ESMAP

Joint UNDP / World Bank **Energy Sector Management Assistance Programme**

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48187

PHILIPPINES

ACTION PLAN ON ELECTRIC ENERGY EFFICIENCY AND CONSERVATION OPTIONS

July 1995

Power Development, Efficiency &
Household Fuels Division
Industry and Energy Department
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PREFACE

This report presents action plan and options for the development of sustainble electricity end-use efficiency activities in the Philippines. It synthesizes the finding of several studies -- including Enery Service Companies (ESCOs) Private Sector PromotionWorkshop, Philippines Electric Appliance Energy Efficiency Study, and Heavy Industry Sector Energy Efficiency Improvement Potentials -- conducted during the course of this study. In addition to this final report, there are three other major reports: (1) Energy Service Companies Workshop Report; (2) Philippines Appliance Energy Efficienct Program; and (3) Report on Heavy Industry Sector Energy Efficiency Improvement Potentials.

The study was financed by a grant from the Government of the Federal Republic of Germany and was conducted by the Joint UNDP/ World Bank Energy Sector Management Assistance Program (ESMAP) in close cooperation with the Government of the Philippines.

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AHAM	Association of Home Appliance Manufacturers
Appl	Appliance
BPS	Bureau of Products Standards
CFL	Compact Fluorescent Light
DOE	Department of Energy
DOI	Department of Industry
DSM	Demand-Side Management
ERB	Energy Regulatory Board
ESMAP	Joint UNDP/World Bank Energy Sector Management Assistance Programme
ESCO	Energy Service Companies
FATL	Fuels and Appliances Testing Laboratory
NEA	National Electrification Administration
NPC	National Power Corporation
OEA	(former) Office of Energy Affairs
PNOC	Philippine National Oil Company
PPS	Product Performance Standard
TACSAL	Technical Assistance Component of Structural Adjustment Loan
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WB	The World Bank - International Bank for Reconstruction and Development

GW	giga watt
GWh	giga watt hour
kW	kilo watt
kWh	kilo watt hour
MW	mega watt
TWh	tera watt hour

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Introduction

1. Between 1991 and 1993 the Philippines faced a power crisis that led the government to undertake drastic reforms in the power sector as well as the institutional and regulatory framework. These reform efforts have both strengthened the power sector and shifted the responsibility for power generation from the public sector to private sector. By mid-1994 the private sector had about 30 generation projects under construction or in operation, accounting for approximately 4,000 MW of generating capacity and covering more than 80 percent of peak demand. The country has finally overcome the power crisis, and its economy has recently begun to recover.[1] However, the price Philippines consumers have had to pay to endure and overcome the crisis has been great.[2] Electricity prices in the Philippines are among the highest in Asia, second only to Japan.

2. During the past year and a half foreign investment has increased. However, to continue its growth, the Philippines industrial sector must maintain a competitive edge. Reducing energy, especially electricity costs, through conservation and efficiency improvement is critical if large and medium industrial units are to retain a competitive advantage.

3. Furthermore, recent interest in managing electricity demand, combined with the ongoing reform toward a greater role for the private sector in power supply in the Philippines, may eventually change the power supply market at the retail level and could alter the way large and medium electric customers use and buy electricity. As a result, it is critical that consumers -- especially large and medium industrial customers -- be prepared for the more efficient power market and a sustainable approach to end-use energy conservation and efficiency improvement.

4. As in many other developing countries, the potential for energy savings in the Philippines is enormous in all economic sectors. However, during the past decade energy conservation and efficiency improvement activities have failed to reach a sustainable stage, despite several efforts led by the government with assistance from many multilateral and bilateral donors. This failure stems from several factors. First, past government energy conservation and efficiency improvement efforts were fragmented, geared toward solving immediate problems, and concentrated on building public sector capacity to provide energy conservation services to end-users. Second, although the government has been directly involved in variety of energy conservation and efficiency improvement projects, private sector involvement have been limited in providing end-use conservation efficiency services. Third, although the government's efforts have generated public awareness on the issues -- as reflected by many requests for government

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1 Although GDP between 1991 and 1993 grew at a low rate only 0.44 percent per year, between 1993 and 1994 GDP grew 4 percent. The World Bank forecasts that GDP for 1995 will grow at the rate of 5 percent.

2 The World Bank estimates that the power crisis of 1991-93 resulted in economic losses of about US$1 billion per year. Furthermore, the majority of the new power plants added on to solve the power crisis are bunker C oil and diesel units, which although inexpensive and easy to install, are expensive to operate.

assistance from large and medium energy consumers interested in energy end-use conservation and efficiency improvement -- a vast majority of energy consumers are still reluctant to initiate in any energy conservation and efficiency improvement activities, including low-or no-cost measures. This is because these consumers: (a) lack the financial strength to invest in end-use efficiency improvement; (b) senior management staff are not fully aware of profitability and do not have sufficient information on the performance of end-use efficiency improvement measures; and (c) consumers do not have access to end-use efficiency technology. These impediments have overshadowed several favorable conditions for end-use efficiency improvement, including high electricity prices and a high level of public awareness of energy issues.

5. This study addresses strategies for promoting sustainable end-use electricity efficiency activities within the framework of the Philippines power sector reform and the anticipated demand management activities. The main objective of the study is to help the Philippines government to develop sustainable end-use energy conservation and efficiency activities (i.e., an end-use energy efficiency market) by using a combined demonstration project and training program that would act as a "catalyst" for the emergence of an end-use energy efficiency market. The design of the recommended demonstration project would take into account the past experience of energy conservation and efficiency improvement activities in the country, the ongoing power sector reform, and interest among government and utility company officials in managing electricity demand.

Potential for Savings, Achievement, and Barriers for Sustainable Activities

6. Despite extensive energy conservation and efficiency improvement efforts on the part of the Philippines government, there is still enormous potential for energy savings in all economic sectors. For example, in the industrial sector, the total industrial energy consumption in 1990 is estimated at 3.858 million TOE of which the total amount of electricity is about 10,000 GWh. The potential for energy savings in the industry is relatively high. The estimated potential for electricity demand and energy savings for motor-driven industrial processes alone ranges between 137 and 353 MW of electricity demand and between 600 and 1,600 GWh of energy. The present study projects that by imposing efficiency standards for motors (between 1 and 200 horsepower), savings could reach 136.7 GWh of energy and 30 MW of demand annually by the year 2010. All previous studies have also shown large savings in excess of 20-25 percent through implementation of low-cost measures. The World Bank's Technical Assistance Component of Structural Adjustment Loan II (TACSAL) project estimates that an annual savings of 22 percent equivalent to 770,000 TOE, could be achieved through implementation of financially viable options.

7. The potential for end-use conservation and efficiency improvement in the residential and commercial sector is also great. For example, the total amount of electricity sold by MERALCO in the residential sector increased significantly (approximately 35 percent) between 1980 and 1990. Total electricity sales by MERALCO in the residential sector are about 3 to 3.5 TWh. A previous ESMAP study,-- The Philippines: Defining an Energy Strategy for

Household Sector 1992-- revealed that significant energy saving gains in this sector could be made through efficiency improvement in lighting, refrigeration, and cooling (fans and air conditioning). Similarly, MERALCO's total sales of electricity in the commercial sector were approximately 3 to 3.7 TWh, but the total increase in electricity sales was slightly lower than in the residential sector only about 28 percent over the same period. An audit of 50 commercial buildings by the Philippines Department of Energy in 1989 revealed that 60.4 percent of the total electricity consumption in the buildings was for air conditioning, 19.3 percent for lighting, and the remaining 20.3 percent was for other applications. The present study estimates that implementing product performance standards for room air conditioning, refrigerators, ballast, fluorescent lamps and some motors (1 to 200 horsepower) could potentially save 1,707,189 MWh and reduce peak demand by 456 MW over 10 years.

8. Since 1980, the Philippines Department of Energy (formerly the Office of Energy Affairs), with assistance from foreign donors, has initiated the implementation of more than US$14 million in energy conservation and efficiency improvement programs. Typically, these conservation programs were aimed at reducing wasteful use of energy, promoting adoption of energy efficiency improvement and conservation technology, providing end-use efficiency technology information, and assisting industrial and commercial energy customers in implementing end-use efficiency improvement and conservation measures. These programs have been successful in increasing public awareness of energy savings potential and the financial viability of energy efficiency measures. The programs have also helped to contain energy waste through implementation of energy audits and low-cost house-keeping measures. The Department of Energy also conducted seminars for the energy managers of approximately 120 industrial and commercial establishments, training and certifying the energy managers in the implementation of energy conservation programs. As a result of this concentration on promoting public sector capacity, and because the government took the lead and acted as a focal point for executing the energy conservation programs and projects, the private sector was left behind in providing end-use efficiency services to consumers.

9. In addition to these programs, several important laws and regulations intended to improve end-use efficiency have recently been passed and enacted. One law that caused an impressive energy efficiency improvement in a subsector was a requirement that enterprises with monthly energy expenditures in excess of 2 million pesos hire energy managers and report their energy consumption to the Department of Energy. As a result, about 40 percent of large industrial customers are currently in continuous dialogue with the Department of Energy through energy reports, energy audits, and special energy advisory services. The effect in the cement industries has been particularly impressive. Since the enactment of this legislation, overall energy consumption in the cement industry has decreased.

10. The climate for implementing electricity conservation in the industrial sector is currently very positive for several reasons. First, the cost of energy (including electricity and other fuels) in the Philippines is relatively high; electricity rates in the Philippines for all customer classes are much higher than in other Asian countries except Japan.

11. Second, the recent power crisis created a high level of public awareness of energy issues. This awareness is much higher than in other countries in Asia and cuts across the social spectrum. The power crisis placed burdens on everyone in the country. The memory of the economic and business losses caused by power shortage is still fresh.

12. Third, the Philippines is endowed with low-cost and skilled human resources. There is a large pool of engineers (and other technically oriented personnel) available to work for private energy management or suppliers of end-use efficiency equipment for competitive compensation relative to the current labor market. Furthermore, if the recent interest in privatizing the National Power Corporation (NPC) is realized, the pool of available engineers may increase, and retraining them for employment on the end-use side may be the most logical approach. Although these engineers and technicians lack specific knowledge about energy end-use efficiency and conservation, but they could easily be retrained.

13. Fourth, the government, which to date who has been the focal point of energy end-use conservation and efficiency improvement, is aware of the need to develop a sustainable end-use conservation and efficiency improvement activity i.e., a market approach.

14. Fifth, there exists a viable market for end-use efficiency services and equipment. Recent government efforts to liberalize trade have created an interest among large and medium industrial operators and owners in reducing their electricity bills as part of the overall efforts to attain a competitive advantage.

15. However, despite these achievements and favorable conditions, the trend has not been sustainable. The overall energy efficiency improvement and conservation effort in the Philippines are still fragmented. This study finds that a vast majority of energy consumers have not taken any efficiency improvement and conservation measures. This inaction stems from several factors. First, senior management in particular are not aware of end-use energy efficiency technology and the possible financial return on such an investment. In some cases, managers are aware of energy-efficient technology and the potential financial return, but remain reluctant to invest. These managers give a higher priority to investing in the expansion of their production than to investing in energy-efficient technology.

16. Second, the practice of business decision making typically places emphasis on initial purchase cost and on simple analysis of payback period. This makes energy-efficient equipment and services appear uncompetitive. It is also quite common -- especially during economic downturn periods -- that energy customers do not have access to the financial resources necessary to purchase energy-efficient technology and services.

17. Third, energy efficiency is not one of the top priorities of high level managers. Typically, middle-and junior-level managers are rewarded for maintaining production schedules irrespective of energy costs.

18. Fourth, there is a lack of unbiased information and easy access to energy-efficient technology and equipment. Customers are therefore, skeptical about claims of energy savings.

As a result, there is a need for a performance standard and testing program to provide objective and reliable information to purchasers of energy-efficient equipment.[3] Furthermore, reliable information on the performance of conservation and efficiency improvement measures must be readily available for energy consumers and decision makers.

