include definition of the type of organization, staffing levels and classification, sources and amounts of funding, definition of activities and relation to the private sector. Recently, the higher management and senior technical staff has transferred back to PNOC from where they were originally seconded, creating an initial management gap and uncertainty of tenure for remaining staff.

Interest and demand for the services of the conservation division from industry and other sectors is considerable, both for preliminary and in-depth audits, as well as for training and information. It is considered that the division could and should charge fees for these services. Such income should optimally not revert to the treasury however, but be used to enhance conservation activities.

The engineering and consultancy section has achieved a high degree of technical competence in performing preliminary audits and recommending intermediate operational energy saving measures. It is considered to have the capability to perform in-depth audits but the project has provided insufficient practical application and experience in this area. The present reporting also lacks a convincing financial presentation of potential savings and related investments required to convince management of assisted firms. The section at present does not systematically follow-up on audits performed and recommendations made, and reports are not submitted in a timely enough fashion. It is likely that greater follow would increase implementation of recommended measures by the audited firms.

The fuels and appliance testing section is only partly operational, some equipment is not yet in operation, operational and testing procedures are not completely developed, and staff is not yet fully trained. A major problem in this area has been lack of a plan to market the services of the laboratory, and identification of clients. Management of the laboratory is working hard to alleviate these gaps and appears highly motivated. A large investment has been made in the laboratory equipment that will also entail considerable annual expenditures. Charging fees for testing and analysis could alleviate this burden.

The training and education section is operational with qualified and experienced staff. An annual programme of seminars and other training activities is organized and coordinated with other organizations, and a regular magazine and informative brochures are being published and distributed. Four good manuals on energy conservation are available.

An excellent and extensive library with energy conservation books and periodicals exists, but this should be better catalogued and publicized.

The planning and evaluation section is mainly involved in collecting and monitoring energy consumption data from the largest energy users in the country and preparing reports based on these. The scope and system of data collection and financial/economic analysis should be further reviewed and expanded, as well as better integrated with the audit activity. Data base work should be further expanded (work is now underway) to include cost and availability of conservation equipment in the country. The choice of computer hardware (HP1000) for the work of this unit is questionable, and further applications of this computer presents higher costs and technical problems that other systems would not have presented.

B. Recommendations

It is recommended:

1. That a comprehensive energy conservation function be retained by Government, and that the present Conservation Division/EMCS be constituted into an expanded and enhanced technical and implementation entity with a private sector orientation. This entity should be located either in Government as at present but with fees charged for services and used to augment resources directly, or should be reconstituted as quasi-public entity with interim Government financial support but fee collection intended to eventually cover costs. Care should be taken in the reorganization to maintain staff morale and ensure

staff views on management are given attention. Institutional development is still at a critical stage.

2. That energy audit work in the future be explicitly designed to stimulate conservation implementation via improved post-audit follow-up, performance of more in-depth audits initially, and that selection of firms for audit stress large and energy intensive firms.

3. That greater attention be paid to stimulating private sector entities such as engineering firms and private investor involvement in both conservation engineering and financing of energy efficiency or fuel substitution investments.

4. That future Conservation policy and management ensure that donor support is designed to complement Government goals and objectives.

5. That priority attention be given to defining the role and functions of the Testing and Standards Laboratory, fee structure, accreditation of testing work and correction of deficiencies with the physical structure and equipment. Formation of an advisory group from standards institutions, user groups, and energy suppliers is recommended for this purpose.

6. That the Conservation Division establish an economic analysis group located in the Planning and Analysis Unit to provide overall economics support to the entire division, and expanded capability in energy conservation analysis.

7. That the scope of data base and analysis activities be further defined and data requirements redefined, before software development work under the NEC contract begins.

8. That the management, terms of reference, and scope of the TAC SAL II Project be reexamined in light of progress already achieved in energy audits, and the strong internal capability of the Conservation Division to perform audits.

Recommendations to UNDP/UNIDO

Testing and Standards Laboratory

9. That no additional funds be allocated for procurement until (a) a plan of operation is prepared for the laboratory, (b) NEC terms of reference and staff/consultancy capability determined, and (c) the existing components of the laboratory become operational.

10. That in order to ensure effective use of the NEC contract, funds for short-term expert consultancy be provided by UNDP to define explicit terms of reference and assist in selecting the appropriate local participants for the NEC contract.

11. That data and analysis activities in the NEC contract be refined and revised, and that additional data inputs be determined before NEC undertakes development of additional software. UNDP/UNIDO should support this effort if necessary, ensuring that it coordinate closely with the TTEM and TAC SAL II activities, other OEA data and analysis activities, and the National Census and Statistics Office, among other GOP entities.

12. That the second phase of the project be funded, and that a formulation mission be fielded for this purpose. Resolution of issues with the TAC SAL II project should first be addressed however (8 above).

Recommended components should include: (see Appendix IV for details)

a. Assistance in design and implementation of a revised and expanded Conservation function.

b. Development of a conservation implementation strategy including financing and incentive elements.

c. Stimulation of an expanded capability in manufacturing and engineering conservation services, and integration of these activities into the overall implementation plan.

d. Further development of financial and economic analysis capability.

e. Support for the Testing and Standards Laboratory function.

f. Support for cogeneration and energy management in electricity including load management.

g. That greater priority be given to fuel substitution particularly coal substitution, but also other conventional and non-conventional fuels.

h. That further studies and analysis be supported:

- Transport energy conservation

- Subsector industry studies

- Development of practical standards on energy efficiency for industry and other energy intensive equipment and devices, together with an implementation strategy and program.

