Republic of the Philippines
Department of Energy

THE DEVELOPMENT STUDY ON ENERGY EFFICIENCY AND CONSERVATION IN THE REPUBLIC OF THE PHILIPPINES

Final Report

March 2012

Japan International Cooperation Agency

Tokyo Electric Power Company, Inc.

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Abbreviations

Abbreviations	Words (Original)
ACE	ASEAN Centre for Energy
ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BDO	Banco De Oro Unibank
BIR	Bureau of Internal Revenue
BNPP	Bataan Nuclear Power Plant
BOI	Board of Investment
BPI	Bank of the Philippine Islands
BPO	Business Process Outsourcing
BPS	Bureau of Product Standards
CDM	Clean Development Mechanism
CEC	Coefficient of Energy Conservation
CEEDS	Cooperative Energy Efficiency Design for Sustainability
CFL	Compact Fluorescent Lamp
CM	Commercial Message
CO2	Carbon dioxide
CSR	Corporate Social Responsibility
C/P	Counterpart
DB	Database
DBM	Department of Budget and Management
DBMS	Database Management System
DENR EMB	Department of Environment and Natural Resources Energy Management Bureau
DepEd	Department of Education
DOE	Department of Energy
DOE EUMB	DOE Energy Utilization Management Bureau
DOE EUMB EECD	DOE, EUMB, Energy Efficiency and Conservation Division
DOE EPIMB	DOE Electric Power Industry Management Bureau
DOE EPPB	DOE Energy Policy and Planning Bureau
DOE LATL	DOE Lighting and Appliance Testing Laboratory
DOF	Department of Finance
DOST	Department of Science and Technology
DOST ITDI	DOST Industrial Technology Development Institute
DOST PCIEERD	DOST Philippine Council for Industry, Energy and Emerging Technology Research and Development
DOTC	Department of Transportation and Communication
DPWH	Department of Public Works and Highways
DTI	Department Trade and Industry
DTI BPS	DTI Bureau of Product Standards
DSM	Demand-Side Management
EC	Electric Cooperative
ECCJ	Energy Conservation Center of Japan
EDUFI	Energy Development & Utilization Foundation, Inc
EES&L	Energy Efficiency Standard and Labeling
EESP	Energy Efficiency Service Provider
EGGEC	Expert Group on Energy Efficiency and Conservation
EMS	Energy Management System
ENPAP	Energy Efficiency Practitioners Association of the Philippines, Inc
EPC	Energy Performance Contract
EPIRA	Electric Power Industry Reform Act
ERC	Energy Regulatory Commission

ERIA	Economic Research Institute for ASEAN & East Asia
ESCO	Energy Service Company
EU	European Union
FIES	Family Income and Expenditure Survey
FPI	Federation of Philippine Industries, Inc.
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEMP	Government Energy Management Program
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
HECS	Household Energy Consumption Survey
IACCC	Inter Agency Committee on Climate Change
ICETT	International Center for Environmental Technology Transfer
IEC	Information, Education and Communication
IIEE	The Institute of Integrated Electrical Engineers of the Philippines
IMD	International Institute for Management Development
IPP	Independent Power Producer
IPPA	IPP Administrator
ITU	International Telecommunication Union
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau
MEPS	Minimum Energy Performance Standards
MERALCO	Manila Electric Company
MTOE	Million Tons of Oil Equivalent
NEDA	National Economic Development Authority
NEECP	National Energy Efficiency and Conservation Program
NPC	National Power Corporation
NSCB	National Statistics Coordination Board
NSO	National Statistics Office
OFW	Overseas Filipino Worker
OTTV	Overall Thermal Transfer Value
PAL	Perimeter Annual Load
PCCI	Philippine Chamber of Commerce and Industry
PDP	Philippine Development Plan
PECCI	Philippine Energy Conservation Center, Inc.
PEEP	Philippine Energy Efficiency Program
PEP	Philippine Energy Plan
PEZA	Philippine Economic Zone Authority
PHP	Philippine Peso
PIA	Philippine Information Agency
PLIA	Philippine Lighting Industries Association
PNS	Philippine National Standard
PPP	Public Private Partnership
PROMEEC	Promotion of Energy Efficiency and Conservation
PSALM	Power Sector Assets and Liabilities Management Corporation
PSME	Philippine Society of Mechanical Engineers
PSVARE	Philippine Society of Ventilation, Air conditioning and Refrigeration
PU	Private Utility
R&D	Research and Development
SDGM	Small Discussion Group Meeting
SIDA	Swedish International Development Cooperation Agency
SWGM	Stakeholders Working Group Meeting
TEPCO	Tokyo Electric Power Company, Inc.
TESDA	Technical Education and Skills Development Authority

TFEC	Total Final Energy Consumption
TOU	Time of Use
TPES	Total Primary Energy Supply
TRANSCO	The National Transmission Corporation
UAP	United Architects of the Philippines
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environmental Programme
UNIDO	United Nations Industrial Development Organization
VECO	Visayas Electric Power Company

Unit

Abbreviations	Words (Original)
GWh	giga watt hour
JPY	Japanese yen
ktoe	kilo tons of oil equivalent
kW	kilo watt
kWh	kilo watt hour
loe	liter of oil equivalent
M	million
Mloe	million liter of oil equivalent
MW	mega watt
PHP	Philippine peso
toe	tons of oil equivalent
USD/US$	United States dollar

Chapter 1 Introduction

1.1 Background and Objective

1.1.1 Background of the Study

In the Philippines, the self-sufficiency ratio of energy supplies (58% in 2008) is lower than neighboring countries, and depends on oil and coal from foreign countries for a considerable amount of the fuel used (42% in 2008). Therefore, recent skyrocketing oil prices are having adverse effects on the economic and industrial activities of the Philippines. The Philippine Energy Plan 2007 Update (hereafter "PEP") aims to achieve a self-sufficient energy supply of 60% by 2010 and identifies the important issues as 1) development of domestic fossil fuels, 2) promoting renewable energy (biomass, solar power, wind power and marine power), 3) switching to alternative fuels, and 4) improving energy efficiency and conservation (hereafter “EE&C”). In the plan, final energy consumption rises from 24.53 MTOE (Million Tons of Oil Equivalent) in 2007 to 30.69 MTOE in 2014, that is, it grows at a rate of 3.3% each year. The demand reduction effect is forecasted to be about 4.07%-4.66% every year until 2014. Thus, promoting energy efficiency and conservation is of increasing importance.

Japan’s policy, Country Assistance Program for the Republic of the Philippines (2008) focuses attention on one of the priority assistance areas of “Sustainable Economic Growth Aimed at Creating Employment Opportunities”, and Japan decided to promote Securing a Stable Supply of Electric Power as a support for the foundation for economic growth. As planned, in the JICA Project Execution Plan (2009), assistance in improving energy efficiency and the conservation system and the organizational structure is part of Enhancing Power and the Energy Sector. In addition, EE&C activities are extremely important from the perspective of the Preservation of Natural Resources/ Response to Climate Change corresponding to development challenges, the Environmental Protection and Disaster Prevention in the Poverty Reduction as priority assistance areas for the Philippines, and the activities would be conformed to Japan’s aid policies.

Concerning renewable energy, the DOE-led Renewable Energy Act of 2008 R.A.9315 was enacted and the renewable energy supply would be increased in the future. Regarding EE&C, however, EE&C Law does not exist. While various organizations, nevertheless, such as the DOE, the Department of Science and Technology (DOST), Energy Efficiency Practitioners Association of the Philippines, Inc (ENPAP) individually advance the promotion of EE&C activity, inclusiveness of the EE&C activities has not been attempted with organizational harmony. Additionally, no energy management system and effective labeling schemes exist.

According to the Detailed Plan Decision Investigation in February 2010, the absence of an Energy Efficiency and Conservation Law is the ultimate cause preventing the promotion of EE&C activity with amongst various organizations. The DOE, the counterpart (hereinafter referred to as “C/P”) of the Study, recognizes organizing functions amongst the related organizations and the designing of an Energy Efficiency and Conservation Bill as an urgent issue

This Study supports DOE in establishing a framework to promote EE&C (measures and organizational structure) and designing an EE&C bill with an aim to institutionalize EE&C measures and establishing an EE&C bill.

1.1.2 Objective of the Study

The objective of the Study is to ensure both the institutionalization of EE&C measures and the enactment of the Bill by providing support for an organizing framework on energy efficiency and conservation promotion (such as energy efficiency and conservation measures and organizational structure) and assisting the design of an energy efficiency and conservation bill.

1.1.3 Target Area of the Study

Whole of the Philippines

1.2 Contents of the Study

In order to accomplish the aforementioned objective, the JICA Study Team will conduct the following:

1) Basic Survey

- Information collection on the current situation and policies of the energy and power sector
- Information collection on the current situation and policies in the field of energy efficiency

2) Organizing Issues in Promoting Energy Efficiency and Conservation

- Analyzing issues in promoting energy efficiency and conservation
- Analyzing issues in promoting energy efficiency and conservation at the end-user level
- Analyzing issues concerning cooperation amongst organizations and donors
- Reviewing existing energy efficiency and conservation bills and analyzing pertinent issues
- Identifying and analyzing the barriers in establishing the energy efficiency and conservation law

3) Proposing Possible Measures for Promoting Energy Efficiency and Conservation

At this moment, there is no comprehensive framework to promote energy efficiency and conservation in the Philippines. Thus, the following energy efficiency and conservation measures are to be analyzed based on the issues identified in Chapter 2.

- Energy management system (scheme)
- Information, Education and Communication (IEC) for energy efficiency and conservation
- Efficient appliance dissemination and labeling system
- Energy audit system (scheme)
- Database for energy efficiency
- Promotion of ESCO (Energy Service Company)
- Subsidy and finance mechanisms to promote energy efficiency

Regarding the transport sector, possible measures and examples of other countries are provided. As for the energy performance standards for buildings, the current situation survey and analysis within the capacity are shown in Chapter 13.

4) Proposing an Organizational Structure for Promoting Energy Efficiency and Conservation

5) Proposing how to reflect possible energy efficiency and conservation measures into the upcoming energy efficiency and conservation bill

6) Counterpart Capacity Building through this Study

1.3 Approach of the Whole Study

1.3.1 Overview of the Study

The idea of the overview of the Study is described in Figure 1-1 and in the following:

【Grasping Potential】

- Grasping basic information of the energy and power sector
- Grasping EE&C potential of each sector

【Analyzing Existing Measures】

- Grasping existing measures and analyzing issues of each measure

【Sharing Overview of the Whole Picture】

- Overlooking the existing measures and sharing the overview with related parties
- Proposing an organizational structure for related parties and role allocation

[Analyzing EE&C bills and Support the drafting of a bill]

- Analyzing existing EE&C bills and identifying issues.
- Supporting in drafting an EE&C bill

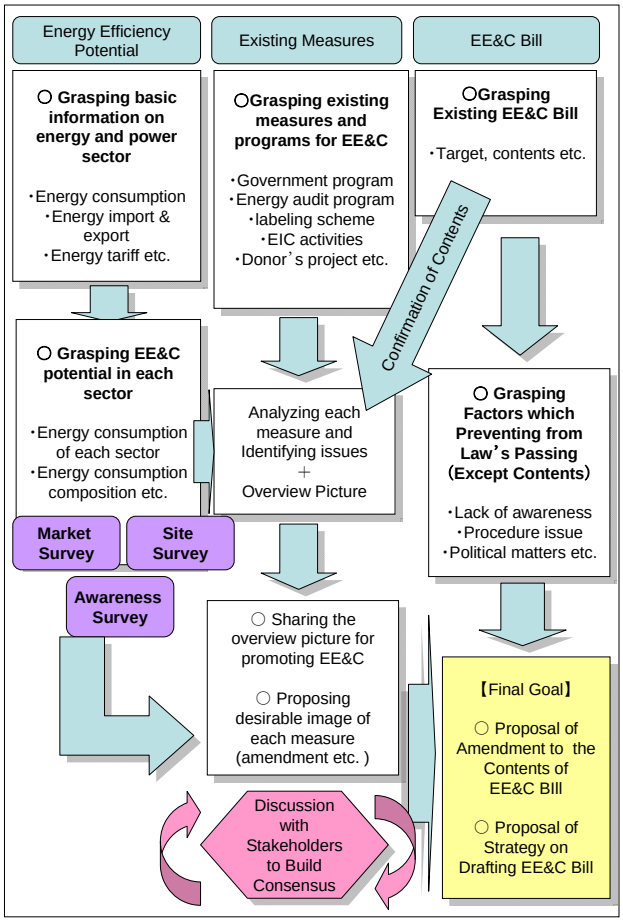


Figure 1-1 Overview of the Study

Amongst the above, the "Grasping EE&C potential" is fundamental information in order to judge whether each measure is adequate for the prioritized sectors, in proposing improvements for each measure or analyzing stakeholders' roles. Although it would be difficult to grasp it in details due to the time constraints of the survey period, it is still necessary to have a rough idea.

In addition, as described at the bottom of the figure, "Stakeholders' Discussion", building consensus amongst the stakeholders is a key factor to accomplish this study, since there are various stakeholders and various activities. Essentially, all the stakeholders have been working positively on "Energy Efficiency and Conservation". Thus, the direction must be basically the same. Therefore, sharing and confirming the overview picture and individual roles through workshops (seminars) and interviews will contribute or help to formulate an EE&C Bill or further energy efficiency and conservation.

1.4 Schedule of the Study

Figure 1-2 shows the overall schedule of the Study. In the initial plan, basic information and information on existing measures were to be collected in the 1st and 2nd local surveys. An overview of the current situation was supposed to be presented and shared in the 3rd survey and a proposal was to be presented in the 4th survey reflecting the comments from stakeholders. Considering the situation change, which demands a stronger and earlier request in order to propose an EE&C bill, however, the Study Team presented a draft of the EE&C bill in the 3rd survey. At the same time, the design concept for the measures were discussed with relevant organizations including DOE.

After the presentation of the EE&C bill draft by the Study Team, the DOE revised and made their own EE&C bill draft and conducted its own internal legal check of it. The DOE presented it to the stakeholders and collected their opinions during the 4th survey. Based on these, the DOE plans to complete their final version of the EE&C bill draft.

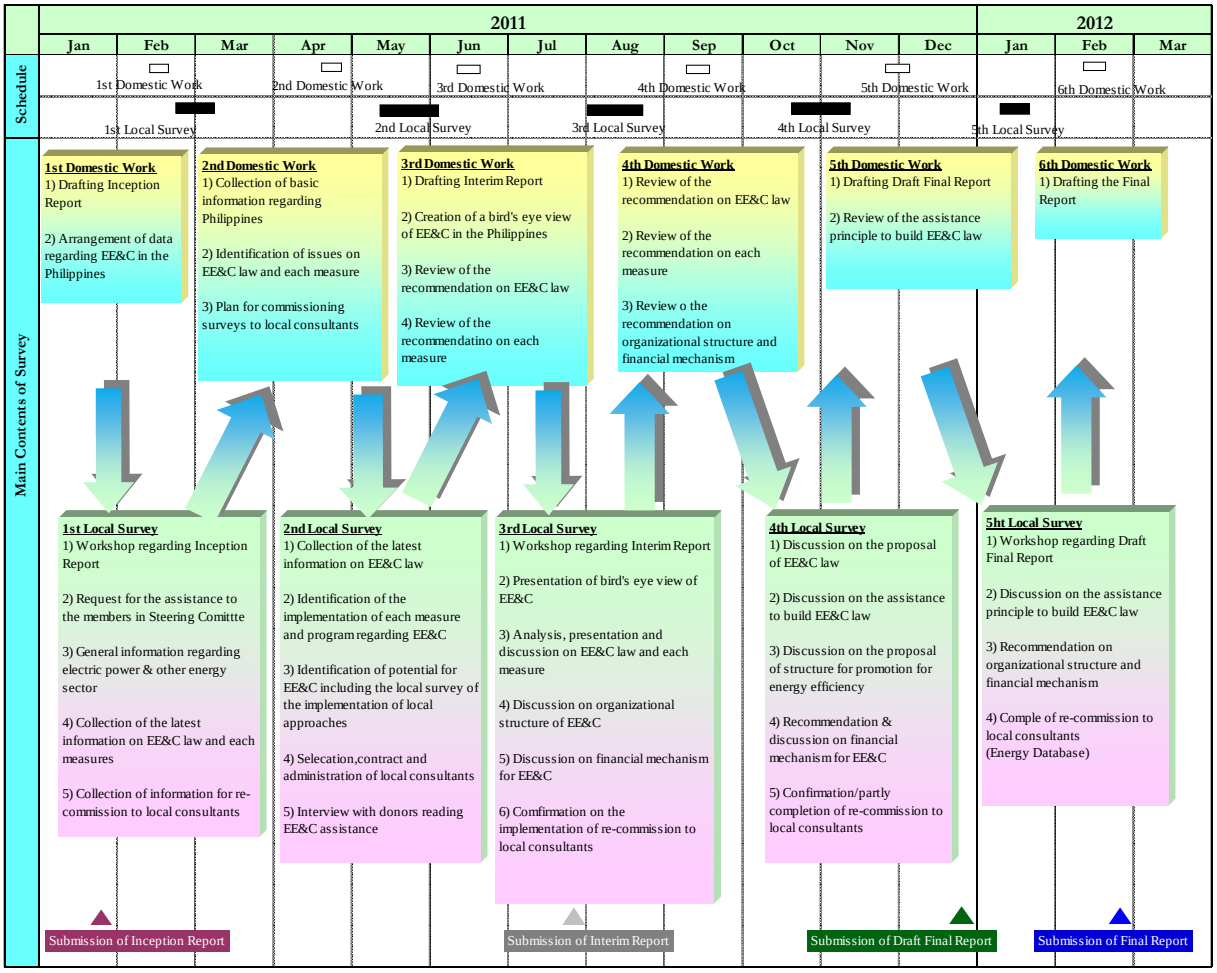


Figure 1-2 Overall Schedule of the Study

1.5 Study Team Structure

The Study Team structure is described in Figure 1-3. The study team consists of two teams; a team which is involved in collecting information and proposing improvement as to individual measures, and a cross-sectional team which proposes the organizational structure, finance mechanisms, and an EE&C bill.

Although the team structure is basically as follows, if the matter extends to other measures or each measure is interconnected, a new team is possibly to be organized. To reorganize a study team, a project manager, sub-project manager and a coordinator needs to communicate with each member and coordinate the whole survey.

Especially, the re-commissions to the local consultants of an EE&C awareness survey and a market survey needs to be implemented with inclusive content, and be coordinated by a project manager, a sub-project manager, a coordinator and other experts.

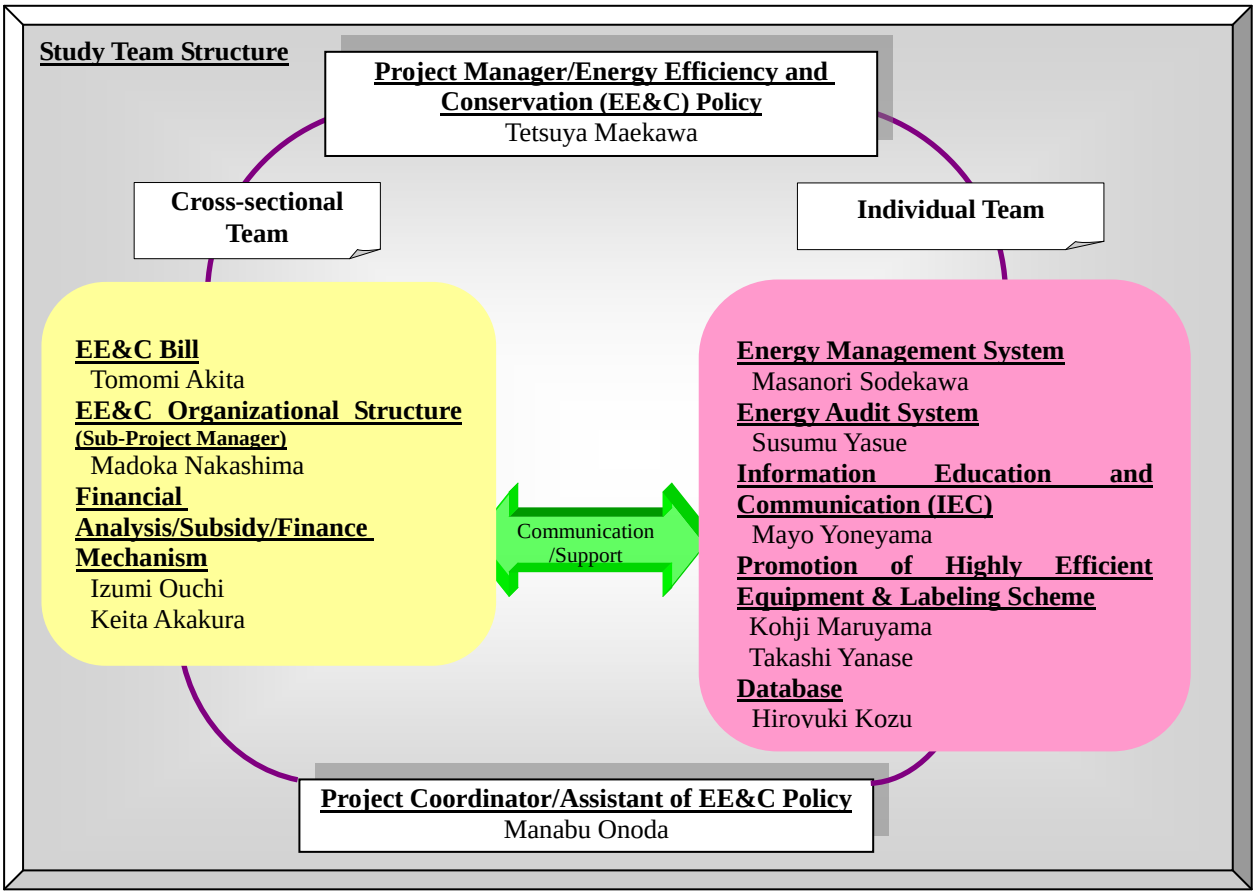


Figure 1-3 Study Team Structure

1.6 Framework of Discussion with Related Parties

The DOE and the Study Team set up a meeting, “Steering Meeting” to make decisions.

In the Philippines, a great number of various organizations have been conducting activities individually. In order to promote EE&C activities effectively, it is essential to closely cooperate amongst related organizations. Thus, a meeting for discussions amongst stakeholders was set up as a Stakeholders Working Group Meeting, SWGM, the head of which is DOE. Members of SWGM mainly consist of governmental and public organizations, non-profit organizations etc. which conduct EE&C activities. The member list is shown in Table 1-2. In addition, another meeting for discussion where each member of SWGM will discuss each theme in detail was also formulated as a Small Discussion Group Meeting, SDGM (refer Table 1-2).

The roles of these meetings are shown in Table 1-1 and the structure is in Figure 1-4.

Table 1-1 Roles of the Meetings

Title of Meeting	Role	Member List
Steering Meeting	To decide the contents on the proposals	DOE and Study Team
Stakeholders Working Group Meeting (SWGM)	To present inputs from SDGM and JICA Study Team	Member list is shown in the following tables.
Small Discussion Group Meeting (SDGM)	To discuss each topic in details and bring proposals for SWGM	Member list is shown in the following tables.

Table 1-2 Members of SWGM

Organization (Abbreviation)	
DOE EUMB EECD	Department of Energy, Energy Utilization Management Bureau, Energy Efficiency and Conservation Division
DOE-LATL	Department of Energy, Lighting and Appliance Testing Laboratory
DOE-ITMS	Department of Energy, Information Technology and Management Service
DOST-PCIEERD	Department of Science and Technology, Philippine Council for Industry, Energy and Emerging Technology Research and Development
DOF	Department of Finance
DTI-BOI, -BPS	Department of Trade and Industry, Board of Investment, Bureau of Product Standards
DOTC	Department of Transportation and Communications
DENR-EMB	Department of Environment and Natural Resources, Environmental Management Bureau
DepEd	Department of Education
NEDA	National Economic Development Authority
ENPAP	Energy Efficiency Practitioners Association of the Philippines, Inc.
PECCI	Philippine Energy Conservation Center, Inc.

Table 1-3 Member List of SDGM

Theme	JICA Team	DOE-EUMB-ECCD	Other Stakeholders
EE&C Law	Tomomi Akita	Art Habitan	**PECCI**, DOTC, DOST, ENPAP
Organizational Structure	Madoka Nakashima	Gee Almonares	**DENR**, PECCI
Energy Management System	Masanori Sodekawa	Joan Sotelo	**ENPAP**, PCCI
Energy Audit Scheme	Susumu Yasue	Antonio Nabong	**DOST**, PCCI
IEC	Mayo Yoneyama	Rose Sumulong	**DepEd**, DENR, PCCI, DOTC, ENPAP, PIA
Labeling Scheme	Kohji Maruyama	Jun arreno	**DOE-LATL**, DOTC, DTI-BPS
Database	Hiroyuki Kozu	Gee Almonares	**DOE-ITMS**
Financial Mechanism	Izumi Ouchi	Vilma Reyes	**DOF**, NEDA, DTI-BOI

Note: Organizations in bold type are the prime organization in its Small Discussion Group.

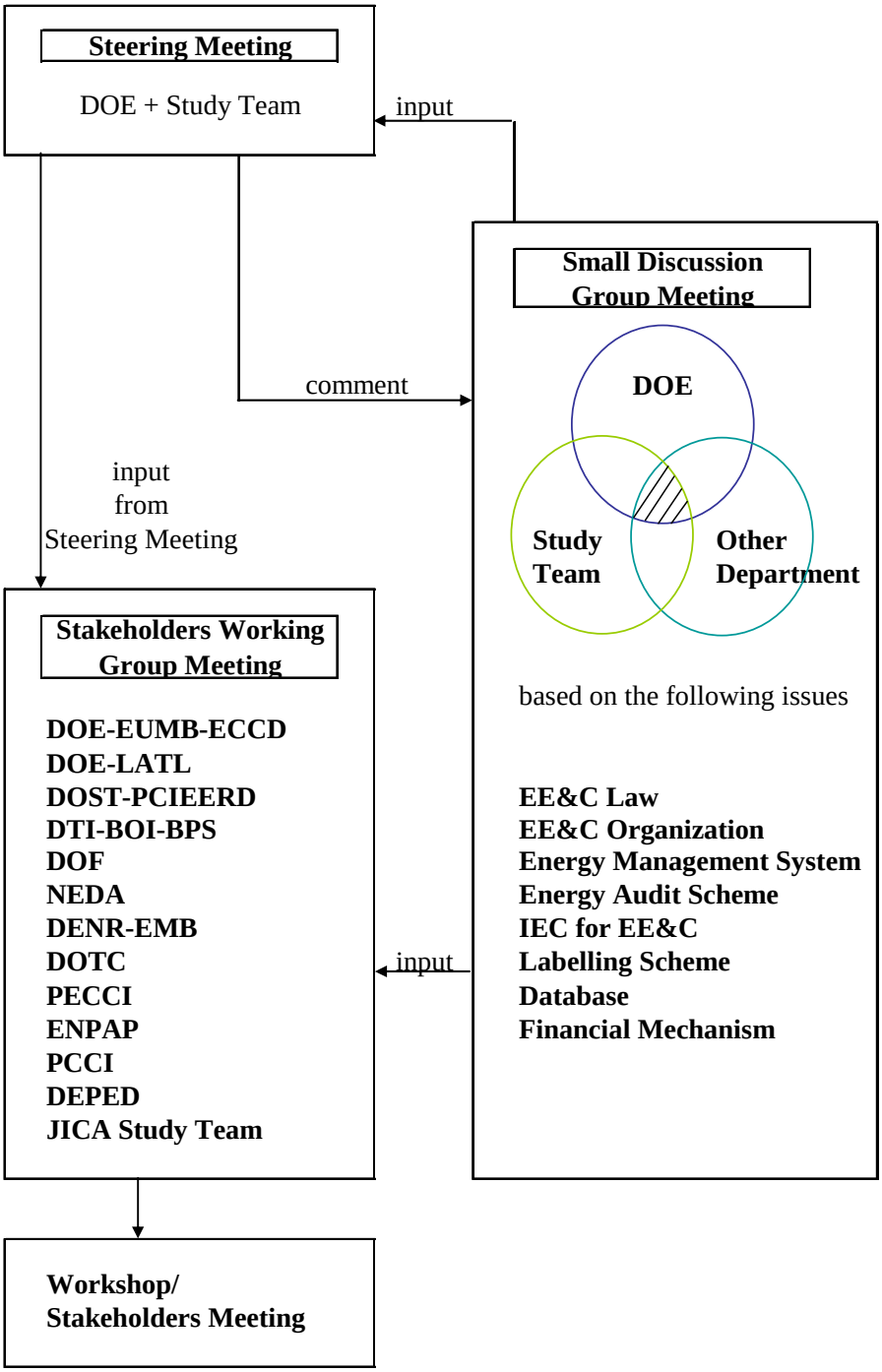


Figure 1-4 Structure of the Meetings for Discussion

1.7 Re-commission Work to Local Consultants

In order to accomplish the Study efficiently, the following three surveys or work are were commissioned to local consultants.

- ✓ Market survey on highly efficient appliances
- ✓ Awareness survey on energy efficiency and conservation
- ✓ Training on establishing an energy database

Table 1-4 Contents of Re-commission Work to Local Consultants

Survey	Period	Outline of Work
Market Survey	June 2011 - August 2011	**Market Research on Highly Efficient Appliances/equipment** **Objective:** The objective is to conduct market research on high-efficient appliances/equipment which consumes a large volume of energy in the residential sector including Energy Efficiency Standards & Labeling (hereafter "EES&L") products. Another objective is to collect data on energy efficiency to improve EES&L schemes, to increase target appliances/equipment of EES&L, to subsidize programs for high-efficient appliances/equipment. **Contents:** Hearing investigation and questionnaires to 50 Retailers, 45 Manufacturers and 5 Industry organization
Awareness Survey	June 2011 - August 2011	**Awareness on EE&C and Energy Consumption Survey** **Objective:** One objective is to investigate energy consumption statuses, specification of EA, usage patterns of EA, renewal trends of EA and EC awareness of energy consumers in the residential, industrial and commercial sectors. And another is to collect data to improve the IEC campaign, labeling program and subsidy program. **Contents:** Hearing investigation and questionnaires up to 200 residential consumers and 100 industries/commercial enterprises
Training on Database	November 2011 - January 2011	**Training on Security in Submitting Reports on line** **Objective:** Online report submission will start after the national energy conservation database is restructured. And additional security measures for the online report submission will be required. This training is aimed to improve the capacity of ITMS for protecting DOE websites against cyber attacks. **Contents:** Lectures and practices of the following items ➢ Server configuration ➢ Website attack technique and protections ➢ Treatment after the website attack ➢ Discovery of vulnerabilities in server side scripts

1.8 Others

(1) Workshops (Seminars)

As one of the opportunities for discussion amongst the stakeholders, in addition to the aforementioned SWGM, workshops (or seminars) were conducted as follows targeting all the relevant stakeholders in the field of EE&C such as government-related organizations, manufacturers, importers, retail shops, and private companies in the commercial and residential sector in order to collect comments.

Table 1-5 List of Workshop/Stakeholders Meeting

1st Workshop/Stakeholders Meeting	
Timing	March, 2011
Objective	To share the study principle, schedule with C/P etc.
Contents	Explanation and Introduction of the Inception Report ・ Overview and Schedule of the Study ・ Confirmation of survey method for each measure ・ Request for cooperation from relevant stakeholders ・ Q&A on uncertain issues of importance ・ Introduction of EE&C policy and measures in Japan Particularly, the following which has strong relevance to the Philippines （Energy management system (scheme), Energy auditor qualification scheme, labeling scheme, finance mechanism, organizational structure etc.）
Venue	Manila
2nd Workshop/Stakeholders Meeting	
Timing	August, 2011
Objective	To collect comments from stakeholders
Contents	Presentation of the contents of the 1st draft bill and each measures ・ Presentation of and discussion of the contents of the 1st draft EE&C bill ・ Presentation of and discussion on the current proposal of each measure
Venue	Manila
3rd Workshop/Stakeholders Meeting	
Timing	October, 2011
Objective	To collect comments from stakeholders
Contents	Presentation of the draft DOE bill ・ Presentation of and discussion of the DOE bill draft
Venue	Manila

(2) Site Visit

The Study Team visited sites accompanied by the DOE to grasp the current situation of the sites, for example, the technology level, activities and awareness for EE&C etc. The sites visited were four: one from the industrial sector and three from the commercial sector. The results are described briefly in 3.4.

Chapter 2 Brief Overview of Energy Sector in the Philippines

2.1 General Information

2.1.1 Geography and Natural Ambience

The Philippines is an archipelago comprised of 7,109 islands of which 4,600 have been named and 1,000 of them contain inhabitants. It is the second largest number of islands following Indonesia. The land mass is 299,764 square kilometers. 96 % of the Philippines is categorized broadly into eleven main islands including Luzon, Visayas, and Mindanao. Its capital city is Manila of Luzon.

The Philippines has a tropical maritime climate, which is known as a monsoon climate, and is usually hot and humid. There are three seasons: the dry season, the summer season from December to May; and the rainy season from June to November. The average yearly temperature is around 26.6°C. In consideration of the temperature, location in terms of longitude and elevation are significant factors. In addition, the Cebu has an ill-defined dry and rainy season.

Table 2-1 Monthly Average of Temperature and Rainfall in Manila

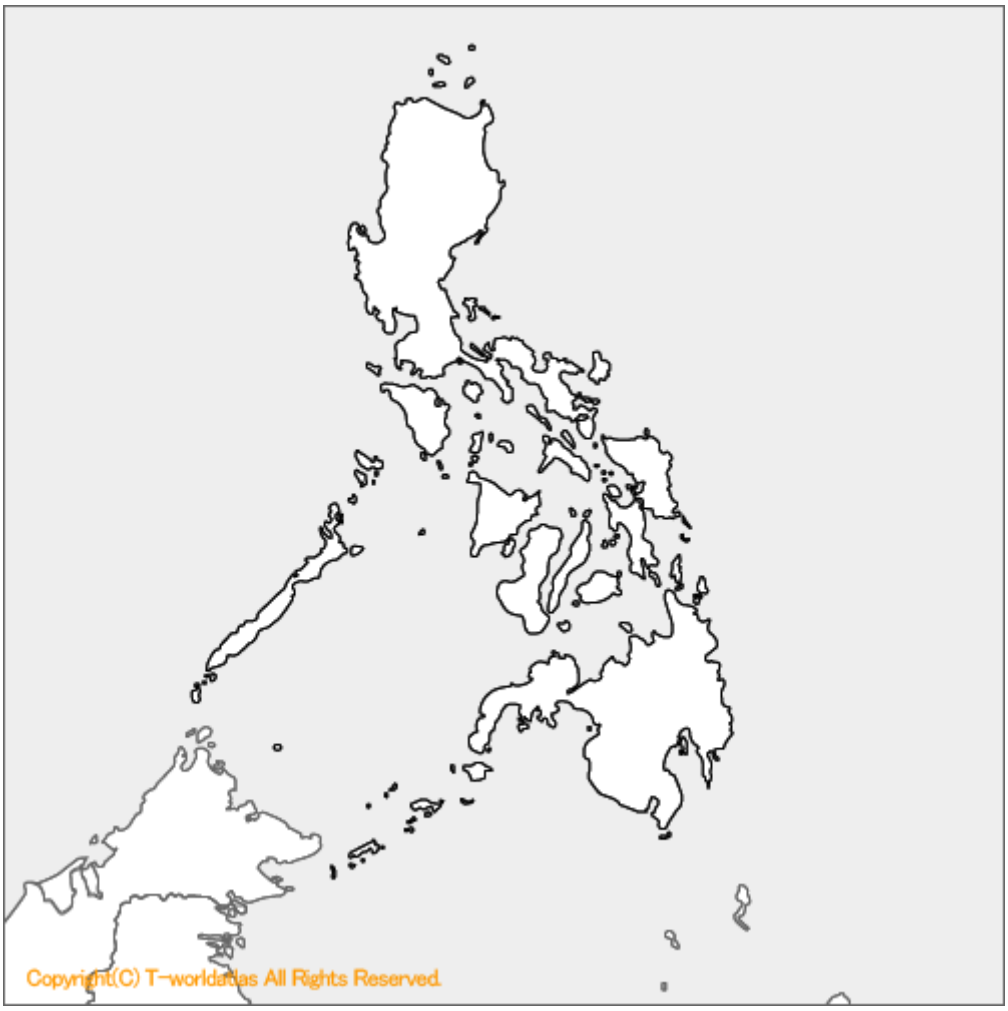
Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Average high temperature (C)	29.5	30.5	32.1	33.5	33.2	32.2	31.1	30.6	30.9	30.9	30.7	29.7
Average low temperature (C)	23.5	23.8	24.9	26.2	26.7	26.2	25.8	25.5	25.5	25.5	24.9	23.9
Rainfall (mm)	19.0	7.9	11.1	21.4	165.2	265.0	419.6	486.1	330.3	270.9	129.3	75.4

(Source: World Temperature website)

Table 2-2 Monthly Average of Temperature and Rainfall in Cebu

Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Average high temperature (C)	27	28	28	29	30	29	29	29	29	28	28	28
Average low temperature (C)	26	26	26	27	28	27	27	27	27	27	27	26
Rainfall (mm)	109	71	50	55	119	190	203	175	200	196	142	132

(Source: World Temperature website)



(Source: sekaichizu website http://www.sekaichizu.jp/)

Figure 2-1 Cartograph of the Philippines

2.1.2 Overview of Politics and Economy

(1) Overview of the Country

The following table shows the overview of the social and economic data of the country.

Table 2-3 Country and Social Affairs of the Philippines (as of 2010)

Items	Contents
Country name	Republic of the Philippines
Land	299,764 square kilometers, an archipelago comprising 7,109 islands
Population	94,013,200 (2010 estimate)
Capital	Manila (Population 11,550,000)
Cuisine	Malayo-Polynesian, mixed Chinese American, Hispanic, and other Asian
Language	Official language: Filipino and English　Regional language: about 80
Religion	Catholic:83 %, Other Christian:10 %, Islam:5 %
expected life	73 years for women and 67 years for men
literacy rate	83.4 %（2003 census)
college-going rate	30 % (Including job training centers)
Currency	Peso (1 US$ 45.11/average in 2010)
Nominal GDP	2010 = 188,719 million US$
Real GDP growth rate	Average 4.7 % during 2001-2010
GDP per Capita	2010 = 2,007 US $ / Capita
Unemployment rate	2007=7.3 %、2008=7.4 %、2009=7.5 %
CPI increase rate	2007=2.8 %、2008=9.3 %、2009=3.2 %

(Source: National Statistics Office (NSO), National Statistical Coordination Board (NSCB), Bangko Sentral ng Pilipinas (BSP))

(2) Political Environment

The Politics of the Philippines takes place in an organized framework comprised of a presidential, representative, and democratic republic. The List of Presidents of the Philippines are shown in Table 2-4. The current executive branch is headed by President Benigno S. Aquino III (Inaugurated in June 2010, 6-year term), Vice-President Jejomar Binay (inaugurated in June, 2010, 6-year term). Foreign Secretary set a national goal towards peace and development and to achieve a higher degree of democratic equality in Mindanao. Although Energy Efficiency Laws were established under President Marcos, they are presently not being enforced.

The national legislature of the Republic of the Philippines is a bicameral body consisting of the Senate (upper chamber), and the House of Representatives (lower chamber). The Senate is composed of 24 senators half of which are elected every three years, and the House of Representatives is composed of a maximum of 286 congressmen.

Table 2-4 Presidents and Terms of Office

Presidents	Terms of Office
Manuel Roxas	May 28, 1946 - April 15, 1948
Elpidio Quirino	April 17, 1948 - December 29, 1953
Ramon Magsaysay	December 30, 1953 - March 17, 1957
Carlos P. Garcia	March 18, 1957 - December 29, 1961
Diosdado Macapagal	December 30, 1961 - December 29, 1965
Ferdinand Marcos	December 30, 1965 - February 24, 1986
Corazon Aquino	February 25, 1986 - June 29, 1992
Fidel V. Ramos	June 30, 1992 - June 29, 1998
Joseph Estrada	June 30, 1998 - January 20, 2001
Gloria Macapagal-Arroyo	January 20, 2001 - June 29, 2010
Benigno Aquino III	June 30, 2010 -

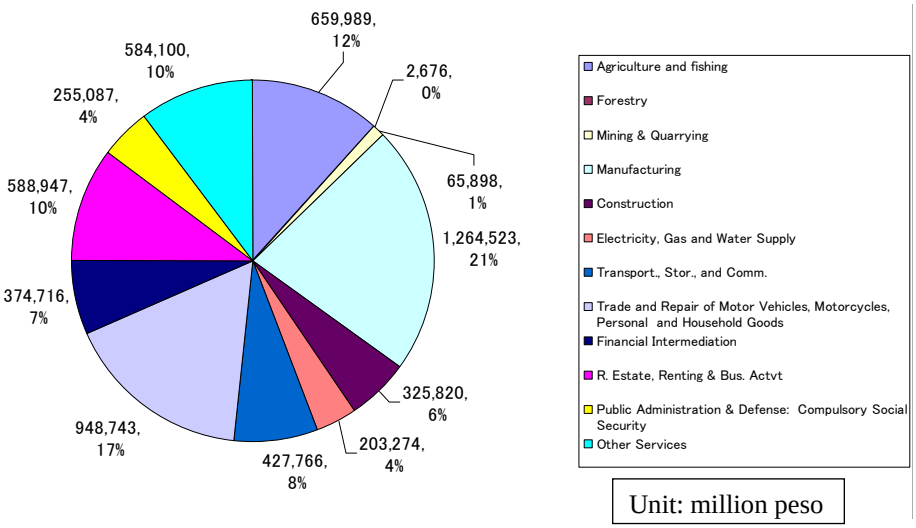
(3) Economic Activities

The industry of the Philippines is composed of agricultural products such as bananas and sugar canes. The Manufacturing and Service Industry has grown dramatically since the Philippines recovered from the doldrums of 1980-1990s. Manufacturing comprises 32 %, the Service industry comprises 56 % of the GDP as shown in Table 2-5. However, existing problems of political uncertainty resulting in wealth being concentrated into the hands of an affluent few with the majority remaining impoverished, numerous strikes, and the failure to create an environment conducive to foreign direct investment has plagued the country for quite some time. To make matters worse, population upsurge in the whole country and natural disasters in many parts of the country has created an influx of people into the capital regions that has not kept pace with the rate of economic development resulting in a poverty level that has not changed. Therefore, a large number of Filipinos have been international migrant workers.

Table 2-5 GDP by Industrial Origin (1998-2010)

	AT CONSTANT 2000 PRICES												
INDUSTRY	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Unit: In million pesos													
1. AGRI.FISHERY,FORESTRY	441,167	483,739	500,111	517,332	534,509	559,470	583,629	596,727	618,457	647,687	668,550	663,744	662,665
a. Agriculture and fishing	437,754	479,756	494,904	514,316	532,358	556,710	579,354	592,331	613,298	643,792	664,573	659,848	659,989
b. Forestry	3,413	3,983	5,206	3,016	2,151	2,759	4,275	4,396	5,159	3,894	3,977	3,896	2,676
2. INDUSTRY SECTOR	1,175,381	1,157,967	1,233,773	1,245,634	1,281,634	1,336,430	1,406,338	1,465,272	1,532,814	1,621,226	1,699,171	1,666,601	1,859,515
a. Mining & Quarrying	21,833	21,935	22,518	21,296	34,961	39,547	37,631	43,624	43,535	51,649	50,926	59,130	65,898
b. Manufacturing	816,434	830,296	876,107	899,794	927,102	961,264	1,011,618	1,062,612	1,106,052	1,145,529	1,194,921	1,137,534	1,264,523
c. Construction	216,708	183,607	203,932	189,122	181,518	187,312	198,404	198,154	217,637	249,379	266,751	284,994	325,820
d. Electricity, Gas and Water Supply	120,406	122,129	131,216	135,423	138,053	148,307	158,685	160,882	165,591	174,670	186,572	184,943	203,274
3. SERVICE SECTOR	1,710,354	1,787,728	1,846,830	1,921,373	2,002,525	2,112,569	2,286,974	2,419,280	2,564,959	2,759,375	2,869,379	2,966,895	3,179,358
a. Transport., Stor., and Comm.	194,454	202,675	219,235	242,853	267,930	300,683	337,039	360,885	376,398	408,076	423,952	423,398	427,766
b. Trade and Repair of Motor Vehicles, Motorcycles, Personal and Household Goods	486,273	528,845	565,481	595,646	618,810	650,490	698,830	740,311	784,443	851,892	863,732	875,616	948,743
c. Financial Intermediation	177,023	183,696	187,139	194,805	204,818	217,494	232,730	257,301	287,793	317,104	322,672	340,329	374,716
d. R. Estate, Renting & Bus. Actvt	328,245	334,750	333,727	333,272	340,567	358,651	392,961	419,523	446,975	482,493	526,116	547,866	588,947
e. Public Administration & Defense: Compulsory Social Security	185,082	184,272	184,539	187,892	189,531	196,030	210,720	212,055	219,563	222,665	227,223	241,009	255,087
f. Other Services	339,277	353,490	356,709	366,906	380,868	389,220	414,694	429,205	449,788	477,145	505,683	538,677	584,100
GROSS DOMESTIC PRODUCT	3,326,902	3,429,434	3,580,714	3,684,340	3,818,667	4,008,469	4,276,941	4,481,279	4,716,231	5,028,288	5,237,101	5,297,240	5,701,539
Net Primary Income	467,937	467,957	616,162	663,977	709,970	904,163	985,406	1,148,645	1,195,082	1,247,725	1,352,909	1,691,527	1,859,847
GROSS NATIONAL INCOME	3,794,839	3,897,391	4,196,876	4,348,316	4,528,637	4,912,632	5,262,348	5,629,924	5,911,313	6,276,013	6,590,009	6,988,767	7,561,386

(Source: NSCB)



(Source: NSCB)

Figure 2-2 GDP by Industrial Origin Share (2010)

(4) Economic Trends

Recent trends concerning Philippine economy of the recent years (after 2010) are as follows.

- According to the NSCB, 1st Quarter investment of foreign origin was 22,022,000,000 Peso down 52.8 % from the same term last year. Investment in Manufacturing comprises 32 % of the amount 30.6% is from the US and 21.5% is from Japan. The investment amount of direct equity investment of foreign origin in 2010 was 196.1 billion pesos, a 61.0 % increase over the previous year, fortunately the amount of 58.3 billion pesos from Japan occupied the top position. By industry, the top share of the investment amount was the manufacturing which came to 162.8 billion peso, a 43.0 % increase over the previous year.

  The amount of indirect investment into the Philippines in 2010, according to the BSP, was 4.6 billion US$ up 12 fold from a year earlier. Especially, listed companies including banking corporations, real estate, holding companies, communications of Philippine Stock Exchange (PSE) constituted 65.2 % of that amount. Investments from the US, Singapore, UK, Luxembourg, and Hong Kong constitute 81.7% of that amount.
- According to the NSO, the total amount of trade was 106.1 billion US$, a 30.2 % increase over the previous year, exports were 51.4 billion US$, a 33.8 % increase over the previous year, imports were 54.7% billion US$, a 26.9 % increase over the previous year, the growth rate of exports was higher than imports. Semiconductors, comprising 60.5 % of the exports, led to an increase in the total amount of the exports.
- According to the Family Income and Expenditure Survey of NSO, the average annual family income in 2009 was 206 thousand pesos, a 33 thousand peso increase over the previous survey in 2006, the average annual expenditure in 2009 was 176 thousand pesos, a 29 thousand peso increase over the previous survey in 2006. The Survey also shows the Gini coefficient was estimated as 0.4484, a slight improvement over the previous 0.4580 in 2006.
- Department of Finance straightened out the matter concerning the abolishment of the PEZA (The Philippine Economic Zone Authority) incentives including income tax holidays (ITH) for Developers of economic zones to Board of Investment (BOI) at the end of October 2010. The DOE and BOI are now debating reviewing these investment incentives. Although the DOF, responsible for financial restoration, have kept pleading with the BOI to scale down these incentives for investment, BOI has been unyielding in their opposition to these offers. There was no way to avoid the decreasing ITH because Gregory Domingo, the Philippines Trade Secretary seems to support abolishment.
- The National Wages and Productivity Commission approved the highest daily minimum wages of 404 pesos from 382 pesos in NCR in June 8, 2010.
- According to the UNDP Human Development Report 2009, the top 10 % ranking constitutes 33.9 % of the national income. On the contrary, the bottom 10 % ranking constitutes 2.4 % of the national income, the gap between the rich and the poor is 14.1 times over.
- According to the Philippine Overseas Employment Administration, the number of overseas Filipino workers in 2009 is 1,422,586, a 15 % increase over the previous year in spite of the world economy recession (refer Table 2-6).The number of new hires decreased (7.2 %), but the number of contract

renewals with international migrant workers increased (24 %). The amount of cash transfers from oversea workers increased 5.6 % in 2009 over the previous year（refer Table 2-7).