19. Fifth, in spite of the government's direct involvement in energy conservation and efficiency improvement, its capability is still limited. With only its limited fiscal and manpower resources to work with, the government cannot effectively and efficiently provide end-use efficiency services to all energy consumers.

20. Sixth constraint on sustainable energy end-use conservation and efficiency improvement is the lack of an institutional and regulatory framework that would encourage an end-use energy conservation market to emerge. Although electricity retail prices in the Philippines are very high, they dot not reflect the true costs of generation, transmission, and distribution. Thus, electricity prices which are one of the major conditions making conservation and efficiency improvement investment more cost effective provide a mixed signal to consumers. The relatively high imported duties on equipment and complicated customs procedures also discourage electricity customers from investing in imported energy-efficient equipment.

21. Seventh, and most crucial impediment was the failure of the government to recognize the importance of the private sector as the provider of energy end-use conservation efficiency services.

Recommendations

22. A strategy must be developed to overcome these constraints before sustainable conservation and end-use efficiency improvement activities can be established. The most important barriers are the institutional and regulatory frameworks for example, the ongoing power sector reform (and the ultimate structure of the Philippines power sector), an electricity tariff structure that does not reflect actual costs, and duties on imports of energy efficient equipment. As part of the ongoing power sector reforms, the Philippines government must create a regulatory framework that will send a unified signal to stimulate and enhance sustainable end-use conservation and efficiency improvement activities.

23. As an initial step toward sustainable end-use efficiency activities in the Philippines, this study recommend two specific electricity conservation and efficiency improvement programs. The first program involve a capacity building toward an establishment of electric motor efficiency standard as well as implementing electricity efficiency standard for rewound motors. Specifically, the program involves using a technology transfer for motor rewind and implementing certification for motor rewind and rewound motors as a vehicle for capacity building toward implementation of electric motor efficiency testing and standard in the

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[3] The Fuel and Appliance Testing Laboratory with assistance from the World Bank, Asia Alternative Energy Unit is currently testing compact fluorescent lamp.

country. The second program is aimed specifically to improve electricity efficiency and conservation among large and medium electricity customers through an implementation of power factor correction and in-plant load management demonstration program. The proposed program entails an establishment of electricity conservation revolving trust fund earmark for specific electricity end-use conservation and efficiency improvement projects. The program is intended to promote private sector involvement in conservation and efficiency improvement and create sustainable end-use efficiency activities in the Philippines. This fund would provide the necessary financing for electric customers to overcome high initial investment costs. In addition, a complementary demonstration project should be carried out as a model of the performance and profitability possible with efficient end-use technology. The demonstration project, which would provide necessary information and training to electricity customers would serve as a ***catalyst*** to promote sustainable end-use energy efficiency and conservation activities in the Philippines.

Motor Rewind Technology Transfer and Certification Program

24. As part of the strategy to promote sustainable end-use energy efficiency activities, it is critical that wasteful energy conservation practices be suspended and that wasteful energy-using equipment be eliminated from the market. As pointed out in this study, instituting electric motor efficiency standards could provide significant and sustainable energy and demand savings in the long-run. However, the Philippines currently has neither the necessary regulatory framework nor the necessary electric motor efficiency standards and testing facility. It would thus be premature to recommend electric motor efficiency standards. However, as a first step toward this goal, this study recommends that a small program be developed for: (1) a technology transfer on motor rewinding; and (2) training in testing, and certification. This program would allow the government to control the efficiency standard of rewound motors, which represent a significant portion of motors being used. In practice, failed motors can be rewound to achieve their original specification and efficiency level or, in some cases, achieve a higher efficiency level. However, if the repair and rewind are poorly performed, it can accelerate efficiency degradation.

25. The recommended program would transfer technological know-how on electric motor rewind and repair to local rewind and repair shop and large electric customers who currently rewind their own failed motors. The Fuels and Appliances Testing Laboratory (FATL) will be the lead agency for technology transfer, testing, and certification. The main objectives of the program are two folds. First, the program is used as a vehicle to build FATL's capacity toward electric motor testing and implementation of electric motor efficiency standard in the country. Second, the program is intended to make sure that the motor repair and rewind shops adopt the correct techniques for screening out motors whose repair or rewinding would not be cost-effective. It is not intended to promote motor rewind business. In effect, the program would ensure that motor rewind and repair shops adopt the most up-to-date and correct technology and practices for motor rewind and repair. The testing and certification program along with the technology transfer, would be designed to educate and assure customers about the

products and services as well as establishing a foundation for motor efficiency testing and standards program for the Philippines.

Power Factor Correction and In-Plant Load Management Demonstration Project and Training Program

26. The recommended demonstration project would be concentrated on a few specific measures of electric end-use efficiency, including improving power factor and in-plant electricity demand load management among large industrial and commercial electric customers. This is to reinforce distribution companies' interest in improving power factor as well as load factor among its customers. For example, MERALCO recently began providing technical advice to its customers to improve their power factor. In addition, major changes in the power sector which have been implemented including power sector restructuring and new tariff structure create a need end-use conservation and efficiency improvement specifically, the in-plant load management and power factor correction. Effectively, the power sector restructuring will likely change the way electricity is bought and sold at both the wholesale and retail level. Specifically, the effect of power sector restructuring at the retail level means that large and medium electric customers will eventually be allowed to negotiate electricity rates with any supplier. The recently approved tariff structure contains substantial demand charge. As a result, it is urgent that large and medium electricity customers begin to invest in in-plant load management and power factor correction to: (1) alleviate the impact of the new tariff; and (2) prepare themselves for the new power market structure. Similarly, at the wholesale level distribution companies will also be able to choose and negotiate wholesale electricity rates with any power producers. Therefore, distribution companies will eventually have to prepare themselves for the new power market structure.

27. As a central component for the program, it is recommended that the Philippines National Electrification Administration (NEA) set up a conservation revolving trust fund earmarked for power factor correction systems and in-plant electricity demand load management for large and medium industry and commercial electric customers. The availability of funds would: (1) ensure that the lack of financing for energy conservation and end-use efficiency investment is minimized; and (2) encourage private firms to provide contract energy management services and to supply end-use efficiency equipment. At the same time, the conservation fund would serve as a catalyst and encouraging private firms such as suppliers of capacitors and contract energy management companies to participate in this specific end-use efficiency market promotion. This conservation trust fund could be accumulated from various sources including a power factor surcharge or penalty imposed by the utilities, donor countries, the World Bank loan, and the Global Environmental Facility (GEF).

28. To carry out the program, each participating utility company should establish an Electricity Demand Load Management Unit to be responsible for approving the demonstration project, providing technical assistance, verifying, and approving the quality of services provided to its electricity customers by the contract energy management service providers and equipment

suppliers. To finance the project, paricipating utility companies would borrow money from the fund managed by National Electrification Administration (NEA) to pay for the capacitors and/or services on the behalf of its participating customers. In effect, the contract energy management services and end-use efficiency equipment providers will receive direct payment in full from the utility company. Customers would then pay the utility company for the services and equipment as an additional payment on their monthly electricity bills. Effectively, customers would lease or purchase the capacitor and the related services from the utility company. The demonstration project could be set up either parallel to, as part of, or independently from other demand-side management programs. However, it is crucial that certain conditions (including reasonable power factor surcharge and demand charge) be instituted as an incentive for targeted customers. Recently approved of new atriff structure which contains substantially higher demand charge than the before could provide an incentive for electricity customers to participate in the program.

29. Parallel to the recommended demonstration project, a training and certification program must be established. The training program should be designed to transfer the related technology and training (i.e., the power factor correction system and in-plant electricity demand load management) to strengthen private sector capacity, including industrial plant and building energy managers (i.e., electricity customers), utility personnel, contract energy management companies, and suppliers of end-use energy efficiency equipment. The certification component of the program should be designed to screen out unscrupulous providers of contract energy management services and equipment and to set standards for the market. The demonstration project, together with the training and technology transfer program would complement recent developments in power sector reform in two ways. First, the demonstration project and training program would prepare large and medium customers for the ongoing power sector reform. If the reform efforts proceed as planned, large and medium electric customers would be allowed to negotiate electricity prices directly with their suppliers. Currently, most large industrial customers are not allowed to negotiate electricity prices with their suppliers, the exception being the National Power Corporation's (NPC) direct customers. The demonstration project and training program will also help large industrial and commercial customers to better manage their electricity demand load.

30. Second, as a result of the ongoing power sector reform, its is conceivable that the National Power Corporation (NPC) will eventually be privatized. This would mean that some personnel would not be needed. The demonstration project and training program would provide an opportunity for some former personnel of the National Power Corporation (NPC) to be retrained in the areas of demand-side and load management, conservation, and end-use efficiency services for electric customers. These retrained personnel would play a crucial role in creating sustainable end-use energy conservation and efficiency improvement activities in the Philippines.

31. The demonstration project and training program would also complement the proposed demand-side management programs.[4] Specifically, the demonstration project and

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[4] Recently, the Philippnes Department of Energy completed two demand-side management studies. A Long-Term Power Planning Study was carried out with assistance from the Asian Development Bank, and a Demand-Side Management Action Plan with assistance from USAID.

training program would prepare large industrial and commercial customers for the demand-side management program, if the Philippines utilities choose to implement it. Typically, demand-side management program design and delivery for large and medium customers is custom designed made to fit each customer's energy use. Both utilities and customers would benefit, if customers are prepared to discuss and negotiate for the program that would be appropriate for them. Furthermore, the demonstration project and training program would help to prepare suppliers of contract energy management services and suppliers of end-use energy efficiency equipment for the demand-side management programs. It is anticipated that if the demand-side management programs are implemented, end-use efficiency equipment suppliers and contract energy management companies will play an important role in the efficient and successful implementation of the programs.

I. AN OVERVIEW OF THE ENERGY SECTOR

The Macroeconomic Context

1.1 During the mid-1980s, the Philippines' economy encountered severe economic problems, and GDP for 1984 and 1985 declined at the rate of 7.3 percent each year. Although GDP subsequently increased from 3.4 percent in 1986 to 6 percent in 1989, in 1990 it grew only 2.7 percent. This time the economic decline was further exacerbated by a severe power crisis. During the crisis which lasted between 1991 and 1993, the Philippines economy did not grow, while the economies of all her neighboring countries grew significantly -- close to 10 percent per year in many countries, and about 10 percent per year in others. It is estimated that the power crisis of 1991-93 resulted in economic losses of about US$1 billion per year. The Philippines was one of the only east Asian nations that did not enjoy an economic boom.

1.2 Beginning in 1994 the Philippines overcame the power crisis and the economy began to expand. In 1994 the GDP grew about 4.5 percent, and it is expected to grow more than 5 percent in 1995. During the past 18 months foreign investment has increased, and the Philippines economy now appears to have the potential to be as successful as its neighbors.

1.3 To realize this potential the Philippines economy -- particularly the industrial sector -- must be able to maintain a competitive edge. Reducing energy costs, especially through conservation and efficiency improvement, is a critical approach to attain a competitive advantage. Currently, electricity prices in the Philippines are among the highest in Asia, second only Japan. The high prices are partly due to the fact that the new power plants added on to solve the power crisis have high operating costs. The new plants are mostly diesel or bunker C oil units, which are inexpensive and quickly built. Furthermore, most of the Philippines energy requirement is imported. Promoting the rational use of electricity could reduce import bills and ultimately ensure economic stability and steady economic growth.

Electricity Demand and Supply

1.4 Electricity demand in the Philippines has been increasing. According to a forecast conducted by the National Power Corporation (NPC) electricity demand is expected to grow at about 12 percent per annum, for 1994 to 2000.[5] This demand forecast is based on optimistic estimates of average GDP growth, at about 7 percent to the end of the decade. Relying on the less optimistic of figure of only 5.5 percent GDP growth per year, the World Bank estimates that electricity demand will grow more slowly, at an approximate rate of 9.5 percent per year during the same period.[6]

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5 National Power Corporation Power's Development Program 1994 (PDP-94).

