# THE ENERGY EFFICIENCY AND DEMAND SIDE MANAGEMENT PROGRAMS AS IMPLEMENTED BY THE ENERGY EFFICIENCY DIVISION OF THE DEPARTMENT OF ENERGY

by

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## ABSTRACT

The thrust of the Philippine energy sector, specifically the government side, is to involve the active participation of not only all the government agencies involved in energy activities but the private sector as well. This participation shall mean technical and financial participation, directly and indirectly.

The Department of Energy is on the process involving the continuing update and development of a Philippine Energy Plan (PEP), which has a 30-year time scope, which will help the country monitor and determine energy supply and demand vis-a-vis the growing demands of an industrializing country like the Philippines.

Among the most vital component of the PEP is the thrust to pursue national programs for energy efficiency and demand-side management. Seven energy efficiency sub-programs have been identified for implementation, with a target savings of 623 Million Barrels of Fuel Oil Equivalent (MMBFOE). A cumulative net savings of P237 Billion shall be generated against a total investment cost of P54.5 Billion.

The Philippine energy sector will continue to develop and implement strategies to promote the efficient utilization of energy which will cover all aspects of the energy industry.

The plan is focussed on the training and education of the various sectors on the aspects involved in the implementation of energy efficiency and demand-side management elements on a more aggressive note. The implementation of technical strategies by the Department will continue on a higher and more extensive level, these are: energy utilization monitoring, consultancy and engineering services, energy efficiency testing and labelling program, and demand-side management programs for each sector.

In summary, the PEP, as anchored in energy efficiency and demand-side management tools, among others, will ensure a continuous energy supply at affordable prices while incorporating environmental and social considerations.

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*By JESUS C. ANUNCIACION, Chief, Energy Efficiency Division, Department of Energy.*

The implementation and monitoring of the government's energy efficiency program shall involve the active participation of other government agencies, private sector groups as well as financial and educational institutions.

The Department of Energy is on the process involving the continuing update and development of a Philippine Energy Plan (PEP), which has a 30-year time scope, which will help the country monitor and determine energy supply and demand-side management vis-a-vis the growing demands of an industrializing country like the Philippines.

Among the most vital component of the PEP is the thrust to pursue national programs for energy efficiency and demand-side management. Seven energy efficiency sub-programs have been identified for implementation, with a target savings of 623 Million Barrels of Fuel Oil Equivalent (MMBFOE). A cumulative net savings of P237 Billion shall be generated against a total investment cost of P54.5 Billion.

Energy conservation enjoys the distinct advantage of having a shorter lead time than most options for increasing energy supply. Adoption of energy efficiency technologies and measures to improve energy utilization have been proven to generate large savings. However, these savings have not been achieved due to a number of other factors, such as: lack of awareness on these technologies, competition for scarce capital, etc. Thus, it is necessary to first undertake a critical analysis of issues and problems affecting the energy sector in order to develop more responsive policy strategies.

For the Demand-Side Management (DSM) program in particular, previous DSM studies have identified the following common barriers in its implementation:

1. High cost of efficient equipment and limited access to capital.
2. Absence of alternative financing such as offered by Energy Service Companies (ESCOs).
3. Limited availability of efficient equipment.
4. Limited local expertise on efficient practices and equipment.
5. Limited knowledge on DSM planning, implementation and evaluation.
6. Limited customer awareness.

In response to these challenges, the Philippine government continues to develop and implement strategies to promote the efficient utilization of energy which include both price and non-price intervention mechanisms as provided in the following strategies.

*Instituting Energy Efficiency Through Energy Policies.*

In the past years, the Philippine government sought to insulate its economy from higher international oil prices by providing subsidies and raised domestic energy prices gradually in the interest of general price stability or for political reasons. In order to hold down industrial production costs, taxes on fuel oil have also been relatively low.

It was recognized, however, that subsidies and low prices give rise to excessive demand and tend to encourage economically and environmentally inefficient practices. Hence, with the recent move of government to deregulate the downstream oil industry, restructure the import tariff and excise taxes on crude oil and petroleum products, and rationalize the electricity rates to reflect the true cost of energy production, the public will be assured of a more stable and reasonable prices, fair trade practices, security of supply, public health and safety, increased industry efficiency, product and facility standards and quality, and environmental protection.

