



**Asia-Pacific  
Economic Cooperation**

# PEER REVIEW ON ENERGY EFFICIENCY IN THE PHILIPPINES

Final Report

9 November 2012

Endorsed by the APEC Energy Working Group

# CONTENTS

Contents.....	ii
Preface .....	v
Executive Summary.....	vi
Recommendations .....	ix
<b>PART 1: BACKGROUND INFORMATION.....</b>	<b>1</b>
Introduction .....	2
1. Statistics, Forecasts and Trends in Energy Consumption .....	4
1.1. Trends in Energy Supply.....	4
1.2. Trends in Energy Consumption .....	5
2. Energy Efficiency Institutions, Policies and Major Programs.....	9
2.1. Institutional Framework.....	9
2.2. Energy Efficiency Policy.....	13
3. Coping Mechanism.....	27
3.1. Master Plan on Energy Conservation and GHG Emission Reduction.....	27
3.2. Monitoring and Reporting System Including Methodology for the Target Implementation Tracing Mechanism .....	30
<b>PART 2: Review team report.....</b>	<b>31</b>
1. INSTITUTIONAL CONTEXT .....	32
A. Achievement .....	32
B. Challenge (Critique) .....	32
C. Recommendations .....	33
2. ENERGY EFFICIENCY GOALS, TARGETS AND STRATEGY .....	33
a. Achievement .....	33
B. Challenge (Critique) .....	38
C. Recommendations .....	40
3. ENERGY DATA COLLECTION AND MONITORING.....	43
A. Achievement .....	43

B.	Challenge (Critique) .....	44
C.	Recommendations .....	44
4.	POLICY MEASURES – SECTORAL ANALYSIS .....	46
4.1	Industrial Sector .....	46
a.	Achievement .....	46
B.	Challenge (Critique) .....	51
C.	Recommendations .....	52
4.2	Electricity Sector .....	53
a.	Achievement .....	53
B.	Challenge (Critique) .....	54
C.	Recommendations .....	54
4.2.1	Supply Side .....	54
4.2.2	Demand Side .....	56
4.2.3	Transmission and Distribution .....	57
4.3	Commercial and Residential Sector .....	58
a.	Achievement .....	58
B.	Challenge (Critique) .....	64
C.	Recommendations .....	66
4.4	Transport Sector .....	68
a.	Achievement .....	68
B.	Challenge (Critique) .....	70
C.	Recommendations .....	70
5.	ENERGY MANAGEMENT MECHANISM AND TRAINING .....	71
A.	Achievement .....	71
B.	Challenge (Critique) .....	74
C.	Recommendations .....	74
6.	APPLIANCES AND EQUIPMENT .....	76
A.	Achievement .....	76
B.	Challenge (Critique) .....	78

C. Recommendations .....	78
Appendix A: Peer Review Team Members.....	81
Appendix B: Organisations and Officials Consulted.....	82
Appendix C: References .....	84

## PREFACE

According to the guidelines for the APEC Peer Review on Energy Efficiency (PREE), the objectives of the PREE, endorsed by APEC leaders at their 2007 meeting is to:

- Share information on energy efficiency performance as well as on policies and measures for improving energy efficiency
- Provide opportunities for learning from the experiences of other economies and for broadening the network among energy efficiency policy experts
- Explore how energy efficiency goals on an overall and /or sectoral basis and action plans could be effectively formulated in each economy under review, taking into account the range of possible strategies that could be used, according to the circumstance of each economy
- Monitor progress attaining energy efficiency goals on an overall and/or sectoral basis and implementing action plans, if such goal and action plans have been already formulated at the time of the review
- Provide recommendation for voluntary implementation on how implementation of action plans could be improved with a view to achieving energy efficiency goals

Two activities are undertaken as part of the PREE:

- a) **Peer Review** of volunteer member economies
- b) The **Compendium** of energy efficiency policies of APEC member economies based on either the APEC voluntary PREE or energy efficiency aspects of the IEA Energy Policy Review.

Philippines volunteered to undertake a peer review. This report presents the results of a peer review of energy efficiency policies conducted in the Philippines.

The primary accountability for each peer review is shared by the economy being reviewed and the Review Team. The peer review in Philippines was conducted by a Team of nine experts (see Appendix A) who visited the Philippines from 6-10 February 2012.

During the visit, the Review Team had comprehensive discussion on energy efficiency with representative and experts from government ministries and agencies, private and state companies (see Appendix B). The Review Team wishes to thank all the presenters and others that spent time with the team for discussions, especially the representatives of the Philippine Department of Energy who organized the event.

## EXECUTIVE SUMMARY

The Philippine economy has long been a champion of energy conservation. Learning from major drawbacks such as oil price hikes, supply shortage, power outages, etc. strict measures to conserve energy is being implemented. In August 2004, the government through the Department of Energy (DOE) together with its attached agencies, the National Power Corporation (NCP), National Electrification Authority (NEA), Philippine National Oil Company (PNOC), Power Sector Assets and Liabilities Management Corporation (PSALM) launched the National Energy Efficiency and Conservation Program (NEECP) aimed at strengthening the implementation of energy efficiency and conservation by promoting awareness on the efficient utilization of energy in the economy. Through the NEECP, every Filipino is encouraged to make energy conservation a way of life hence the tag *“EC Way of Life”* as the government’s promotional theme. Further in 2008, the economy hosted an Energy Summit which obliged the government to develop a more comprehensive energy management policy towards judicious and efficient utilization of energy across the demand sectors.

Currently with the new administration, Energy Reform Agenda through its **“Energy Access for More”** the DOE’s role has been strengthened further to ensure the delivery of secure, sustainable, sufficient, quality and environment-friendly energy to all sectors of society through the mobilization of private sector participation and involvement of other stakeholders. In view of this new policy statement, the government set its main goal to reduce demand sector’s energy consumption by ten percent (10%) from the period 2010-2030. To help the government attain and ensure energy security at the national level, the DOE formulated short to long-term strategies across all energy sectors

During its visit, the PREE Review Team is pleased to note the successful implementation of these policies and programs and that DOE is continuously pushing further in achieving its goal. It may also be worth mentioning that the government’s efforts can be proven to be effective through the public and private sectors’ active participation in its various activities.

The **“Fuel Economy Run”** which is being conducted yearly was participated in by various transport organizations and vehicle manufacturers and assemblers. Meanwhile, industrial establishments vie with each other in implementing EE&C programs to significantly reduce energy consumption to consequently garner the government’s recognition through the **“Don Emilio Abello Energy Efficiency Awards”** and to be elevated further to join the **“ASEAN Best Practices Competition for Energy Management in Buildings and Industries”**. Relatedly, consumers’ awareness has been enhanced through DOE’s **“Information, Education and Communication Campaign (IEC)”** under its **“DO Right. Be Bright. Bright Now.”** advocacy. Through the **“Energy Labelling and Efficiency Standards”**, consumers have been judicious in selecting various household electrical products with the help of **“Energy Guide”** which can be found particularly in electrical household appliances such as room air conditioners and refrigerators and lighting system such as fluorescent lamps (linear and compact type) and ballasts.

While these programs and activities have been regularly implemented, the Review Team found some areas which the economy could further improve to ensure goals are achieved. Generally, the Review Team noted that during IEC, activity would only be limited to conduct of training and seminars and dissemination of information and promotional materials, however, energy savings obtained through its conduct have not been measured. The success of the IEC activity has been measured only through the number of organizations and participants who joined the activity. Hence, a call back or feedback mechanism is recommended.

Another challenge that must be overcome is the lack of an appropriate regulatory scheme for utilities to participate in supporting and carrying out energy efficiency and conservation programs. Decoupling a utility's profits from its sales of energy is necessary to make the utility indifferent to selling less product and if the utility is allowed a return on its investment equal to that which it receives for supplying energy it enhances the utilities capacity to deliver energy efficiency and conservation programs.

Similarly, as the economy majorly comprised of low to medium income families, the Review Team deem it necessary to create an energy efficiency framework that is focused on the low-income people. Expanding energy efficiency policies to focus on the low-income and/or rural community will allow more flexibility to meet the targets while protecting a vulnerable segment of the economy and meeting an important social goal.

While DOE maintained good energy database, there is a need to further improve the collection and monitoring of data, as the Review Team noted that while submission of reports is not mandatory under Memorandum Circular 93-03-05, there are no sanctions for non-compliance. It is also proposed to set individual sector goals and develop a more robust energy consumption data base.

Giving of awards is a strategic program of the government hence it will be a challenge for the department to encourage more industries for energy efficiency and conservation program be part of their own strategies.

As in most economies, the transport sector is the major consumer of fuel oil, in order to curb the economy's heavy dependence on oil in general, and imported oil in particular the Team proposes that the government enhance the introduction of electric vehicles which can be coupled with efforts to minimize upstream emissions from electricity generation, through measures taken in the energy sector. Similarly, it is deem necessary to strengthen benefits in the sector through the introduction of fuel economy standards, financial (tax) incentives that would favor energy efficient vehicles, transport demand management etc. These measures can be implemented at very little financial cost, but require strong political leadership to implement.

Finally and most importantly, there is a strong recommendation for the passage of **Energy Conservation Bill**. At present, the economy has no appropriate legal policy framework or law on energy efficiency and conservation that would provide them guidance and address the negative impact to its growing economy brought about by the economy's internal condition as well as external global influence such as world oil crisis and the escalating crude oil prices and other petroleum products in the world market. While, some of the industries have implemented EE&C program voluntarily, the government may not

have the full control on the establishments specifically on integrating specific EE&C in its everyday operation as well as reporting the company's fuel consumption. The enactment of the Bill may likewise address problems cited by DOE such as but not limited to inadequate financial and manpower resources.



## RECOMMENDATIONS

### *Institutional Context*

**Recommendation 1** Closer coordination among relevant departments should be enhanced in order to maximise energy saving across the various sectors in the Philippines. More coordination between central government and local governments should be enhanced so as to maximise energy saving across the various regions in the Philippines.

**Recommendation 2** More human resources and budget should be provided for institutions which are responsible for EE improvement in various sectors/areas.

**Recommendation 3** A proposed EE and Conservation Centre of the Philippines should be carefully considers in terms of its distinctive role, funding etc. in Enercon Bill.

### *Energy Efficiency Goals, Targets and Strategy*

**Recommendation 4** Integrate energy efficiency plans and policies across the Government

**Recommendation 5** Enhance the Government Energy Management Program (GEMP) visibility in the government by having it lead the Interagency Energy Efficiency and Conservation Task Force.

**Recommendation 6** Develop and Implement a National Action Plan for Energy Efficiency

**Recommendation 7** Create a pathway with annual timelines to meet the stated energy efficiency targets.

**Recommendation 8** Set individual sector goals and develop a more robust energy consumption data base.

**Recommendation 9** Modify low carbon scenarios, which currently rely heavily on renewable fuels, to reflect more aggressive EE targets across all sectors

**Recommendation 10** Establish a K-12 and University energy efficiency schools program

**Recommendation 11** Create a national public education and awareness campaign for energy efficiency. Tie in important national overarching goals in the message.

**Recommendation 12** Create an energy efficiency framework that is focused on the low-income people of the Philippines

**Recommendation 13** Create an economic environment for utilities to provide energy efficiency services to the people and businesses of the Philippines

### ***Energy Data Collection and Monitoring***

**Recommendation 14** Establish Data Centre and Information of Energy Conservation to enhance data analysis function.

**Recommendation 15** Improving data collection and monitoring through different data collection system.

### ***Industry Sector***

**Recommendation 16** As the DOE regularly conducts IEC it is highly recommended to device a feedback mechanism (e.g. poll exit during IEC; feedback/callbacks on audits) after an information campaign and energy audit is conducted.

**Recommendation 17** There is a need to strengthen ties with private sector to increase its participation in recognition awards and in other efforts of the government on energy efficiency and conservation.

**Recommendation 18** Continue constant, close cooperation with other government agencies, ESCOs, and other entities for successful energy conservation;

**Recommendation 19** It is highly recommended that the programs and projects of the agency be carried over even after the project is completed.

**Recommendation 20** The DOE should enjoin active participation of private sector/industries in lobbying for the passage of Enercon Bill as its enactment will benefit both the government and the industry sector.

### ***Electricity Sector***

**Recommendation 21** DOE should continue to request the power producers to improve the heat rate for fossil power units of its power plants.

**Recommendation 22** DOE should consider requesting the supply-side (generation, IPPs and energy supply companies) to improve the average efficiency of existing thermal power units.

**Recommendation 23** DOE should request or encourage the power development plans/power companies to adopt the best available technologies for new generation units.

**Recommendation 24** It is deemed necessary that DOE and private power companies adopt more efficient schemes for promoting energy conservation to reduce peak load power demand.

**Recommendation 25** The National Grid Corporation of the Philippines (NGCP), the National Transmission Corporation (TransCo) and the National Electrification Administration (NEA) should make continuous efforts to further improve transmission & distribution reliability, efficiency and reduce system losses.

### *Commercial and Residential Sectors*

**Recommendation 26** Government should “*lead by example*” to set up as a model for the private sector to follow.

**Recommendation 27** Promote “Cool Roofs” for all low rise buildings and work to include it within the Green Building Design and eventually in Building Codes

**Recommendation 28** Initiate a program to develop Commercial and Multi-family (e.g. condo type) Building Labels – start with a voluntary pilot introduction

**Recommendation 29** Promote “ESCOs” in commercial and government building retrofits and continue training more lending institutions on the benefits of financing the resulting projects

**Recommendation 30** Initiate legislative and regulatory actions to “fast track” a mandatory Building Energy Efficiency Code program for the Philippines

**Recommendation 31** Develop a comprehensive and mandatory building energy consumption survey in order to better understand the types of buildings and their energy consumption

### *Transport Sector*

**Recommendation 32** Consider the further integration of **land use planning** with transport. Efforts could be taken to minimize urban sprawl of cities, by ensuring that new developments occur around public transport corridors. Excessive travel can be minimized through mixed land use planning, coupled with the improvement of non-motorized transport infrastructure and public transport systems.

**Recommendation 33** Consider the development of **financial mechanisms** and **national programs** to encourage/incentivize local governments to replicate and scale up good practice. Lessons may be drawn from for instance India, where the national government is making available funding for sub-national governments to improve urban transport, under certain criteria (such as the existence of a comprehensive mobility plan).

**Recommendation 34** Focus on **low hanging fruit**: e.g. the introduction of fuel economy standards, financial (tax) incentives that favour energy efficient vehicles, transport demand management etc. These measures can be implemented at very little financial cost, but require strong political leadership to implement.

**Recommendation 35** Work **across sectors**. For example, the introduction of electric vehicles can be coupled with efforts to minimize upstream emissions from electricity generation, through measures taken in the energy sector. The potentially negative impacts of biofuels on food prices could also be mitigated through strong policies in the agriculture sector.

**Recommendation 36** Continue to enhance **interagency coordination** to holistically support energy efficient, sustainable transport. This would particularly be true in urban areas, where transport systems

dissect different political boundaries. Mechanisms can be strengthened to ensure that local government units can cooperate to achieve their common goal of sustainable and efficient transport.

### ***Energy Management Mechanism and Training***

**Recommendation 37** Combined different energy management activities together to fully use of the government resource in a more systematic way in order to collect more data for future benchmark and plan the future energy conservation action.

**Recommendation 38** Expand the mechanism of spot check to cover the private sector.

**Recommendation 39** Fully use of the professional engineers in the private sector (such as professional engineer association, research institute, academic, ESCO association, etc.) to expand the energy management services (such as spot check, energy audit, etc.)

**Recommendation 40** Set up a database about the information of participants in different kind of training workshop.

**Recommendation 41** Request the participants to fill in an evaluation form and express their comments and suggestion for the training workshop.

**Recommendation 42** Compile the best practices of those companies which received the energy conservation related awards from the government and publish these successful practices for other companies to follow or future reference.

**Recommendation 43** Help the ESCO industry to set up the M&V (measurement and verification) regulations and guideline for the evaluation of energy conservation credit.

**Recommendation 44** Help ESCO industry to solve the financial problem by set up a fund or provide low-interest loan.

### ***Appliances and Equipment***

**Recommendation 45** The new coming label with star ranking system is easier to understand than the present one. However EE label for every product does not have the same pattern. All appliances should be adjusted to the new pattern with star ranking system. One Message for All!

**Recommendation 46** Cost of annual energy consumption can also be indicated on the label.

**Recommendation 47** The data that can be shown on the label would serve as reference for comparison for consumer.

**Recommendation 48** For the consumer to get enough information before they purchase a product, the label should not only be put on the products but information should also be displayed in the store.

**Recommendation 49** EE S&L roadmap should be set to cover all sectors i.e. household, commercial, industry, transport and agriculture in short, medium and long terms. For example, setting MEPS & HEPS for building envelopes materials i.e. glass window, insulator, roof tile, and etc. can support energy conservation in building programs. In addition, machinery and equipment, which can reduce energy consumption, should be planned accordingly to set up EE standard such as variable speed drive (VSD).

**Recommendation 50** Enhance financial support for high efficient products through revolving fund, direct subsidy, etc.

**Recommendation 51** To ensure energy saving for lighting, the introduction of high energy efficient lighting fixture can be considered to be integrated with the lighting environment design. It can attain the same illumination with less lighting fixture.

**Recommendation 52** Please consider to set up the guideline for the design of motor application to help carrying out the MEPS for motor (such as how to design the fan, pump, etc.) It is understood that the effect of energy conservation needs to start from the system design with the enforcement of different EE standards.

**Recommendation 53** Capacity building for testing laboratories is important. To make sure that testing results are accurate, the testing facilities should not only have the capability but the technical staff's skills for testing as well needs to be developed.

**Recommendation 54** Public awareness for using high efficient appliances and equipment should be promoted covering all sectors. Moreover, the current and previous public awareness should be evaluated to identify the gap where the Philippine government can find area for further improvement or emphasize successful program.

## **PART 1: BACKGROUND INFORMATION**

The background information contained in this report has been contributed by the Philippines. This information is intended to provide some context to the recommendations of the PREE Team. The first section discusses the trends in Philippines's energy consumption. The second section provides information on Philippines's energy efficiency institutions, current policies and objectives and energy efficiency programs.

**ENERGY EFFICIENCY AND CONSERVATION PROGRAM OF THE  
PHILIPPINES DEPARTMENT OF ENERGY**

---

**INTRODUCTION**

The Philippines being highly dependent on oil import to run its economy is sensitive and vulnerable to world price increases and oil disruptions having no sufficient indigenous fossil energy resource. At the height of the oil embargo in 1973 and 1978, the government implemented strict measures to conserve energy including scheduled rotating brownouts, gas rationing, among others.

The energy policies in the '70s were encapsulated in the compendium of energy conservation laws enacted by then Batasan Pambansa (BP) or National Assembly and through Letters of Instructions (LOIs) and Presidential Decrees (PDs). Moreover, policies on energy efficiency and conservation which emanated from past Presidents (Fidel V. Ramos and Gloria Macapagal-Arroyo) were in the form of Executive Orders and Administrative Orders. These Presidential Directives mainly support the promotion and the raising of public awareness on energy efficiency and conservation.

The energy demand in the country has grown overtime as depicted in its final energy demand as well as from the historical energy mix from 1973 to 2010. Approximately, a 321 percent growth in energy use was posted during the period. In 2008 to 2010, oil importation is decreasing whilst the country is attempting to be more secure in its energy supply through the exploration and development of its indigenous energy and other renewable energy resources such as wind, hydro, solar, ocean wave, geothermal and biomass. Republic Act 9513 otherwise known as the Renewable Energy (RE) Act of 2008 gave impetus to accelerate the exploration and the development of the country's RE resources, increase its utilization, making it a tool to prevent harmful emission thus protecting the health of the people and the environment.

Energy pricing is a highly volatile political decision by all economies. The continued hikes in world oil prices would mean corresponding increases in the local prices of goods and services, thus government efforts to alleviate poverty will suffer defeat if not given proper attention. The Philippines has been reputed as having the second highest electricity price tariff next to Japan, and the highest among ASEAN member economies.

The Downstream Oil Industry Deregulation Act of 1998 empowers oil companies to set their own pricing mechanism unregulated based on local oil market forces competition principle that will be taking place along the way. Meanwhile, electricity pricing is a regulated energy commodity wherein the Energy Regulatory Commission (ERC) set the price for electricity. However, in both cases oil and electricity are very much subjective to the spikes of global oil price market trend; global and domestic political climate conditions; weather; supply and demand; technology, among others.

The results of the Energy Summit in 2008 prompted the government to develop a more comprehensive energy management policy towards judicious and efficient utilization of energy across the demand sectors. The public would like to see a dynamic government action plan that will address the high prices of energy, the development of non-polluting energy resources (renewable energy), and the option to consider nuclear energy in the future.

The Philippine Energy Summit for sub-sector on the Energy Efficiency and Conservation resulted in the drafting of several major priority action plans as shown below, wherein DOE considers its implementation after the summit. These are:

Proposed action plan for the immediate term:

- The establishment of a legal policy framework for energy efficiency in the supply and demand side of the energy market sector;
- The creation of a comprehensive and innovative financial facilities e.g. loan guarantees, EE&C fund;
- Major retrofit program for Commercial and Industrial Sector;
- Massive replacement of incandescent bulbs to compact fluorescent lamps (CFL) in Distribution Utilities;
- The development of a national strategy for efficiency improvement in power generation, transmission and distribution; and,
- The reinstatement of Demand-Side-Management (DSM) practices among Distribution Utilities.

Proposed action plan for the short term period:

- Review and amendment of the Procurement Law/Guidelines for Energy Efficiency related procurement;
- Creation of an Energy Efficiency & Conservation Center (EECC);
- Development/update of Energy Efficiency Standard & Labelling for greenhouse gas (GHG) contributors e.g. appliances, motor vehicle, etc.;
- Provision for the implementation of Public Transport Leasing Program; and
- Provision for the implementation of an Aviation Fuel Efficiency Enhancement Program.

Proposed action plan for the medium term period:

- Extension of Energy Efficiency Lighting in Local Government Buildings and Roadways; and
- Provision for the implementation of Public Transport Reform for Mass Transit.

Proposed action plan for the long term period:

- Monitoring compliance of the action plans;
- Scaling up of effective action plans; and
- Redesigning or introduction of new interventions.

All these action plans anticipate the development of a stronger and sustainable Energy Efficiency and Conservation Program which covers all demand sectors.

To date, many of the above proposed measures have been carried out and implemented and some policy measures have been included in the proposed Energy Efficiency And Conservation Bill.



# 1. STATISTICS, FORECASTS AND TRENDS IN ENERGY CONSUMPTION

## 1.1 Trends in Energy Supply

### Historical Energy Mix

Figure 1 shows the historical energy mix of the country from 1973 to 2010. Total energy usage posted a dramatic growth of 321% in the last 38 years.

Meanwhile, Figure 2 shows the historical total energy mix by source, which includes the indigenous, conventional and renewable energy resources as well as imported oil and coal. The trend in the mix shows that use of imported energy is declining very fast

together with renewable energy in 1997 and 1990, respectively. However, with the passage of Renewable Energy Act of 2008, the development and the utilization of RE is likely to have a dramatic increase in the next decades.

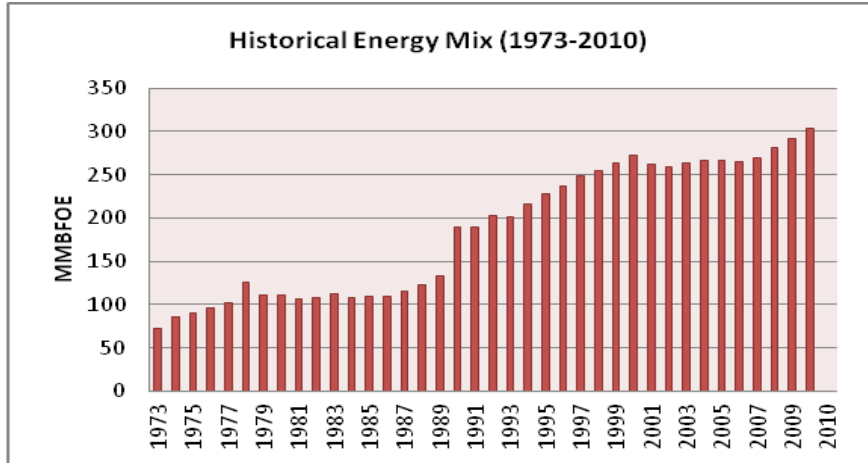


Figure 1: Historical Energy Consumption, 1973-2010

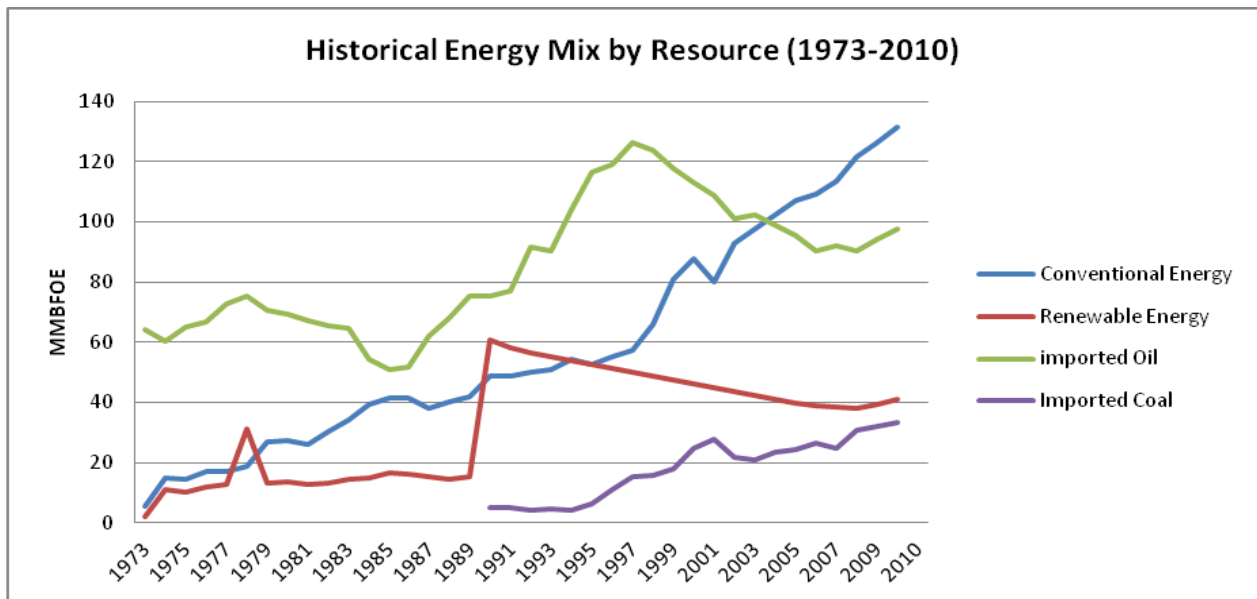


Figure 2: Historical Energy Mix by Resource: 1973-2010

## 1.2 Trends in Energy Consumption

### Sector Energy Demand

In 2010, the country's energy demand amounts to around 24.74 million tons of oil equivalent (Mtoe) as shown in Figure 3. The Transport sector has the highest energy demand equivalent to 9,022.7 thousand tonnes of oil equivalent (ktoe) in 2010 followed by industrial and residential sectors with an energy demand of 6,363.7 and 6,125 ktoe, respectively.