TERMS OF REFERENCE

Joint UNDP/UNIDO Evaluation Mission

PHI/82/002 Industrial Energy Management Consultancy and Training

Background

The project was approved in August 1982 at a cost of US$ 1,579,750 and implementation was started with the arrival of the Chief Technical Adviser (CTA) at the Bureau of Energy Utilization (BEU), Manila on 23 May 1983.

Within a few months after the work plan was drawn up, BEU formally constituted the Energy Management and Consultancy Service (EMCS) consisting of four divisions:

a) Consultancy and Project Engineering
b) Planning and Evaluation
c) Training and Education
d) Testing and Standards

To date 28 engineers/staff have been assigned to form the core group of EMCS. The most important aspect of the project is training of the technical personnel of EMCS in Energy Management and Conservation Techniques.

Consultancy and Project Engineering Division

In the Consultancy and Project Engineering Division, 15 engineers are receiving training in energy audits on the shop floor level. Three engineers have also been trained in detailed design and engineering. Eight engineers are engaged in follow-up activities and visited some of the industries where preliminary energy audits were carried out in 1985 to assist in implementation of the recommendations given in the energy audit reports.

Testing and Standards Division

Six engineers from the Testing and Standards Division are currently being trained by the senior BEU staff in fuels and appliance testing procedures. A laboratory has been constructed in which testing of airconditioners for their energy efficiency have been completed. Testing of certain biomass fuels to substitute fuel oil have been carried out in the experiments.

Testing and Education Division

All engineers of EMCS are being assigned to prepare papers for manual preparation. Four engineers are assigned to prepare manuals on energy audit and guidelines for detailed design of conservation projects.

Planning and Evaluation Division

The Planning and Evaluation Division has obtained HP-1000 computer so that the monitoring of energy consumption of several industrial enterprises can be computerized. Three engineers are assigned to computerize the data on country's industrial uses and consumption of energy.

The project has encountered serious delays in its implementation because of the failure to engage the two experts for posts 11-02 Energy Audit Specialist and 11-05 Fuels and Appliance Testing Specialist, as planned.

UNIDO evaluated 21 candidates for post 11-05 of which 11 were submitted to the Government. All of them were rejected, although in UNIDO's views the experience/background of these candidates were in line with the terms of reference. BEU indicated that candidates from institutes like ETL (U.S.A.) and IIRS (Ireland) would be suitable for this post. Unfortunately UNIDO has not been able to submit candidates from these institutions.

Because of the failure to engage these experts it was decided during the last TPR held in April 1986 to shorten the duration of posts 11-02 and 11-05 from 12 to 6 m/m each in the hope that identification of candidates would be easier. Justification for the shortening is as follows:

Post 11-02 Energy Audit Specialist

Since the start of the project, the CTA has conducted many preliminary audits. Therefore, part of the terms of reference of this post has already been implemented. At the last TPR it was decided to extend the CTA until June 1987, partly to enable him to complete the remaining 50% of the T.O.R. Post 11-02 was therefore shortened to 6 m/m. After this decision was taken, UNIDO was able to identify an acceptable candidate for this post; however, the expert was only available for a period of not less than one year. NEDA agreed to revise the duration of this post with additional funding mainly because of the following:

1. This was the first candidate accepted by the BEU and available;

2. During the additional six months the expert will be able to conduct detailed energy audits and applied research studies in selected industries, and EMCS engineers will be able to receive further in-depth training;

3. BEU has been reluctant to charge the industry for the services of the EMCS because it has felt that the level of expertise of the EMCS engineers was too general and the reputation of the EMCS as an institute has not yet been sufficiently established.
It is now envisaged to start charging the industry for EMCS services through the conduct of detailed energy audits and applied research studies by the international consultant.

Post 11-05 Fuels and Appliance Testing Specialist

For this post, BEU would like to have a consultant with relevant experience in appliance testing. According to the BEU all submitted candidates had no experience in this field. Since it has not been possible for UNIDO to interest suitable candidates for this post BEU requested to shorten the duration to 3 m/m and have part of the activities subcontracted to the U.P./National Engineering Center.

The in-depth evaluation mission is now requested to assess whether: (a) the main thrusts of this project, training of the EMCS engineers, energy auditing and fuels and appliance testing, are to be continued; (b) the envisaged second phase of the project should emphasize other areas of energy management; and, (c) the organization of the project should be modified.

Purpose of the Evaluation

The primary purpose of the evaluation of the project will be:

A. To review the project design, giving emphasis to the relevance and effectiveness of the activities undertaken in strengthening the capabilities of EMCS in performing its role in the conduct of energy audits, in the development of appropriate consulting methods and in the initiation of recommendations on energy conservation measures;

B. To assess the progress of implementation in relation to the scheduled activities, outputs and their contribution to the attainment of the immediate objectives;

C. To evaluate the work of the long-term and short-term consultants vis-a-vis their terms of reference and the expected outputs;

D. To examine the extent to which outputs produced by project contributed to the building of BEU/EMCS capabilities to perform required tasks in terms of staff qualifications and experience, methodologies, equipment, etc. and the extent to which EMCS will be able to continue the work after completion of the project;

E. To assess the extent to which EMCS has built up contact with industry and value of BEU services for industry;

F. To assess the extent to which EMCS has built up contacts and is cooperating with other organizations in the country with interest in energy saving, and to review the mandate of EMCS in this context;

G. To prepare detailed suggestions for a next phase of the project if applicable.

Composition of the Mission

The mission will consist of a UNDP Consultant/Team Leader, a UNIDO Consultant/Member and a representative of the Government (names and functional titles will be added as soon as received).