6 Philippines Power Sector Study: Structural Framework for the Power Sector, the World Bank, Report No. 13313-PH November 30, 1994

1.5 The World Bank electricity demand forecast is broken down by region. It is estimated that energy demand for Luzon will increase from 21.13 TWh in 1994 to 29.50 TWh in 1998, a 40 percent increase over 4 years. For Visaya, energy sales are expected to increase about 47 percent during the same period, increasing from 2.88 TWh to 4.26 TWh. For Mindanao, energy sales are expected to have the highest increase, 62 percent, from 4.70 TWh to 7.66 TWh between 1994 and1998. During the same period total power sales in the Philippines are forecasted to increase 44 percent, from 28.7 TWh to 40.4 TWh

Table 1-1: Power Demand Forecast

	LUZON		VISAYAS		MINDANAO		TOTAL		
YEAR	Sales in 1000 GWh	Peak Demand in MW	Sales in 1000 GWh	Peak Demand in MW	Sales in 1000 GWh	Peak Demand in MW	Sales in 1000 GWh	Gene-ration 1000 GWh	Peak Demand in MW
1990	17.64	3,023	1.87	494	3.73	621	22.9	24.7	3,974
1992	18.88	3,250	2.25	622	4.24	725	23.8	25.6	4,186
1994	21.13	3,693	2.88	705	4.70	811	28.7	30.8	4,937
1996	24.73	4,286	3.52	851	6.00	1,038	33.9	36.3	5,830
1998	29.50	5,128	4.26	1,010	7.66	1,329	40.4	43.2	6,858
2000	35.20	6,102	5.15	1,201	9.52	1,648	48.1	51.53	8,262

Source: Philippines Power Sector Study, Structural Framework for the Power Sector, World Bank, Report No. 13313-PH Nov.30, 1994.

1.6 To meet the increasing demand, the World Bank estimates that the Philippines would need an additional 20.7 TWh of energy (about 67 percent increase) in only 6 years (between 1994 and 2000), the peak demand would also need to be increased by 67 percent, from 4,937 MW to 8,262 MW. In the short-term (1994 to1998) the Philippines power sector must increase its power generation by 12.4 TWh, increasing from 30.8 TWh to 43.2 TWh. During the same period, the peak demand must increase by 2,200 MW, more than half of which (66 percent) in the Luzon. In terms of investment requirements, it is estimated that between 1994 and 2004 the Philippines would need to invest about US$25-38 billion, depending on the demand forecast (12,000-17,000 MW by 2004).[7] Obviously, this magnitude of investments is beyond the country's financial and fiscal capacity. Although recent experience has shown that a significant amount of these investments can be absorbed by the foreign private sector, it is crucial that other

[7] Philippines Power Sector Study: Structural Framework for the Power Sector, the World Bank, Report No. 13313-PH, November 30, 1994.

least cost alternatives, such as end-use conservation and efficiency improvement measures be explored to alleviate some of this financial burden. The Philippines is once again at the cross-roads of economic prosperity, and it is crucial that resources be spent as efficiently as possible.

Recent Development in the Power Sector

1.7 The power crisis of 1991-1993 drastically changed the face of Philippines power sector. To deal with the power crisis, the government of the Philippines embarked on a series of initiatives aimed at restructuring the power sector as well as the legal and institutional framework. For example, the government created the Department of Energy (DOE formerly the Office of Energy Affairs) in December 1992, bringing the National Power Corporation (NPC), National Electrification Administration (NEA), and the Philippines National Oil Company (PNOC) under its control. Under this new arrangement, the Energy Regulatory Board continues to report directly to the Office of the President; however, its regulatory power has been extended to cover the National Power Corporation (NPC) and the electricity cooperatives in addition to the investor-owned utilities.

1.8 Another significant aspect of power sector reform was the effort to: (1) shift responsibility for power generation from the public sector to the private sector; and (2) privatize the National Power Corporation (NPC). The reform effort has proven successful in attracting private investors to invest in power generation, thus solving power shortage in the short-term, and laying the foundation for strengthening the power sector in the medium and long-terms. By mid-1994, about 30 privately funded power generation projects were under construction or in operation. The combined new generating capacity accounts for approximately 4,000 MW, or about 80 percent of peak demand in 1994. However, electricity prices generated by these new independent power producers are high because most of the power plants added on to solve the power crisis have high operating costs.

1.9 According to the government's plan, the main objective for power sector development is to ensure that all future power requirements can be met by private investors with private capital. Given this goal, the government realizes that the distribution companies must be restructured and government agencies strengthened to capture the benefits expected to ensue from privatization. In fact, the realization of these benefits depends in large part on the development of a competitive market.[8] This goal has a few important ramifications. First, as a precondition, electricity pricing and tariffs must be revised to reflect the real cost of production, this revision should include a demand charge and power factor surcharge. As a result, some of the large and medium industrial and commercial customers may have to bear an additional burden. To alleviate this burden these consumers may have to invest in in-plant load management and power factor correction systems. Second, a competitive power market at the retail level for large industrial and commercial customers would mean lower electricity prices and tariffs for customers who have the most desirable demand load shape required by the

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8 Philippines Power Sector Study: Structural Framework for the Power Sector, the World Bank, Report No. 13313-PH, November 30, 1994.

suppliers. As a result, it is critical that these customers be prepared for the consequences of the government's power sector reform efforts.

1.20 Parallel to the power sector reform, there has been a widespread interest in demand-side management (DSM) among government and utility officials. The Philippines Department of Energy has recently completed two demand-side management studies, a Long-Term Power Planning Study (with assistance from the Asian Development Bank [ADB]) and a Demand-Side Management Action Plan for the Philippines (with assistance from the United States Agency for International Development [USAID]). Both studies call for the development of private sector capability to take a leading role for end-use energy conservation and efficiency improvement to ensure that sustainable end-use efficiency activities can emerge. Demand-side management, if implemented, will help create more interest among contract energy management companies and suppliers of end-use efficiency equipment.

Energy Conservation Issues Among Large Industrial and Commercial Customers

1.21 As is typical in many other developing countries, the potential for energy savings (including electricity) in the Philippines is relatively high in all economic sectors. In spite of several efforts led by the government with assistance from several multilateral and bilateral donors, energy conservation and efficiency improvement activities during the past decade have failed to reach a sustainable stage, especially in the industrial sector. This failure stemmed from the fact that past energy conservation and efficiency improvement efforts tended to concentrate on building public sector capacity. In addition, energy conservation and efficiency improvement activities in the past were fragmented because they were geared toward solving immediate energy problems. The government tended to involve itself directly in providing energy conservation and efficiency services. Finally, although the government's efforts generated public awareness of energy issues, this awareness has failed to translate into actions. A vast majority of energy consumers in the Philippines are still reluctant to invest in energy conservation and efficiency improvement.

1.22 This inaction among energy consumers stems from several factors. First, a significant number of energy consumers do not have the financial strength to invest in conservation and efficiency improvement. Second, senior management are not fully aware of end-use energy efficiency and the potential financial return on investment in energy efficiency equipment. Third, there is a lack of unbiased information and easy access to energy-efficient technology and equipment. Fourth, energy conservation and efficiency activities are not typically the high priority among high-level managers. Finally, given its resources, the government cannot be expected to effectively and efficiently provide end-use efficiency services to all energy consumers.

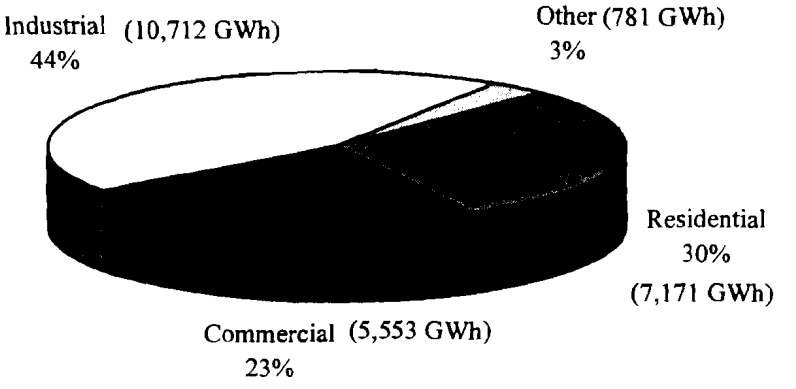
1.23 It is crucial to develop strategies to overcome those impediments, so that sustainable end-use conservation and efficiency improvement activities can emerge. Sustainable solutions in the Philippines would mean a greater reliance on the private sector to undertake end-

use efficiency initiatives. Taking into account recent development in the power sector, this study recommends that the Philippines government develop strategies to overcome constraints, to stimulate more private sector involvement, and to create favorable market conditions for end-use energy conservation efficiency improvement activities. The following chapters provide a detailed discussion of the potential savings accruing from, impediments to, and recommended actions toward sustainable end-use electricity conservation and efficiency improvement activities in the Philippines.

II. POTENTIAL SAVINGS AND ACHIEVEMENT

2.1 Total electricity consumption in the Philippines in 1993 was about 24,219 GWh. As shown in Figure 2-1, the industrial sector accounted for 44 percent of total electricity end-use in the country, the residential sector 30 percent, and the commercial sector 23 percent. Most industrial customers are located in Luzon; and most of them are MERALCO's customers and the National Power Corporation's (NPC) direct industrial customers. MERALCO's industrial customers consume more than two-thirds of all electricity sold in Luzon and about 47 percent of all industrial electricity sold in the country. Electricity consumed by the National Power Corporation's (NPC) directly connected industrial customers accounts for another 25 percent of all industrial electricity sold in the country. Electricity consumption in the residential and commercial sector is also concentrated in Luzon, where all consumers are MERALCO customers. About 80 percent of all electricity sold in the residential sector, and about 86 percents sold in commercial sector are in Luzon.

Figure 2-1 End-Use Electricity Consumption (1993)



Source: Long-Term Power Planning Study, 1995 (Consultant Report to Asian Development Bank[ADB] and the Philippines Department of Energy [DOE])

Potential Savings in the Industrial Sector

2.2 In recent years the Philippines government has initiated a free trade policy aimed at promoting the country's international trade. Realizing that end-use conservation and efficiency improvement in the industrial sector could significantly reduce production costs and ultimately contribute to a competitive advantage, many industries are interested in rehabilitation and modernization projects to improve their competitiveness. Large and medium industrial units find that reducing energy consumption particularly electricity consumption, through energy

conservation projects is a complementary step to their cost-cutting measures. Furthermore, energy conservation projects can aid the industries' modernization efforts by identifying and replacing outdated equipment and processes as well as energy-wasting practices.

2.3 As shown in Table 2-1, total electricity consumption in the industrial sector was approximately 10,721 GWh, or about 44 percent of total electricity consumption in 1993. Potential savings from end-use electricity conservation and efficiency improvement in the industrial sector are relatively high. The analysis of savings potential for motor-driven industrial processes alone could produce significant savings, since it accounts for 72 percent of total electricity end-use in the industrial sector (see Table 2-2). Based on the ratio of US savings, the estimated potential savings (from variety of measures) range between of 600 and 1600 GWh energy and between 135 and 350 MW demand (see Table 2-3).[9] The present study projects that by imposing efficiency standards for motors (from one to up to 200 horsepower) savings could be as high as 136.7 GWh of electricity energy and 30 MW of electricity demand annually by the year 2010 (see Table 2-4).

Table 2-1. Philippines Industrial Electricity Consumption

Industrial Subsector	Energy Consumption in 1993 (GWh)
Food , beverages, tobacco	2,023.273
Textile industries	857.227
Paper and paper products	815.445
Chemicals	1,406.051
Non-metallic and mineral products	1,475.714
Basic metal industries	1,891.583
Fabricated metal products	876.520
Other industries (includes mining, quarrying, Wood and wood products	1,366.434
Total industrial energy consumption	**10,712.247**

Source: MERALCO, NPC, and DOE.

9 The estimates for Philippines energy and demand savings opportunities are tabulated based on the projections and proportions of United States industry.