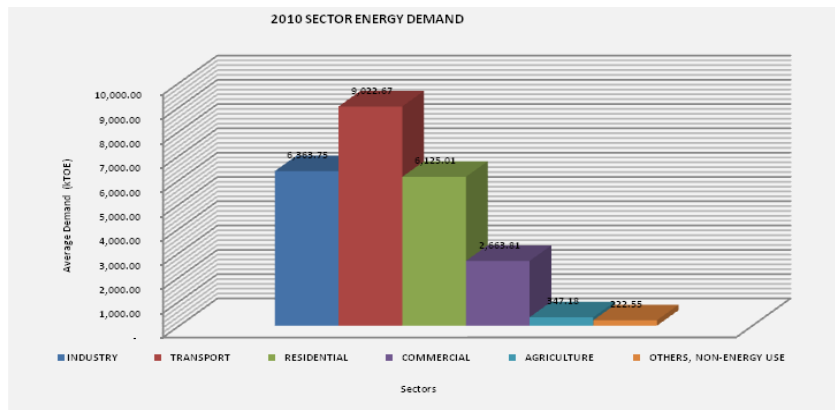


Figure 3: 2010 Sector Energy Demand

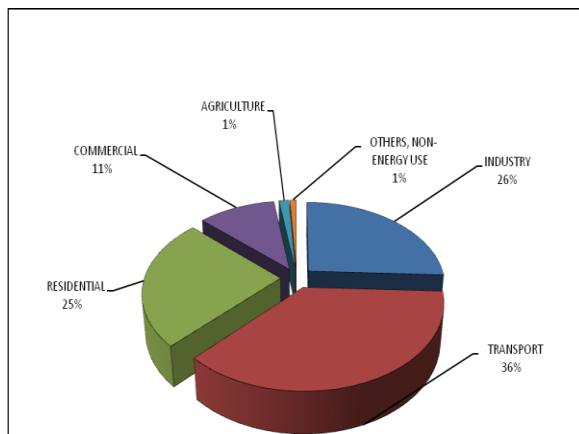


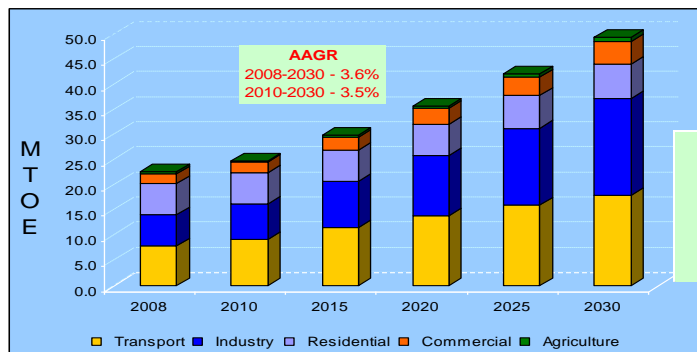
Figure 4: Sectoral Demand Percentage Share

Sectors utilizing energy for non-power applications have the lowest requirement equal to 222.50 ktoe.

In terms of percentage share (Figure 4), the transport sector accounts 36%; industry 26%; residential 25%; commercial 11%, agriculture 1%; and non-energy use 1%.

Total energy demand is expected to grow at minimum average rate of 3.5 to 3.6% per year over the next 20 years.

The industrial, commercial and transport sectors are projected to register the highest growth rates at 5.2%, 4% and 3.8% per annum, respectively. (See Figure 5)



\*AAGR – Annual Average Growth Rate

Figure 5: Demand Outlook by Sector (Business-as-Usual Scenario)

During the time the country began to get industrialized and commercial business establishments sprouted in major cities around the country there was a parallel increase in people's demand for home appliances and automobiles. Then major roads began to get clogged due to increase in public transport competing with private vehicles in narrow streets of cities and municipalities, job opportunities and employment swell as well in most urban cities.

municipalities, job opportunities and employment swell as well in most urban cities.

Population grew mostly in urban areas from 42.1 million Filipinos in 1975 to 92 million as indicated in the 2009 census. Population grew by a hefty 54.34 percent in the last 34 years.

Table 1 below shows the energy intensity and per capita energy consumption for measuring level of energy intensity.

Table 1: Energy Intensity Indicator

<u>Parameters</u>	<u>1975</u>	<u>1985</u>	<u>1995</u>	<u>2005</u>	<u>2009</u>
Energy Consumption (Gwh)	12,221	22,766	33,554	56,568	62,030
*Population (Million)	42.07	55.34	68.61	84.54	92
**GDP Current Prices in Billion Pesos	-	-	1,906.328	5,437.905	7,678.917
***Energy Intensity (Gigawatt-hour /GDP)	-	-	17.6	10.4	8.08
***Energy consumption Per Capita (Kilowatt-hour/capita)	290.50	411.38	489.05	669.12	674.23

Source: \*-National Statistical Coordination Board (<http://nscb.gov.ph>), Department of Energy, PEP 1993-2000

\*\*-National Accounts Estimates of Main Aggregate/UN Statistic Div. / <http://data.un.org>

\*\*\*-Estimated based on given parameters

- No available data

The data above shows an increase in Energy Usage Per Capita from 489.05 to 674.23 Kwh from 1995 to 2009, coinciding with increases in real GDP. Energy Intensity however declined from 17.6 Gwh in 1995 to only 10.4 Gwh in 2005 and slid down to 8.08 at the end of 2009.

The slight decrease could be attributed to the following: the adoption of energy conservation measures by the energy consuming sectors; adoption of energy-efficient technologies; the change in the energy mix or softening in energy demand because of the effect of the Asian and global financial crises experienced in 2008-2009; and, the continuing increases in world crude oil price since 2003.

### **Sectoral Electricity Consumption: Potential for Electricity Saving**

Shown in Table 2 below is the continuous uptrend in the electricity consumption of the energy demand sectors comprising of the commercial, industrial, residential, transport and power utilities. Power loss due to transmission and distribution technical and non-technical losses is likewise increasing on a yearly basis.

In Figure 6, it can be noted that electricity demand is increasing at an average rate of 4.5 percent annually. This means that there is a direct correlation with the increase in population and the growth of the economy expressed in Gross Domestic Product (Table 1 for the Energy Intensity Indicators).

Table 2: Electricity Consumption by Sector: 1991 to 2008 (Million Kwh)

YEAR	TOTAL	RESIDENTIAL	COMMERCIAL	INDUS-TRIAL	TRANSPORT	OTHERS	UTILITIES / OWN USE	POWER LOSSES
1991	25,649	6,249	4,847	9,339	-	952	1,086	3,176
1992	25,870	6,053	4,910	8,859	-	823	1,154	4,071
1993	26,579	6,368	4,725	9,395	-	721	1,132	4,238
1994	30,459	7,282	5,865	10,684	-	762	1,132	4,734
1995	33,554	8,223	6,353	10,950	-	1,067	1,226	5,735
1996	36,708	9,150	7,072	11,851	27	1,167	1,340	6,128
1997	39,796	10,477	7,984	12,531	29	1,296	1,471	6,037
1998	41,577	11,936	8,725	12,543	29	934	1,590	5,849
1999	41,431	11,875	8,901	12,444	30	921	1,536	5,754
2000	45,289	12,894	9,512	13,191	55	957	2,390	6,345
2001	47,048	13,547	10,098	14,452	55	1,042	2,196	5,713
2002	48,468	13,715	10,109	13,628	28	1,110	3,873	7,915
2003	52,940	15,357	11,106	15,188	37	1,069	3,410	6,810
2004	55,956	15,920	11,785	15,012	37	1,359	4,653	7,227
2005	56,568	16,031	12,245	15,705	91	1,177	4,591	6,817
2006	56,784	15,830	12,679	15,888	97	1,275	4,227	6,885
2007	59,612	16,376	13,470	16,522	107	1,641	3,994	7,608
2008	60,821	16,644	14,136	17,031	112	1,283	3,935	7,680

Note: Details may not add up to totals due to rounding-off. Source: Department of Energy.

This also indicates the need for government to put in place a plan for additional power supply into the grid while at the same time consider a strategic management of energy consumption of the demand sectors through conservation and judicious utilization of power. An effective energy demand strategy can mitigate the need for the additional capacities in the grid.

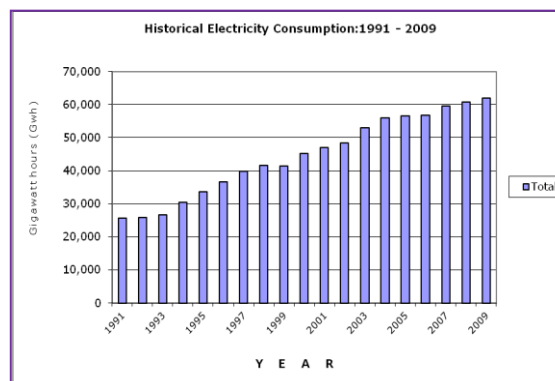


Figure 6: Historical Electricity Consumption: 1991 –

### **Transport Sector Fuel Consumption: Potential for Fuel Saving**

Records from the Department of Energy reveal that the road transport industry sector is one of the highest energy consuming demand sectors, accounting for a share of about 36% based on the 2010 data. In comparison, industry accounts for 26%, residential 25%, commercial building 11%, and agriculture sector barely 1% of the total energy consumption by the Philippine economy.

In Table 3 below, data show types of vehicles with their corresponding fuel consumption in thousand liter units from 1988 to 1996. Based on the data, all of the four types of vehicles (cars, utility vehicle, trucks, buses, and motorcycle / tricycle) fuel consumptions have been increasing.

The factors affecting increases in fuel consumption include among others the age of the vehicle, poor maintenance, driving habits, vehicle weight and capacity, tire pressure, long idling for running engine, heavy traffic, road conditions, as well as the increase in the actual number of units on the road.

Table 3: Fuel Consumption in Thousand Liters by Type of Vehicle 1988-1996

Type of Vehicle	1988	1989	1990	1991	1992	1993	1994	1995	1996
Total Consumption	2,921,307	3,401,487	3,731,889	3,856,863	4,448,343	5,038,224	5,383,479	6,123,739	6,828,812
Cars	612,750	700,583	740,884	670,468	759,918	843,055	893,498	1,019,676	1,130,526
Utility Vehicles	1,372,829	1,596,863	1,779,556	1,959,551	2,270,329	2,591,161	2,721,882	3,091,498	3,415,228
Trucks	430,521	485,583	527,290	576,688	631,276	716,488	731,847	819,054	931,985
Buses	63,759	73,898	77,869	91,079	131,607	116,296	143,299	135,433	126,704
MC/TC	441,447	544,560	606,290	559,076	655,213	771,224	892,953	1,058,077	1,224,369

Source: Department of Energy (DOE)

In Figure 7, the graph indicates that buses posted the lowest consumption while the highest consumers are utility vehicles (vans and other light duty vehicles).

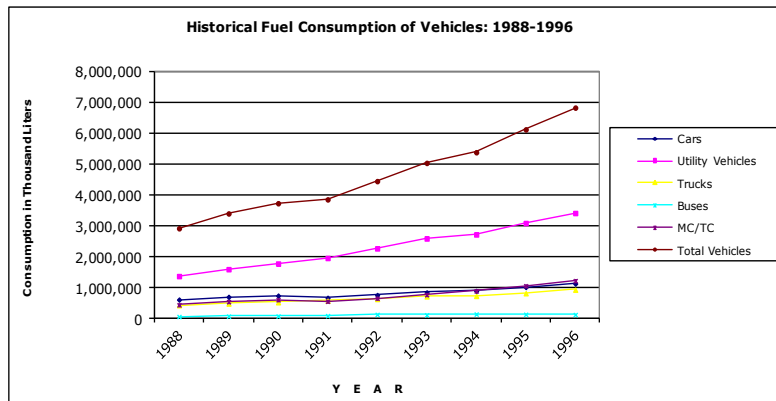


Figure 7: Fuel Consumption of Vehicles by Type (1988 – 1996)

In this regard, the continuous increase in road transport fuel consumption would affect the riding public in terms of transport fare, cost of agricultural products, costs of goods and services that may require transport service, among others. The road transport industry sector is one area where the government could look into the implementation of appropriate energy management program to manage its fuel consumption.

## 2. ENERGY EFFICIENCY INSTITUTIONS , POLICIES AND MAJOR PROGRAMS

### 2.1 Institutional Framework

#### Department of Energy

The Department of Energy (DOE) was created under Republic Act 7638, also known as the "Department of Energy Act of 1992", which has been entrusted the mandate to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the government relative to energy exploration, development, utilization, distribution and conservation.

The DOE implements energy policy of the state to ensure a continuous, adequate, and economic supply of energy with the end in view of ultimately achieving self-reliance in the country's energy requirements through the integrated and intensive exploration, production, management, and development of the country's indigenous energy resources, and through the judicious conservation, renewal and efficient utilization of energy to keep pace with the country's growth and economic development and taking into consideration the active participation of the private sector in the various areas of energy resource development; and to rationalize, integrate, and coordinate the various programs of the Government towards self-sufficiency and enhanced productivity in power and energy without sacrificing ecological concerns.

Figure 8 shows the institutional framework of the DOE which has oversight over five (5) other government-owned and controlled corporations, namely: National Power Corporation (NPC), National Electrification Administration (NEA), Philippine National Oil Company (PNOC), Philippine Electricity Marketing Corporation (PEMC), and the Power Sector Assets and Liabilities Management Corporation (PSALM).

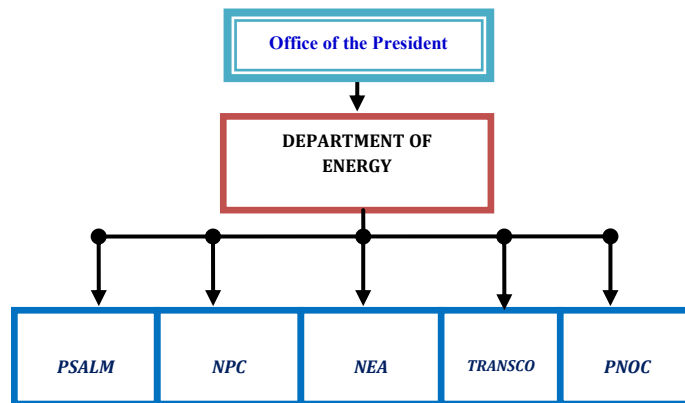
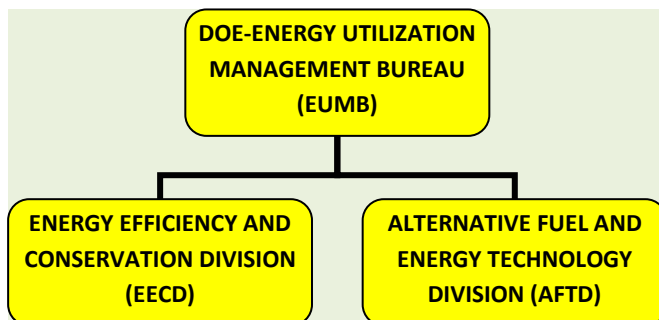


Figure 8: Institutional Framework: The Umbrella Organization of the Energy Family



The Energy Utilization Management Bureau (EUMB) is the unit of the DOE responsible in the formulation and implementation of policies, plans, programs and regulation on new energy technologies, alternative fuels and the efficient, economical transformation, marketing and distribution of conventional energy resources and ensures the efficient and judicious utilization of energy resources.

## **OTHER ENERGY EFFICIENCY INSTITUTIONS**

There are three (3) important government institution partners of DOE in the implementation of energy management program of the government. Their functions and roles are defined below.

### **Department of Science and Technology - Philippine Council for Industry and Energy Research & Development (DOST-PCIERD)**

The Philippine Council for Industry and Energy Research & Development (PCIERD) is a government office under the Department of the Science and Technology (DOST). It is a government research planning and policymaking body. It is a central agency for the planning, monitoring, and promotion of scientific and technological research for applications in the industrial, energy, utility, and infrastructure sectors.

PCIERD has the authority to specify national R&D goals, draw corresponding plans and policies, and set priorities for research in its delineated sectors. PCIERD has supported several projects on energy conservation for industry and buildings. It was responsible for implementing a collaborative work under the ASEAN-US Project on Energy Conservation in Buildings. The Council has been involved in Demand Side Management and has classified it as a priority program. Its main goal is to promote and develop new technology that would support national efforts to conserve and use energy efficiently. The conduct of energy audit in the industrial manufacturing sector is the first step to see patterns of energy usage and technologies in place in this sector. (Source: DOST homepage, <http://www.dost.gov.ph>)

However, PCIERD's role and function in the energy sector do not include the formulation of national policies on energy efficiency and conservation and the setting-up of a national energy efficiency and conservation plans and programs.

### **Department of Trade and Industry – Bureau of Product Standards (DTI-BPS)**

The Bureau of Product Standard (BPS) develops, promotes, and implements product standards and related programs nationwide. It also participates and represents the country in various standards-related activities worldwide. BPS is an active member of the International Organization for Standardization (ISO), the International Electro-technical Commission (IEC), the Asia Pacific Economic Cooperation (APEC), and the ASEAN Consultative Committee for Standards and Quality.

Among its programs and services is the Accreditation of Conformity Assessment Bodies, which awards certificates of accreditation to management system certification bodies that issue Certificates on Hazard Analysis Critical Control Point (HACCP), ISO 9001 or QMS, ISO 14001/Environmental Management System (EMS), and the latest addition among its standard is the ISO 50001 for Energy Management Standard for Industry. (Source: DTI homepage, <http://www.dti.gov.ph>)

DTI also has a Memorandum of Agreement with DOE through the Energy Research Testing and Laboratory Services relative to standards and labeling.

### **Department of Environment and Natural Resources (DENR)**

The DENR is tasked to formulate and implement policies, guidelines, rules and regulations related to environmental management and pollution prevention and control. It likewise implements and supervises the government's policies, plans and programs pertaining to the management, conservation,

development, use and replenishment of the country's natural resources and biological diversity. DENR also promulgates and implements rules and regulations governing the exploration, development, extraction, disposition, and use of our forests, lands, minerals, wildlife and other natural resources.

The DENR is currently implementing a US\$10.9-million World Bank (WB) funded project, which aims to replace around 375 chillers used in industrial, commercial, service, and institutional establishments nationwide with **more energy efficient** and environment friendly technology . Called the “Chillers Energy Efficiency Project,” the project will provide financial incentive to chiller owners to encourage them to replace old chillers that consume around 50% more energy than new ones and emit harmful greenhouse gases into the atmosphere.

The project aims to enhance the capacity of chiller owners, energy service companies, and commercial financing entities to take advantage of carbon financing using a “programmatic approach” to the Clean Development Mechanism (CDM) of the Kyoto Protocol, a departure from the conventional approach where projects were processed individually. “Replacing old and inefficient chillers will reduce greenhouse gas emissions as well as improve energy efficiency in the refrigeration and air-conditioning sector,” “The project will illustrate to building owners that investing in environment-friendly technologies brings energy efficiency and thus makes good business sense.”

### **Government Agencies and Private Sector’s Participation in the Implementation of Executive Order 123**

The government through the DOE implements energy efficiency and conservation awareness program as part of its strategy to manage energy effectively and efficiently. Executive Order 123 was issued by then President Fidel V. Ramos, which institutionalized the Committee on Power Conservation and Demand Management (CPCDM). The CPCDM is headed by a private individual and Co-Chaired by a DOE Undersecretary. There are nine other government agencies and six private organizations and NGOs that make up the CPCDM Committee.

The major role of CPCDM is to promote power conservation and demand management through information, education and communication campaign (IEC) in the sectors of commercial, industrial, residential, and the academe. To raise public awareness, a multitude of seminar-workshops were held in major cities and municipalities in practically all regions of the country. Provincial, city or municipal chapters were formed and headed by the President of the Philippine Chamber of Commerce and Industry (PCCI) from said region, city or municipality. These chapters are mirror image of the national CPCDM Committee and were designed to provide sustainability of the whole program concept that is to propagate values formation among energy users.

A Memorandum of Understanding (MOU) is part of the activity during the formal establishment of a chapter in a locality. Participation in the seminar-workshop varies depending on the target sectors. For the academe, students from grade 5 and 6 elementary and 3rd and 4th year high school were invited to attend, while plant facility personnel, employees and managers of companies from commercial and industrial sectors likewise attended. Similarly, household owners and members of home associations and the Barangay Chairman and Council members were the target participants to represent the Barangay residential sector.



## **Government Agencies and Private Sector's Participation in the implementation of Executive Order 472**

Under Executive Order 472 s. 1979, the Committee on Fuel Conservation and Efficiency in Road Transport (CFCERT) was created. The Committee was chaired by the Undersecretary of DOE and co-chaired by the Undersecretary of the Department of Transportation and Communication (DOTC). Twelve government agency representatives and six (6) private sector representatives comprised the Committee.

The program objective is to promote the judicious and efficient utilization of fuel in the road transport sector through awareness campaigns in major cities and municipalities around the country. A regional, city or municipal chapter was established to provide continuity of the program in the locality. The local chapter was headed by a representative from the transport association .

Seminar workshops among transport association members and similar activities were likewise conducted at the local Land Transportation Office (LTO) with drivers as participants. Aside from providing them education on traffic safety rules, participants were also taught the proper maintenance of vehicle, proper driving habits, and the importance of protecting the environment. Participants were from the transport associations of Bus, Taxi, Jeepney, Tricycle, and private car owners.

The government also promotes the empowerment of the consuming public by selecting fuel efficient vehicles when buying brand new vehicles. Since 2005, a fuel economy run activity is being conducted to measure the fuel mileage rating of various types of vehicles sold in the market. Collaboration was established among the government and the auto industry associations, car manufacturers including its dealers and/or distributors, transport groups and associations, private communication group, automotive association, government agencies such as the Philippine Information Agency (PIA), DTI, DOTC, LTO, and Land Transport Franchising Regulatory Board (LTFRB), non-government organizations, and other stakeholders from the transport industry. The use of tri-media was the avenue to communicate the results of the fuel economy run activity.

The major goal of the government is to transform the auto industry from selling gas-guzzling vehicles to fuel efficient ones without any impact on the engine displacement size, safety and comfort. This involves a total technological change approach in the auto industry for the Philippines. The likes of hybrid car which run through a combination of fuel and electricity, or fuel cell car, or pure electric motor driven vehicles, is a welcome development. Likewise, the transformation of 2-stroke motorcycle engine to 4-stroke engine, is another welcome technological advancement in the motor cycle industry. All of these technological change and innovation will result in the reduction of fuel consumption in the transport sector.

## **Private Sector and Stakeholders Participation in the National Recognition Award on Energy Efficiency**

The DOE chairs the Steering Committee of the Don Emilio Abello Energy Efficiency Award while the Technical Evaluation Committee is chaired by a representative from the private sector. The award giving body is composed of representatives from Shell Philippines, Chevron, Petron Corporation, Philippine Energy Conservation Center, Inc., Energy Practitioners Association of the Philippines (ENPAP), Energy Development Utilization Foundation, Inc. (EDUFI), Manila Electric Company (MERALCO), National Electrification Administration (NEA), Philippine National Oil Company (PNOC), and National Power Corporation (NPC).