Timetable and Itinerary of the Evaluation

The mission members will assemble in Manila, Philippines. The Team Leader will be briefed at UNIDO Headquarters before departure to the Philippines. The mission will stay for approximately 15 working days in the Philippines. The UNDP Consultant/Team Leader will debrief in UNDP Headquarters, New York.

Consultations in the Field

The Mission will maintain close liaison with the UNDP Resident Representative in the Philippines, the concerned agencies of the Government, any member of the international team of experts, the counterpart staff assigned to the project as well as UNIDO's field staff in the country.

Although the Mission should feel free to discuss with the authorities concerned anything relevant to its assignment, it is not authorized to make any commitments on behalf of UNDP or UNIDO.

Reporting

The UNDP Consultant/Team Leader will be responsible for writing, editing and producing the report with the assistance of the other mission members. The report will be prepared in draft in the field along the lines indicated in the attached outline. It will be presented to the Government in draft so that there is an opportunity to discuss it and submitted in final form to UNDP and to the Executing Agency. The UNDP will be responsible for formal submission of the report to the Government and for reporting on the results of the evaluation to the Governing Council of UNDP.

ANNEX II

PERSONS CONSULTED DURING THE EVALUATION

Government

Mr. Vicente D. Salazar, Jr.	Acting Director External Assistance Staff National Economic and Development Authority (NEDA)
Mr. Antonio V. del Rosario	Officer-in-Charge, Office of Energy Affairs
Mr. Eric Lopez	External Assistance Staff, NEDA

Bureau of Energy Utilization

Mr. Jesus Asuncion	Acting Director, EMCS
Mr. Benjamin P. Lim	Former Chief Conservation Division, BEU and National Project Coordinator
Ms. Mirna R. Campanano	Head, Testing and Standards Section
Ms. Ricaflor Salonga	Training Specialist, Acting Head, Training and Education Section
Ms. Connie Baduria	Chemical Engineer, responsible for data base work
Mr. Wayne Abaya	Acting Head, Consultancy and Engineering Section

UNDP/UNIDO Manila

Mr. Turhan K. Mangun	Resident Representative, UNDP
Ms. Elizabeth Fong	Deputy Resident Representative, UNDP
Mr. Nicholas Brown	Assistant Resident Representative, UNDP
Ms. Meriaty Subroto	Junior Professional Officer, UNIDO
Mr. Erik Bos	Former Junior Professional Officer, UNIDO (1984-1985

ANNEX II

Project International Staff

Mr. P. R. Srinivasan	Chief Technical Advisor (Post 11-01)
Mr. Brian J. Cunningham	Energy Audit Expert (Post 11-02)
Mr. Norval Jackson	Fuels and Appliance Testing Expert (Post 11-05)

Other International Organizations

Mr. Kenneth King	Energy Specialist, Asian Development Bank (AsDB)
Mr. Kari J. Nyman	Project Engineer, AsDB
Mr. Richard S. Stevenson	Energy Officer, USAID-Manila
Mr. Allan Evans	Resident Consultant, TTEM Project, USAID-Manila
Mr. Albrecht Kaupp	Expert GTZ Rational Utilization of Energy Project

Other National Organizations and Industry

Mr. Leopoldo V. Abis	Executive Director, National Engineering Center, UP
Mr. Orlando L. Galang	Vice-President-General Manager Shipping and Transport Corp. PNOC (Former Acting Director, BEU)
Mr. Victorio M. Dimagiba	Former Officer-in-charge, BEU
Mr. Gregorio S. Gonzales, Jr.	President, Energy Management Association of the Philippines
Mr. Estefanio M. Gacad	Metallurgy, Research and Quality Control, Manager, ARMCOR-MARSTEEL Alloy Corp., Chairman, Steel Industry Sectoral Committee, ENMAP
Mr. Tristan H. Calasanz	President, East-West Consolidated Services, Inc. Chairman, Power Generation Committee, ENMAP

ANNEX II

Mr. Abundio Q. de la Cruz	President, Resource Technology Corporation
Mr. Edward C. Chan	Vice-President Operations Integral Chemical Corporation
Mr. Rolando G. Ricasata	Production Manager, Foods Division, CFC Corporation

ANNEX III

SECOND PHASE PROJECT PROPOSALS

Conservation Implementation

The failure of the industrial sector to take advantage of the many cost effective energy conservation and fuel substitution opportunities is the single largest problem facing the BEU-Conservation Division. This inertia is the result of numerous technical, general economic and financial, and institution barriers affecting willingness and ability to undertake investment. Common barriers or disincentives apart from the recent economic downturn in the Philippines appear to be the following:

- Lack of clear and substantial visibility of conservation projects and their benefits,
- Private benefits diverging and being lower than social benefits,
- Competition for funds and attention with other investments,
- Lack of experience and knowledge of conservation projects,
- Foreign exchange component of conservation investments and foreign exchange scarcity, plus risk of exchange rate losses,
- Uncertainty on project performance, and
- Lack of readily available local equipment and instruments for the project.

Programmatic Prerequisites

A number of prerequisites should be present in the future Conservation Division Program, and should be incorporated where required into either UNDP/UNIDO project support and/or condition of support as appropriate. These include:

1. Organizational. A comprehensive energy conservation organization with functions delineated elsewhere in this report is the best way to ensure success. However, this organization must separate service from regulatory and standard setting functions. Separation of regulatory functions as has just occurred into another agency is consistent with this model. Theorganization should facilitate and stimulate rather than duplicate private sector functions, and have strong Government policy and budget support in achieving its mission.