Table 2-2. Industrial Sector Electricity End-Use Shares

Industrial Sub-sector	Motor	Lighting	Cooling	Other	Total
Food	83%	7%	5%	5%	100%
Textiles	55%	14%	11%	20%	100%
Paper & Paper Products	94%	3%	2%	1%	100%
Chemicals	38%	1%	1%	60%	100%
Non-Metallic Mineral Products	81%	2%	2%	15%	100%
Basic Metal Products	84%	6%	5%	5%	100%
Fabricated Metal Products	84%	6%	5%	5%	100%
Other Industrial	84%	5%	4%	19%	100%
Total	**72%**	**5%**	**4%**	**19%**	**100%**

Source: Long-Term Power Planning Study, 1995 (Consultant Report to Asian Development Bank [ADB] and the Philippines Department of Energy [DOE])

Table 2-3. Savings Potential: Motor- Driven Industrial Processes

Savings Measure	US Savings Potential (TWh)	Philippine Savings Potential (GWh)	Philippine Savings Potential (MW)
High- efficiency motor	59	140	30
Correct rewind damage	15	38	8
Correct over-sizing	8	20	4
Electrical tune- ups	14-72	36-184	20
Controls	75-298	192-763	42-167
DC and other motors	3	8	2
Maintenance	34-98	87-251	19-55
(indirect) Reduced distribution loss	24-55	61-141	13-31
(Indirect) Reduced HVAC effect	13-24	33-61	7-13
Total Savings	245-632	627-1617	137-353

Source: Nadel 1991 and ESMAP field study.

Table 2-4 Potential Energy and Capacity Savings of Motor Efficiency Standards for A.C. Induction Motor(1- 200 hp)

Year	Cumulative Energy Savings (MWh)	Cumulative Capacity Savings (MW)	Cumulative[10] CO2 Reduction (1000 kg)
Year 2000	55,160	12	40,453
Year 2010	136,697	30	100,244

Source: Report on Household Appliance Minimum Performance Program, ESMAP January 1993.

Potential Savings in the Residential and Commercial Sector

2.4 The potential for electricity savings is also great in the residential and commercial sectors. MERALCO's sales of electricity to the residential sector increased significantly (approximately 35 percent) between 1980 and 1990. Total electricity sales by MERALCO to the residential sector are estimated at about 3 to 3.5 TWh. A previous ESMAP study, the Philippines: Defining an Energy Strategy for the Household Sector 1992, revealed that lighting accounted for 28.4 percent, while refrigeration and air conditioning accounted for 30.9 percent of total electricity use in the household (see Table 2-5). Thus, significant savings in this sector are concentrated in lighting and refrigeration.

2.5 Similar to its sales in the residential sector, MERALCO's total sales of electricity in the commercial sector were approximately 3 to 3.7 TWh, but the total sales increase was slightly lower, only about 28 percent in the same period (1980 and 1990). An audit of 50 commercial buildings by the Philippines Department of Energy in 1989 revealed that 60.4 percent of the total electricity consumption was for air conditioning, 19.3 percent for lighting, and another 20.3 percent for other applications (see Table 2-5). The present study estimates that an implementation of product performance standards for room air conditioning, refrigerators, ballast, fluorescent lamps, and some motors (up to 200 horsepower) could potentially save 1,707,189 MWh and reduce peak demand by 478 MW over 10 years (see Table 2-6).

10 Carbon Dioxide reductions varies widely depending on the power plant efficiency and the used fuels. Nonetheless an average 7ee kg/MWh CO_2 emission is used for the calculation.

Table 2-5. Distribution of End-Use Application by Sector

Application	Residential Sector Buildings	Commercial Offices a/	Sector Hotels a/	Buildings Hospitals a/
Air Condition	3.9	60.4	61.9	65.5
Refrigeration	27.0	*	*	*
Lighting	28.4	19.3	22.5	16.3
Others	40.7	20.3	15.6	18.2
Total	100	100.0	100.0	100

Note: a/ There is no separation of refrigeration load in the commercial survey or in surveys for hotels and hospitals.

Sources: 1) The Philippines: Defining and Energy Strategy for Household Sector, ESMAP 1992;
2) DOE Building energy use report.

Table 2-6. Achievable Energy and Demand Savings
(1995- 2005)

ITEM	AVG. ACCUM ENERGY SAV'GS		TOTAL DEMAND REDUCTION		AVOIDED INVEST COST		TOTAL AVOIDED COST (Mil US$)
	Appl savings (kW/ Unit)	Utility (MWh)	peak load (MW)	base load (MW)	Peak load (Mil US$)	Base load (mil US $)	
Room A/C	268	240,380	62	21	43	32	75
Refrigerator	112	474882	127	42	89	63	152
Ballast (40W)	13	524,180	157	52	110	78	188
FL- Lamp (40 W)	10	365,742	110	37	77	56	133
Motors (1-200)	278	102,005	22	7	15	11	26
TOTAL	*	1,707,189	478	159	334	240	574

Note: Savings reflects the estimated potential for the cumulative savings that could be achieved by implementing the Household Appliance Minimum Product Performance Program

Source: Report on Household Appliance Minimum Performance Program, ESMAP January 1993.

Achievements

2.6 The Philippines is one of a very few developing countries that has taken initial steps to implement a testing and labeling program for household appliances. The Department of Energy and the Fuels and Appliances Testing Laboratory (FATL), in cooperation with Bureau of Product Standards (BPS) has been successful in establishing the regulatory framework necessary to implement the minimum efficiency program for air conditioners. The approach uses the Minimum Performance Standards (MPS) and labeling programs to inform consumers about energy costs while applying pressure on manufacturers to market or produce more efficient products. Recently, the Fuels and Appliances Testing Laboratory (FATL) completed a National Testing Standard for refrigerators and began to establish a dialogue and negotiation with refrigerator manufacturers in the country to develop labeling, and ultimately, efficiency standards for refrigerators. The government's cooperative approach i.e., its reliance on negotiation with manufacturers is very typical in Asia and has been successful in developing minimum efficiency standards for air conditioners in the country. It is expected, therefore, that the Philippines should soon be able to establish efficiency standards and begin labeling refrigerators. Furthermore, recently, with assistance from the World Bank, Asia Alternative Energy Unit, the Fuels and Appliances Testing Laboratory (FATL) has begun testing the performance of compact fluorescent lamps which are available in the Philippines. These activities are positive steps toward establishing household appliance standards for energy efficiency.

2.7 Implementation of Minimum Performance Standards (MPS) for household appliances is one of many electricity end-use efficiency achievements. Recently several important laws and regulations aimed at improving end-use efficiency have also been enacted. One of the most successful required that enterprises with monthly energy expenditures in excess of 2 million pesos hire energy managers and report their energy consumption to the Department of Energy. As a result of this law, about 40 percent of large industrial customers are in continuous dialogue with the Department of Energy through energy reports, energy audits, and special energy advisory services. The effect has been particularly impressive in the cement industry. Since the enactment of this legislation the overall energy consumption in the cement industry has declined.

2.8 However, the Philippines still does not have efficiency standards for motor or testing facility and capacity. As pointed out in the previous sections, potential savings resulting from implementing motor efficiency standards are quite large. As a result, it is crucial that the government -- in particular the Department of Energy (DOE), Fuels and Appliances Testing Laboratory (FATL) and Bureau Product Standards (BPS) -- prepare the regulatory framework necessary to establish motor efficiency standards. This study recommends that Fuels and Appliances Testing Laboratory (FATL) begin to built its capacity to implement a motor efficiency standards and efficiency testing program. The implementation of a motor efficiency standards and testing program should be incremental to allow time for the agencies involved to build their capability and for lawmakers to develop a regulatory framework as well as consumers to make adjustment. The process of capacity building could for example, begin by targeting the

rewind motor (as recommended in this study). Programs such as certification for rewind motors and motor rewind technology transfer could be used as a vehicle toward the implementation of motor efficiency standards.

2.9 Since 1980 the Philippines Department of Energy, with assistance from foreign donors, has initiated the implementation of more than US$14 million in energy conservation and efficiency improvement programs (see Annex 5). Typically, these conservation programs have been aimed at reducing wasteful use of energy, promoting adoption of energy efficiency improvement and conservation technology, providing end-use efficiency technology information, and assisting industrial and commercial energy customers in implementing end-use efficiency improvement and conservation measures. These programs have been successful in increasing public awareness of energy savings potential and the financial viability of energy efficiency measures. The programs have also helped to contain energy waste through implementation of energy audits and low-cost house-keeping measures. The Department of Energy also: (1) conducted seminars for the energy managers of approximately 120 industrial and commercial establishments; and (2) trained and certified energy managers to implement energy conservation programs. By concentrating on promoting public sector capacity and allowing the government to take the lead and act as a focal point for executing energy conservation programs and projects, the private sector was left behind in providing end-use efficiency services to consumers.

2.10 The climate for implementing electricity conservation in the industrial sector is currently very positive for several reasons. First, the cost of energy (including electricity and other fuels) in the Philippines is relatively high; electricity rates in the Philippines for all customer classes are much higher than in other Asian countries except Japan.

2.11 Second, the recent power crisis created a high level of public awareness of energy issues. This awareness is much higher than in other countries in Asia and cuts across the social spectrum. The power crisis placed burdens on everyone in the country. The memory of the economic and business losses caused by power shortage is still fresh.

2.12 Third, the Philippines is endowed with low-cost and skilled human resources. There is a large pool of engineers (and other technically oriented personnel) available to work for private energy management or suppliers of end-use efficiency equipment for competitive compensation relative to the current labor market. Furthermore, if the recent interest in privatizing the National Power Corporation (NPC) is realized the pool of available engineers may increase, and retraining them for employment on the end-use side may be the most logical approach. Although these engineers and technicians lack specific knowledge about energy end-use efficiency and conservation, but they could easily be retrained.

2.13 Fourth, the government, which to date who has been the focal point of energy end-use conservation and efficiency improvement, is aware of the need to develop a sustainable end-use conservation and efficiency improvement activity i.e., a market approach.

2.14 Fifth, there exists a viable market for end-use efficiency services and equipment. Recent government efforts to liberalize trade have created an interest among large and medium

industrial operators and owners in reducing their electricity bills as part of the overall efforts to attain a competitive advantage.

2.15 However despite these achievements and favorable conditions, the trend has not been a sustainable. The overall energy efficiency improvement and conservation effort in the Philippines is still fragmented. This study finds that a vast majority of energy consumers have not taken any efficiency improvement and conservation measures. These inaction, especially among large industrial and users suggests an urgent need to explore the causes and develop a long-term solution for electricity end-use conservation and efficiency improvement.

III. END-USE CONSERVATION AND EFFICIENCY ISSUES

3.1 End-use energy conservation and efficiency improvement activities in the Philippines cannot flourish without a long-term strategy. Despite a favorable environment, numerous demonstration programs, extensive foreign assistance, and legislative actions, the energy conservation programs have not reached a sustainable level for several reasons. First end-users (i.e., electricity customers) are unwilling to invest in electricity conservation and efficiency improvement. Second, suppliers of electricity efficiency equipment and contract energy management services, as part of their lack of long-term vision have failed to appreciate the potential long-term, profits associated with energy efficiency technology. Third, the institutional and regulatory framework provides mixed signals when promoting end-use efficiency and conservation activities. Fourth, the unavailable or inaccessible financing necessary to invest in electricity conservation and efficiency improvement projects.

3.2 In the absence of a clear agenda to overcome these constraints end-use conservation and efficiency improvement activities will not be able to reach a sustainable level. Although many individual energy conservation and efficiency improvement projects have been successful, they have failed to create the necessary infrastructure to establish the energy end-use conservation and efficiency improvement market.

End-Users

3.3 One of the main constraints is the continuing reluctance of a vast majority of electricity end-users (i.e., electricity customers) to invest in conservation and efficiency improvement. Their unwillingness and skepticism stem from lack of reliable information on the technology and the costs and benefits of conservation and efficiency improvement, lack of access to necessary financial resources, and consumer attitude toward conservation and efficiency improvement. In practice, electricity end-users (i.e., electricity customers) have failed to create demand for electric conservation and efficiency services.