This institution has been around since 1982, and for 28 years, it has recognized the efforts of companies in reducing their energy consumption through the application of several energy management measures and energy efficiency and conservation projects. The award is given every December of the year during the DOE’s founding anniversary that coincides with the celebration of National Energy Consciousness Week.

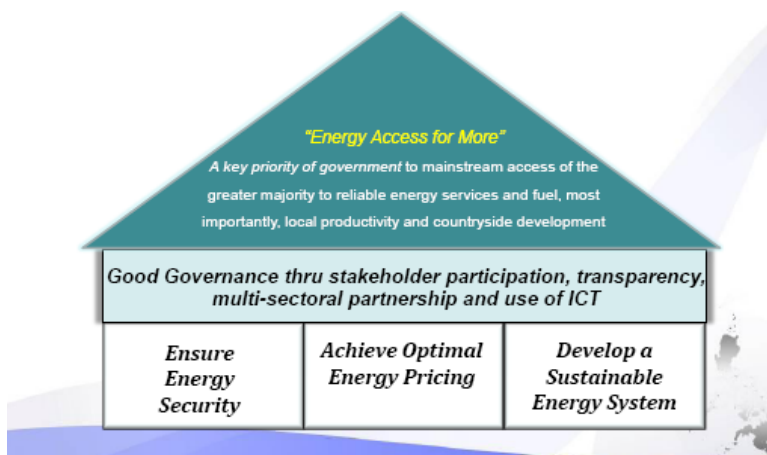
## 2.2 Energy Efficiency Policy

### 2.2.1. National EE&C Policy & Strategy

Cognizant of its role to promote better quality of life for the Filipino, the DOE ensures the delivery of secure, sustainable, sufficient, quality and environment-friendly energy to all sectors of society through the mobilization of private sector participation and involvement of other stakeholders towards providing **“Energy Access for More.”**

At the onset of President Benigno S. Aquino administration, the energy sector outlined the following three (3) major pillars as its overall guidepost and direction, to wit: (a) ensure energy security; (b) achieve optimal energy pricing; and (c) develop a sustainable energy plan. An overarching strategy to achieve these is the principle of **“good governance.”**

In view of this policy statement of good governance, the DOE-Energy Utilization Management Bureau shall ensure energy security by contributing energy supply to the grid and other energy streams by way of promoting the judicious and efficient utilization of energy across demand sectors. The main goal is to reduce demand sector’s energy consumption by ten percent (10%) based in the 2010-2030 Philippines Energy Plan.



The major strategies to achieve this goal are as follows: (a) Establishment of an appropriate policy framework on energy efficiency and conservation; (b) Identification of major energy efficiency and conservation programs and activities of high impact; (c) Enhancement of a cooperative partnership with other government agencies, public sectors, private industry associations, and other appropriate stakeholders; (d) Enforcement of existing laws and policies on energy efficiency and conservation; and (e) Enhancement bilateral and multilateral cooperation with other countries.

In order to attain and ensure energy security policy at the national level, the DOE shall adopt the following strategies described below:

#### I. Accelerate the exploration and development of oil, gas and coal resources

##### Short-term

- Conduct of PECR (Oil, Coal)

- Revisit the cost recovery scheme
- Revisit the cross cost recovery scheme
- Enhance capacity to undertake collection and reporting of complete, accurate and timely oil and gas data through the Joint Oil Data Initiative (JODI)
- Optimize utilization of local supply

## **II. Intensify development and utilization of renewable and environment-friendly alternative energy resources/technologies**

### *Short-term*

- Conduct of RE resource and technology assessment
- Expand the use of alternative fuels for transport
- Revisit the GSPA to consider gas for transport
- Forge MOAs with National Water Resource Board (NWRB), National Commission on Indigenous People (NCIP) and DENR to streamline procedures in the issuance of necessary permits in RE development.
- Coordinate with DOF and BOI for the crafting of procedures in the availment of specific fiscal incentives for RE developers and manufacturers, suppliers and fabricators of locally-sourced RE equipment.
- Forge MOA with DA in the implementation of RE law provisions providing incentives to farmers engaged in biomass production.
- Formulate standards for cleaner fuels/biofuels
- Initiate testing of higher biofuel blends for transport
- Promote the use of clean coal technology through the implementation of the MOU on Carbonization and Briquetting Technology with the New Energy Industry and Technology Development Organization (NEDO) of Japan and DOE

### *Medium-term*

- Implement the Clean Fuels and Vehicles Program in collaboration with DOTC, DENR, DTI, DOST and DOE.
- Establish infrastructure for natural gas and biofuels

### *Long-term*

- Increase utilization of RE resources for non-power application.

## **III. Enhance energy efficiency and conservation**

### *Short-term*

- Re-file the Energy Conservation Bill
- Rationalize public utility vehicles in major roads, particularly EDSA.
- Promote energy efficiency lighting technologies (Philippine Energy Efficiency Project)
- Monitor the implementation of Administrative Order 126, requiring government buildings to reduce electricity and fuel consumption by 10%.
- Conduct energy audit of DOE-attached agencies.
- Promote and strengthen Energy Service Companies.
- Establish energy benchmark in the manufacturing and building sector.

### *Medium-term*

- Implement the Enercon Law
- Promote green building rating system
- Promote adoption of Energy Management Standard in industries under ISO 50001 framework.
- Implement Heat Rate Improvement in Power Plants.
- Promote Demand-Side Management (DSM) program
- Develop and implement energy efficiency labeling program for brand new vehicles.

### *Long-term*

- Expand promotion of Energy Efficiency and Conservation Program and Energy Consumption Monitoring in large seaborne vessels (passenger ships, cargo/tanker ships), and electric cooperatives/distribution utilities.

## **IV. Attain nationwide electrification**

### *Medium-term*

- Develop policy and regulatory framework for distributed generation projects in the main grid and micro- and mini-grid areas with small generation facilities

## **V. Put in place reliable power supply**

### *Short-term*

- Conduct inventory of energy/plant sites
- Create an independent Reliability Council that will ensure the compliance of the electric power industry participants to their obligations as utility companies.
- Ensure that all power stakeholders comply with the government policies, the DOE may opt to report and recommend to ERC the imposition of the penalties and sanctions to such industry participants.
- Tap the embedded generators in Luzon should power supply situation worsen
- Undertake the Systems Operations Audit to determine the real status of the national transmission system.

### *Medium-term*

- Propose amendment to EPIRA to further define Section 71 on invoking Electric Power Crises

## **VI. Improve transmission and distribution systems**

### *Short-term*

- Develop monitoring and continuous disclosures of the status of all generation facilities

## **VII. Secure vital energy infrastructures and facilities**

### *Short-term*

- Operationalize marker technology to address smuggling
- Expedite procurement and operation of mobile testing laboratory

- Expedite procurement of LPG testing equipment
- Strict enforcement of OIMB's importation rules
- Update energy (oil/power) supply contingency plan
- Classify oil infrastructures (depots, terminals) of national significance
- Strengthen ability to respond to oil supply disruptions
- Improve establish logistics facilities to support cleaner/alternative fuels
- Work for clarification of the implementation mandates of the Biofuels Law.
- Clarify guidelines on energy projects, e.g., terminals, transport facilities (LGU vs National)

*Medium-term*

- Upgrade/rehabilitate NPC plants to ready-to-operate status including cost recovery and rate related concerns.
- Develop/establish strategic oil stockpile
- Provide additional oil distribution infrastructure
- Expand/upgrade oil refineries
- Pursue passage of LPG and Natural Gas Bill
- Review oil deregulation law (to improve implementation enforcement)

**VIII. Maintain a competitive energy investment climate**

*Short-term*

- Establish one-stop-shop for power generation projects including reportorial requirements of DOE to monitor the proposed power projects.
- Open access for natural gas (expand utilization)
- Conduct of open and competitive selection process of awarding RE service contracts
- Review guidelines on taxation (duty, excise, VAT) on importation
- Clarify taxation on petroleum products (local vs imported)
- Review international agreements (i.e., ASEAN Economic Integration)

*Long-term*

- Study possibility of establishing Capacity Markets and file for needed issuances

2.2.2 *Laws And Regulations Related To The Promotion Of Energy Efficiency*

**Energy Management Policy of the Government towards Judicious and Efficient Utilization of Energy**

The management of energy through energy efficiency and conservation aimed to reduce the country's oil import bill, reduce wasteful use of energy, and other forms of unproductive energy losses, is just one of the strategies to ensure energy security. The lower energy intensity per gross domestic product (GDP) unit is a positive indicator of healthy economic state.

The sets of Presidential policies on energy efficiency and conservation provide a framework within which energy policies imposed to produce savings were implemented to cover not just government entities but private sector as well. These policies have mandatory characteristic, however, it does not carry penalty provisions. Generally, all these policies focus on the promotion of energy efficiency and

conservation programs and measures in a selective manner. These include the following: Awareness raising campaign, standard and labelling, government energy management program, conduct of energy audit, and accreditation of energy service providers.

Table 4 below describes the official issuances that authorized the government to implement its present energy management policy towards the judicious and efficient utilization of energy in the demand sectors.

Table 4: List of Active Presidential Issuances on Energy Efficiency and Conservation (1990 – 2008)

<u>Executive Orders (E.O)</u>	<u>Title</u>
E.O. 418 (s.1990)	Directing the immediate implementation of Energy Conservation Program.
E.O. 422 (s.1990)	Activating and reorganizing the Energy operation Board as the administrative machinery for the efficient and equitable allocation and distribution of energy under certain conditions.
E.O. 433 (s.1990)	Directing the immediate implementation of additional energy conservation measures.
E.O. 123 (s.1993)	Institutionalizing the Committee on Power Conservation and Demand Management.
E.O. 472 (s.1998)	Institutionalizing the Committee on Fuel Conservation and Efficiency in Road Transport.
<u>Administrative Order (A.O.)</u>	
A.O. 103 (s.2004)	Directing the continued adoption of austerity measures in the government.
A.O. 110 (s.2004)	Directing the institutionalization of a government energy management program.
A.O. 117 (s.2005)	Providing for adjusted official hours in Departments, Bureaus, Offices and other agencies in the Executive Branch, including Government-Owned and Controlled Corporations, for the months of April and May 2005.
A.O. 126 (s.2005)	Strengthening measures to address the extra ordinary increase in world oil prices, directing the enhanced implementation of the government's energy conservation program.
A.O. 110-A (s.2006)	Amending A.O. 110 s. 2004 – Directing the institutionalization of a government energy management program.
A.O. 183 (s.2007)	Directing the use of energy efficient lighting/lighting system (EELs) in government facilities.
A.O. 228 (s.2008)	Addressing the rising cost of energy.
<u>Department Circulars (DCs)</u>	

DOE-DC 93-03-05 (s.1993)	Requires all commercial, industrial, and transport establishments consuming 1 million liters of oil equivalent (LOE) to submit Quarterly Energy Consumption Report to the Department of Energy. In addition, companies consuming more than 2 million LOE annually are also required to submit an Annual Energy Conservation Program.
DOE-DC 2008-09-004	DOE-ESCO Accreditation Program

#### Other Regulatory Policy Requirements

The DOE recognizes that there are barriers to the nationwide promotion and effective implementation of the energy efficiency and conservation program.

For one, except for the government sector, energy efficiency and conservation activities are currently being undertaken on a purely voluntary basis.

An energy conservation law could widen the scope of the national program, allow strict regulation of energy efficiency and conservation undertakings, and institutionalize more incentives towards greater stakeholder participation.

Below are the proposed regulatory policies necessary to strengthen EE&C implementation in the energy demand sector:

Table 5: Proposed Regulatory Policies

Proposed Regulatory Policies	Remarks
1. Energy Conservation Bill	New submission of the bill to the 15 <sup>th</sup> Congress
2. "Energy Conserving Design Guidelines for Buildings and Utility System"	For promotion to City Building Officials, Architectural Associations; Proposed to be an integral part of the National Building Code of the Philippines.
3. New DOE Memorandum Circular to supersede DOE MC 93-03-05 to enhance monitoring & compliance of the building sector and industry	Designation of type 1 and Type 2 Energy Consumption sector; provision for the Accreditation of Energy Manager by DOE.
4. Policy Framework for Demand Side Management (DSM)	Review and recommendation from electric utilities
5. Energy Management Standard (EMS) based on ISO Framework	Standardize EMS within the scope of the Corporate Management System [DOE/DTI-BPS/UNIDO project]

Shown in Table 6 are the applicable energy conservation policies issued by former President Ferdinand E. Marcos. All issuances during this period prescribed penalties for offenses and non-compliance, thus measures taken were more effectively implemented to mitigate and cushion the impact of energy crisis at that time. A mandatory compliance and penalty clause provisions were enshrined in these laws.

Table 6: Historical Legislated Law and Presidential Issuances on Energy Conservation (1979 – 1981): President Marcos Government Administration

Batas Pambansa (BP)		
BP 33 (s. 1979)	An act defining and penalizing certain prohibited acts inimical to the public interest and national security involving petroleum and/or petroleum products, prescribing penalties therefore and for other purposes.	Lapsed
BP 36 (s.1979)	An act imposing an energy tax on electric power consumption	Lapsed
BP 73 (s.1980)	An act to further promote energy conservation and for other purposes	Lapsed
BP 73-IRR (s.1980)	Implementing rules and regulation of BP 73	Lapsed
BP 872 (s.1985)	An act amending Sections Ten and Fourteen of BP 73	In-active / Prescribed validity period of BP 73 up to June 1990)
Letter of Instruction (LOI)		
LOI 825 (s.1979)	To all Ministries, Departments, Bureaus and Agencies of the Government including Government Own and/or Controlled Corporations: Compliance strictly observed and institute energy conservation measures.	Lapsed
LOI 879 (s.1979)	To all Ministries, Departments, Bureaus and Agencies of the Government including Government Own and/or Controlled Corporations: Compliance strictly observed and institute energy conservation measures.	Lapsed
LOI 933 (s.1979)	The Minister of Industry and Chairman of the Board of Investment; the Minister of Energy, the Minister of Finance, the Governor Central Bank of the Philippines, the Chairman Development Bank of the Philippines, the President Philippine National Bank: Compliance strictly observe and institute on energy priorities program on pioneer preferred areas of investment in the priority plans by the Board of Investment.	Lapsed
LOI 1018 (s.1980)	To all Ministries, Departments, Bureaus and Agencies of the Government including Government Own and/or Controlled Corporations: Compliance strictly observed and institute energy conservation measures.	Lapsed



LOI 1152 (s.1981)	To all Ministries, Departments, Bureaus and Agencies of the Government including Government Own and/or Controlled Corporations: Compliance strictly observed and institute energy conservation measures.	Lapsed
Department Circular (OEA)		
OEA-DC 88-03-004 (s. 1988)	Requiring all commercial, industrial, and transport establishments consuming 1 million liters of oil equivalent (LOE) to submit Quarterly Energy Consumption Report to the Department of Energy. In addition, companies consuming more than 2 million LOE annually are also required to submit an Annual Energy Conservation Program.	Lapsed /
DOE-DC 93-03-05 (s. 1993)		Active

### 2.2.3 Major Programs for the Implementation of Energy Efficiency

#### **THE NATIONAL ENERGY EFFICIENCY AND CONSERVATION PROGRAM (NEECP)**

In August 2004, the government through the Department of Energy (DOE) launched the National Energy Efficiency and Conservation Program (NEECP) aimed at strengthening the implementation of energy efficiency and conservation by promoting awareness on the efficient utilization of energy in the country. This initiative is relative to the Department’s mandate to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the Government relative to energy exploration, development, utilization, distribution and conservation.

Through the NEECP, every Filipino is encouraged to make energy conservation a way of life hence the theme “EC Way of Life.”

With the active involvement of the private sector, the DOE pursues aggressive implementation of existing energy conservation programs to rationalize energy demand consumption, particularly for petroleum and electricity. The overall goal of this program is to control the impact of oil price volatility to the economy and reduce carbon dioxide emissions that are harmful to the environment.

Under the NEEC Program are the following activities:

#### **DOE Fuel Economy Run**

The Department of Energy (DOE) spearheads the conduct of Fuel Economy Run to promote the judicious utilization of energy particularly fuel, by increasing public consciousness on energy efficiency.

This activity puts premium on vehicle maintenance and driving capabilities to obtain data on actual fuel consumption in a safe and normal driving condition taking place on national roads and main thoroughfares.

Through the conduct of the Fuel Economy Run, the DOE has gained the support and participation of various transport organizations and vehicle manufacturers and assemblers. This event is also co-sponsored by petroleum companies, namely: Petron Philippines, Pilipinas Shell, Chevron and Total Philippines.



Winners of the Fuel Economy Run receive cash prizes and other giveaways and certificate of participation. Their names and registered economy ratings are also published in leading newspapers with nationwide circulation.

A total of 11 Fuel Economy Runs for different types of vehicles have already been conducted by the DOE, making it the premier government agency to emphasize the importance of vehicle maintenance and proper driving habits to achieve fuel economy rating. These are as follows:



1. Asian Utility Vehicle (November 10, 2002)
2. Passenger Car (April 27, 2003)
3. Passenger Jeepney (July 13, 2003)
4. Passenger and Light Duty Vehicle (February 28, 2004)
5. Fuel Economy Run in Metro Cebu (April 17, 2004)
6. Fuel Economy Run in Southern Mindanao (September 17, 2004)
7. Passenger Car and Light Duty Vehicle (may 13,2006)
8. Biodiesel Fuel Economy Run for Passenger Jeep and Mega Taxi (December 9,2006)
9. First DOE-Auto LPG Fuel Economy Run (December 18, 2007)
10. Fuel Economy Run for Passenger Cars, SUVs, MPVs & Pick-ups ( October 23, 2008)
11. First DOE E10 Fuel Economy Run (November 27, 2009)

Participants in the Fuel Economy Run:

1. Car Companies of OEM Vehicles
  - a. Passenger cars
  - b. Light duty vehicles
  - c. Asian utility vehicles
  - d. Multi-purpose vehicles
  - e. Sports utility vehicles
  - f. Pick ups
2. Transport Groups
  - a. Passenger jeepneys
  - b. Taxi/mega taxi
3. Government Vehicles

### ***Don Emilio Abello Energy Efficiency Awards***

Don Emilio Abello Energy Efficiency Awards is the recognition given to outstanding companies and energy managers who have implemented EE&C programs to significantly reduce their energy consumption.

It was named after Don Emilio Abello who is the Father of Energy Conservation in the



Philippines. He is the brainchild of the Philippine Enercon Program during the Marcos era.

In 2010, 61 commercial and industrial establishments received various award categories ranging from Hall of Fame Award, and Outstanding Award to Special Award. Likewise, 31 Energy Managers received a special Energy Manager Award, recognizing their efforts and dedication to operate their respective facilities efficiently and judiciously. The combined energy savings of these establishments reached 159 million Liters of Oil Equivalent (MLOE) with an equivalent monetary value of Php 5 billion and a CO<sub>2</sub> avoidance of 269,444 tons.

### **ASEAN Best Practices Competition for Energy Management In Buildings and Industries**

The ASEAN-wide Best Practices Awards Competition was launched in March 2000 as part of the program on energy efficiency and conservation of the ASEAN.

This is a recognition program aimed at achieving the following objectives:

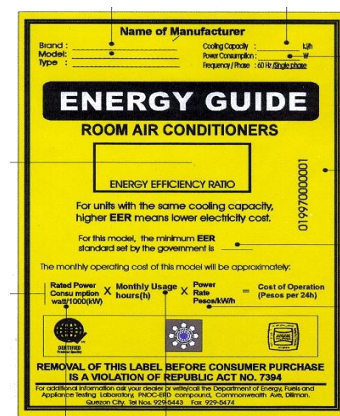
- To promote and disseminate best practices in energy management demonstrated or applied in buildings and industries in the ASEAN member countries.
- To encourage all sector participation in adopting and implementing innovative and creative energy management approaches towards energy conservation to enhance business growth.
- To promote energy management as a tool to save energy; as another form of energy resource; and, to improve environmental quality in the ASEAN region.
- To promote and disseminate best practices in energy management demonstrated or applied in buildings and industries in the ASEAN member countries.
- To encourage all sector participation in adopting and implementing innovative and creative energy management approaches towards energy conservation to enhance business growth.
- To promote energy management as a tool to save energy; as another form of energy resource; and, to improve environmental quality in the ASEAN region.

### **Energy Labelling and Efficiency Standards**

The DOE houses the Lighting and Appliance Testing Laboratory (LATL), which conducts energy performance tests on electrical household appliances such as room air conditioners and refrigerators and lighting system such as fluorescent lamps (linear and compact type) and ballasts.

It has an in-house calibration laboratory which also provides services to the appliance and lighting industry. It is also capable of conducting tests on energy saving devices that applies to household electrical products.

LATL attaches energy guide (as shown) indicating the energy rating of a particular product. This aims to improve the efficiency and performance of appliances, equipment and other energy consuming devices as well as empower the consumer in choosing the more energy efficient brand or model of appliance.



## **Energy Audit**

The energy audit is a technical service provided by the DOE to manufacturing plants, commercial buildings and other energy-intensive companies. A team of engineers from the Department evaluate the energy utilization efficiency of equipment, processes and operations of the establishment and recommend energy efficiency and conservation measures to attain energy savings.

The DOE is seeking the support of Energy Service Companies (ESCOs) or private firms that specializes in engineering and energy management services. The active participation of ESCOs is seen to provide alternative choices for industry clients in terms of securing the best technical advisory expertise in the field of efficiency and conservation.

Energy audit services of the Department help companies or establishments determine their energy used patterns and identify energy conservation in all energy-consuming sectors.



## **Philippine Energy Efficiency Project (PEEP)**

Partially funded by a loan from the Asian Development Bank, the Philippine Energy Efficiency Project or PEEP commenced in 2009 and will end in 2011 (note: extension has been requested to NEDA-ICC until 2013). The two main objectives of the project are: 1) the reduction of power generation through curtailment of peak demand; and 2) the reduction of greenhouse gas emissions.

PEEP consists of the following components and their corresponding objectives:

1. **Retrofit of government office buildings** – Retrofitting of lighting systems in 175 government buildings nationwide will be retrofitted, wherein 35 of which are currently undergoing retrofitting works with efficient lighting systems (ELS). This is to establish a model for large-scale implementation in the public sector.
2. **National Residential Lighting Program** – About 8.6 million Compact Fluorescent Lamps or CFLS will be distributed, where 5 million of which have been given away in exchange for the inefficient incandescent bulbs; traffic lights in 247 intersections in metro manila will be retrofitted with the more efficient LED's. Also, LED solar home system lights will be demonstrated in 3 off-grid communities for some 234 beneficiaries.
3. **Public Lighting Retrofit Program** – Public lighting retrofits of mercury vapor lamps to more efficient lighting fixtures such as high pressure sodium lamps to replaced existing fixtures in Burnham Park and Wright Park in Baguio City and about 2,008 street lamp fixtures and four (4) LED Traffic Light intersections in Cagayan De Oro City have been undertaken. Successful demonstration of efficient street lights and traffic lighting in LGUs and the establishment of a model for standardizing public lighting for large scale implementation.
4. **Energy Efficiency Testing and Lamp Waste Management** – Expansion of the capacity of LATL to conduct efficiency testing on a wider range of appliances and the accreditation of the laboratory to

ISO 17025. Procurement of a four (4) Lamp Waste Management facility and the establishment of a business model for collection of lamp waste and the operation of the facility is on-going.

5. **Efficient building initiative** – Establishment of an efficient building rating system that include a Rating Scheme for Green Buildings which would involved ten (10) buildings to be rated for new and retrofitted buildings. The development of a software model tool for rating system shall also the main output of this project component.
6. **Communication and Social Mobilization**  
The Information Materials with regard to the campaigns on “Communication for Efficient Lighting” and “Promoting Efficiency in Everyday Life” shall be produced and distributed, and these shall be consist of commercial ads for tv, radio and print media; streamers and banners, etc.

### ***Government Energy Management Program (GEMP)***

Presidential issuances such as Administrative Orders Nos. 126, 110, 103 and 183 direct all government agencies to reduce fuel and electricity consumption by at least 10%; the continued observance of austerity measures; the use of energy efficient lighting in all government facilities; and, enhanced the implementation of Government Energy Management Program, among others.

The Government Energy Management Program is a continuing program of the DOE, which involves the monitoring of fuel and electricity consumption of all government departments, bureaus, government owned & controlled corporations, academic institutions among others as prescribed in the abovementioned policies. The establishment of energy conservation programs and an enercon group in each agency to be headed by an Energy Conservation Officer is a major requirement under the presidential orders.

To ensure compliance, the DOE conducts spot checks or walk through energy audits (un-announced visit) on government buildings. A grading system is being enforced to determine government agencies’ compliance to various Administrative Orders apart from a monthly submission of electricity and fuel consumption report to the Department for monitoring and assessment. A feedback report has been put in place and the DOE gives awards of recognition to government agencies which consistently meet the criteria for energy savings and for other exemplary efforts made to become energy efficient. The following are the activities under the GEMP:

- Conduct of Spot Check by Energy Audit Team
- Require submission of relevant data/document such as:
  - Designation of an ECO of the concerned agency
  - Monthly submission of fuel and electricity consumption report
  - Posting of Agency Rating as a result of Spot Check
- Seminar Workshop on Energy Conservation for Government Employees.
- Conduct of IEC to different government offices

To date, the DOE conducted spot checks in 719 government agencies. Certificates of Energy/ Monetary Savings were issued to 62 of these agencies.