2. Funding. The Government has the ultimate responsibility of not merely accepting donor funding for single-purpose unrelated components, but instead developing a coherent structure for donors to support. Donors within this Government structure must coordinate their support to ensure an appropriate manageable package of assistance. It is critical to give attention to sustainability of project activities first, this means both ability to service and maintain expensive imported equipment, and to continue to fund programmatic activities "created" by donors.

3. Implementation. Development of a strategy for implementation with a mix of components which includes coordinated pricing, regulation, technical assistance and private-sector incentives is essential. Lack of attention to this integrated approach leads to overemphasis on, or exclusion of, certain essential components. Efficiency improvement is not only a technical or engineering problem, and therefore an implementation program must be developed, with other appropriate elements including broadened set of staff skills for the Conservation Division, e.g., in finance and economics, public information, training, data and analysis, and energy policy. At the same time ultimate success requires emphasis on improving the private sector implementation capabilities and stimulating private investment.

Elements of the implementation program. Implementation of energy conservation requires private sector investments, improved private sector operating habits and improving efficiency in equipment being sold. Various general barriers to conservation implementation are noted above. The Government response must be comprehensive and coordinated and include the following elements:

1. Technical response

   - Provide technical information and training
   - Develop energy sector data for planning
   - Ensure availability of energy conservation equipment
   - Develop energy efficiency targets or standards, and assist in upgrading standards
   - Demonstrate innovations and disseminate results

2. Economic response

   - Set energy prices at appropriate incremental costs reflecting the true cost to society
   - Ensure that pricing policy is applied with social and equity considerations in mind
   - Set tariffs and duties to not discourage import of energy conservation equipment

3. Institutional Conditions

- Government commitment to energy conservation
- Set-up appropriate energy institutions in the public and private sectors
- Ensure that adequate foreign exchange is allocated for energy conservation

4. Financial Conditions

- Availability of sufficient capital under attractive terms
- Provision of incentives tailored to the decision criteria of the private sector
- Development of innovative financing, investment and risk sharing schemes

The GOP has done an outstanding job in establishing many of the technical and economic conditions above, which are discussed elsewhere under pricing, technical assistance-audits and training. In addition, more recently the Technology Transfer for Energy Management (TTEM) Project initiated with A.I.D. support, will demonstrate innovation by funding new conservation measures and equipment. Finally, various new institutional improvements are being discussed to assist to better address program funding and staffing requirements for what is now the Conservation Division. Several areas remain to be addressed which are appropriate to the second phase of the UNDP/UNIDO Industrial Energy Management Consultancy and Training Project.

These include:

1. Implementation strategy and innovative financing alternatives. These should include dealing with problems of initial capital requirements for feasibility studies, technical and general economic uncertainty, relief for debt service fears, stimulation of external private investments, stimulation of banking commitments in conservation, among other areas.

2. Creation of a private sector capability in conservation equipment manufacturing and services, and resolution of the conflicts between the role of the semi-public conservation institution and more appropriately private sector activities.

3. Definition of planning and analysis programs and data requirements, and assistance in building staff capability and training.

4. Development of a financial analysis capability in the institution, and assistance in design and creation of an investment and equipment cost data base.

5. Definition of the Testing and Standards regulatory/ standards setting and monitoring role, development of an effective client service program, and development of an appropriate fee structure. This assumes resolution of building and equipment, training, staffing and maintenance issues for the laboratory.

6. Definition of an effective management structure for the Testing and Standards Laboratory including a Board of Directors, independent financial audit function, salaries schedule, staff plan, and summary workplan. Establishment of a statement of duties and responsibilities for a director and general recruitment for director and staff. Establishment of fee structure for non-laboratory services.

7. To assist in development of a more comprehensive energy management program and strategy, including both establishing programmatic strategy for addressing large industrial energy consumers and sectors, and for new sectoral activities such as transport and expanded activities such as energy conservation in buildings.

8. Extension of energy management activities to local offices of BEU in areas of high industrial density e.g. CEBU and DAVAO. This would include both Government hiring of staff and support of additional staff, and UNDP/UNIDO support of additional training, instruments and equipment, and short-term expert support as required for on-the-job training and intensive audit work.

9. In view of critical problems with electricity supply, the second phase give priority to cogeneration and electrical sector energy management. This should include questions raised by the UNIDO consultant on cogeneration regarding buy-back rates, demonstration requirements, integration into utility planning, and staff and industry training.

10. Fuel substitution particularly coal substitution, but also including other conventional and non-conventional fuels.

11. Further studies and analysis where these can be shown to have direct significance in achieving national energy conservation goals and be staff capability to manage given other workload. Potential areas of support may include among others:

a. <u>Transport energy conservation</u>. This should involve consideration of ways and means to improve vehicle condition and operating practices for energy and overall transport efficiency. The following might be included: (1) support to training program for vehicle mechanics possibly involving vehicle certification as

part of a Government program to institute mandatory (or voluntary) annual testing; (2) setting-up an engine and drive train testing station for diagnosis of vehicle condition as a low-cost service to owners; (3) improving the availability and reducing tariffs or taxes on vehicle spares; (4) evaluation of energy efficiency improvements via vehicle maintenance, road maintenance, improving traffic patterns and management, etc; and finally, (5) a comprehensive energy and transport system study to identify short and long-run issues and prospective opportunities to increase transport sector energy efficiency.

b. Support to sub-sectoral industry studies and conservation implementation activities. For example, evaluation of sugar industry conservation and cogeneration of electricity.

c. Development of practical standards on energy efficiency for industry, together with an implementation strategy and program. This might very well be a voluntary program. By identifying the best practices and means of achieving these, the project should be able to use other means than mandatory standards such as education, audits, public information and recommend financial incentives, to assist in achieving these practices.