Table 2-6 Number of Oversea Filipino Workers

Type of Worker and Hiring	2008	2009	% Change
Grand Total - All Workers	**1,236,013**	**1,422,586**	**15.1**
Landbased Workers	**974,399**	**1,092,162**	**12.1**
New Hire	**376,973**	**349,715**	**-7.2**
GPB Hire	4,102	3,192	-22.2
Private Agency Hire	347,000	326,156	-6.0
Name Hire	25,263	19,660	-22.2
Workers with Special Exit Clearance 1/	72	253	251.4
Employment-based Immigration (EB3) 2/	536	454	-15.3
Rehires	**597,426**	**742,447**	**24.3**
Seabased Workers	**261,614**	**330,424**	**26.3**

1/ - Non-contract worker leaving on employment visa / work permit or equivalent document to work abroad but remains to be employed in the local company or and trainee of PEZA-registered company with trainee visa.

2/ - Filipino Emigrants through employment-based migration, data from Commission Filipinos Overseas (CFO).

(Source: Philippine Overseas Employment Administration (POEA))

Table 2-7 Amount of Cash Transfer from Oversea Filipino Workers

	2003	2004	2005	2006	2007	2008 p/	2009 p/
Total 1/	**7,578,458**	**8,550,371**	**10,689,005**	**12,761,308**	**14,449,928**	**16,426,854**	**17,348,052**
1. United States	4,299,850	4,904,302	6,424,848	6,526,429	7,564,887	7,825,607	7,323,661
2. Canada	27,072	67,338	117,061	590,627	595,079	1,308,692	1,900,963
3. Saudi Arabia	826,358	877,209	949,372	1,117,915	1,141,319	1,387,120	1,470,571
4. United Kingdom	271,034	280,805	300,725	561,670	684,007	776,354	859,612
5. Japan	346,057	308,128	356,659	453,398	401,612	575,181	773,561
6. Singapore	137,166	182,567	240,149	285,126	386,409	523,951	649,943
7. United Arab Emirates	160,822	183,442	257,429	427,246	529,963	621,232	644,822
8. Italy	309,807	449,289	430,071	574,662	635,944	678,539	521,297
9. Germany	95,526	108,124	142,530	162,020	207,935	304,644	433,488
10. Norway	13,935	18,627	19,814	128,279	159,150	185,619	352,957

p/ - Preliminary
1/ - Breakdown may not add up to totals due to rounding off.

(Source: POEA)

(5) Economic Indicators

The following table shows the major economic indicators in the Philippines. After the Lehman shock, the Real GDP Growth Rate of the whole country was 3.7 % in 2008 and 1.1 % in 2009, the other years stayed at around 6 %.

Table 2-8 Main Economic Indicators

Indicators	2004	2005	2006	2007	2008	2009	2010
Real GDP Growth Rate (%)	6.4	5.0	5.3	7.1	3.7	1.1	7.3
Nominal GDP (billion peso)	4,872	5,444	6,031	6,649	7,409	7,679	8,513
Nominal GDP (billion US$)	86.9	98.8	117.5	144.0	167.2	161.1	188.7
GDP per capita (US$)	1,040	1,159	1,351	1,624	1,842	1,748	2,007
Rate of Increase in Consumer Price Index (%)	6.0	7.6	6.2	2.8	9.3	3.2	3.8
Jobless Rate (%)	11.8	11.4	8.0	7.3	7.4	7.5	N.A.
Direct Investment (billion Peso)	173.9	95.8	165.9	214.1	182.7	121.8	196.1
Direct Investment (billion US$)	3.1	1.7	3.2	4.6	4.1	2.6	4.3

(Source: NSO, NSCB, BSP)

(6) Economic Policy

President Aquino has priority policies covering infrastructure development, employment creation, strict tax collection and financial reform, educational improvement, promotion of foreign investments and business environmental agriculture policy, and overseas worker protection.

(a) Infrastructure Development

The Philippines dropped from 39th place last year to 41st among 59 countries or areas in the World Competitiveness Yearbook ranking issued by the International Institute for Management Development (IMD) in Switzerland. The Philippines improved its ranking in the category of business efficiency and economic performance. The report, on the other hand, noted that the Philippines received a low mark for the category on government efficiency and a low level of infrastructure development was ranked second to the last or 57th from 56th last year. The report also recommends investments in energy, transport, and other infrastructure including the quality of basic education.

To establish a sound industrial foundation and create a better life for Filipino citizens, the Aquino administration, from the very start of his presidency, has been committed to improving the infrastructure and making it easier to invest utilizing frameworks such as the Public-Private Partnership in the Philippines. The government also agreed with one of the Japanese general corporations to develop infrastructure projects on November 12, 2010.

(b) Employment Creation

The number of foreign companies coming into the Philippines is low compared with other ASEAN countries in the new millennium. Meeting employment requires a variety of industrial growth, for instance in agriculture or manufacturing. Therefore, the government has to create a basic infrastructure and create a business environment that will attract foreign investment. The creation of infrastructures using entities such as PPP will attract foreign companies to the Philippines and create employment.

Outsourcing from foreign companies called Business Processing Outsourcing (BPO) has recently

expanded as a domestic employment opportunity. The BPO intends to outsource Business operations and processes to outside professionals. In 2009, the number of BPO workers reached 440 thousand, the percentage of it was 1 % of the entire working population, and their income comprised 5% of the nation's GDP. The majority of the outsourcing will be call centers, and the second most will be back-office functions such as accounting, therefore being a BPO worker would require a reasonable amount of education.

(c) Strict Tax Collection and Financial Reform

On the same day of the Aquino administration, DOF Secretary Purisima announced that DOF plans to work with the Department of Trade and Industry (DTI) and PEZA in conducting a fundamental review of the existing preferential taxation system for corporations, and to enforce a strict crackdown on tax evasion by taking tough legal actions. Secretary Purisima also stated that preferential policies for corporations and investors, excluding preferential policies for investors, should be rationalized, and tax benefits for industries expect little job creation.

Secretary Purisima has focused on not only reviewing tax benefits, but also countermeasures for tax evasions, corrupt practices and revenue authorities. The two tax authorities, the Bureau of Internal Revenue (BIR) and the Bureau of Customs (BOC) have estimated the appropriate taxes for the private sectors using information obtained from various industries, the database of governmental agencies such as the NEDA and PBS. For corrupting revenue authorities, on the other hand, the Improvement of recompense and retribution based on merit have been attempted.

2.2 Energy Policy/Plan

The government has developed two energy plans; Philippine Energy Plan and Philippine Development Plan. In this section, the national energy policy and plan are described.

2.2.1 National Energy Policy

(1) The Goal by 2030

According to the Philippine Energy Plan 2009-2030 (PEP 2009-2030) issued by DOE, The government is fully aware of the agendas from 2009 to 2030, ensuring energy security, pursuing effective implementation of energy sector reforms, implementing social mobilization and cross-sector monitoring mechanisms.

(a) Ensuring energy security

- Accelerate the exploration and development of oil, gas and coal resources
- Intensify development and utilization of renewable and environment-friendly alternative energy resources/technologies
- Enhance energy efficiency and conservation
- Attain nationwide electrification
- Put in place long-term reliable power supply
- Improve transmission and distribution systems
- Secure vital energy infrastructure and facilities

- Maintain a competitive energy investment climate

(b) Pursue effective implementation of energy sector reforms

- Monitor the implementation of, and if necessary, recommend amendments to existing energy laws
- Promote an efficient, competitive, transparent and reliable energy sector
- Advocate the passage of new and necessary laws

(c) Implement social mobilization and cross-sector monitoring mechanisms

- Expand reach through Information, Education and Communication
- Establish cross-sector monitoring mechanisms in cooperation with other national government agencies, academe, local government units, non-government organizations and other local and international organizations.
- Promote good governance

(2) Priority Matters to Achieve the Target

PEP 2009-2030 notes the development planning of the energy sector until 2030. Priority matters shown in PEP 2009-2030 are;

1) Exploration/Development of Conventional Fuels
2) Going for Clean and Green Energy
3) Promoting Responsible Use of Energy
4) Ensuring Developments in the Power and Electrification Sector
5) Pursuing Reforms in the Power and Downstream Oil and Gas Industries

One of the above, 3) Promoting Responsible Use of Energy is the main item for the study. The overviews listed above are;

1) Exploration/Development of Conventional Fuels

According to the PEP, for fossil fuels like oil and gas, the target production level at 2030 is 78.59 million barrels of oil, 87.58 million barrels of gas, and service contracts which to date total about 34 will increase to 117. Assuming the realization of these targets, hydrocarbon resources will increase by 40 % during the planning period. The country has 16 sedimentary basins, gas reservoirs and oil fields, and most of them can be found in Luzon, especially Palawan.

Among the action plans to realize these targets is the continuing conduct of the Philippine Energy Contracting Round (PECR)[1] and the establishment of a One Stop Shop to streamline government procedures and processing and provide assistance to potential investors in upstream energy projects. PECR is the government mechanism to bid out prospective areas for exploration and development in the case of natural gas, the continuing inventory of other potential sources will be pursued to explore and develop a

[1] DOE conducted the opening of the First Philippine Petroleum Public Contracting Round (PCR-1) for petroleum development in 2003. Afterwards, the Philippine Energy Contracting Round (PECR) was launched in 2005 for petroleum, coal and geothermal development.

natural gas supply base.

Regarding coal production, it will increase to a high 250 % with the entry of more investors through the PECR or energy contracting round mechanisms and the conversion of existing coal operating contracts from the exploration to the development stage.

2) Going for Clean and Green Energy

Renewable energy development was promoted with the passage of the Renewable Energy Act of 2008. After its signing, a total of 206 contracts had been finalized, and the target of Renewable Energy based installed capacity for power generation doubled in 2030 from the 2008 level of 5,300 MW.

Now, various Technical Working Groups and Sub-committees of the National Renewable Energy Board are discussing the various policy and regulatory mechanisms to speed up the implementation of the law. For instance, there are the Feed-in-tariff (FIT), the Renewable Portfolio Standard (RPS) and the Net Metering. FIT offers guaranteed payments on a fixed rate for Renewable Energy generation, excluding any generation for its own use. RPS is a market-based policy that requires power suppliers to source an agreed portion of their energy supply from eligible Renewable Energy resources. The Net Metering is a system in which a distribution grid user has a two-way connection to the grid. This system is only charged for net electricity consumption and credited for any overall contributions to the grid.

The State university-based Renewable Energy Center of DOE and local research institutions have plans and programs to update the existing renewable energy database of DOE, including promotional activities on renewable energy, particularly ocean energy projects.

Regarding geothermal, the Philippines will lead the world in geothermal energy development. The targeted installed capacity will increase from 1,972 to over 3,000 MW at the end of the planning. To realize this, PECR will be continued to secure geothermal investments. In fact, there are 21 geothermal prospects under PECR. Service contractors on operating will also be encouraged to undertake expansion and optimization projects. On the other hand, low enthalpy geothermal resources and the non-power application of geothermal will be engaged in enthusiastically.

Although existing biodiesel, bioethanol, compressed natural gas, and auto-LPG as alternative energy sources have been considered, nuclear power has attracted attention recently. Therefore, an inter-agency Task Force to decide the feasibility of considering nuclear energy as a long term option in the country was established in collaboration with the Secretaries of DOE and DOST. The Task Force is set to validate the results of the Bataan Nuclear Power Plant (BNPP) feasibility study, which is the major deliverable of a Memorandum of Understanding between NPC and KEPCO, as priority activities in the near term. This study will also undertake a site safety review of the BNPP. The results of the survey currently being conducted as part of the ongoing nationwide PEP IEC campaign will partly form the basis of a public communication plan that can be used for IECs in the future. A study on the competitiveness of nuclear energy as against other fuel sources will also be done and meanwhile, as the country prepares for the possible entry into the use of nuclear power, DOE is capacitating its manpower through various training programs.

3) Promoting Responsible Energy Use

The targeted amount of energy savings is a 10% reduction of the total annual demand of all economic sectors for three years from Jun. 2005 compared with 2004. Energy efficiency is advancing by EO and AO without legal binding force due to no existing energy efficiency laws.

DOE is now implementing the Philippines Energy Efficiency Program (PEEP) with support from ADB. The program includes the implementation of lighting retrofits of selected government buildings, the distribution of CFLs to consumers nationwide, the establishment of a mercury waste management plant for fluorescent lighting. The DOE will also expand the coverage of standards and the labeling program to even include new models of passenger cars and light duty vehicles, and promote energy efficiency buildings with the construction and real estate sectors.

Other programs for implementation are the monitoring of the efficiency performance of power generation utilities and electric distribution facilities, the promotion of aviation fuel efficiency enhancements, retrofitting commercial and industrial establishments and so on.

4) Ensuring Developments in the Power and Electrification Sectors

a. Power Supply and Demand Forecast

According to the Philippine Development Plan 2009-2030 (PDP2009-2030), the energy sales in the Philippines is projected to increase from 55,417 GWh in 2008 to 86,809 GWh by 2018, up to 149,067 GWh by 2030. The energy and demand forecasts for the Luzon grid is composed of about 74 % of the nationwide demand, is expected to grow at the same rate in the future. The power supply and demand prediction of Luzon, Visayas, and Mindanao are shown in Table 2-9 and Table 2-10.

Table 2-9 Energy Sales and Average Annual Growth Rate, 2009-2030

	Luzon	Visayas	Mindanao
Energy Sales	**GWh**	**GWh**	**GWh**
2008	41,275	6,565	7,578
2009	42,768	6,857	7,966
2018	64,303	10,601	11,904
2030	109,477	19,121	20,470
Average Annual Growth Rate	%	%	%
2009-2018	4.53	4.91	4.62
2019-2030	4.53	5.04	4.62
2009-2030	4.53	4.98	4.62

(Source: PDP2009-2030)

Table 2-10 Peak Demand and Average Annual Growth Rate, 2009-2030

	Luzon	Visayas	Mindanao
Peak Demand	**MW**	**MW**	**MW**
2008	6,822	1,176	1,228
2009	7,036	1,331	1,359
2018	10,393	1,887	2,031
2030	17,636	3,404	3,493
Average Annual Growth Rate	%	%	%
2009-2018	4.3	4.89	5.18
2019-2030	4.51	5.04	4.62
2009-2030	4.41	4.97	4.86

(Source: PDP 2009-2030)

b. Power Development Plan

The list of major committed power development projects are shown in the Table 2-11 along with the available capacities from 2009 to 2030. In Luzon, the 600 MW coal-fired plant is under construction, and it will be operating before the end of 2012. In Visayas, the committed projects totaling 638 MW will come on-stream before the end of 2011. In Mindanao, the 42.5 MW from the Sibulan Hydroelectric Power Plant has been generating since May 4, 2010. Additionally, the 8 MW from the Cabulig Hydroelectric Power Plant will start in 2011, the 50 MW from Mindanao III Geothermal Plant also will start commercial operations by 2014. In the Visayas, because DOE campaigned hard for investments, a total of about 610 MW of available capacity have been committed and part of it is now contributing to the grid. As a result, the Visayas has enough installed capacity to meet its requirements. In Mindanao, on the other hand, the DOE did also campaign, only 200 MW of the necessary 500 MW capacity requirement was installed.

The lack of private sector interest to put up the identified additional capacities in Mindanao, due to a variety of reasons including regulatory uncertainties, social acceptability, creditworthiness of off-takers and even the situation of peace and order in some areas, led to the current crisis of a power shortage now in Mindanao. To make matters worse, El Nino, which was the most cataclysmic event in 20 years, struck the country starting in the last quarter of 2009. As of early March 2010, El Nino rendered the 900 MW of Hydroelectric Power Plant capacities in Mindanao to almost nothing, and the island has been declared to be under a state of calamity.

Table 2-11 List of Committed Project of Power Development

Grid	Project Name	Capacity (MW)	Target Completion
Luzon	Coal Fired Power Plant	600 (2 x 300)	2012
	Sub-total Luzon	**600**	
Visayas	CFB Power Plant Expansion Project	240 (3 x 80)	Unit-1 2010 Unit-2 2010 Unit-3 2011
	Cebu Coal-Fired Power Plant	200 (2 x 100)	Unit-1 2011 Unit-2 2011
	Panay Biomass Power Project	17.5	2011
	Nasulo Geothermal Plant	20	2011
	CFB Power Plant	160 (2 x 80)	Unit-1 2010 Unit-2 2010
	Sub-total Visayas	**638**	
Mindanao	Sibulan Hydroelectric Power	42.5 (16.5 + 26)	Unit-1 2010 Unit-2 2010
	Cablig Mini-Hydro Power Plant	8	2011
	Mindanao III Geothermal	50	2014
	Sub-total Mindanao	**101**	
Total Philippines		**1,338**	

(Source: PDP 2009-2030)

Table 2-12 Capacity Additional Requirement, 2009-2030

Year	Luzon				Visayas				Mindanao			
	Plant Type			Total	Plant Type			Total	Plant Type			Total
	Base-load	Mid-range	Peak		Base-load	Mid-range	Peak		Base-Load	Mid-range	Peak	
2009							150	150				
2010											50	50
2011			300	300							50	50
2012		300		300					200			200
2013									100			100
2014		300	150	450					100			100
2015			450	450					100			100
2016		300	150	450					100			100
2017	500			500								
2018		300	300	600			100	100	100			100
2019	500		150	650	100		50	150	100			100
2020	500			500	100			100	100			100
2021	500		150	650	100		50	150			100	100
2022	500		150	650	100			100	100			100
2023	500		150	650	100		50	150	100		50	150
2024	500		300	800	100		50	150	100		50	150
2025	500		150	650	100		50	150	100		50	150
2026	500	300		800	100		100	200	100		50	150
2027		600	300	900	100		50	150	100		50	150
2028	500	300		800	100		100	200	200			200
2029		600	300	900	200			200	100		50	150
2030		900		900	200			200	200			200
Total	**5,000**	**3,900**	**3,000**	**11,900**	**1,400**		**750**	**2,150**	**2,000**		**500**	**2,500**

(Source: PDP 2009-2030)

5) Pursuing Reforms in the Power and Downstream Oil and Gas Industries

DOE is preparing to realize open access in a power sector that will allow bulk power consumers to

choose their power supplier. This implementation of an open access market is based on the Electric Power Industry Reform Act (EPIRA). The EPIRA prescribes certain conditions prior to its implementation including privatization of at least 70% of the total generating assets of Napocor in Luzon and Visayas and the transfer of the management and control of at least 70% of the total energy output of power plants under contract with Napocor to the IPP administrators, and it is already at 68%. Open access will soon be a reality. Furthermore, DOE has demanded that the Energy Regulatory Commissions review the value because the current situation of the power sector may not be taking it into consideration. It is being revised, and thus open access may be realized earlier than anticipated.

The Government, on the other hand, has indicated that the Electric Cooperatives (EC) who have heavy debts should be under the control of the government to guarantee stable management.

DOE's role in implementing a deregulated downstream oil industry environment is to strictly ensure that consumers are safe and protected when it comes to the petroleum products that they consume. DOE is also responsible for industry players in mitigating the impact of oil price increases and ensuring a competitive playing field among the industry players remain continuing programs. Reflecting such a situation, The Presidential Task Force on the Security of Energy Facilities and the Enforcement of Energy Laws (PTF-SEFEEL) will continue to play an important role in safeguarding consumer welfare against various industry malpractices.

According to the PEP2009-2030, the DOE planned to re-file during Congress the Natural Gas Industry Bill that will encourage the private sector to participate in the strategic infrastructure build-up that will transport natural gas from its source to the end users. The DOE also planned to promote natural gas including incentives based on the Investment Priorities Plan, but there has been no progress.

2.2.2 Energy Law

The outline of EE&C law, the examination object of this study, is recorded in chapter 3. Here, the policies and laws involving energy but excluding energy efficiency are described.

(1) Renewable Energy Policy/Law

The Philippines government has developed policies to seek energy resources from the two oil crises of the 1970s shown in the Table 2-13. As a result of these development policies, the country has become 59 percent energy-sufficient compared to a 45 percent sufficiency level in 2001, especially in promoting renewable energy, expanding transmission lines, old-fashioned energy consumption, and in energy supply for isolated location. The power shortage, however, has remained in the Philippines, especially Mindanao, thus the government introduced legislation to attract infrastructure investment such as renewable energy. The government announced the Renewable Energy ACT in December, 2008; Implementing Rules and Regulations (IRR) was established in May, 2009. Since then, the developer shall be fully exempt from income taxes, payment of tariff duties and value-added tax by the government for seven years from the start of commercial operations.

Table 2-13 Acts of Renewable Energy

Acts	Contents
An Act to Promote the Exploration and Development of Geothermal Resources (Presidential Decree 1442, in 1972)	・ Service contractors may be paid a fee not exceeding forty per centum of the balance of the gross value of the geothermal operations ・ Exemption from payment of tariff duties ・ Execution of the activities and operations subject of the service contract shall at all times be subject to direct government supervision ・ Compensating tax on the importation of machinery and equipment and spare parts and all materials required for geothermal operations
Mini Hydroelectric Power Plant (RA7156 in 1991)	・ Special Privilege Tax Incentive ・ Tax and Duty-free Importation of Machinery, Equipment and Materials ・ Tax Credit on Domestic Capital Equipment ・ Preferential Real Estate Tax Rates on Equipment and Machinery ・ Value-added Tax Exemption ・ Income Tax Holiday for seven years
Enabling Private Sector Participation in the Exploration, Development, Utilization and Commercialization of Ocean, Solar and Wind Energy Resources for Power Generation and other Energy Uses (EO462 series of 1997, and EO232 2000)	・ The signature bonus shall be given to the DOE at the date the Pre-Negotiated Commercial Contract is signed ・ The production bonus shall be paid to the DOE at the end of each calendar year during the commercial phase of the project ・ The government will further assist pioneering projects for ocean, solar and wind energy development and commercialization
Electric Power Industry Reform Act (EPIRA) (RA9136 in 2001)	・ The restructuring of the electricity supply industry and the privatization of the National Power Corporation (NPC). The restructuring of the electricity industry calls for the separation of the different components of the power sector namely, generation, transmission, distribution and supply. ・ The equalization of the taxes and royalties applied to indigenous or renewable sources of energy vis-a-vis imported energy fuels ・ The Country-wide Electrification and Missionary Service Company (CEMSCO) which supports the promotion of renewable energy was established
Renewable Energy Act (RA9367, 2008)	・ Income Tax Holiday (ITH) for the first seven years of commercial operations ・ Duty-free Importation of RE machinery, equipment and materials including control and communication equipment within the first ten years upon issuance of a certification of entitlement to incentives ・ Special tax rates on realty and other taxes on civil works, equipment, machinery, and other improvements actually and exclusively used for RE facilities ・ Feed-in Tariff (FIT) ・ Net Operating Loss Carry-Over (NOLCO):during the first three years from the start of commercial operations which had not been previously offset as a deduction from gross income shall be carried over as a deduction from gross income for the next seven consecutive taxable years immediately following the year of that loss ・ National Renewable Energy Board (NREB) a part of DOE was established

(Source: DOE website)

(2) Policies and Laws of Climate Change

In June 2004, per Executive Order No.320, the Department of Environment and Natural Resources (DENR) became a designated national authority as the focal agency to provide for the reduction in the emission of harmful gases to the atmosphere. The purpose of the organization is to protect, conserve and manage the environment and natural resources, and the mandate is to stop environmental abuses, reverse ecological degradation, and conserve remaining natural resources. The DENR shall have the following powers and functions.

1) Formulate and develop a national Clean Development Mechanism (CDM) policy
2) Develop the criteria, indicators, standards, systems and procedures, and evaluation tools for the review of CDM projects.
3) Undertake the assessment and approval of CDM projects that will be submitted to The United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol
4) Monitor the Implementation of CDM projects
5) Perform other functions that are related to and in pursuance of the development of CDM.

The former establishment of DENR, Inter-Agency Climate Change Committee (IACCC), responsible for activities and approaches concerning climate change, was established in May 1991, and summarized the Philippines response to UNFCCC, signed in July 1992, and ratified in August 1994. The Kyoto Protocol was signed in April 1998 and ratified in November 2003.

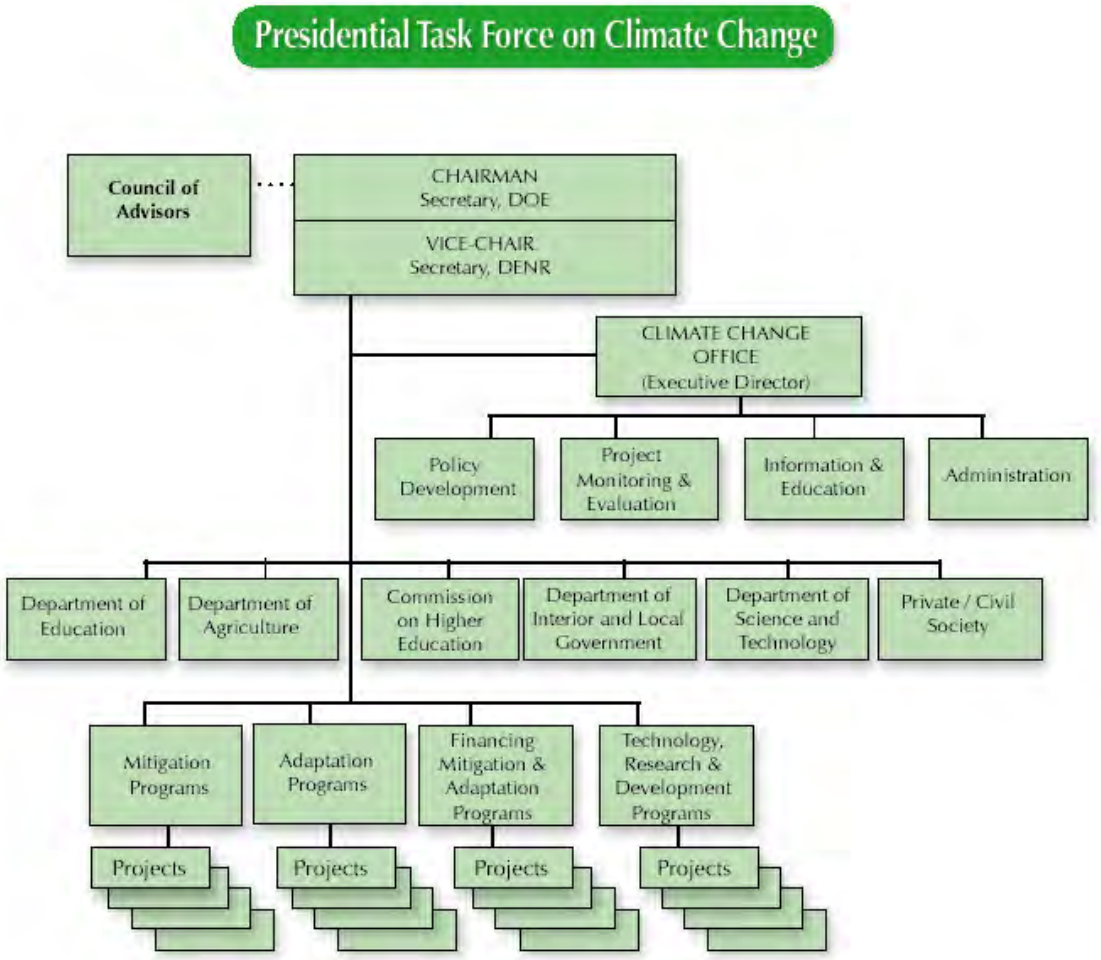
A recent trend in the climate change arena is the establishment of The Presidential Task Force on Climate Change in August 2007. The framework of the task force can be seen in Figure 2-3, and the business affairs based on Administrative Order No.171 signed in February 20, 2007 is as follows;

1) Conduct rapid assessment on the impact of climate change, especially in the most vulnerable sectors and areas.
2) Ensure strict compliance to air emission standards and act with urgency to combat deforestation and environmental degradation
3) Undertake strategies include fuel efficiency, energy conservation, use of renewable energy, waste management
4) Conduct IEC on climate change
5) Design concrete risk reduction and mitigation measures and adaptation responses, especially to address short-term vulnerabilities
6) Collaborate with international partners to support climate change activities
7) Cause the integration and mainstreaming of climate risk management into development policies

The Task Force has strategic directions as follows;

- Implementation of national policies for the reduction of GHG emissions over the next few years
- design adaptation responses to address vulnerabilities of sectors and areas by climate change

- design adaptation measures critical in addressing the current and imminent risks by climate change
- Search for financing mechanisms in support of local and sectoral initiatives
- Introduce innovative lending schemes financing climate change mitigation and adaptation
- Lead in forging bilateral agreements, regional cooperation, and multilateral action to facilitate the transfer of technology
- social mobilization effort across sectors and communities



(Source: The Presidential Task Force on Climate Change Website)

Figure 2-3 Framework of the Presidential Task Force on Climate Change

2.3 Utilities and Tariffs of Power Sector and the other Energy Sectors

2.3.1 Utilities of Power Sector

(1) Circumstances lead to establishment of EPIRA

In the Philippines, there has been an acute power shortage caused by power plant construction delays due to the financial shortage of the National Power Company (hereinafter NPC) from the 1980s. Many Independent Power Producers (hereinafter IPP), foreign capital had joined this sector after receiving IPP entry permission in 1987.

IPPs had contracted for Power Purchase Agreements and Energy Conversion Agreements (hereinafter PPAs) with NPC. Those PPAs contain favorable IPP terms such as a guarantee for power purchasing by NPC and a full supply of fuel.

Furthermore, due to a steep decline of the peso-dollar rate due to the Asian Financial Crisis in 1997, the increase of expenditures for power purchase and fuel which are in proportion to dollar rate had strained NPC's budget.

In order to resolve this situation, the Electricity Power Industry Renewable Act (hereinafter EPIRA) was established by the government in 2001. The main components of EPIRA are described below.

The main components of EPIRA

- Unbundling of Generation and Transmission function
- Disposal of NPC's property: Transfer authority from NPC to Power Sector Assets and Liabilities Management (hereinafter PSALM)
- Privatization of National Transmission Corporation（hereinafter TRANSCO)
- Review of PPA between NPC and IPP
- Establishment of Wholesale Electricity Spot Market（hereinafter WESM)
- Establishment of Energy Regulation Committee

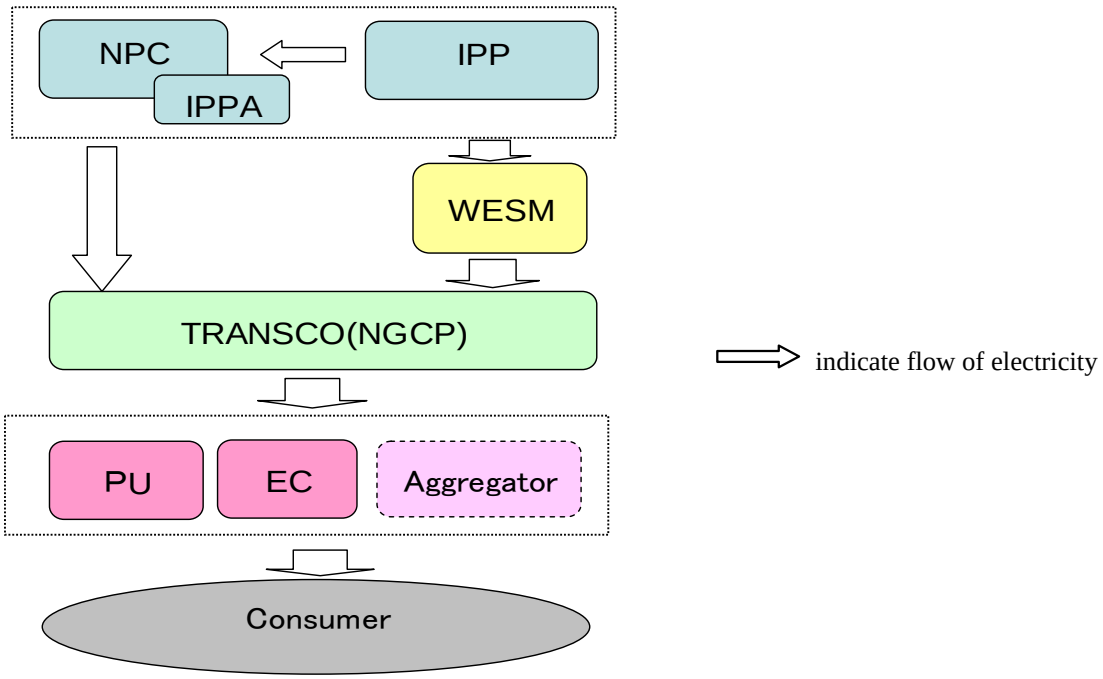


Figure 2-4 Organization of Power Sector

<Major Power Sector Utilities>

NPC (National Power Company)

NPC had monopolized generation and transmission functions until EPIRA enforcement. After the splitting off of transmission functions and the privatization of generation facilities have been executed.

IPPAs (Independent Power Producer Administrators)

Private sector independent entities that will administer and manage contracted energy from the PPAs that the NPC entered into with the IPPs. The IPPAs will be appointed through public bidding to be conducted by PSALM. The IPPAs can enter the WESM.

PSALM (Power Sector Assets and Liabilities Management)

Established to promote clearance of NPC's debt and privatization of NPC's facilities in accordance with EPIRA

TRANSCO (National Transmission Corporation)

TRANSCO became independent from NPC by via the splitting off of the transmission function. National Grid Corp. of Philippines went into business right from 2009.

PU (Private Distribution Utilities)

Biggest company is MERALCO

EC (Electricity Cooperative)

Small nonprofit utilities for distribution and electrification in the rural area

Aggregator

Retail dealer expected to start business after the introduction of open access to the grid

(2) Conditions under EPIRA

Establishment of WESM in accordance with EPIRA made IPP's possible to sell electricity to the market besides PPA and other bilateral contracts. On the other side, IPP's cannot contract a new PPA with purchasing guarantees anymore.

Regarding the Transmission function, TRANSCO became independent from NPC and as for operation of the function National Grid Corp. of Philippines, which is a consortium of private companies, went into business right from 2009.

Regarding the distribution function, there are more than ten private utilities and a hundred and twenty ECs that distribute electricity to each exclusive area (refer to Figure 2-5). MERALCO is the biggest private distribution company, which supplies to the metro-Manila area and its surroundings. Its share is around sixty percent of the whole country. The next largest company is VISAYAN Electric Co. (hereinafter VECO) and its share is around four percent. There is a big gap between MERALCO and VECO. (refer to Table 2-14)

EPIRA plans to begin open access of the grid after the disposal of power plants equivalent to seventy percent of NPC's generation capacity in Ruzon and the Visayas district and so on. When open access started all the generation, distribution and retail utilities were allowed access to the transmission and distribution system to carry out their businesses.

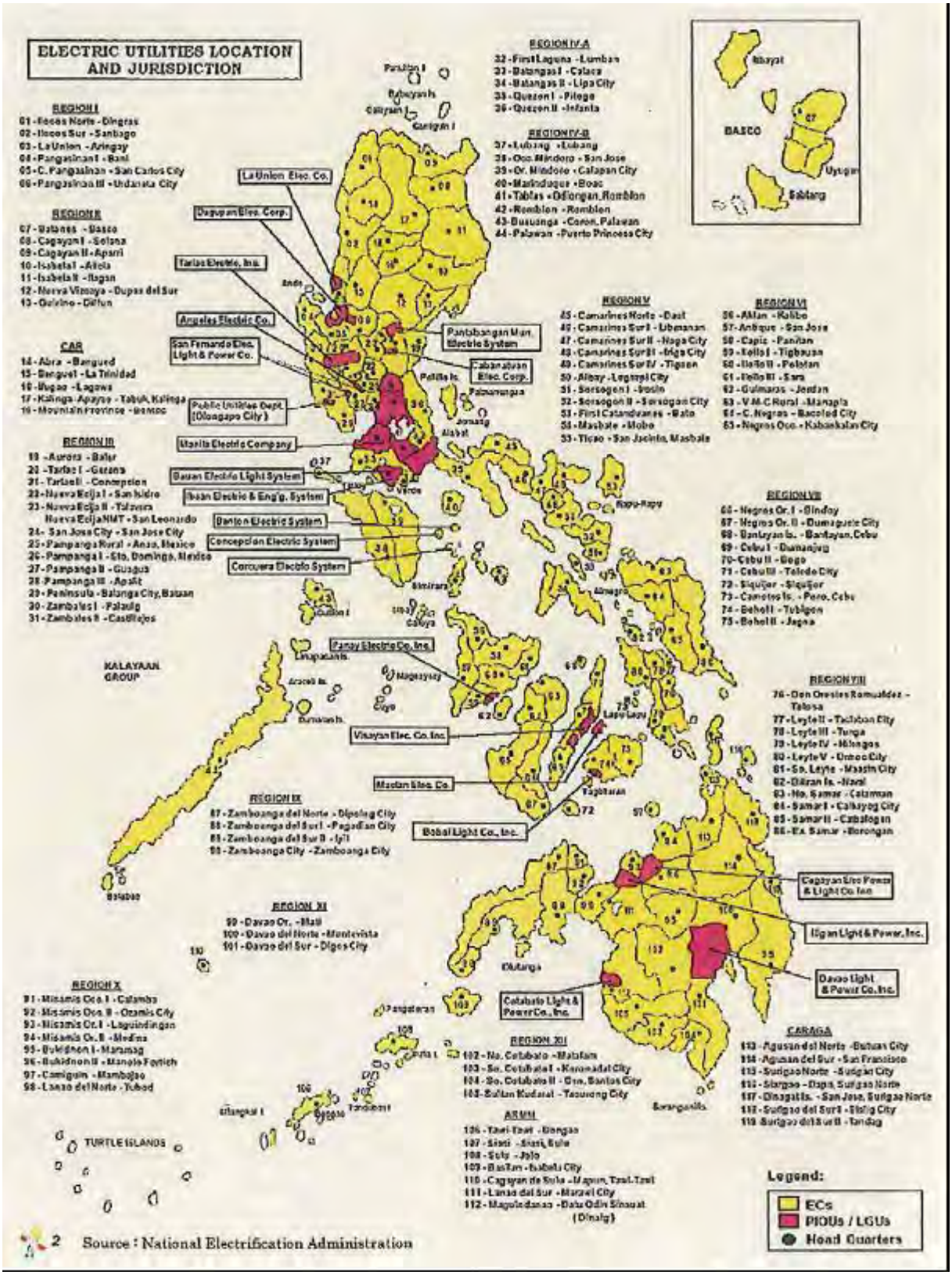
The distribution utilities are now obliged to purchase ten percent of their purchasing power from WESM

now. However, the expected price control mechanisms brought by good use of WESM does not work well because most of the Power is purchased under the contraction of PPA.

Table 2-14 Electricity Sales of a Major Distribution Company (2010)

	Electricity Sales(2010)	
	GWh	Ratio (%)
MERALCO	29,976	58.9
VECO	1,994	3.9
Others	18,928	37.2
Country total	50,898	100.0

(Source: MERALCO document, VECO website, DOE document)



(Source: JICA report「The power demand and development plan of the Philippines」August 2008)

Figure 2-5 Map of Distribution Utilities

2.3.2 Rate and Tariff of Electricity

(1) Electricity Demand and Rate

①Electricity Demand

Regarding electricity demand in the Philippines, it is Explained in 「3.2.6 Power Supply & Demand」. In this paragraph, the electricity demand of MERALCO is shown because the electricity rates will be explained to later refer to the biggest distribution company of MERALCO's tariff.

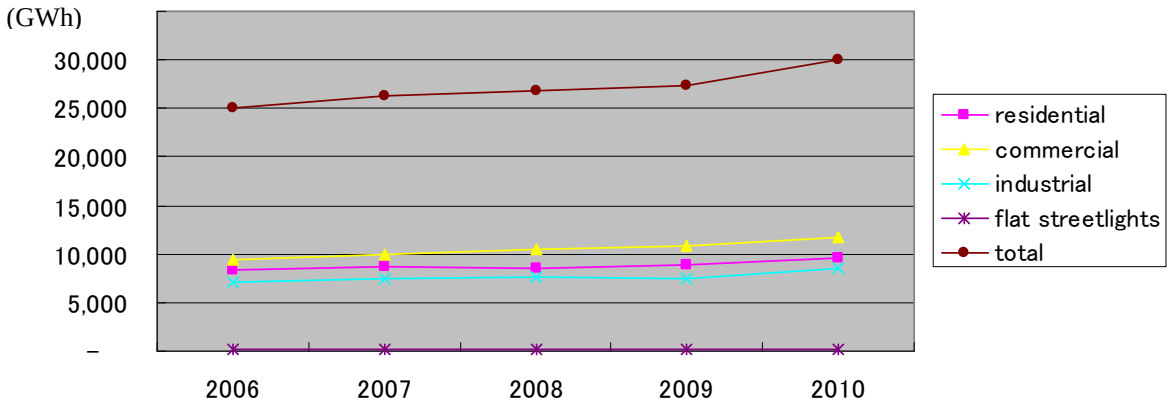
MERALCO will distribute approximately sixty percent of all of the electricity in the Philippines to mainly the Manila metropolitan area. The residential, industrial and commercial sectors share approximately one third of electricity sales for each. The growth rate of electricity sales has been 4.6 percent in the last five years. This situation is similar to the whole country's growth rate.

The commercial sector shows the most highest and steadiest growth rate. (refer to Table 2-15 and Figure 2-6)

Table 2-15 MERALCO's Electricity Sales

Electricity Sales (MERALCO : kWh)

	Sector	2006	2007	2008	2009	2010	2010/2006
	Residential	8,387,617,080	8,655,075,104	8,616,259,815	8,899,726,045	9,535,342,051	
	Commercial	9,454,614,635	10,020,783,356	10,480,646,870	10,795,507,239	11,682,531,259	
	Industrial	7,104,057,996	7,405,306,441	7,563,422,903	7,438,812,821	8,616,117,564	
	Flat streetlights	142,240,900	137,541,963	138,908,626	140,525,997	142,173,029	
	total	25,077,530,611	26,218,706,864	26,799,238,214	27,274,572,102	29,976,163,903	
Growth rate	Residential		3.3%	-0.4%	3.3%	7.1%	3.3%
	Commercial		6.0%	4.6&	3.0%	8.2%	5.4%
	Industrial		4.2%	2.1%	-1.6%	15.8%	4.9%
	Flat streetlights		-3.3%	1.0%	1.2%	1.2%	0.0%
	total		4.6%	2.2%	1.8%	9.9%	4..6%



(Source: MERALCO document)

Figure 2-6 MERALCO's Electricity Sales

②Electricity Tariff

The explanation refers to the biggest distribution company MERALCO's tariff whose share is approximately sixty percent.

The unit price of electricity changed every year and hovered around six (6) to eight (8) PHP/ kWh over the last three years. Those unit prices are equivalent to fourteen (14) to eighteen (18) Yen/kWh (1PHP=2.19JPY) which is a very high price in consideration that the GDP/capita of the Philippines is approximately one twentieth of the Japanese one. (refer Table 2-17)

Table 2-16 MERALCO's Electricity Sales and Unit Price

		2008			2009			2010		
	Sector	Number of customer	Electricity sales(kWh)	Unit price (PHP/ kWh)	Number of customer	Electricity sales(kWh)	Unit price (PHP/ kWh)	Number of customer	Electricity sales(kWh)	Unit price (PHP/ kWh)
	Residential	4,143,271	9,819,239,815		4,276,180	8,899,726,046		4,411,289	9,535,342,051	
	Commercial	413,265	10,480,646,870		423,406	10,795,507,239		437,340	11,682,531,259	
	Industrial	10,004	7,563,422,903		9,877	7,438,812,821		9,790	8,616,117,564	
	Flat streetlights	4,106	138,908,626		4,135	140,525,997		4,202	142,173,029	
	Total	4,570,646	26,799,238,214	6.94	4,713,598	27,274,572,102	6.51	4,862,621	29,976,163,903	7.93
Component ratio	Residential	90.6%	32.2%		90.7%	32.6%		90.7%	31.8%	
	Commercial	9.0%	39.1%		9.0%	39.6%		9.0%	39.0%	
	Industrial	0.2%	28.2%		0.2%	27.3%		0.2%	28.7%	
	Flat streetlights	0.1%	0.5%		0.1%	0.5%		0.1%	0.5%	
	Total	100.0%	100.0%		100.0%	100.0%		100.0%	100.0%	
	Total (JPY/kWh)			15.20			14.25			17.36

1 PHP= 2.19 JPY as of May 13th

(Source: MERALCO document)

The unit price of the average demand models for each demand sector in MERALCO are shown below.

As for residential sector, the unit price for the average model (194kWh/month) is about ten(10)PHP/kWh. The unit price of another model (80kWh/month) is about eight (8) PHP/kWh. There is a subsidy for the electricity tariff of a residential user whose consumption is under 100kWh/month. As for the commercial (20kW, 5000kWh/month) and industrial (120kW, 5000kWh/month) model, the unit price for each model is around eight(8) to nine(9) PHP/kWh.

The breakdown of the unit price for each sector shows that generation charge accounts for approximately fifty to sixty percent in every sector. Despite the clearance of NPC's assets conducted by PSALM and the establishment of WESM, the effect of the price control by the introduction of the market mechanisms have not come out yet. This is because the PPAs between the NPC and IPP contains favorable terms for IPPs which contracted under a tight power supply situation in the 1990s and the dealing amount of WESM remains only at 20 percent for now. (informed by MERALCO)

Furthermore, the universal charge to recover NPC's debt and to collect funds for rural area electrification and the preservation of the environment is also one of the factors that push up electricity rates.

Table 2-17 Unit Price of Residential Sector of MERALCO's Average Model (as of May 2011)

Unit: PHP

		Residential	Accounts
	Billing kWhs	194 kWh	80 kWh
	Generation Charge	5.02	5.02
	Transmission Charge	0.99	0.99
	Distribution Charge	0.93	0.93
	System Loss Charge	0.63	0.63
	Other Charges	1.49	1.53
	Other Subsidy	-0.01	-1.81
	Tax	0.90	0.69
	Total	9.94	7.98
Component Ratio	Generation Charge	50.5%	62.9%
	Transmission Charge	10.0%	12.4%
	Distribution Charge	9.4%	11.7%
	System Loss Charge	6.3%	7.9%
	Other Charges	15.0%	19.2%
	Other Subsidy	-0.1%	-22.7%
	Tax	9.1%	8.7%
	Total	100.0%	100.0%
	Total (JPY/kWh)	21.77	17.47

Table 2-18 Unit Price of Commercial and Industrial Sector of MERALCO's Average Model (as of May 2011)

Unit: PHP

		Commercial	Industrial
	Billing kWhs	5,000 kWh	30,000 kWh
	Billing Demand	20 kW	120 kW
	Generation Charge	5.02	5.02
	Demand Charge	1.08	1.08
	Energy Charge	0.03	0.03
	System Loss Charge	0.63	0.63
	Other Charges	0.54	0.93
	Tax	0.81	0.85
	Total	8.10	8.53
Component Ratio	Generation Charge	62.0%	58.8%
	Demand Charge	13.3%	12.6%
	Energy Charge	0.3%	0.3%
	System Loss Charge	7.8%	7.4%
	Other Charges	6.6%	10.9%
	Tax	10.0%	10.0%
	Total	100.0%	100.0%
	Total (JPY/kWh)	17.73	18.69

1 PHP = 2.19 JPY (as of May 13, 2011)

(Source: MERALCO document)

(2) Electricity Tariffs

The power sector of the Philippines consists of three categories, namely generation, transmission and distribution and the distribution utilities collect the sum of each utility charge at the end. The tariff of each utility needs to be approved by the ERC. The sample of MERALCO's invoice is shown below where each utility's charge is printed in detail.