From September 2005 to July 2011, the government was able to save Php1.8 Billion on Electricity and Transport Fuel.

## Voluntary Agreement

A voluntary agreement is arranged between the DOE and industrial and commercial establishments through the Partnership for Energy Responsive Companies/Ecozones. This agreement encourages these sectors to voluntarily monitor their energy consumption and implement energy efficiency and conservation (EE&C) programs. Under this agreement are the following:

1. **Vehicle Use Reduction Program** which encourages people to lessen the use of their vehicles to reduce carbon dioxide emission and save on fuel consumption through the following:

- a. **Carpooling** – consists of three or more people that commute to work or other destination in a private vehicle in which members work out their own arrangements on who drives and how often, schedules, and payments of gas and maintenance.

- b. **Car Less Day** – fuel conservation measure that encourages motorists to burn calories instead of fossil fuel, reduce traffic congestion and air pollution, and leave the car at home once a week.

- c. **Park and Wait (Anti-Idling)**

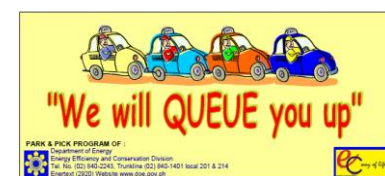
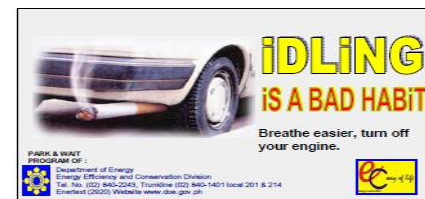
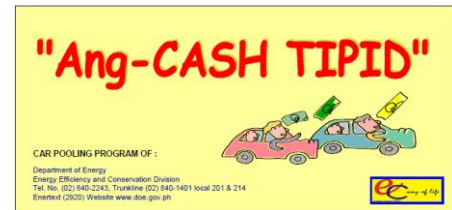
- encourages motorists to turn off their engines when parking
- launched on September 22, 2004 at Poveda

- d. **Park and Ride** – promotes the use of parking spaces where vehicle owners can leave their vehicles and then use the public transport system going to their destination (launched on November 17, 2004 at Manila)

- e. **Park and Walk** – encourages vehicle owners to park their vehicles and use bridge ways and path walks to move around commercial centers (launched on November 18, 2004 at Ayala Land)

- f. **Park and Pick** – encourages vehicles particularly taxis park only at designated places or sites (launched on November 18, 2004 at Ayala Land)

- g. **Park2Fly** – encourages parking at facilities made available near or at the airport for domestic airline passengers



to

## 2. **Placemats Program**

This program encourages leading food chains to use placemats with fuel efficiency and conservation information, as well as power conservation and demand management themes.



## 3. **Palit Ilaw Program**

*Palit Ilaw* (Bulb Exchange Program) is a program encouraging consumers to change their incandescent bulb with high energy efficient compact fluorescent lamp (CFL). The program is supported by the United Nations Development Programme (UNDP) and Global Environment Facility (GEF).



The program aims to eliminate the use of incandescent bulb, a very old lighting technology in which 80% of the energy used is turned into heat and only 20% is converted to light.

The compact fluorescent lamp (CFL) is called an “energy saver lamp” and can last up to 6000 – 10,000 hours compared to 750 to 1000 hours for standard incandescent lamp.

### **Information, Education and Communication Campaign (IEC)**

Information, education and communication (IEC) campaigns is one of the key components to ensure the effective implementation of the country’s energy efficiency and conservation program. The energy sector promotes energy efficiency and conservation through the dissemination of accurate information of energy standards, energy efficient products and innovative technologies to further enhance efficient use of energy. The IEC activities cover business operations and the supply/demand chain, to influence consumers’ behaviour. The two locally funded projects, the Power Conservation and Demand Management (Power Patrol) and the Fuel Conservation and Efficiency in the Road Transport (Road Transport Patrol) are the major components of the IEC program.

The IEC activities include: (a) the conduct of seminar-workshops for target participants in the commercial, industrial, residential, academe and government building sector; (b) the conduct of fuel economy run for transport vehicles, which is one of the mainstay activities of the DOE in partnership with car manufacturers and distributors, oil companies, media and other stakeholders from the transport group; (c) recognition award on energy efficiency, which is given to companies with exemplary improvement in their energy consumption performance through the implementation of efficient projects and measures that may be replicated by other industries and establishments; and (d) in partnership with the Philippine information Agency (PIA), useful media ads on energy conservation tips and practices have been made for television, radio and print for wider reach to target sectors.

### **Promotion and Accreditation of Energy Service Companies (ESCO)**

The promotion and the accreditation of ESCOs by the Department of Energy has been embodied under the DOE-Department Circular issued in 2008.

### ***Demand Side Management Program (DSM)***

The implementation of DSM program encompasses the following activities: promotion of energy efficient technologies in the industrial, commercial, government buildings and household sectors; promotion of Light Emitting Diode (LED) technology in street lighting; promote Voluntary Agreement with the private companies through a Pledge of Commitment to voluntarily reduce energy consumption and maintain energy efficient operation; and, expansion of standard and labelling program to include other electric appliances.

### ***Foreign Assisted Projects***

In the short term, the DOE currently implements two foreign assisted projects, and these are:

- a) The JICA technical assistance in the Developmental Study of Energy Efficiency and Conservation for the Philippine Project. The project sub-components are composed of the Awareness campaign for Information, Education and Communication on Energy Efficiency and Conservation; the Development of a Comprehensive Legal Framework on Energy Efficiency and Conservation; the Development of a Training and Certification Program for Energy Auditor and Energy Manager; and, the Development of a Full Scale National Energy Consumption Database and System Application Tool; and the development of an Energy Efficiency and Conservation Bill for the Philippines.
- b) The UNIDO-GEF technical assistance on the Industrial Energy Efficiency Project for the Philippines. The main goal is to demonstrate energy efficient processes through energy efficiency system optimization and the establishments of an Energy Management Standard for the Industrial sector based on International Standard Organization (ISO) 50001 framework.

### ***Tax Incentives***

One of the barriers to energy management policy particularly in promoting energy efficiency and conservation is the absence of tax policy incentives in the country that will attract energy efficient and conserving technologies as well as technical experts and services from abroad. Without this tax incentive, it would be difficult for private company to shift to more energy-efficient technologies considering that manufacturing industry sector remains to be highly energy intensive, hence goods produced for exports find difficulty competing in the international market because of the significant amount of energy or carbon foot prints.

Tax incentives rest on the mandate of Board of Investment in cooperation with the Department of Finance under the BOI-Investment Priority Plan (IPP). In the 2011 IPP, projects that cover the manufacture/assembly of goods, the utilization of which would significantly lead to the efficient use of energy or minimize/prevent, pollution or reduce greenhouse gas emissions, are among the preferred activities entitled to incentives.

## **3. COPING MECHANISM**

### **3.1 Master Plan on Energy Conservation and GHG Emission Reduction**

#### **3.1.1 The National Energy Efficiency and Conservation Action Plan**



In view of the steady rise in energy demand over the medium term, the DOE came up with the National Energy Efficiency and Conservation Action Plan as shown in Table 7, with the goal of 10% savings in the annual final energy demand forecast for the period 2010 to 2030.

Under the medium term of the plan (2010-2015), the DOE aims to complete the development and passage of Energy Conservation Bill; complete the implementation of the Philippine Energy Efficiency Project (PEEP); sustain information and education campaign (IEC); and strengthen the implementation of National Energy Efficiency Program (NEECP).

It is expected that the implementation of Government Energy Management Program (GEMP); Standards and Labelling for New Vehicles; and Building Certification will commence within the medium term. The DOE shall also pursue the development of Energy Efficiency Guidelines for Residential Buildings; and Benchmarking of Commercial, Government and Industrial Buildings in this period.

One of the provisions under the current proposed Energy Efficiency and Conservation Bill is the institutionalization of the Philippine Energy Efficiency and Conservation Center (PEECC) with the mission to implement and sustain the government’s program on energy efficiency and conservation to promote energy efficient and conserving technologies and related services in the market to open-up financial window for energy efficiency projects to help build capacities, and be a catalyst to remove barriers in the implementation of energy efficiency projects and programs.

The long term objective of the plan is to achieve an annual benefit of 3,455 ktoe energy savings; 339 megawatt-equivalent (MWe) deferred power capacity; and 8,949,063 tons carbon dioxide avoidance (Table 7 Energy savings equivalent to 10% of the annual final energy demand outlook from 2010-2030).

Table 7: Average Annual Energy Saving, Deferred Capacity, And CO2 Reduction

Average Annual Energy Saving	3,455 KTOE
Average Annual Deferred MW Capacity	339 MWe
Average Annual CO2 Reduction	8,949 Kilo-Tons CO2

Table 8: Energy Efficiency and Conservation Action Plan (2010- 2030)

2010	2015	2030
<p>A. Policy formulation and development of Energy Efficiency and Conservation:</p> <ul style="list-style-type: none"> <li>• Advocate the passage of Enercon Bill into Law</li> <li>• Amend DOE Circular 03-05-93</li> <li>• Accreditation of Energy Manager and Energy Auditor</li> </ul> <p>B. National Energy Efficiency and Conservation Program</p>	<p>A. Standard and Labelling for Passenger Cars and Light Duty Vehicles.</p> <p>B. Capacity Building and Certification Program for Energy Manager and Energy Auditor.</p>	<p>A. Promotion of Energy Efficiency and Conservation Program</p> <ul style="list-style-type: none"> <li>• Program for Aviation Fuel Enhancement</li> <li>• Program for major retrofit in the commercial and industrial establishment</li> <li>• Program for Voluntary Agreement with the LGUs</li> </ul>

<p>B.1 Information, Education and Communication Campaign</p> <ul style="list-style-type: none"> <li>• Power Conservation and Demand Management</li> <li>• Fuel Conservation and Efficiency in Road Transport</li> </ul> <p>B.2 Energy Audit Service</p> <p>B.3 Recognition Award</p> <p>B.4 Voluntary Agreement Program</p> <p>B.5 Energy Consumption Monitoring and Verification</p> <p>B.6. Government Energy management Program</p> <p>B.7 Standard and Labelling Program for Home Appliances</p> <p>C. Philippine Energy Efficiency Project</p> <ul style="list-style-type: none"> <li>• Government Building Retrofit</li> <li>• National Residential Lighting Initiative</li> <li>• Public Lighting Retrofit</li> <li>• Lamp Waste Facility</li> <li>• Social Mobilization</li> </ul>	<p>C. Development of Energy Efficiency Guidelines for Residential Buildings.</p> <p>D. Development of Energy Consumption Benchmark for the Commercial, Industrial and Government Building Sector.</p>	<ul style="list-style-type: none"> <li>• Program in the promotion of energy efficient technologies such as: vehicles, motors, Lighting System, Home appliances, devices, and other electric-using equipment.</li> </ul> <p>B. policy Implementation</p> <ul style="list-style-type: none"> <li>• Energy Management Standard</li> <li>• Establishment and Operationalization of the Philippine Energy Efficiency and Conservation Center.</li> </ul>
--	---	---

Through the vigorous and relentless implementation of the various activities under the NEECP, aimed at making energy efficiency and conservation a way of life for everyone, the DOE was able to achieve a total savings of 24.80 MMBFOE in 2010, 10% higher compared to the previous year, and representing 11.79 % of the country’s annual energy demand from 2009-2030 as shown in Table 9.

Table 9: Actual Energy Saving in MMBFOE

Programs	2009	2010
Information, Education and Communication (IEC) Campaign	3.47	3.45
Voluntary Agreements	5.47	3.60
Energy Standards and Labeling	10.98	14.27
Government Energy Management Program (GEMP)	0.22	0.22
Energy Management Program	2.46	3.26
<b>TOTAL</b>	<b>22.60</b>	<b>24.80</b>

The NEECP is a two-pronged program focused on fuel efficiency and conservation; and electricity efficiency and conservation. Its current slogan is “Bright now! Do right. Be bright.”

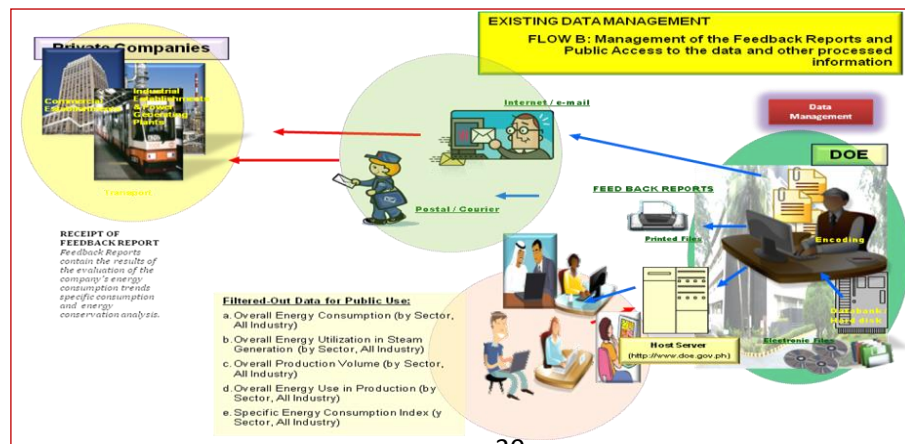
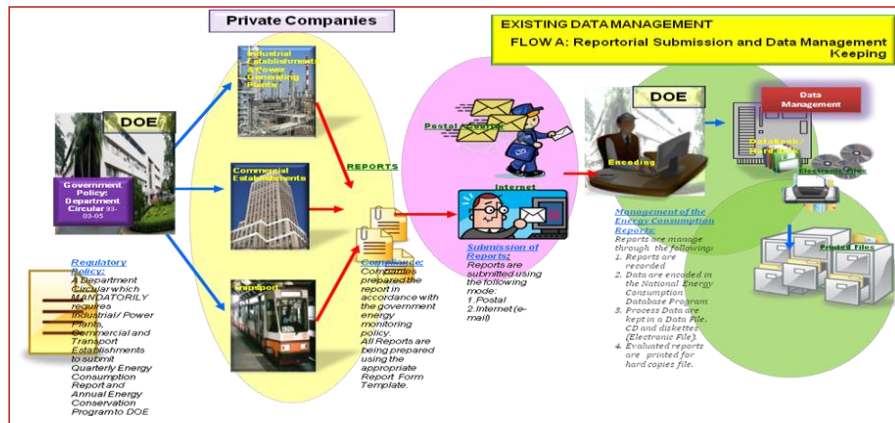
## 3.2 MONITORING AND REPORTING SYSTEM INCLUDING METHODOLOGY FOR THE TARGET IMPLEMENTATION TRACING MECHANISM

### 3.2.1 Energy Consumption Monitoring

Under the DOE Department Circular 93-03-05, all commercial, industrial and transport establishments consuming more than one (1) million liters of oil equivalent or 3.85 million kilowatt hours annually are required to submit quarterly energy consumption reports along with their corresponding production volume. Establishments consuming more than two (2) million liters of oil equivalent or 7.7 million kwh annually must, in addition, submit their energy conservation measures/programs to the DOE.

The data submitted to DOE are encoded in a “National Energy Consumption Database” for monitoring, evaluation and analysis. The processed information data are used for the establishment of sectoral energy consumption indices or Specific Energy Consumption (SEC) for various products or services. Based on the results, it can be used as energy benchmark for certain product in the industry. Moreover, the National Energy Consumption database is the source of information for the nominees to the Don Emilio Abello Energy Efficiency Award and for the ASEAN Energy Management Award.

Illustration below is an overview of flow of data collection and management keeping, feedback reports and process of information for internal and external use. Confidentiality of the reports is being observed by the DOE.



## **PART 2: REVIEW TEAM REPORT**

This part of the report presents the PREE Team's conclusions and recommendation about energy efficiency policies and programs in the Philippines.

## **1. INSTITUTIONAL CONCEPT**

### **A. Achievement**

The Department of Energy (DOE) was created through Republic Act 7638, or the "Department of Energy Act of 1992", which mandates the agency to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the government relative to energy exploration, development, utilization, distribution and conservation.

Alongside with its creation, the DOE implements energy policy to ensure a continuous, adequate, and economic supply of energy with the objective of ultimately achieving self-reliance in the country's energy requirements through efficient utilization of energy taking into consideration the active participation of the private sector in the various areas of energy resource development. The Energy Utilization Management Bureau (EUMB) is the unit of DOE responsible in the formulation and implementation of these policies, plans and programs as well as the regulation on new energy technologies, alternative fuels and the efficient, economical transformation, marketing and distribution of conventional energy resources to ensure the efficient and judicious utilization of energy resources.

In August 2004, DOE launched the National Energy Efficiency and Conservation Program (NEECP) aimed at strengthening the implementation of energy efficiency and conservation by promoting awareness on the efficient utilization of energy in the country. Through the NEECP, every Filipino is encouraged to make energy conservation a way of life hence the theme "EC Way of Life."

With the active involvement of the private sector, the DOE pursues aggressive implementation of existing energy conservation programs to rationalize energy demand consumption, particularly for petroleum and electricity. The overall goal of this program is to control the impact of oil price volatility to the economy and reduce carbon dioxide emissions that are harmful to the environment.

Likewise, the department conducted the Energy Summit in 2008. The results of the Summit directed the government to develop a more comprehensive energy management policy towards judicious and efficient utilization of energy across the demand sectors. Consequently, the public would like to see a dynamic government action plan that will address the high prices of energy, the development of non-polluting energy resources (renewable energy), and the option to consider nuclear energy in the future.

### **B. Challenge (Critique)**

While communication/cooperation of DOE among relevant departments should have been occurring regularly, in some cases the activity is on an ad-hoc basis only.

Meanwhile, several activities of the department entail a lot of local government involvement. Its far reaching goals could be achieved should there be closer coordination between central government and local governments.

The department is likewise constrained with the lack of the necessary resources such as personnel and budget. So much activity could have been implemented should the equivalent budget and manpower be available.

Lastly, it may be worth noting that there's a need for scaling-up and institutionalizing efforts to maximize energy saving and cost saving in an integrated manner.

## **C. Recommendations**

**Recommendation 1** Closer coordination among relevant departments (e.g. closer coordination between Department of Energy (DOE) and Department of Public Works and Highways to developing Building Energy Code and closer coordination between DOE and Department of Transportation and Communication to promote energy efficient transportation ) should be enhanced in order to maximize energy saving across the various sectors in the Philippines. More coordination between central government and local governments should be enhanced so as to maximize energy saving across the various regions in the Philippines.

**Recommendation 2** More human resources and budget should be provided for institutions which are responsible for EE improvement in various sectors/areas.

**Recommendation 3** A proposed EE and Conservation Centre of the Philippines should be carefully considered in terms of its distinctive role, funding etc. in Enecon Bill.

## **2. ENERGY EFFICIENCY GOALS, TARGETS AND STRATEGY**

### **A. Achievement**

The PREE review team is extremely pleased to see that the Government of the Philippines has embarked on a strong and nationally focused energy efficiency program. Through a number of enacted laws, decrees and resolutions (starting in the late 1970s), the Philippines has established a solid institutional framework and has initiated a strategic focus on energy efficiency as a major means to meet its current and future energy needs.

The Philippines has also established a solid set of strategies which will promote energy efficiency and accelerate energy efficient products, programs, and policies through the economy. The energy efficiency strategy being pursued by the Government of the Philippines is driven in large part by five key national goals (the Targets for the goals are listed at the end of the discussion on each goal);

### **1. Dampen demand for energy needs in the future and reduce its significant dependence on imported energy, particularly oil**

This is an important goal for the Philippines, particularly from the national security perspective (i.e. dependence on foreign sources of energy), but it is tempered by the following two needs:

Need to increase access to energy for all citizens (e.g. currently 85% of the residential sector has access to energy but the specific goal is to increase this percentage to 90% in the near future); and

A continuous growth in GDP (> 3.6%/annum) must be maintained to ensure the economic well being of the Philippines economy

Furthermore, the Government recognizes that while it desires to dampen the demand for energy, it is clear that there will be an increasing demand in all sectors (e.g. transport and industry sectors will drive demand while more mechanized agriculture and an increasing population will also contribute to a higher demand).

**Goal 1 Target:** 10% reduction in energy demand 2011 thru 2030

Average annual Energy Savings of 3,455 kTOE 2011 thru 2030

## **2. Reduce energy based environmental degradation**

This goal is driven by a national need to reduce criteria pollutants over the short term and to reduce Greenhouse Gases over the long-term. The electric and transportation sectors are heavily dependent on highly polluting fossil fuels (coal in the former and oil in the latter). The emissions from these fuel sources cause major health risks to the population as well as contributing to the world's greenhouse gas emissions problems.

**Goal 2 Target:** Reduction of GHG emissions 8,949 kT/annum 2011 thru 2030

## **3. Educate consumers on the many benefits of energy efficiency**

Dissemination of information related to energy efficiency is critical to establish a robust national energy efficiency program for an economy and across all sectors – individuals, industrial, transportation, buildings, and government consumers in each of these sectors. Consequently, strong information, education and communication campaigns (the IEC campaign) are a key component to any economy's successful energy efficiency and conservation program. The Philippines Department of Energy (PDOE) has implemented the IEC program and its activities to include the following:

- Seminar-workshops in the industrial, commercial, academic, government and buildings sectors;
- A fuel economy run for transport vehicles;
- A recognition awards program for companies that show exemplary energy efficiency projects that are replicable; and
- Partnership with the Philippine Information Agency (PIA) to conduct media ads for television, radio, and print media.

- The ultimate result of this goal is to make it a way of life, a new life style, and a new ethic for all Filipinos.

**Goal 3 Target:** Implement an Information, Education, & Communication Campaign under the National Energy Efficiency & Conservation Program (NCEEP)

#### **4. Fully utilize the Government Energy Management Program (GEMP)**

The GEMP program has had a long history of working on energy efficiency and conservation in the Philippines. Under Administrative Orders # 103, 110 and 126, the GEMP has focused on three critical activities:

Conduct of Spot Check by Energy Audit Team

Require submission of relevant data/document such as:

- o Designation of an Energy Conservation Officer of each agency
- o Monthly submission of fuel and electricity consumption report

Posting of Agency Rating as a result of Spot Check

GEMP has had significant achievements over the past few years, for example:

From September 2005 to November 2012, through the efforts of GEMP, the government was able to save:

- Php 1.56 Billion in Electricity
- Php 259 Million in Transport Fuel

DOE conducted Spot Checks to 719 government agencies. Certificates of Energy/Monetary Savings have been issued to 94 Government Agencies with a total monetary savings of PhP 234,332,815.00

Additionally, the act that created the PDOE (Republic Act 7638) set forth that the PDOE is "...mandated to prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the Government relative to energy ... conservation." GEMP has the ability to ensure that the Government truly adheres to the principle of *Leadership by Example*. By doing so, it is possible for Government activities to set the standard for Energy Efficiency in the whole economy.

**Goal 4 Target:** Achieve a 10% Savings in kWh and liters of fuel in all government operations

#### **5. Passage of ENERCON legislation**

A legislative bill has been created to enhance the energy efficiency and conservation activities of the Philippines. This bill is known as the Energy Efficiency and Conservation Act of 2012 (the Enercon bill) has been created to;



- establish a policy foundation for accelerating energy efficiency in the economy, and
- develop an integrated, comprehensive energy management policy to maximize the impact of energy efficiency and conservation in the economy.

The PDOE strategy here is to work with all the stakeholders to ensure that this bill voted into law.

**Goal 5 Target:** Passage of ENERCON legislation

Passage in 2012, fully implemented in 2015

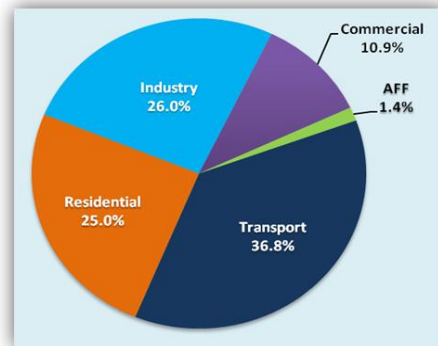
As can be seen from the above, the Government of the Philippines has set a number of significant goals and has achieved a measure of success thus far. See, graphic on the right which indicates that the energy savings have been increasing each year:

YEAR	FINAL ENERGY DEMAND (MTOE)	NEECP SAVINGS (MTOE)	%
2007	23.35	2.16	9
2008	23.17	2.80	12
2009	23.53	3.02	13
2010	24.52	3.70	15

The Government has also set serious targets that must be met in the near future and maintained in the long-run in order to ensure that energy efficiency and conservation play a major role in the Philippines achieving a high level of sustainability and security in the future.