3.4 First, senior management in particular are not aware of end-use energy efficiency technology and the financial returns possible on such an investment. In recent years cost-effective energy-efficient technologies have been improving rapidly, but few training materials and courses have disseminated these new technologies. As a result, a vast majority of electricity consumers are still not familiar with the financial benefit of energy-efficient technologies. In some cases, managers are aware of energy-efficient technology and the attractiveness of the financial return, but remain reluctant to invest. These managers give a higher priority to investment in the expansion of their production than to investing in energy-efficient technology. Typical decision-making processes ignore the impact of investment in energy-efficient technology on the productivity and competitiveness of the industry.

3.5 Second, the practice of business decision making typically places emphasis on initial purchase cost and on simple analysis of payback period. This makes energy-efficient equipment and services appear uncompetitive. It is also quite common -- especially during economic downturn periods -- that energy customers do not have access to the financial resources necessary to purchase energy-efficient technology and services.

3.6 Third, energy efficiency is not one of the top priorities of high level managers. Typically, middle-level and junior-level managers are rewarded for maintaining production schedules irrespective of energy costs.

3.7 Fourth, there is a lack of unbiased information and easy access to energy-efficient technology and equipment. Customers are therefore, skeptical about claims of energy savings. As a result, there is a need for a performance standard and testing program to provide objective and reliable information to purchasers of energy-efficient equipment. Furthermore, reliable information on the performance of conservation and efficiency improvement measures must be readily available for energy consumers and decision makers.

3.8 Fifth, there is generally low level of confidence in providers of contract energy management services. The lack of an established group of such providers is an impediment in itself. As will be pointed out in the following section, there have been cases in which unscrupulous firms have supplied bogus services and products that did not meet the claims of their advertisement the resulting bad reputation has discourage plant managers and owners from investing in equipment and services recommended by contract energy management.

3.9 In the Philippines the above constraints have been further aggravated by years of chronic economic instability, which have prevented electricity consumers from investing in new areas such as energy conservation and efficiency improvement.

Private Suppliers of Services and Equipment

3.10 Another key obstacle preventing end-use conservation and efficiency improvement from reaching a sustainable level has to do with suppliers of end-use efficiency equipment and services, such as suppliers of contract energy management services. In the field of energy end-use efficiency, the Philippines private sector lack both the capacity and the credibility among energy consumers necessary to perform the services or supply energy-efficient equipment. The limitation of capacity has resulted from the government's failure to recognize the role of private sector. In the past, virtually all government projects, whether conducted as pilot or demonstration projects, focused on building the capacity of Department of Energy (DOE) staff and engineers in order to serve local industry. The government of the Philippines has not extended a great deal of assistance to private suppliers of end-use efficiency services and equipment to help them or allow them to participate in the implementation of energy conservation and efficiency projects. In spite of the government's direct involvement in energy conservation and efficiency improvement, its services are still limited. Given the potentially

large energy saving and the magnitude of end-use energy efficiency activities, but the government's limited fiscal and manpower resources it cannot effectively and efficiently provide end-use efficiency services to all energy consumers.

3.11 Likewise, support from international donor agencies for the private sector has been limited to seminars and training workshops that have failed to transfer technological know-how in the area of energy end-use conservation and efficiency improvement to private sector participants. Neither the government nor international donor agencies has made a concentrated effort to develop private sector capacity to provide energy end-use conservation and efficiency services as an integral part of an energy efficiency improvement and conservation program. At the same time, the private sector finds it difficult to enter the market to compete with the government.

3.12 Moreover, private suppliers of end-use efficiency equipment and services have failed to build credibility among electricity consumers because in the past some of these private suppliers did not have long-term business visions. For example, during the power crisis, several private companies claimed that their services and equipment would help electricity customers cope with brown-out problems. In fact, the evidence suggests that these claims were not met. The short-sighted business practices of these companies have severely damaged the credibility of the suppliers of contract energy management services and equipment, thus creating a large obstacle to the development of a sustainable energy end-use efficiency activities in the Philippines.

3.13 Currently, the number of contract energy management services with acceptable experience and technical know-how remains small. The potential to develop commercially viable end-use energy conservation and efficiency improvement services is still limited. Moreover, these companies also have to overcome image problems created by companies with short sighted business practices.

Institutional Framework

3.14 Another set of constraints has to do with an institutional and regulatory framework that sends mixed signals to electricity end-users and private suppliers of energy efficiency equipment and contract energy management services. The institutional and regulatory framework should be designed to provide incentives for both end-users and suppliers of energy efficiency equipment and services to conserve electricity and improve efficiency. For example, the Philippines government must institute a more appropriate tariff structure that includes appropriate demand charges. As recommended in a 1994 World Bank report, "The Government's pricing policy has been at variance with the National Power Corporation's (NPC) supply constraints. As a result, electricity is already very expensive for unsubsidized consumers. The structure of tariffs needs revision to include demand charges. Distorting subsidies need to be eliminated or made fully transparent. Appropriate regimes for wheeling and standby charges

need to be developed."[12] Although recently there have been some minor rate adjustments, significant electricity pricing reforms are needed.[13] In the absence of suitable pricing signal and strong regulatory frameworks electric end-users will not have correct incentives to invest in any end-use energy conservation and efficiency improvement.

3.15 Another example refers to the fact that the removal or reduction of imported duties for energy-efficient equipment would allow this equipment to compete with inefficient equipment in the market. In effect, the government must adopt a long-term vision by creating an environment in which electricity conservation and efficiency improvement can flourish. In the absence of a clear and unifying agenda from the government, electricity end-use conservation and efficiency improvement activities will not be able to reach a sustainable level.

3.16 Government actions and policies have also failed to realize the significance of suppliers of contract energy management services and equipment. Realizing the importance of energy conservation and efficiency improvement, the Philippines government has been directly involved in variety of energy efficiency projects. This left little room for the private sector to participate in the energy efficiency services market. For example, only US$200,000 out of a US$14 million government-sponsored energy conservation and efficiency improvement program went to contracts with private companies. Moreover, a vast majority of energy efficiency activities and programs have emphasized solutions to immediate energy problems; they lack a long-term vision and mechanism that would allow an end-use energy conservation and efficiency improvement market to flourish.

3.17 In practice, the implementation of electricity end-use conservation and efficiency improvement among electricity customers will result in direct revenue losses among distribution companies (such as MERALCO) and independent power producers. The benefits will fall largely on electric customers and the National Power Corporation (NPC) in terms of avoided investment. This is where the market fails to function properly. If the benefits and costs are not regulated to distribute equally among players (distribution and generation companies) in the power sector, any efforts to develop a sustainable electricity end-use conservation and efficiency improvement will fail.

Financial Issues

3.18 Another issue is the availability and accessibility of the capital necessary to finance electricity end-use conservation and efficiency improvement projects. In general, end-users, contract energy management services, and suppliers of end-use efficiency equipment in the

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[12] Ther Philippines Power Sector Study, Structural Framework for the Power Sector, World Bank Report No. 13313-PH, November 30, 1994.

[13] Due to rapid developments in power sector reform and restructuring, it is conceivable that significant change may take place soon. Recently, the National Power Corporation (NPC) requested that the Energy Regulatory Board (ERB) approve the introduction of demand-based charges in its wholesale rate and MERALCO has requested a 7.5 percent rate increase.

Philippines lack easy access to capital in the amount necessary to invest in such projects. The lack of access to capital is further exacerbated by the fact that initial costs for energy-efficient equipment are very high. In practice, energy conservation and efficiency improvement projects must compete for capital with other projects such as expansion and renovation. Because of problems such as attitude toward conservation, lack of information, and lack of a long-term business vision on the part of service providers, energy conservation and efficiency improvement projects have not been given priority for the capital. Furthermore, as is the case in many countries financial institutions in the Philippines are not interested in providing any loans for energy end-use conservation and efficiency improvement projects. During the past decade, the lack of credits has been further exacerbated by years of chronic economic instability and low domestic and foreign investment.

Energy-efficient Equipment

3.19 Energy-efficient equipment in the Philippines is relatively expensive for electric customers. Although in many cases energy-efficient technologies are fairly well-known, they are not readily available locally and must be imported. However, most importers are not interested in importing energy-efficient equipment because the Philippines market is small. Local suppliers and importers do not foresee any profits to be made. In some cases, energy-efficient equipment is available but at a substantially higher price than in industrialized countries. In addition, imported, energy-efficient equipment is made for used in industrialized countries, whereas experience and testing has shown that some technologies may not be suitable for use with the uncertain power quality. For example, the compact fluorescent lamp may not be suitable because of the uncertain power quality, -- that sometimes characterized the Philippines power supply situation -- which may shorten the life of the lamps. Therefore, it is crucial that a performance standard and testing program be established to screen out the unsuitable products and provide unbiased information to consumer.

Power Sector Reforms and End-Use Efficiency Issues

3.20 As pointed out in Chapter I, recent developments in the Philippines power sector have had several important consequences besides providing adequate electricity supply both short and long-term to electric customers and shifting the burden of investments to the private sector. Each of which consequences implies that there is an urgent need for the government to create a favorable environment, -- i.e., an institutional and regulatory frameworks -- to ensure a sustainable level of end-use conservation and efficiency improvement activities in the country.

3.21 Efforts to create sustainable electricity end-use conservation and efficiency improvement could be weakening because independent power producers and distribution companies are in the business of selling electricity. Unless the government institutes a regulatory framework to ensure that these private power producers will benefits from electric end-use efficiency activities, any long-term conservation and efficiency efforts are likely to fail.

3.22 Restructuring and privatization of the power sector, particularly the National Power Corporation (NPC), would mean that some positions would be terminated. It is crucial that these former utility companies employees be retrained in the areas of demand-side and load management, conservation, and end-use efficiency for electric customers. It is expected that these retrained personnel will play a crucial role in creating sustainable end-use energy conservation and efficiency improvement activities in the Philippines. The retraining program would alleviate the economic and social impact of restructuring and privatization as well as benefit the proposed demand-side management programs when they are implemented.

3.23 It is conceivable that restructuring and privatizing the Philippines power sector will create competition at both wholesales and retail levels. In a competitive power market, large industrial and commercial customers would be allowed to negotiate rates directly with the supplier. It is therefore crucial that large industrial and commercial customers prepare themselves to reduce electricity costs under the new market conditions. Such preparation includes helping customers learn to better manage their electricity demand, negotiate electricity rates with suppliers, and reduce their electricity bills.

3.24 Although the "fast track" power sector reform has successfully relied on private power producers to solve power crisis, the electricity prices charged by those are relatively high. Most of the new power plants added on to solve the power crisis have very high operating costs because they rely on imported oil or diesel. Therefore, it is essential that the government encourage electricity consumers -- particularly large and medium industrial and commercial customers -- to engage in electricity end-use conservation and efficiency improvement to alleviate the impact of high electricity prices and to maintain a competitive advantage for their products in the world market.

IV. ACTION PLAN TOWARD SUSTAINABLE END-USE CONSERVATION AND EFFICIENCY ACTIVITIES

4.1 The previous chapters outlined potential electricity savings, past electricity conservation efficiency activities, achievements, and constraints on sustainable end-use conservation and efficiency improvement in the Philippines. The hurdle requiring most immediate attention is the institutional and regulatory framework, which sends a mixed signal to electricity consumers, contract energy management services, and end-use efficiency equipment providers. Specifically, the government must take immediate action to:

(1) Revise electricity tariffs to reflect the true costs of power generation, transmission, and distribution; (The approval -- in early 1995 -- granted to the National Power Corporation to modify tariff structure to have higher demand charge is another positive step toward the electricity tariff reform.)[14]

(2) Reform the regulatory framework ensures that the benefits and costs of electricity end-use conservation and efficiency improvement are distributed fairly among generation and distribution companies;

(3) Implement other regulatory frameworks to remove obstacles and encourage consumers to invest in electricity end-use conservation and efficiency improvement, for example removing imported duties on energy-efficient equipment;

(4) Develop an immediate and long-term plan to strengthen private sector capacity;

(5) Set standards for energy end-use efficiency services and equipment.