ANNEX IV

LIST OF INTERNATIONAL EXPERTS/CONSULTANTS

The following assignments were implemented:

Post 11-01	Chief Technical Advisor	- Mr. P.R. Srinivasan	- 48 m/m
11-02	Industrial Energy Audit	- Mr. Cunningham	- 12 m/m
11-04	Electrical & Mechanical Energy Processes	- Mr. R. Rajaram	- 12 m/m
11-05	Fuel and Appliance	- Mr. N. Jackson	- 3 m/m

Short-Term Consultants

11-51	Appliance Testing Laboratory	-Mr. P. Naghten	- 2.4 m/m
11-54	Coal Combustion Technology	-Mr. W. Szulakowsky	- 2 m/m
11-55	Cogeneration	-Mr. R. Erickson	- 2 m/m
11-56	Appliance Testing Laboratory	-Mr. G. Yamamoto	- 0.5 m/m
11-57	Industrial Energy Audit	- Mr. Robinson	- 1 m/m

Posts 11-03 Thermal and Chemical Energy Processes, 11-52 Buildings Energy Evaluation and 11-53 Cement Industry Expert were not implemented.

LIST OF STUDY TOURS AND FELLOWSHIPS PROGRAMME UNDERTAKEN BY BEU PERSONNEL

	No. of BEU Personnel
1. Study Tour on Consultations with Various Institutions Involved in Energy Conservation and Energy Use Standards, August 22 - September 23, 1983 (O.L. Galang and B.P. Lim)	2
2. Testing of Home Appliance and Energy Conservation, July 1984 - August 1984 (W.D. Abayan)	1
3. Building Energy Standard, September 1984 - October 1984 (M.T. Ocampo and J.N. Asuncion)	2
4. Engineering Design/Energy Audit Studies, October 1984 - December 1984 (L.M. Manzanillo and M.L. Soriano)	2
5. Petroleum Management, August 1984 - November 1984 (M.B. Acosta)	1
6. Training Techniques and Management Publicity, July 1984 - August 1984 (M.R. Campanano and R.L. Salonga	2
7. Cogeneration, October 1984 - November 1984 (W.S. Toledo and J.C. Anunciacion)	2
8. Study Tour on Advance Energy Management Training Programme, March 1985 - April 1985 (R. Arriola)	1
9. Study Tour on Industry and Utility Energy Conservation, June 1985 - July 1985 (J. Colico, A. Habitan, G. Solera and T. Casacop)	4
10. Study Tour on Public Enterprise Policy and Management in Developing Countries, July 1985 - August 1985 (O.L. Galang)	1
11. Study Tour on Advanced Senior Management Course and Operation of Energy Management, September 1985 - October 1985 (B.P. Lim)	1
12. Study Tour on Petroleum Management Programme, July 1985 - November 1985 (Z. Monzada)	1
13. Study Tour on Energy Management and Policy Course, January 1986 - August 1986 (L.M. Manzanillo)	1
14. Industrial and Utility Energy Conservation, April 1986 - June 1986 (C.F. Cordero, D.D. Pinano and C.V. Tupas)	3

15. Energy System: Planning and Modelling, June 1986 - July 1986 (C.S. Naduria and A.C. Pujanes) 2

16. Home Appliance and Equipment Testing, July 1986 - September 1986 (R.R. Acosta and I.R. Divinagracia) 2

17. Study Tour on Fuels and Appliance Testing, October 1986 - November 1986 (A.P. Habitan) 1

18. Energy Planning and Policy Course, January 1987 - August 1987 (J.T. Tamang and Ma.A. Albino) 2

19. Study-tour on Fuels and Appliance Testing, April 1987 - May 1987 (M.R. Campanano and H.B. Arias) 2

20. Energy Conservation in Industry Course, April 1987 - May 1987 (C.A. Guirante) 1

ANNEX VI

REVIEW OF INSTITUTIONAL OPTIONS FOR THE PHILIPPINE ENERGY CONSERVATION PROGRAM

July 6, 1987

CONTENTS

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REVIEW OF INSTITUTIONAL OPTIONS FOR THE PHILIPPINE ENERGY CONSERVATION PROGRAM

Institutional Background

Most national conservation programs begin in the public sector. This is due to the initial need to establish energy policy at the national level and the normal practice of donor assistance. A number of important energy sector reorganizations are currently underway in the Philippines. Their objectives appear to be to achieve decentralization of energy management functions, separation of regulation from planning and promotion, but at the same time, to maintain both coordinated energy programs and the high priority assigned to energy matters.

There are a variety of options open to the Philippines for modifying and improving the current organization for energy management. At one extreme would be a stronger Government program oriented toward further regulation of energy use and mandated conservation standards. This approach implies both a strong and well-funded bureaucracy, effective enforcement, Government knowledge of appropriate standards for each sector, and misdirection in the private sector. The absence of these elements makes this extreme Government oriented strategy inappropriate. Similarly, exclusive reliance on the private sector requires energy prices to be set equal to true economic cost, widespread understanding of conservation options, and adequate private funds for investment, among other factors.

Clearly, neither of the two extremes above is realistic in actual fact. A carefully constructed organizational compromise is therefore required to optimize the roles and capabilities of Government and the private sector.