The goals impact all sectors of the economy. As can be seen from the graphic below,

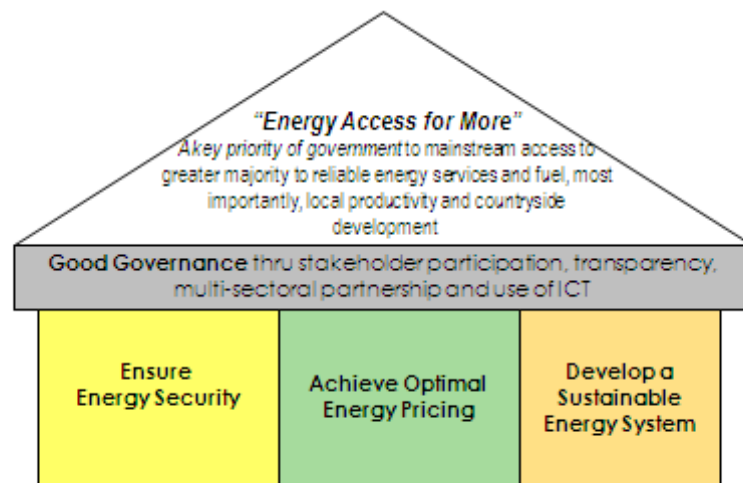
The total final energy consumption for 2010 shows significant consumption in the transportation, industrial and residential sectors. Therefore the energy efficiency and conservation strategies that need to be developed to meet the goals must address each of these sectors<sup>1</sup>.



It is the Philippines Department of Energy under RA 7638 (noted previously) that is charged with carrying out the energy policies and programs of the economy and it recognizes the need for a comprehensive national energy policy and program portfolio. PDOE is led by Secretary Jose Rene D. Almendras who has focused its efforts to meet its sustainability and security mandate in six line bureaus. These bureaus report directly to 3 Undersecretaries with one of the line bureaus, the Energy Utilization Management Bureau (EUMB) handled by Undersecretary Loreta G. Ayson who reports directly to the Secretary.

<sup>1</sup> Energy savings and reduction of oil consumption is being addressed using strategies to increase biofuels, cleaner burning fuels (e.g. natural gas), and electricity. Since these strategies are not specifically in the energy efficiency or conservation arena, this report will concentrate on the other sectors.

The EUMB is responsible for the National Energy Efficiency and Conservation policy and strategy. EUMB focuses its efforts on the overall guidepost and direction set at the beginning of the administration of President Benigno S. Aquino. This direction included three major pillars which formed the foundation for achieving “energy access for more” under the principle of “good governance”. The following diagram clearly shows the three pillars that the EUMB supports in its need to meet the 10% reduction goal on energy consumption based on the 2010 – 2030 Philippines Energy Plan:



Thus, in order for the EUMB to operate effectively under the above direction and in order to meet its mandate as stated below, the EUMB must develop effective strategies:

**EUMB MANDATE:**

Formulate policies, plans and programs related to:

- Energy efficiency and conservation, and
- Alternative fuels and energy technologies

while ensuring effective implementation thereof in the government, industrial, commercial, residential and transportation sectors.

The EUMB has therefore developed five major strategies to meet the energy efficiency and conservation goals:

- a. Establishment of an appropriate policy framework on energy efficiency and conservation;
- b. Identification of major energy efficiency and conservation programs and activities of high impact;
- c. Enhancement of a cooperative partnership with other government agencies, private industry associations, and other appropriate stakeholders;
- d. Enforcement of existing laws and policies on energy efficiency and conservation; and
- e. Enhancement of bilateral and multilateral cooperation with other economies.

In addition, there are a series of short-, medium-, and long-term sub-strategies that the EUMB has embraced as a means to enhance energy efficiency and conservation in the Philippines economy:

*Short-term*

- Re-file the Energy Conservation Bill
- Rationalize public utility vehicles in major roads, particularly EDSA.
- Promote energy efficiency lighting technologies (Philippine Energy Efficiency Project)
- Monitor the implementation of Administrative Order 126, requiring government buildings to reduce electricity and fuel consumption by 10%.
- Conduct energy audit of DOE-attached agencies.
- Promote and strengthen Energy Service Companies.
- Establish energy benchmark in the manufacturing and building sector.

*Medium-term*

- Implement the Enercon Law
- Promote green building rating system
- Promote adoption of Energy Management Standard in industries under ISO 50001 framework.
- Implement Heat Rate Improvement in Power Plants.
- Promote Demand-Side Management (DSM) program
- Develop and implement energy efficiency labeling program for brand new vehicles.

*Long-term*

- Expand promotion of Energy Efficiency and Conservation Program and Energy Consumption Monitoring in large seaborne vessels (passenger ships, cargo/tanker ships), and electric cooperatives/distribution utilities.

In summary, the PDOE has achieved modest success in achieving reductions in energy consumption and is preparing for the future by implementing solid strategies while supporting passage of strong legislation that would accelerate much more energy efficiency and conservation into the economy.

**B. Challenge (Critique)**

While there have been measurable achievements by PDOE in effecting energy efficiency and conservation programs and policies, more can and should be done in the future. However, there are some difficult challenges that must be overcome.

First and foremost, the PDOE, particularly the EUMB/EECD lacks the necessary resources (e.g. personnel and budget) to be able to implement in wider scale its mandate to promote energy efficiency and conservation to ensure and sustain energy security of the country and to help mitigate climate change.

Second, the fact that the Enercon legislation has not passed in previous Congresses, there is no guarantee that it can be passed in the 15<sup>th</sup> Congress of the Philippines.



Absence of an appropriate legal policy framework or law (i.e. the Enercon bill) on energy efficiency and conservation is constricting the ability of the PDOE to (i) meet the goals that have been set, and (ii) effect the strategies that are needed to accelerate energy efficiency and conservation measure into the economy.

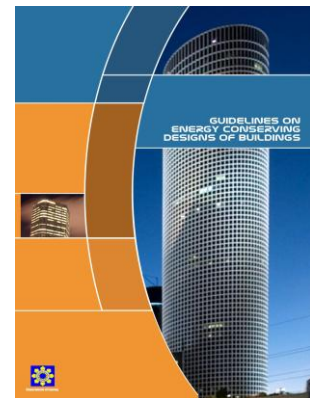
Other substantial challenges also exist. For example, inadequate awareness and absence of sustainable information, education and communication campaigns hamper the ability of the PDOE to promote across all the sectors

energy conserving measures, energy efficient technologies, and capacity buildings/trainings, among others. Even in academic institutions, the lack of a “green and sustainable” education program for children makes it difficult to change the culture toward a more energy efficient and conservation minded population.

Another challenge that must be overcome is the lack of an appropriate regulatory scheme for utilities to participate in supporting and carrying out energy efficiency and conservation programs. Decoupling a utility's profits from its sales of energy is necessary to make the utility indifferent to selling less product and if the utility is allowed a return on its investment equal to that which it receives for supplying energy it enhances the utilities capacity to deliver energy efficiency and conservation programs. In the United States where each state regulates the ratemaking process in the state, those states which have “decoupled” (or have some other efficiency or conservation incentives for utilities) contribute nearly \$8 billion/annum to energy efficiency and conservation programs. Therefore, the challenge here is for the Philippines Government to break the link between profits and revenues and remove the disincentive (present in traditional utility ratemaking) for utilities to run energy efficiency and conservation programs and invest in other measures to reduce demand and load.

Other challenges that the Government of the Philippines and PDOE face include:

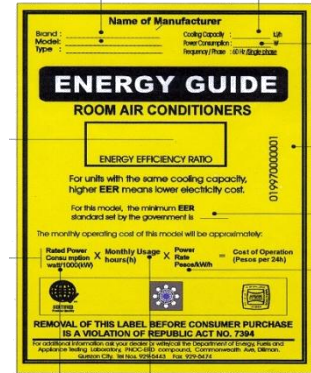
- moving from voluntary programs to mandatory programs (e.g. mandating the “*Guidelines for Energy Conserving Design of Buildings*”);
- expanding the standards and labeling program which currently is limited to a few selected household appliances (e.g. room air conditioners, small refrigerators) while higher energy



consuming appliances such as large refrigerators, washing machines have yet to be rated and labeled; and

- developing a national energy efficiency building code for new construction and one which is also applicable to major renovations in existing buildings.

However, many economies have faced these challenges and have been able to overcome them and create a robust and vibrant energy efficient and conservation oriented program in the economy.



### C. Recommendations

#### Recommendation 4 Integrate energy efficiency plans and policies across the Government

This will ensure a common strategic plan and that energy efficiency actions will be coordinated and shared among the various agencies. The creation of an Interagency Energy Efficiency and Conservation Task Force that meets regularly to share information, progress and status of energy efficiency in the Departments will have a reinforcing effect and drive energy efficiency further into the government. Having the government embed the energy efficiency concept in its daily work also will help drive the energy efficiency culture throughout the entire Philippine economy.

#### Recommendation 5 Enhance the Government Energy Management Program (GEMP) visibility in the government by having it lead the Interagency Energy Efficiency and Conservation Task Force.

By taking the lead on a newly created government-wide energy efficiency task force, GEMP will be much more visible and have additional capacity to integrate energy efficiency plans and policies across all Departments. Coordinating policies and actions across all Departments will drive the energy efficiency culture throughout the entire Philippine economy.

*Leadership by Example* is a powerful tool to transform the energy efficiency marketplace in the economy. The government sector's purchasing power alone offers a powerful non-regulatory means to stimulate demand for energy-efficient products and services. Domestic suppliers of energy-related products and services are then encouraged to introduce more energy-efficient products and services as a real and vibrant market for energy efficiency emerges from the government actions<sup>2</sup>.

GEMP should take the lead in bringing new programs to other agencies (e.g. making performance contracting easier to implement would benefit other agencies as they attempt to meet their annual reduction target.

#### Recommendation 6 Develop and Implement a National Action Plan for Energy Efficiency

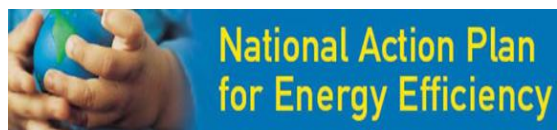
<sup>2</sup> See,

[http://www.usaid.gov/our\\_work/economic\\_growth\\_and\\_trade/energy/publications/projects/mexico\\_peps.pdf](http://www.usaid.gov/our_work/economic_growth_and_trade/energy/publications/projects/mexico_peps.pdf)

Using the current foundation of plans, policies, programs, and legislation to serve as a framework, Philippines can develop a comprehensive economy-wide energy efficiency plan that will help transform the efficiency marketplace and meet its efficiency targets.

A number of APEC economies have established a national energy efficiency action plan to guide them along the pathway to a clean and sustainable energy future.

The United States developed a comprehensive National Action Plan for Energy Efficiency over the past few years. The development of this plan was under the auspices of the US Department of Energy and the Environmental Protection Agency, but relied heavily on both private sector and non-governmental input throughout the entire process.



A Leadership Group of nearly 60 nationally known energy organizations were brought together to lead the development of this forward-looking plan. Even today as that plan is meeting many of its goals the private sector and non-governmental representatives are still working together diligently with the government to move it forward; while it is evolving, the Leadership Group is updating the plan through 2025.



Chile, recently established its own National Action Plan for Energy Efficiency. That plan was based in large part on the results of APEC's Peer Review of Energy Efficiency program. Chile's actions in that plan make a powerful statement as to how important a well-developed and executed plan can help an economy's overall energy future. In fact, the Alliance to Save

Energy awarded Chile with the Americas 2010 EE Visionary Award.

**Recommendation 7** Create a pathway with annual timelines to meet the stated energy efficiency targets.

This is necessary to ensure that the government is able to determine whether targets will be met on time, or whether more aggressive actions/measures are needed.

For example, Peru is developing an energy efficiency pathway of policies and programs for its economy to follow. The pathway will incorporate annual timelines to meet the stated energy efficiency targets and which can be used by Peru to measure its progress. This will enable the government to continually take stock of where they are, what progress has been made, and what further policies and programs (or targets and goals) set forth in its strategic plan need to be modified or enhanced. Additionally, this annual review also provides the government an opportunity to include all sectors of the economy as part of the plan to increase the energy efficiency target over time. By reviewing the target annually and

evaluating progress, Peru will likely be able to ratchet up the target over time. By including all sectors, there will be more flexibility across a broader spectrum as additional sectors can contribute to meeting higher targets.

**Recommendation 8** Set individual sector goals and develop a more robust energy consumption data base.

Setting individual sector targets will allow the PDOE to focus and tailor policies and programs as they are needed in specific sectors. Making energy consumption reporting mandatory will enhance the ability to benchmark and understand where additional attention is needed

**Recommendation 9** Modify low carbon scenarios, which currently rely heavily on renewable fuels, to reflect more aggressive EE targets across all sectors

Energy Efficiency is the first response for reducing carbon and will achieve the most reductions at the lowest cost. While clean energy supply (renewables) or use of cleaner burning fossil fuels (natural gas) can help to reduce carbon (and other pollutants), only energy efficiency and conservation produce no emissions at the cheapest cost and in the shortest time frame. Adopting significant energy efficiency and conservation measures can help an economy achieve its carbon reduction goals quicker and at lower cost than any alternative. And it is unclear that any economy should waste a valuable and expensive resource (i.e. renewables) on any inefficient process, product, building or vehicle. Energy efficiency should be the Philippines first choice for carbon reductions.

**Recommendation 10** Establish a K-12 and University energy efficiency schools program

Teaching students about energy efficiency will make EE a part of their life from their early years. They will also take the EE message home to their families. And they will be the future leaders who continue to pursue energy efficiency throughout their lives

**Recommendation 11** Create a national public education and awareness campaign for energy efficiency. Tie in important national overarching goals in the message.

This is a critical action that will build public support for energy efficiency measures and programs initiated by the government and enterprises. While educating the public (and enterprises) on the cost savings from efficiency, national goals such as energy security (reducing liquid fuel imports) and Greenhouse Gas reductions (due to energy efficiency actions) will resonate well with the public and get them to become more efficient as a matter of national pride. A very clear message on energy efficiency must be developed and spread among all of the organizations and stakeholders in order to ensure a transformational change within the economy; each agency of the government must adhere to the common message as they undertake their own actions, policies, and programs with energy efficiency and conservation as a top priority.

**Recommendation 12** Create an energy efficiency framework that is focused on the low-income people of the Philippines

Expanding energy efficiency policies to focus on the low-income and/or rural community will allow more flexibility to meet the targets while protecting a vulnerable segment of the economy and meeting an important social goal.

The United States has created a significant program to assist its low-income population. The Weatherization Assistance Program provides funding for residential energy efficiency measures to be installed in low-income households. This has the effect of lowering the utility bills for the household while making the residence more comfortable for those living there. This program has reduced energy consumption in this vulnerable community, puts more discretionary money into their pockets, and created jobs and an industry of home energy efficiency and conservation retrofits.

**Recommendation 13** Create an economic environment for utilities to provide energy efficiency services to the people and businesses of the Philippines

The utility industry can be a significant partner in delivering massive amounts of energy efficiency if the proper regulatory schemes are in place. Utilities, including coops, are also a critical player in this area as it can promote the types of policies, regulations, and reforms that would place energy efficiency on the same financial basis as generation.

Decoupling the a utility's profits from its sales of energy is necessary to make the utility indifferent to selling less product and if the utility is allowed a return on its investment equal to that which it receives for supplying energy it enhances the utilities capacity to deliver energy efficiency and conservation programs. In the United States where each state regulates the ratemaking process in the state, those states which have “decoupled” (or have some other efficiency or conservation incentives for utilities) contribute nearly \$8 billion/annum to energy efficiency and conservation programs. Therefore, the challenge here is for the Philippines Government to break the link between profits and revenues and remove the disincentive (present in traditional utility ratemaking) for utilities to run energy efficiency and conservation programs and invests in other measures to reduce demand and load.

### **3. ENERGY DATA COLLECTION AND MONITORING**

#### **A. Achievement**

The national energy data collection is done by the Policy Formulation & Research Division (PFRD) which is under the Energy Policy and Planning Bureau (EPPB) of DOE. PFRD plays an important role in data collection directly from the first party regardless under DOE or under different government agencies. PFRD also formulate policy recommendations and course of action on current and emerging issues based on energy models, surveys, research and studies for the short, medium and long term national energy plants, programs and targets.

The collection of data relating to energy efficiency and energy savings are done through energy audits, research and energy conservation programs, conducted by DOE together with various parties either government or private.



PREE team found the existing monitoring and evaluation of energy efficiency and conservation done systematically for both government and private sector. As mandated by the Government Energy Management (GEMP), report on energy use by government agencies is submitted each month for monitoring purposes.

Meanwhile, for private sector, monitoring and evaluation of energy savings is mandated through DOE Department Circular 93-03-05. This circular mandates all commercial, industrial and transport establishments consuming more than one (1) million liters of oil or 3.85 million kilowatt hours annually to report their energy usage to DOE. For organizations which consume more than two (2) million liters of oil or 7.7 million kilowatt annually, must submit the energy conservation measures or programs to the DOE. Reports are submitted to DOE every three months and are encoded in a "National Energy Consumption Database" managed by Energy Utilization Management Bureau (EUMB)

## **B. Challenge (Critique)**

Data and information on the implementation of both energy savings through energy audit, research and energy conservation programs conducted by organizations and governmental and private agencies as are present have no exact data exchange platform, request for data is solely on request. There is a need for a data and information centre related to the energy efficiency and conservations.

While data collections were mostly done through energy audit for both government and private sector, it is necessary to have standard rules on the implementation of energy audits and energy auditors who carry out energy audits.

Meanwhile, records showed that data collection in conjunction with the DOE Department Circular 93-03-05 which is imposed in 1993, the level of public compliance of commercial, industrial and transport reporting their use of energy is only 10%.

- There is no exact policy for the public data collection as it is only voluntary. Data collected only depends on the level of awareness of the energy consumer and their readiness to report their use of energy. Furthermore, there's no penalty imposed to those who does not obey the circular which makes reporting of energy use as not a priority for them.
- Reportorial for commercial, industrial and transport energy demand used same forms, when in fact, energy used in the commercial buildings, industrial and transportation each have different specification.
- Reporting has reached to four times in a year.

## **C. Recommendation**

The Data collection developed by DOE seems to cover the energy end-use of all sectors in a very detailed and systematic manner. However, the review team found small room for improvement in the application of evidence-based decision making by policy makers in government.

**Recommendation 14** Establish Data Centre and Information of Energy Conservation to enhance data analysis function.

- a. Establishment of the data centre and Information under the management of Energy Utilization Management Bureau (EUMB) can done by enhancing the "National Energy Consumption Database" which will not only manage the database of the national energy consumption but more broadly, to include: data centre and information related to the activities on efficiency of national energy by both government or private sectors, in cooperation with other interested parties which in some ways conducting analysis to assist DOE in making policies related to energy efficiency; as well as developing a monitoring system to ensure achieving the national energy conservation target.
- b. Establish ministerial regulation on data collection and management with clear accountability for each unit of DOE and other relevant agencies and state owned companies when it comes to the provision of the central data and information on Energy Saving.
- c. Upgrade the infrastructure in communication technology (hardware, software and so forth) including development of human resources and capacity building for central data and information of energy saving.

**Recommendation 15** Improving data collection and monitoring through different data collection system.

- a. Data collection through energy audit on industry, commercial, SME etc is conducted by various players.
  - Enhance cooperation in data sharing/exchange from audit result as well as harmonization of data collection to complement each other and avoid duplication.
  - Introduce a Standard Procedure in energy audit. To ensure that audit is carried out efficiently which will benefit other auditors as well; audit results can be good for references purposes.
  - Encourage more certified energy auditor to ensure that energy audit is carried out effectively and produces a high quality data and maximize saving opportunity.
- b. Enhance the DOE Department Circular 93-03-05 by:
  - Mandatory data submission, though the immediate passage of Enercon Bill, and introducing penalty for non compliance energy users, for example in the case of Indonesia, companies which do not comply, their names will be published as such in local newspapers.
  - Introducing/making a reporting form easier by:

- Create a separate form for Building and Industries. Data collection for building and industry needs to be separated. The current form used for buildings do not cover the exterior of the buildings, the areas that are air conditioned etc, which are necessary in counting the building SEC (kWh/m<sup>2</sup>/thn).
  - Submission of report at least once a year.
- c. Make use of ESCO information/data by reporting EE&C activities to DOE. Information/data from ESCO related to the successful implementation of energy efficiency is needed to enrich the information that can be emulated by other organizations.
  - d. Enhance communication & monitoring system and publish periodically the energy efficiency monitoring reports as well as disseminate the reports to stakeholders and energy users for their appreciation.

#### **4. POLICY MEASURES – SECTORAL ANALYSIS**

##### **4.1 Industry Sector**

###### **A. Achievements**

As gleaned from the economy's energy data (*Figure 4, Part 1 of the report*) the total energy demand reached 24.7 MTOE in 2010, 26 percent of which accounted for the total energy demand in the industry sector, likewise the sector is expected to grow the fastest among the sectors at 5.2% (*Figure 5, Part 1 of the report*) annually over the next 20 years.

In this regard, the continuous increase of energy use in the sector paved the way to the development and implementation of appropriate energy management program to manage its fuel consumption. In 2004, the government through the Department of Energy (DOE) launched the National Energy Efficiency and Conservation Program (NEECP)<sup>3</sup> aimed at strengthening the implementation of energy efficiency and conservation by promoting awareness in the efficient utilization of energy in the country, and in 2008 the *Philippine Energy Summit*<sup>4</sup> for sub-sector on the Energy Efficiency and Conservation resulted in the drafting of several major priority action plans. While, the department's plans and programs cut across all sectors (*Figure 4.1*), some would address specifically the industry sector, among them are as follows:

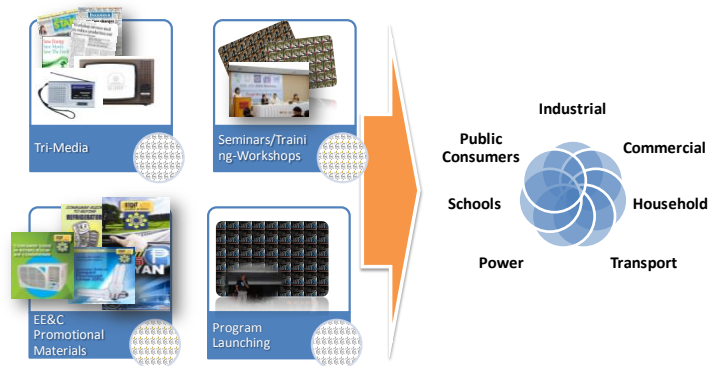
---

<sup>3</sup> <http://www.doe.gov.ph/EE/EE&C;>

<sup>4</sup> *The 2008 Philippine Energy Summit, held January 29-31 at the SMX at Mall of Asia, brought together over 2,500 energy stakeholders from various sectors, conducted mainly as an immediate response to the oil price spike, as indicated by its theme "\$100 per Barrel: Crisis or Opportunity?", the Summit yielded a comprehensive, short- to long-term reflection and sharing on the energy problem in its various dimensions and manifestations; see: <http://www.doe.gov.ph>*

**i. Information, Education and Communication Campaign**

Information, education and communication (IEC) campaigns which is one of the key components to ensure the effective implementation of the economy’s energy efficiency and conservation program, is being conducted continuously by the department. The promotion of energy efficiency and conservation would usually be done through the dissemination of accurate information of energy standards, energy efficient products and innovative technologies to further enhance efficient use of energy.



**Figure 4.1 - Information, Education and**

The IEC activities would cover business operations and the supply/demand chain, to influence consumers’ behaviour. The activity generally includes conduct of seminar-workshops for target participants in the commercial, industrial, residential, academe and government building sector. The department has also formed strong partnership with the economy’s Philippine information Agency (PIA), wherein useful media ads on energy conservation tips and practices have been made for television, radio and print for wider reach to target sectors.

**ii. Energy Management System/Energy Audit;**

Meanwhile, the DOE provides technical services to manufacturing plants, commercial buildings and other energy-intensive companies through energy audit. A team of engineers from the Department evaluate the energy utilization efficiency of equipment, processes and operations of the establishment and recommend energy efficiency and conservation measures to attain energy savings. Energy audit services of the Department also help companies or establishments determine their energy used patterns and identify energy conservation in all energy-consuming sectors.



The DOE likewise would seek support of Energy Service Companies (ESCOs) or private firms that specializes in engineering and energy management services. The active participation of ESCOs is seen to provide alternative choices for industry clients in terms of securing the best technical advisory expertise in the field of efficiency and conservation.

### iii. Recognition Awards;

Every year the Department of Energy celebrates the National Energy Consciousness Month (NECM)<sup>5</sup> to strengthen stakeholders' awareness on energy conservation efforts of the government. Relatedly during the celebration, DOE gives recognition award to companies with exemplary improvement in their energy consumption, namely the Don Emilio Abello<sup>6</sup> Energy Efficiency Awards.

The Don Emilio Abello Energy Efficiency Awards is a prestigious recognition that is given to a company from the commercial, industrial and transport sectors that invests in energy efficiency for greater productivity with the abatement of greenhouse gas emissions that leads to climate change mitigation. Since 2006 a total of 215 establishments<sup>7</sup> received various award categories ranging from Hall of Fame Award, and Outstanding Award to Special Award. Likewise in 2010, 31 Energy Managers received a special Energy Manager Award, recognizing their efforts and dedication to operate their respective facilities efficiently and judiciously.



It may be worth mentioning that the PEER Review Team conducted site visit to one of Don Emilio Abello Awardees, the Analog Devices Gen. Trias, Inc. located in Gen. Trias, Cavite. The company was awarded with the Secretary's Award, which means it has obtained the highest Percent Energy Conservation (PECO) rating as determined by the Committee<sup>8</sup>. Specifically, Analog Devices achieved 20.4% PECO and garnered an energy savings of 3,278,071 litres of oil equivalent (LOE) or a monetary equivalent of PhP 129,811,612 and 5,275,057 kg of avoided CO<sub>2</sub>.