(Ref) .MERALCO's invoice

Metering Information

Meter Number	Prev Rdg	Pres Rdg	Mult	Registered
	35478	35856	40	15120 kWh
		1475	40	59 kW
	24893	25177	40	11360 rKVAh

Billing Details

Rate Components	Base	Price	Amount
GENERATION			
Generation Charge (PhP/kWh)	15120	5.0474	76,316.69
Prev Mos Adj on Gen Cost	15120	0.0555	839.16
Previous Years' Adjustment***	15120	0	0.00
SUBTOTAL			77,155.85
TRANSMISSION CHARGE(PhP/kW/mo)	59	336.6396	19,861.74
Transmission Charge (KONVAT)	19861.74	100%	19,861.74
System Loss Charge (PhP/kWh)	15120	0.6401	9,678.31
DISTRIBUTION (Meralco)			
DISTRIBUTION CHARGE			
Energy Charge (PhP/kWh)	15120	0.0283	428.38
Demand Charge(PhP/kW/mo)	59	269.7500	15,915.25
Metering Charge (PhP/cust/mo)	1 mo	1136	1,136.00
Supply Charge (PhP/cust/mo)	1 mo	2153	2,153.00
Power Factor Adj.	36203.37	3.03%	1,096.96
Power Factor	79.95 %		
SUBTOTAL			20,727.59
SUBSIDIES			
Lifeline Rate Subsidy(PhP/kWh	15120	0.1664	2,515.97
Cross Subsidy Charge(PhP/kWh)	15120	0.0103	155.74
SUBTOTAL			2,671.71
GOVERNMENT TAXES			
Local Franchise Tax	130095.20	0.500%	650.48
VALUE ADDED TAX			
Generation Charge	76316.69	10.8100%	8,249.83
Prev Mos Adj on Gen Cost	839.16	9.1700%	76.95
System Loss Charge	9678.31	8.720[illegible]%	843.95
Distribution Rev & Subs	24049.78	12%	2,885.97
SUBTOTAL			12,707.18

Billing Details (continued...)

Rate Components	Base	Price	Amount
UNIVERSAL CHARGES			
Missionary	15120	0.0454	686.45
Environmental Fund	15120	0.0025	37.80
NPC Stranded Debts			
NPC Stranded Contract Costs			
Ecomln Taxes and Royalties			
DUs Stranded Contract Costs			
SUBTOTAL			724.25
Total Bill Amount		131,409.95	
VAT Sales	110,883.96	12,886.70	
VAT Zero Rated	0.00	0.00	
VAT Exempt	20,585.99		
5% Final Withholding Tax	110,883.96		-5,544.20
TOTAL CURRENT AMOUNT			₱ 137,992.45

Additional Bill Information

Customer Classif. By Voltage - Secondary Voltage

Amortization of cross subsidy charge under-recovery for the period June 2003 to Oct 2006 per ERC Decision in ERC Case No. 2007-157 RC dated Nov. 16, 2009

Includes amortization of lifeline rate subsidy under-recovery for the period June 2003 to Dec 2007 per ERC Decision in ERC Case No. 2008-008 RC dated Nov. 16, 2009.

LOAD FACTOR : 34.45 %

OTHER UNPAID REGULAR BILLS

Bill Date	Due Date	Amount
03/13/2011	03/22/2011	128,434.70
Total		128,434.70

① Daily load curves of MERALCO's supply area

According to the daily weekday load curve during the dry season which is supposed to be the high demand, the demand starts to increase from 8:00am to the long flat top in daytime until 9:00pm. The peak demand for the commercial sector appears from 11am to 6pm. On the other hand, for the residential sector it is from 7:00pm to 10:00pm and the industrial sector shows the flat load curve. The total peak hours have become very long. Then MERALCO's annual load factor is approximately eighty (80) percent which is very high. (informed by MERALCO)

The following load curves are a sample of each sector's demand at some specific area.

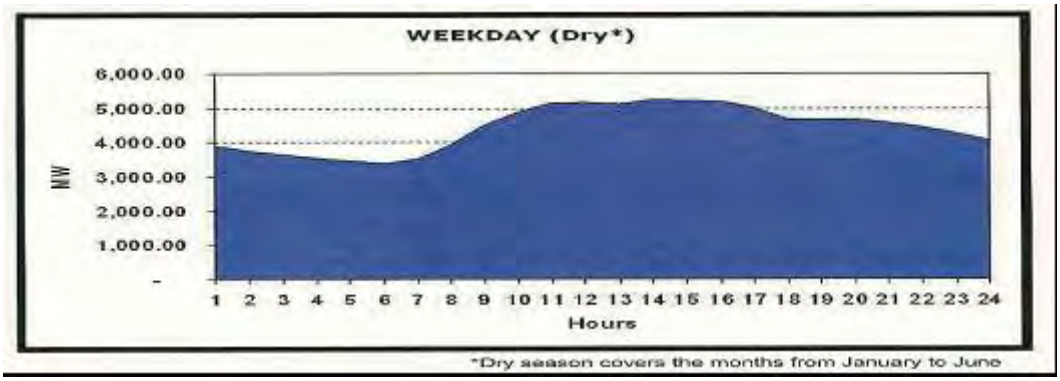
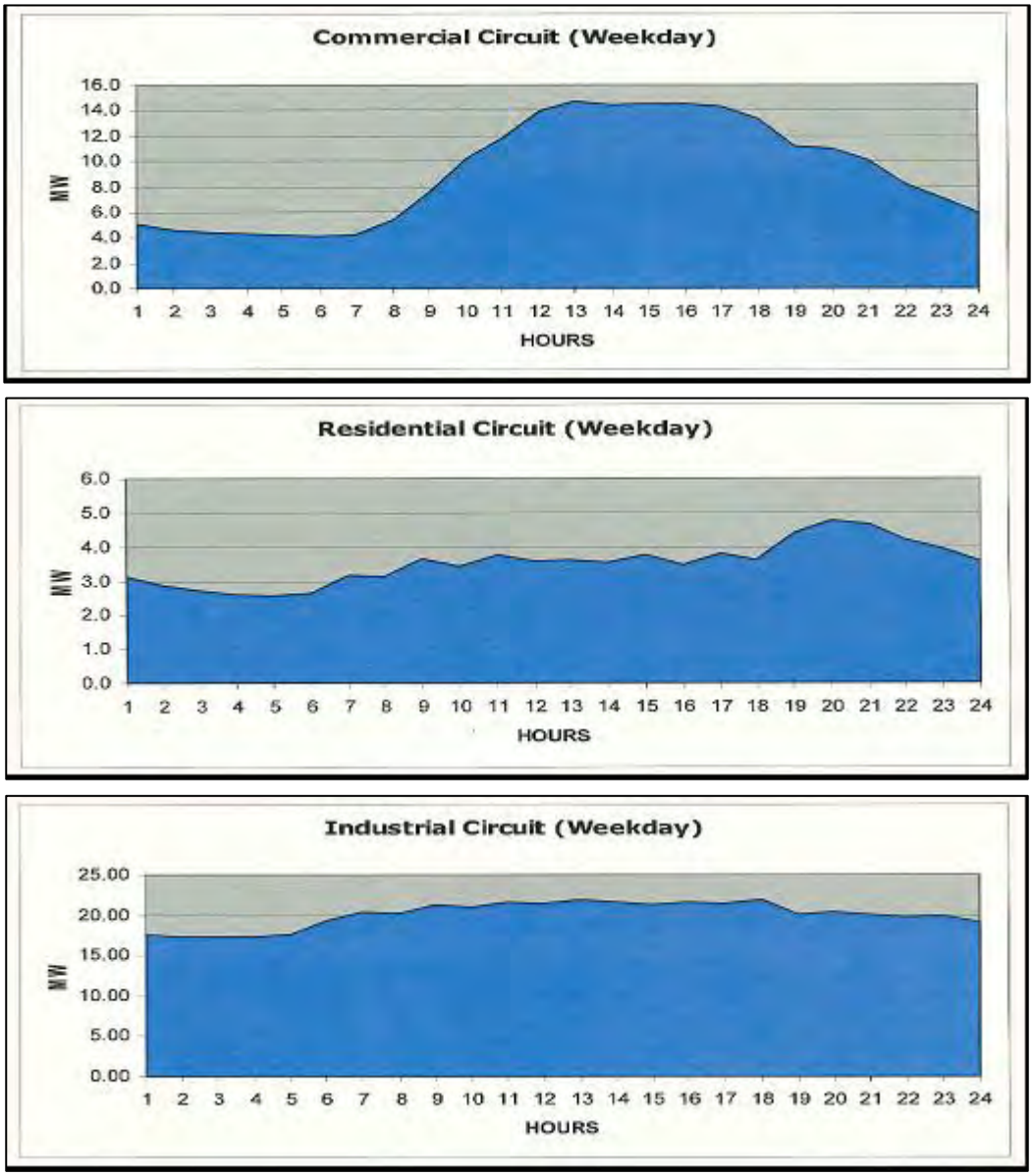


Figure 2-7 MERALCO's daily load curve (weekday dry season)

Source: MERALCO



Source: MERALCO document

Figure 2-8 MERALCO's Daily Load Curve for each Sector (weekday: sample of specific area)

② Time of Use(TOU) tariff

The TOU tariff is one of the measures for the peak shift of power demand. There are two types of TOU tariffs for MERALCO's customers, namely NPC TOU and MERALCO TOU.

Commercial and industrial users can choose NPC TOU if there average demand over the last twelve (12) months exceeds seven hundred and fifty (750) kW.

Eighty-nine (89) of MERALCO's customers are applying NPC TOU as of May 2011.

The hourly rates are divided into four (4) periods, the dry or wet season and the peak or off-peak hours including the weekday or the weekend. Those rates are determined based on the NPC's hourly generation rates approved by the ERC. The rate for the peak time is around 6.5 PHP/kWh (from 10am to 4pm and from 7pm to 8pm during the dry season and 11am and 7pm during the wet season). The lowest rate is under 2 PHP/kWh which is applied to 4am to 7am during the weekends of the wet season. (refer to Table 2-19) It is characteristic that the customer needs to estimate his electricity demand before usage and commit to paying it regardless of actual consumption.

Commercial and industrial users can choose MERALCO TOU if there average demand over the last twelve (12) months exceeds five (5) kW. Twenty-two (22) of MERALCO's customers are applying for MERALCO TOU as of May 2011.

The TOU tariff also exists for residential customers and three thousand (3000) of MERALCO's customers are applying for this tariff as of May 2011. The hourly rates are divided into four (4) periods. They are the dry or wet season and peak or off-peak hours including weekdays or weekends. Those rates are adjusted monthly based on the Basic Generation Charge approved by the ERC. (Refer to Table 2-19) The highest rate is around 6.5PHP/kWh for the dry season peak and the rate for the off-peak is around 3 PHP/kWh which is almost half of the highest rate.

Table 2-19 TOU Tariff of MERALCO

	NPC TOU	MERALCO TOU	TOU Rate Program for Residential
sector	Commercial, Industrial	Commercial, Industrial	Residential
Basis of Rate	NPC TOU hourly rate	Purchased Power Cost from Generation companies in 4 periods peak and off-peak, wet and dry	
Eligibility	Average demand in last 12 months is at least 750kW	Average demand in last 12 months is at least 5kW	Average usage in last 12 months is at least 1,000kWh
Type of contract	Take or Pay	Take and Pay	Take and Pay
One-Time Registration Fee	Php32,420+12%VAT	24,908 pesos for customers with an average demand of at least 40kW. 4156.26 pesos for customers with an average demand of 5-39.99kW. Plus 12% VAT	(1-phase meter) Php2,720 (1-phase meter) Php3,890
Incremental Charges (Monthly)	Metering : Php1,620 Supply : Php49.39	Metering : Additional 10% Supply : Additional 10% Additional 0.01Php/kWh	Metering : (1-phase)Php117.20 (3-phase)Php175.63 Supply : Php0.0109/kWh

(Source: MERALCO website (accessed June 20, 2011))

(*1) NPC's Time of Use rates of Luzon grid

TIME OF USE RATES
LUZON GRID
in P/kWh

PERIOD	(JANUARY - JUNE)		(JULY - DECEMBER)	
	Monday - Saturday	Sunday/Holiday	Monday - Saturday	Sunday/Holiday
1:00 AM	2.3426	2.5022	2.3426	2.3426
2:00 AM	2.3426	2.3426	2.3426	2.3426
3:00 AM	2.3426	2.3426	2.3426	2.3426
4:00 AM	2.3426	2.3426	2.3426	1.8649
5:00 AM	2.3426	2.3426	2.3426	1.8649
6:00 AM	2.3426	2.3426	2.3426	1.8649
7:00 AM	2.3426	2.3426	2.3426	1.8649
8:00 AM	2.6256	2.3426	2.5022	2.3426
9:00 AM	5.779	2.3426	2.6256	2.3426
10:00 AM	6.5283	2.5022	5.9872	2.5022
11:00 AM	6.5283	2.5022	6.5283	2.5022
12:00 PM	6.5283	2.5022	5.9872	2.5022
1:00 PM	6.5283	2.5022	5.9872	2.5022
2:00 PM	6.5283	2.5022	6.5283	2.5022
3:00 PM	6.5283	2.5022	5.9872	2.5022
4:00 PM	6.5283	2.5022	5.779	2.5022
5:00 PM	5.9872	2.5022	5.5481	2.5022
6:00 PM	5.9872	2.5022	5.9872	2.6256
7:00 PM	6.5283	5.779	6.5283	5.5481
8:00 PM	6.5283	5.779	5.9872	5.5481
9:00 PM	5.9872	3.2594	5.779	2.6256
10:00 PM	3.2594	2.6256	2.6256	2.5022
11:00 PM	2.6256	2.5022	2.5022	2.3426
12:00 AM	2.5022	2.3426	2.3426	2.3426

ERC Provisionally Approved RORB-TOU Rates (February 16, 2009)

(Source: MERALCO website (accessed June 20, 2011))

(*2) Basic Generation Charge

(Php/kWh)

	Time Period	Dry Season (Jan.-June)	Wet Season (July-Dec.)
Weekday			
Peak Rate	8:01am-9:00pm	6.4852	6.1053
Off-peak Rate	9:00pm-8:00am	3.0925	3.0925
Weekend			
Peak Rate	6:01pm-8:00pm	6.4852	6.1053
Off-peak Rate	12:01am-6:00pm 8:00pm-12:00mn	3.0925	3.0925

(Source: MERALCO website (accessed June 20, 2011))

2.3.3 Energy Price of Oil Industry

(1) Companies of Oil Industry

The Philippines downstream oil industry is currently dominated by two (2) major oil refining and marketing companies; Petron and Pilipinas Shell. Philippine National Oil Company (PNOC), a state-owned company, and Saudi Aramco jointly own Petron; each with a 40 percent stake while the public holds the remaining 20 percent shares. Petron operates a 180,000 bbl/d refinery and over 1,200 gasoline stations nationwide; Pilipinas Shell has a 110,000 bbl/d refinery and about 800 gasoline stations. Caltex Philippines Inc. converted its 86,500 bbl/d refinery into an import terminal in 2003 and now operates as a plain marketing and distributing company under the name “Chevron” with around 850 retail gas stations nationwide.

The government of the Philippines has promoted liberalization of the downstream oil industry with the establishment of RA 8479 promoting fair trade practices and free competition; encouraged entry of the new players in the industry; and promoted retail competition. The deregulation of the oil industry has encouraged the entry of over 367 new players, bringing in a total of 28.4 billion PHP worth of investments in various downstream oil projects.

(2)Price Monitoring

Deregulation does not guarantee lower prices but fair prices. Domestic oil prices are increasingly reflecting the increase of world market prices. One of the benchmarks of domestic oil prices is the Dubai crude oil price, which has a close correlation as shown in the graph below.

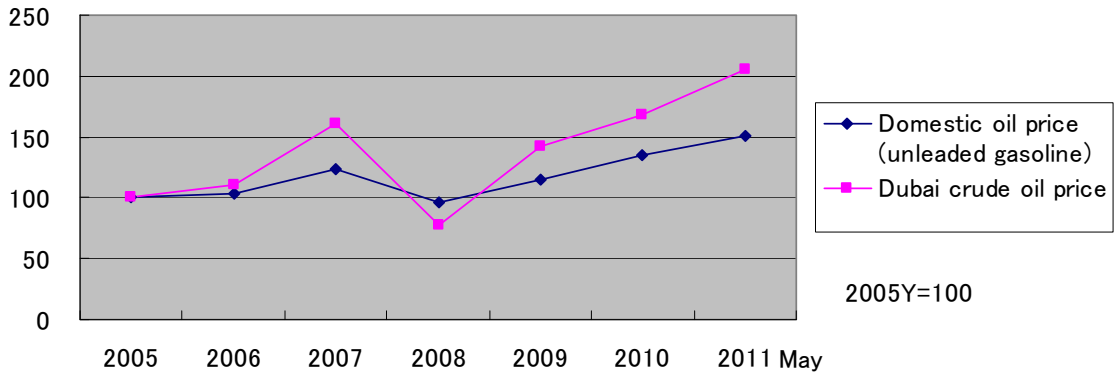


Figure 2-9 Indexes of Retail Price of Gasoline in the Philippines and Dubai Crude Oil (2005Y=100)

The DOE monitors the prices of both raw material crude oil and the refined petroleum products in the international market. Domestic wholesale prices are also monitored.

(For reference) Information of oil price dispatched via the DOE's website

OIL MONITOR

As of June 7, 2011

WORLD OIL PRICES (For May 30-June 3, 2011 trading days)

Oil prices traded generally higher over the previous week as averages advanced by about two dollars. The higher price trends were said to have been supported by the following events:

- Weak US dollar over other currencies;
- Intensifying unrest in Yemen and continued political unrest in other oil-rich countries in the Middle East/North Africa region;
- Temporary shut down of Keystone Pipeline, where a minor spill at Kansas pump station was discovered. The pipeline delivers a half million barrels of oil per day from Alberta to the United States;
- Increasing diesel and fuel oil consumption of power plants in Argentina because of dropping temperatures, which led to cuts of natural gas supplies. The Law provides that the government must cut gas deliveries to power plants first and then factories to guarantee supplies for residential and business users, which use the energy source widely for cooking and heating.

On the other hand, the Oil Producers Exporting Countries (OPEC) is considering raising oil supply targets at their upcoming meeting on 08 June 2011, in a move to weaken oil prices to $100/bbl and lessen the drag of high energy costs on global economic growth. This is the first time since 2007 that the group consider to increase official output.

Other recommended reference sites:
(1) http://www.aip.com.au/pricing (2) http://www.med.govt.nz/ers/oil_pet/prices/prices.html

DOMESTIC OIL PRICES

The oil companies implemented an increase of P0.30/l for gasoline and P0.90/l for diesel on 07 June 2011.

The adjustment brings the year-to-date net increases of P5.97/l for gasoline and P6.20/l for diesel.

As monitored, shown below are the retail prices in Metro Manila beginning 7 June 2011.

Products	Price Range	Common Price
	P/liter	
Diesel	43.50-45.50	45.10
Gasoline	51.55-57.82	54.90
Auto LPG	31.43-31.63	
LPG, P/11-kg cylinders	685.00-757.00	

For more information, call the Department of Energy:
Pricing: 840-2187
LPG: 840-7130
Fuels: 840-5869

SMS: (0915) 4409421
Email: oilmonitor@doe.gov.ph
Website: http://www.doe.gov.ph

(Source: DOE website (accessed June 20, 2011))

Table 2-20 Retail Oil Price Information Dispatched via DOE's Website (Manila Metropolitan Area)

PREVAILING RETAIL PRICES OF PETROLEUM PRODUCTS IN METRO MANILA
As of April 14, 2011

PRODUCT	CALTEX	PETRON	SHELL	SEAOIL	FLYING V	UNIOIL
UNLEADED	55.85 - 57.10	54.85 - 59.37	53.35 - 59.52	54.75 - 57.45	54.75 - 57.10	53.35 - 58.09
PREMIUM UNLEADED	56.30 - 59.10	55.35 - 60.56	56.05 - 60.81	55.74 - 58.75	58.05 - 58.80	53.95 - 55.59
PREMIUM PLUS UNLEADED		52.20 - 52.45	60.80 - 61.90			
DIESEL	46.10 - 48.90	47.50 - 48.89	47.60 - 48.89	47.10 - 48.50	47.10 - 48.45	46.90 - 47.89
DIESEL (PUJ Discount)					47.10	
KEROSENE	54.34 - 58.14	54.34 - 57.20	54.70 - 55.25	54.70 - 58.65	55.70	

PRODUCT	TOTAL	CITY OIL	JETTI	EASTERN
UNLEADED	55.85 - 56.80	55.70 - 55.85	55.80	55.00 - 55.30
PREMIUM UNLEADED	56.40 - 59.10	56.20 - 57.50	56.40	56.30 - 57.80
DIESEL	47.90 - 48.65	47.10 - 48.20	46.90	47.35 - 47.60
DIESEL (PUJ Discount)				
KEROSENE		54.50 - 57.80		

Effectivity:
Caltex - April 12, 2011/6:00 AM
Petron - April 12, 2011/12:00 NN
Shell - April 12, 2011/6:00 AM
Total - April 12, 2011/6:00 AM
Seaoil - April 12, 2011/6:00 AM
Unioil - April 6, 2011/8:01 AM
Flying V - April 14, 2011/ 12:01 AM
Cilyoil - April 12, 2011/6:00 AM
Eastern - April 13, 2011/12:00 AM
Jetti - April 13, 2011/ 12:01AM

(Source: DOE website (accessed June 20, 2011))

(3) Distribution Channels of Oil Industry

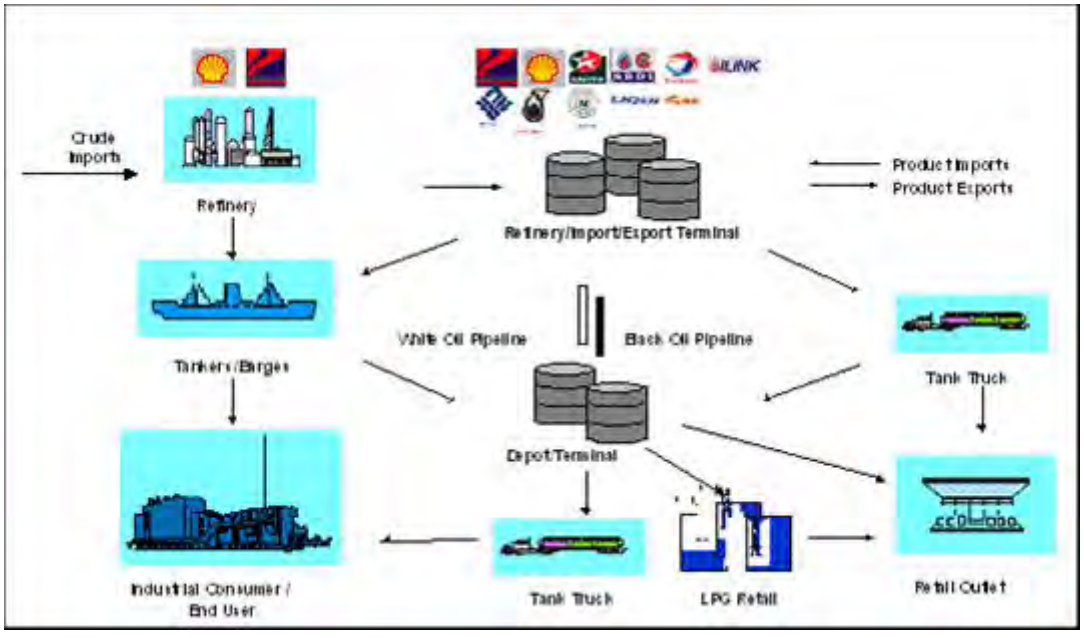
The distribution channels of the oil industry consists of the next four (4) stages.

1)Importation of crude oil

2)Processing of intermediate and refined products at the refineries (Shell Petron)

3)Product distribution to different bulk plants/depots and the Batangas-Manila pipeline (Petron, Shell, Caltex)

4) Delivery of refined / finished products to the retail outlets and industrial consumers.

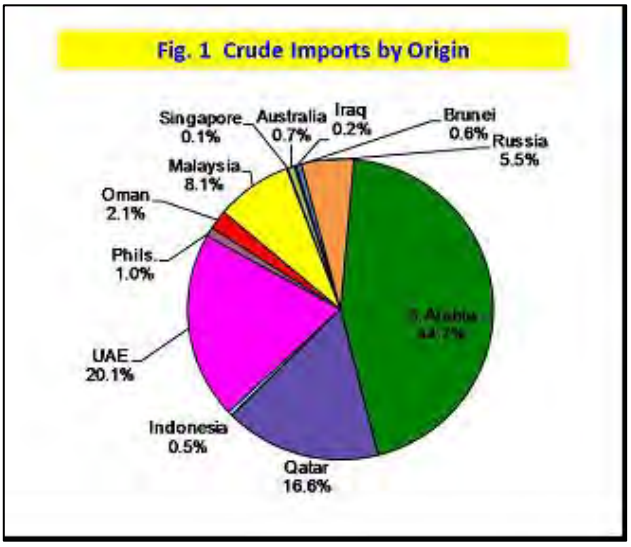


(Source: DOE website (accessed June 20, 2011))

Figure 2-10 Distribution Channels of Oil Industry

①Crude Imports by Origin

The imports of crude oil in 2009 is 50.6MMB and imports from middle-east countries is 42.2MMB occupies 83.5% of whole imports. The major countries are Saudi Arabia (44.7%),UAE(20.1%) and Qatar(16.6%) in order.

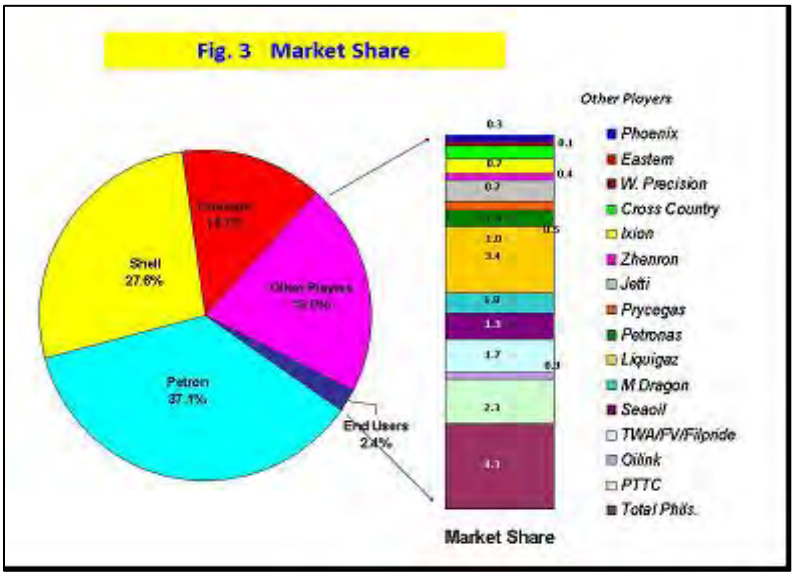


(Source: DOE website (accessed June 20, 2011))

Figure 2-11 Crude Imports by Origin (2009)

②Share in the Oil Products Market

The share of the sum of the three major companies (Petron Corp., Chevron Phils. and Pilipinas Shell Petroleum Corp.) is approximately eighty (80) percent. However, it declined from 81.9 percent in 2008 to 78.8 percent in 2009 due to the growth of other companies such as Liquigaz which increased its LPG market shares.



(Source: DOE website (accessed June 20, 2011))

Figure 2-12 Market Share of Oil Products (2009)

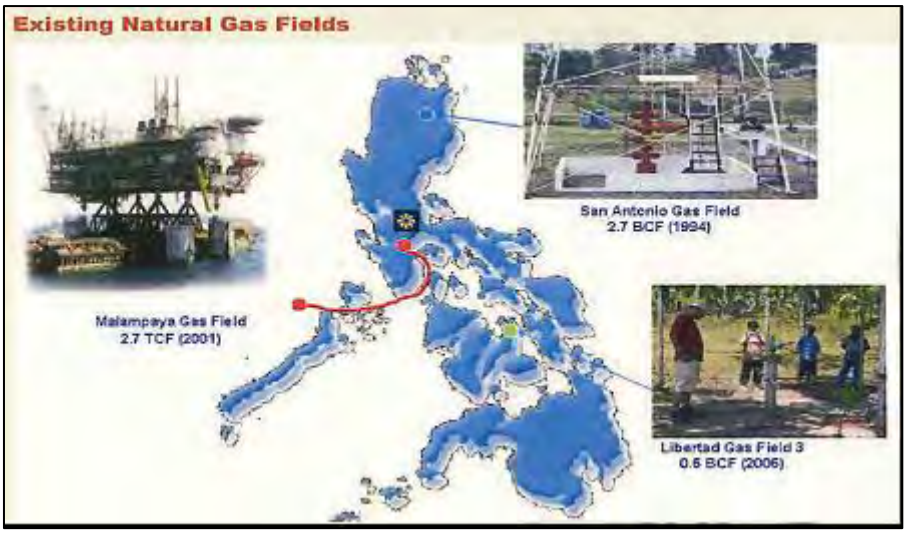
2.3.4 Utilization of Natural Gas

The natural gas consumed in the Philippines is all from domestic products and its share in primary energy consumption was eight (8) percent in 2009. (3.1.2)

Natural gas is the Philippines' strategic fuel which is aiming at a 60% energy self-sufficiency rate by 2010 via the diversification of energy.

(1) Natural gas supply

There are three gas fields in the Philippines. Most of the natural gas supply comes from the Malanpaya gas field via a submarine cable.



(Source: DOE Website (accessed June 23, 2011))

Figure 2-13 Gas Fields in the Philippines

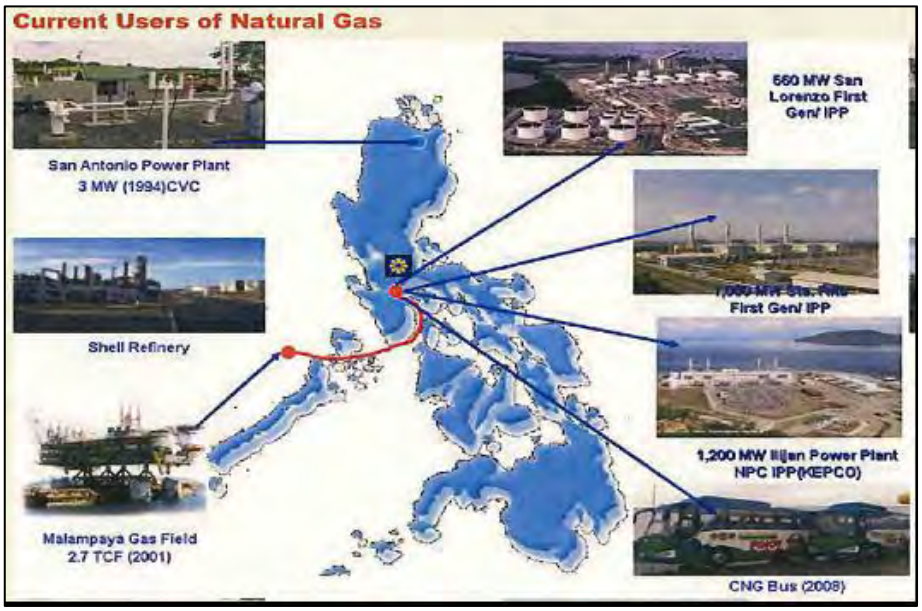
The construction of a gas pipeline is planning to utilize domestic natural gas.

(Source: PEP (Philippine Energy Plan)2007)

Figure 2-14 Plans for Construction of a Gas pipeline in the Philippines

(2) Utilization of Natural Gas

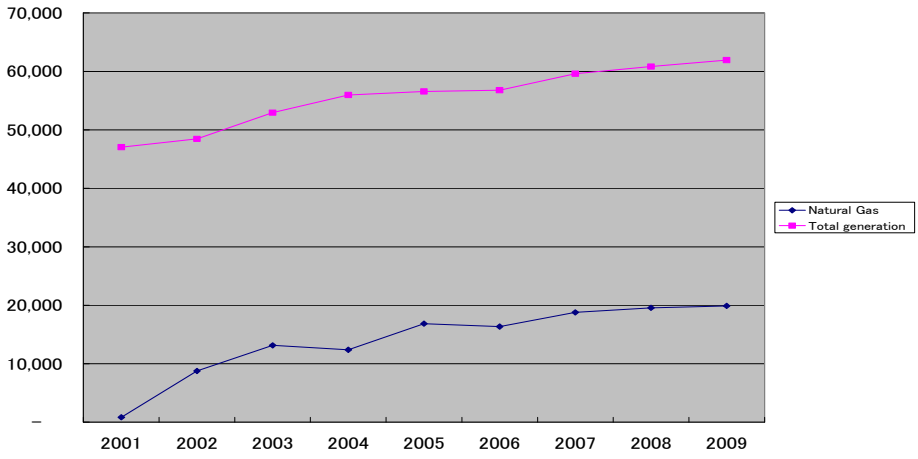
Natural Gas is consumed for the generation of IPPs, the operation of a Pilipinas Shell refinery and fuel for a compressed natural gas bus for now. It is planning to expand its usage to the commercial and residential markets. (by PEP)



(Source: DOE Web.(accessed June 23, 2011))

Figure 2-15 Usage of Natural Gas in the Philippines

The power generation of the natural gas power plant is increasing year by year. (Refer to the figure2-18) and its shares were thirty-two (32) percent in 2009.



(Source: DOE document)

Figure 2-16 Generated Electricity by Natural Gas and Total

Chapter 3 Current Situation and Issues on EE&C in the Philippines

3.1 Principle of Analyzing the Current Situation and Issues

3.1.1 Principle of Analysis

In analyzing current EE&C situation and issues, the following aspects have been taken into consideration.

(1) Driving actors behind the activities
(2) Sectoral Characteristics

(1) Actors

Activities to promote EE&C, in light of the underlying agents, there are two actors such as energy consumers and supporters for EE&C and they are categorized into the following three types in the Study (refer to Figure 3-1).

a. Energy consumer activities
b. Activities by goods (appliance/equipment/system etc.) providers and service providers which support activities of "a", namely energy consumers
c. Activities by governmental and public organizations which support activities of "a", namely energy consumers

Government and public organization activities "c" have a two-fold classification. There is a direct approach to "a" and an indirect approach towards "a" through the creation of a market of goods and services provided by "b" which contributes to EE&C.

- ✓ As for "a", the energy transformation sector, such as electric power companies which usually are regarded as energy suppliers, is also considered to be an energy consumer since they consume energy in the form of loss through transformation and supply.
- ✓ As for "b", goods providers are manufacturers, importers, retail shops etc. and service providers are energy audit companies and energy auditors, NPO, ESCO, design firms, general contractors, banks etc.
- ✓ As for "c", donors are included herewith.

In addition, "b" and "c" also has energy consumer characteristics.

The current energy consumer situation is analyzed in 3.5, EE&C supporters are taken up in 3.6 to 3.8. The current situation and the detailed issues and proposals of each measure are described in the corresponding chapters after Chapter 4.

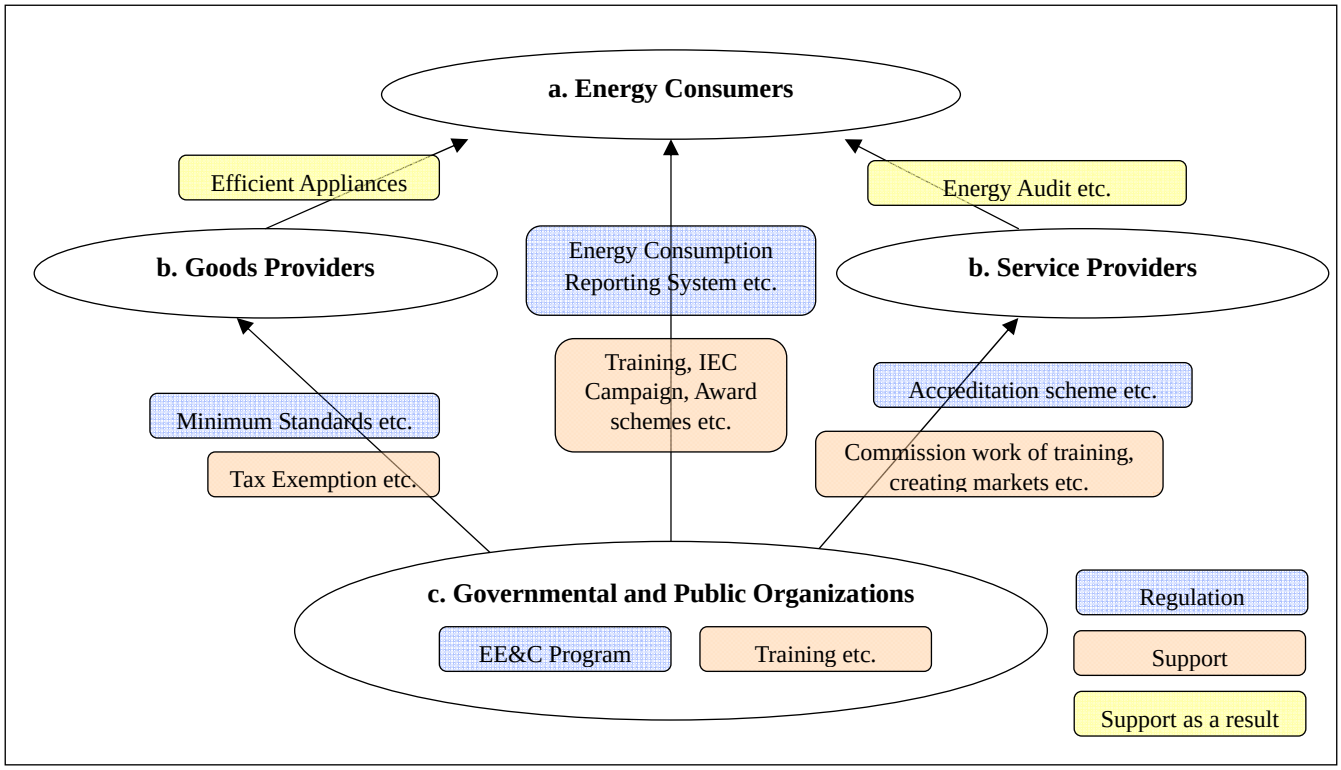


Figure 3-1 Concept of EE&C Activities in viewpoint of the Actors

(2) Sectoral Characteristics

Energy consumption has been analyzed by sector, since the characteristics of it depend on each sector, e.g. volume of energy consumption, equipment in use, subjects to be targeted by EE&C supporters etc. For example, the industrial sector consumes a lot of energy in total and the number of energy consumers is limited. Thus, it is possible to target with a direct approach such as regulatory system to mandate them to report their energy consumption. On the other hand, the residential sector also consumes a great amount of energy in total, but each individual amount of energy consumption is small. Thus, a system or framework to approach the general public should be adopted such as an IEC campaign through mass media and improving appliance efficiency in the market which as a result promotes consumer purchases of high efficient appliances. Grasping these sectoral characteristics would be the basis for identifying the target to be supported, priorities among the sectors, etc.

This Study categorizes the whole into the following 5 sectors which show different characteristics of energy consumption.

- ✓ Energy transformation sector (especially power sector)
- ✓ Industrial sector (excluding energy transformation sector)
- ✓ Commercial sector

- ✓ Governmental sector[1]
- ✓ Residential sector

In addition, as shown in 3.2.3, the transport sector which is one of the large energy consuming sectors in the Philippines should be targeted as the subjects for detailed analysis. However, due to certain circumstances and based on the discussion with DOE of C/P, it has not been targeted for analysis of the current situation and issues, and only the sample cases from Japan and other countries will be introduced.

The agricultural sector, which also needs to be targeted for EE&C, is also excluded from the analysis target due to its small energy consumption.

3.1.2 Information Source for Grasping the Current Situation

The following information sources are utilized in order to grasp the current situation of energy consumption and activities for EE&C in the Philippines.

(1) Macro data (by EPPB and statistical data of IEA etc.)
(2) Information on the website and existing material etc.
(3) Interview survey for target organizations and relevant parties
(4) Information collection via a local consultant survey
(5) Site visit survey

Regarding the ways of (3) and (5), given that they are not statistical or objective data, avoiding a certain degree of subjectivity may be difficult, however, this data is utilized to roughly grasp the current situation of EE&C activities with these points in mind. In addition, (4) is also limited in the number of answers different from a national census, but it will be used to gain a fair idea of the situation which should indicate the best direction to begin moving in.

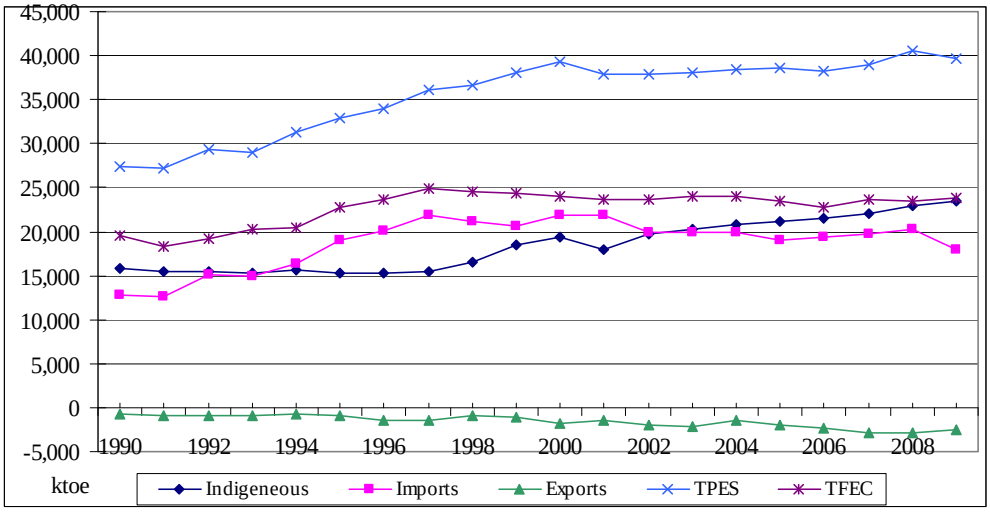
3.2 Energy Demand and Supply Situation in the Philippines

3.2.1 Primary Energy Supply and Production

Figure 3-2 depicts the trend of total primary energy supply (TPES), imports, exports and final energy consumption. Between 1900 and 2000, TPES increased by an average of 3.7 percent per year. However, there was not a marked increase from then to 2009.

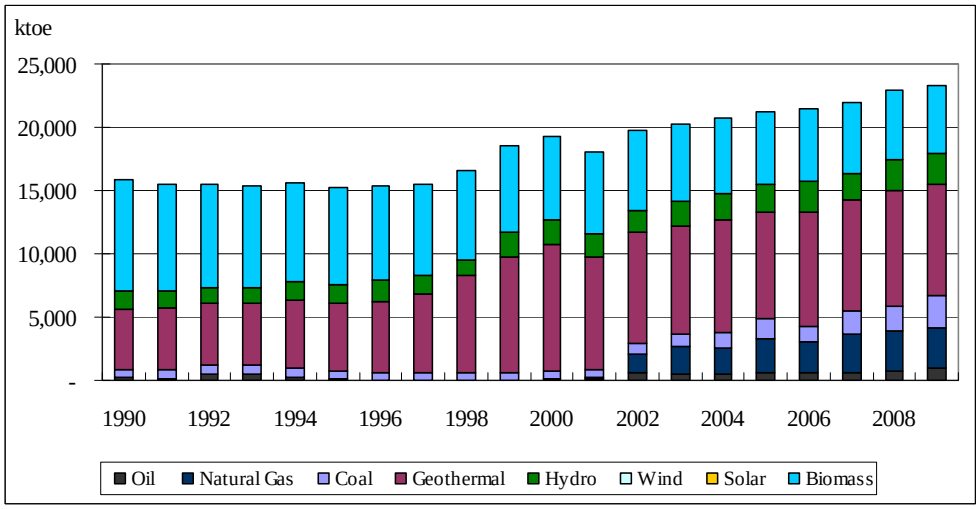
The amount of domestic energy production increased from the late 1990's and has exceeded that of imports since 2003. As shown in Figure 3-3, the utilization of domestic LNG, geothermal sources and coal contributes to the increase of domestic production.

[1] There is no classification of "governmental sector" in the statistics data of 2.2, but it has been targeted with particular EE&C measures. Thus, it is described separately in this report.



(Source: DOE-EPPB)

Figure 3-2 Trend of Total Primary Energy Supply and Final Energy Consumption

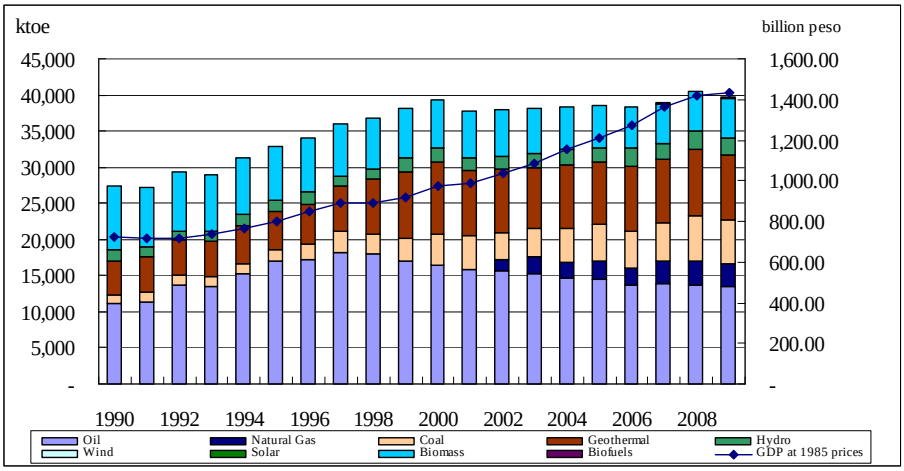


(Source: DOE-EPPB)

Figure 3-3 Trend of Primary Energy Production

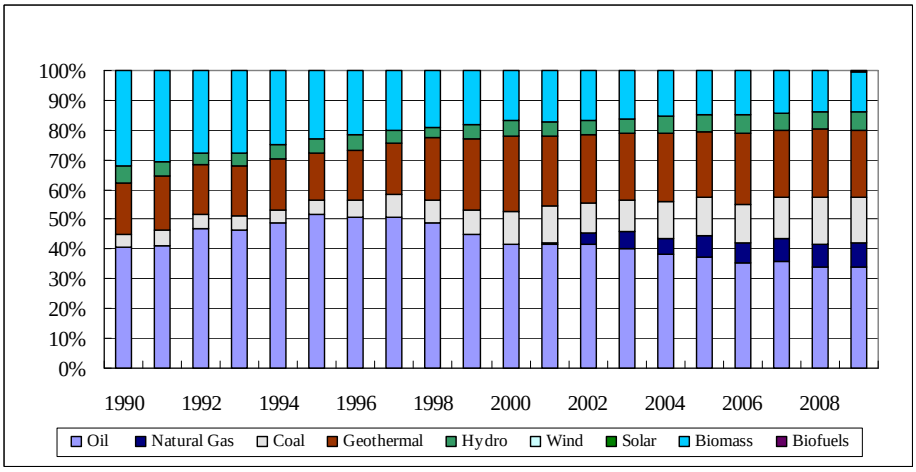
Figure 3-4 and Figure 3-5 depicts the trend and the composition of total primary energy supply and the composition, respectively. In recent years, while the dependence on oil and the utilization of biomass is decreasing gradually, the use of geothermal sources, coal and LNG is increasing. The breakdown of each energy source in 2009 is; oil/oil products at 34.0 percent, geothermal sources at 22.4 percent, coal at 15.3 percent, biomass at 13.6 percent, LNG at 8.1 percent and hydro at 6.2 percent. One factor characteristic of the Philippines is that the composition of geothermal sources exceeds 20 percent, which ranks the Philippines 2nd in its utilization, following the United States.