4.2 The main objective of these actions should be to create an environment that encourage electricity efficiency and conservation efforts in the Philippines to reach a more active and sustainable levels. These recommended actions will require political and fiscal commitment by the government.

4.3 As an initial step toward sustainable end-use efficiency activities in the Philippines, this study recommend two specific electricity conservation and efficiency improvement programs. The first program involve a capacity building toward an establishment of electric motor efficiency standard as well as implementing electricity efficiency standard for rewound motors. Specifically, the program involves using a technology transfer for motor rewind and implementing certification for motor rewind and rewound motors as a vehicle for capacity building toward implementation of electric motor efficiency testing and standard in the country. The second program is aimed specifically to improve electricity efficiency and

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[14] The new tariff structure provides 50 percent of the revenue from demand charge and another 50 percent from energy consumed, while the old tariff structure provides only 30 of revenue from demand charge and the rest from energy consumed.

conservation among large and medium electricity customers through an implementation of power factor correction and in-plant load management demonstration program. The proposed program entails an establishment of electricity conservation revolving trust fund earmark for the program. The program is intended to promote private sector involvement in conservation and efficiency improvement and create sustainable end-use efficiency activities in the Philippines.

Motor Rewind Technology Transfer and Certification Program

4.4 As part of the strategy to promote sustainable end-use energy efficiency activities, it is critical that wasteful energy conservation practices be suspended and that wasteful energy-using equipment be eliminated from the market. As pointed out in this study, instituting electric motor efficiency standards could provide significant sustainable energy and demand savings. Currently, however, the Philippines lack both the necessary regulatory framework and an adequate electric motor efficiency standards and testing facility. It would be premature to recommend electric motor efficiency standards. However, as a first step toward this goal, this study recommends that a small program be developed for: (1) a technology transfer on motor rewinding; and (2) training in testing and certification program. Because rewound motors represent a significant portion of motors being used and another source of motor supplied to the market, the recommended program would allow the government to control the efficiency standard of rewound motors in the market. In practice, failed motors can be rewound to achieve their original specification and efficiency level, or in some cases achieve higher efficiency level. However, if the repair and rewind are poorly performed, it can accelerate efficiency degradation.

4.5 The recommended program would transfer technological know how on electric motor rewind and repair to local rewind and repair shops and large electric customers who currently rewind their own failed motors. The Fuels and Appliances Testing Laboratory (FATL) will be the lead agency for technology transfer, testing, and certification. The main objectives of the program are two folds. First, the program is used as a vehicle to build FATL's capacity toward electric motor testing and implementation of electric motor efficiency standard in the country. Second, the program is intended to make sure that the motor repair and rewind shops adopt the correct techniques for repair, and rewinding and that they screen out motors that are not cost-effective to repair or rewind. It is not intended to promote motor rewind business. In effect, the program would ensure that motor rewind and repair shops adopt the most up-to-date and correct technology and practices.

4.6 In practice, the program should be designed to educate motor rewind technicians, consumers, and to provide assurances concerning relevance products and services. Program designers should begin by developing an inventory of motor rewind and repair shops in the Manila metropolitan area and in the country, respectively. These shops should then be categorized on their volume of business and size of motor. This information will allow Department of Energy (DOE) and Fuels and Appliances Testing Laboratory (FATL) staff to develop a plan for a technology transfer and certification program. With assistance from motor rewind expert Fuels and Appliances Testing Laboratory (FATL) staff should as a second step

develop a series of workshop aimed at transferring motor rewind and repair techniques and technology to technicians from local repair and rewind shops. Concurrently, Fuels and Appliances Testing Laboratory (FATL) staff should develop a rewound motor testing program and a motor rewind and repair certification program.

Power Factor Correction and In-Plant Load Management Demonstration Project and Training Program.

4.7 To encourage the development of a sustainable end-use conservation and efficiency improvement activities, the present study recommends that the Philippines Department of Energy and distribution companies develop and implement a ***Power Factor Correction and In-Plant Load Management Demonstration Project and Training Program.*** The recommended demonstration project and training program will be designed to establish long-term solutions as well as overcome obstacles facing electricity end-users and providers of services and equipment. For example, the demonstration project would demonstrate to large industrial and commercial electricity customers the benefits of specific measures of conservation and efficiency improvement. The training program would contain a certification component designed to screen out unscrupulous service and equipment providers and set standards for the industry. The certification component would reestablish the credibility of electricity end-use efficiency service and equipment suppliers among electricity customers. The training would be directed at the management and staff of contract energy management services and end-use efficiency equipment providers, the energy managers of large industrial and commercial customers, as well as utility personnel to ensure the successful building of private sector capability.

4.8 The demonstration project would concentrate on specific measures of electric end-use efficiency, including improving power factor and in-plant electricity demand load management among large industrial and commercial electric customers. This is to reinforce distribution companies' interest in improving power factor as well as load factor among its customers. For example, MERALCO recently began providing technical advice to its customers to improve their power factor. In addition, major changes in the power sector which have been implemented including power sector restructuring and new tariff structure create a need end-use conservation and efficiency improvement specifically, the in-plant load management and power factor correction. Effectively, the power sector restructuring will likely change the way electricity is bought and sold at both the wholesale and retail level. Specifically, the effect of power sector restructuring at the retail level means that large and medium electric customers will eventually be allowed to negotiate electricity rates with any supplier. The recently approved tariff structure contains substantial demand charge. As a result, it is urgent that large and medium electricity customers begin to invest in in-plant load management and power factor correction to: (1) alleviate the impact of the new tariff; and (2) prepare themselves for the new power market structure. Similarly, at the wholesale level distribution companies will also be able to choose and negotiate wholesale electricity rates with any power producers. Therefore,

distribution companies will eventually have to prepare themselves for the new power market structure.

4.9 The proposed demonstration project and training program would not only strengthen this activity but also ensure its sustainability. They will also complement the proposed demand-side management programs currently under consideration by the Department of Energy (DOE) and the utility companies.[14] Specifically, the demonstration project and training program will prepare large and medium industrial and commercial customers for the demand-side management program, if the Philippines utilities choose to implement it. Typically, demand-side management program design and delivery for large and medium customers is custom-designed to fit customers' energy-use patterns and needs. As a result, it would benefit both utilities and customers if customers are prepared to discuss and negotiate for the program best suited to them. Furthermore, the recommended project and training program would prepare suppliers of contract energy management services and of end-use energy efficiency equipment for the demand-side management programs. In other words, it would lay the foundation for private sector and electric customers to participate in the demand-side management program. It is anticipated that if the demand-side management program is implemented, end-use efficiency equipment suppliers and contract energy management companies would play important roles.

Setting Up Revolving Trust Fund for Electricity Conservation

4.10 With respect to the financing barrier, it is recommended that the Philippines National Electrification Administration set up revolving trust fund earmarked for power factor correction systems and in-plant electricity demand load management for and medium large industries and commercial electric customers. As part of the power sector restructuring, the Philippines government is currently drafting a new electric power code. One specific element in the new legislation mandates that the National Electrification Administration (NEA) provides financial support to distribution companies. With this new role, NEA may be ideally suit to become a financial intermediary for electricity conservation. and efficiency improvement projects in the Philippines.

4.11 The availability of capital would encourage private firms to provide contract energy management services and end-use efficiency equipment. The fund will also provide: (1) consumers with some relief from the initial investment necessary for efficiency technology; and (2) alleviate the impact of electricity pricing reform. At the same time, the electricity conservation fund would serve as a "catalyst" by encouraging suppliers of capacitors and other efficiency equipment to participate in this specific end-use efficiency market promotion. The conservation fund could be accumulated from various sources, including power factor surcharges or penalties imposed by the utilities, the government, donor countries, World Bank loan, and the Global Environmental Facility.

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14 Recently, the Philippnes Department of Energy has completed two demand-side management studies, Long-Term Power Planning Study with assistance from the Asian Develoipment Bank and the Demand-Side Management Action Plan with assistance from United States Agencyfor International Development.

4.12 It is recommended that the National Electrification Administration manages the revolving trust fund for electricity conservation at the wholesale level, while participating distribution companies (including NPC since it also have about 90 direcly connected large industrial customers) acts as the executing agency of the fund, that is manage the fund at the retail level. In effect, NEA lend the money from the trust fund to participating distribution companies which in turn provide financing for their respective customers to invest in power factor correction and in-plant load management. The revolving trust fund could be accumulated both from within distribution companies, (a power factor correction surcharges) and from external sources. Therefore, to minimize complications stemming from the transfer of funds, revenue generated from power factor correction surcharges by the distribution company will remain within the company. However, these funds will be matched with funds borrowed from trust fund managed by National Electrification Administration (NEA).

4.13 To ensure that the trust fund is self-financing, National Electrification Administration would impose a small management fee for the money the participating companies borrow. Distribution companies would also add a service charge on its sevices. When the trust fund also includes loan money, an appropriate interest charge should be passed on to consumers.

4.14 **Operationalization and Organizational Arrangement:** Each participating company should also establish an Electricity Demand Load Management Unit. this unit would be responsible for approving each project, as well as providing technical assistance to, and verifying and approving the quality of services performed by the contract energy management company or suppliers of power factor correction equipment (i.e., capacitors). To finance the proposed projects, each participating company will use money accumulated from power factor correction surcharges and money borrowed from the revoling trust fund to pay for the equipment and services on behalf of its participating customers. In effect, the contract energy management services and end-use efficiency equipment providers will receive direct payment in full from the utility company. Customers will then pay for the services and equipment to the utility company as an additional payment on their monthly electricity bills. Effectively, customers lease purchase the capacitor and/or related services from the utility company. Or for simpler arrangement the utility company could directly lend the money to its customers who want to invest in power factor correction and/or in-plant load management.

4.15 The recommended demonstration project could be set up either parallel or complement to, as a part of, or independently from other demand-side management programs. However, it is crucial that certain conditions be instituted to create incentive among targeted customers, including a reasonable power factor surcharge and demand charge.

4.16 Projects can be initiated by any party, including, utility companies, electricity customers, and contract energy management services or equipment providers. However, the responsible agency, i.e., Electricity Demand Load Management Unit of the participating distribution companies must develop a work plan to: (1) approve the proposed project; (2) ensure sound technical services and equipment; and (3) certify the quality of services and equipment

before release payment to contract energy management services and equipment suppliers. This is because the services and the installed equipment (i.e., the power factor correction system and in-plant load management) belong to the utility companies. Electricity customers lease services and equipment from the utility companies. Almost all of the responsibility is placed on the participating distribution companies because the companies finance each of the project. Furthermore, the companies are in a much better position than customers to ensure that the provided services and the installed equipment are technically sound.

4.17 Participating distribution companies together with National Electrification Administration (NEA), and the Department of Energy (DOE) should employ a direct marketing approach. Utility companies staff must directly contact and visit large industrial and commercial customers to convince them to participate in the demonstration program and training project. This direct marketing approach will allow their staff to learn more about the specific needs of each customer as well as create public awareness among customers. Utility companies staff should also contact potential contract energy management services and end-use efficiency equipment providers. This will allow interested private sector entities to prepare for participation.