<sup>5</sup> By virtue of Presidential Proclamation No. 1427, s of 2008, declaring December of every year as National Energy Consciousness Month (NECM)

<sup>6</sup> Named after Don Emilio Abello who is the Father of Energy Conservation in the Philippines and the brainchild of the Philippine Enercon Program during the Marcos era;

<sup>7</sup> With an equivalent total savings of 601,173,935 liter of oil equivalent (LOE) and CO<sub>2</sub> avoidance of 252,493,053 kg (see presentation on Don Emilio Abello Awards presented during PREE in the Philippines, February 6-10, 2012);

<sup>8</sup> The 2011 Don Emilio Abello Energy Efficiency Awards Committee was composed of the heads of the ff: 1) Philippine Department of Energy (DOE), the Secretary as Chair, 2) Petron Corp., 3) National Power Corporation (NPC), 4) Manila Electric Company (MERALCO), 5) Pilipinas Shell Petroleum Corp., 6) Philippine National oil Co. (PNOC), 7) Chevron Phils., Inc., 8) Energy Utilization Foundation, Inc. (EDUFI), 9) Energy Efficiency Practitioners Assoc. of the Phils., and 10) Phil. Energy Conservation Center, Inc.

In addition, the department participates in the ASEAN Best Practices Competition for Energy Management in Buildings and Industries<sup>9</sup>, with entrees coming from the industries recognized through the Don Emilio Abello Award. These entries won major categories in the 2011 ASEAN Energy Management Award for Major Buildings and Industries.

**iv. Public and Private Sector partnerships**

To complement the government’s plans and program on energy efficiency and conservation, the department, forged strong partnerships with both the public and private sectors. Several mechanisms have now been in place in the private sector that would sustain the energy efficiency and conservation efforts of the government. Similarly, other government agency collaborates with DOE to ensure coverage of wider areas through implementation of technically assisted or foreign assisted projects.

**a. UNIDO-GEF Technical Assistance : Industrial Energy Efficiency Project for the Philippines**

The “*Industrial Energy Efficiency Project for the Philippines*” (see Figure 4.2) is a multilateral technical assistance by United Nations Industrial Development Organization and Global Environment Facility (UNIDO-GEF)

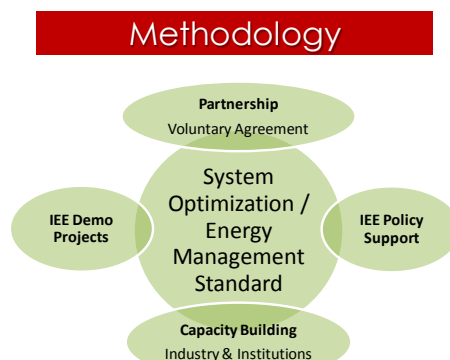
The project has started in 2011 and will run for five years with the Department of Trade and Industry (DTI)<sup>10</sup> as one of the co-implementors. Energy intensive industries such as food and beverages, chemical, paper and steel are the focus sectors of the project.

Specifically, the project aims as follows:

Introduce ISO 50001 Energy Management Standard framework & system optimization approach for improvement of industrial energy efficiency;

Enhance financing capacity in support for industrial energy efficiency project; and,

Address institutional and technical barriers through capacity building interventions and support on demonstration projects.



**Figure 4.2 – Methodology Industrial Energy Efficiency**

<sup>9</sup> ASEAN-wide Best Practices awards competition was launched last March 2000 under the program area on energy efficiency and conservation ASEAN Plan of Action. Objectively, this is a recognition program aimed to provide international prominence and recognition to buildings and entities; see: <http://www.doe.gov.ph/EE/RAP.htm>

<sup>10</sup> For development & promotion of Energy Management Standard based on ISO 50001 framework, see presentation on “*PHILIPPINE Industrial Energy Efficiency Project*” presented during PREE in the Philippines, February 6-10, 2012.

As far as the project is concerned, the department has completed hiring of a National Project Coordinator and Project Assistant and is currently in the process of putting up the Project Management Office (PMO) to house the contracted personnel of the PMO until 2016.

**b. Philippine Energy Efficiency Project (PEEP)**

The Philippine industry sector is faced with challenges corollary to the economy’s rapid urbanization and industrialization. Propelled by increasing activity in the sector, energy consumption as well as water and air pollution consequently increases. The DOE came up with the PEEP, a 3-year project funded by Asian Development Bank (ADB) which aims to reduce energy consumption and GHG emission in the building sector through a unified “Green Building Certification System” in collaboration with the Philippine Green Building Council<sup>11</sup>. Specifically, the project has the following activities;

- Implementation of the building rating system by streamlining existing initiatives into a single nascent system;
- Development of software for “BERDE”<sup>12</sup> rating system, and;
- Certification of buildings.

The “BERDE” rating system follows international accepted standards and covers the following strategies:

- Building Automation Systems;
- Energy Efficient Equipment;
- Building Envelope;
- Energy Efficiency Improvement – starting at 12.5% improvement;
- Onsite renewable energy – 5%;
- Natural Ventilation;
- Efficient Lighting; and
- Metering

**c. Philippine Efficient Lighting Market Transformation Project (PELMATP)**

A UNDP-GEF funded project, PELMATP generally aims to remove barriers to widespread use of energy efficient lighting systems (EELs). This is a 5-year project which collaborates with several private and public entities implementing different areas of the

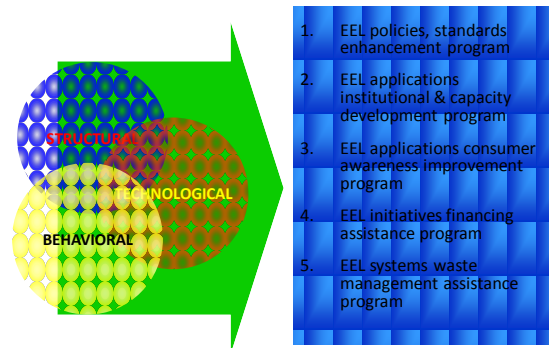


Figure 4.3 : Strategies and Components

<sup>11</sup> PHILGBC-Registered with the Securities and Exchange Commission (SEC) in March 22, 2007;

<sup>12</sup> “Building for Ecologically Responsive Design Excellence”, a program initiated by the PHILGBC to facilitate greener building, see: <http://philgbc.org>

strategies and components of the project (see Figure 4.3).

PELMATP cut across all sectors of energy, target activities in the industry sector however include reviewing and updating of the lighting system specification in the Building Energy Use Guidelines of the National Building Code.

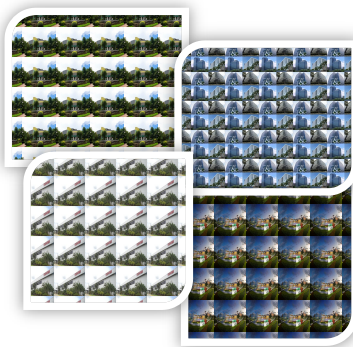
In so far as the project is concerned, the revised guidelines on energy conserving design of buildings and manual on efficient lighting has been presented and 2000 copies were distributed to the various cities and municipalities nationwide (17 local government units (LGUs) in the National Capital Region, 90 in Luzon and 54 in the Visayas and Mindanao). Meanwhile, the manual on efficient lighting is being used as reference in the subject on Illumination Engineering in the curriculum for Electrical Engineering of 130 schools

## B. Challenge (Critique)

While the department has been actively conducting IECC regularly, activity would only be limited to conduct of training and seminars and dissemination of information and promotional materials, however, energy savings obtained through its conduct have not been measured. The success of the information campaign was only measured through the number of organizations and participants who joined the activity. No follow-ups or survey have been conducted to guarantee that the information disseminated is being practiced by the participants. Measuring the savings which is supposed to be obtained after the conduct of IEC remains a challenge to the department.



Meanwhile, the conduct of energy audit to some establishments is on a voluntary basis. Over the years however, industries volunteering to be audited is declining. Similarly with the conduct of IEC, after the audit has been performed no follow-up has been conducted to counter-check if the recommendations made by the DOE have been successfully implemented and sustained.



The giving of awards to several industries is a very strategic program of the department. This would further encourage the industries to perform productively at a lower cost with adequate use of energy. However, while the award has been given regularly it appears that the establishments or industries participating in over the years have been declining. Specifically, in 2009 there were 43 industries participated in; however in 2010 the numbers declined to 39 until became only 32 in 2011<sup>13</sup>. It will be a challenge

<sup>13</sup> presentation on “*Don Emilio Abello Awards*” presented during PREE in the Philippines, February 6-10, 2012



for the department to encourage more industries for energy efficiency and conservation program be part of their own strategies and subsequently be recognized by its efforts through these awards.

The DOE continues to implement projects to complement its energy efficiency and conservation programs. Together with other government agencies as well as private sectors the DOE were successful in implementing these projects however, the projects would usually depend highly on the budget to be provided by the funding institutions and would be bounded by the completion date. Oftentimes objectives of the project may not be sustained as they are usually constrained with limited budget and time. While the participation of the private sectors would somehow lessen the government's burden in terms of financial aspects the private sector however, has also its own limitations.

The passage of Energy Conservation Bill is likewise a big challenge to the Philippines. At present, the economy has no appropriate legal policy framework or law on energy efficiency and conservation that would provide them guidance and address the negative impact to its growing economy brought about by the economy's internal condition as well as external global influence such as world oil crisis and the escalating crude oil prices and other petroleum products in the world market. While, some of the industries have implemented EE&C program voluntarily, the government may not have the full control on the establishments specifically on integrating specific EE&C in its everyday operation as well as reporting the company's fuel consumption.

### **C. Recommendations**

**Recommendation 16** As the DOE regularly conducts IEC it is highly recommended to devise a feedback mechanism (e.g. poll exit during IEC; feedback/callbacks on audits) after an information campaign and energy audit is conducted.

The callbacks or feedback mechanism would capture the extent of the energy efficiency and conservation efforts conducted hence this will ensure sustainability and the success of IEC and audits conducted. Likewise, the information that will be gathered after the conduct of information campaign and energy audit will be useful for benchmarking of energy savings obtained sectorally.

**Recommendation 17** There is a need to strengthen ties with private sector to increase its participation in recognition awards and in other efforts of the government on energy efficiency and conservation.

**Recommendation 18** Continue constant, close cooperation with other government agencies, ESCOs, and other entities for successful energy conservation;

The private sector would usually collaborate with the DOE in its energy projects, but sometimes it will just be limited to the same establishment/industries only. The more private sector/industries actively participating in DOE's programs and projects the bigger opportunity to attain energy savings;

Similarly, the stronger collaboration of DOE with other government agencies, ESCO's and other entities, the more likely assurance of EE&C efforts to be successful

**Recommendation 19** It is highly recommended that the programs and projects of the agency be carried over even after the project is completed.

The agency's EE&C programs would usually be tied up with a project. While integrating some of the agency's functions into a project could assist them in achieving its goals, a project however would usually depend on the budget obtained from funding agencies and would usually end on certain duration. It will be more rewarding if the objectives integrated in a project be sustained even after its completion.

Further, the results gathered from the project will usually be very useful especially for benchmarking, it would be better to maximize the savings potential resulted from projects for other activities and programs of the agency for benchmarking.

**Recommendation 20** The DOE should enjoin active participation of private sector/industries in lobbying for the passage of Enercon Bill as its enactment will benefit both the government and the industry sector.

The Enercon Bill will be an act institutionalizing energy efficiency and conservation, enhancing the efficient use of energy, and granting incentives to energy efficiency and conservation projects, and for other purposes. Once the bill is in forced, it would provide DOE guidance and address the negative impact to its growing economy brought about by the economy's internal condition as well as external global influence. Likewise, the bill would assist the DOE in the smooth implementation of its EE&C plans and programs together with the private sector. As both the government and the private institutions would benefit from the Enercon Bill, it is recommended that DOE enjoins their active participation, lobbying with them if possible, for its immediate passage.

## **4.2 Electricity Sector**

### **A. Achievement**

The Department of Energy (DOE) launched the National Energy Efficiency and Conservation Program (NEECP) in August 2004. The NEECP aimed at strengthening the implementation of energy efficiency and conservation program by promoting awareness on the efficient utilization of energy in the country. The main goal of NEECP is energy savings equal to 10% of the annual final Energy Demand for the period 2010-2030. There are two (2) pronged programs in the NEECP, namely: 1) Power conservation and demand management program, 2) Fuel efficiency and conservation program. There are eight key components being implemented in the National Energy Efficiency and Conservation Program to encourage energy efficiency in all parts of society to ensure energy security, achieve optimal energy pricing and develop a sustainable energy plan.

The Philippine Energy Efficiency Project (PEEP) which commenced in 2009 and will end in 2013 (*note: extension has been requested to NEDA-ICC until 2013*) implements energy efficiency and conservation (EE&C) projects in residential, public and government sectors to reduced peak load power demand and imported oil for power generation.

Meanwhile, an attached agency of the Philippine DOE, the National Electrification Administration (NEA) continued to launch various systems loss reduction projects for Rural Electric Cooperatives.

Similarly, private energy distribution companies, like MERALCO, in order to improve energy efficiency in the demand side, continued to promote various management programs and provide energy efficiency initiatives to customers including: MERALCO special rate program, active participation in energy efficiency (EE) advocacy drives of the government and EE solutions/services.

## **B. Challenge (Critique)**

Within the next 20 years, the country needs a total additional power-supply capacity of 14,450 MW: Luzon grid will require an additional capacity of 10,450 MW, Visayas grid will require an additional capacity of 2,050 MW and Mindanao grid will require an additional capacity of 1,950 MW.

The required reserve margin of peak in Luzon grid, Visayas grid and Mindanao grid are 23.4%, 23.4% and 21%, respectively.

Coal will remain to be the major fuel use for power generation; however it will also mean increase in the green house gas emission. Renewable energy and energy efficiency are keys to reduce the dependency from fossil fuel and improve energy security, but wind generation will be an intermittent energy source.

The Power Development Plan (PDP) and Transmission Development Plan (TDP) are anchored on the electricity sector goal of continuously ensuring a reliable and adequate supply of electricity in meeting the country's growing power requirements. The integrated plans at the distribution, transmission and generation levels must be an optimal combination of distribution and transmission system improvements to complement the needed generation expansion.

## **C. Recommendations**

### **4.2.1 Supply Side**

**Recommendation 21** DOE should continue to request the power producers to improve the heat rate for fossil power units of its power plants.

The economy's installed capacity and peak load in 2011 are 10,727MW and 7,895MW in Luzon, 2,046MW and 1,487MW in Visayas. The reserve margins for Luzon and Visayas are 35.86% and 37.59%, respectively. The higher reserve margins can ensure to continue security of electricity supply, but result in too many generators operating in stand-by with low efficiency.

The target for the reserve margin level could be decreased to follow increasing installed capacity. Hence, to improve the heat rate of fossil units, power plant could adopt the following programs on heat rate improvement:

- Root cause analysis of higher condenser back pressure to propose corrective measure and improve thermal efficiency.
- The study of operational parameters for combined-cycle unit to improve unit heat rate.
- The monitoring of heat rate controllable loss for coal and oil-fired units to provide optimal operation conditions.
- The balancing of pulverized coal flow and tuning of combustion parameters to improve combustion performance.
- The tuning of combustion parameters for gas turbine to prevent abnormal vibration and excessive deterioration of the components.
- Replacement of inefficiency ID Fan with variable frequency drives for ID Fan to improve power plant efficiency.

**Recommendation 22** DOE should consider requesting the supply-side (generation, IPPs and energy supply companies) to improve the average efficiency of existing thermal power units.

The efficiency of existing thermal power units is lower. Improving the average efficiency of existing fossil generators could reduce use of imported fossil fuel for power generation and green house gas emission.

Meanwhile, to improve the average efficiency of existing generating units, the power plants could adopt the following strategies on average efficiency improvement:

- Improving the AH (Air-Heater) heat components of steam power units.
- Improving the balancing flow for the pulverized coal tubes of coal-fired boilers.
- Establishing advanced process control (APC) system for thermal power plants.
- Upgrading the gas turbine blades for Combined-cycle units

**Recommendation 23** DOE should request or encourage the power development plans/power companies to adopt the best available technologies for new generation units.

Within the next 20 years, the country needs a total additional power-supply capacity of 14,450 MW.

The installed capacity and peak load of Mindanao in 2011 are 1,681MW and 1,468MW. The reserve margin was 14.51%, which was less than required reserve margin. The insufficient reserve margin would not ensure continuing security of electricity supply.

To cope with future power demand growth, the supply-side should have sufficient supply of power, maintain adequate reserve margins and upgrade power supply safety and stability for people's livelihoods and the development of business and commerce.

A traditional coal-fired generating unit has a thermal efficiency of about 37%. In order to improve boiler efficiency, DOE should encourage the supply-side to adopt supercritical coal-fired generating units with an efficiency of 44.5%,

Adopting the high-pressure gas turbine for combined-cycle units instead of the conventional lower efficiency combined-cycle units would improve power supply.

#### **4.2.2 Demand side**

**Recommendation 24** It is deemed necessary that DOE and private power companies adopt more efficient schemes for promoting energy conservation to reduce peak load power demand.

The economy's total electricity consumption in 2010 was posted at 67,743 million KWh, a 9.38% increase over the previous year. Of these, 18,833 million KWh, or 27.80%, was consumed by residential sector; 16,621 million KWh, or 24.54%, was consumed by commercial sector; 18,576 million KWh, or 27.42%, was consumed by industrial sector; 1,596 million KWh, or 2.36%, was consumed by other sectors.

The PEEP implements energy efficiency and conservation (EE&C) projects in residential, public and government sectors to reduce peak load power demand and import oil for power generation only through the use of energy-efficient lighting systems. PEEP also hopes to achieve its goal through promoting the use of energy-efficient lighting systems.

DOE and power companies could strengthen external energy conservation campaigns through various channels: Internet, school activities, communities, mother's classrooms, energy conservation seminars, etc. To further promote energy conservation and carbon reduction, DOE could start an "Energy Conservation Competitions" campaign among the local governments. In addition to a basic discount of 5~20%, the households, primary and junior high school of provinces and cities/municipalities who won the top 3 places with good energy conservation performance are entitled to have another 5~15% competition discount according to their rankings.

To balance the system load, sufficient utilization of off-peak power, and shift or reduce peak load hour consumption, propose instituting the following power price management measures:

- Discount rates for ice storage central Air-conditioning system
- Duty cycling control of Air-conditioning program
- Demand response program

### 4.2.3 Transmission and Distribution

**Recommendation 25** The National Grid Corporation of the Philippines (NGCP), the National Transmission Corporation (TransCo) and the National Electrification Administration (NEA) make continuous efforts to further improve transmission & distribution reliability, efficiency and reduce system losses.

The T&D losses for the last five years (2006~2010) were 12.12%, 12.76%, 12.63%, 12.18% and 11.51%.

The system reliability/availability performance of MERALCO franchise areas in 2011: Interruption Frequency Rate (IFR) was 3.06 times and Cumulative Interruption Time (CIT) was 3.11 hours.

The Interruption Frequency Rate (IFR) for forced and pre-arranged interruptions, a measure of average number of interruptions experienced by a MERALCO customer, improved by 19.3% to 3.06 times compared with the previous year's IFR of 3.79 times.

The Cumulative Interruption Time (CIT) for forced and pre-arranged interruptions, a measure of the average duration of interruptions experienced by a MERALCO customer, at 3.11 hours is 19% improvement compared with last year's CIT of 3.83 hours for the same period.

Hence, to ensure the reliability of the power grid, maintain the stability of system power supply, improve the transmission efficiency and meet the diversified demands of the load, NGCP and TransCo should continue to promote the transmission development plan.

Likewise, to increase power distribution reliability, efficiency and power supply quality, NEA should launch various distribution projects and system loss reduction projects to strengthen its partners in the rural electricity system.

Meanwhile, there are five strategies for T&D loss reduction. The strategies are:

**Strategy 1. Balance local supply and demand**

To develop new power supply to meet local demand as far as possible, and evenly allocate the power plant site to balance the local supply and demand, as well as reduce the line flow between areas.

**Strategy 2. Increase operating voltage adequately**

Adequately adjust and increase the operating voltage at different levels of substations. Increasing the voltage of lines can effectively reduce the current requirement for a given amount of power, and therefore reduce the power transmission losses.

**Strategy 3. Promote load management**

Implement time-of-use (TOU) and seasonal pricing, interruptible power and ice-storage central air conditioning systems to improve system load factor and shift peak load. At the same time,

use strategies of efficiency management, favorable incentives, technology transfer, technology service and education to gain energy conservation and enhance energy efficiency.

**Strategy 4. Launch T & D development program**

Install new transmission and distribution facilities to enhance system operation security, power supply reliability, and upgrade the efficiency of transmission and distribution lines.

**Strategy 5. Strengthen the inspection of energy theft or illegal power connection**

Reinforce the prosecution of illegal use of electricity to avoid if not reduce the theft of electricity.

### **4.3 Commercial and Residential Sectors**

#### **A. Achievements**

The Government of the Philippines has initiated a number of energy efficiency and conservation programs in the commercial and residential buildings sector. Over the years, the Government of the Philippines has initiated a strategic focus on energy efficiency in buildings as a means to meet its strategic goals related to its overall energy and environmental policies and programs.

The buildings sector energy efficiency strategy being pursued by the Government of the Philippines is driven in large part by six key national goals (the Targets for the goals are listed at the end of the discussion on each goal);

#### **1. Implement a major energy efficiency retrofit program for both commercial and residential buildings**

This is an important goal for the Philippines, particularly from the national security perspective (i.e. dependence on foreign sources of energy), but it is tempered by the following two needs:

- Need to increase access to energy for all citizens (e.g. currently 85% of the residential sector has access to energy but the specific goal is to increase this percentage to 90% in the near future)
- A continuous growth in GDP (> 3.6%/annum) must be maintained to ensure the economic well being of the Philippines economy

Looking at energy consumption data by sector (See, Figure 1 in this section of the report), it becomes clear that the commercial and residential sectors when combined nearly equal the consumption in the transport sector, Philippines largest energy consuming sector. Furthermore, the Government recognizes that while it desires to dampen the demand for energy, it is clear that there will be an increasing demand in all sectors. In fact, through 2030 the commercial sector is projected to have the 2<sup>nd</sup> highest average annual growth rate (AAGR) of all the sectors (See, Figure 2 of Part 1 of the report for details). Consequently, it is necessary to develop an aggressive energy efficiency buildings retrofit program in order to ensure long-term energy savings. As buildings have life-times of 50 to 100 years, and as existing

buildings in an economy often make up the vast majority of all buildings<sup>14</sup>, improvements in energy savings in the existing buildings market will yield large and continuous energy savings over the life of the buildings.

**Goal 1 Target:** Retrofit lighting systems in 175 government office buildings; replace > 10 million incandescent bulbs in residential buildings with compact fluorescent bulbs

## 2. Continue the Energy Efficiency Lighting as well as the electricity and fuel reduction program in Government Buildings

Lighting is one of the major sources of building energy usage, accounting for 19 percent of global electricity consumption in 2005. In Asia, lighting's share in national electricity consumption is even bigger than the world's average, reaching around a quarter of the total<sup>15</sup>. Consequently, this goal is very important to the Philippines' energy efficiency and conservation program goals and targets. This referenced report also notes the key element of outreach and information dissemination is critical to informing building owners of the potential savings by installing efficient bulbs and/or lighting systems.

When looking at where energy can be saved in residential and commercial buildings, it should be noted that lighting technologies are in the highest savings bracket. Typical savings potential<sup>16</sup> for the most common types of devices in use today, compared to the most efficient technology available:

- Appliances: 45-55 percent
- Air conditioning 40-50 percent
- **Lighting: 70-80 percent**
- Stand-by power: 72-82 percent



Consequently, efficiency lighting becomes a critical tool to lower energy consumption in buildings.

**Goal 2 Target:** Continue the Energy Efficiency Lighting as well as the electricity and fuel reduction program in Government Buildings; utilize the EELs manual to help disseminate information to practitioners

<sup>14</sup> See, <http://www.egeec.apec.org/www/UploadFile/EGEE17%20Minutes.pdf>, where on page 3 of the report, it is noted that "...of the building stock in ten years time, 85% exist at the present." Consequently, it is important to include existing buildings in any measures taken in the buildings sector to reduce energy consumption.

<sup>15</sup> *Building Energy Efficiency*, an Asia Business Council report, Source: Based on data from The Institute of Energy Economics, Japan (IEEJ), 2006, "Asia/World Energy Outlook 2006", pages 57 & 58, see: <http://eneken.ieej.or.jp/en/data/pdf/362.pdf>

<sup>16</sup> Source: World Business Council for Sustainable Development, 2005, "Pathway to 2050: Energy and Climate Change," see: <http://www.wbcsd.org/>



### **3. Promote and Strengthen Energy Service Companies (ESCOs)**

Economies throughout Asia and the rest of the world understand that a key barrier to energy efficiency and conservation is financing. An ESCO can help fill this financing gap by utilizing an energy service performance contract (ESPC) and providing the financing for bankable energy retrofit projects. After performing an investment grade audit and installing the required measures, the ESCO is paid back through the energy savings.