Likewise, electricity tariffs are being restructured to encourage efficiency of electricity use and optimize generation capacity expansion, such as unbundling the generation charges from transmission costs. Long-marginal costing will be applied to reflect the true cost of producing electricity, thereby, providing the proper economic signal that will encourage greater efficiency in generation, transmission, distribution as well as in the utilization of energy.

Pricing policy is of course not the only available means of inducing energy conservation. The Philippines applies a wide variety of policies and programs designed to influence the consumer's demand for energy. These efforts include incentive policies; education, training, and information programs; regulatory measures; and programs concentrated on particular energy-consuming sector.

Following the two energy crises in the 70's and 80's, the energy conservation program of the government has focused its efforts on four major activities: training and education, energy utilization monitoring, consultancy and engineering services, and energy efficiency standards and appliance labelling. Since then, there has been a notable shift towards a more aggressive promotions program and greater intervention to effect higher savings both for the consumers and the suppliers.

*Training and Education.*

In order to promote greater awareness and to institutionalize conservation and energy efficiency as a way of life, it is imperative that the general public be educated on the efficient use of energy. This is addressed through the regular conduct of seminar-workshops and energy briefings. A basic energy management training course conducted annually has been institutionalized as a requirement for accreditation as Energy Manager by the Energy Management Association of the Philippines (ENMAP). Other courses include sessions on energy auditing industrial and commercial establishment, energy conserving technologies, and energy conservation opportunities in various energy intensive systems, process, and equipment. Since 1979, the DOE has conducted a total of 99 energy management training courses to 4,059 plant level technicians, engineers, academicians, and energy managers.

A massive information campaign dubbed as 'Power patrol" is currently waged in three broad fronts: household and villages, commercial and industrial, and schools and educational institution sectors. A long-term objective of this campaign is to instill the value of being efficient in electricity use while its more specific objective is to reduce electricity consumption by at least 10%. The grades V and VI students are taught how to read their electric meters at home and apply electricity savings techniques to reduce their consumption at home.

*Energy Utilization Monitoring.*

The DOE requires the industrial, commercial and transport establishments consuming more than one million fuel oil equivalent liters (FOEL) per year to submit quarterly energy consumption reports while those consuming more than two million FOEL are further required to submit annual energy conservation program and efficiency targets. To secure top level commitment, awards and recognition through the Don Emilio Abello Energy Efficiency Award are given to companies and individuals for their outstanding achievements. In 1996, the awardees were able to achieve significant energy savings ranging from 187 thousand liters of oil equivalent (LOE) to nine million LOE.

*Consultancy and Engineering Services.*

The government placed the industrial sector as one of its top priorities in terms of extending technical assistance and training since it accounts for 40% of the total Philippine energy consumption. Energy Management Advisory Services -- from walk-through and detailed energy audits of facilities to project engineering -- are also offered. The DOE also supports Energy Service Companies (ESCOs) which provide similar services to enable industrial and commercial establishments to reduce their energy consumption by implementing energy conservation measures and technologies. A total potential energy savings of 675 million LOE have been identified through the energy audits undertaken from 1979 to 1996.

*Energy Efficiency Testing and Labelling Program.*

The DOE provides the necessary facilities to assist both the public and private sectors in their research studies on product upgrading and energy efficiency improvements. Some of these facilities are: calorimeter room, pilot scale boiler; fuel and appliance testing facilities. To date, only window type airconditioners are being labelled with their actual energy effici- tio (EER) in conjunction with the Efficiency Certification Program. Future pr ll cover refrigerators, ballasts, lighting systems, and other white products.

*and-Side Management (DSM) Programs.*

During the past year, much has been done to drum-up support for DSM in the country. The severe capacity shortfalls peaking at more than 1,200 MW in the summer of 1993 intensified the need to look seriously at DSM as an option to address the challenges that the electric power industry is now facing.

DSM's primary objective of controlling the character of the load by influencing the patterns, timing and level of customer demand. In the Philippines where the necessity for electricity is growing, peak clipping (reduction of utility loads during peak demand periods) or strategic conservation (reduction in end-use consumption) will be more beneficial in terms of postponing expansive capacity additions, enhancing customer services, and mitigating adverse environmental effects of increased energy usage.

Supplementing the power supply expansion projects are a number of DM programs that cover a broad range of activities which include research/studies, training and program implementation, Under these broad classifications, specific activities are being implemented which include the development and implementation of energy efficiency standard for buildings, appliances and equipment and issuance of energy conservation policies that will rationalize electricity fuel prices.