While the annual average increase of total primary energy supply is 2.0 percent between 1990 and 2009, that of real GDP (at 1985's prices) is 3.8 percent and energy-GDP elasticity between the periods is 0.53.



(Source: DOE-EPPB)

Figure 3-4 Trend of Total Primary Energy Supply and Real GDP (at the year 1985's prices)



(Source: DOE-EPPB)

Figure 3-5 Breakdown of Total Primary Energy Supply (by energy source)

3.2.2 Energy Conversion

Table 3-1 indicates the national energy balance in 2009. 50.2 percent of TPES was consumed by the power generation sector. The ratio of transmission and distribution (generation end) is 12.1 percent.

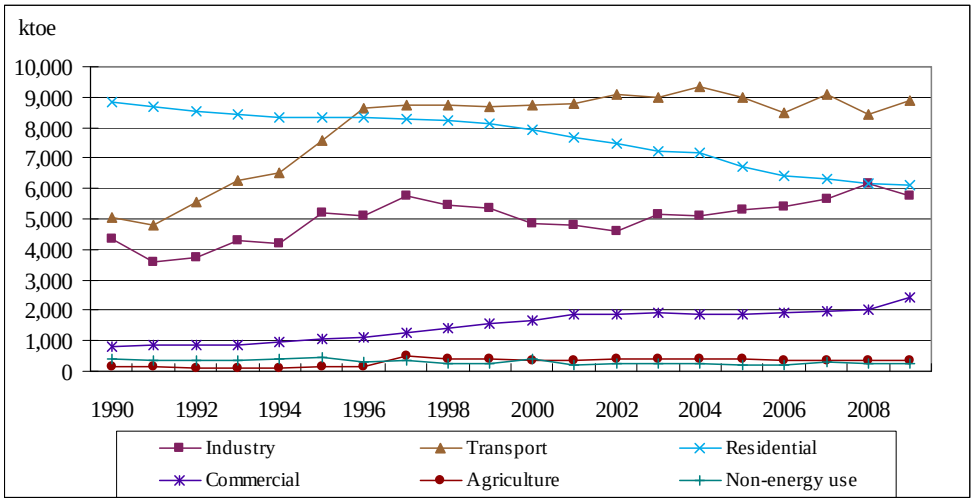
Table 3-1 National Energy Balance in 2009

	Coal	Natgas	Oil & Oil Products	Hydro	Geothermal	Solar	Wind	Biomass	CME	Ethanol	Electricity	Total
Indigeneous	2,473.95	3,214.71	962.17	2,436.97	8,878.51	0.11	5.54	5,377.90	107.25	12.92	-	23,470.02
Imports (+)	3,888.12	-	13,993.64	-	-	-	-	-	-	35.86	-	17,917.61
Exports (-)	(1,052.41)	-	(1,523.14)	-	-	-	-	-	-	-	-	(2,575.54)
Bunkering (-)	-	-	(197.52)	-	-	-	-	-	-	-	-	(197.52)
Stock Change (+/-)	756.86	-	258.40	-	-	-	-	-	13.08	(3.74)	-	1,024.61
Primary Energy Supply	**6,066.51**	**3,214.71**	**13,493.55**	**2,436.97**	**8,878.51**	**0.11**	**5.54**	**5,377.90**	**120.33**	**45.04**	**-**	**39,639.18**
Refinery (Crude Run)	-	-	(218.39)	-	-	-	-	-	-	-	-	(218.39)
Power Generation	(4,442.23)	(2,967.48)	(1,177.89)	(2,436.97)	(8,878.51)	(0.11)	(5.54)	(6.48)	-	-	5,326.36	(14,588.86)
Gas Manufacture	-	-	-	-	-	-	-	-	(5.19)	-		(5.19)
Transmission/Dist. Loss (-)	-	-	-	-	-	-	-	-	-	-	(646.05)	(646.05)
Energy Sector Use & Loss (-)	-	(177.11)	(277.94)	-	-	-	-	-	-	-	(303.10)	(758.14)
Net Domestic Supply	**1,624.28**	**70.13**	**11,819.33**	**-**	**-**	**-**	**-**	**5,371.42**	**115.14**	**45.04**	**4,377.21**	**23,422.55**
Statistical Difference												(369.97)
% Statistical Difference												(1.58)
Net Domestic Consumption	**1,624.28**	**70.13**	**12,189.30**	**-**	**-**	**-**	**-**	**5,371.42**	**115.14**	**45.04**	**4,377.21**	**23,792.52**
INDUSTRY	**1,469.28**	**69.71**	**1,359.37**	**-**	**-**	**-**	**-**	**1,391.24**	**9.36**	**-**	**1,469.26**	**5,768.22**
TRANSPORT	**-**	**0.42**	**8,749.53**	**-**	**-**	**-**	**-**	**-**	**101.96**	**45.04**	**9.53**	**8,906.48**
RESIDENTIAL	**-**	**-**	**937.57**	**-**	**-**	**-**	**-**	**3,671.36**	**-**	**-**	**1,507.90**	**6,116.83**
COMMERCIAL	**-**	**-**	**826.45**	**-**	**-**	**-**	**-**	**308.82**	**0.01**	**-**	**1,269.03**	**2,404.31**
AGRICULTURE	**-**	**-**	**204.78**	**-**	**-**	**-**	**-**	**-**	**3.80**	**-**	**121.48**	**330.07**
OTHERS, NON-ENERGY USE	**155.01**	**-**	**111.60**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**266.61**
Self-Sufficiency												**59.21**

(Source: DOE-EPPB)

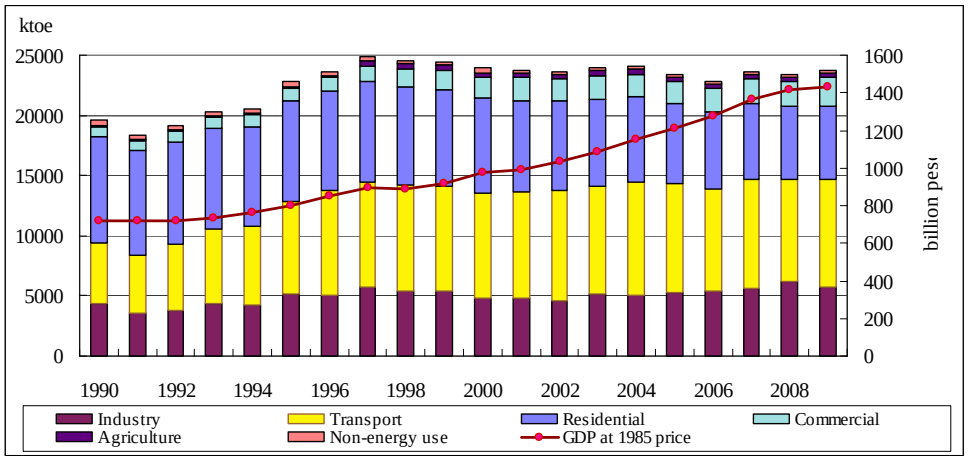
3.2.3 Final Energy Consumption

The trend and breakdown of final energy consumption by sector is shown in Figure 3-6, Figure 3-7 and Figure 3-8. In 2009, the composition of each energy source by sector is; the transportation sector at 37.4 percent, the residential sector at 25.7 percent, the industrial sector at 24.2 percent, the commercial sector at 10.1 percent and the agricultural sector at 1.4 percent whose characteristic is that the share of energy consumption by the transportation sector is the highest. The annual average growth rates by sector are; the transportation sector at 3.0 percent, the residential sector at -1.9 percent, the industrial sector at 1.5 percent and the commercial sector at 5.9 percent.



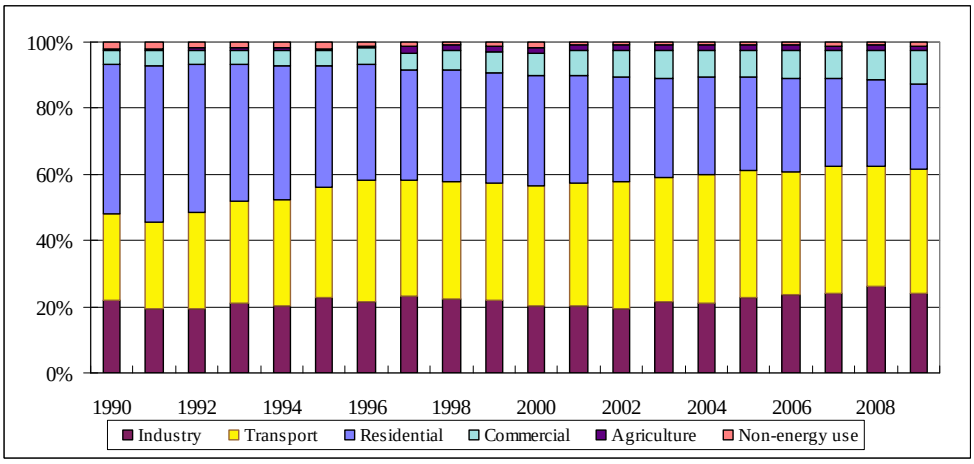
(Source: DOE-EPPB)

Figure 3-6 Trend of Final Energy Consumption (by Sector)



(Source: DOE-EPPB)

Figure 3-7 Trend of Final Energy Consumption and Real GDP (at the year 1985's prices)



(Source: DOE-EPPB)

Figure 3-8 Breakdown of Final Energy Consumption (by Sector)

3.2.4 Energy Intensity

The primary energy intensity to the GDP is used as an indicator showing national energy efficiency. The less primary energy intensity to the GDP, the better and more energy-efficient it is.

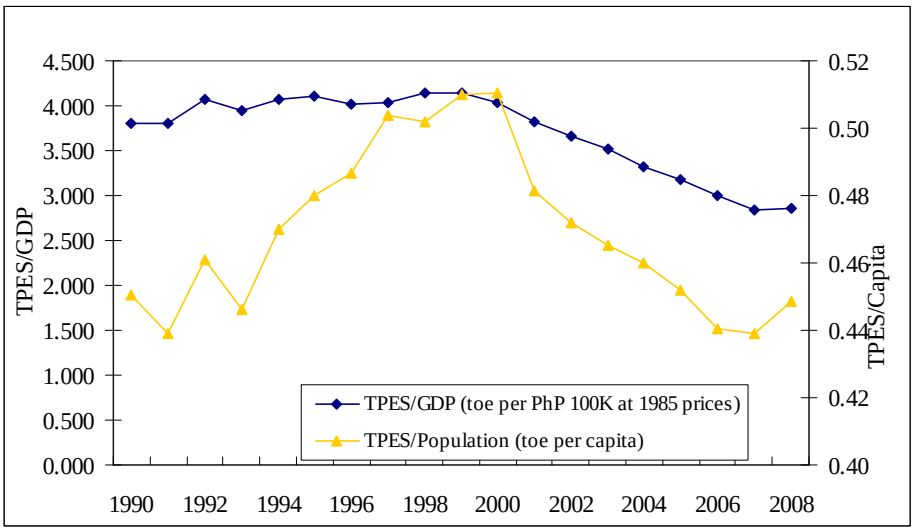
The trend of primary energy intensity to the GDP and TPES per capita is shown in Figure 3-9. As shown in Section 3.2.1, between 1990 and 2009, the annual average growth rate of the real GDP (at 1985's prices) is higher than that of TPES. That is to say, the primary energy intensity to the GDP is declining.

The following are considered to be possible factors:

(1) The increase of consumer spending caused by remittance from OFW (Overseas Filipino Workers) contributing to the growth of GDP.

(2) While some wealthy people contribute to the growth of GDP, poor people do not consume so much energy. That is, it looks as if the primary energy intensity to the GDP is good.

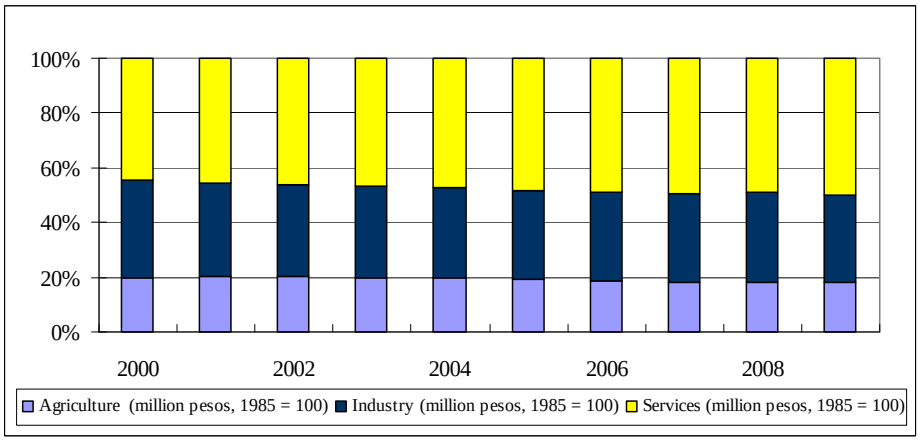
The BPO (Business Process Outsourcing) industry, which is not an energy-intensive industry such as call center businesses, have been developed in Manila.



(Source: DOE-EPPB)

Figure 3-9 Trend of Primary Energy Intensity to GDP and TPES per Capita

Figure 3-10 depicts the composition of the real GDP by sector. In 2009, the shares of each sector are; the service industry (the tertiary industry) at 50.0 percent, the manufacturing industry (the secondary industry) at 31.8 percent and the agriculture, forestry and fisheries industry (the primary industry) at 18.1 percent. Moreover, the annual average growth rates by sector between 2000 and 2009 are the service industry at 5.7 percent, the manufacturing industry at 3.1 percent and the agriculture, forestry and fisheries industry at 3.4 percent.

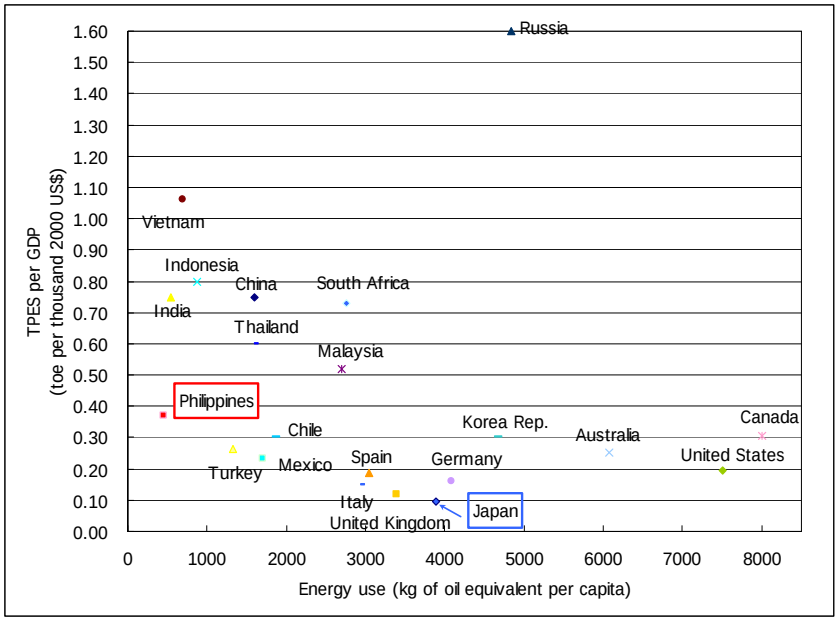


(Source: DOE-EPPB)

Figure 3-10 Breakdown of Real GDP (by Sector)

Figure 3-11 indicates the relations between TPES per capita and the Primary Energy Intensity to the GDP of various countries. The TPES per capita of the Philippines is lower than India and Vietnam that have less GDP per capita than the Philippines. Moreover, as for the primary energy intensity to the GDP, the value of the Philippines exceeds those of Malaysia and Thai, however it is about 3.8 times as big as Japan's.

Hence, it can be said that there is still room for energy efficiency in the Philippines.



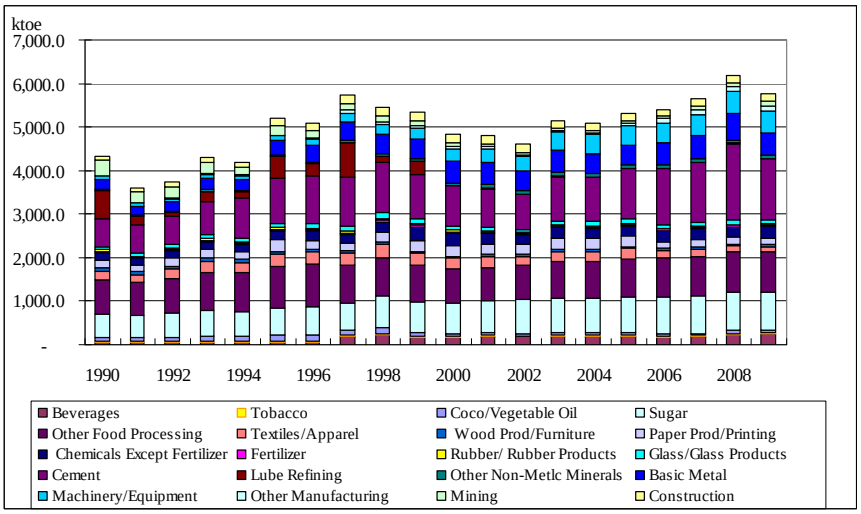
(Source: World Development Indicators 2011)

Figure 3-11 TPES per capita and Primary Energy Intensity to GDP

3.2.5 Individual Sector

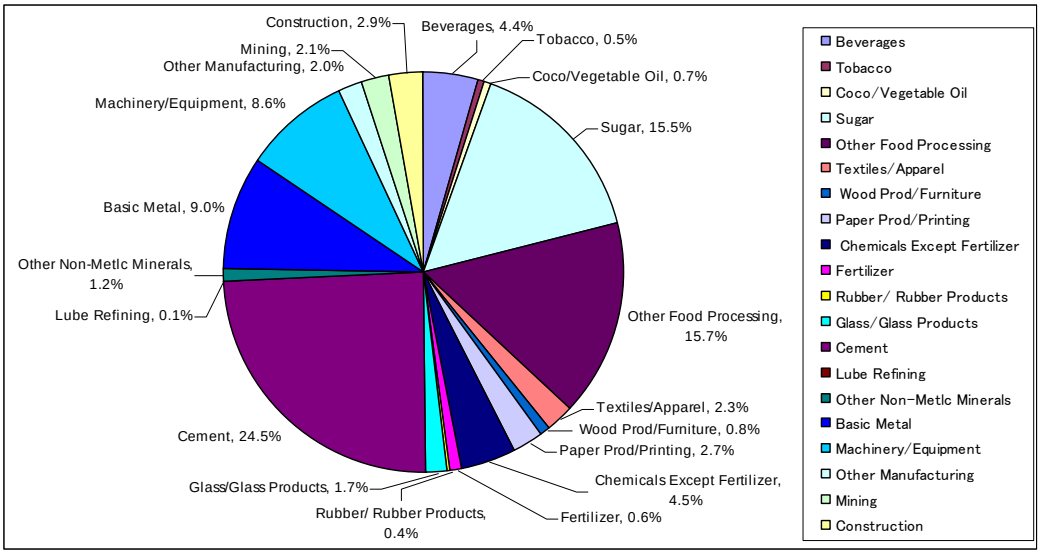
(1) Industrial Sector

Figure 3-12 shows the trend of final energy consumption by sub-sector. In 2009, the energy-consuming sub-sectors were mainly; cement at 24.5 percent, other food processing at 15.7 percent, sugar at 15.5 percent, basic metal at 9.0 percent and machinery/equipment at 8.6 percent. The sub-sectors related to food shares total 36.3 percent.



(Source: DOE-EPPB)

Figure 3-12 Trend of Final Energy Consumption by Sub-Sector

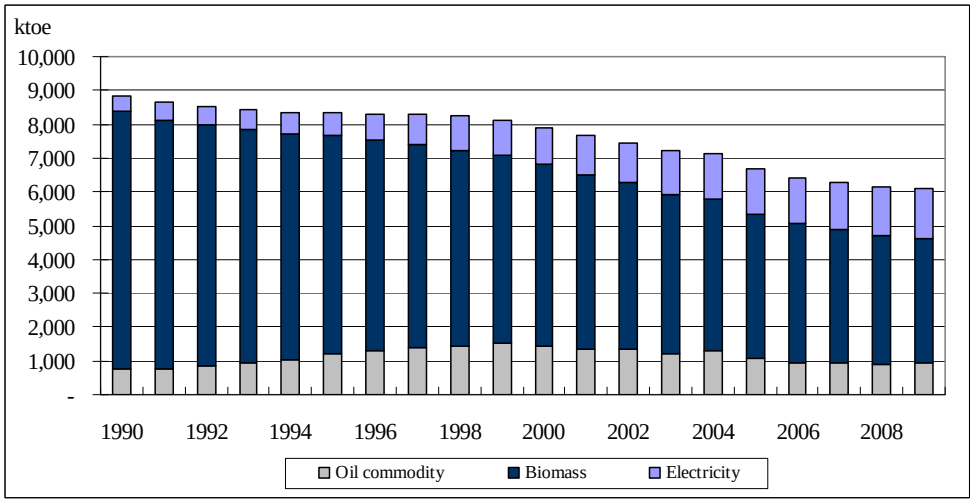


(Source: DOE-EPPB)

Figure 3-13 Breakdown of Final Energy Consumption by Sub-Sector in 2009

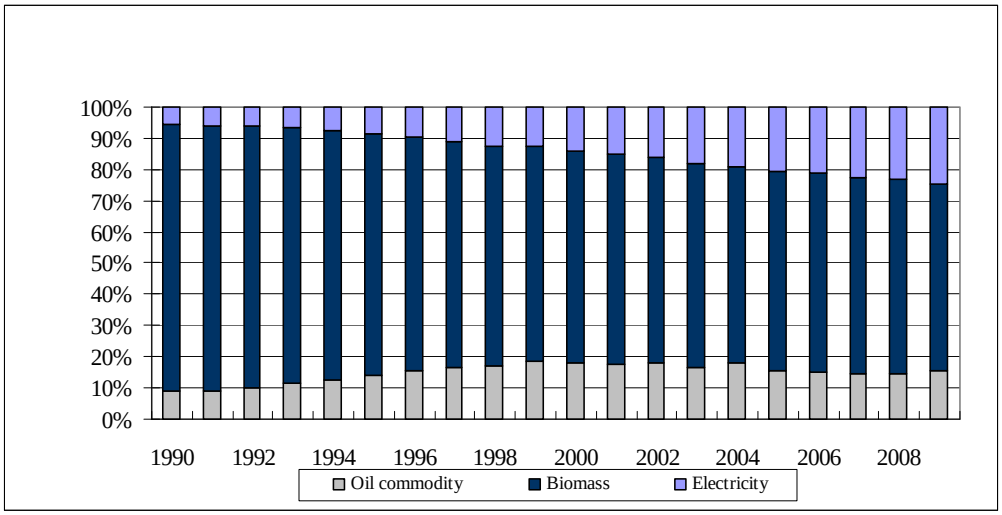
(2) Residential Sector

As mentioned above, while the residential sector shares came to 25.7 percent of final energy consumption in 2009, the amount of energy consumption is declining. There is an especially marked decrease of biomass consumption, one reason is that the energy source for cooking and water heating is changing from wood/charcoal to LPG because of the increase in household income and convenience. Meanwhile, the amount of electricity consumption is increasing by an annual average of 6.2 percent between 1990 and 2009 due to the improvement of the rural electrification rate via related a policy and the increase of the ownership rate of electric appliances.



(Source: DOE-EPPB)

Figure 3-14 Trend of Final Energy Consumption at Residential Sector

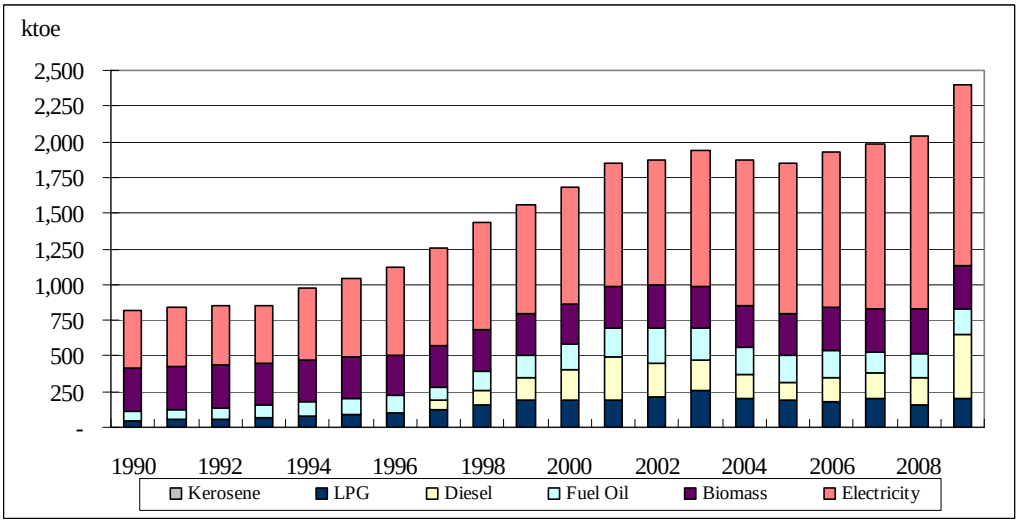


(Source: DOE-EPPB)

Figure 3-15 Breakdown of Final Energy Consumption at Residential Sector by Energy Source

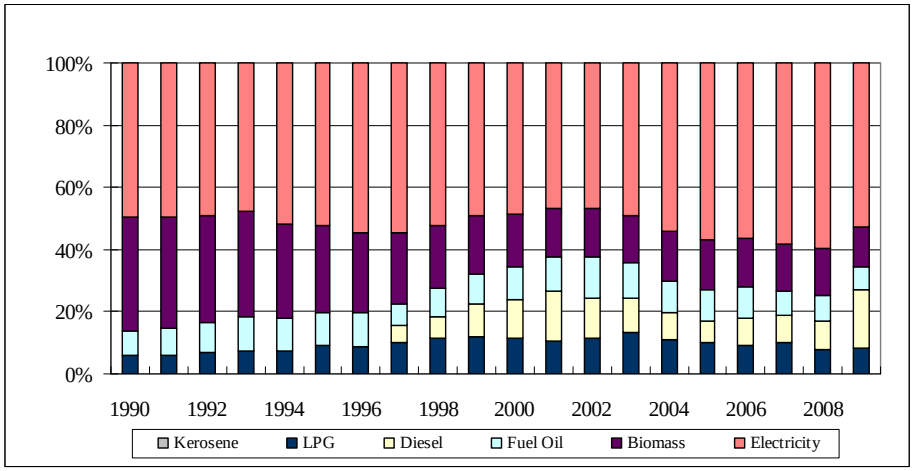
(3) Commercial Sector

Although the commercial sector accounts for only approximately 10 percent of final energy consumption in the Philippines, the remarkable increase of energy consumption is being recorded as shown in Figure 3-16. Most of them have been attributed to electricity consumption broken down into electricity at 52.8 percent, oil products at 34.4 percent and biomass at 12.8 percent.



(Source: DOE-EPPB)

Figure 3-16 Trend of Final Energy Consumption at Commercial Sector

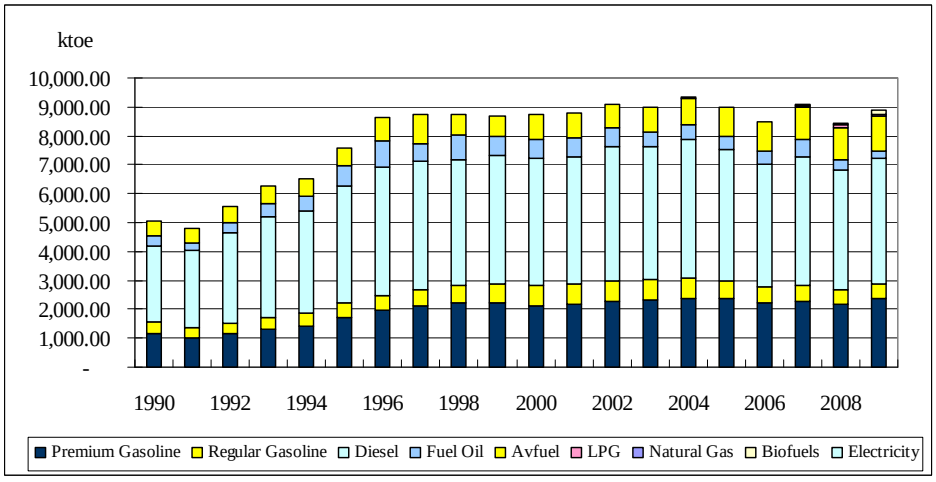


(Source: DOE-EPPB)

Figure 3-17 Breakdown of Final Energy Consumption Sector by Energy Source at the Commercial

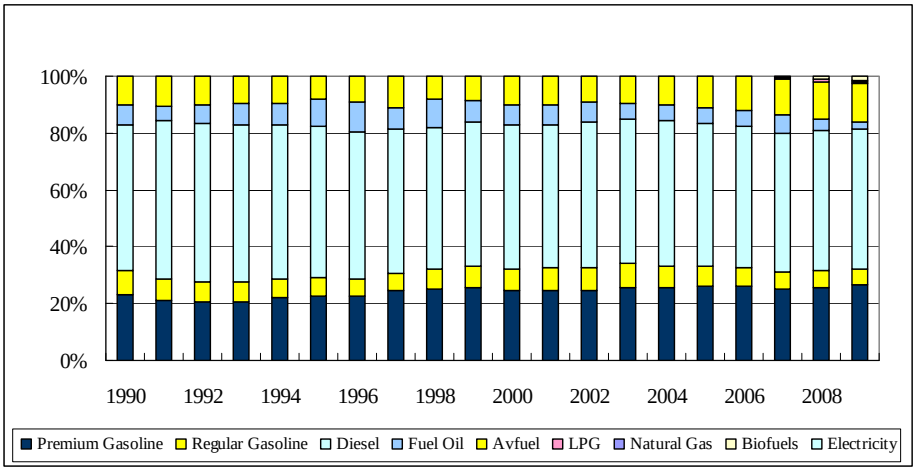
(4) Transportation Sector

In 2009, the oil product accounted for 98.2 percent of energy consumption, the breakdown of which is; diesel oil at 48.8 percent, premium gasoline at 26.6 percent, aviation fuel at 13.5 percent and regular gasoline at 5.8 percent.



(Source: DOE-EPPB)

Figure 3-18 Trend of Final Energy Consumption of Transportation Sector

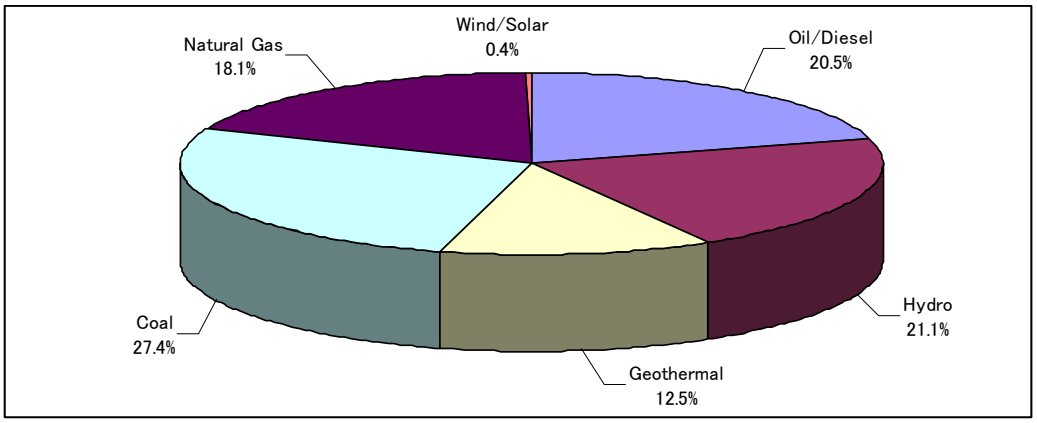


(Source: DOE-EPPB)

Figure 3-19 Breakdown of Final Energy Consumption by Energy Source at Transportation Sector

3.2.6 Power Supply and Demand

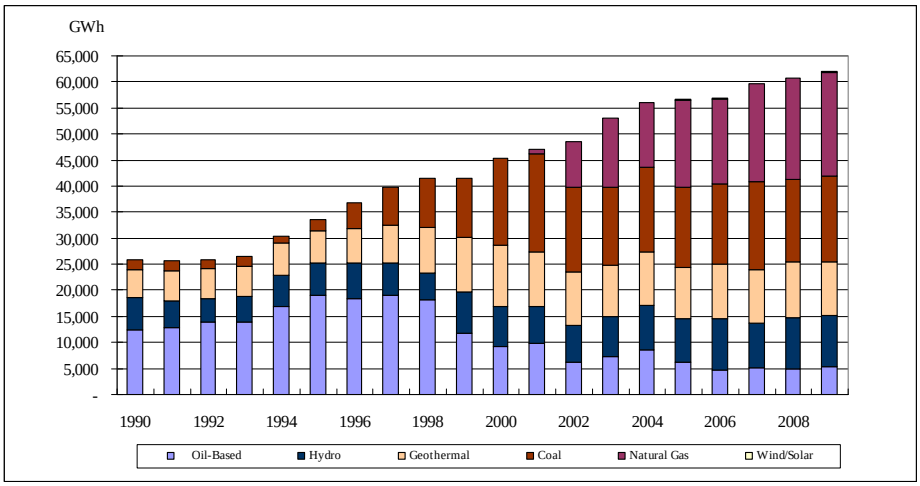
Figure 3-20 indicates the composition of installed capacity in the Philippines. As of 2009, the Philippines has a generation capacity of 15,610MW, whose breakdown by energy source is; coal at 27.4 percent, oil base at 20.5 percent, LNG at 18.1 percent, hydropower at 21.1% and geothermal sources at 12.5 percent. The unique characteristics are that; the ratio of diesel oil generation (12.6 percent of nationwide installed capacity as of 2007) is high; and the ratio of geothermal generation is at the highest level in the world. In addition, maximum power demand in 2009 was 9,467 MW.



(Source: DOE-EPPB)

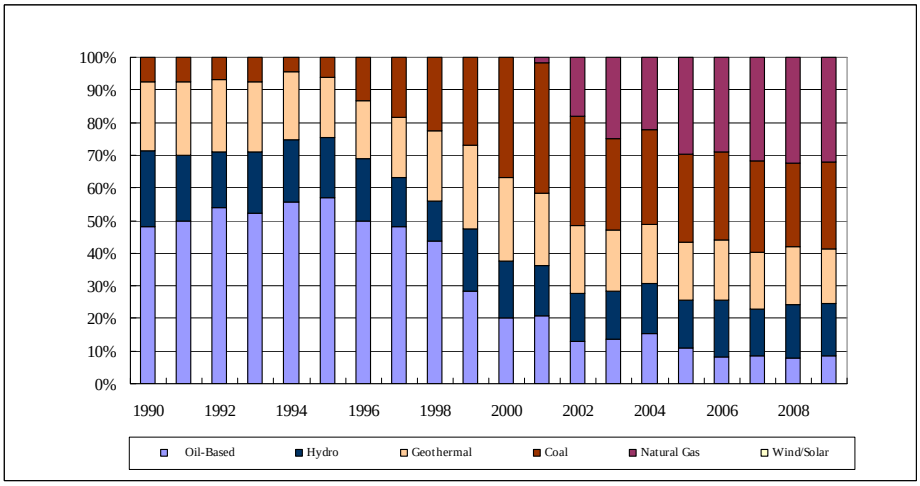
Figure 3-20 Composition of Installed Capacity in 2009

Figure 3-21 depicts the trend of power generation by fuel source in the Philippines. Since the production of LNG at the Malampaya gas field started after 2001, LNG thermal power generation shifted into high gear and the amount of the power generation is increasing yearly. Instead, oil power generation is declining and is being replaced by LNG power generation. The annual average growth rate between 1990 and 2009 was 4.6 percent.



(Source: DOE-EPPB)

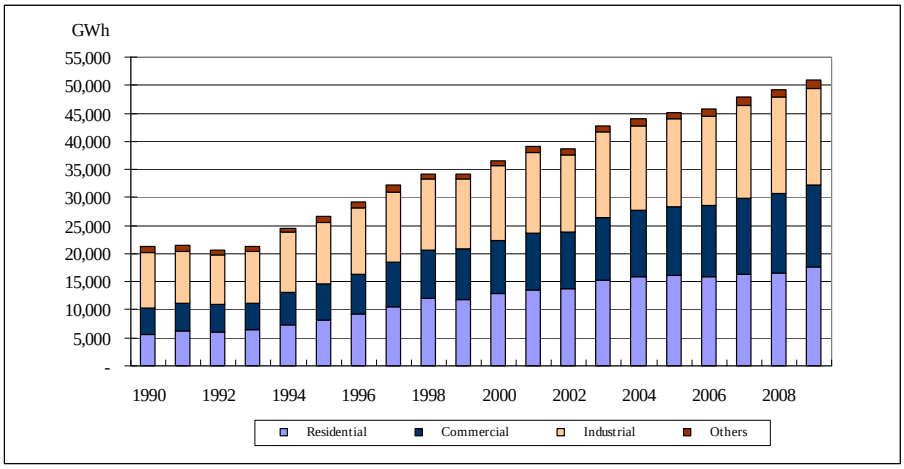
Figure 3-21 Trend of Power Generation by Fuel Source



(Source: DOE-EPPB)

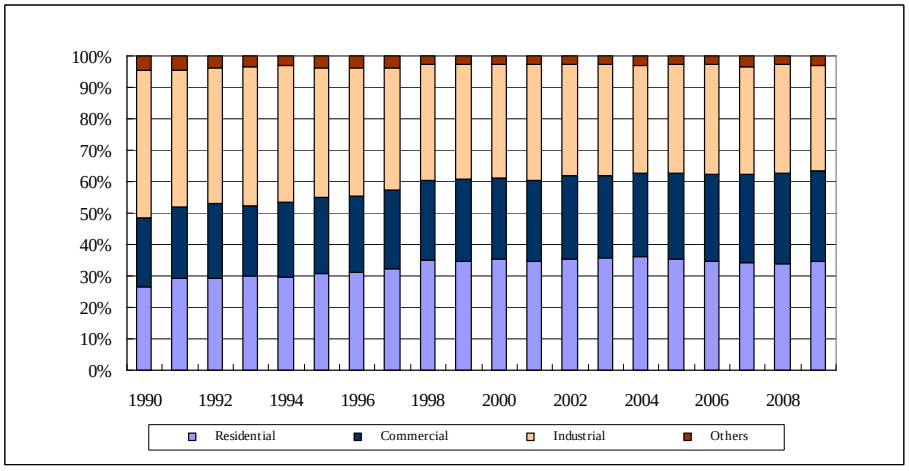
Figure 3-22 Breakdown of Power Generation by Fuel Source

Figure 3-23 and Figure 3-24 show that the trend of electric power sales and its composition by sector. The annual average growth rate between 1990 and 2009 was 4.7 percent. It can be pointed out that electricity sales are increasing steadily. As of 2009, the share of electric power sales by sector is; the residential sector at 34.4 percent, the commercial sector at 29.0 percent, the industrial sector at 33.6 percent and the agricultural sector at 3.0 percent. The annual average growth rate per the main sectors between 1990 and 2009 was the residential sector at 6.2 percent, the commercial sector at 6.2 percent and the industrial sector at 2.9 percent.



(Source: DOE-EPPB)

Figure 3-23 Trend of Electric Power Sale



(Source: DOE-EPPB)

Figure 3-24 Breakdown of Electric Power Sale by Sector

3.3 Re-Commission to Local Consultant

The survey was carried out with the following three objectives.

① Grasp the specification and dissemination status of high-efficient equipment and grasp the present condition of labeling systems to consider the best labeling systems for the Philippines.

② Grasp the actual conditions of energy consumption in the industrial ,commercial and residential sector and grasp the situation of EE&C activities to consider the necessary scheme to promote them.

③ Calculate the economic effects by improving equipment efficiency with the data which was retrieved in the above two processes to verify the effectiveness of the financial support scheme.

Regarding the dissemination status of the equipment, the number of the air-conditioners (hereinafter AC) has been growing remarkably. It was confirmed that most parts of the AC type was occupied by a low-efficient window type in the market of the Philippines. The main obstruction preventing the dissemination

of high-efficient ACs is the high price. Furthermore, there is another reason that the Philippines MEPS standards for AC are looser than that of Thailand. As for the lighting, the dissemination of the CFL type is very high, on the other hand the LED type is rare in the market.

Regarding EE&C awareness, behaviors are not active due to the lack of knowledge and experience although the necessity of EE&C is recognized by the respondents. DOE activities have not been well-known, so the improvement of information strategies via the effective use of mass media is important. As for the EE&C behavior of users, the habit of turning off lights when not in use are done well but awareness in terms of AC temperature control is relatively low.

The increase of electricity consumption in the residential and commercial sectors in a high temperature month indicates that AC's electricity consumption has a large impact. As for the purchasing behavior of respondents, the price difference between high-efficient ACs and low-efficient ones is a major problem although the importance of equipment efficiency has been recognized. So it is necessary to decrease the price difference of equipments by providing financial support for users.

3.3.1 Plan of Re-Commission to Local Consultant

(1) Market Research on High-efficient Appliances/ Equipment

a. **Objectives**

The objective is to conduct market research on high-efficient appliances/equipment, which consumes a large volume of energy in the residential sector including Energy Efficiency Standards & Labeling (hereafter EES&L) products. Another objective is to collect data on energy efficiency to improve EES&L schemes, to increase target appliances/equipment of EES&L, to subsidize programs for high-efficient appliances/equipments.

b. **Expected outcome**

- Diffusion status of high-efficient products on the market out of the targeted ones of EES&L (Energy Efficiency Standards & Labeling), ones which consume energy in large volume for now or in the near future in the residential areas in the Philippines
  - Increase of target appliances/equipment of EES&L can be examined.
- Data on energy efficiency, specifications, etc. of products on the market
- Actual situation regarding the display of the labeling at retail shops
- Sales-promotion strategy for the diffusion of high efficiency appliances/equipment of manufacturers and retailers.
  - Evaluation, problems and reform measures for the EES&L can be examined.
- Relationship between the energy efficiency and the price of target products of EES&L
  - Subsidy program for the diffusion high-efficient products can be considered.

c. **Products to be investigated**

[Target products of the EES&L]

Air conditioners, refrigerators, CFL, electronic ballast

[Products that consume energy at large for now or in the near future in residential areas]

TVs, lighting appliances (Fluorescent light tube, LED lamps), electric water heater, fans,

washing machines

d. **Investigation target and number of samples**

- Retailers: 50
- Manufacturers and importers: 45
- Industry organizations: 5

e. **Items to be gathered**

Items	Contents
Product	Products, Manufacturers, Market shares, Sales records and trends, Sales forecast and trend forecast, Performance data
Price	Prices, How to purchase (Cash, credit card, loan)
Promotion	Effect of the labeling program, Display of the labeling at retail shops, the labeling program, Sales strategy, Product development
Place (sales channel)	Domestic products, Imported products, Assortment of products (Lineup of products)

f. **Investigation methods**

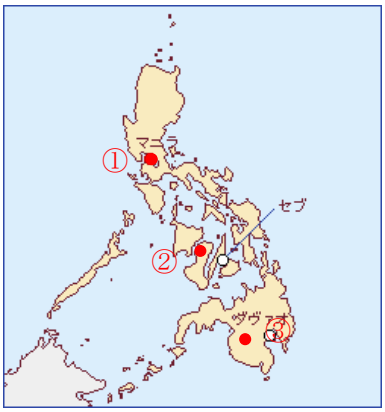
- Hearing investigation
- Questionnaires

g. **Duration of investigation**

- 2011/5/27 – 2011/8/31

h. **Area of investigation**

- Luzon area Metro Manila (Point① on Figure 3-25)
- Visayas area: Bacolod (Point② on Figure 3-25)
- Mindanao area: Cagayan de Oro (Point③ on Figure 3-25)



Area of investigation

(2) Demand and Awareness Survey on Energy Efficiency and Conservation

a. **Objectives**

The objective is to investigate energy consumption status, EA specifications, EA usage patterns, EA renewal trends and EC awareness of energy consumers in the residential, industrial and commercial sectors. And another is to collect the data to improve the IEC campaign, the labeling program and the subsidy program.

b. **Expected outcome**

- Target demand (or EA) for efficient promotion of EC can be identified.
- EA renewal demand with a promotion subsidy can be presumed.
- Degree of recognition of on-going EC promotion activities can be acquired.

c. **Items for investigation**

Residential Consumers

<Items>	<Contents>
Basic consumer information	・ Annual income, family composition, size of house ・ Monthly consumption of electricity(kWh)
Electric Appliances ※lights, refrigerator, AC, TV, water heater etc	・ EA specifications(Capacity (kw)、Performance indication, size, maker, number of equipment ・ Usage patterns(AC example: hours of operation per day, month of operation, temp setting)
EC awareness	・ Degree of recognition of EC activities such as an EE Label ・ Priorities in purchasing EA (design, price, performance, operation costs etc.) ➢ Renewal plans(if he/she is planning to renew the EA, or if he/she considers a renewal with subsidy promotion) ➢ Any activities to reduce energy consumption ➢ EC policy activities expected for the government ・ Measure of information procurement, family activities

Industrial/Commercial Consumers

<Items>	<Contents>
Outline of consumer	・ Installed equipment, size of business premises (m2 of office), annual sales, number of employees ・ Monthly energy consumption ・ Regular office hours
Energy consuming equipment	・ Specifications, numbers, performance info by maker ・ Operation patterns
EC awareness	・ Energy Management (if any, data for collection and reporting scheme) ・ Energy Audit experience or necessity ・ ESCO service experience or necessity ◆ Renewal of equipment (history and plan) ◆ EC activities in place ・ EC activities expected for the government (subsidies for efficient products, tax reduction)

d. **Investigation target and number of samples**

- Residential Consumers 200
- Industry/Commercial/Schools 100

e. **Investigation methods**

- Hearing
- Query distribution/collection

g. **Duration of investigation**

- 2011/5/27 - 2011/8/31

h. **Area of investigation**

- Luzon area: Metro Manila
- Visayas area: Bacolod
- Mindanao area: Cagayan de Oro

3.3.2 Overview and Results of the Survey

(1) Market Survey on High Energy-efficient Appliances

1) Overview

The Study Team conducted a market survey on appliances, which have gained a relatively wider use and consumed energy in large volumes (including target appliances of EES&L (Energy Efficiency Standards & Labeling)), and held hearings on EES&L, etc. in the Philippines with retailers, manufacturers / importers, and related industry organizations.

The survey was conducted in three cities, including Metro Manila (Luzon area), Bacolod City (Visayas area), and Cagayan de Oro City (Mindanao area).

Table 3-2 Sample of Survey

	Manufacturers/Importers	Retailers	Industry Association
Metro Manila	26	31	4
Bacolod City	-	7	-
Cagayan de Oro City	-	12	-
TOTAL COLLECTED	**26**	**50**	**4**

In addition to the questionnaire surveys, the Study Team collected various statistic materials and held hearings with the importers.

In this market survey, the sales volume data by product could not be obtained from manufacturers, importers, and retailers because they had difficulty disclosing their trade secrets. Furthermore, the survey was conducted in cooperation with organizations shown in Table 3-2. However, please note that it was difficult to thoroughly collect data of the products distributed in the Philippines.

Details are shown below:

a. Room air conditioners

1) Estimated demand

In this survey, the sales volume data by product could not be obtained from manufacturers, importers, and retailers because they were restricted from disclosing their trade secrets.