Building an indigenous ESCO community in an economy can ensure that a robust energy efficiency building retrofit program is implemented at the lowest cost and it ensures the use of local firms and labor. The Government of the Philippines has begun to create the conditions for such a community to grow within the economy.

**Goal 3 Target:** Establish and expand the Accreditation Registry of ESCOs and utilize ESCOs more fully in the government building retrofit program

### **4. Promote Green Building rating systems**

Rating systems (and labeling activities) are a high profile way to inform consumers about the energy efficiency of a product. Many APEC economies have rating and labeling programs for many appliances and equipment. There is also a variety of building rating systems used in APEC to recognize the most efficient buildings in both the residential and commercial sector.

In the Philippines, the *Building for Ecologically Responsive Design Excellence* (BERDE) rating system has been implemented for new and existing buildings in 2010 and 2011, respectively. In some respects, BERDE can be compared to the better known LEED rating system of the Green Building Council, which rates buildings throughout the world. So long as building rating systems are objective, transparent and analytically sound, they should be supported as they can be strong transformers of the buildings sector.

**Goal 4 Target:** Establish a green buildings rating system involving 10 pilot new & existing buildings

### **5. Have the “Energy Conserving Design Guidelines for Buildings” become an integral part of the National Buildings Code**

Energy efficient building codes are the foundation for an economy to transform its building sector into one that is energy efficient and, if implemented properly, will continue to increase the building efficiency over time. Energy efficiency building codes generally govern the design and construction of new buildings, but can also be crafted to include major renovations of existing buildings. Efficiency codes generally set a minimum baseline for practices related to the building envelope and systems such as electrical, lighting, plumbing and other mechanical equipment.

As the energy intensity of the buildings sector steadily increases, energy codes and standards are understood to be important to reducing energy consumption and pollutants by making new

construction more energy efficient. The built environment not only accounts for the highest portion of overall energy consumption in most countries, but it also has been identified to contain some of the most cost effective improvement opportunities. However, it is only by mandating standards which capture the energy savings potential in every building, through a code, that large scale energy efficiency can occur.<sup>17</sup>

**Goal 5 Target:** By 2015 the “Energy Conserving Design Guidelines for Buildings” become an integral part of the National Buildings Code

## 6. Benchmarking commercial and government buildings

Benchmarking buildings allows an economy to track and assess energy and water consumption across the entire portfolio of buildings across an economy and across various subsectors of similar buildings. Benchmarking can help set investment priorities, identify under-performing buildings, verify efficiency improvements, and provide analytical data for future decision making.

Under the United States Environmental Protection Agency, an excellent example of a benchmarking tool has been developed. Though it is voluntary to participate, the *Portfolio Manager* is an interactive energy management tool that is used by building owners and others in a secure online environment<sup>18</sup>. The tool also provides a rating system based on a 1 to 100 scoring system. Buildings that achieve 75 points can qualify for an “Energy Star” label; an additional benefit for those that participate in the portfolio manager program.

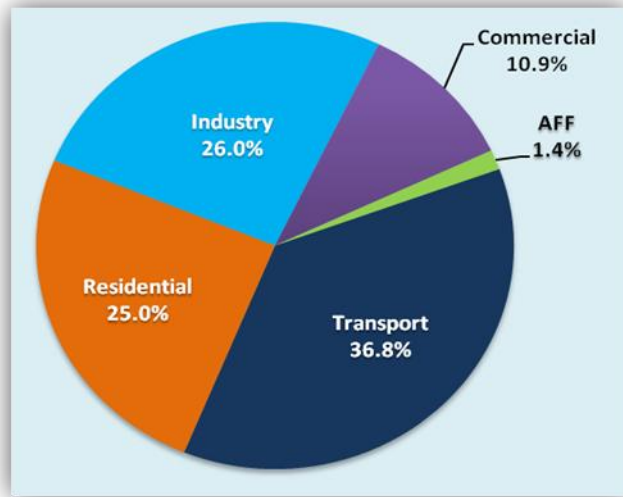
**Goal 6 Target:** By 2015 implement energy consumption benchmarking commercial and government buildings

As can be seen from the above, the Government of the Philippines is beginning to shape a strategic set of commercial and residential buildings programs and policies. The necessity for doing this is seen in Figure 1 below. When combined as one sector, the commercial and residential sectors’ total energy consumption is virtually equal to that of transport energy consumption.

---

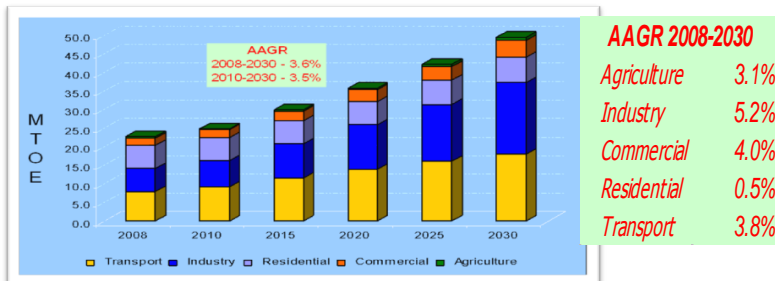
<sup>17</sup> *Building Energy Codes - Best Practices Report for APEC Economies*, The Building Codes Assistance Project of the Alliance to Save Energy, Dec. 2009. Also, See “Curbing Global Energy Demand Growth: The Energy Productivity Opportunity,” McKinsey Global Institute, 2007.

<sup>18</sup> [http://www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)



**Figure 4.3.1 Total Energy Consumption by Sector, 2010**

Interestingly, in an Asia Business Council report<sup>19</sup> on building energy efficiency, it is noted that in 11 Asia economies studied, building energy consumption as a percent of total final energy consumption will grow to 11.2 % by 2030 from only 7.3 % in 2004. As this relative increase of 50% shows the impact of energy use in buildings, it is clear that buildings should be a major target for an economy’s energy efficiency programs and policies.



Furthermore, when one looks at Figure 2, the likely average annual growth rate (AAGR) for energy demand in the Philippines over the next 20 years, the commercial sector will have the second highest rate of all the sectors.

**Figure 4.3.2. Energy Demand by Sector - Business as Usual Scenario**

Achievements abound in the PDOE’s commercial and residential buildings programs. For example in the area of efficiency lighting and systems, the Energy Efficiency Lighting project (PELMPT), from 2005 through 2010, has reduced building energy consumption by 7,366 GWh and reduced GHG emissions by nearly 4 million tons. With co-funding from the Global Environmental Facility, and a variety of other

<sup>19</sup> Page 18 of Building Energy Efficiency, an Asia Business Council report, Source: Based on data from The Institute of Energy Economics, Japan (IEEJ), 2006, “Asia/World Energy Outlook 2006”, see: <http://eneken.ieej.or.jp/en/data/pdf/362.pdf>

partners, including PDOE, it performed a number of important and related lighting tasks, including distribution of efficient light bulbs, a consumer awareness program, capacity development, and a financing assistance program (including training ten financial institutions on financing of energy efficiency lighting projects) among others.

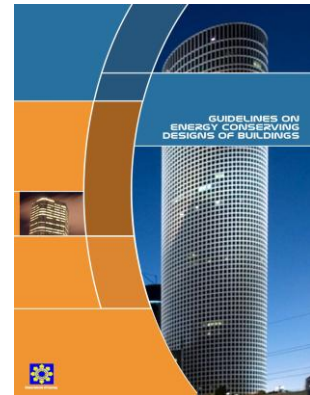
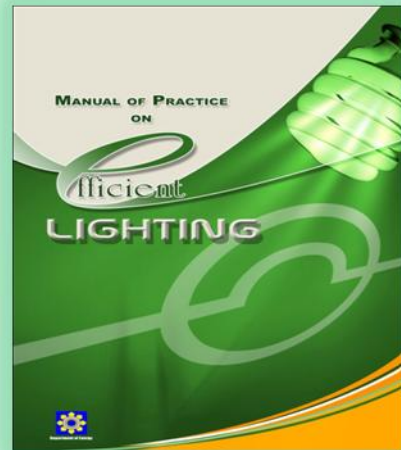
Also the National Residential Lighting Program exchanged more than 5 million efficient light bulbs for inefficient incandescent bulbs; and another 8.6 million are expected to be exchanged soon. Traffic lights in 247 locations in Manila will be replaced with highly efficient LEDs, and three communities will receive LED solar home system lights. A model for large scale lighting system retrofits will be developed based on the results of 175 government building retrofits (35 of which have been completed). The development of a lighting guide has also been an important accomplishment. These have all contributed to a more enlightened public that recognizes the benefits of efficient lighting.

The voluntary *“Energy Conserving Design Guidelines for Buildings and Utility System”* is a good first step to developing a mandatory national building energy efficient code. Moving to codify the Guidelines into the National Building Code would be a logical next step.

The Government of the Philippines has achieved some success in the standards and labelling area. Currently energy efficient labels are limited to a few selected household appliances (e.g. room air conditioners, small refrigerators). However it is the intent to expand the standards and labelling program to higher energy consuming appliances such as large refrigerators and washing machines that have yet to be rated and labelled. The PDOE, housing its own testing laboratory, is able to conduct a credible labelling program.

The labels themselves have been cast as a five star system, which seems to be an easily recognized symbol for excellence. PDOE has recognized that the current labels are not all quite the same and therefore work has begun on harmonizing the “look” and the data contained on the label. This is an important consideration as it is critical for the public to recognize and accept the label.

The Government Energy Management Program (GEMP) has played a strong role in the government building sector. Functions of GEMP’s buildings involvement have been focused on energy audits and tech assistance, with a look to involving ESCOs to a greater degree. The GEMP also ensures that each government entity designate a senior official as its Energy Conservation Officer and GEMP works closely with local government units and encourages them to implement energy efficiency and conservation



measures (this is good recognition by GEMP of the importance that local governments can play in the transformation of an economy to a sustainable and energy efficient one). GEMP also conducts Spot Checks by Energy Audit Team and creates a report card grading each agency. This can be a powerful tool as no leader of a Department (i.e. Secretary) wants to be the one with a low score. It could even be more powerful if the results were published.

In order to continue achieving success in transforming the Filipino culture to one of energy efficiency and conservation, the PDOE has established a number of strategies to pursue as it plans to meet the goals and targets set forth for the commercial and residential buildings sectors.

These strategies include:

- Re-file and work for passage of the Enercon legislation focusing on commercial and residential energy efficiency parts

Enhance these areas by moving to mandatory actions after voluntary pilots are examined and modified where necessary.

- Enforce existing laws and policies related to the building sector
- Monitor government building energy consumption and ensure that it meets government targets
- Continue promotion of green building design and rating system
- Continue energy audits of DOE related agencies while promoting and strengthening ESCOs

Enforce existing laws and policies related to the building sector

- Monitor government building energy consumption and ensure that it meets government targets
- Continue promotion of green building design and rating system

Continue energy audits of DOE related agencies while promoting and strengthening ESCOs

In summary, the PDOE has achieved a good initial foundation to achieve reductions in energy consumption in the buildings sector and is preparing for the future by implementing solid strategies while moving to new programs and policies that will accelerate much more energy efficiency and conservation into the residential and commercial buildings sector.

## **B. Challenge (Critique)**

While there have been measurable achievements by PDOE in effecting energy efficiency and conservation programs and policies in the commercial and residential buildings sectors, there are some difficult challenges that must be overcome if the Philippines is to fully realize the goals and targets it has set.

As we have seen, the buildings sector will be one of the fastest growing energy consuming sectors in the future. And the fact that most existing buildings have not had energy efficiency retro-fits yet, the scope

of an overall effort to reduce building energy consumption will be a large undertaking. Coupled with the lack of staff and funding for the PDOE and its energy efficiency and conservation bureau, the EUMB, it will be necessary to craft an overall buildings strategy that integrates key initiatives and sets firm dates for implementation of needed policies and programs.

Therefore, some key areas that need a focused effort by the Department (or in concert with other Departments such as the Department of Social Welfare and Development) include creating a mandatory energy efficiency building code for all new buildings and existing buildings that are going under a major renovation. This would require, at a minimum, having the now voluntary "*Energy Conserving Design Guidelines for Buildings and Utility System*" be codified in a mandatory national building energy code.

While creating a mandatory building energy code likely will require foundational legislation that is only one of the challenges related to developing a robust building energy code program. Once codes are developed, it will be necessary to initiate an implementation program and an enforcement program, both requiring trained personnel and funding.

It will also be necessary to transparently engage all stakeholders in a public review of all energy efficient codes, in order to ensure buy-in from all key stakeholder groups. And then moving to a Best Practice in building energy efficient codes, the codes program would be designed so that every "x" number of years, the codes would be publically reviewed with the goal to increase the efficiency measures coincident with pushing beyond the current efficiency of products/construction techniques being employed as business-as-usual at that time.

In the interim, it will still be necessary to continue existing programs related to commercial and residential building consumption. Some challenges can be expected here as well.

The Energy Efficiency Lighting project (PELMPT), though successful, will find it more challenging in the future. With co-funding from the Global Environmental Facility, and a variety of other partners, including PDOE, from 2005 through 2010 this program has reduced energy consumption by 7,366 GWh and reduced GHG emissions by nearly 4 million tons. Tasks included distribution of efficient light bulbs, a consumer awareness program, capacity development, and a financing assistance program (including training ten financial institutions on financing of energy efficiency lighting projects) among others. But this project required funding from many sources and it is not clear that a self-sustaining model could be created.

Also the National Residential Lighting Program exchanged more than 5 million efficient light bulbs for inefficient incandescent bulbs; and another 8.6 million are expected to be exchanged soon. Traffic lights in 247 locations in Manila will be replaced with highly efficient LEDs, and three communities will receive LED solar home system lights. A model for large scale lighting system retrofits will be developed based on the results of 175 government building retrofits (35 of which have been completed). Other high efficiency lighting demos are also taking place with an eye to establishing a long-term sustainable program. Challenges in these programs will include long-term funding sources but also the further testing of any sustainable program models that are developed in the future.

In order to improve building data collection and create a credible building benchmarking program, the current DOE MC 93-03-05 must be superseded with an MC that requires mandatory data submission from the buildings sector. And that MC must also expand the scope of buildings that must comply. This could be challenging as it will require key personnel to develop a vibrant database system and analytical capability to maximize the usefulness of the data set created.

Continuing to improve and expand the energy efficiency labelling program is already proving challenging. Harmonizing the various “looks” of the labels is a critical step as consumers find it much easier to recognize a single label (a branding technique) than multiple labels. Labels can play a major role in transforming and accelerating the energy efficiency in an economy.

Creating a ratings system for buildings is also a difficult challenge. Even voluntary ratings systems can prove challenging as consumers will be confused if there are a variety; they won’t know what the differences are and therefore they will be unable to determine what they really want. Will BERDE and LEED, lead to more buildings being rated, or will it be the start of introducing confusion to building owners of both commercial and residential buildings. The PDOE will conduct a 10 buildings pilot program to test a green building rating system and develop a model tool for ratings.

While the PDOE has achieved success in supporting the nascent ESCO industry, the next step will be in the financing area. Having access to capital is critical to the ESCO industry as they fund the upfront cost of the energy efficiency retrofit, while getting paid from the savings that are actually achieved<sup>20</sup>. In many economies, bankers are unfamiliar with energy service performance contracts and need to be educated on what investment grade audits are and why these types of projects are generally low risk. PDOE’s accreditation program is a good step in building a viable ESCO community in the Philippines.

While challenges remain, PDOE should continue to implement its current programs and policies and look to implementing even more ambitious ones in the future.

### **C. Recommendations**

**Recommendation 26** Government should “*lead by example*” to set up as a model for the private sector to follow.

Expand the government building retrofit program (currently 175 buildings) to encompass all government buildings;

- Set government wide energy efficiency targets, ratcheting them upwards on a regular schedule and require each agency to report publicly each year, continue the annual agency report cards;

---

<sup>20</sup> The “actual savings” is also a challenge as an ESCO is measuring a counter-factual; what is actually being consumed and comparing it to what would have been consumed without the changes made by the ESCO. There are international protocols for such measurements and these should always be followed when doing such projects.

- Expand the National Residential Lighting Program by working with international finance institutes and other funders, including utilities;
- Challenge private sector to match/exceed agency goals/targets

While government buildings are not yet mandated to meet Green Building design criteria in the National Building Codes, government should push the technology envelope, mitigating the inherent risks and lead the adoption of new technologies.

Publicly reporting progress to meeting government wide annual energy efficiency targets pushes Agency heads to achieve the targets.

A challenge to the public based on the government goals can accelerate the green technology industry throughout the country

**Recommendation 27** Promote “Cool Roofs” for all low rise buildings and work to include it within the Green Building Design and eventually in Building Codes

Cool Roofs are most effective in tropical and sub-tropical climates and can reduce energy consumption up to 15% of total A/C loads. A study of cool roofs in India showed 7+% reduction in new buildings and much greater in existing buildings

**Recommendation 28** Initiate a program to develop Commercial and Multi-family (e.g. condo type) Building Labels – start with a voluntary pilot introduction

Labels drive consumers to demand higher efficiency in the homes they live in and offices they work in (similar to how labels for appliances drive purchasers to buy high efficiency products)

**Recommendation 29** Promote “ESCOs” in commercial and government building retrofits and continue training more lending institutions on the benefits of financing the resulting projects

ESCO financing can replace ever increasing capital budgets. Lending institutions can be supportive financing partners to ESCOs to drive EE retrofits throughout the economy

**Recommendation 30** Initiate legislative and regulatory actions to “fast track” a mandatory Building Energy Efficiency Code program for the Philippines

Mandatory energy efficient building codes ensure that buildings being built today are more efficient and reduce energy consumption and costs.

Include major renovations and promote “passive” design features

Major renovations bring the other 97% of buildings (the “existing” buildings sector) into potential code compliance. Passive design can lower SHG and significantly reduce heat load and decrease energy consumption

In developing Building energy codes, allow for regular public reviews to revise and increase the efficiency targets (e.g. every 3 years)



“Regular” process and timing for enhancing code ensures building construction keeps pace with technology advancement, while allowing feedback from all interested stakeholders, and 2. Energy consumption is then guaranteed to be reduced in new buildings over time.

Develop Compliance program for Codes (to be inspected both during construction and after building is completed).

This ensures that building was built to design specifications (current compliance only for design review for construction permit).

**Recommendation 31** Develop a comprehensive and mandatory building energy consumption survey in order to better understand the types of buildings and their energy consumption

This will enable the identification of best performing and worst performing buildings to target for quickest reductions in energy consumption.

#### 4.4 Transport Sector

The transport sector in the Philippines represents the single largest sector of energy use, accounting for 36.8% of final energy demand (DOE, 2012). Energy consumption in the transport sector is set to grow further, due mainly to the rapid increase in private motorized vehicles. Unique from other sectors, transport is highly reliant on oil, meaning that transport operators and consumers are vulnerable to the increasing price of oil. It is clear that maximizing energy efficiency in transport is crucial for the Philippines to achieve energy security and affordable transport services for all.

As motorization continues, the Philippines is also witnessing the negative impacts of transport growth. Based on UNCRD (2010)<sup>21</sup> and World Bank (2009)<sup>22</sup> the Philippines lost approximately 2% of its GDP in congestion (in Metro Manila alone, in 2008) and a further 2.6% in road accidents (in 2005). Furthermore, 65% of the air pollutants in urban areas are estimated to come from transport.

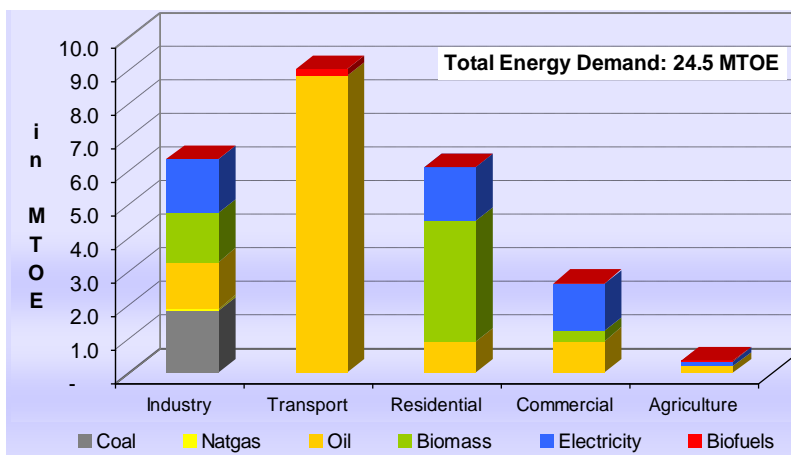


Figure 4.4.1: Total Energy Demand by Sector and Fuel Type in 2010 (Source: Philippine Energy Outlook, 2030 –Preliminary Results)

#### A. Achievement

In view of these challenges, the Philippines is taking proactive measures to address energy efficiency in the transport sector. This takes place within the wider strategic need to develop environmentally

<sup>21</sup> UNCRD (2010). Formulation of a National Sustainable Environmentally Sustainable Transport Strategy for the Philippines – Final Report.

<sup>22</sup> World Bank (2009). Clean Technology Fund :Investment Plan for the Philippines

sustainable and socially inclusive transport that serves the needs of all members of society, and mitigates the aforementioned negative impacts of motorized transport.

Efforts are led through a number of interrelated national-level policy frameworks, including but not limited to:

**The National Framework Strategy on Climate Change (2010 – 2022)**, formulated by the Climate Change Commission of the Office of the President of the Philippines, which notes the adoption of environmentally sustainable transport as a key target to achieve sustainable energy, and in particular the implementation of a clean fleet program, socially equitable and integrated land-use and transport planning processes, energy efficiency labeling for new vehicles, and innovate financing for EST.

**National Implementation Plan on Environment Improvement in the Transport Sector**, formulated by the Department of Transportation and Communications, which specifies key measures to tackle climate change, air pollution and noise in road, rail, maritime and aviation sectors.

**National Environmentally Sustainable Transport Strategy for the Philippines**, formulated by the Department of Transportation and Communications and Department of Environment and Natural Resources, which through a participatory process has developed priority strategies, indicators and key result activities under five clusters; public health and social equity, roadside pollution, transport planning, road safety, and advocacy and awareness.

These frameworks collectively acknowledge the three key strategies for climate mitigation and energy efficiency improvement in the transport sector, namely:

- Avoiding the need for unnecessary travel.
- Shifting towards, or retaining the modal share of sustainable modes such as public transport and nonmotorized transport.
- Improving the efficiency of all transport modes (vehicle and fuel efficiency).

The table below provides a non-exhaustive list of the existing initiatives of the Philippines, categorized by Avoid, Shift and Improve measures.

**Table 4.4.1: List of current initiatives in the transport sector**

Pillar	Current initiatives (non-exhaustive)
AVOID	Truck bans at certain times of day Private vehicle bans based on license plates by day of the week Car free days Travel demand management
SHIFT	Bus Rapid Transit systems for Metro Manila, Cebu and Davao (planned) Promotion of MRT, LRT and urban rail systems (upgrading planned) Introduction of bike lanes (e.g. Marikina)
IMPROVE	Alternative fuels program (DOE) Fuel Economy Run (DOE) Government Fleet Energy Conservation Training Program (DOE) Emission control standards (DOTC)

	Vehicle technology improvements (DOE, DOTC, DOST) Driver behavior improvement
--	--

**B. Challenge (Critique)**

Similar with many developing countries in the region, the Philippines faces a set of challenges in technological, financial and institutional terms that could be met in order for the country to fully achieve sustainable transport, and scale up the existing good practices and initiatives.

Technologically, the Philippines may benefit from further enhancements and transfers of technology, including in the areas of:

Mass public transport, where for example efforts in developing Bus Rapid Transit systems are still in their infancy, and may be better supported through international expertise.

Vehicle technology, not limited to new technologies such as hybrid/electric vehicles but also the retrofitting of existing fleet of buses, jeepneys, tricycles and other public utility vehicles.

Fuel technology, especially in view of the ambitious targets set by the Alternative Fuels Program to reduce reliance on (imported) oil.

Financially, the implementation of the aforementioned national strategies is envisaged to require significant resources. A significant part of current resources are provided by foreign assistance. To further scale up these efforts, it would be imperative to develop in parallel locally sustainable financial mechanisms that provide a sustainable flow of financing for such activities, especially at the subnational level.

Institutionally, there are a large number of relevant authorities that are working to address the challenges in the transport sector. These include national government bodies such as the Department of Energy, Department of Transportation and Communication, Department of Environment and Natural Resources, Department of Public Works and Highways, and Department of Science and Technology. Furthermore, local governments (cities, municipalities and barangays) are often responsible for aspects of transport policy. Private sector entities, especially associations for public transport vehicles (jeepneys, FX vehicles, taxis, tricycles etc) also play a major role in supplying transport services. To promote a holistic approach to energy efficiency in urban transport, further joint work between these entities become crucial.

**C. Recommendations**

Based on the current situation, the following recommendations can be made to further enhance the Philippines’ efforts to improve energy efficiency in urban transport.

**Recommendation 32** Consider the further integration of **land use planning** with transport. Efforts could be taken to minimize urban sprawl of cities, by ensuring that new developments occur around public transport corridors. Excessive travel can be minimized through mixed land use planning, coupled with the improvement of non-motorized transport infrastructure and public transport systems.