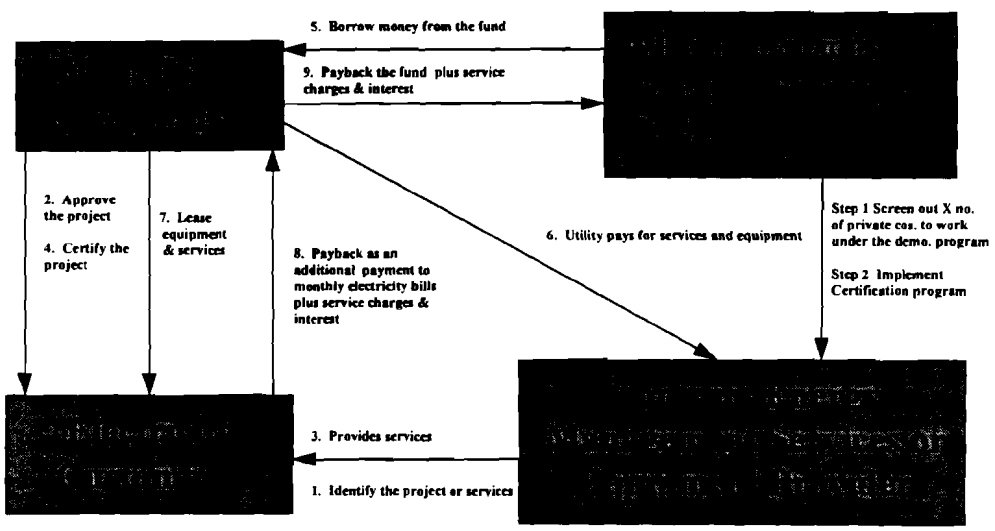
Training and Technology Transfer

4.18 Parallel to the demonstration project, a training and certification program must be established. The training program should be designed to transfer the related technology and training (i.e., a power factor correction systems and in-plant electricity demand load management) in order to strengthen private sector capacity. Participants should include industrial plant and building energy managers (i.e., electricity customers), as well as personnel from utilities, contract energy management companies, and suppliers of end-use energy efficiency equipment. The certification component of the proposed training program should screen out unscrupulous providers of contract energy management services and equipment and set standards for the market. The demonstration project, together with training and technology transfer program would complement recent developments in power sector reform in two ways. First, the demonstration project and training program would educate and prepare large customers to be ready for ongoing power sector reform. Specifically, if the reform is proceeds as planned, large and medium electric customers would be allowed to negotiate prices directly with their suppliers. Currently, most large industrial customers are not allowed to negotiate electricity prices with their suppliers, the exception being the National Power Corporation (NPC) direct customers. The recommended demonstration project and training program will also help large and medium industrial and commercial customers to better manage their electricity demand load.

4.19 Second, as a result of the ongoing power sector reform, its is conceivable that the National Power Corporation (NPC) will eventually be privatized. This would mean that some personnel would no longer needed. The demonstration project and training program would allow some of the personnel, particularly those hired to the newly established Customer Load Management Unit in each participating distribution company, to be retrained in the areas of load

management, conservation, and end-use efficiency for electric customers. It is expected that these retrained personnel will play a crucial role in creating a sustainable level of end-use energy conservation and efficiency improvement in the Philippines. The retraining program will also benefit the proposed demand-side management programs, if they are implemented.

Figure 4-1
Power Factor Correction and In-Plant Load Management Demonstration Program



Awareness and Information Campaign

4.20 To ensure that large industrial and commercial electric customers are aware of electricity end-use efficiency measures and their benefits, the Department of Energy (DOE) and National Electrification Administration (NEA) in conjunction with utility companies should creates a public awareness and information dissemination campaign. Specifically, there are two level of campaigns: (1) a macro level designed to advertise the costs and benefits of certain end-use conservation and efficiency improvement measures/technologies; and (2) a micro level (i.e., case studies) designed to educate electricity customers using the example of the proposed demonstration program. The targeted audience of the campaign should be top industrial and commercial managers, chief executive officers and their staffs, chief financial officers, engineering operation managers, and private suppliers of end-use efficiency equipment and/or services.

4.21 To improve customer awareness at the macro level, the program should include a range of activities to encourage and inform major business decision-makers of the benefits to be gained from effective energy management. A case study focusing on the benefits of specific end-use conservation and efficiency improvement measures implemented as part of the effective energy management must be used to complement the macro level of campaign and to persuade the audiences. The main strategy is to link case studies with the general awareness and information campaign. Using case studies would be the most effective approach for demonstrating the financial benefits of energy management (i.e., in-plant load management and power factor correction) to senior management. Several methods could be used to promote awareness and deliver information. The methods to be considered include:

- Technical and business presentations to business clubs and industry and trade association;
- Technical presentations to relevant professional association or clubs;
- Placement of reports and articles in the business press and other related publication;
- Retainment of public relation firms or advertising company to promote awareness and disseminate information.

ENERGY MANAGEMENT ORGANIZATION IN THE PHILIPPINES

Organizations	Activities	Energy Audit Equipment and Facilities	Capability of Permanent Technical Personnel and Funding for Activities
1. Department of Energy • Conservation Division • Fuel and Appliance Testing Laboratory	• Conduct energy management and training course. • Extend Energy Audit services. • Monitor energy consumption of energy intensive companies. • Implement foreign- assisted projects. • Fuel & industry water samples testing. • Calibration of industrial instruments. • Appliance. • Energy labeling.	• One energy bus. • Several set of energy audit equipment. • Fuel and industrial water laboratory. • Calibration equipment. • Appliance efficiency testing modules.	• Eight years experience in energy management • Attended various training both in-country and abroad • Funding comes from government budget and donor support
2. Cebu Chamber of Commerce and Industry (CCCI) (an industry association)	• Energy audit services.	• One energy bus leased from DOE. • Set of energy audit instrument leased from DOE.	• Two years experience in energy audit services • On-the-job training at DOE • Funding comes from donor support and member fees. Income of P 170,000 in 1991
3. PNOC - Energy Research and Development Center (PNOC-ERDC) (government corporation	• Limited number of energy audit services to PNOC subsidiaries and Petron Corporation clients.	• Has limited equipment (arrange joint energy audit service activities with DOE).	• Two years of energy audit service experience through a sub-contract from DOE • Funding comes from corporate funds and support from government donors
4. Energy management Association of the Philippines	• Conduct energy management workshops and conventions. • Arranges foreign expert assistance. • Cooperates with DOE in giving annual achievement awards in energy conservation.	• No permanent technical staff. There is however, possibility of drawing technical staff from association members on a part-time basis. • Funding comes from membership fees and minimal donor supports.	• Two years of energy audit service experience through a sub-contract from DOE • Funding comes from corporate funds and support from government donors

ENERGY MANAGEMENT ORGANIZATION IN THE PHILIPPINES

Organizations	Activities	Energy Audit Equipment and Facilities	Capability of Permanent Technical Personnel and Funding for Activities
5. National Engineering Center	• Cooperate with DOE in the conduct of energy management training courses.	None.	• No technical staff to conduct energy audits but can provide lecturers. • Funding comes from training fees and government support.
6. Philippines Center for Industry, Energy Research and Development (PCIERD) (government agency	• Provide funding for energy conservation projects implemented by DOE.	None.	• Handles only administration of funding for others • Funding comes from government support and from donors.
7. University of Mindanao (RUE-DAVAO)	• Offer Energy Conservation and Management Course as a subject at the university level. • Extended limited number of energy audit service to industrial companies.	• Set of energy audit instruments leased from DOE.	• One university professor has undergone on-the-job training at DOE • Funding comes from donors support. Facilities are provided by University. Obtain some income from energy audits.
8. Energy Development and Utilization Foundation, Inc. (EDUFI) (semi-private foundation)	• Coordinate joint private-government energy programs.	None.	• There is an Executive Director that currently implements activities of the foundation. The foundation intends to personnel from existing organizations to implement its activities. • Funding comes from government support, contributions from industry associations and donors
9. Board of Investment	• Includes energy conservation projects in the Investment Priorities Plan (IPP) upon requested of interested parties. Listing in IPP (annual) enables projects to obtain fiscal incentives.	None.	• Technical personnel are able to evaluate energy conservation. • Funding comes from government budget.

THE FIRST ENERGY CONSERVATION LAWS BEFORE THE OMNIBUS LAW

Laws/Regulations	Date Approved	Provisions
1. Presidential Decree No. 1026 as amended by Presidential Decree No. 1573 Law creating the Department of Energy	October 6, 1977	Empowered the Bureau of Energy Utilization (now Office of Energy Affairs) to: 1. Formulate, develop and periodically review the national energy conservation program. 2. Conduct energy audit of energy-consuming establishment to develop and help improve energy utilization efficiency. 3. Develop and adopt energy utilization standards. 4. Require energy-intensive projects and establishments to submit an energy impact assessment.
2. Letter of Instruction No. 825	March 16, 1979	Requiring all industry plants, factories and commercial establishments consuming at least P 3,000,000 worth of fuel and power per annum to submit energy conservation program and quarterly energy consumption reports.
3. Batas Pambansa Blg. 36 Energy Tax on Electric Power Consumption	September 7, 1979	An energy tax was incorporated in the electric charges of residential customers consuming more than 650 kWh per month.
4. Letter of Instruction No. 1152	April 10, 1980	Directing the Board of Investments to include Energy Conservation Projects in the Investment Priorities Plan and to extend the incentives under the Omnibus Investment Code.
5. Letter of Instruction No. 1018	May 9, 1980	Requiring all government offices and government corporations to institute energy conservation measures to reduce their electricity consumption to 90% of the 1979 level.

THE OMNIBUS LAW
(Batas Pambansa Blg. 73)

Laws/Regulations	Date Approved	Provisions
1. Batas Pambansa (B.P.) Blg. 73 as amended by B.P. Blg. 872 "Omnibus Energy Conservation Law" (effective from June 11, 1980 to June 10, 1990)	June 11, 1980	1. Prohibition of the importation, manufacture of assembling of gasoline-powered passenger cars with engine displacement of over 2800 cc or curb weight exceeding 1500 kg including accessories. 2. Prohibition of the use of neon and electric lights for commercial advertising earlier than 6:00 p.m. and beyond 9:00 p.m. and, except during the Christmas season and Ramadan, the deliberate and excessive lighting in hotels, shopping complexes, buildings and commercial establishments. 3. Requiring industrial, commercial and transport establishments to collect waste oil for recycling as fuel or lubricating oil. 4. Requiring industrial, commercial and transport establishments consuming more than one million fuel oil equivalent liters of energy annually to submi fuel and electric consumption, production and sale statistics. 5. Requiring industrial, commercial and transport establishments consuming more than two million fuel oil equivalent liters of energy annually to employ qualified engineers to act as energy managers, and to submit conservation programs and energy audits. 6. Regulating the use of air-conditioners in offices, as well as in commercial and industrial establishments, including the setting of thermostats to temperatures that will conserve but still assure reasonable convenience to users. 7. Requiring manufacturers and dealers of oil and electric-consuming devices equipment, appliances, and vehicles manufactured or sold in the Philippine to show their product's energy requirements and consumption efficiency. 8. Prohibiting the use of government vehicles for purposes other than official business.

THE OMNIBUS LAW
(Batas Pambansa Blg. 73)

Laws/Regulations	Date Approved	Provisions
		9. Establishment and administration of a fuel allocation and rationing program, as well as fixing oil refineries' production yields and qualities during period of tight supply. 10. Requiring distribution and sale of alcohol/gasoline (alcogas) or other energy blends in order o increase the use of domestic energy resources. 11. Setting standards of energy consumption for oil-powered or electric-driven machinery, equipment, appliances, devices and vehicles imported into, manufactured, assembled or sold in the Philippines. 12. Setting energy use standards for industrial, commercial and transport establishments. 13. Staggering working and school hours to conserve energy and ease the traffic situation. 14. Prescribing the study of energy conservation in appropriate grades or levels in school. 15. Setting standards in the use of building materials and in the designs for private offices, as well as commercial and industrial buildings, which will promote the ends of energy conservation. 16. Limiting and fixing operating hours of business and entertainment establishments. 17. Regulating the use of motor vehicles to include: restricting the use of certain types of vehicles, imposing carless days, fixing speed limits, denying registration of vehicles not meeting energy consumption standards, etc.