According to the Japan Refrigeration and Air Conditioning Industry Association “Air Conditioner

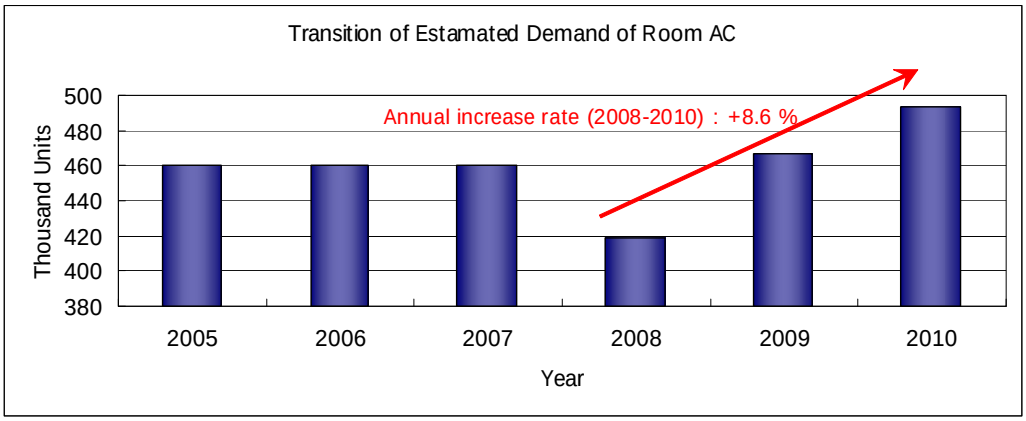
Demand Estimation in the World for April 2011", the supposed demand for room air conditioners in recent years in the Philippines is as follows. The demand has been increasing steadily since 2008 with an annual average growth rate of 8.6%.

Table 3-3 Estimated Demand for Room Air Conditioners in the Philippines

(Thousands of unit)

Year	2005	2006	2007	2008	2009	2010
Supposed demand for room air conditioners	460	460	460	419	467	494

Source: The Japan Refrigeration and Air Conditioning Industry Association "Air Conditioner Demand Estimation in the World for April 2011"



(Source: The Japan Refrigeration and Air Conditioning Industry Association "Air Conditioner Demand Estimation in the World for April 2011")

Figure 3-25 Trends in Estimated Demand for Room Air Conditioners in the Philippines

2) Type

When estimating the sales percentage by type based on the "Air Conditioner Demand Estimation in the World for April 2011" and the information received in hearings from manufacturers, etc., the window-type ACs could account for about 70 to 80% of the market and split-type ACs for about 20 to 30%. In the split-type ACs, air conditioners with inverters are estimated to hold a share comprising approximately 20 to 30% of the market and air conditioners without inverters comprise about a 70 to 80% share.

Table 3-4 Market Share (Estimate) by Model

Type	Market share	Remarks
Window Type	70～80 %	
Split Type	20～30 %	With inverter: 20～30% Without inverter: 70～80%

The shares per horsepower are estimated in the following Table 3-5:

Table 3-5 Market Share by Horsepower (Estimate)

Horsepower	Market share
0.5 HP	25 %
0.75 HP	25 %
1 HP	30 %
Over 1.5 HP	20 %

3) Energy efficiency

In the Philippines, EER(Energy Efficiency Ratio)has been adopted as the energy efficiency indicator for room air conditioners in EES&L, and is obtained by dividing the rated cooling capacity (kJ/h) by rated power consumption (W).

Figure 3-27 shows the distribution of EER for window-type ACs and split-type ACs without inverters, which are accredited by DOE-LATL, as well as the distribution of EER for inverter-mounted split-type air conditioners which have been collected in this market survey. Regarding room air conditioners without inverters, in the Philippines MEPS based on EER has been introduced to models with a cooling capacity of less than 12,000kJ/h and models with 12,000kJ/h to 26,000kJ/h. MEPS therefore is 9.1 and 8.6, respectively. Currently, MEPS has not been applied to inverter air conditioners in the Philippines.

EER for inverter air conditioners shown in Figure 3-27 is the catalog data measured voluntarily by manufacturers and importers themselves and the measurement method has not been clarified yet. In addition, while EER for air conditioners without inverters accredited by the DOE-LATL has been accumulating for many years until March 2011 and includes data on former models, EER for inverter air conditioners is the data of the latest models collected in this market survey conducted in 2011. Therefore, such data cannot be simply compared with each other and are treated as reference only. However, the high efficiency of inverter air conditioners can be confirmed by Figure 3-27.

As reference, the MEPS for room air conditioners in the Kingdom of Thailand (hereinafter “Thailand”) is shown in Figure 3-27 using the purple line. MEPS based on COP (W/W) (Coefficient of Performance, heating or cooling capacity per electric power capacity) to models with the cooling capacity of 8kW or less and 8 to 12 kW or less has been introduced in Thailand, and MEPS therefore is 2.82 and 2.53, respectively. When converting these figures into the Filipino EER (kJ/W-h), the figures stand at 10.2 and 9.1 respectively. As stated in Chapter 8, the current MEPS in the Philippines for room air conditioners was determined in 1998 and has not been revised for many years. Thus, we find that Filipino MEPS remains at a lower level compared to Thailand.

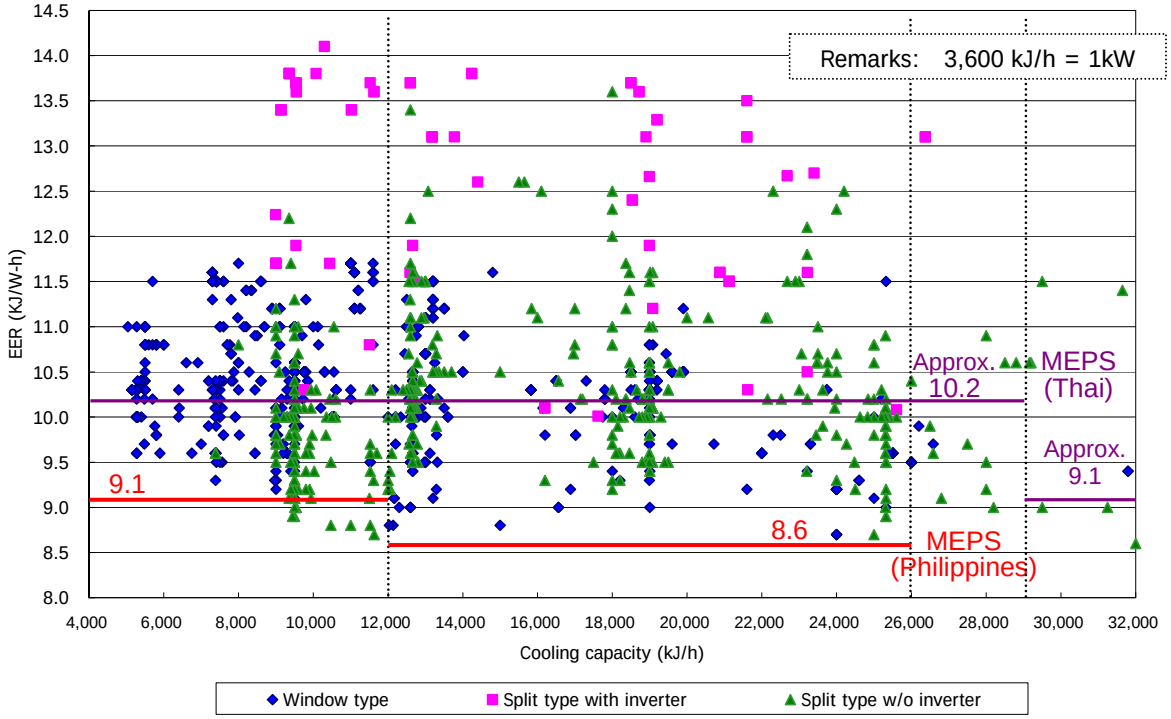


Figure 3-26 Relations between Cooling Capacity and Energy Efficiency (Data from market survey and DOE-LATL)

Figure 3-28 shows the relationship between the data on cooling capacity for room air conditioners and EER, which were collected in this market survey. Different from Figure 3-27, Figure 3-28 also plots the data on the EER for window-type ACs and split-type ACs without inverters, which have been collected as of this market survey.

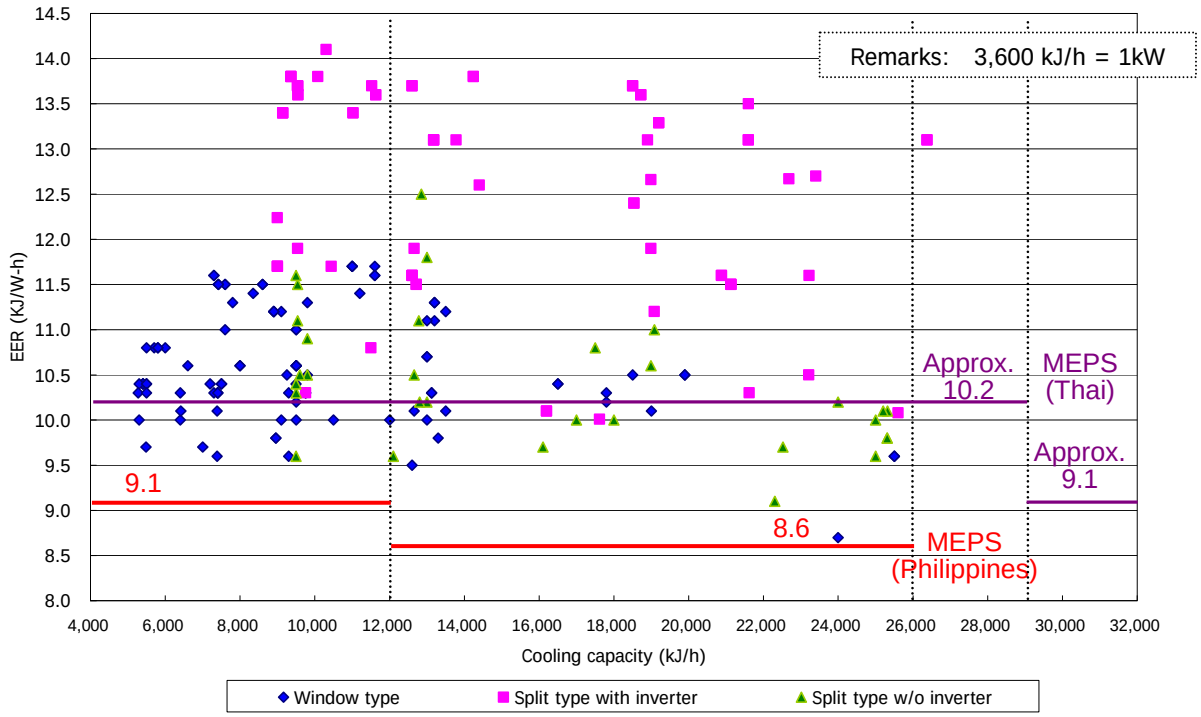


Figure 3-27 Relations between Cooling Capacity and Energy Efficiency (Data from market survey)

4) Price

Relations between the price data and the cooling capacity, which are collected from retail shops in this survey, are shown in Figure 3-29. Inverter air conditioners are distributed in the higher price range compared with models without inverters.

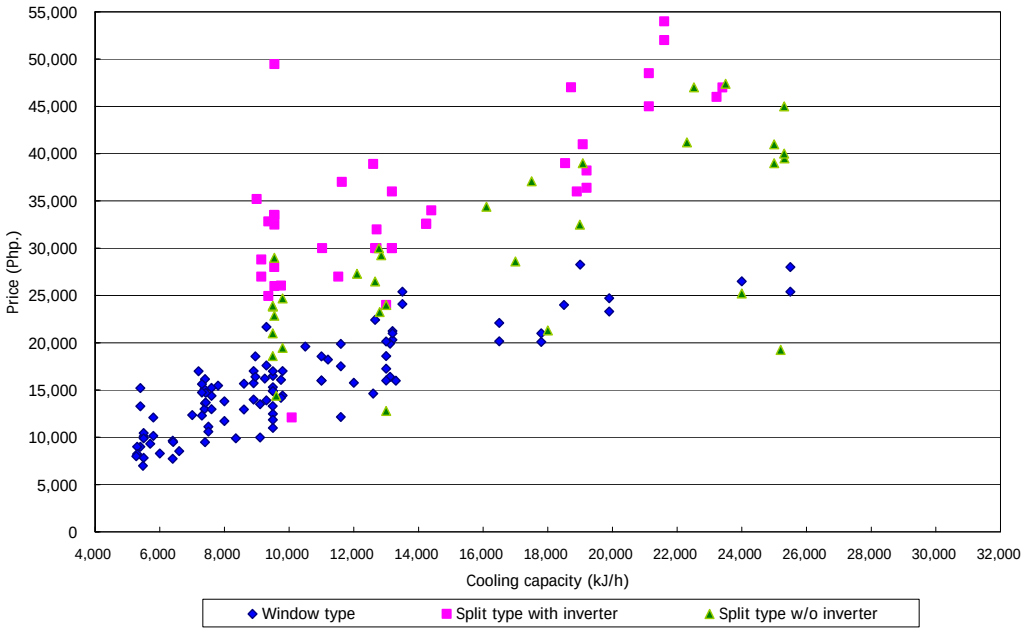


Figure 3-28 Relations between Cooling Capacity and Product Price

b. Refrigerators

1) Energy efficiency

In the Philippines, EEF (Energy Efficiency Factor) has been adopted as the energy efficiency indicator for refrigerators and freezers in EES&L and can be obtained by dividing the total storage volume (L), the total capacity of refrigerator and freezer areas, by power consumption (kWh) over a 24-hour period.

Figure 3-30 shows the relationship between EEF and the data accredited by DOE-LATL and the total storage volume of the data obtained in this market survey. In the current EES&L, inverter-mounted refrigerators have not been included and therefore EEF has not been measured. Given this, no data on such products have been included in Figure 3-30.

In this regard, in the Philippines, MEPS is currently not being applied to refrigerators and freezers but obligations to attach labels are being imposed on manufacturers.

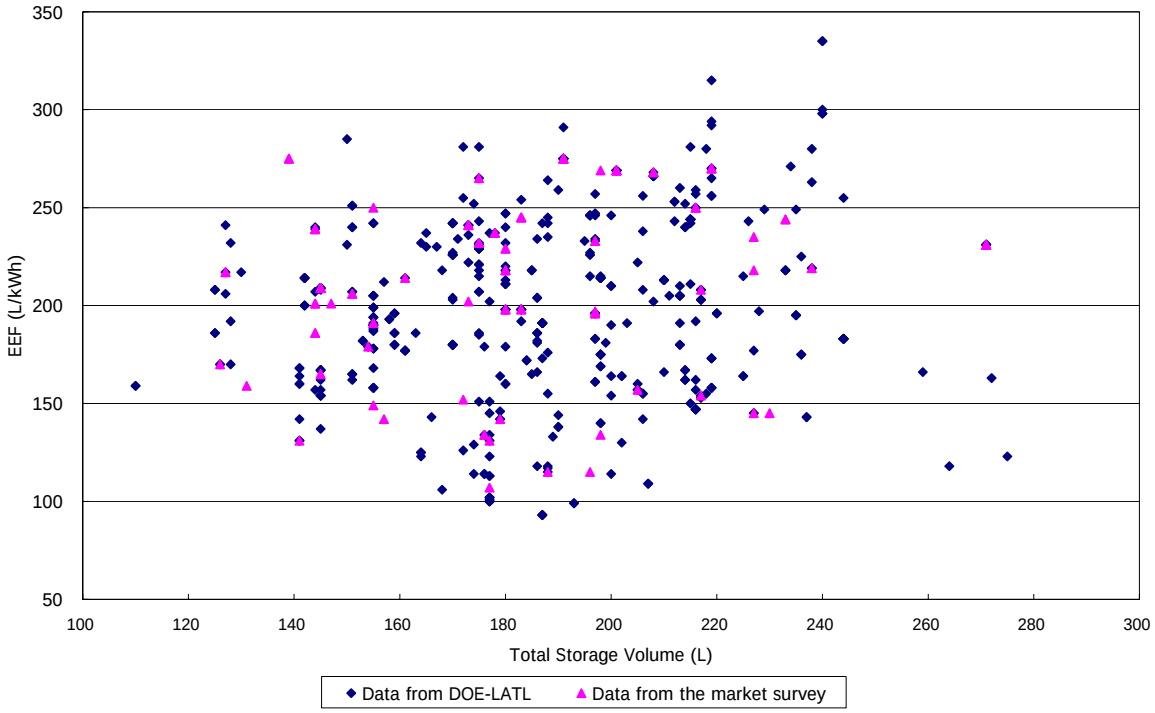


Figure 3-29 Relations between Total Storage Volume and Energy Efficiency

2) Price

The relationship between price data collected from retail shops in this survey and EER are shown in Figure 3-31. Small correlations between EER and prices can be confirmed in the following Figure:

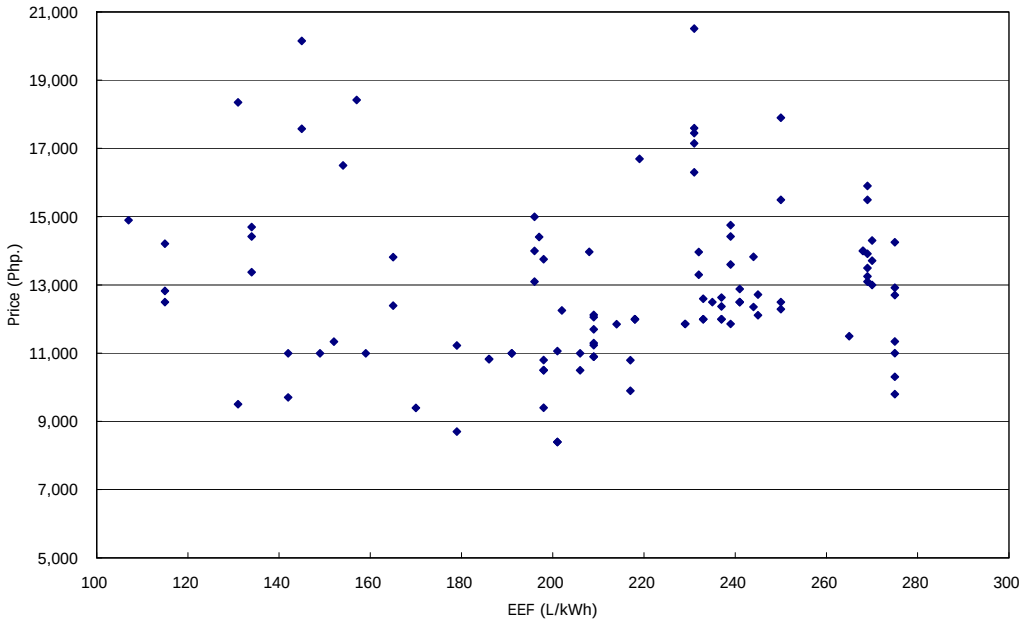


Figure 3-30 Relations between EEF and Prices (Refrigerators without inverter)

The relationship between price data collected from retail shops in this survey and the total storage volume are shown in Figure 3-32. As the total storage volume data on the inverter-mounted refrigerators can also be obtained, the refrigerators from such models are also included in the Figure below:

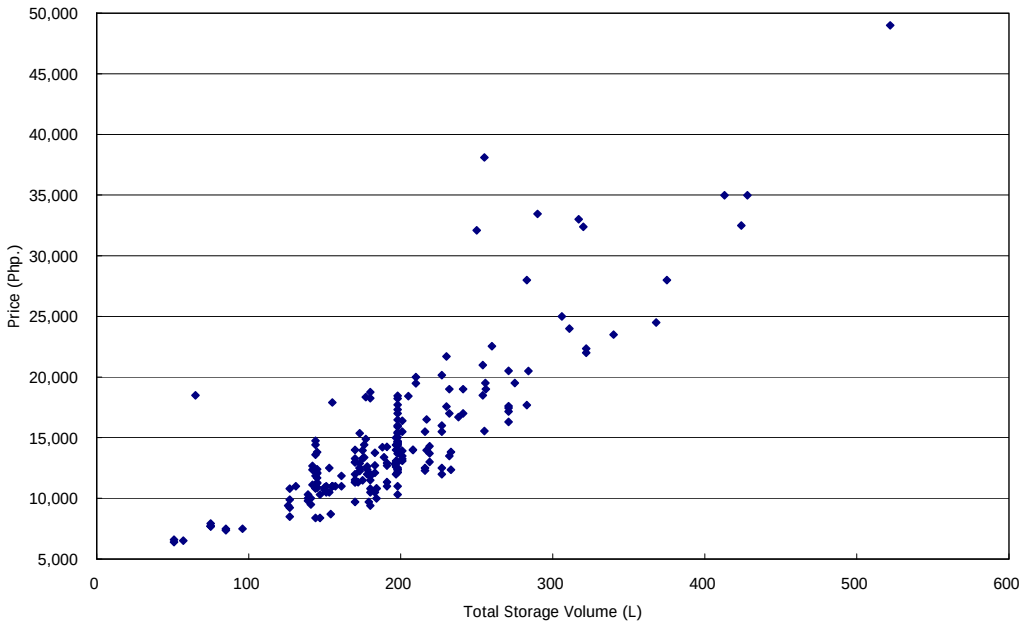


Figure 3-31 Relations between Total Storage Volume and Prices

Figure 3-33 shows a comparison of the original units (product price / total storage volume) regarding the production lineup of a certain manufacturer, including inverter-mounted refrigerators. Such a manufacturer

prepares the inverter-mounted refrigerators in the product group with a total storage volume of more than 300L.

In comparison using the original unit of product prices, the average volume of refrigerators with inverters is about 1.6 times (112PHP./L) the average volume (about 69PHP./L) of refrigerators without inverters.

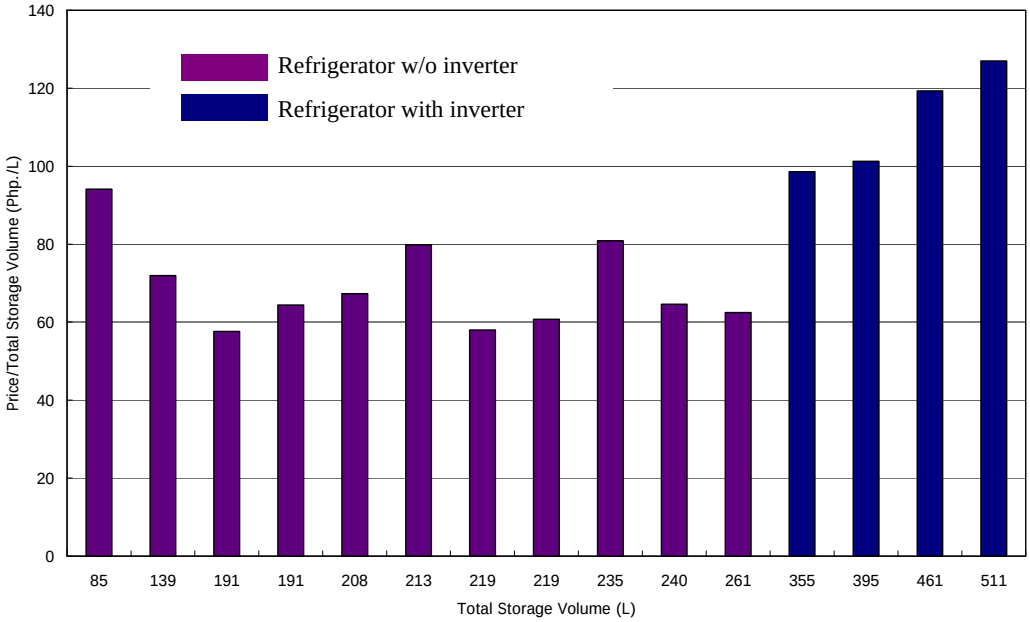


Figure 3-32 Total Storage Volume and Original Unit of Product Prices

c. TV

1) Rated power

The Energy Efficiency Standards & Labeling has not been introduced into TVs, and so there are no systems for general consumers to compare the energy efficiency of each product.

Based on the data on CRT-based TVs and LCD TVs collected in this survey, the relationships between the screen size and the rated power are shown in Figure 3-34. This data has been picked up from the catalogues of each company.

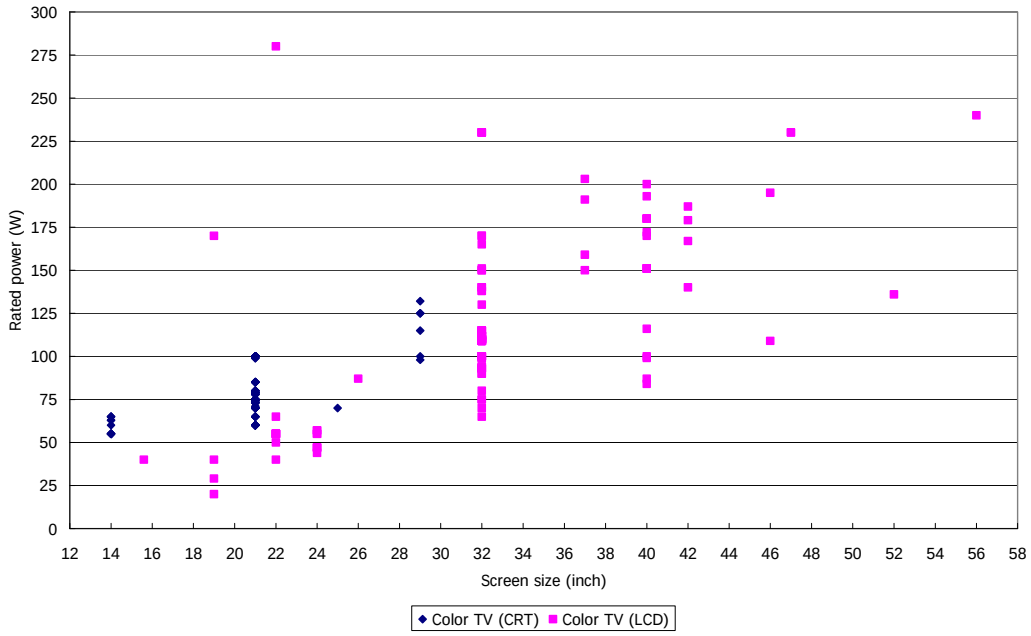


Figure 3-33 Relations between Screen Size and Rated Power

2) Type

In the 238 household energy usage survey, households having TVs account for 68 % (163 households) of the total. The number of units held stands at 248 and the number of average units held by households having TVs is 1.5 units.

The breakdown by model of 248 units is as follows:

Table 3-6 Holding Share by Type

Type	Share
CRT	70%
LCD	25%
LED	3%
Plasma	2%

d. Washers

1) Price

The Figure below shows a comparison of the original units (product price / total capacity) of product prices regarding the production lineup of a certain manufacturer, including fully automatic washers. For the manufacturer, only fully automatic washers with more than 8.0kg have been added to the lineup. For the manufacturer, all products of fully automatic washers have been equipped with inverters.

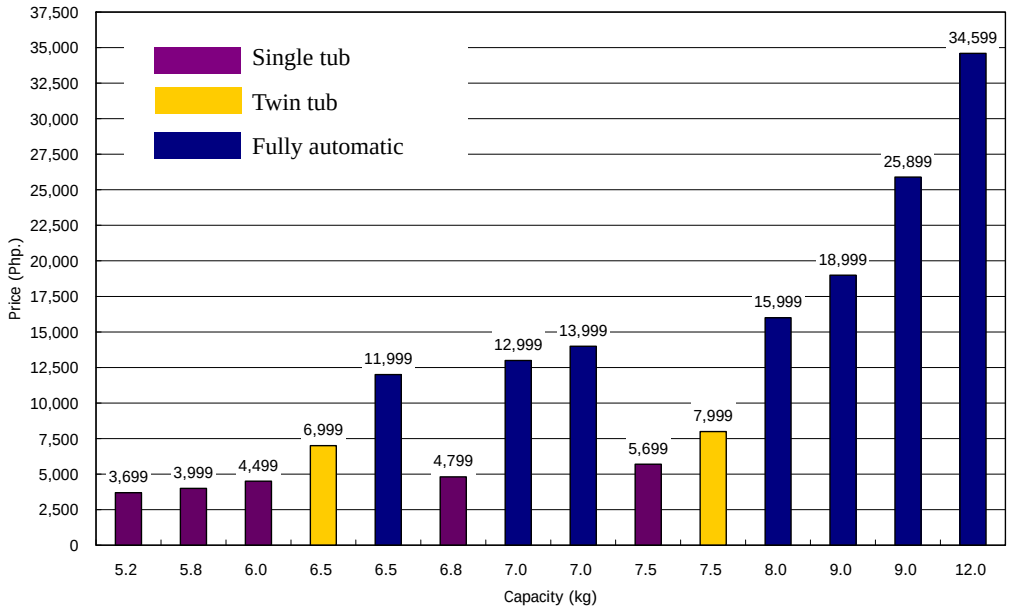


Figure 3-34 Total Capacity and Product Prices

The Figure below is a comparison using the original units of product prices. The average value of single tubs, twin tubs, and fully automatic washers is 723 PHP./kg, 1,072 PHP./kg, and 2,225 PHP./kg, respectively.

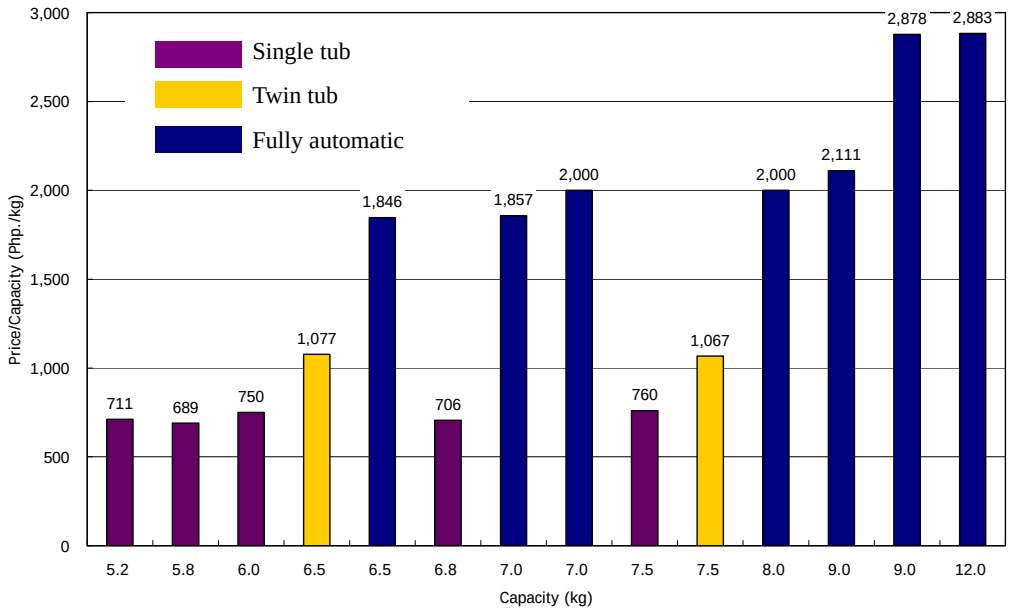


Figure 3-35 Total Capacity and Original Units of Product Prices

e. CFL

1) Luminous efficacy

In the Philippines, it is obligatory to comply with MEPS and attach energy conservation labels regarding

CFL. The minimum efficiency standards are called “Efficacy” and defined as the value obtained by dividing the lumen by the rated power (W). MEPS is set depending on the color temperature level and the power volume. Furthermore, in the Philippines, regulations for useful hours have been established and the useful hours of CFL are determined to be 6,000 hours.

Table 3-7 MEPS for CFL

Input power of lamp (W)	Initial luminous efficacy (lm/W) Correlated color temperature (CCT)	
	≤ 4000K	> 4000K
≥ 2 to < 5	45	41
≥ 5 to < 9	50	46
≥ 9 to < 15	55	52
≥ 15 to < 25	60	57
≥ 25	65	62

The Figure below illustrates power consumption and efficacy based on the product data obtained from the DOE-LATL database and this market survey. The sales volume and distribution volume have not been obtained but it is estimated that main products are those with power consumption of about 5 to 25W rather than the number of the products.

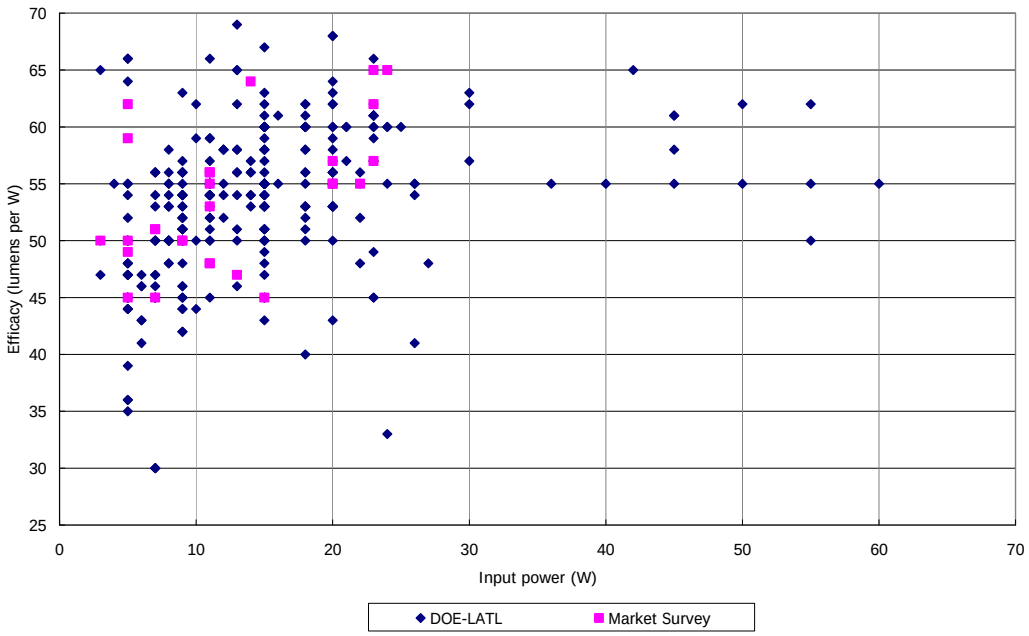


Figure 3-36 Power Consumption and Efficacy

2) Price

The Figure below illustrates the relationship between the product prices and energy efficiency based on the data collected from this market survey. The correlation coefficient of the two pieces of data is 0.49. So it is believed that there is a relatively strong correlation between such data.

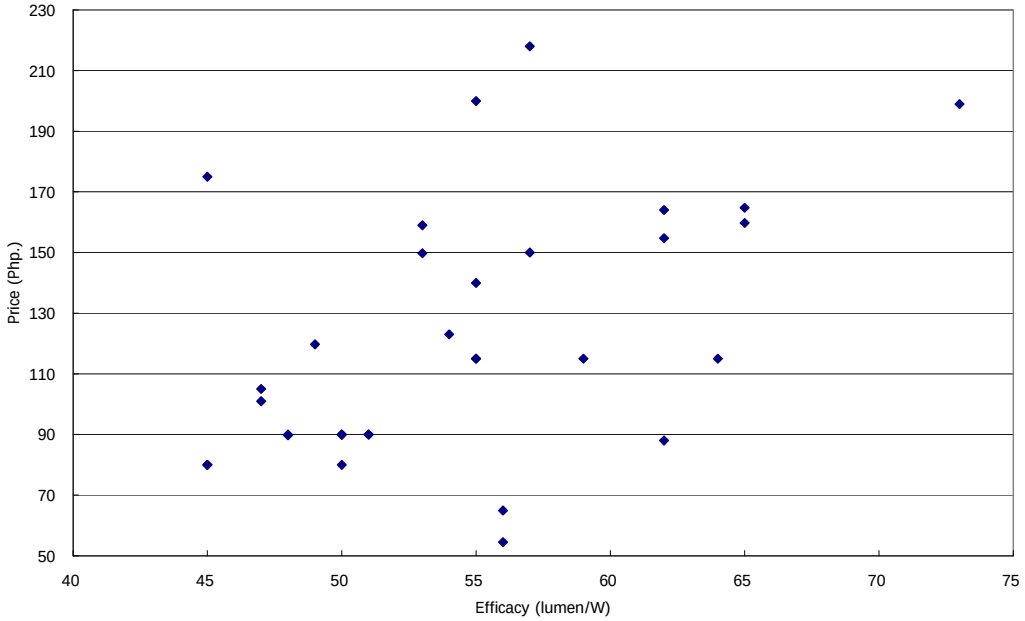


Figure 3-37 Product Prices and Energy Efficiency

3) Diffusion rate

According to the energy usage survey, the number of lighting appliances installed per household is 11.4 units. Of out these, CFL shows a high of 7.3 units (64% of the total) so we can confirm that the CFL diffusion rate amongst general households is broad.

f. LED

Out of 11.4 units of lighting appliances installed per household found in the energy usage survey, LED accounts for only 0.1 units, showing that LED has scarcely been diffused and the percentage of households having LED in comparison with households having lighting appliances is 2%.

Thus, LED has not been diffused and the data obtained in the market survey is insufficient perhaps due to limited market distribution. However, the retail price of a certain LED fluorescent lamp (16 W, 1,500 lumens) is 2,600 PHP. and that of the LED bulb (4W, 110-140 lumens) is 635 PHP, which is very expensive compared with other products.

g. Opinions / requests concerning EES&L

Opinions / requests obtained from manufacturers, etc. through this market survey concerning EES&L have been summarized as follows:

Manufacturers, etc. wish:

- ✓ to further seek to diffuse and enlighten EES&L via campaigns using TV, Internet, radio, newspapers, etc.
- ✓ the government to appeal to the advantages inherent in high-efficient appliances, because some consumers are not aware of the long-term economic advantages of high-efficient appliances with high initial costs and this is one reason for the lower diffusion of high energy-efficient appliances.

- ✓ the government to provide purchasing support through preferential taxes, a subsidy system, etc. towards the diffusion and promotion of high-efficient appliances.
- ✓ the government to implement rigid monitoring because low-efficient and cheap products that do not satisfy are prevailing in the market, which impede fair competition.

(2) Awareness Survey on EE&C

Outline:

-The number of samples: only in major cities

Residential sector: 238

Industrial and commercial establishments: 100

- ✓ Among people who answered the questionnaire in the residential sector, almost all people understand the importance of EE&C measures as one way of implementing environmental measures. However, they do not access EE&C information and have enough knowledge and experience. Therefore, their behavior is negative when it comes to EE&C measures.
- ✓ EE&C awareness is weak compared to other environmental issues.
- ✓ The IEC campaign by the DOE is known among only less than half of the people who answered the questionnaire. There are many comments that DOE should encourage awareness-raising in Barangay or other villages.
- ✓ For the residential sector, the most effective dissemination tool is the TV for residential sector. The DOE should implement a media campaign such as TVs and radios. In addition, the EE&C materials of utility providers (pamphlets, leaflets and bill) is also effective.
- ✓ For industrial and commercial establishments, the Industry Association is the most effective when it comes to disseminating information. The second effective tool is the National Training-Workshop by DOE.

Industrial and Commercial Sector:

1) The number of respondents

188 of questionnaires were distributed and 100 were collected, which means the response rate is 53%. According to the local consultant, the response rate was lower than other environmental surveys such as those targeting waste disposal or water pollution. That may be because EE&C is not popular yet in the Philippines.

62 were collected from the industrial sector, and 38 were collected from the commercial sector. The distribution of each sector is shown as follows. In the commercial sector, the answers from the office building management companies hotels and schools were collected, and in the industrial sector, the answers from the water suppliers, water treatment companies and food factories were collected.

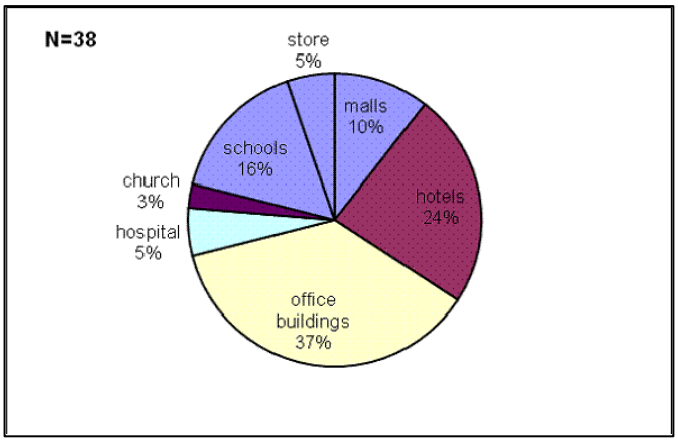


Figure 3-38 Distribution of Commercial Sector

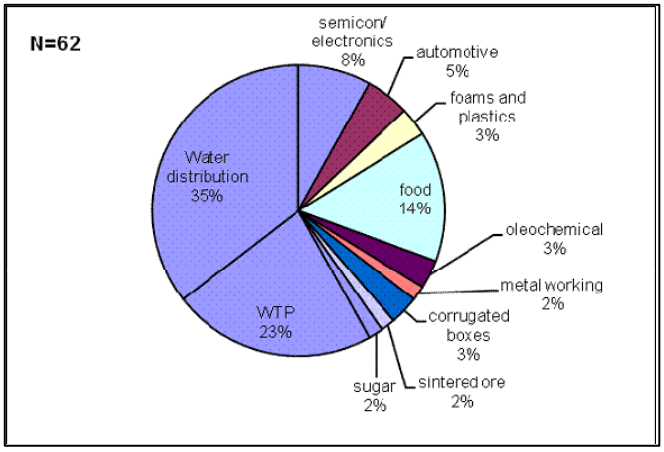


Figure 3-39 Distribution of Industrial Sector

2) Collection Methods of Energy Consumption Data

The most utilized collection method of energy consumption data is to collect bills. The second method is to investigate equipment meters and collect data directly. It is clear that the automatic data collection system is not popular in the Philippines yet.

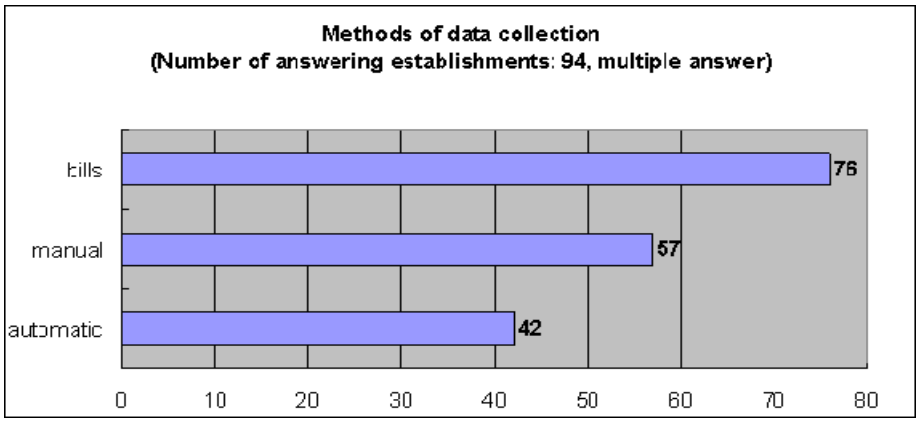


Figure 3-40 Methods of Data Collection

Regarding energy data recorded monthly, almost all of the establishments manage energy consumption data and costs.

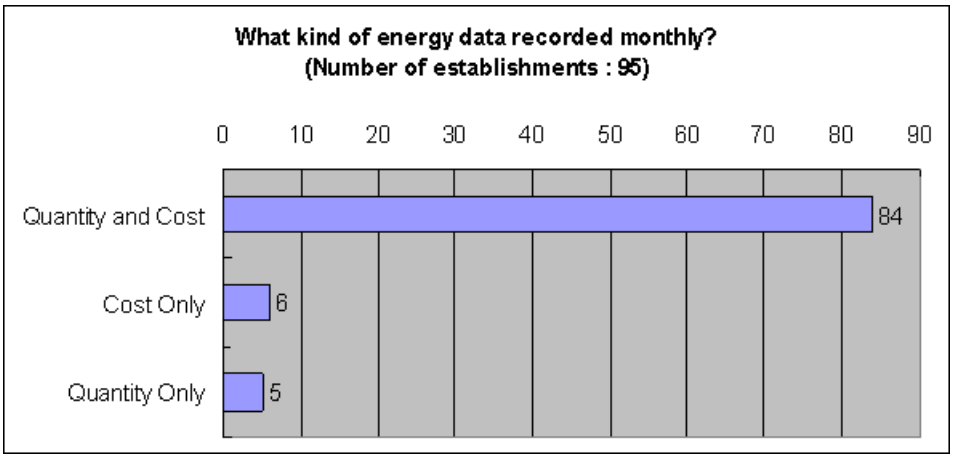


Figure 3-41 Recorded Data

3) In-house promoting team for EE&C measures

83% of respondents answered that there are in-house promoting teams for EE&C measures. The main reasons to promote EE&C is the cost reduction of energy expenses, global warming reduction and CSR (Corporate Social Responsibility).

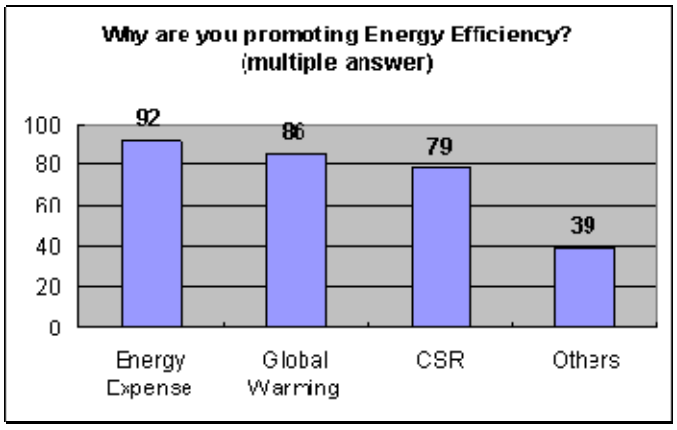


Figure 3-42 Objectives to Promote EE&C

4) Investment on EE&C measures

87% of respondents answered that they have invested on EE&C measures before. Mostly, they invested in lighting installments for EE&C. The general measures being implemented outside investments are tuning off the lights when not necessary including during lunch breaks.

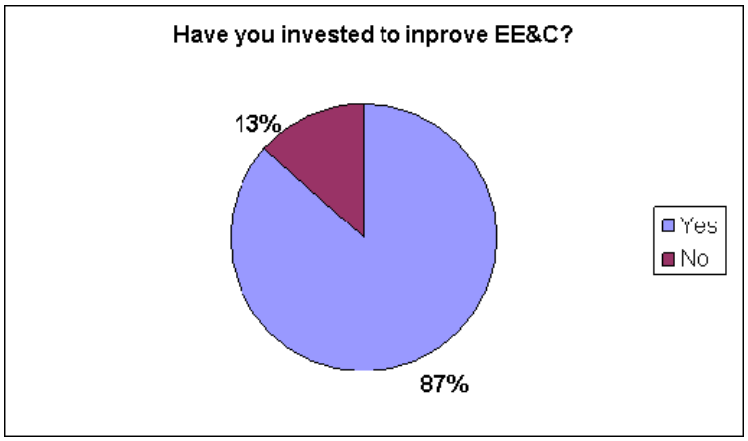


Figure 3-43 Experience of Investment on EE&C

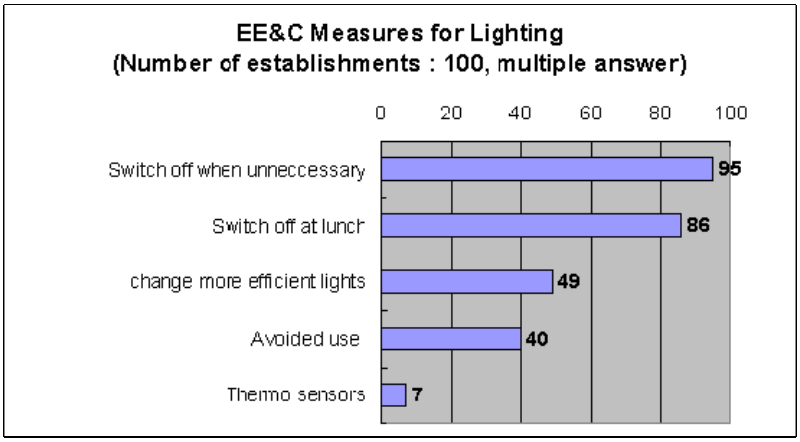


Figure 3-44 EE&C Measures for Lighting

5) Awareness level of IEC campaign by DOE

The awareness level of the Don Emilio EE&C Award is very low, 66%. The information on the EE&C Award is given from the Industry Association to the industrial and commercial sector. On the other hand, with regard to the EE&C training-workshop sponsored by DOE, 63% of respondents have joined, however, others have never even heard of the workshop.