**Recommendation 33** Consider the development of **financial mechanisms** and **national programs** to encourage/incentivize local governments to replicate and scale up good practice. Lessons may be drawn

from for instance India, where the national government is making available funding for subnational governments to improve urban transport, under certain criteria (such as the existence of a comprehensive mobility plan).

**Recommendation 34** Focus on **low hanging fruit**: e.g. the introduction of fuel economy standards, financial (tax) incentives that favour energy efficient vehicles, transport demand management etc. These measures can be implemented at very little financial cost, but require strong political leadership to implement.

**Recommendation 35** Work **across sectors**. For example, the introduction of electric vehicles can be coupled with efforts to minimize upstream emissions from electricity generation, through measures taken in the energy sector. The potentially negative impacts of biofuels on food prices could also be mitigated through strong policies in the agriculture sector.

**Recommendation 36** Continue to enhance **interagency coordination** to holistically support energy efficient, sustainable transport. This would particularly be true in urban areas, where transport systems dissect different political boundaries. Mechanisms can be strengthened to ensure that local government units can cooperate to achieve their common goal of sustainable and efficient transport.

## 5. ENERGY MANAGEMENT MECHANISM AND TRAINING

### A. Achievement

The Government of the Philippines has participated in and initiated a number of energy efficiency promotion and training programs. Over the years, the Government of the Philippines has also conducted couple of award programs to the government agency or private sector for their great achievement in the improving of their energy consumption system to save energy and reduce carbon emission.

- ASEAN Energy Management Scheme (AEMAS)

The certification awarded under this mechanism is recognized in 10 ASEAN countries for those professional with high standard of skills for energy system management. The program is also awarded the certificates to those companies with best practices for energy conservation.

There are 33 certificates awarded to Energy Managers in the Philippines, and 3 energy management gold standard certificates were awarded as well to 3 companies in Philippines.

Try to introduce a simple process for Philippines to implement the requirement in ISO 50001 with less cost and by considering the local situation.

The comparison with ISO5001 can be summarized as:

- The Energy Management System of AEMAS and of ISO 50001 is similar; the only difference is that AEMAS certification requires end-users to demonstrate actual implementation of energy saving measures.
- AEMAS trained and certified Energy Managers will have the skills and capability to implement the AEMAS and ISO 50001 Energy Management Systems: the cost of ISO 50001 certification will therefore be significantly reduced for AEMAS-certified companies.

- Recognition Award Program: The DEAEAA and ASEAN Award

DEAEAA Award is given to recognize the company has significantly reduced their energy consumption by implement EE&C programs. In 2010, 62 companies received the award. It shown 93 MLOE energy saving, 5 billion Php money saving and 39,369 tons of CO<sub>2</sub> reduction. The award was launched from 1982.

ASEAN Energy Award includes EE&C Best Practices Competition in Buildings (2000) and Energy management Award for Building and Industry (2007). There are several entries or winners from Philippines society every year.

Those award programs are one of the driving force for major energy consumer to review and improvement their efforts in carrying out the measures toward the energy conservation and carbon reduction.

The direct contribution from DEAEAA for the last couple years can be summarized in the Table 5-1

**Table 5-1 Energy conservation contribution for the DEAEAA**

Year	No. of Companies Awarded	Energy Savings (LOE)	CO2 Avoidance (Kg)
2006	33	72,420,637	30,416,668
2007	29	47,836,021	20,091,129
2008	39	89,423,184	37,557,737
2009	43	141,480,353	59,421,748
2010	39	156,277,880	65,636,710
2011	32	93,735,860	39,369,061
Total	215	601,173,935	252,493,053

- Government Energy Management Program (GEMP)

This program aims to help the government related department or agency to reduce their energy consumption by conducting spot check and posting the results through the rating mechanism. An incentive is also provided for the agency that reached the goal for 10% of energy consumption reduction.

The program was launched on September, 2005. To date, there are total of 719 spot checks conducted and 64 certificates issued with total savings of around 234 million Php.

The detailed measures were also set up for the entire government agency to follow. The recommendations for the spot check are also provided to the agencies which they can carry out for further improvement in order to reach the energy conservation goal. However, the follow-up action should be enhanced.

- DOE IEC Campaign: National EE&C Training Seminar Workshop for the Commercial and Industrial Sectors. Fifteen (15) workshops were organized in 2011 with total 1270 participants.

The topics covered in the series of training workshop are as follows:

- Overview of the ASEAN Energy Management Handbook

- DOE Recognition Award: Don Emilio Abello Energy Efficiency Award; ASEAN Energy Management Award
- Industrial Energy Efficiency: Efficient Combustion Control for Boilers and Furnaces; High Efficiency Motor (HEM) and Pumps; Heat Rate Improvement in Power Plant
- Guidelines on Energy Conserving Design in Building; Heat Ventilation and Air Conditioning System (HVACS); Lighting System
- Efficient Transport System and Fuel Efficiency

The ASEAN also developed an energy management handbook which introduced the efficient utilization of energy in commercial building and industrial manufacturing sectors.

In addition the workshops try to train the participants with the skill to conduct energy audit, energy monitoring, and use of the boiler efficiency software.

However, the database can be set up to analyze the information about the teaching material, participants, lecturers, and response from this training workshop for further expanding the effect on the really energy conservation actions.

- Energy Management System and Services / Energy Audit

There are two types of energy audit that were carried out in the Philippines: walk through (or preliminary) audit and general (detailed) energy audit.

There are a total of 31 companies (or organizations) that were audited by DOE during 2009 ~ 2011 in the field of electrical, mechanical and building system. The results were analyzed and common audit recommendations were also highlighted for general public reference. However, due to the manpower of DOE, the audit service cannot be expanded to cover more energy consumers.

- Energy Audit Services in SME's

This energy audit is carried out as a project base by Department of Science & Technology (DOST). All the audits being conducted cooperated with other public or private companies (agencies).

A total of 131 companies were audited in the project from 2000 to 2011, with 57 of

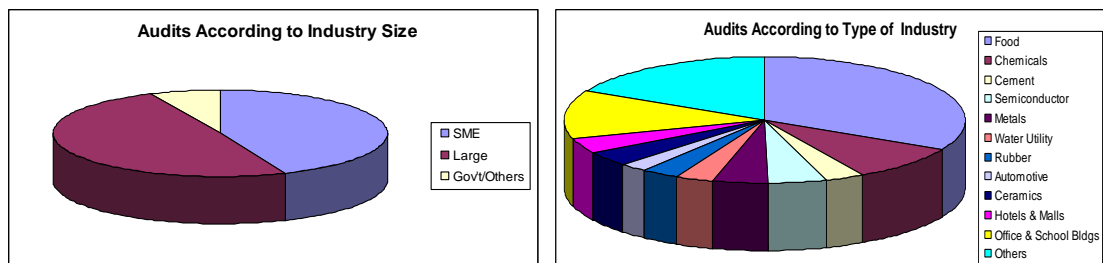


Figure 5-1 Analysis of SME distribution under energy audit service

them are SME's, 65 for large companies, and 9 others which includes government agency. The potential saving resulted from these audits is about Php 190 millions. (See Figure 5.1)

An energy audit skill training workshops were also organized, so far there were 13 training workshops hosted since 2005 with 307 participants. However, the integration with other government provided services should be enhanced to systematize the audit mechanism.

## **B. Challenge (Critique)**

While there have been measurable achievements by Philippines Government in conducting different energy management and training programs, there are some difficult challenges that the energy auditing and other programs must overcome if the Philippines will try to further improve the energy conservation and efficiency mechanism.

As we have seen, the energy management and training is the key factor to upgrade the capability of both government and private sectors in order to face the considerable structure change in the whole society (industry, commercial, and residential) as well as the rapid economic growth. As a result of this quick change, energy consumption increased dramatically during the past 10 years. The Review Team considers it appropriate to use more specific or categorized energy management mechanism based on the characteristics of each sub-sector to fairly evaluate policy effectiveness and energy efficiency activities in both government and private sectors.

Therefore, some follow-up actions need to be enhanced or stressed through some efforts of the Government and cooperation from private sector and general public, such as:

- The follow-up action should be enhanced after various services have been provided by the Government to realize the findings obtained from energy audit or spot check.
- The data or information collected from different mechanism provided by the Government should be carefully compiled and analyze further for the preparation of future teaching material, participants, lecturers, and response from previous training workshop conducted as well as expanding the further effects of energy conservation actions.
- Due to DOE's lack of manpower, the audit mechanism and scope of work cannot be expanded to cover more energy consumers. The professional services or experts from the private sectors can be good resources for expanding the existing service mechanism.
- The integration of multi-ministry provided services should be enhanced or carefully reviewed in order to systematize the audit mechanism under the available resources.

## **C. Recommendations**

**Recommendation 37** Combine different energy management activities together to fully utilize the government resources in a more systematic way in order to collect more data for future benchmark and in planning future energy conservation action.

There are different energy management services – spot check, energy audit, etc. provided by the Department as well as the private organization. The data collected from those different approaches cannot be combined to form a data base and consequently trace the follow-up actions. It is better to

integrate all these current resource together and make a more systematized audit mechanism to collect more detailed energy consumption information and set up a more concrete foundation for future review of EE&C policy and goal.

**Recommendation 38** Expand the mechanism of spot check to cover the private sector.

The spot check carry out in the GEMP has post major impact in helping the government agency execute the energy system improvement and subsequently gain the effect in reducing the energy consumption. We would like to recommend the expansion of this mechanism to cover the private sector in order to let them understand the government intensions in EE&C. However, this is different with the audit system that covers the high energy intensity users only. The effect will be more significant for general public to understand the importance of energy conservation and learn how to achieve energy conservation in their daily lives.

**Recommendation 39** Fully use of the professional engineers in the private sector (such as professional engineer association, research institute, academic, ESCO association, etc.) to expand the energy management services (such as spot check, energy audit, etc.).

Due to the limitation of manpower and equipment of the Government, the coverage of energy audit or spot check cannot be expanded to help more energy consumer evaluate the current energy situation. Thus, follow-up for the system improvement cannot be carried out as well to enable them to collect data for energy conservation or provide more recommendations for their further improvement.

**Recommendation 40** Set up a database on the information of the participants who attended the various training workshops conducted.

The database of the participants can be used by the Government to analyze or trace back the effect of the promotion on energy efficiency conservation measures in the implementation to their respective companies. The feedback from each participant can also be used for further improvement on the contents of workshops.

**Recommendation 41** Request the participants to fill in an evaluation form and express their comments and suggestion for the training workshop.

This will benefit the future training workshop planning, including the lecturer, contents, fields, etc. Likewise, this will ensure full use of the government resources as well as gain the maximum contribution of the participants in the promotion of various energy efficiency measures.

**Recommendation 42** Compile the best practices of those companies which received the energy conservation related awards from the government and publish these successful practices for other companies to follow or future reference.

The experience of those companies which received the energy conservation related award is very valuable for others for reference. The experience can be shared through the publication of these best



practices or organize a workshop with a site visit to one of these companies. Probably, the DOE can set this as a form of obligation for the companies which received the awards to share their best practices.

**Recommendation 43** Help the ESCO industry to set up the M&V (measurement and verification) regulations and guideline for the evaluation of energy conservation credit.

The possible outcome for ESCOs to introduce measurement and verification (M&V) processes is to increase the confidence of potential clients in the ESCO business (such as ensuring impartiality in energy saving performance verification, transparency for the system commissioning processes, etc.), thus ensuring that the reported energy and cost saving can be accepted by both parties (ESCO company and clients).

**Recommendation 44** Help ESCO industry to solve the financial problem by set up a fund or provide low-interest loan.

In order to set up the infrastructure for the development of ESCO, the first priority is the financial problem and the evaluation (or calculation) of energy conservation credit. The low-interest loan or some guarantee fund probably can be considered. The guideline for M&V process or accreditation mechanism probably also can be considered.

## 6. APPLIANCES AND EQUIPMENT

### A. Achievement

The Government of the Philippines through the DOE has set up the Lighting and Appliance Testing Laboratory (LATL), which conducts energy performance tests on electrical household appliances such as room air conditioners, refrigerators and lighting equipment such as fluorescent lamps (linear and compact type) and ballasts. It has an in-house calibration laboratory which also provides services to the appliance and lighting industry. It is also capable of conducting tests on energy saving devices that applies to household electrical products. The DOE through LATL is in charge of attaching the energy label (as shown in Figure 6-1) in “white appliances” indicating the energy rating of a particular product. This aims to improve the efficiency and performance of appliances, equipment and other energy consuming devices as well as empower the consumer in choosing the more energy efficient brand or model of appliance.

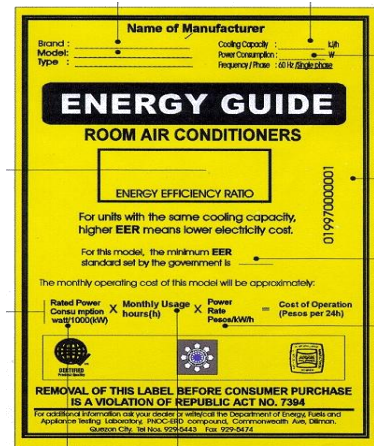


Figure 6-1 Energy information guide for the appliance

Philippine Government also carried out several activities to further promote new technology and high-energy efficient products in order to reduce the energy consumption and carbon emission. All these activities are coordinated with other measures for the commercial and residential sectors. This cooperation mechanism has doubled the energy conservation efforts of the government. Other major activities and their influence can be summarized as following.

- 1) The Philippine Efficient Lighting Market Transformation Project
  - Duration: 2005 ~ 2010
  - Purpose: Remove barriers to widespread use of energy efficient lighting systems
  - Achievement: 7,366 GWh energy savings and 3,977,000 tons of CO<sub>2</sub> emission reduction during this period (more than expected results at 7,147 GWh energy savings and 3,859,000 tons of CO<sub>2</sub>)
  - Total budget: US\$ 15,130,655
  
- 2) Promotion of high-energy efficient lighting
  - Bulb Exchange Program is a program encouraging consumers to change their incandescent bulb with high energy efficient compact fluorescent lamp (CFL). The program is supported by the United Nations Development Programme (UNDP) and Global Environment Facility (GEF). The program aims to eliminate the use of incandescent bulb, a very old lighting technology in which 80% of the energy used is turned into heat and only 20% is converted to light.
  - Carry out the communication program and campaign to educate the public on awareness and benefits of efficient lighting use.
  - Carry out the Nationwide Residential Lighting Program - The procurement and delivery of 5 million pieces of Compact Fluorescent (CFL) has been completed, whilst the distribution of 3.6 million more is set to be completed by March 2012.
  
- 3) Harmonization of Standard and Labelling (S&L) program with other EE projects such as retrofit of government buildings by replacing fluorescent lamps, Incandescent bulbs, and inefficient magnetic ballasts by energy efficient alternatives (T5, CFLs and electronic ballast), and the use of guidelines for energy conserving design of buildings, etc.
  
- 4) Public Lighting Retrofit Program
  - The contract aimed to retrofit the lighting system of Burnham Park and Wright Park in Baguio City and install 2008 units of street lights and four (4) traffic intersection lights in Cagayan De Oro City. Completion date of installation is set on October 13, 2011.
  - Another set of 159 traffic light intersections replacement from incandescent bulbs to LEDs in Metro Manila was awarded for completion in March 2012.
  
- 5) Energy Efficiency testing & Lamp Waste Management Program - Awarding of contract for the supply, delivery and installation of testing equipment is planned: December 2011 to 2012.
  
- 6) Energy labelling program coverage (by 2011): room air-conditioners (RACs), refrigerators, compact fluorescent lamps (CFLs), linear fluorescent lamps (LFLs), fluorescent lamps ballasts, and circular fluorescent lamps. Washing machines, television sets, larger sizes of refrigerators and soft drink coolers will be covered by 2013.
  
- 7) The manual on efficient lighting is being used as reference in the subject Illumination Engineering Design in the curriculum for Electrical Engineering of 130 schools.

## B. Challenge (Critique)

While there are already measurable achievements by Philippine Government in promoting the efficiency of appliances and equipment in the past, there are still some difficulty and challenges in the expansion of testing facilities, testing standards, and minimum energy efficiency standards (MEPS).

As we know, the testing facility and professional testing engineer is the fundamental requirement for expanding the coverage of energy efficiency to more products.

In one of the presentations, the expert team found that the future actions that need to be enhanced or stressed by the effort of Government can be summarized as follows:

- 1) According to ASEAN Economic Community in 2015, there will be free flow goods in ASEAN, so harmonization standards in ASEAN need to be prepared for free trade in the future. Harmonization of air conditioner EE standards (include test standards) in ASEAN is ongoing. MEPS of Philippines standard in some cooling capacities are lower than some countries in ASEAN such as Singapore and Thailand; therefore, Philippines government should analyze the impacts of local air-conditioners, when MEPS and HEPS of air-conditioners have been harmonized.
- 2) The preparation or expansion of testing facilities for the new products or speeding up of the publication of testing standards and process for different products.
- 3) The mechanism for using the testing facilities of universities, research organizations and private sectors.
- 4) Acceleration of emission control standard (Euro 4) to be implemented before 2016. Low emission means high fuel efficiency. (covers the transportation sector)
- 5) 60 percent of lamps used by households are energy efficient. It means that 40 percent of inefficient lamps are remaining in the households, so Philippine government still has to push more effort to fill the gap.

## 3. Recommendations

Based on the above findings and challenges, the Expert Team would like to propose the following recommendations for the DOE's further consideration in order to improve the economy's energy efficiency programs or infrastructure.

**Recommendation 45** The upcoming label with star ranking system is easier to understand than the present one. However EE label for every product does not have the same pattern. All appliances should be adjusted to the new pattern with star ranking system. One Message for All!

The purpose of energy labelling stick or system is to provide the necessary information for consumer to understand the performance of each appliance or equipment conveniently. It is better to have one common pattern for all the products to reduce the confusion brought to the consumer. Labelling can also help reduce the burden for the manufacturer.

**Recommendation 46** Cost of annual energy consumption can also be indicated on the label.

The operation cost of the appliance or equipment that can be shown on the labelling stick can produce direct impact or indication for consumer to estimate about the overall expense which they would pay before they purchase or replace old appliances or equipment with the new one.

**Recommendation 47** The data that can be shown on the label would serve as reference for comparison for consumer.

The purpose of energy labelling system is to provide the necessary information for consumer to understand the performance of each appliance or equipment. So, they can make the optimum selection based on their own financial situation and requirement. This will drive the necessary for the labelling system or sticks simple and easy to understand by the consumer.

**Recommendation 48** For the consumer to get enough information before they purchase a product, the label should not only be put on the products but information should also be displayed in the store.

The consumer may usually find it hard to compare the features of the appliances or equipment which are on display all at the same time. In order to eliminate this situation and deliver the necessary information to the consumer, the same information shown on the labelling stick should also be posted on the store or in a catalogue for easy access and reference of consumer.

**Recommendation 49** EE S&L roadmap should be set to cover all sectors i.e. household, commercial, industry, transport and agriculture in short, medium and long terms. For example, setting MEPS & HEPS for building envelopes materials i.e. glass window, insulator, roof tile, and etc. can support energy conservation in building programs. In addition, machinery and equipment, which can reduce energy consumption, should be planned accordingly to set up EE standard such as variable speed drive (VSD).

In doing so, the manufacturer can plan ahead their technology requirement in the future. This is also very helpful for planning the R&D programs that would help local industry in upgrading their technology to meet the future energy efficiency standard requirement.

**Recommendation 50** Enhance financial support for high efficient products through revolving fund, direct subsidy, etc.

To further encourage the general public to replace old appliances or equipment with high energy efficient products, financial incentives in the form of subsidy can be provided as well as cash refund, reduction in electricity bill, tax credit, etc.

**Recommendation 51** To ensure energy saving for lighting, the introduction of high energy efficient lighting fixture can be considered to be integrated with the lighting environment design. It can attain the same illumination with less lighting fixture.

The new lighting fixture should not only have high energy efficiency but also possesses wide light spreading and distribution effects. In order to fully use these characteristics of new lighting fixture, a

new indoor lighting design guideline or handbook should also be published to educate or help the general public to understand the real requirement for the lighting environment. It is also probably necessary to set up some training workshop or certification mechanism for those professional engineer involved in the lighting system design.

**Recommendation 52** Please consider to set up the guideline for the design of motor application to help carry out the MEPS for motor (such as how to design the fan, pump, etc.) It is understood that the effect of energy conservation needs to start from the system design with the enforcement of different EE standards.

The integration of technology for the energy consumption system is always the final step for the optimum operation of appliances or equipment. The high energy efficient motor needs a proper design of fan or pump to meet the system requirement with less energy consumption. Likewise, it is necessary to set up some training workshop or certification mechanism for the professional engineer who would be involved in the system or final product design.

**Recommendation 53** Capacity building for testing laboratories is important. To make sure that testing results are accurate, the testing facilities should not only have the capability but the technical staff's skills for testing as well.

**Recommendation 54** Public awareness for using high energy efficient appliances and equipment should be promoted covering all sectors. Moreover, the current and previous public awareness campaign should be evaluated to identify the gap where the Philippine government can find area for further improvement.

## APPENDIX A: PEER REVIEW TEAM MEMBERS

Mr. Kenji **KOBAYASHI**, Peer Review Team Leader, President, Asia Pacific Energy Research Centre (APERC), Japan

Mr. Brian **CASTELLI**, Executive Vice President, Programs and Development: Alliance to Save Energy (ASE), Washington, D.C. United States of America

Mr. Ko **SAKAMOTO**, Transport Economist, Asian Development Bank (ADB)

Mr. Chin-Chung **WU**, Chief Planning Division, Department of System Operations, Taiwan Power Company, Chinese Taipei

Mr. Asawin **ASAWUTMANGKUL**, Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy, Thailand

Mr. Iwan **RUSTANDI**, Engineer PT. Energy Management Indonesia (Persero), Indonesia

Mr. Asrul Sany Haji Mohammad **ALI**, Chief Technical Assistant, Energy Efficiency & Conservation Unit, Energy Department at the Prime Minister's Office, Brunei Darussalam

Dr. Bing-Chwen **YANG**, Team Leader, Asia Pacific Energy Research Centre (APERC), Japan

Ms. Elvira Torres-**GELINDON**, Senior Researcher, Asia Pacific Energy Research Centre (APERC), Japan

## **APPENDIX B: ORGANISATIONS AND OFFICIALS CONSULTED**

### **Department of Energy**

Secretary Jose Rene D. Almendras  
Undersecretary Loreta G. Ayson

### **Energy Utilization and Management Bureau (EUMB)**

Ms. Evelyn N. Reyes, Director, EUMB-DOE  
Mr. Jesus C. Anunciacion, Asst. Director, EUMB-DOE  
Mr. Artemio P. Habitan, OIC, Energy Efficiency and Conservation Division (EECD)  
Mr. Antonio M. Nabong  
Ms. Genevieve L. Almonares  
Mr. Max G. Marquez  
Mr. Marlon Romulo U. Domingo  
Mr. Allan G. Bacudo  
Ms. Rosalie Joan R. Sotelo  
Ms. Rose V. Sumulong  
Ms. Vilma P. Reyes  
Mr. Ronaldo P. Parreño, Jr.

### **Energy Policy and Planning Bureau (EPPB)**

Mr. Jesus T. Tamang, Director, EPPB-DOE

### **Energy Research Testing and Laboratory Services (ERTLS)**

Ms. Rachel S. Huliganga, Director, ERTLS-DOE

### **Department of Transportation and Communication (DOTC)**

Mr. Arnel Manresa, Chief, Road Transport Planning Division, DOTC

### **National Electrification Administration (NEA)**

Mr. Ferdinand P. Villareal, Division Manager, Technical and Operations Division, Energy Department

### **Department of Science and Technology (DOST)**

Mr. Apollo Victor O. Bawagan, OIC Chief, Energy Section, Chemical-Energy Division, Industrial Technology Development Institute

### **Energy Efficiency Practitioners Association of the Philippines (ENPAP)**

Mr. Richard A. Uy, President ENPAP and Vice President, OSP ESCO International, Inc.  
Mr. Bernard E. Pacia, Director, ENPAP and Manager, Field Technical Services, Petron Corporation

### **Energy Aviation Support Corporation**

Mr. Reynaldo D. Legada, President

### **Philippine Green Building Council**

Arch. Christopher C. Dela Cruz, Chairman

**Honda Cars Philippines, Corporation**

Atty. Louie C. Soriano, Head Corporate Affairs Department

**Manila Electric Company (MERALCO)**

Mr. Alex C. Cabugao, Assistant Vice President for Corporate Business Technical Support

**Analog Devices (For the Site Visit)**

Mr. Edmundo G. Fortunado, Managing Director



## APPENDIX C: REFERENCES

1. APEC, *Peer Review on Energy Efficiency in Chinese Taipei*, Final Report November 2010, Report for the APEC Energy Working Group
2. APEC, *Peer Review on Energy Efficiency in Malaysia*, Final Report May 2011, Report for the APEC Energy Working Group
3. APEC, *Peer Review on Energy Efficiency in Indonesia*, Final Report February 2012, Report for the APEC Energy Working Group
4. APERC 2003, *Energy Efficiency Programmes in Developing and Transitional APEC Economies*