Incentive policies at the moment are limited to the grant of soft loans to industrial and commercial establishments for demonstrating technically and economically viable energy conservation technologies.

The Technology Transfer for Energy Management (TTEM) has proven that the concept of a Demonstration Loan Fund (DLF) in terms of providing attractive financial package was effective in overcoming barriers to implementation of energy conservation in industry.

The TTEM project as a three-pronged strategy of technical advice and training, demonstration and promotion, and financial support has been validated as workable, although it requires time to mature. The project's legacies, i.e., trained staff; reflows of P64.5 million (US$2.5M) and at least P49 million (US$1.9M) annual energy savings from 17 demonstration projects: provided the raw materials and stimulus for its institutionalization and future technology replication.

Table 1 summarizes the demonstrated energy conservation technologies (i.e. cogeneration, combustion control, waste heat recovery, power factor improvement, etc.) and their corresponding project costs and payback period based on their energy saving potential.

Regulations are also in place in the meantime that the DOE is pursuing a new legislation to further promote and institutionalize energy conservation in the country.

Among the most current are the regulations enumerated below.

*Building Energy Use Standards.* - The "Guideline for Energy Conserving Design of Buildings and Utility System" was approved as a referral code of the National Building Code of the Philippines in 1992 and was recently published for mandatory implementation. A second volume, "Guidelines for Energy Conserving Operation and Maintenance of Buildings, Utility Systems and Equipment," provides recommendations principally for the guidance of engineers and building administrators involved in the operation and maintenance of buildings.

*Establishment of DSM Policy Framework.* - Following the issuance of Department Circular No. 95-08-007 on the implementation of DSM by electric utilities, the DOE and the Energy Regulatory Board (ERB), together with the members of the National DSM Working

Group, developed a national DSM policy and regulatory framework entitled "A Framework for Demand-Side Management in the Philippines" designed to encouraged and facilitate public participation in identifying issues and reaching consensus on how to proceed with activities perceived to be for the common good. After conducting nationwide public consultations for over one year, the ERB promulgated and adopted the said framework in December 1996.

*Adoption of Integrated Resource Planning.* - A study on the restructuring and privatization of the electric power industry recommends the transfer of most responsibilities for utility planning to the distribution companies. The development of Integrated Resource Plan (IRP) could pose a significant challenge. Thus, it is important to provide utilities with the training, models, and organization development support necessary to create their own IRP capabilities. To do this, more advance methodologies that allow a comparison of specific DSM resources with specific competing supply-side resources will be needed by the distribution companies.

*Commercialization Strategies For Energy Efficiency Technologies.*

As shown in the flowchart (Figure 1), the strategies and priorities for commercialization of energy efficiency technologies stem from the definition of national goals, followed by an assessment of resources, energy use, and status of technologies using baseline surveys as reference.

Research, Development and Demonstration (RD & D) is conducted on selected projects. These projects are evaluated periodically to determine if they meet national goals and objectives. Developments such as introduction of new equipment and technologies are also a strong possibility during the periodic evaluation to upgrade the project and make some modifications, if necessary, while still on the demonstration stage.

In the event that those projects identified are found technically and economically feasible and are able to meet other project criteria, they are then commercialized. Commercialization is backed-up by a set of incentives such as soft loans, tax credits, tax exemptions, technology transfer, education and training, and public information to promote awareness and accelerate adoption of the technology. After every year of implementation, the project is evaluated to determine its impact and significance with regard to energy savings, socio-economic, and ecological benefits.

In summary, the PEP, as anchored in energy efficiency and demand-side management tools, among others, will ensure a continuous supply of energy at affordable prices while espousing environmental and social factors.