Constraints to Energy Conservation

The achievement of energy efficiency or fuel substitution goals is hindered by a number of constraints. The major fall into four basic categories:

- Inappropriate energy prices and divergence of market from social costs
- Absence of comprehensive Government energy policy and appropriate laws and regulations
- Inability or unwillingness of the private sector to invest

- Lack of technical capability and/or experience by energy users or unavailability of conservation equipment or services

These constraints and the approach to their resolution determines the necessary tasks and program of the energy management organization. Table 1 below shows the major requirements for a comprehensive conservation (and fuel substitution) program. Requirements fall into three basic categories, policy and regulation, technical services and information, and investment and financing. It is relatively obvious from the types of functions to be performed, that certain areas such as policy and regulation, tend to logically fall into the Government arena. On the other hand, the responsibility for technical support and services and investment and financing is likely to need to be divided between the Government and the private sector.

Table 1. National Energy Management Functions

Policy and Regulation	Technical Services and Information	Investment and Financing
o Energy policy and planning	o Technical assistance and energy auditing	o Allocation of funds for investment
o Energy pricing		
o Energy efficiency standards	o Training for industry, Government, utilities and others	o Investment in conservation or fuel substitution
o Economic incentives and penalties	o Demonstration of innovations	
o Inspection and certification	o Design, fabrication, installation services	
o Monitoring and data base development	o Supply of energy efficient equipment	
o Public information on conservation benefits	o Research and development	

Issues in Determining Organizational Structure

In the ideal system the market might be expected to have sufficient information to allocate enough investment resources to optimally achieve energy efficiency and fuel substitution.

However, as noted above, existence of various constraints or divergences from the optimum requires non-market intervention and/or assistance. The determination of what types of intervention and by whom, depends primarily on four factors:

1. Divergence of public from private interest, risk in conserving and market uncertainty,

2. Motivation and self-interest of various parties,

3. Experience, effectiveness and technical capability, and

4. Resource availability and willingness to commit resources.

Judgement on these four factors needs to be made for each of the functions in Table 1 to determine the appropriate institutional responsibility and nature of the organization to execute that function. This to say that there is no best organization independent of local conditions and constraints. Determining who should do what, and how it should be done, is therefore a matter of careful evaluation of (1) divergence in public versus interest, (2) motivation, (3) capability and 4) resource availability.

Institutional Options for Energy Management

Reviewing the above functions and applying these to the Philippines, it appears appropriate that Government should play the primary role in setting the policy, and the economic and regulatory climate for conservation (and fuel substitution). Additionally, the electrical supply system and a significant part of the petroleum supply system are now in Government hands. However, since the majority of the energy utilization and support services and equipment are in the private domain, a mixture of public and private roles is desirable in technical services and information. Likewise, Government will need to ensure that local funds and foreign exchange are available for investment, and provide incentives where required for investment.

The Philippines has thus far pursued a largely Government based approach in energy conservation policy and regulation, and in providing technical support to industry and others. This has, however, included a substantial outside participation in training and public information initiatives, involving industry personnel, industry organizations and educational institutions, among others. The current system was appropriate for the initial stages of the conservation program, and as policy and regulatory development has occurred, and private awareness and technical capability has been created.

The next stage of the conservation (and fuel substitution) program will require a shift from the current approach. This shift most importantly should contain a stronger implementation and direct service orientation. An adjustment and augmentation of the current Government activity, and potentially a reorganization, is therefore required. Note: The proposals discussed in this paper do not deal with energy regulatory areas such as pricing or regulation. These are, of course, critical, but beyond the scope of this paper.

Conservation Center Approach

Creation of an Energy Conservation Center (ECC) is one option to effect the necessary changes. The Energy Conservation Center may take a number of forms. The ECC might be either wholly in Government, semi-private or entirely private. There is no predeterminable best choice independent of the current Philippine circumstances and policy. However, it should be understood that the semi-private or private ECC approach is not appropriate for regulatory and policy determination functions of energy management. The ECC approach is likely to mean further separation of functions and some dilution of the comprehensive approach characterizing the Philippines first phase of conservation activity. The nature of the ECC depends again basically on the judgments made on the factors above, that is, (1) divergence in public versus interest, (2) motivation, (3) capability and (4) resource availability.

There are a number of models for the transition of initial public sector conservation efforts to either joint public and private, or private sector. In Korea, for example, a conservation center (Korean Energy Management Corporation) was created which, although operating as a public entity, was financed primarily by fees for services from the private sector. The development of non-government revenue sources can be particularly important to stimulate both productive and useful services as well as freedom from government budgetary pressures.

There are risks in transition to a public-private type organization for energy conservation. These include the fact that the government may be unwilling to continue funding once the center starts operating and gathers revenues from fees. In addition, there can be difficulty in the center actually achieving the needed flexibility of a private corporation while being partly publicly funded. In addition, a subsidy of the energy conservation services by continued funding from Government may undermine the development of private sector services by engineering firms which are more capable and motivated.

Shifting the testing and standards laboratory functions of the Conservation Division into a semi-private organization would preclude the organization from standard setting and regulation, but could still allow development of proposed voluntary standards and certification of compliance.

The best model to follow appears to be to maintain a combination of the public and private. The semi-private energy management group partially supported by fees for services (from the Government and private clients), would concentrate on audit work, private sector technical capacity building, promotion of conservation implementation, data gathering and analysis, special studies, fuel and appliance testing, and research and development; and private firms would be free to provide commercial energy conservation engineering, design and construction services.

It is probably unrealistic to expect such a center to be independent of direct government support in the Philippines, since certain public interest functions would probably remain. On the other hand, certain public functions will need to be separated into another organization because they deal with regulation or standards which cannot be delegated to the private or semi-private organization.

Summarizing the benefits of an Energy Conservation Center partially outside the normal Government framework.

1. Less burdened by Government rules and operating procedures, particularly such things as salary restrictions and inability to hire people based upon technical and experience, as opposed to academic, criteria.