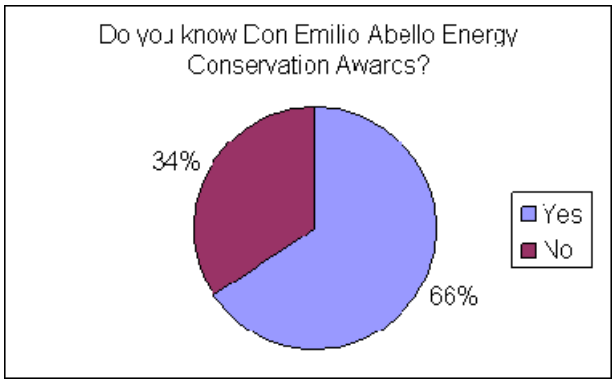


Figure 3-45 Awareness Level of Don Emilio EE Award

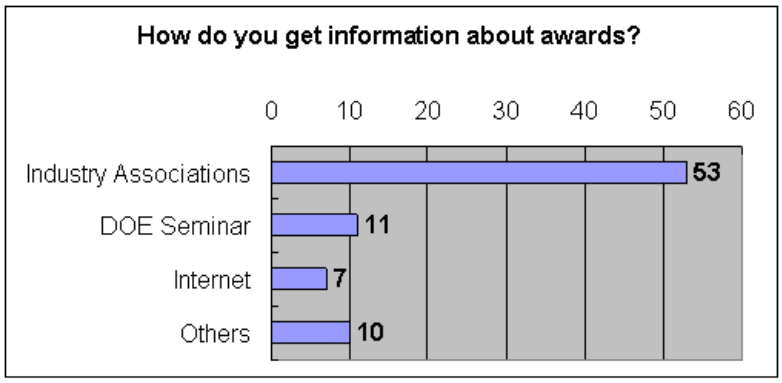


Figure 3-46 Methods of Information Collection

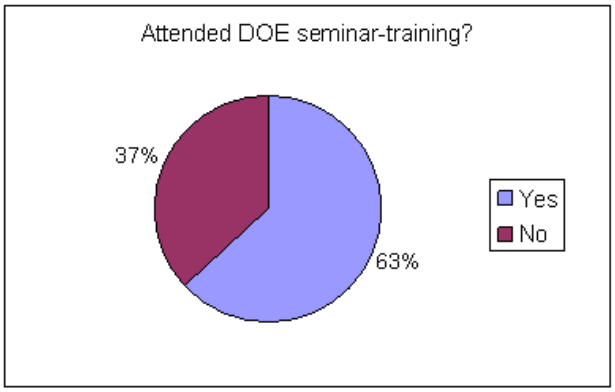


Figure 3-47 Experience of EE&C Training-workshop

6) Certifications

68% of the establishments have not been certified, while others have various certifications of OHSAS (Occupational Health and Safety Assessment Series) and others. OHSAS18001 and SA8000 are the international standards for the labor environmental assessment. The TS16949 is the management system standard in the car industry.

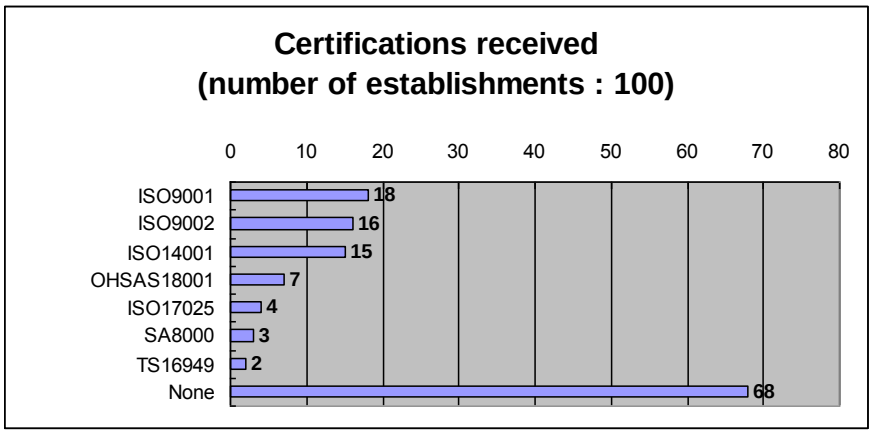


Figure 3-48 Establishments of the Certificated

7) Other comments

The awareness level of the IEC campaign by DOE is very low, so DOE should conduct more and more mass media campaigns.

With a chance to join the EE&C training-workshop, we would like to join. We have never known the workshop until now. The DOE should inform more establishments.

Residential Sector:

1) Information Sources

TV/cinema, Print ads (newspaper and magazines), utility providers and the internet are effective sources when it comes to disseminating information in the residential sector.

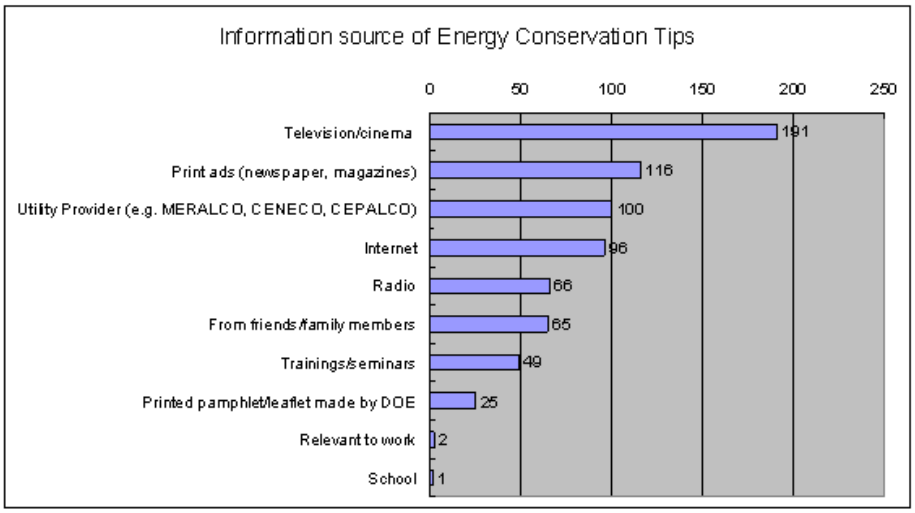


Figure 3-49 Information Source of EE&C Tips

As the distribution spot for EE&C tips, many respondents prefer “on the internet (including social networking)”, commercial places, schools and the local public offices of the DOE and other departments.

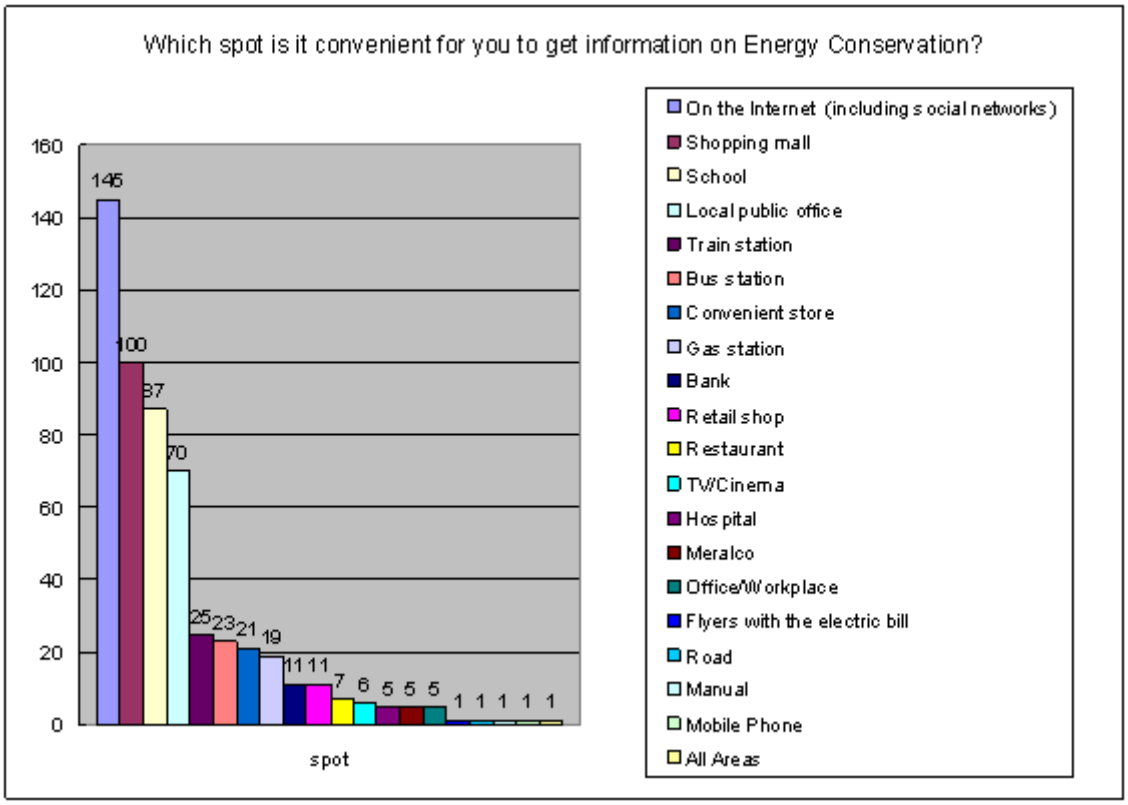


Figure 3-50 EE&C Tips Distribution Spot

2) EE&C behavior

96% of respondents already have already incorporated EE&C activities into their home lifestyle. Especially, EE&C measures for lighting is easy to conduct.

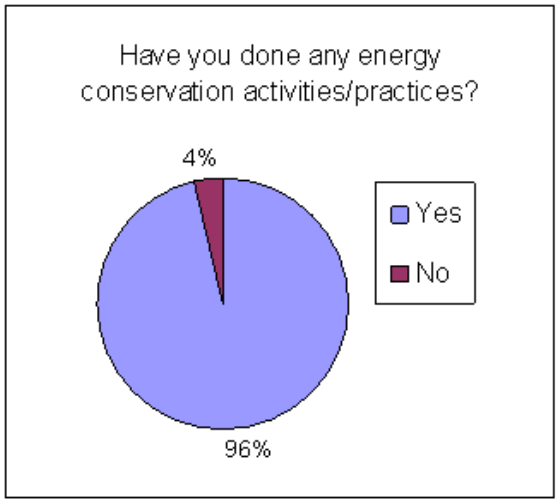


Figure 3-51 EE&C Activities

Table 3-8 Representative EE&C behavior at Home

EE&C measures	Yes	No
Turn off or disconnect electrical appliances/items that are not in use	212	2
Set the air conditioning thermostat at the highest comfortable temperature as possible.	64	26
Turn off your air conditioner when you leave a room for a long time	119	15
Clean or change filters for air conditioning systems regularly	100	17
Set the appropriate refrigerator thermostat setting	165	13
Minimize the opening of refrigerator door	170	14
Turn off lights that are not used	199	0
Do not place the refrigerator near the stove/oven or any appliances that generate heat	133	16
Regularly defrost refs and freezers	146	15
Check for leaking gasket/ door seal of refrigerators	119	23
Use public transportation such as train and bus more often than own car	113	22
Saving water when taking shower	130	17

3) Awareness level of IEC campaign by DOE

Regarding the IEC campaign by DOE, there are many answers of "don't know" or "have heard/seen/taken". Energy efficiency lighting, Energy efficiency lighting, air conditioner and refrigerator are regarded as easy measures having a high-level of awareness. In the transportation sector, carpooling is the most popular measure.

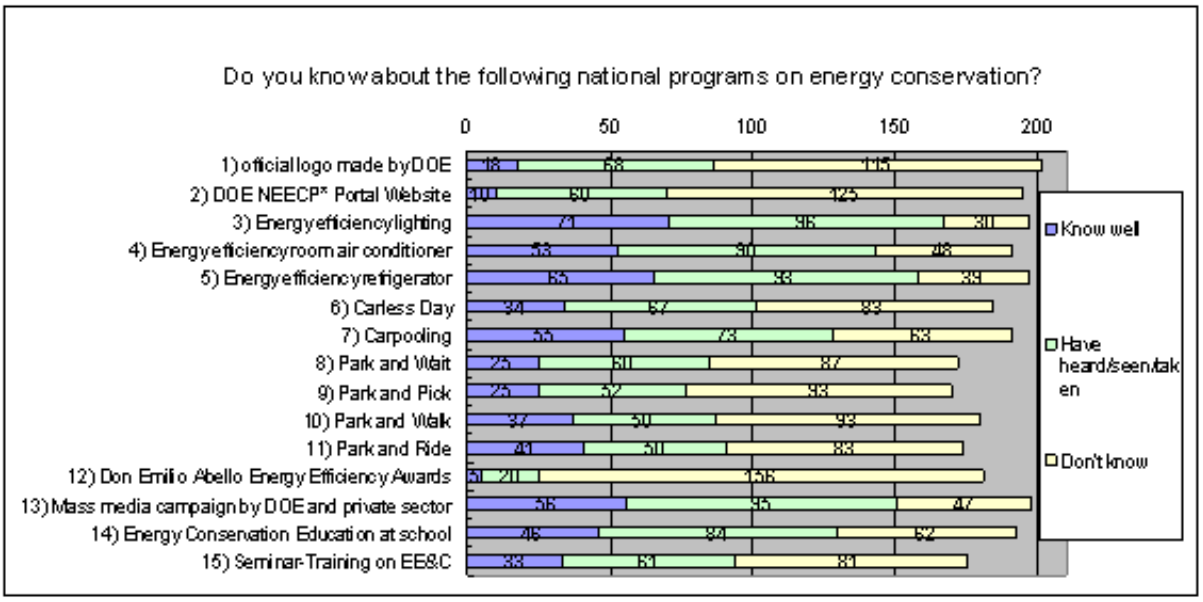


Figure 3-52 Awareness Level of IEC Campaign on EE&C by DOE

4) Lighting

CFL is utilized in many households. 46% of respondents have one or more CFLs. This may be the effect of the ADB project of 13 million compact fluorescent lamps (CFLs) being distributed to residential and other customers to reduce peak power demand.

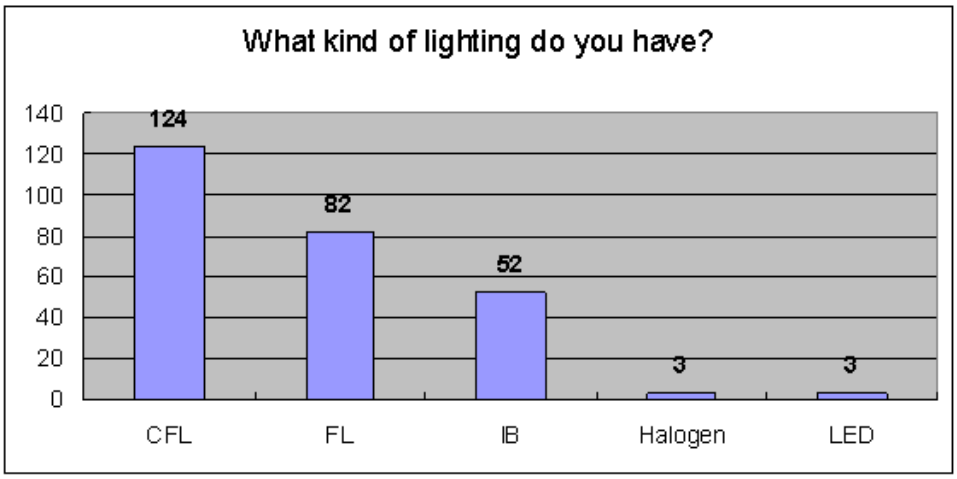


Figure 3-53 Number and Type of Lighting

5) AC and Fan

85 residences, 36% of respondents have one or more ACs. (NSO survey 2004 indicated that only 6% of all the Philippines have ACs. The local survey of the Study was conducted only in cities, not villages, so the result is more than the average rate.) Controlling AC temperatures is regarded as an EE&C measure. 72% of respondents are aware of the temperature level More than 70% of the respondents use the AC everyday.

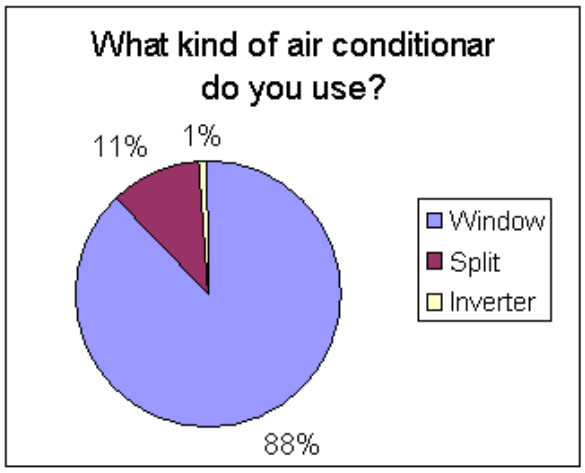


Figure 3-54Types of AC

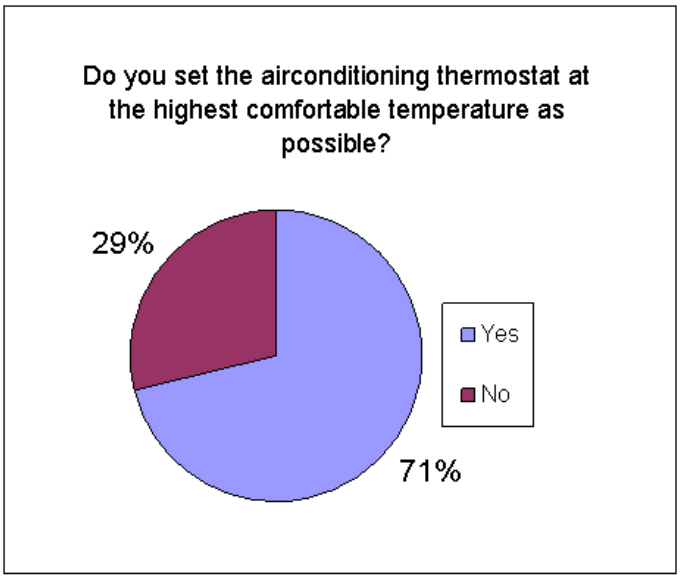


Figure 3-55 Awareness on Temperature Control of AC

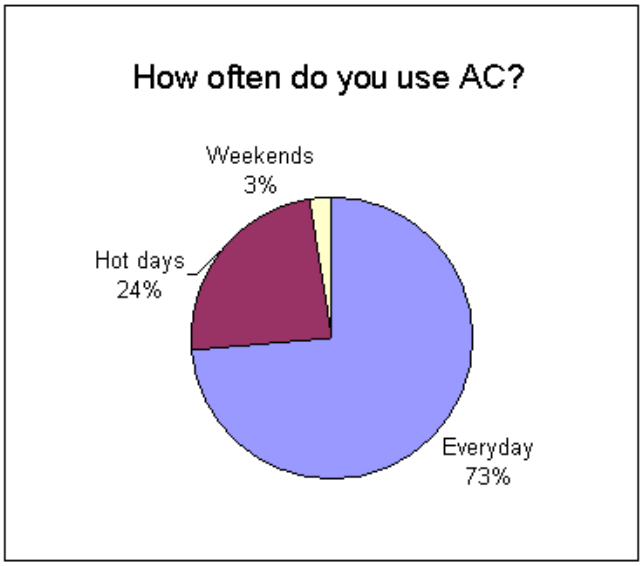


Figure 3-56 Frequency of AC Use

On the other hand, 159 residences, 67% of respondents have one or more fans. The number of residences who have fans is twice as many as ACs. (NSO survey 2004 indicated that 74.1% of all the Philippines have fans. The local survey of the Study was conducted only in cities, not villages, so the result is more than the average rate.) The three types of fans are the Standfan, Deskfan and Wallfan. The AC is difficult to buy because the initial cost is very expensive based on the average income in the Philippines. Compared to that, the fan is very cheap and easy to install in each room. The Standfan is the most popular type of fan, the average number of respondents is 1.5.

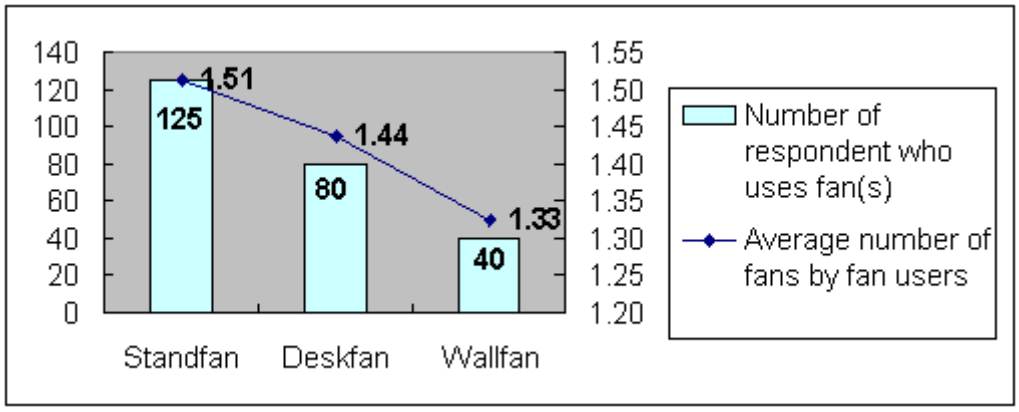


Figure 3-57 Number of Respondents Who Use Fan and Average Number of Fans

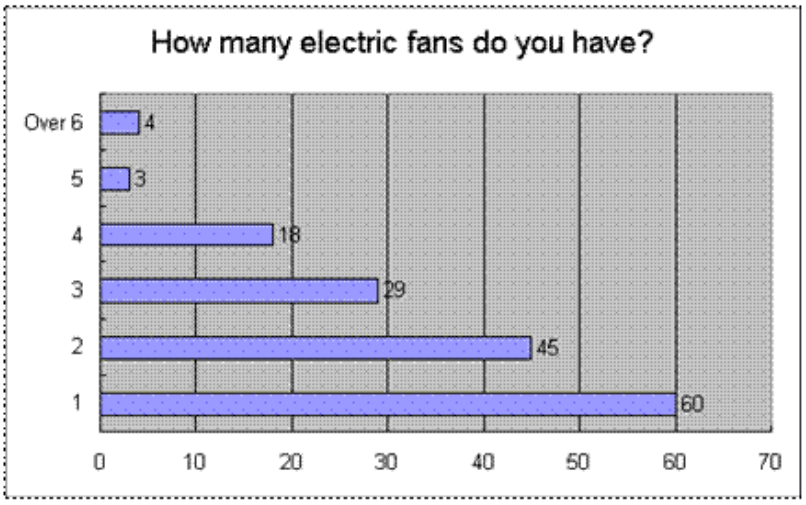


Figure 3-58 Number of Fans

6) Other comments

-The dissemination of EE&C information to consumers is insufficient. The DOE should cooperate with the private sector and religious groups to implement an IEC campaign not only in cities, but also barangay.

-As a school curriculum, the EE&C concept should be taught in various schools. Furthermore, EE&C education should be conducted in public.

-An awareness survey itself is effective as an IEC campaign, so this should be continued periodically.

(3) Energy Consumption Situation etc.

Electricity consumption data of each sector's respondents are as follows.

Regarding the commercial sector thirty-eight(38) users answered the questionnaire and the monthly sum of their consumption data is shown in the following graph. The consumption levels of May and June are relatively high. This may have been caused by an increase of AC use corresponding to high temperatures. As for the share of the types of businesses, the sum of hotels and office buildings exceeds sixty percent (60 %).

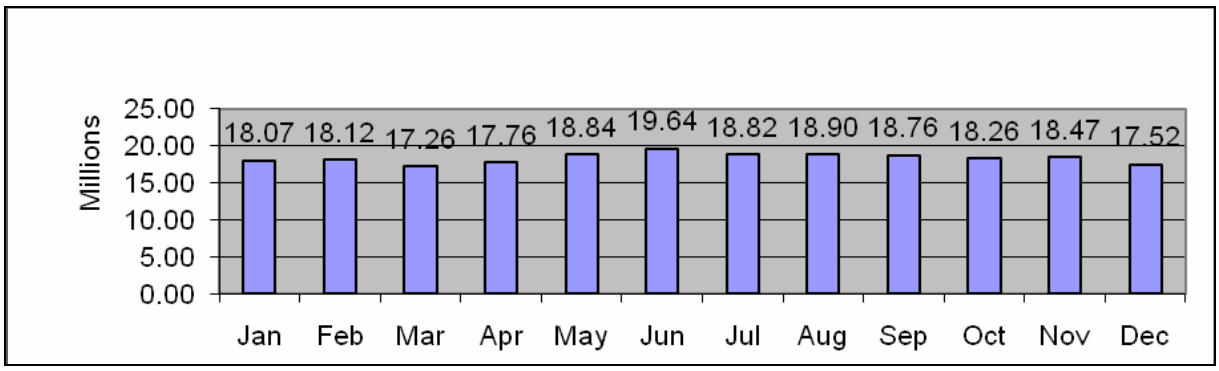


Figure 3-59 Monthly Electricity Consumption of Commercial Sector (2010: GWh)

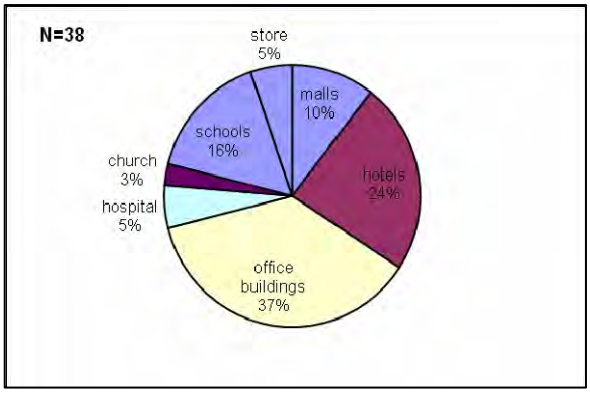


Figure 3-60 Share of Types of Business in Commercial Respondents

Regarding the industrial sector sixty-two (62) users answered the questionnaire. But after removing the respondents of water supply and sewerage utilities, twenty six (26) respondents remained. The following graph shows the monthly sum of their consumption. No determinate law cannot be seen in the data. The consumption levels are much influenced by the product activities of users in this sector. As for the shares of the types of businesses, food has the largest share (34%).

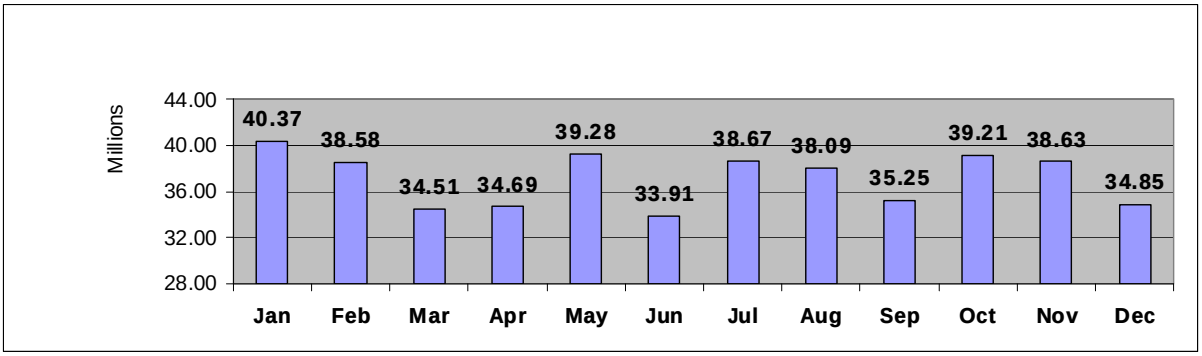


Figure 3-61 Monthly Electricity Consumption of Industrial Sector (2010: GWh)

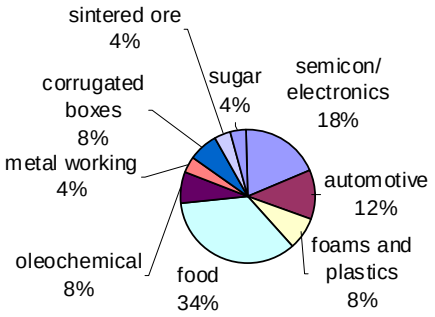


Figure 3-62 Share of Types of Business in Industrial Respondents

In the residential sector, the monthly consumption data is not collected but the highest and lowest monthly consumption data in the previous year of each respondent is collected. The average of the highest monthly consumption is 338kWh which is more than 1.6 times larger than that of the lowest month, which is 208 kWh and it might be caused by AC use.

Table 3-9 Highest and Lowest Monthly Electricity Consumption of Residential Sector

	Highest Month (March to May)	Lowest Month (June to November)
Total kWh / month	54,018	33,295
Total No. of Respondents	160	160
kWh/Respondents	338	208

The average daily operation hours of AC at the households is six (6) hours per the result of the questionnaire although there is little fluctuation.

Table 3-10 Number of Households by AC Operation Hours

Operation hours (a)	METRO MANILA	CAGAYAN DE ORO	BACOLOD	Number of Households (b)	(a) × (b)
1	2		3	5	5
2	3	1	1	5	10
3	3		3	6	18
4	15	2	1	18	72
5	9		1	10	50
6	10	1	2	13	78
7	4	1	2	7	49
8	10	4	1	15	120
9	1			1	9
10	1	1	2	4	40
11		1	1	2	22
12	1	1	4	6	72
13				0	0
14				0	0
15	1			1	15
Average					**6.0**

Regarding the share of the AC type within the respondents who possess AC, a window type has a large share that is 88% and the split type has 11%. Only respondents have ACs with inverters.

Table 3-11 Number of Households by AC Type

	Window-type	Split-type without Inverter	Split-type with Inverter	Total
No. of Respondents	79	10	1	90
Ratio	87.8%	11.1%	1.1%	-

Possession rate of air-conditioner: 37.8% 90/238
(No. of respondents for which have AC(90)/Total respondents of questionnaire(238))

When respondents are going to purchase home appliances, the first priority in choosing equipment is the “price” and the second is “energy efficiency” according to the survey.

Table 3-12 Priority to Choose Home Appliances

	6	**5**	**4**	**3**	**2**	**1**
Price	12	9	18	28	38	65
Brand/Maker	24	20	27	36	33	37
Energy rating/energy efficiency	16	17	21	30	41	56
Design	39	45	32	15	12	7
Functions/features	59	24	43	34	32	26
Capacity	40	45	36	21	17	8

Note: 1 being the priority

Regarding the term to recover the investment cost when the respondents are going to purchase equipment, two (2) to (3) years was the most popular answer in the commercial and industrial sectors. A very short term is required to recover investment cost in the Philippines.

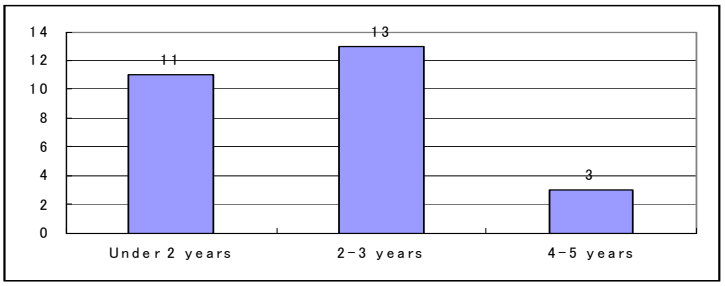


Figure 3-63 Expected Payback Period of Investment (Commercial sector)

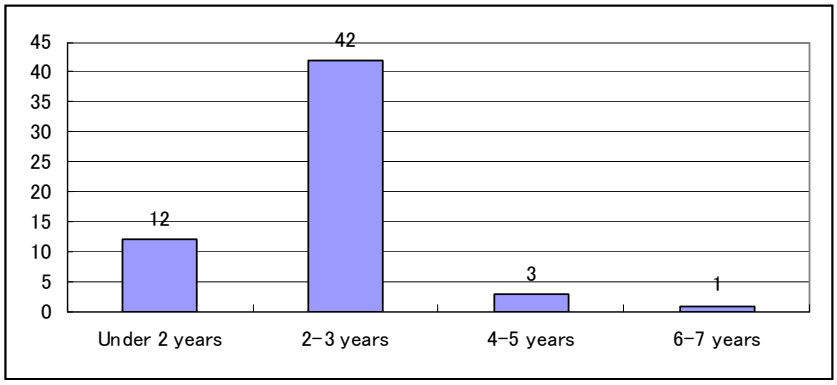


Figure 3-64 Expected Payback Period of investment (Industrial sector)

The economic efficiency realized by improving the energy efficiency of AC in households that has a large impact on electricity consumption will be evaluated in chapter 11 “Finance Mechanizm”.

3.4 Site Visit Survey

The Study Team had site visit surveys thanks to DOE’s introduction in order to grasp technology level and activities & awareness for EE&C on sites. Four sites were visited; one from industrial sector and the others from commercial sector. All received Don Emilio Awards in the past and are at the level of best practice so that they do not indicate average level in the Philippines. The summary of the site visits, however, is described below for reference.

(1) Energy Management

- ✓ They have received Don Emilio Awards and have been managing energy with dedicated care such as from planning, implementation to evaluation.
- ✓ The factory achieved EE&C with more than 20% improvement in energy intensity.
- ✓ Although one of them tried to utilize energy intensity as an indicator, it was difficult to manage it, since the denominator considers fluctuating factors (number of customers and

visitors, use rate of reception, etc.) On the other hand, another of them sets common benchmarks over the group companies for energy management, e.g. target energy consumption, 168 kWh per air-conditioning area m^2 for the previous year and 164 kWh, minus 2.3%, for this year

- ✓ The staff in charge of energy management have finished (the 1st) training and certification course for energy managers by AEMAS.
- ✓ There are much room to learn from them not only in terms of technologies but also in terms of raising awareness of employees which has been conducted positively.
- ✓ They are planning to apply for ISO50001. However, they seemed, by the observation of the Study Team, to be slightly hesitated, because they already have implemented energy management and ISO50001 will increase paper work.

(2) Energy Audit and Investment for EE&C

- ✓ One of the criteria for investment, a payback period is about 2 years.
- ✓ It is acceptable to receive energy audits by the third parties with nondisclosure agreement. In case of a shopping mall of commercial sector, there was a opinion that it may make it easier to persuade the board with evaluation by outsiders.
- ✓ A ratio of energy cost out of the whole cost is from approx. 5% to 10% (in case of a shopping mall).

(3) Technological Aspects

- ✓ Own generators were set for blackouts. However, the ratio of electricity supply by own generators has been decreasing, since supply reliability of MERALCO has been improving and grid electricity has been cheaper compared to that of own generation.
- ✓ Inverters have been introduced and utilized in both cases.
- ✓ A measure to add additives to refrigerant of refrigerators has been implemented in both cases to improve EE&C.
- ✓ Power factors have also been managed.
- ✓ Energy consumption by air-conditioning consumes approx. 60% of the total in case of the shopping mall. The room temperature has been set at 22℃.

(4) Opinions about EE&C Law

The followings are the opinions for EE&C Law.

- ✓ It is preferable to avoid a measure which limits energy consumption in amount, since it limits economic activities.
- ✓ There was a case that energy intensity based on shipping price had been checked for evaluation. However, it became uncontrollable, since it was effected greatly by its market price.
- ✓ Websites or database on energy management and EE&C will contribute to dissemination of energy management.

3.5 Current Situation and Issues by Sector

3.5.1 Power Sector

(1) Existing Legal System and Activity

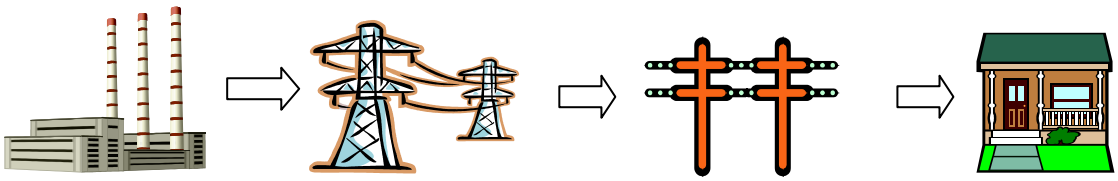
①Role of the DOE for the Power Sector and efficiency indicator

An excerpt concerning the role of the DOE from the Department of Energy Act of 1992(RA7638) which amended coinciding to the establishment of EPIRA is shown below.

- Formulate policies towards the planning and implementation of a comprehensive program for the efficient supply and economical use of energy
- Ensure the reliability, quality and security of electric power supply

The indicators to check the efficient supply of energy that is supposed to be the thermal efficiency (heat rate*) for generation sector and system loss rate for the transmission and distribution sector.

* Heat rate: Heat rate (Btu /kWh) is applied for the indicator of generation efficiency in the Philippines. On the other hand, thermal efficiency (%) which is the inverse of the heat rate is applied usually in Japan.



The following is the current situation of regulation and activity concerning the indicator of energy efficiency

② Activities to Improve the Generation Sector's Heat Rate

The following is an explanation for the scheme to promote generation efficiency of each power plant owned by IPPs and NPC. The explanation per each contract type.

ⅰ) Bilateral Contract and supply to WESM

IPPs procure fuels by themselves to supply electricity for the bulk user under the bilateral contract and spot market WESM. Therefore, they can reduce fuel consumption and its costs by improving the heat rate. As the result of the fuel cost reduction, they can increase their profits and competition in the spot market. Hence, the improvement of the heat rate might work as an incentive for them.

ⅱ) Case of the PPA between NPC and IPP contains regulations for the Heat Rate

IPPs can obtain the necessary amount of fuel from the NPC to generate electricity for the NPC under the PPA between NPC and IPP. Therefore, some PPA incentives to improve heat rate are stated to

promote both reduced fuel consumption and fuel costs. For instance, one concrete method of incentives for a coal power plant is as follows. NPC tests the actual heat rate under the rating capacity operation annually and compares it to the guaranteed heat rate that is showing signs of age degradation. If the tested heat rate is lower than the guaranteed one, an incentive will be given to IPPs in proportion to the assumed reduction of coal consumption. (refer to Figure 3-58)

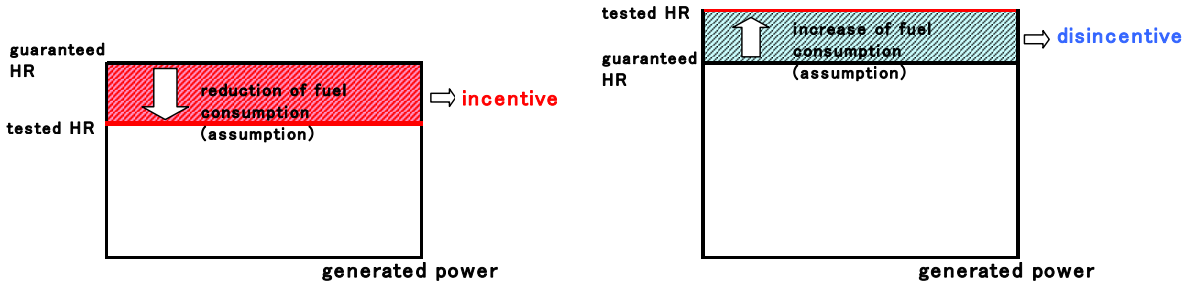


Figure 3-65 Method of Incentive by Tested Heat Rate

This incentive method is recognized as an efficient scheme to improve power plant operations by ERC The interviewed IPP submits the data as a daily report to the DOE, NPC, IPPA, EPIMB, NAPOCOR etc. such as the generated amount, the fuel consumption, the running and suspended period of the plant and reason for suspension.

iii) The NPC-owned plant and the case of the PPA between NPC and IPP not contain regulations for the Heat Rate

The ERC sets the Heat Rate Cap for each plant as a benchmark that is at the lowest annual average heat rate in the last three (3) years. The ERC promotes efficient operations by leveling a penalty to the utilities if their actual heat rate exceeds the heat rate cap due to inefficient operations and incentives are handed in an opposite case scenario.

The ERC sets the Heat Rate Cap for each grid and fuel type before it changed to the set for each plant now. The heat efficiency data which is the common index in Japan written in the righthand side of the table below is calculated based on the heat rate for reference purposes.

Table 3-13 Proposed Heat Rate Caps Updated to 2007

Plants	Proposed HR Cap (BTU/kWh)	(Ref.)Heat Efficiency
CALACA	11,439	29.8%
LIMAY(BLOCK A)	9,907	34.4%
LIMAY(BLOCK B)	9,912	34.4%
NAVOTAS	11,785	29.0%
BDPP	9,447	36.1%
PB101	9,351	36.5%
PB103	9,238	36.9%
PDPP	9,251	36.9%
PB102	9,175	37.2%
PDPP3	8,848	38.6%
NMPC1	9,307	36.7%
NMPC2	8,949	38.1%
PB104	9,134	37.4%

(Source: ERC document)

③Regulation and activity in the Transmission Sector

ⅰ) Regulations by ERC

MAR(Maximum Allowable Revenue: PHP/kW) which is allowed to TRANSCO(NGCP) to impose an electricity charge is calculated according to the ERC approved formula, then approved via a public hearing. That formula has the mechanism to reflect the utility's effort for efficiency. Utilities can take advantage if they could reduce transmission loss.

MAR on 2011 is going to refer to the public hearing (as of June 20, 2011). The total amount is increased but the unit rate per k W is dropped compare to the 2010 data reflecting NGCP's operational efficiency which operates the transmission work as a stand-in substitute of TRANSCO.

Table 3-14 MAR for TRANSCO

	TOTAL Php million	Indicative Average Php/kW	note
2011	46,284.78	364.27	before public hearing
2010	44,991.45	366.92	actual
difference	1,293.33	−2.65	

(Source: NGCP website (accessed June 20 2011))

④Regulation and activity in the Distribution Sector

ⅰ) Regulation by ERC

The System Loss Cap for the distribution utilities that is reflected into the electricity charge had been regulated by RA 7832 from 1995 until 1999 but no further cap is considered after that.

The new system loss cap was set by the ERC which is established after the enforcement of EPIRA. And now the cap for PU is 8.5 percent and for EC is 13 percent. (refer to Table 3-4)

The MAP (Maximum Allowable Price: PHP/kW, PHP/kWh) which is approved by the ERC is calculated reflecting those System Loss Cap. Hence, it has a mechanism to enhance the reduction of distribution losses.

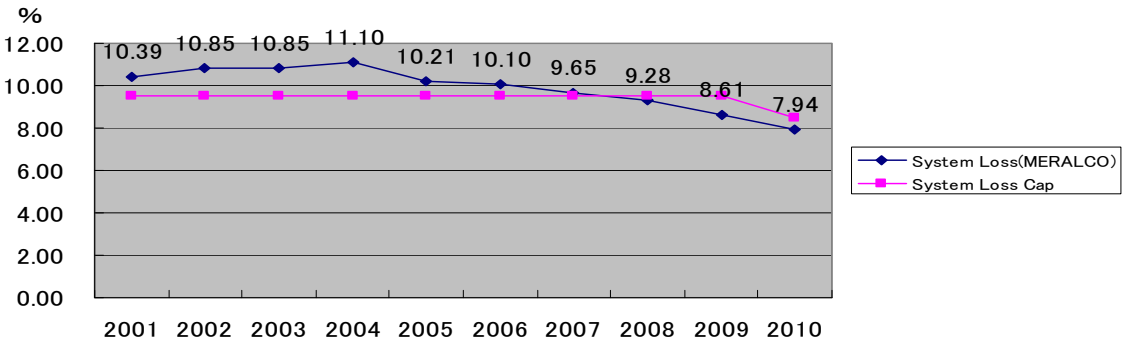
Table 3-15 Recoverable Systems Loss

	1995	1996	1997	1998	1999	⇨	2010
Private Utilities	14.50%	13.25%	11.75%	9.50%		⇨	8.50%
Electric Cooperative	22.00%	20.00%	18.00%	16.00%	14.00%		13.00%

(Source: ERC document)

ⅱ) Activity of Distribution Utilities

The Philippines biggest private distribution utilities MERALCO has made a continuous effort to reduce distribution losses. (refer to Figure 3-27) The main objective to reduce distribution loss was Non-Technical Losses due to electricity pilferage, and recently it has changed to Technical Loss. Hence, MERALCO has been implementing investments to replace their transformers.



(Source: MERALCO Annual Report 2010)

Figure 3-66 MERALCO's Distribution Loss and System Loss Cap

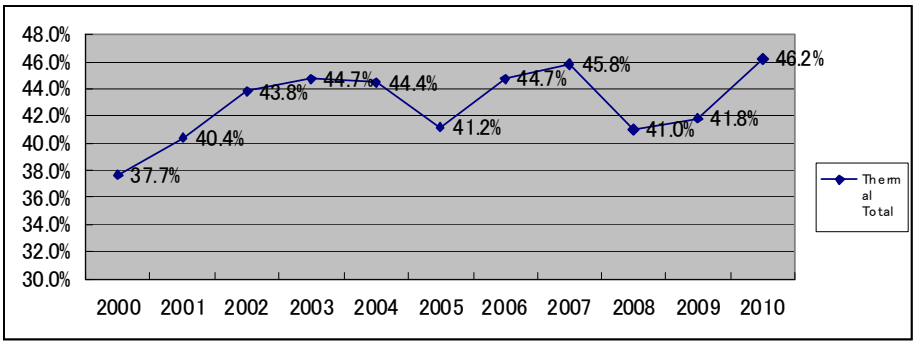
ECs average distribution loss was nearly seventeen (17) percent over ten years ago. It has declined to under fifteen (15) percent in 2007.

JICA is implementing a Project on System Loss Reduction for the Philippine Electric Cooperatives (EC's) from March 2011 to March 2013. In that project, JICA will support ECs on the engineering and capacity building of the plan to support the promotion of the distribution system loss reduction.

(2) Grasp of the Current Situation (energy efficiency data etc.)

i) Actual data of Heat Rate

Though the data from ERC was not available, the Study team created its own temporary data of thermal efficiency. The data was calculated by dividing electricity generation by fuel consumption. Each data for the calculation could be gotten from the statistics of DOE and the results of the calculation are shown in the following figure.



(Source: The study team supposed from the data of DOE's statistics)

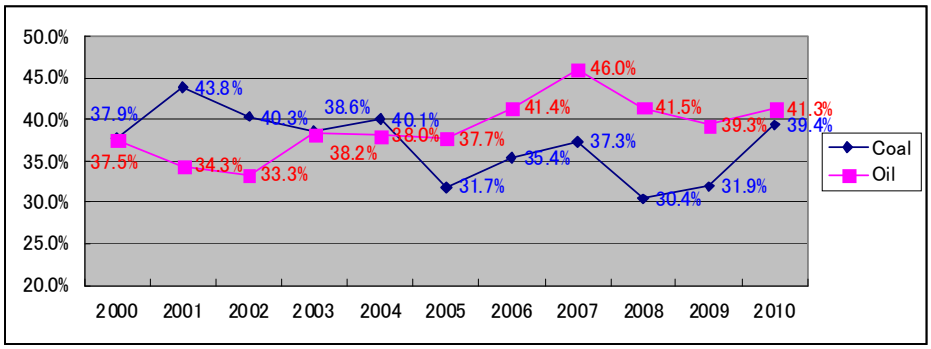
Figure 3-67 Thermal Efficiency (*) of Thermal Power Plant

(*) efficiency calculated by dividing electricity generation by fuel consumption using DOE's energy statistics (different from so-caooled "thermal efficiency")

As the figure 46.2% as of 2010 is abnormally high, it is suspicious whether the supposed data is directly referring to thermal efficiency or not. However, the ten years historical data from 2001 to 2010 which are scattered between 41% and 46% cannot be evaluated as getting better or worse.