Figure 1

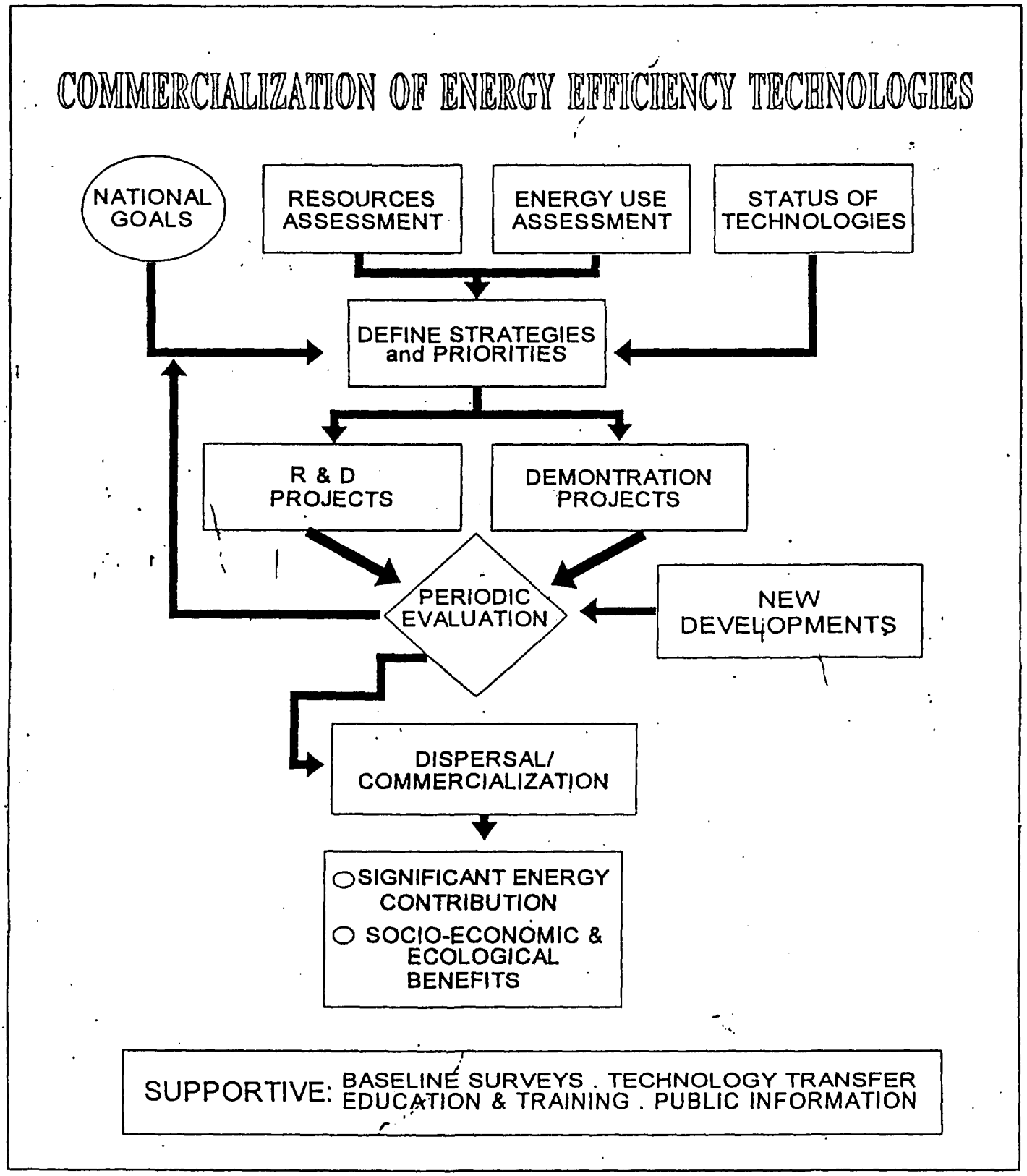
COMMERCIALIZATION OF ENERGY EFFICIENCY TECHNOLOGIES
NATIONAL GOALS
RESOURCES ASSESSMENT
ENERGY USE ASSESSMENT
STATUS OF TECHNOLOGIES
DEFINE STRATEGIES and PRIORITIES
R & D PROJECTS
DEMONTRATION PROJECTS
PERIODIC EVALUATION
NEW DEVELOPMENTS
DISPERSAL/ COMMERCIALIZATION
SIGNIFICANT ENERGY CONTRIBUTION
SOCIO-ECONOMIC & ECOLOGICAL BENEFITS
SUPPORTIVE: BASELINE SURVEYS . TECHNOLOGY TRANSFER EDUCATION & TRAINING . PUBLIC INFORMATION