THE ENERGY CONSERVATION ACT OF 1991

Descriptions	Comments
1.0 Title: "Energy Conservation Act of 1991"	
2.0 General Description: An act to institutionalize energy conservation and enhance efficient use of energy.	Emphasized permanence of the Law as opposed to Batas Pambansa Blg. 73 which had specific period of effectivity.
3.0 Pertinent Provisions:	
3.1 The Office of Energy Affairs is empowered to:	
(a) Plan, develop and implement overall national energy conservation measures, programs and activities.	Restated the mandate of the Office of Energy Affairs (Executive Order No. 193) in more specific terms.
(b) Conduct energy audits of the industrial, commercial and transport establishments in order to identify and recommend energy conservation measures.	This activity has been implemented by the Office of Energy Affairs (OEA) since 1979. By December 31, 1991, OEA already has extended close to 700 energy audit services. Current capability is around 100 companies per year.
(c) Set, in consultation with the Department of Trade and Industry, standards of energy consumption for oil-powered or electrical-driven machinery and equipment including but not limited to boilers. Kilns and furnaces, electrical equipment, appliances, and vehicles imported into, manufactured, assembled or sold in the Philippines for domestic use, taking into account the technical and economic limitations involved.	Setting of standards require close consultations between the government and the affected sectors (local manufacturers, importers, etc.). Certification testing facilities are sometimes required. During the ten year effectivity of Batas Pambansa standards of energy consumption were set for window type air-conditioners.
(d) Require industrial, commercial and transport establishments consuming more than one million fuel oil equivalent liters of energy, including liquid fuels and electricity annually, to submit fuel and electric consumption as well as production statistics in order to properly monitor energy consumption and utilization efficiency.	Since 1979, OEA has required establishments covered to submit quarterly energy consumption reports. Ensuring compliance is the main problem. Submissions from 1979 to 1981 had already been encoded into an Energy Data Base developed by OEA. The reporting requirement enabled OEA to identify clients for its energy management services (energy audits, training courses, etc.). It is envisioned that data can be used to set energy use standards or norms for industrial, commercial and transport establishments.
(e) Set in consultation with concerned government agencies, energy use standards for industrial, commercial and transport establishments, taking account the technical and economic limitations involved.	This same provision was also included in Batas Pambansa Blg. 73. However, due to the absence of working models even in industrialized countries, OEA has found it difficult to implement the provision in the last 10 years. With the establishment of the Energy Data Base for quarterly energy reports, it is hoped that OEA can start a pioneering effort in the field of energy use standards setting. Admittedly, this would be a long-term program.

THE ENERGY CONSERVATION ACT OF 1991

Descriptions	Comments
(f) Require industrial, commercial and transport establishments consuming more than 2 million fuel oil equivalent liters of energy annually to employ qualified engineers to act as energy managers and to submit energy conservation programs.	Compliance in the provision through Batas Pambansa Blg. 73 had been very satisfactory. About 120 covered establishments have registered their energy managers with OEA. These energy managers have coordinated closely with OEA in the implementation of their establishments' energy conservation program.
(g) Regulate in consultation with the Department of Trade and Industry, the use of air conditioners in offices and in commercial and industrial establishments, including but not limited to requiring the use of thermostats, and setting them to certain temperatures that will conserve energy but still assure reasonable convenience to the users thereof.	
(h) Require industrial, commercial and transport entities or establishments to collect or cause the collection of waste oil for recycling as fuel or lubricating oil.	The presence of re-refining companies and waste oil recycles had beneficial effect in assuring compliance with the provision. Establishments have ready market for their collected waste oil.
(i) Launch a nationwide information campaign in coordination with the Philippine Information Agency and the Office of the Press Secretary on energy conservation.	OEA information dissemination efforts had been previously limited to the conduct of energy management training courses, energy briefings, and distribution of brochures, journals and posters. The participation of government information agencies in the effort will enable OEA to access the mass media in promoting the energy conservation ethic among the populace.
(j) Administer the activities of Technology Transfer for Energy Management (TTEM) Project. For this purpose, all funds, monies, interests, reflows and properties outstanding and accruing from the TTEM Project upon its termination shall continue to be utilized by the Office of Energy Affairs for the following purposes: 1. finance energy conservation projects of industrial and commercial establishments; 2. monitor implemented subprojects and document the actual energy savings generated; and 3. disseminate information on implemented subprojects through case studies and seminars/workshops to encourage replication by other industrial and commercial establishments.	This provision will enable OEA to access funds amounting to P 54 million (US$ 2 million) for re-lending to industrial and commercial establishments to encourage implementation of energy conservation projects.

THE ENERGY CONSERVATION ACT OF 1991

Descriptions	Comments
3.2 Functions of other government agencies	
(a) The Department of Trade and Industry shall require manufacturers, importers or dealer of oil and electric-consuming devices, equipment appliances and vehicles manufactured or sold in the Philippines to show their product's energy requirements and consumption efficiency. It is likewise mandated to provide fiscal incentives and priorities to energy-related and energy conservation projects.	The Bureau of Product Standards of the Department of Trade and Industry is coordinating closely with the OEA Fuel and Appliance Testing Laboratory (FATL) in implementing Energy Labeling Programs. Energy conservation projects have been enjoying fiscal incentives since 1981 through inclusion in the Board of Investment" Investment Priorities Plan (IPP). Incentives mainly refer to tax and duty free exemption for importation of capital equipment.
(b) The Department of Education, Culture and Sports shall incorporate in the curricula of elementary, high school and college levels the awareness, applicable technologies and practices on energy conservation and the relevance of the same on the economic development of the state.	This provision intends to develop the energy conservation ethic among the young and eventually future workers of the Philippine industry. Implementation of the provision would require supplementary training for teachers and professors. Current OEA efforts in this field involved the introduction of Energy Conservation and Resource Management course as a subject in the engineering curricula of the University of Mindanao in Davao City, Philippines. Results have been favorable with average of 250 enrollees per semester.
(c) Government-owned and controlled financial institutions shall set aside funds for lending for energy-related and energy conservation projects at concessional rates of interest to attract private sector investments in these area of concern consistent with the technologies deemed appropriate and projects included in the Investment Priorities Plan of the Department of Trade and Industry.	It is hoped that this provision will overcome one of the identified barriers in the implementation of energy conservation projects, i.e., lack of financing for capital investments.
(d) All national government agencies, bureaus and intrumentalities, including government-owned and controlled corporations, shall adopt measures to conserve energy, shall set examples and models on utilizing energy efficiently through the application or appropriate technologies in their respective plants, buildings or offices.	Through this provision, it is hoped that the Philippine Department of Budget and Management (DBM) and the Philippines Congress will view more favorable request for capital outlays to improve the energy utilization efficiency of government facilities.

THE ENERGY CONSERVATION ACT OF 1991

Descriptions	Comments
4.0 Contingency Powers of the President of the Philippines	
In times of critical energy supply disruptions or imminent danger thereof as recommended by the Office of Energy Affairs to the President. The President is hereby empowered to issue such orders directing the adoption of more stringent energy conservation measures, including but not limited to power/fuel allocation or rationing, limitation of operating hours of commercial, industrial and similar establishments, restrictions on use of government and private motor vehicles, staggering or limiting working hours in both public and private sectors and temporary closure of fuel intensive industries.	The provision enables the President of the Philippines the power to assure supply of fuel and power to vital industries and services during periods of extreme shortages.
5.0 Penal Provision	
Failure or unjustified refusal to comply with the provisions of this Act or with the energy conservation measures promulgated in accordance with the provisions of this Act and duly published as herein provided shall be illegal. Such failure or unjustified refusal shall, upon conviction be published by a fine of not less than ten thousand pesos (P 10,000) or by imprisonment of not less than six months, or both, at the discretion of the court provided that, if the violation is committed by a juridical person, the penalty herein provided shall be imposed upon the official and/or employee thereof responsible for the violation. Provided, further, that if the violation is committed by a government official or employee, including those in government-owned or controlled corporations, he shall, in addition to the penalty provided above, be subject to disciplinary administrative proceedings and penalties.	Penalties for violations of the provisions of the proposed law are more stringent than those of Batas Pambansa Blg. 73.

ENERGY CONSERVATION PROGRAMS OF THE PHILIPPINES

Program	Start	End	Funds US$ Donor	Funds US$ Counterpart	Implementing Agency	Major Activities
1. Industrial Energy Audits and Conservation Program for the Philippines	1982	1983	650,000 Asian Development Bank	20,000	Bureau of Energy Utilization (now Office of Energy Affairs)	1. Conduct energy audits to 70 plants 2. Estimate the potential for industrial energy Conserva- tion in the Philippines. 3. Review the existing situation, and identify the major barriers to energy conservation. 4. Identify government policies and programs that could help the Philippines realize the potential for energy conservation. 5. Provide for counterpart training largely through on the job training.
2. Industrial Energy Management Consultancy and Training Phase I	1983	1987	1,578,250 United Nations Development Program	320,000	Office of Energy Affairs	1. Preliminary and detailed energy audit of industrial and commercial establishments. 2. Construction of a Fuel and Appliance Testing Laboratory 3. Training of OEA Personnel 4. Development of Energy Data base

ENERGY CONSERVATION PROGRAMS OF THE PHILIPPINES

Program	Start	End	Funds US$ Donor	Funds US$ Counterpart	Implementing Agency	Major Activities
3. ASEAN-Australia Non-Conventional Project on Energy Conservation	1984	1987	173,000 AIDAB	27,000	Office of Energy Affairs	1. Conduct research on vehicle efficiency and traffic Management. 2. Introduction of Second Law Analysis, Linhoff Analysis and Thermal Energy System Optimization (TESO) in a Philippine Petroleum Refinery. 3. Conduct Study on the applicability of Australian computer aided design and energy analysis of new and retrofit commercial building in the Philippines
4. ASEAN-US Project on Energy Conservation in Buildings	1985	1990	600,000 USAID	15,000	Office of Energy Affairs	Development of cost effective "Building Energy Use Standards" for incorporation into the National Building Code
5. World Bank TAC - SAL II	1986	1989	657,000	None	Office of Energy Affairs	1. Establishment of 10 sectoral energy audit teams. 2. Procurement of basic energy audit instruments. 3. Energy Audit Training . 4. Conduct of about 50 energy audits 5. Development of National Implementation Program

ENERGY CONSERVATION PROGRAMS OF THE PHILIPPINES

Program	Start	End	Funds US$ Donor	Funds US$ Counterpart	Implementing Agency	Major Activities
6. Technology Transfer for Energy Management	1987	1990	4,500,000 U.S. Agency for International Development	630,000	Office of Energy Affairs	1 Information Disse-mination. 2. Training of industry personnel on energy conservation technologies. 3. Financing program for Energy Conservation Demonstration Projects.
7. Philippine - West Germany Technical Cooperation Agreement on the Rational Utilization of Energy	1987	1992	1,855,000	100,000	Office of Energy Affairs	1. Energy Management Ad-visory Service through the "ENERGY BUS PROGRAM' 2. Introduction of Energy Conservation and Resource Management Courses in local universities. 3. Support for the CEBU-Energy Bus Program 4. Demonstration Projects for LPG -Fired Energy Efficient Ceramic Kiln
8. Industrial Energy Management Consultancy and Training, Phase II	1989	1992	1,245,000 United Nations Development Programme	220,000	Office of Energy Affairs	1. Detailed Energy audit of 20 energy intensive companies. 2. Energy Database Development 3. Enhancement of the capabilities of the Fuel and Testing Laboratory (FATL)

ENERGY CONSERVATION PROGRAMS OF THE PHILIPPINES

Program	Start	End	Funds US$ Donor	Funds US$ Counterpart	Implementing Agency	Major Activities
9. Swedpower-Industrial Combined Heat and Power Systems Development	1990	1994	1,972,000 BITS	80,000	Office of Energy Affairs	1. Conduct Cogeneration Potential Study for National Capital Region. 2. Demonstration Project for 1,000 KW Cogeneration System
10. ASEAN-AUSTRALIA PROJECT P2-Energy Conservation for Industrial Equipment and Processes	1990	1994	183,000	31,000	Office of Energy Affairs	1. Detailed energy audit of chemical and coconut vegetable oil companies. 2. Implementation of at least 4 energy conservtion demonstration projects
11. ASEAN-AUSTRALIA PROJECT P2-ENERGY Analysis and Modelling of Buildings	1990	1994	179,000 AIDAB	A$ 30,000	Office of Energy Affairs	1. Detailed energy audit of buildings. 2. Implementation of at least 3 energy conservation demonstration projects in buildings.
TOTAL			13,592,250	1,473,000		