2. Greater ability and motivation to respond quickly to demand from the private or public sector energy users meeting needs efficiently.

3. Allows services to be provided which market demands and market is willing to pay for it, thereby ensuring efficiency.

4. Removes industry doubt about the quality or personnel since personnel can be hired anywhere within the market place due to competitive salaries and terms of service being offered.

EXAMPLE

Energy Conservation Center Organization Proposal

Goals

There are four primary goals to be achieved by the conservation organization. These are:

- o reduction of petroleum imports and associated balance of payments deficit,
- o increased competitiveness and efficiency of industry,
- o reduced requirements for new electrical power supply, and increased efficiency in the operation of the existing system,
- o increased self-reliance and the use of indigenous energy resources.

Organizational Functions

Presented in Figure 1 is an organization chart, and in Figure 2 a functional organization and staffing chart, for the Energy Conservation Center. There are six basic organizational units recommended as follows:

1. Programs and Implementation Assistance
2. Energy Management (Engineering and Audit) Services
3. Planning and Analysis
4. Training and Public Information
5. Fuels and Appliance Laboratory
6. Administration and Fee Collection

Implementation Sequence

The recommended sequence of implementation actions is as follows:

1. Formally constitute the BEU-Conservation Division as the Energy Management Center of the Philippines-(EMCOP) under Presidential Order.

2. Transfer remaining legal regulatory functions of the Conservation Division to the Energy Regulatory Board. Retain only advisory, technical support and monitoring roles in the EMCOP.

3. Constitute a Board of Directors under the Acting Director of the Office of Energy Affairs.

4. Staff of the Conservation Division transfer to the EMCOP. Staff prepare preliminary staff plan, budget and fee proposals, including proposed level of continuing Government assistance linked as closely as possible to services and studies to be performed.

5. Board of Directors reviews functional organization, staffing plans and preliminary budget and fees proposals.

6. Recruitment initiated for EMCOP Executive Director and staff vacancies from private and public sectors.

7. Complete multi-year budget and workplan for EMCOP, forward to GOP along with proposed services to be provided for GOP.

Budget

(It was not feasible, given time available, to prepare an example budget)