TABLE 1

**TECHNOLOGY TRANSFER FOR ENERGY MANAGEMENT (TTEM)**
**Implemented Projects**

| COMPANY | INDUSTRY/SECTOR | TECHNOLOGY | PROJECT COST (million P) | TTEM-DLF Contribution | TOTAL SAVINGS Energy (BOE/year) | TOTAL SAVINGS Monetary (MP/year) | ACTUAL SAVINGS Energy (BOE/year) | ACTUAL SAVINGS Monetary (MP/year) | Payback Esti. (years) | Payback Actual (years) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Aras-Asan Timber Co.,Inc. | Wood(plywood) | Steam System Improvement | 2.30 | 1.70 | 7674.80 | 1.30 | 2646.00 | a)1.32 | 1.80 | 1.77 |
| 2. Armco-Marsteel Alloy Corp. | Steel/metal(grinding balls) | Oxy-fuel burner system | 5.90 | 4.20 | 1617.00 | 2.70 | 3529.00 | b)4.40 | 2.20 | 2.19 |
| 3. Bell Carpets Intl. Mfg.,Inc. | Carpet making | Cogen./waste heat recovery | 1.20 | 0.85 | 750.10 | 0.30 | | | 4.00 | 4.00 |
| 4. Benguet I | Mining(copper) | Power factor correction | 0.70 | 0.52 | 869.30 | 0.60 | 123.00 | b)0.28 | 1.10 | 1.17 |
| 5. Benguet II | Mining(copper) | High efficiency motors | 1.00 | 0.70 | 125.90 | 0.60 | 538.00 | a)0.27 | 1.50 | 1.67 |
| 6. C. Alcantara & Sons Inc. I | Wood(plywood) | Centralized boiler control | 2.00 | 1.50 | 10527.40 | 1.70 | | | 2.60 | 1.18 |
| 7. C. Alcantara &Sons Inc. II | Wood(plywood) | Steam system improvement | 4.50 | 3.30 | 4217.40 | 0.70 | 41565.00 | a)2.78 | 2.90 | 6.43 |
| 8. Cagayan El. Powr & Light Co.,Inc. | Electric utility | Tech. loss reduction program | 5.70 | 4.20 | 3517.90 | 1.40 | 10263.00 | b)1.07 | 4.10 | 4.07 |
| 9. Central Azucarera de Don Pedro | Sugar | Power factor correction | 0.70 | 0.51 | 129.40 | 0.40 | 174.00 | a) 0.34 | 1.80 | 1.75 |
| 10.Central Fermentation Ind.,Corp. | Chemical(alcohol) | Cogeneration system | 19.20 | 4.20 | 5189.00 | 11.50 | 12804.00 | b)6.70 | 1.70 | 1.67 |
| 11.Kalinisan Steam Laundry,Inc. | Laundry service | Process modification | 10.20 | 4.70 | 6320.70 | 3.60 | 1296.00 | a)3.65 | 2.80 | 2.83 |
| 12.Mabuhay Vinyl Corporation | Chem.(caustic soda &PVC | Steam sys.improvement | 0.90 | 0.65 | 2679.50 | 1.40 | 2679.00 | b)1.80 | 0.60 | 0.64 |
| 13.PLDT | Telecommunication | Chiller optimization | 6.40 | 4.20 | 973.90 | 1.40 | 585.00 | b)1.30 | 4.70 | 4.57 |
| 14.Republic Cement Corporation | Cement | Waste heat recovery | 7.70 | 4.30 | 8874.10 | 3.40 | 7520.00 | a)3.76 | 2.30 | 2.26 |
| 15.Rubberworld Philippines,Inc. | Rubber(footwear) | Boiler load optimization | 4.10 | 3.00 | 3662.80 | 1.60 | 2910.00 | b)3.80 | 2.60 | 2.56 |
| 16.Trust Intl. Paper Corp. | Paper | Power factor correction | 3.70 | 2.80 | 1554.10 | 1.50 | 1549.00 | a)1.78 | 2.50 | 2.47 |
| 17.Union Glass & Container Corp. | Glass(bottles) | Waste heat recovery | 15.50 | 4.30 | 8952.60 | 4.00 | 9877.00 | a)4.94 | 3.80 | 3.88 |
| | | TOTAL | 91.60 | 45.63 | 67,635.90 | 38.10 | 98054.00 | 49.03 | | |
| | | AVERAGE | 5.40 | 2.68 | 3,978.60 | 2.20 | 6537.00 | 3.27 | 2.50 | |