The supposed thermal efficiency of coal-fired power plants and oil-fired ones are shown in the following

figure. They are also fluctuating widely.



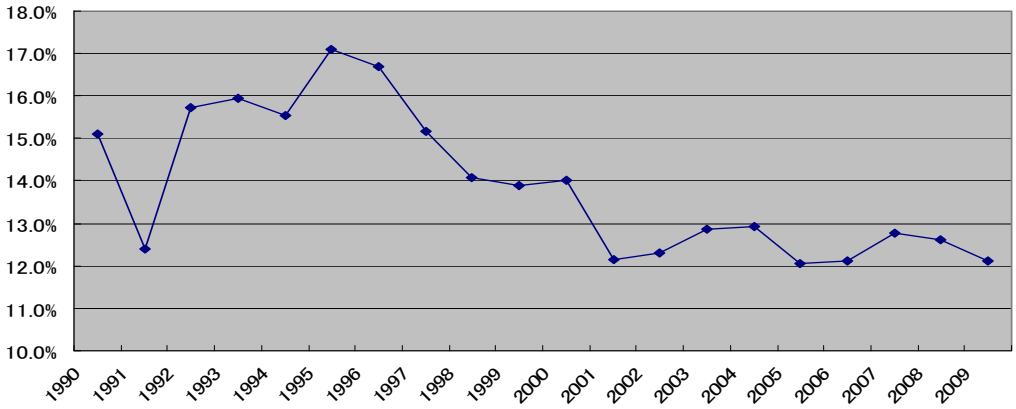
(Source: The study team supposed from the data of DOE's statistics)

Figure 3-68 Thermal efficiency (*) of Thermal Power Plant (Coal and Oil)

(*) efficiency calculated by dividing electricity generation by fuel consumption using DOE's energy statistics (different from so-called "thermal efficiency")

ii) Actual data of Transmission and Distribution Loss (hereinafter T/D Loss)

Refer to the T/D Loss rate over last two (2) decades that can be divided into two periods. In the 1990s it showed the highest data at 17.1 percent in 1995 and the data for the other years are at around 15 percent. However, after the establishment of EPIRA in 2001 the data stabilized below thirteen (13) percent. The most recent rate was 12.1 percent in 2009. (refer to Figure 3-28, Table3-5)



(Source: DOE document)

Figure 3-69 The Chronological Data of T/ D Loss Rate

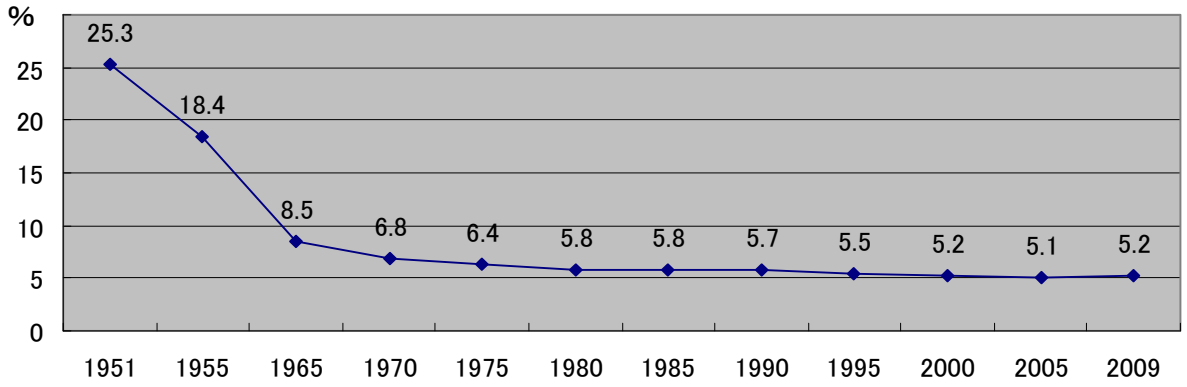
Table 3-16 The Chronological Data of T/D Loss Rate

(GWh)

	1990	1995	2000	2001	2005	2009
Electricity Generation	26,327.00	33,554.00	45,290.00	47,049.04	56,567.74	61,934.43
T/D Loss	(3,980.00)	(5,735.00)	(6,345.44)	(5,712.66)	(6,817.17)	(7,512.22)
Energy Sector Use	(1,134.00)	(1,226.00)	(2,389.79)	(2,196.09)	(4,591.17)	(3,524.37)
Net Domestic Supply	21,213.00	26,593.00	36,554.77	39,140.29	45,159.40	50,897.84
T/D Loss Rate	15.1%	17.1%	14.0%	12.1%	12.1%	12.1%

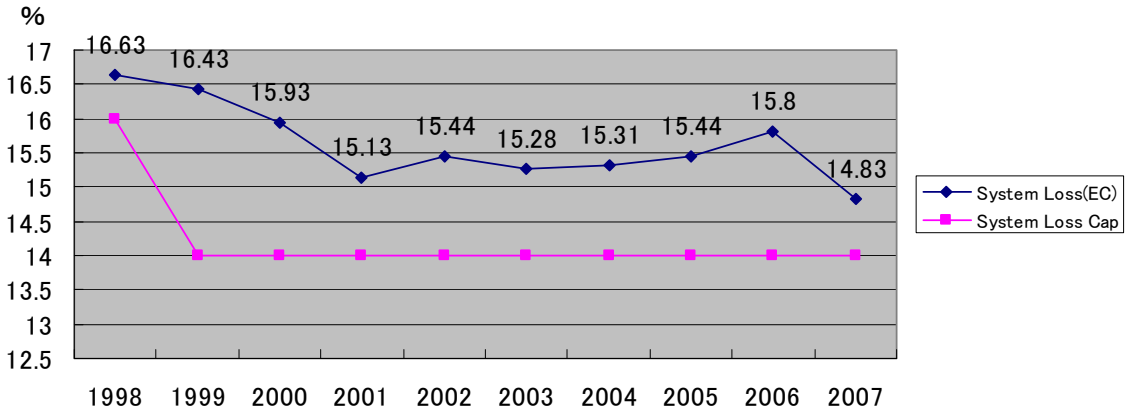
(Source: DOE document)

At the present moment, the Philippines T/D Loss rate is twice as high as Japan's. One of the reasons is the high distribution loss rate of many ECs whose size are small.



(Source: Denki Jigyou Binran 2010)

Figure 3-70 The Chronological data of T/D Loss Rate in Japan (Average rate of 9 utilities)



(Source: ERC document)

Figure 3-71 The Chronological data of Distribution Loss Rate of EC (simple average) and System Loss Cap

(3) Theme and Points to Note for Support

Regarding energy efficiency in the Power sector, some regulations by ERC and the activities of utilities are already being implemented in the generation, transmission and distribution sector. However, ERC regulation is effective on the process of rate approval. ERC is not supposed to implement direct instructions and support based on the periodical report of operational data reported by the utilities.

It is important for the DOE to carry out technical and financial support for the utilities as well as grasp, analyze and utilize the efficiency of the index in cooperation with the ERC.

It is necessary to consider the following to realize it; adjustment of the way to get data from utilities so as not to increase the utilities' workload, negotiation to clarify the roles of ERC and DOE concerning analysis and utilization of data, the available contents of technical and financial support.

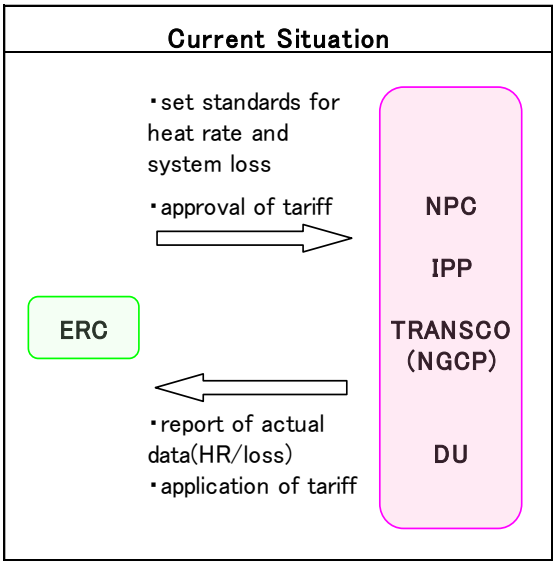


Figure 3-72 Regulation and Report between ERC and Utilities

In the existing Enercon Bill, namely the Angara Bill(SENATE BILL No.2027)which has already been submitted to the Senate and awaiting deliberation, the main targets are the Power and Transportation Sector and the stated method to improve efficiency is as follows. The degree of awareness concerning the Power Sector issue has been inferred from that.

<For reference> An excerpt of the statement for the Power Sector in Angara Bill

- The ERC in coordination with the DOE shall monitor plant efficiency improvement programs implemented by generation companies.
- All Distribution Utilities shall reduce system losses to percentage levels duly determined by the ERC to protect consumers from unreasonable electricity rates.
- The DOE shall steer the provision of the necessary technical assistance and formulation of efficient technology leading to System Loss Reduction
  - The DOE together with the DOST shall sponsor and intensify research and development in systems loss reduction technologies.
  - The DOE and ERC shall intensify technology transfer on efficient transmission and delivery

systems through the conduct of trainings and seminars to Distribution Utilities covering effective approaches to reduce systems loss.

- The ERC shall impose the submission among Distribution Utilities of a monthly performance report on Systems Loss Reduction of all Distribution Utilities. These reports will aid the DOE to identify Distribution Utilities that need monitoring and technical assistance.

- Each Distribution Utility shall bi-annually submit an Electricity Distribution Network Enhancement Plan. The Enhancement Plan shall be considered an Energy Efficiency project and shall be entitled to incentives.

- To further strengthen the government's initiatives in energy efficiency and conservation, an appropriate and equitable Time of Use Rate Mechanism shall be determined.

3.5.2 Industrial Sector

This section grasps and analyzes the current situation and issues of energy consumers in the industrial sector.

(1) Current Situation of Energy Consumption

1) Energy Consumption

As shown in Figure 3-6, the industrial sector consumes a third in volume, following the transport and residential sectors and its proportion is 24.2%. It shows a steadily increasing trend since the 1990's and although it has remained at the same level since 2002, it surely is a large energy-consuming sector.

2) Power Consumption

As shown in Figure 3-23, the industrial sector has been consuming 33.6% as of 2009, only second to the residential sector (34.4%). The increasing rate is 2.9% during the period from 1990 to 2009.

3) Energy Intensity Data

The energy intensity data per each sub-sector is necessary for the benchmarking method and the DOE has been eager to collect the data, but up until now, it has not been collected yet. (The DOE has been requested to provide sample data, although it is not benchmarking data.)

4) Tariffs and Prices of electricity and energy

The unit price of electricity, depending on each condition, was reported as being approximately 6 to 8 PHP/kWh (14 to 18 JPY/kWh). It is higher than Japan's. Furthermore, when the price of goods and power purchase parity are considered (which is about 1/10 to 1/20), the energy price becomes much higher and should be expressed accordingly. Gathering from the interviews conducted, they seem to be aware that the price is high and this will serve as an EE&C motivating factor. However, since it has been high for a long period of time, people have become acclimated to such prices and thus subjectively may not feel that the price is so high.

5) Large Energy Consuming Industries

Within the industrial sector, large energy consuming sub-sectors, as shown in 3.1.5 (1), are , in terms of the proportion of final energy consumption, as follows: cement (24.5%), other food (15.7%), sugar

(15.5%) and metal (9.0%), and machinery (8.6%). The food in total covers 36.3%.

The power ratio which is a ratio of the power consumption of the total energy consumption is different amongst the sub-sectors. The power ratio of the industry in total is 25.5%, shown in the C column of Table 3-6. That of the Food (total) is 12.6% but that of sugar, which is the primary industry, is low at 2.6%. Similarly, that of cement is quite low at 3.2%. On the other hand, those of metal and machinery are high being respectively 57.9% and 73.9%.

In the statistics, the power consumption of final energy consumption is calculated as secondary energy. When the power consumption is calculated as primary energy in consideration of generation efficiency and others, the ranking of the large energy consuming subsectors becomes different. A trial calculation is shown in Table 3-6. The energy transformation efficiency is to be assumed 1/3 herewith.

The cement sector was the highest energy-consuming sector in terms of final energy consumption, but other food reached the top echelon followed by machinery and metal (refer to D column). The reason is that these industries that have a high power ratio, the energy consumption in the primary energy counts for more than double of those in final energy consumption.

As shown by this calculation, in case the minimum limit is decided by the energy consumption volume, the choice of final or primary energy will affect the volume and the number of targeted energy and energy consumers. In other words, when the energy consumption in final energy is used for the minimum limit, it means that it excludes certain large energy consuming industries as a nation and that it underestimates power consumption as national energy consumption.

Table 3-17 Large Energy Consuming Subsectors (Calculation in final and primary energy)

	<A>	<B>		<C>	<D>		<E>
	Electricity Consumption (ktoe)	Total **Final Energy** Consumption (ktoe)	Ranking	Power Ratio = <A>/<B>	Total **Primary Energy** Consumption* (ktoe)	Ranking	Ratio <D>/<B>
Industry (Total)	1,469	5,768		25.5%	8,751		1.52
Food (Total)	269	2,126		12.6%	2,671		1.26
Sugar	23	894	3	2.6%	942	5	1.05
Other Food	245	1,232	2	19.9%	1,729	1	1.40
Cement	45	1,412	1	3.2%	1,504	2	1.07
Metal	300	517	4	57.9%	1,125	4	2.18
Machinery	367	497	5	73.9%	1,243	3	2.50

Note: As for power generation efficiency, 1/3 is used for temporary estimation to indicate approximate figures.

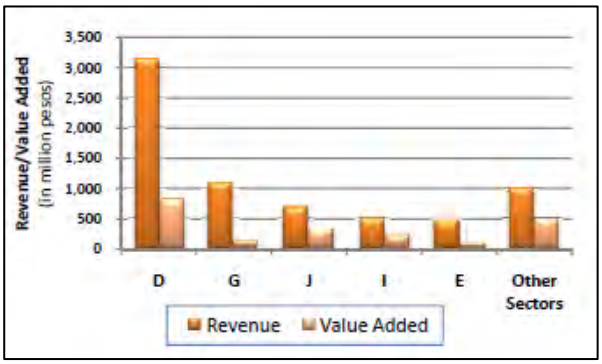
(Source: energy balance of 2009, DOE-EPPB)

6) Main Industries

A statistical survey in 2008 by NSO shows that companies of only the manufacturing sector[2] of the industry account for 4,603 and is the biggest sector, consisting of 21.9% of the total. The revenue of the sector, which is biggest, is 3.2 trillion PHP and 816.5 billion PHP in value added. (D in Figure 3-32 shows the manufacturing sector.) Within the sector, refined petroleum and other fuel products are in the 1st position (PHP 460.5 billion and 14.9%) in revenue and semi-conductor devices and other electronic

[2] "Machinery" in Table 3-6 covers different sub-sectors from the ones of "Manufacturing" due to differences

components are second (with PHP 236.4 billion and 14.1%).



Sector

D: Manufacturing

G: Wholesale and Retail Trade

J: Financial Intermediation

I: Transport, Storage and Communications

E: Electricity, Gas and Water

(Source: 2008 Annual Survey of Philippine Business and Industry (Preliminary Results, NSO))

Figure 3-73 Revenue and Value Added of Industry

(2) Existing Schemes and Support Activities for EE&C

The existing schemes and activities targeting the industrial sector are shown below. (Refer to the corresponding sections of each measure and issues.) There are various activities implemented.

- ✓ Don Emilio Award (Coordinating with Energy Consumption Monitoring)
- ✓ Training/Seminar/Workshop by DOE targeting engineers
- ✓ Energy Audit by DOE, DOST-PCIEERD, DOST-ITDI, MERALCO etc.
- ✓ AEMAS project (ACE) to train and certify energy managers and energy auditors
- ✓ UNIDO Training Project for energy managers of industry
- ✓ UNEP/SIDA project for EE&C (Capacity building for industrial sector)
- ✓ PROMEEC by ASEAN to train engineers in industrial sector

(3) Characteristics of Energy Consumers

The characteristics of energy consumers of the industrial sector are shown below.

1) Person-Awareness

- ✓ It is recognized that EE&C awareness is high due to the high price of electricity.
- ✓ On the other hand, the energy cost is not so substantial in proportion (approx. 5% from the interview). Thus, only the large companies are proactive in terms of EE&C.
- ✓ The aforementioned large companies are aware of the importance of EE&C and contributing towards environmental protection.

2) Person- Knowledge and know-how

- ✓ Director level personnel in the facility department seem to be in charge of energy management. The sites where energy management has been implemented, especially companies who have applied for awards have been implementing energy management quite adequately.

- ✓ Some companies already had their staff to acquire AEMAS qualification of energy managers.
- ✓ Application for ISO50001 seems to be recognized as necessary by large companies.
- ✓ Judging from that energy management manual which was even into the process and supported by PROMEEC, has been very welcomed, medium and small companies need support in the energy audit or assessment even of the process.
- ✓ In usual cases, outsiders are not able to conduct energy audits on the process and the target of the energy audit/assessment is limited to the utility facility (common equipment such as air-conditioning, lighting etc.). Companies do not seem to have energy audit/assessment know-how so there is a need for an energy audit/assessment. Currently, however, they are managing by consulting with sub-contractors etc.
- ✓ The industrial sector retains engineers within their companies so that they are basically capable of energy management.

3) Equipment and System

- ✓ It is reported that for utility equipment, not the process facility, there is a lot of equipment manufactured in the USA, e.g. such as heat generating equipment for air-conditioning. (For example, chillers' manufacturers, Trane or Carrier are common.)
- ✓ As the merits to be had from inverters are understood, they have been introduced. There are cases where inverters are used not by automatic controls but by manual controls to substitute for valve controls.
- ✓ It seems to be common to have their own power generators due to the experience of unstable and unreliable power supply. The supply liability, however, has been improving recently and power supply from the grid is cheaper (about 20%) than that of individual generation, even the price is the highest in Asia. Thus, it appears that the switching from generation to grid supply is becoming a trend.

4) Finance

- ✓ Affordable payback period for investment is reported to be 2 years, and 3 years at the longest.
- ✓ Low interest loan on the project base does not appear to be so attractive to large companies considering that the rate is not substantially low and the procedures are quite complicated.

5) EE&C Potential

- ✓ Regarding EE&C Potential, it is difficult to determine in figures, but it seems to be approximately 10 to 30%, since the system from a generation ago is commonly used.
- ✓ There are cases where inverters are used, but the dissemination rate is unknown.

6) Others

- ✓ An organization, which can facilitate the industrial and commercial sector, is the Philippine Chamber of Commerce and Industry, PCCI.

(4) Issues of Industrial Sector

The issues toward EE&C in the industrial sector are based on the analysis of the current situation as follows.

1. Although the energy price is quite high, it is more likely to consider improving profits by

increasing sales rather than through EE&C cost reductions. Thus, it is necessary to implement IEC measures in consideration of their EE&C worth and impact.

2. Although there are companies that have a high EE&C awareness, even such companies recognize that the criteria for investing EE&C as being 2 or 3 years at the longest, which limits the range of the measures. Therefore, it is necessary to provide information or seminars/training on EE&C measures, the payback period which is short and can be practically implemented through operations and maintenance.
3. The medium and small companies lack financial resources or the willingness for EE&C investment. When not only large companies but also medium and small companies are targeted, there needs to be some supporting financial measures.
4. Regarding utility equipment such as air-conditioning facilities, not the process facilities, it seems that the manufacturers of common machinery are limited. It may derive from high efficient and expensive equipment that is difficult to use due to the strict criteria of payback period.
5. This is slightly redundant to the second item; what is necessary is not the promotion of state-of-the-art technology, but the practical measures via astute operations & maintenance and common technology such as the utilization of e.g. inverters.

3.5.3 Commercial and Business sector

(1) Energy Consumption Conditions

As shown in Figure 3-6 Trend of Final Energy Consumption (by Sector)the commercial and business sector from 2001 to 2008 was constant. However, there was a sudden increase in 2009, and the total final energy consumption rate was about 10%. However, the rate of increase from 1900 to 2009 was 5.9%, and the rates for the transportation, residential and industry were higher than for this sector, but the rate of increase for commercial enterprises and business was the highest.

According to Figure 3-16 Trend of Final Energy Consumption at Commercial Sector from 1990 to 2009, the two factors on the increase are diesel oil and electrical power. Diesel oil is for power generation for private use, so these two items can together be considered to bed electrical power consumption-related. Looking just at Manila and the surrounding urban areas, there is a great number of new large scale commercial and business related facilities and large-scale shopping malls attracting visitors, so we can expect an increase in power consumption to continue in the future.

(2) Existing Energy Conservation Control and Support Activities

Energy conservation control and support activities related to the commercial and business sectors are outlined below. As with the industry sector, it is the entry condition of the Don Emilio Award that facilities the submission of a voluntary quarterly basis energy consumption report to the DOE. Past winners are big company names, yet there are few opportunities for the medium scale enterprises, which have a majority of the reporting target.

While there is no regulatory system, there are voluntary reporting target facilities and enterprise information on the DOE database in order to manage the reports system. A general energy manager is involved in the preparation and drafting of this report documentation, so large-scale enterprises with

surplus human resources can designate an in-house energy manager. To this end, a report can be submitted to the DOE, and it is the case that it is easy to apply for previous awards (please refer to the conditions and subject sections of each policy for details).

- ✓ Don Emilio Award (Energy Consumption Monitoring)
- ✓ Training/Seminar/Workshop by DOE targeting engineers
- ✓ Energy Audit by DOE, DOST-PCIEERD, DOST-ITDI, MERALCO etc.
- ✓ AEMAS project (ACE) to train and certify energy managers and energy auditors

(3) Energy Consumer Characteristics

So far, the survey could be carried out based on an introduction from the DOE, with a visit paid to large-scale commercial buildings and interviews with the energy manager. This survey information centrally analyzed and the contents are somewhat biased towards large-scale enterprises. From now on, efforts will be made to get a firm understanding of medium-sized enterprises, based on inspections carried out by a designated local consultant.

1) Awareness

- ✓ As with the industrial sector, electricity costs are high, so energy-saving awareness is high.
- ✓ Full-time or additional duties as an energy manager are not required, and it is only for some large-scale enterprises who can secure skilled people who are highly aware of energy saving.
- ✓ If ISO14001 certification has already been obtained, it is easy to make the connection between reductions in environmental impact and energy savings

2) Knowledge

- ✓ Energy managers at large scale enterprises are actively acquiring specialized knowledge from ESCO and facility construction companies. (There might be few opportunities for medium-sized enterprises to obtain information)
- ✓ In 2011, we saw the beginning of activities towards acquiring AEMAS Energy Manager Certification at large-scale enterprises. If we take part in the AEMAS training (3 days), then they can learn about overall energy management from the management side.
- ✓ In the industrial sector, there is the responsibility for the utilities and production process planning and maintenance management, and the accumulation of knowledge for energy saving is centered around such responsibilities. However, in the commercial and business sectors, it is difficult to secure the same level of organization and skilled people (The situation in Japan is the same).

3) Equipment / system

- ✓ At large scale-facilities, in general the heat source is a turbo refrigeration unit with chilled water circulated by primary and secondary pumps and cooled air supplied to each area via ducting from air-conditioning units.
- ✓ With medium sized enterprises, it is often the case that there are window type air-conditioners in each room.
- ✓ Highly efficient inverter turbo refrigeration units, like those found in Japan are yet to be seen. However, inverter controlled chilled water and domestic water pumps are seen on site.

- ✓ With packaged air-conditioning units, equipment efficiency is being improved by using refrigerants. This is not common in Japan.
- ✓ There are cases of actions being taken towards proactive improvement in equipment and system installations for energy efficiency. On the other hand, measures of adjustment of dampers and instrumentation set points etc. seem to be a few cases.

4) Funding

- ✓ As with the industrial sector, the idea that it takes 2 to 3 years of payback period in implementing energy-saving measures is firmly rooted. We agree with UNIDO's point that investment recovery periods are short in the developing world. (In Japan, the recovery period for commercial and business sectors is generally about 4 to 5 years).
- ✓ Some locally inspected commercial buildings are making use of ESCOs for energy saving policy.

(4) Issues in Commercial and Business sectors

Based on the current situation we can infer the following issues with regards to energy saving in the commercial sector.

1. Insufficient data on energy consumption in the commercial and business sectors is an issue. The quarterly energy consumption report system implemented by the DOE is to be legislated, and it is to be hoped that the trends in annual energy consumption of the sectors concerned can be grasped. In the future, with regards to commercial and business sector energy, additional energy expenditure can be expected, so we will be able to make use of the report for the trend analysis of data based on the use of facilities too.
2. The AEMAS certification system implemented by ENPAP under the ACE/EC is a project with a time limit, and although the verification process is underway in some large companies, it is difficult to see how maintaining value levels of verification will proceed from hereon.
3. An energy manager is invariably assigned to facilities targeted by the DOE-implemented energy consumption report system. It is hoped that there will be progress with the accumulation of energy saving knowledge and from education by contributions from energy managers. A clear policy needs to be formulated to determine the qualities and experience required by energy managers.
4. Investment, along with energy saving measures, is focused on large companies, and those achievements are evaluated, as in the Don Emilio Award. However, in only implementing changes to the existing installations of equipment, systems and control settings, there are insufficiencies in practical examples, education and diffusion of implemented energy saving measures.

3.5.4 Government Sector

(1) Current Conditions for Energy Consumption

The Government Energy Management Program (GEMP) is implemented based on administrative orders, and the energy consumption of each government agency reported to the DOE covers the electricity used by government facilities and the fuel consumption of public vehicles. However, the DOE/EECD does not

enforce the use of databases or data analysis.

Additionally, according to information from the DOE, for local government agencies etc., as there is no thoroughness with or common knowledge of the GEMP report system, the present report data does not seem to give accurate information to all government facilities

(2) Current Systems and Support for Energy Saving

GEMP is central to the system, and this system includes the following activities except for the previous energy consumption report.

- ✓ Each government agency submits an Energy Conservation Program, which shows the annual departmental energy plan to the DOE once a year.
- ✓ The DOE energy audit team carries out a spot check of the entire facility, and team personnel score the actual energy saving activities using a checklist of 20 items (indicated by percentage, a perfect score being 100%).
- ✓ Based on the score from the spot check a rating expressed in stars is given, this is announced officially on the DOE homepage, and a placard showing the number of stars awarded is displayed at the entrance for the applicable period.

  An example of the official announcement of scores is shown in the next table. (ordered by the highest scores for different areas, only the top 10 metropolitan areas)

Table 3-18 Example of the Official Announcement of Scores

ENERGY AUDIT SPORT CHECK RATING BY REGION
(As of December 30, 2006)

	REGION/ AGENCY	SCORE	RATING
	NATIONAL CAPITAL REGION		
1	OP - Tahanan ng Masa	99%	5 star
2	Bases Conversion Development Authority	97%	5 star
3	Department of Energy	96%	5 star
4	OP - Malacañang Palace	96%	5 star
5	OP - Kalayaan Hall	96%	5 star
6	Bangko Sentral ng Pilipinas	96%	5 star
7	Local Water Utilities Administration	96%	5 star
8	Philippine Economic Zone Authority	95%	5 star
9	Philippine Overseas Employment Administration	95%	5 star
10	Philippine National Police	95%	5 star

- ✓ As well as the scoring of energy saving activities, a report that contains improvement advice to sites is submitted to the applicable facilities from DOE.
- ✓ The audit team can issue a certificate of financial savings due to the energy saving activities for the DBM, and the repayment of savings can be secured by each facility presenting this certificate to the DBM.
- ✓ The GEMP results are officially announced on the DOE homepage, the financial savings from September 2005 to May 2008 were PHP 1,009,379,074 (electrical PHP 853,186,142, fuel PHP 156,192,932). Implemented energy saving measures at the facilities are as follows.

Electrical facilities

- ◆ Air-conditioning operation limited to 6 hours (9 ~ 12: 00、13 ~ 16: 00)
- ◆ Air-conditioning is switched to ventilation mode during Lunch (12 ~ 13: 00)
- ◆ Room temperature setting is not set below 25°C.
- ◆ Incandescent lamps are replaced with fluorescent lamps (40W to 36W or 32W slim type)
- ◆ Lights are turned off 12: 00 ~ 13: 00
- ◆ Unused PCs and office equipment is switched off.

Fuel

- ◆ Preventative maintenance is carried out on all vehicles.
- ◆ Stop usage of deteriorating or inefficient vehicles.
- ◆ Organized usage
- ◆ Fuel allocation of each vehicle is reduced by 10%.

(3) Characteristics of Energy Consumers

An analysis of conditions at visited government facilities is carried out based on an investigation of government sector energy users' characteristics.

1)Awareness

- ✓ Awareness among government facility staff concerning energy saving based on GEMP is high.
- ✓ There is a repayment system for energy cost savings which functions as an incentive.
  Energy saving measures centered on operational improvements are variously implemented, so there are doubts as to whether they can continue these levels of awareness and work towards improvement.

2) Knowledge

- ✓ An Energy Conservation Officer (ECO) appointed by the GEMP is stationed at each facility, and it is a condition that the aforementioned 20 items are promoted. Other than these 20 items, knowledge concerning energy saving is necessary.
- ✓ The spot check of each government facility is centered on consultations with the ECO, and it is difficult to determine whether the necessary education and diffusion of energy saving knowledge for each staff member is being carried out.

3) Equipment / systems

- ✓ At government facilities visited for consolation, most of the air-conditioning was provided by packaged type window A/C units, many of which are probably deteriorating.
- ✓ The indoor cooling temperature can only be determined from the temperature setting of those packaged air conditioning units, and the actual indoor temperature is unknown.
- ✓ Ventilating systems are not installed in offices, toilets, warehouses etc.
- ✓ Measures such as slim-type fluorescent lamps, highly efficient reflectors, and reductions in the number of lamps have been carried out by GEMP.
- ✓ Although converse to the private sector, energy saving measures based on the regulation of dampers and set points are central, and there are no cases of energy saving based on investments

to improve equipment and systems.

(4) Challenges for Government Departments

Based on present conditions, it is our conjecture that improvements in energy saving in government departments are as follows.

1. Although implementing energy saving measures based on usage are central, and it is hoped that this will continue, and though progress is being made in improving the efficiency of lighting, there are many cases of air-conditioning equipment deterioration. Securing of government or donor funding to proceed with improving the efficiency of air conditioning equipment is necessary.
2. Energy consumption data of each government agency reported to the DOE is not being utilized. Based on data analysis of area characteristics too, it is hoped we can announce the amount of energy consumption reductions and the results of the trend analysis, not just an announcement of the financial savings.

3.5.5 Residential Sector

(1) Number of Households, Size of Household, Household Income and Expenditure

According to the 2009 Family Income and Expenditure Survey (FIES) undertaken by the National Statistics Office (NSO), the number of households in the Philippines was 18,452 as of 2009. The average earning of Filipino families nationwide was 206 thousand pesos yearly and the average expenditure was 176 thousand pesos.

The average income of families in the bottom 30 percent income class, those considered to be poverty-stricken, was 62 thousand pesos in 2009, while it was 268 thousand pesos in the upper 70 percent income class. The 2009 FIES also reveals that the poor families spent 64 thousand pesos annually on average, which is two thousand pesos more than their average annual income. In contrast, the families in the upper 70 percent income class spent 224 thousand pesos a year on average, hence, they are capable of generating savings of 44 thousand pesos a year on average.

Table 3-19 Average Income, Expenditure and Savings of Families by Income Class in 2006 and 2009

Income Decile/ Group	Income	2009 (In thousand pesos)			2006 (In thousand pesos)		
		Income	Expenditure	Savings	Income	Expenditure	Savings
Philippines		206	176	31	173	147	26
First Decile		41	43	(3)	32	35	(3)
Second Decile		64	66	(2)	51	52	(2)
Third Decile		81	81	(*)	65	66	(*)
Fourth Decile		100	97	3	81	79	2
Fifth Decile		122	116	6	100	95	5
Sixth Decile		150	139	11	124	116	8
Seventh Decile		189	171	18	156	143	13
Eighth Decile		244	216	28	205	181	24
Ninth Decile		342	288	53	292	244	47
Tenth Decile		728	535	193	622	460	162
Bottom 30%		62	64	(2)	49	51	(2)
Upper 70%		268	224	44	226	188	38

(Source: 2009 FIES)

The percent distribution of the number of households and the aggregated annual income by income class are shown in Table 3-20 and Table 3-21.

The Gini coefficient is commonly used as a measure of inequality of income and wealth in society. The Gini coefficient in the Philippines in 2009 was estimated at 0.4484, which improved compared to the previous survey in 2006. However, according to data from the on-line database of the UNDP Human Development Report 2007-2008, the Gini coefficient in the Philippines was ranked as 42nd out of 126 countries and 4th out of 18 countries in Asia. Hence, it is still a society with an income gap.

Table 3-20 Percent Distribution of the Number of Households by Income Class

Year	2003	2006	2009
No. of households (thousand)	16,480	17,403	18,452
By income class (%)			
Under P40,000	12.9	8.0	4.1
40,000 – 59,999	15.4	13.5	8.7
60,000 – 99,999	23.9	23.7	22.2
100,000 – 249,999	33.6	36.0	41.0
250,000 and over	14.2	18.8	23.9

(Source: 2009 FIES)

Table 3-21 Percent Distribution of the Aggregated Annual Income by Income Class

Year	2003	2006	2009
Total household income (billion P)	2,437	3,006	3,804
By income class (%)			
Under P40,000	2.5	1.4	0.6
40,000 – 59,999	5.2	3.9	2.1
60,000 – 99,999	12.7	10.8	8.6
100,000 – 249,999	35.6	32.8	31.7
250,000 and over	44.0	51.1	56.9

(Source: 2009 FIES)

Table 3-22 depicts the percent distribution of the size of the household. Since the population was 94.01 million (estimate value as of 2010) and the number of households was 18,452, the average household size came to 5.1.

Table 3-22 Percent Distribution of Size of Household

Year	2009 in Philippines	＜Reference＞ 2005 in Japan
No. of households (thousand)	18,452	49,063
By family size (%)		
One	4.1	29.5
Two	9.3	26.5
Three	14.6	18.7
Four	18.9	15.7
Five	18.8	5.8
Six	14.1	2.5
Seven	9.2	1.0
Eight	5.1	0.2
Nine	2.9	0.1
Ten or more	3.1	0.0

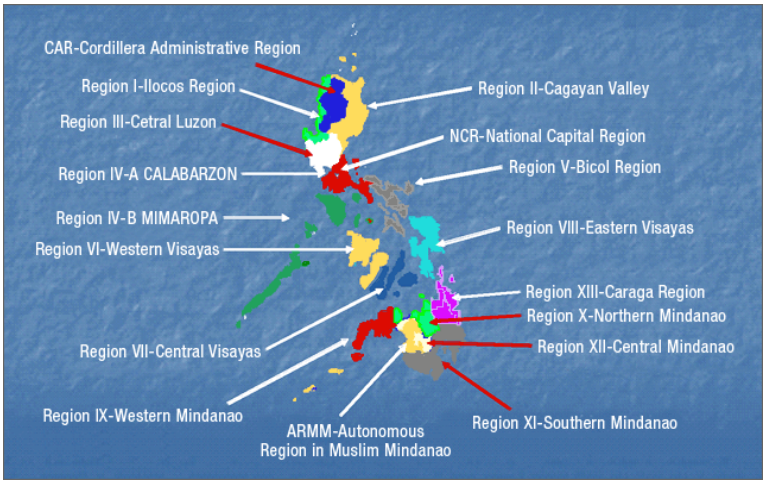
(Source: 2009 FIES)

Table 3-23 depicts the annual average household income, expenditures and savings by region. The interregional comparison bespeaks of the average household income in the National Capital Region (NCR) to be 356 thousand pesos, which is the highest in the country, and about 1.7 times as high as the nationwide average. The lowest annual average income, 113 thousand pesos, was recorded in the Autonomous Region in Muslim Mindanao. Moreover, the minimum daily wage is 404 pesos in the NCR as of June 2011.

Table 3-23 Annual Average Household Income, Expenditure and Saving by Region

Region	2009 (In thousand pesos)			2006 (In thousand pesos)		
	Income	Expenditure	Savings	Income	Expenditure	Savings
Philippines	206	176	31	173	147	26
National Capital Region	356	309	47	311	258	53
Cordillera Administrative Region	219	174	44	192	151	42
I - Ilocos	186	152	35	142	124	19
II - Cagayan Valley	181	141	40	143	118	25
III - Central Luzon	221	189	32	198	170	27
IVA - CALABARZON	249	213	36	210	186	23
IVB - MIMAROPA	141	121	21	109	93	16
V - Bicol	152	137	15	125	110	15
VI - Western Visayas	159	143	16	130	116	14
VII - Central Visayas	184	152	32	144	124	21
VIII - Eastern Visayas	160	128	32	126	104	22
IX - Zamboanga Peninsula	144	116	28	125	99	27
X - Northern Mindanao	165	139	26	142	117	25
XI - Davao	166	142	24	135	115	19
XII - SOCCSKSARGEN	154	132	22	114	96	18
XIII - Caraga	149	125	23	118	100	18
Autonomous Region in Muslim Mindanao	113	98	15	89	75	14

(Source: 2009 FIES)



(Source: http: //www.mlit.go.jp/)

Figure 3-74 Map of the Philippines

Table 3-24 shows the percent distribution of household expenditure by income class. The percent of food in the household expenditure (Engle's coefficient) was; 42.6 percent of the households with average annual income, 59.9 percent of the households in the bottom 30 percent income class and 40.5 percent of the households in the upper 70 percent income class.

As described above, the annual average expenditure was 176 thousand pesos. When major expenditures from the data of Table 3-24 are taken into account, the households with the annual average income spent 75.0 thousand pesos, 22.5 thousand pesos, 13.6 pesos and 12.5 pesos for food, house

rent/rental value, transportation/communication and fuel, light and water, respectively in a year. According to FIES, the electricity bill accounted for 54.1 % out of fuel, light and water, thus the electricity bill at households with the annual average income was 6.8 thousand pesos (3.9 percent of total expenditure).

Table 3-24 Aggregated Household Expenditure and its Percent Distribution by Income Class

Expenditure Items	2009			2006		
	All Income Groups	Bottom 30%	Upper 70%	All Income Groups	Bottom 30%	Upper 70%
Philippines						
Total Expenditure (In billion pesos)	3,239	352	2,887	2,561	267	2,297
Percent	100.0	100.0	100.0	100.0	100.0	100.0
Food Expeditures	42.6	59.9	40.5	41.4	59.1	39.3
Alcoholic Beverages	0.7	1.1	0.6	0.7	1.2	0.6
Tobacco	0.8	1.6	0.7	0.9	1.7	0.8
Fuel, Light and Water	7.1	6.8	7.1	7.6	7.3	7.7
Transportation and Communication	7.7	3.9	8.2	8.2	3.8	8.7
Household Operation	2.3	1.7	2.4	2.3	1.8	2.4
Personal Care and Effects	3.8	3.7	3.8	3.7	3.7	3.7
Clothing, Footwear and Other Wear	2.2	1.9	2.2	2.4	2.0	2.5
Education	4.3	1.2	4.6	4.4	1.3	4.7
Recreation	0.4	0.1	0.4	0.5	0.2	0.5
Medical Care	2.9	1.7	3.0	2.9	1.7	3.0
Non-Durable Furnishings	0.2	0.2	0.2	0.2	0.2	0.2
Durable Furniture and Equipment	2.7	0.8	2.9	2.7	0.8	2.9
Taxes	2.0	0.2	2.3	1.6	0.2	1.8
House Rent/Rental Value	12.8	9.4	13.2	12.7	9.0	13.2
House Maintenance and Minor Repairs	0.6	0.4	0.6	0.5	0.5	0.6
Special Family Occasions	2.7	1.6	2.9	2.8	1.7	2.9
Gifts and Contributions to Others	1.4	0.7	1.5	1.4	0.7	1.4
Other Expenditure (inc. Value Consumed, Losses)	2.9	3.1	2.9	3.0	3.3	3.0

(Source: 2009 FIES)

(2) Housing Policy and Type

According to "JETRO Public Awareness on Environment and Environmental Policies in the Philippines" (Tentative translation), the housing policy and its situation in the Philippines are as follows:

- The number of houses is insufficient compared to the population and the government is promoting the housing supply especially in the NCR. In addition, it is designed to promote housing for poor people.
- The National Housing Authority in charge of the housing policy, in cooperation with the local governments and NGO, is enhancing the different four (4) kinds of house construction for the poor group, the low-income group including public officers, middle-income group and communities (cooperative dwelling for multi-families).
- The housing supply plan in the NCR is proceeding, synchronizing the development plan of the area along railway lines based on the extension plan of LRT and MRT and the construction of new lines. Whereas the central government is mainly in charge of policy coordination, implementation is supported by local government grants and NGOs and low-interest financing by public financial institutions.

As for the housing ownership, according to "NSO Philippines in Figures 2011", the percentage of owned houses was 83 percent and that of rental housing (including illegal occupants) was 17 percent as of 2005. The most popular material used for the outer wall of housing is concrete, brick and stone, accounting for 36.8 percent of the total. As for the roof material, galvanized iron and aluminum is popular.

Table 3-25 Material of Outer Wall and Roof of Housing

Construction Materials of the Outer Walls and Region	Total Occupied Housing Units	Construction Materials of the Roof		
		Galvanized Iron/ Aluminum	Tile Concrete/ Clay Tile	Half Galvanized Iron and Half Concrete
PHILIPPINES				
Total	18,162,497	13,626,566	191,692	885,608
Concrete/Brick/Stone	6,687,348	6,340,206	145,779	101,633
Wood	3,592,454	2,595,477	13,740	104,644
Half Concrete/Brick/Stone and Half Wood	3,778,334	3,002,102	25,256	569,998
Galvanized Iron/Aluminum	222,833	169,935	3,783	28,755
Bamboo/Sawali/Cogon/Nipa	3,604,808	1,412,278	-	74,081
Asbestos	6,027	4,591	170	232
Glass	4,273	2,702	483	487
Makeshift/Salvaged/Improvised Materials	105,518	46,738	-	2,328
Others/Not Reported	159,681	51,969	2,460	3,406
No Walls	1,221	568	21	44

(Source: The 2007 Census of Population)

(3) Energy and Electricity Consumption

As stated in Section 3.2.5, whereas the residential sector shares 25.7 percent of final energy consumption in 2009, the amount of energy consumption is declining. Especially noticeable is the decrease of biomass consumption, one reason is that the energy source for cooking and water heating is changing from wood/charcoal to LPG due to the increase of household income and convenience.

Meanwhile, the amount of electricity consumption is increasing due to the enhancement of rural electrification and the widespread use of electric appliances. The share of electric power sales in the residential sector was high and it accounted for approximately 34 percent of electric power sales around the country.

The following indicates the electric power consumption situation in the residential sector. It was pointed out that the electricity consumption in the residential sector was constantly increasing except for a certain period after 2000. As indicated in PEP, it seems that the increasing trend will continue in the future and the needs and potential of energy efficient activities will also rise.

Table 3-26 Electricity Consumption in the Residential Sector in the Philippines

Year	2000	2001	2002	2003	2004
Consumption (GWh)	12,894	13,547	13,715	15,357	15,920
Growth Rate (%)		5.1%	1.2%	12.0%	3.7%
Year	2005	2006	2007	2008	2009
Consumption (GWh)	16,031	15,830	16,376	16,644	17,534
Growth Rate (%)		-1.3%	3.4%	1.6%	5.3%

(Source: DOE)

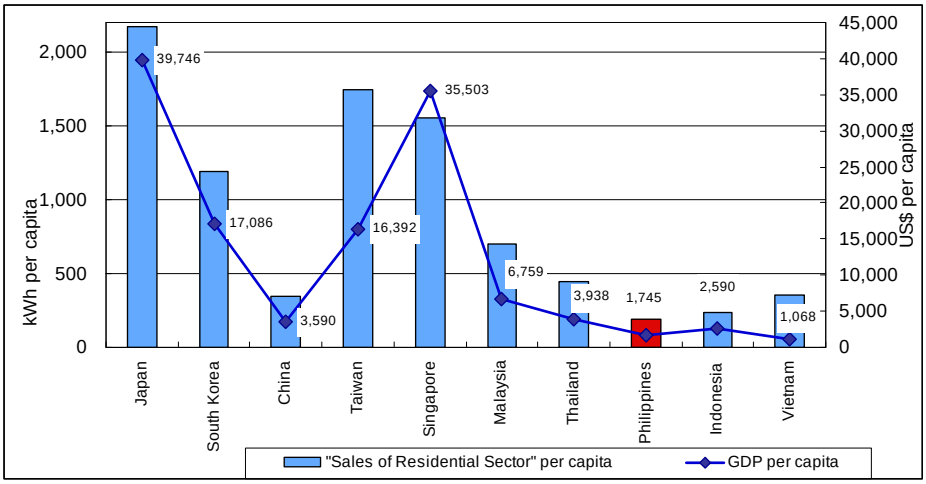
Table 3-27 depicts the trend of the total electric power consumption and the electric power consumption per customer in the residential sector in the MERAL12CO business area. In the NCR, a household consumed approximately 2,100 kWh on average yearly.

Table 3-27 Total Electric Power Sales and Electric Power Sales per Household in the Residential Sector in the MERALCO Business Area between 2006 and 2010

Year	2006	2007	2008	2009	2010
Consumption (MWh)	8,376,617	8,655,075	8,616,260	8,899,726	9,535,342
Growth Rate (%)		3.3%	-0.4%	3.3%	7.1%
Number of Customers	3,979,529	4,046,522	4,143,271	4,276,180	4,411,289
kWh/customer/year	***2,105***	***2,139***	***2,080***	***2,081***	***2,162***
Growth Rate (%)		1.6%	-2.8%	0.1%	3.9%

(Source: MERALCO)

Figure 3-75 depicts the electric power consumption per capita in the residential sector and the GDP per capita in 2009 in some Asian countries. Whereas the GDP per capita in the Philippines (1,745 USD) exceeds that of Vietnam (1,068 USD), the power consumption per capita in the residential sector in an opposite situation and those of the Philippines and Vietnam are 190 kWh and 350 kWh, respectively. One factor would be that since the electricity rate is high in the Philippines compared to the income level, which may serve as a motivating factor to the Filipino people to save on electricity consumption.



Source: JEPIC

Figure 3-75 Electric Power Sales per capita in the Residential Sector and GDP per capita (in 2009)

(4) Household Energy Consumption Survey by NSO

It is a kind of rather old data, but based on the "2004 Household Energy Consumption Survey (HECS)" carried out by NSO in 2004 the energy consumption situation in the residential sector is shown below.

1) Outline of the Survey

Year	2004
No. of samles	22,041 households (Valid response: 16,793 households)
Traget energy	Electric power, LPG, Kerosene, Light oil, Biomass
Surveyed items	Consumption situation by energy source, Awareness on the Labeling Program, etc.

2) Outline of the Results

◆ Energy use

- 14.9 million households or 87.6 percent of the total 17.0 million households in the country used electricity during the surveyed period.
- From 1995 (the previous survey) to 2004, the number of liquefied petroleum gas (LPG) household users doubled in number from 4.2 million households to 8.8 million households.
- In 2004, a total of 2.0 million households (11.7%) and 567 thousand households (3.3%) used gasoline and diesel, respectively, for power generation and transportation.
- Among the conventional types of fuel, kerosene became less popular, registering a decrease of 23.8 percentage points from 79.9 percent in 1995 to 56.1 percent in 2004.
- The proportion of households using fuelwood reduced from 63.5 percent to 55.1 percent; the proportion of households using charcoal from 38.5 percent to 34.2 percent. Although the incidence of fuelwood usage decreased, more than half of the total households still used fuelwood in 2004.
- Among the types of fuel, electricity registered the greatest proportion of household users, ranging from 90.5 percent to 98.6 percent, across income classes except in the lowest range of less than 5,000 pesos of average family income. Electricity was widely used across the income classes.
- Next to electricity, LPG was recorded as the next most used fuel by households especially in higher income groups. The more income groups were used, the higher the amount of LPG.
- The proportion of households using gasoline and diesel went up in proportion to the family income. As the household income class increased, the level of kerosene, fuel wood and biomass residue users declined.