Figure 1

ORGANIZATIONAL CHART

ENERGY MANAGEMENT CENTER OF THE PHILIPPINES

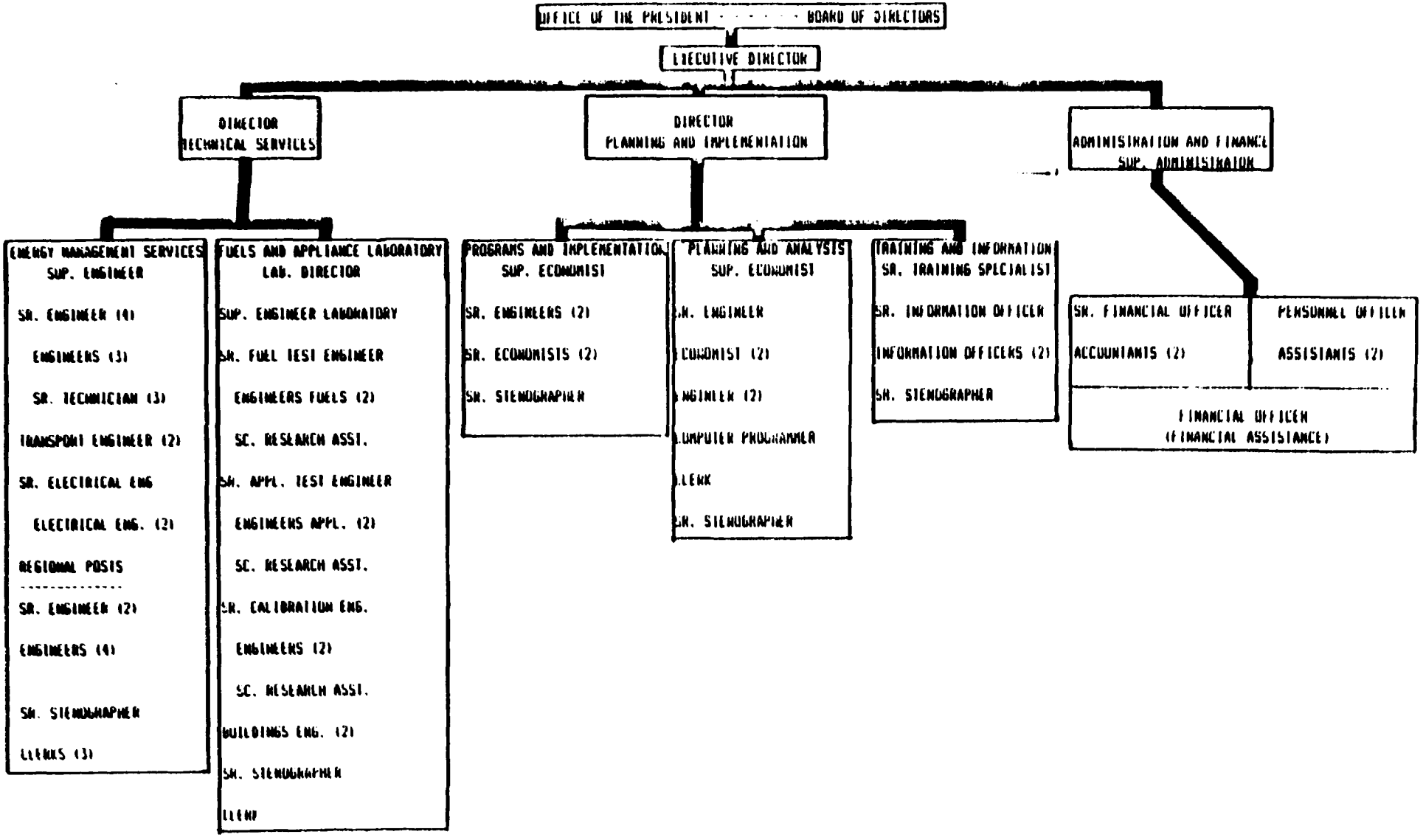
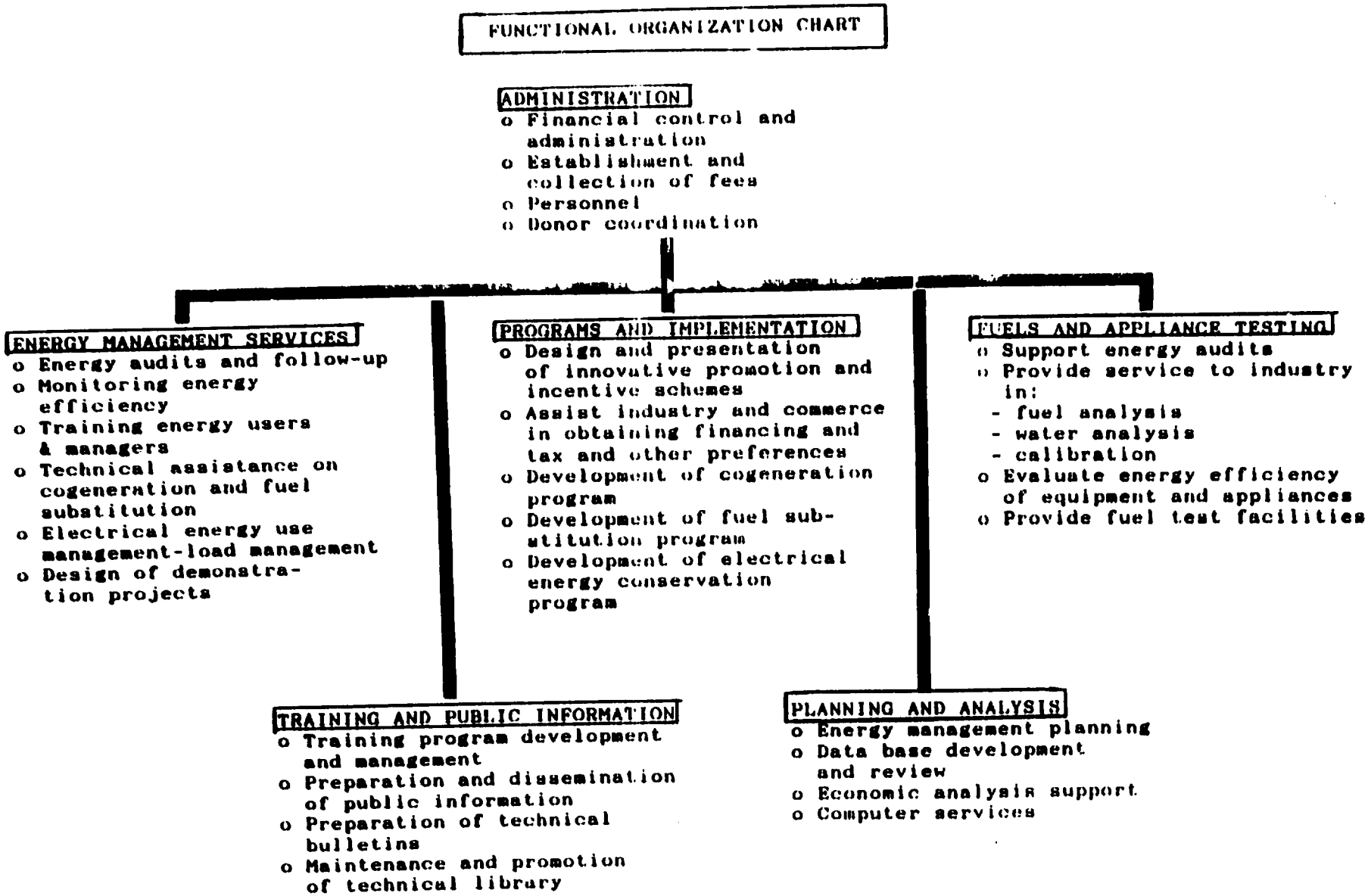


FIGURE 2


FUNCTIONAL ORGANIZATION CHART
ADMINISTRATION
o Financial control and administration
o Establishment and collection of fees
o Personnel
o Donor coordination
ENERGY MANAGEMENT SERVICES
o Energy audits and follow-up
o Monitoring energy efficiency
o Training energy users & managers
o Technical assistance on cogeneration and fuel substitution
o Electrical energy use management-load management
o Design of demonstration projects
PROGRAMS AND IMPLEMENTATION
o Design and presentation of innovative promotion and incentive schemes
o Assist industry and commerce in obtaining financing and tax and other preferences
o Development of cogeneration program
o Development of fuel substitution program
o Development of electrical energy conservation program
FUELS AND APPLIANCE TESTING
o Support energy audits
o Provide service to industry in:
- fuel analysis
- water analysis
- calibration
o Evaluate energy efficiency of equipment and appliances
o Provide fuel test facilities
TRAINING AND PUBLIC INFORMATION
o Training program development and management
o Preparation and dissemination of public information
o Preparation of technical bulletins
o Maintenance and promotion of technical library
PLANNING AND ANALYSIS
o Energy management planning
o Data base development and review
o Economic analysis support
o Computer services