Table 3-28 Number of the Households Using Each Energy Source by Income Class

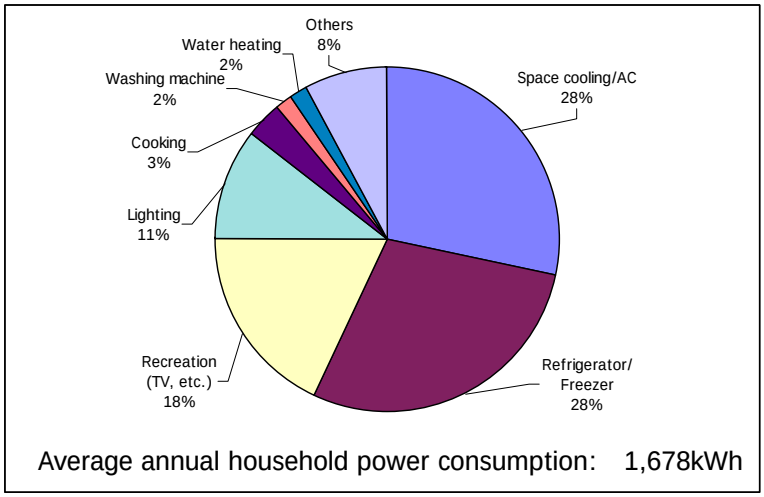
	Any Fuel	Electricity	LPG	Gasoline	Diesel	Kerosene	Fuelwood	Charcoal	Residue
All Income Class	16,973	14,872	8,842	1,986	567	9,525	9,357	5,811	3,177
Less than P5,000	5,705	4,229	1,149	212	55	4,530	4,557	1,510	1,811
P5,000 - P9,999	5,372	4,863	2,740	510	83	3,111	3,020	1,868	914
P10,000 - P14,999	2,336	2,271	1,797	343	78	933	883	895	236
P15,000 - P24,999	1,997	1,969	1,737	435	126	606	544	857	122
P25,000 and over	1,555	1,533	1,413	485	225	343	351	678	94
Not reported	7	7	5	1	-	2	2	3	-

Unit: Thousand

(Source: 2004 HECS)

◆ Electricity

- The ownership rates for electric and lighting appliances out of the households (13.3 million) who reported to be users of electricity sourced from the distribution companies are; lighting appliances at 99.9 percent, TV, etc. at 89.8 percent, electric fans at 74.1 percent, air conditioners at 6.5 percent, refrigerators and freezers at 44.9 percent and water heaters at 2.5 percent.
- The annual average electricity consumption per household was 1,678 kWh. The proportion of consumption by its use is shown in Figure 3-76.



(Source: 2004 HECS)

Figure 3-76 Percent Distribution of Electricity Consumption per Household by Use

◆ LPG

- Almost 100 percent of households used LPG for cooking while 12 percent used it for heating water for bathing.

◆ Gasoline and Diesel

- Ninety-eight percent of the 2.0 million households used gasoline for transportation. Likewise, 87.7 percent of the 567 thousand households using diesel used it for the same purpose.

◆ Kerosine

- A majority of the 9.5 million households (77.3 percent) used kerosene for lighting.

◆ Fuelwood and Charcoal

- Generally, fuelwood and charcoal were used for cooking and food preparation as reported by a majority of the households who used these types of fuel. About 10 percent of the households using fuelwood heated or boiled water for bathing.

◆ Awareness of the Energy Efficiency Labeling Program

- The awareness of the households on the government's Energy Efficiency labeling Program was low and 89.7 percent of the total households did not know about the program. More than eighty percent of those who were aware of the labeling program (10.3 percent of the total households) considered the energy efficiency label as a factor in the purchase of their appliances and lighting system.

(5) Existing Energy Efficiency Policies and Support Activities

The following are the existing energy efficiency policies and support activities aimed at the residential sector. (Refer to the current situation and issues of each measure for details.)

- ◆ Regulatory measures
  - Energy Efficiency Standard & Labeling (EES&L)
- ◆ IEC
  - IEC activities for promoting energy efficiency by government agencies such as DOE
  - Voluntary IEC activities for promoting energy efficiency by private companies such as electric power utilities
- ◆ Support from international organizations
  - National Residential Lighting Program out of PEEP supported by ADB
  - PELMATP supported by UNDP/GEF

(6) Present Challenges

The following are the estimated residential sector issues thus far: :

- ◆ During the retailer hearing investigation conducted by the JICA Study Team, some retailer staff said that most of the customers tended to purchase cheap and low-efficient air conditioners instead of high-efficient air conditioners with inverters. Moreover, an industry association related to electric appliances has also obtained the same information. According to the above, consumers may purchase low efficient and cheap products without knowing the running cost. In addition, although the old low-efficient appliances are still being used given their remaining life span, they have not yet been replaced due to financial constraints.

⇒ Improving the labeling is recommended in order to enable consumers to compare the life-cycle cost per product and the financial merits. Moreover, the introduction of such financial incentive schemes such as VAT exemptions, no-interest loans, subsidies, etc should be considered in order to enhance the purchases of high efficient products and the replacement of old-type products.

- ◆ Implementing periodical policy assessments such as a household energy consumption survey and public awareness surveys etcetera are recommended.
- ◆ Since the household awareness of the government's Energy Efficiency labeling Program was low, it can be pointed out that the government should give the public more sufficient information. Providing information to people in the upper income classes would also be important given their higher purchasing power of products that consume a relatively large amount of electricity such as room air conditioners and refrigerators.

⇒ Enhancing the energy efficiency awareness of the Filipino people through educational activities such as campaigns, museum tours, and providing information etcetera are sought after.

3.6 Organizational Structure

The DOE is in charge of energy in general. There is a large variety of EE&C activities in the Philippines.

Thus, the number of related organizations is also large. The list of related organization is shown in the next table. The C/P of the Study is DOE-EUMB-EECD which is in charge of establishing and implementing EE&C policy, measures and programs.

Table 3-29 List of Related Organization for EE&C

Abbreviation	Name of Organization	Role in brief
Governmental and Public Agencies		
DOE	Department of Energy	DOE is in charge of energy sector.
-EUMB-EECD	- Energy Utilization Management Bureau, Energy Efficiency and Conservation Division	Major agency to plan and implement EE&C.
- EPPB	- Energy Policy and Planning Bureau	EPPB establishes national energy plan and national power development plan based on data collection of energy supply and demand.
- LATL	- Lighting and Appliance Testing Laboratory	LATL tests appliance performances.
- ITMS	- Information Technology and Management Servicies	ITMS provides IT services in DOE, related to EE&C database.
DOST	Department of Science and Technology	DOST promotes R&D.
- PCIEERD	- Philippine Council for Industry, Energy and Emerging Technology Research and Development	PCIEERD provides IEC for EE&C including energy audits.
- ITDI	- Industrial Technology Development Institute	ITDI provides energy audits.
DTI	Department of Trade and Industry	DTI supervises manufacturers (industrial sector) etc.
- BOI	- Board of Investment	BOI is a key player in considering financial mechanism
DOTC	Department of Transportation and Communication	DOTC supervises transport sector.
DOF	Department of Finance	Governmental budget
DPWH	Department of Public Works and Highways	DPWH relates EE&C in the aspect of energy conserving building guideline
DA	Department of Agriculture	DA supervises agricultural sector
DepEd	Department of Education	DepEd is in charge of education.
- CHED	- Commission on Higher Education	inclusion of EE&C in the curriculum
DENR	Department of Environment and Natural Resources	DENR shares the similar goal of environment and EE&C
TESDA	Technical Education and Skills Development Authority	TESDA trains and certifies technicians, which may relates to certification of energy managers etc.
NEA	National Electrification Administration	NEA is in charge of electrification
NSO	National Statistic Office	NSO provides statistical data for EE&C
ERC	Energy Regulatory Commission	ERC supervises electric power sector
Private Organizations		
MERALCO	Manila Electric Company	Electricity distribution organization in Manila region. MERALCO conducts IEC campaign and energy audits for EE&C
ENPAP	Energy Efficiency Practitioners Association of the Philippines, Inc.	A NPO to promote EE&C C/P of AEMAS project
PECCI	Philippine Energy Conservation Center, Inc.	A NPO to promote EE&C
EDUFI	Energy Development and Utilization Foundation, Inc.	A NPO to promote EE&C

3.6.1 Government Organizations

This section introduces organizations that play important EE&C roles and the outline of their activities.

(1) Department of Energy: DOE

The DOE is a supervising government organization in the field of energy and is in charge of energy policy. Some of their primary roles are to establish energy policy, establish, operate, mitigate and abolish various regulatory actions, privatize energy related businesses, establish and implement an energy resources development plan, and promote EE&C. The organizational structure is shown in the next figure.

Logo of DOE

EUMB-EECD (Energy Utilization Management Bureau-Energy Efficiency Conservation Division) which is the C/P of the Study is in charge of EE&C policy. A section related to renewable energy was also under the EUMB before, but it became another bureau, the Renewable Energy management Bureau (REMB) after the enactment of the Renewable Energy Law (RE Act 2008). The number of staff of the whole DOE is about 500 and approximately 15 staff are under EUMB-EECD. The annual budget of EECD is approximately 20 million pesos.

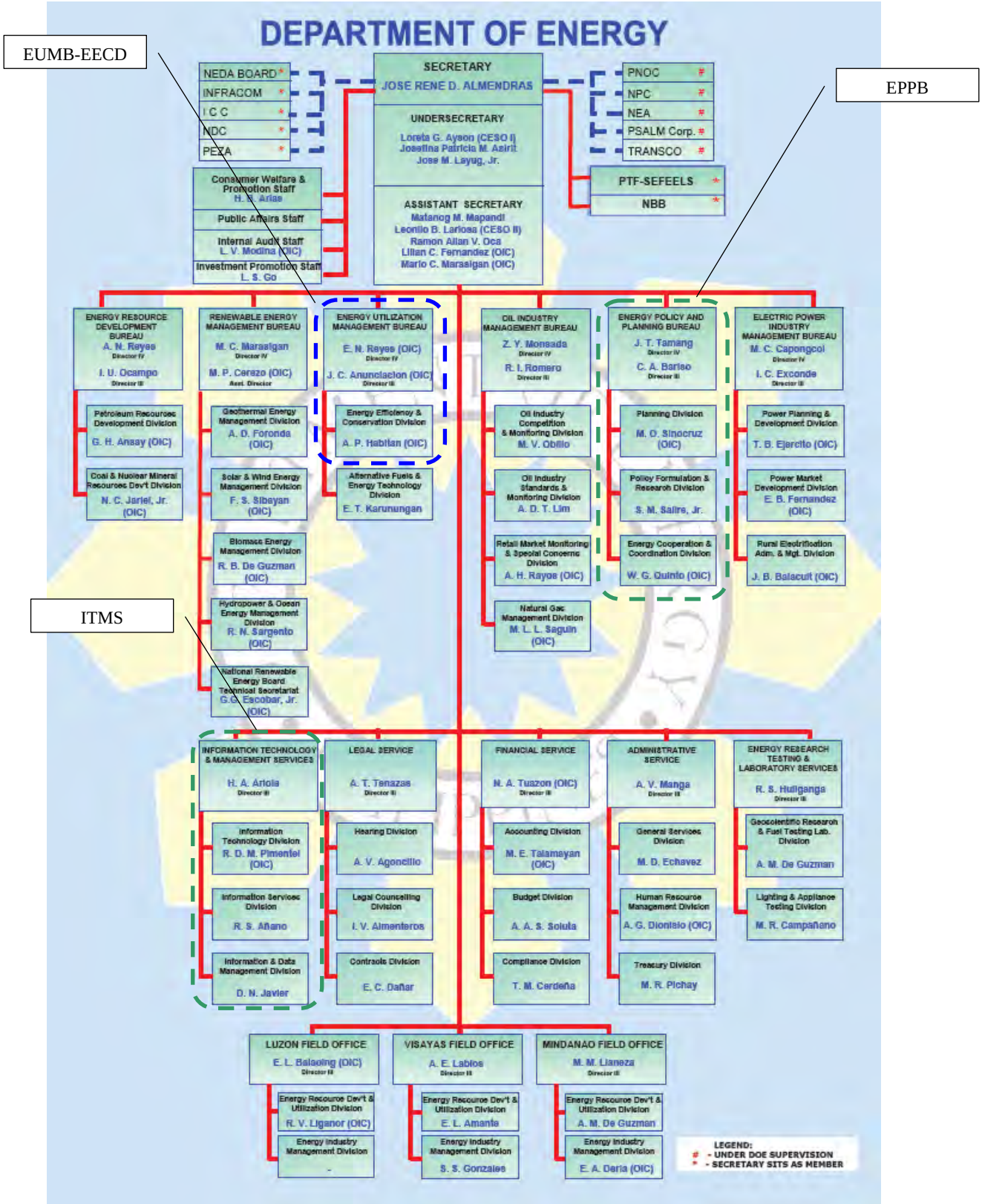
In addition to those and the ones listed in Table 3-29, such as EPPB-LATL and ITMS, sections which relate to EE&C have been listed as follows.

- ERTLS: Energy Research Testing & Laboratory Service	In charge of minimum energy performance standard and labeling scheme
- EPIMB: Electric Power Industry Management Bureau	Supervises electric power sector
- NGMB: Natural Gas Management Bureau	Supervises natural gas sector
- OIMB: Oil Industry Management Bureau	Supervises oil industry

In addition to the above, there are organizations that are a part of the “energy family” of DOE, shown below;

- PNOC (Philippine National Oil Corporation)
- NPC (National Power Corporation)
- NEA (National Electrification Administration)
- TRANSCO (National Transmission Corporation)
- ERC (Energy Regulatory Commission)
- PSALM (Power Sector Assets and Liabilities Management Corporation)
- WESM (Wholesale Electricity Spot Market) etc.

All except PNOC are related to the electric power sector.



(Source: DOE website: accessed in June 2011)

Figure 3-77 Organizational Structure of DOE

(2) Department of Trade and Industry: DTI

The Department of Trade and Industry (DTI) has the dual mission of facilitating the creation of a business environment and at the same time, of ensuring consumer welfare to contribute to the country's goal of achieving economic growth towards poverty reduction. Specifically, the DTI supports the expansion of Philippine exports, an increase in investments, and the development and promotion of the country's micro, small, and medium enterprises (MSMEs). The DTI is a supervising organization of manufacturers and importers/exporters.

In the field of EE&C, the Bureau of Product Standards, DTI-BPS, has been cooperating with DOE in introducing and operating Minimum Energy Performance Standards, MEPS and a labeling scheme for home appliances towards the promotion of energy efficient appliances in the market. (refer to Chapter 8 for the details of labeling scheme.)

In addition, the Board of Investment, BOI under DTI (the lead investment promotion agency) is a counterpart in considering financial mechanisms.

(3) Department of Science and Technology: DOST

The Department of Science and Technology, DOST, is in charge of providing central direction, leadership and coordination of all scientific and technological activities and of formulating policies, programs and projects to support national development. It is an organization in charge of Research and Development (R&D). The organizational structure is shown in the next figure.

Logo of DOST

Programs and projects cover 11 fields and one of them is energy filed including the "Energy Conservation Program". It has 16 regional offices besides headquarters.

(i) DOST-PCIEERD

A section of DOST, the Philippine Council for Industry, Energy and Emerging Technology Research and Development, PCIEERD has been active in the EE&C field. The mission is to support Small and Medium Enterprises (SMEs) for EE&C and sets the following objectives;

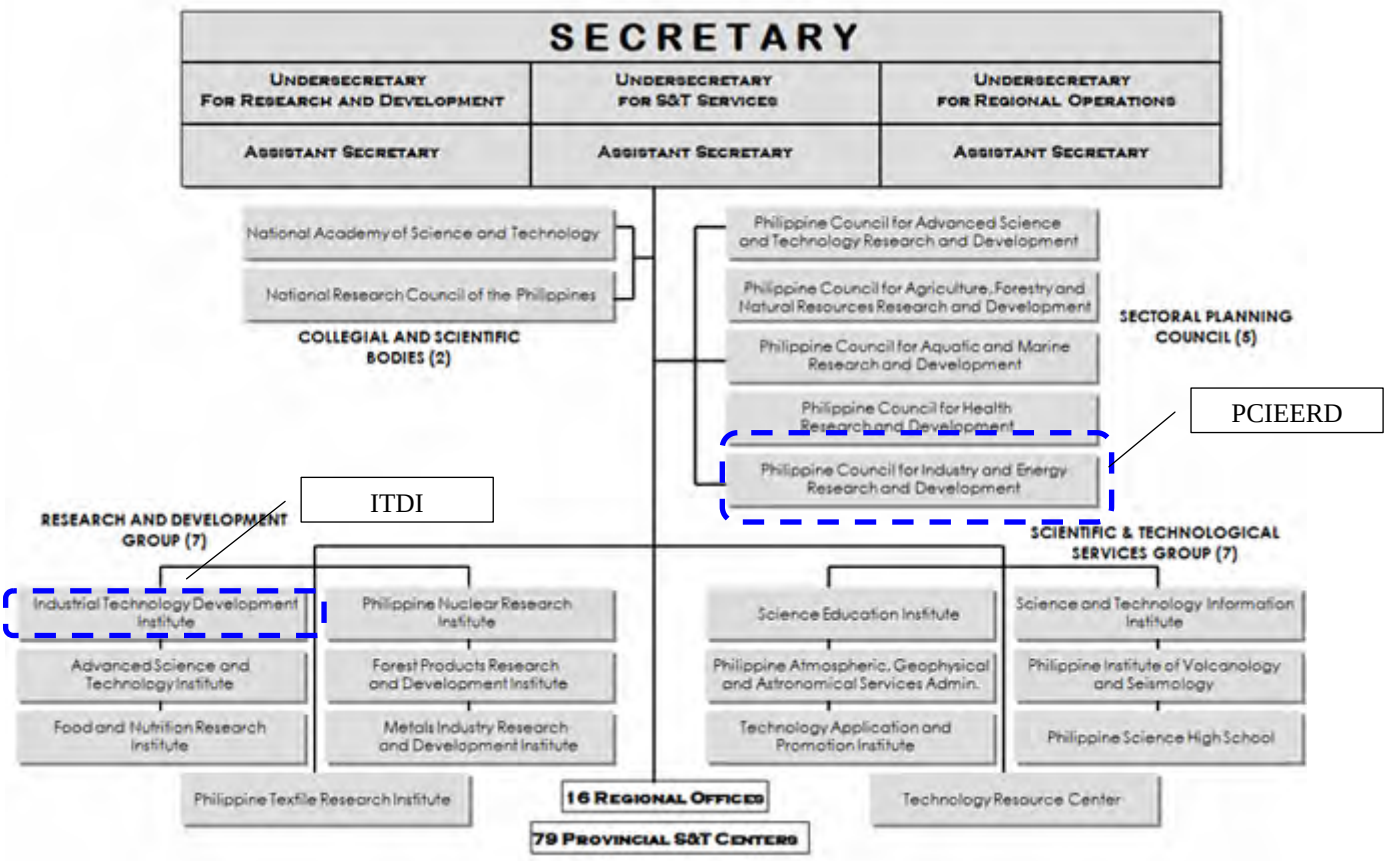
- ✓ To support SMEs in their efforts to reduce energy usage and lower their production costs as it presents areas where energy wastage and plant inefficiencies usually occur
- ✓ To provide countermeasures for these inefficiencies as well as identifying energy saving potential targets in the different areas of production

PCIEERD has 5 governing councils and acts in cooperation with 16 regional offices of DOST. One regional office has 15 staff. Regarding role demarcation, it may be described as DOE for Metro Manila and DOST-PCIEERD for the provinces.

In more detail, it provides energy audits and promotes EE&C technologies utilizing outside resources (it has experience in undertaking a JETRO project). The method is that the headquarters educates the regional offices and regional offices provide seminars and energy audits (basically for free) in the corresponding region. It focused on educating industry associations etc. rather than individual companies.

(ii) DOST-ITDI

Industry Technology Development Institute of DOST also conducts energy audits for primarily the industrial sector and sometimes for the commercial sector for a fee. The strong points are that it has equipment for measurement and engineering staff covering all the fields of an energy audit. (Refer Chapter 7 for the details of energy audits.)



(Source: DOST website: accessed in June 2011)

Figure 3-78 Organizational Structure of DOST

3.6.2 Private Organizations

There are private organizations that promote EE&C such as ENPAP (Energy Efficincy Practitioners Association of the Philippines, Inc), PECCI (Philippine Energy Conservation Center, Inc) and EDUFI (Energy Development and Utilization Foundation, Inc.). Although PEECI and EDUFI have been closely cooperating with DOE such as being members of the Technical Committee of Don Emilio Award, they are currently not greatly active as organizations. Thus, the ENPAP which has been actively promoting EE&C is introduced herewith.

(1) Energy Efficiency Practitioners Association of the Philippines, Inc.: ENPAP

The ENPAP is a non-profit organization (NPO established in 1983. Revenue only comes from fees for

seminars and training and it has a membership system. It has about 15 member companies and more than 300 individual members.

The board consists of six members and there are eight directors and an advisory team (10 members). DOE members are in an Advisory Team as honorary members. The following six committees have been formulated.

- ✓ Education and Training
- ✓ Policy and Advocacy
- ✓ Business Development
- ✓ Ways and Means
- ✓ Membership/Fellowship
- ✓ Chapters

The activities mainly cover the following 4 fields. It closely cooperates with DOE such as being the C/P in the Philippines for the AEMAS project by ACE (ASEAN Center for Energy) and as a member of the Technical Committee of Don Emilio Award. In addition, it also cooperates with the project, BERDE, Building for Ecologically Responsive Design Excellence, which evaluates the environmental performance of buildings.

<Main Fields>

- ✓ Seminars and Training – regular or in house
- ✓ Energy management consultancy services
- ✓ Energy Audit and assessment services
- ✓ Conduct of energy management studies & feasibility studies

3.7 Overview of Supporting Activities for EE&C

There are a great number of activities to support energy consumers in EE&C by private companies. This section shows those activities mainly related to DOE. The categories of activities are combination of the following:

- ✓ Direct or indirect measures to support energy consumers
- ✓ Mandatory or supportive measures
- ✓ Permanent measures by DOE and other governmental organizations or temporary measures based on project activity

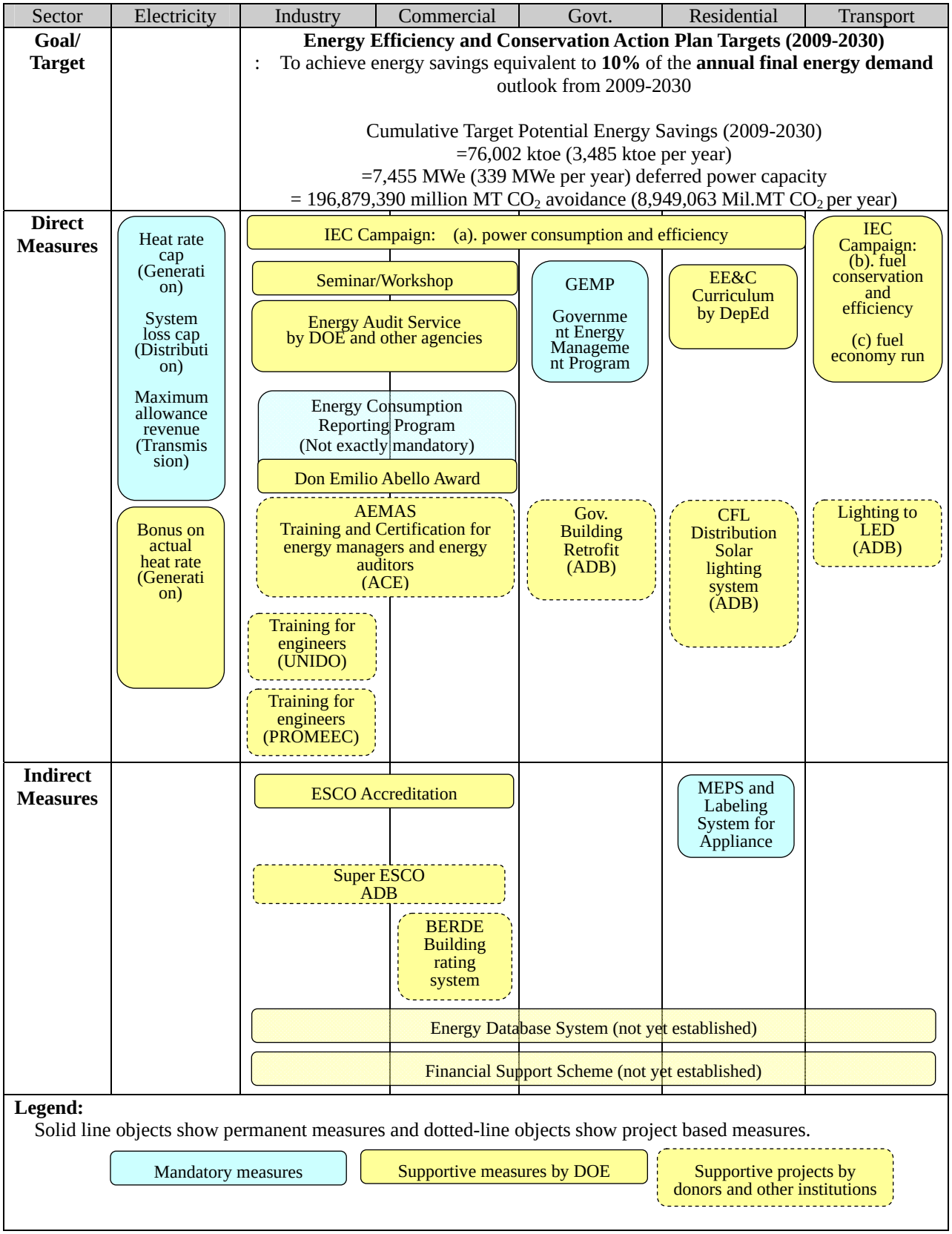
The overview of the activities is shown in the next figure, categorized by sector, direct/indirect, permanent/temporary measures. The list of them is shown in Table 3-17. EE&C measures, mainly supportive measures, have been developed and implemented towards all the sectors. While there are many projects conducted by organizations other than the DOE (dotted line frame), there are few indirect measures through creating markets or the environment. The measure for the power (electricity) sector is a combination of regulatory measures in losing the target (meaning “self-pay”) and a supporting measure of providing a bonus.

Main items are as follows: the outline of the activities is shown after Figure 3-36 and Table 3-18 and the details are described in the corresponding sections after Chapter 4.

- ✓ IEC Campaign
- ✓ Seminars and workshops targeting industrial and commercial sectors
- ✓ Energy consumption report system & the Don Emilio Abello Award
- ✓ Energy consumption report system on the governmental sector (GEMP: Government Energy Management Program)
- ✓ Minimum Energy Performance Standard (MEPS) and labeling scheme of home appliances
- ✓ Energy audit service (organizations other than DOE also provide this service.)
- ✓ ESCO accreditation scheme
- ✓ Accreditation scheme of energy managers and energy auditors by AEMAS
- ✓ EE&C database
- ✓ Financially supporting scheme

In addition, the goal/target which the DOE adopts for all of these measures is as follows;

- ✓ Energy Efficiency and Conservation Action Plan Targets (2009-2030)
  To achieve energy savings equivalent to 10% of the **annual final energy demand outlook** from 2009-2030
- ✓ Cumulative Target Potential Energy Savings (2009-2030)
  = 76,002 ktoe (3,485 ktoe per year)
  = 7,455 MWe (339 MWe per year) deferred power capacity
  = 196,879,390 million MT CO_2 avoidance (8,949063 Mil. MT CO_2 per year)



(Source: DOE documents)

Figure 3-79 Overview of Supporting Activities for EE&C

Table 3-30 Outline of Supporting Activities for EE&C

	Title	Contents
1	**Information, Education and Communication Campaign**	
	a. Power conservation and efficiency (commercial, industrial, power, residential)	**Campaign** TV and Cinema, conservation tips for electricity, electricity saving tips (handouts), newspapers, brochures, poster making contest, etc. *Partially to be implemented with PIA*
	b. Fuel conservation and efficiency (land, sea and air transport)	**Seminar/Workshop** on road transport
	c. Fuel economy run	**Campaign:** Park and Ride, Carless Day, etc.
2	**Energy Management Service (energy audit service)**	DOE provides energy audit service on request. Other agencies such as DOST-PCIEERD, DOTS-ITDI, ENPAP also provide energy audit service.
3	**Voluntary Agreement**	Placemats etc. *With private organizations*
4	**Government Energy Management Program (GEMP)** **(A103)**	DOE mandates government agencies to reduce energy consumption by 10% compared to that of 2004.
5	**Standard and Labeling (Home Appliances)**	Minimum energy standards and labeling system for home appliances *With DTI*
6	**Energy Consumption Reporting Program (DOE Memorandum Circular No. 9303-05)**	A voluntary program asks energy consumers equal to or more than 1 million loe to report their energy consumption and the ones with equal to or more than 2 million loe to report energy efficiency plan. More than 200 entities joined. Reports are used for Don Emilio Abello Award.
6	**Don Emilio Abello Energy Efficiency Award**	DOE gives energy efficiency awards for industry and commercial sector's entities and energy managers.
7	**ESCO Accreditation**	DOE accredited four (4) ESCOS (as of June 2011).
8	**Energy Conserving Guidelines in Buildings**	DOE publishes energy conserving guideline for building and equipment design. *To be cooperated with DPWH*
8	**Philippine Energy Efficiency Prject (PEEP) sponsored by ADB**	
	a. CFL distribution	CFLs have been distributed to residential sector.
	b. Government retrofit	Government buildings have been retrofitted using ADB low rate loan.
	c. Public lighting retrofit	Public lighting has been retrofitted.
	d. LED traffic lighting	Traffic lighting has been retrofitted to LED lamps.
	e. Solar LED home lighting system	LEDs have been distributed to residential sector.
	f. Expansion of testing laboratory and lamp waste management facility	The appliance-testing laboratory expanded the range of appliances to test energy efficiency performance
	e. Super ESCO	Super ESCO project is under discussion.
	f. Green building EE rating System	
9	**UNIDO-DOE Industrial EE for the Philippines**	UNIDO provides trainings for industrial engineers for energy efficiency.
10	**AEMAS by ACE**	C/P: ENPAP AEMAS project trains and certifies energy managers and energy auditors.
	ASEAN Award for Industry and Buildings	Winners of Don Emilio Abello Award will be candidates for these ASEAN Awards
	ASEAN EM EE&C Award for Buildings	
	APEC	Labeling system and Energy Efficiency Building Code
	APERC	Labeling system and Energy Efficiency Building Code
	ERIA	Analysis on Energy Saving Potential in East Asia
	ICA	Labeling system for Air-conditioner and Freezer in ASEAN
	UNEP	Labeling system for Air-conditioner and Freezer in ASEAN
	KESCO	the safety aspects of a power plant

(Source: DOE documents)

The details of the activities will be shown in the corresponding sections after Chapter 4. Here is the introduction of the brief summary.

(1) Law and regulations
(2) IEC activities (campaign etc.)
(3) Energy consumption reporting system on the governmental sector
(4) Energy audit scheme
(5) MEPS and labeling scheme of home appliances
(6) ESCO
(7) Energy database
(8) Financial supporting scheme

(1) EE&C law

EE&C law was enacted in the Philippines in 1980 as a temporary legislation, and expired in 1987. After that, no EE&C laws were enacted. Several EE&C bills have been developed, but not enacted. Consequently, the government of the Philippines has promoted EE&C through administrative orders or programs, which have been effectively easier than an act. However, as legal binding powers of such orders are limited and a comprehensive approach has been insufficient, EE&C in the Philippines has not achieved a satisfactory outcome. Therefore, the early establishment of EE&C law, which enables a comprehensive approach towards the establishment and operation of EE&C systems with a legal basis, is required.

(2) Information, Education and Communication (IEC)

Awareness on EE&C in the Philippines is class-dependent (rich or poor). The concept of EE&C education has not been established yet. An IEC campaign related to EE&C has been implemented based on the Environmental Education Act (2007) under DENR and the private sector, such as private entities and the non-governmental organization (NGO). The current IEC campaign under DOE is one component of NEECP. The main components are the *Don Emilio Abello Energy Efficiency Awards*", seminar-training on energy management and the distribution of brochures. The issue is that now the DOE cannot divide the annual budget effectively based on the priority of each component. It is necessary that the target sector and target population should be chosen and the creation of IEC plans should be in consideration of the costs and its effects.

(3) Energy Consumption Reporting

The National Training Workshop on Energy Efficiency and Conservation will be held in 11 major cities, starting this year and provides energy management training programs. These programs will use the Energy Management Handbook for ASEAN edited by ECCJ as educational materials to promote energy management.

The government is implementing some activities such as correcting and analyzing the amount of energy consumption, site surveys and the certification of the energy savings under the Government Energy Management Program (GEMP) for the governmental sector.

Although, there is a DOE-led energy consumption reporting system for the private sector, given that there are no legal submission requirements, those who submit reports are mostly large companies The system, however, is utilized for the selection of the year's Don Emilio Abello Energy Efficiency Awards and creates incentives to promote energy efficiency.

The UNIDO is discussing the Industrial Energy Efficiency Project, the target for the industrial sector, with DOE and the current situation in the end of May is awaiting DOE approval. After the approval, the DOE' internal project office will be established and start activities towards the introduction of the energy management system and the promotion of the energy optimum system for the industrial sector.
The AEMAS (ASEAN Energy Management Accreditation Scheme) Project, supported by ACE/EU, conducted by ENPAP, provides a mid-May energy management training program. The trainees will receive certification from AEMAS, but it will remain within the private sector.

(4) Energy Audit

Energy Audits are carried out mainly by government organizations such as the DOE, DOST and etc while private sectors are doing the same kind of activities as well. And its technology (by DOE) has already reached a certain advanced level through experiences of foreign cooperation such as PROMEEC (Program of Energy & Efficiency Program) by ECCJ and NEECP (National Energy Efficiency and Conservation Program, 2000~2010).

The present problem is that various organizations are carrying out an Energy Audit but their cooperation and coordination efforts are insufficient and there seems to be no clear future Energy Audit prospects in the Philippines.

It is expected that the demand for the energy audit will drastically increase if the energy conservation law is established and it will be an urgent matter to procure a sufficient number and quality of Energy Auditors.

In order to accomplish this purpose, international technical cooperation programs such as PROMEEC by ECCJ should be more actively promoted and training programs for Energy Auditors such as AEMAS (ASEAN Energy Management Scheme) by ACE and more technical seminars on Energy Audits by the DOE should be carried out throughout the Philippines.

(5) Energy-Efficient Equipment and Labeling Program

In the Philippines, since the DOE does not have the authority to enforce compliance without EE&C Law, the DTI-BPS (Department of Trade and Industry - Bureau of Product Standards) has cooperated with the Filipino EES&L (Energy Efficiency Standards & Labeling), which has been mandatory per the PNS (Philippines National Standard) which is enforceable by the law. The PNS obliges manufacturers and importers: (1) to comply with Minimum Energy Performance Standards (MEPS); and (2) to attach labels on every designated product.

Meanwhile, some DOE staff feels that; the DOE should be empowered to administer EES&L under the authority of EE&C Law; and should operate EES&L autonomously and flexibly. Considering the history, stakeholder resources such as know-how, human resources, budget, the future framework and the contents to be included in EE&C Bill should be discussed.

Moreover, the followings are main issues needing attention to improve EES&L:

(1) improve the labeling contents so that consumers can understand energy-saving effects more easily;
(2) periodically conduct an evaluation of the policy effect and an awareness survey of the Labeling Program, and;
(3) consider the introduction of such financial incentive schemes as VAT exemptions, no-interest loans, and subsidies in order to spread high energy-efficient appliances

(6) ESCO

Activities for Promoting ESCOs and the expanding ESCO market are of great use for ESCO promotion. There are potential customers facing higher energy bills in the Philippines than in other countries, and ESCOs will solve their business challenges utilizing ESCO services. The services include initial investigated savings and guaranteed energy savings.

The DOE started the Criteria of Accreditation for ESCOs, but there are remaining problems, the lack of awareness for ESCO business, ESCO staff skill level, and financing.

(7) Energy Conservation Database

As a source of an existing National Energy Conservation Database, there are two types of report systems for energy-intensive consumers. One is a quarterly report system on energy consumption and its index (SEC). The other is an annual report system on energy conservation planning, and the achievement of an energy conservation program.

The number of reported cases is small because there are no legal obligations in submitting, as both reporting systems are based on a memorandum circular of DOE. Establishing an energy management system with the obligation of submitting the report might be required in order to collect a sufficient amount data for analysis. The DOE has a future vision for the above database containing the data of energy consumption.

(8) Financial Mechanisms

A low rate loan scheme supported by KfW has been confirmed as a financial support scheme for EE&C activity. However, it is not functioning well.

Although, the expansion of a financial support scheme is desired in the future, the supporting measure may be limited to tax benefits due to limited fund resources. In other words, it will be required to raise new funds. However, it supposed to be difficult to persuade nations to agree on imposing an additional tax or charges on energy charges when the rate is already high.

3.8 International Cooperation Activities

The Philippines has many activities and projects for the promotion of the energy efficiency supported by a number of forms of International Cooperation. In this section, the framework in the future in the Philippines will be considered based on perceived current circumstances with directed activities of each cooperative venture

3.8.1 Activities of Japanese International Cooperation

The Ministry of Economy, Trade and Industry (METI) has five priorities; 1) intellectual property rights protection, 2) development of institutions for an accreditation standard, 3) efficiency of physical distribution, 4) environment and energy efficiency, 5) development of human resources for industry, for strategic regions – Middle East Asia with technical support. Japan also decided to provide technical assistance of the most-advanced energy efficiency technology in the world to developing countries facing environmental and increasing energy consumption challenges with economical development. Japan also set a goal of components for the Asian Standard; "Energy Manager Scheme Support, Energy Efficiency Guideline Support" and so on.

The Energy-Manager-Scheme Support is implemented by the Japan External Trade Organization (JETRO) with the Green Aid Plan (GAP) in the Philippines. The Energy Manager Scheme and the Energy Audit Method were introduced for food processing, the steel industry, and then casting industry up until now. The Association for Overseas Technical Scholarship (AOTS) has held seminars for energy efficiency. Furthermore, the Energy Conservation Center of Japan (ECCJ) has supported energy management and audit standards, capacity building, and energy efficiency best practices through the Promotion of Energy Efficiency and Conservation (PROMEEC).

3.8.2 Activities of International Cooperation

Activities for energy efficiency in Philippines are shown in Table 3-31, categorized according to subject.

Table 3-31 Matrix of Activities for Energy Efficiency by International Cooperation

Energy Efficiency	Cooperation Activities	C/P	Contents
IEC	ADB PEEP (2008-2012)	DOE	Distribute CFLs and Promote consumer energy conservation
	UNDP/GEF PELMATP(2005-2010)	DOE	Promote energy efficiency lighting system (continue in PEEP)
	UNEP/SIDA GERIAP		IEC for Industrial Sector
Energy Managers and Energy Auditors	UNIDO Industrial Energy Efficiency Project	DOE	Standardization of energy management, capacity building for industries
	ACE/EU AEMAS (2010-2012)	ENPAP	Development of an energy management scheme in ASEAN countries
Labeling Scheme / Building Energy Efficiency Code	APEC EGGEC, CEEDS		Development of a labeling scheme
	UNEP, ICA		Development of a labeling scheme for air-conditioners and refrigerators

(1) Asian Development Bank (ADB)

The Philippines Energy Efficiency Program (PEEP) is implemented by DOE with support from ADB. The objective of the PEEP is to demonstrate the societal benefits of implementing a series of energy efficient projects in the commercial, residential and public sectors. The Philippines Efficient Lighting Market Transformation Project (PELMATP) implemented by the Department of Energy (DOE) since 2005,

complimented by the Government Energy Management Program (GEMP) has been the cornerstone of PEEP, which is composed of seven (7) components as follows (The details are shown in the table);

1) Energy Efficiency in Government Buildings
2) Nationwide Residential Lighting Program
3) Public Lighting Program
4) Energy Efficiency Testing and Lamp Waste Management
5) Super ESCO
6) Efficient Building Initiative
7) Communication and Social Mobilization

The project implementing body of the Super ESCO seems, however, to be no governmental organization or company decided by DOE.

The Loan Agreement between DOE and ADB concerning PEEP was finalized in May 2009. The International Institute for Energy Conservation (IIEC) was contracted in March 2010 to provide Project Implementation Services. The budget of PEEP is 46.50 million US$, ADB 31.1 million payment and Japan 1.5 million payment through the CEFPF (Clean Energy Financing Partnership Facility). The budget selection of PEEP is shown in Table 3-33, especially the National Residential Lighting Program is allowed about 16 million US$.

Table 3-32 Budget Selection of PEEP

Unit: million USD

Item	Amount
A. Base Cost(*1)	
1. Efficient Lighting Initiative	
1.1 Retrofit Government Office Buildings	2.66
1.2 National Residential Lighting Program	16.16
1.3 Public Lighting Retrofit Program	1.33
1.4 Energy Efficiency Testing and Lamp Waste Management	
2. Efficiency Initiatives in Buildings and Industries	
2.1 Super ESCO	8.00
2.2 Efficient Building Initiative	0.50
3. Communication and Social Mobilization	
3.1 Communication for Efficient Lighting	1.50
3.2 Promoting Efficiency in Everyday Life	1.00
4. Project Implementation Support	1.50
5. Taxes and Duties	2.40
B. Contingencies	
1. Physical	3.32
2. Price	1.28
C. Financing Charges during Implementation	3.34
Total (A+B+C)	46.50

ESCO = energy service company

*1 in mid-2008 prices.

*2 Physical contingencies computed at 9% for base cost. Price contingencies computed at 0.8% for foreign exchange costs, and 5.0% in 2008 and 4.5% in 2009 onward for local currency costs: includes provision for potential exchange rate fluctuation.

*3 Includes interest and commitment charges. Interest during the grace period is computed at the 5-year forward London interbank offered rate plus a spread of 0.2%. Commitment charge is calculated at 0.15% on the undisbursed balance.

(Source: ADB)

Table 3-33 Components of PEEP

Component 1: Energy Efficiency in Government Buildings
Goal: To reduce wasted energy in government office buildings due to inefficient lighting equipment. Contents : Older-style fluorescent lamps, incandescent bulbs, and inefficient magnetic ballasts will be replaced by energy efficient new T8 fluorescent lamps, CFLs, and electronic ballasts. Targets ; 42 (of an estimated 300 nationwide) selected government office buildings in Metro Manila. Main activities ; ・ Conduct of validation audits of the buildings with the assistance of the government energy officers to finalize the scope of supply and services ・ Coordinate retrofits and issuance of acceptance certificates
Component 2: Nationwide Residential Lighting Program
Goal: To promote Energy Efficiency for distribution of Energy Efficiency Lighting for the residential sector. Contents : Distribution of CFLs to eligible consumers in Metro Manila and participating electricity utilities and Electric Cooperatives (EC) nationwide; the collection, recording and storage of incandescent bulbs (IBs); and the disposal of IBs after independent verification in compliance with CDM protocols. Main activities; ・ Measurement and Verification of Program Impacts ・ Documentation for CDM ・ Reporting and Dissemination ・ Disposal of Incandescent Bulbs ・ LED - Customer Satisfaction Survey and Reporting
Component 3: Public Lighting Program
Goal: The demonstration of energy savings through the adoption of efficient lighting technologies for public lighting, and to promote compliance with Roadway Lighting Guidelines developed under PELMATP to standardize the specifications for public lighting nation-wide. Contents: Replacement of mercury vapor lamps and incandescent bulbs (IBs) with high pressure sodium vapor lamps for street lighting and IBs in existing traffic lights with LEDs. Target : the cities of Baguio, Cagayan De Oro and two other sites Main activities; ・ Prepare technical specifications and bid documents ・ Coordination of retrofits and the issuance of acceptance certificates ・ Conduct of pre and post installation monitoring and the verification of energy and demand savings
Component 4: Energy Efficiency Testing and Lamp Waste Management
Goal: To expand the capacity of the appliance-testing laboratory, to test energy efficiency performance of a wider range of appliances including televisions, washing machines, large refrigerators, freezers and a range of other consumer products. Contents: the supply, installation, commissioning and operator training
Component 5: Super ESCO
Goal: To promote energy efficiency (EE) projects in the public and private sectors. Contents: The Government of the Philippines established a Super-ESCO, the EC^2 Corporation, to provide technical assistance and to enable it to achieve its mission in implementing ESCO projects in the public sector and facilitating the creation of a sustainable market for private sector ESCO operations. Main activities; ・ Review and refine the strategic business plan of the EC^2 Corporation ・ Assist in developing the organizational structure and staffing ・ Develop the business processes, project financing structures and standard forms and contracts ・ Provide extensive training band capacity building to the EC^2 Corporation staff ・ Develop the business processes, project financing structures and standard forms and contracts ・ Training and Capacity Building ・ Project Development - Public Sector ・ Project Development - Private Sector ESCOs ・ Measurement and Verification
Component 6: Efficient Building Initiative
Goal: To reduce energy and GHG emissions in the building sector Contents: To develop the framework for such a system and a supporting technical and Institutional structure. The

Philippines Green Building Council has developed a draft framework titled "Building for Ecologically Responsive Design Excellence (BERDE)" and this framework is used as the basis for developing a Green Building Rating system in this component.

Main activities;

- Access the proposed rating system for new and retrofitted Buildings
- Streamline Existing Initiatives into a single-building Rating System for the Philippines
- Draft Specifications and conduct Industry-wide consultation
- Develop Specifications for the scoring mechanism and software
- Develop accreditation requirements and procedures for the implementation of a rating system
- Develop a Training Curriculum for accrediting assessors
- Upgrade the design of selected demonstration buildings to meet system requirements
- Certify Buildings using the system

Component 7: Communication and Social Mobilization

Goal: To promote the PEEP Project as follows;

1) To enlightenment the continued EE conservation awareness of each consumer and Promoting EE for Everyday Life
2) Social Mobilization

Main activities;

1) To continually enhance EE conservation awareness of each consumer and Promoting EE for Everyday Life

- Assess existing partnerships and formulate strategies and methodologies on how to maximize community involvement
- Identify and assist in the establishment of linkages with other target partners of the program at the national, regional, provincial, municipal and barangay levels
- Design appropriate research instruments and conduct rapid assessment of the opinions, beliefs, knowledge, practices, and other behavioral determinants of the target participants
- Develop an information and education campaign (IEC) strategy and work plan
- Conduct a baseline study and pilot-test the IEC strategy with select partners and client-beneficiaries
- Assist in communication capacity building for the institutional partners' manual on EE in Everyday Life by supervising the design and pilot testing of trainers
- Assist in the dissemination of information materials through proper institutional channels

2) Social Mobilization

- Develop a social mobilization strategic work plan
- Facilitate the establishment of institutional linkages and partnerships from among identified partners
- Conduct the assessment of capacity building efforts particularly those directed towards changing the behavior of project participants and beneficiaries
- Facilitate the capacity building of institutional partners
- Design, organize and facilitate training to be able to communicate the messages of the program and to stimulate people to action
- Promote participation of the concerned stakeholders in the implementation of similar future undertakings
- Develop a systematic database to store and process information gathered on the socio-economic profiles of the target beneficiaries and institutional partners

(Source: DOE website)

(2) United Nations Development Programme (UNDP) / Global Environment Facility (GEF)

GEF approved The Philippines Efficient Lighting Market Transformation Project (PELMATP) in 2004. This project is a five-year project from 2005 led by DOE with support from UNDP and GEF. The Project aims to promote Energy Efficient Lighting (EEL) systems in the Philippines, and is composed of five (5) components shown in Table 3-34.

Table 3-34 Components of PELMATP

Component 1: EEL Policies, Standards and Guidelines Enhancement Program
Goal: To institutionalize the Energy Efficiency Lighting Contents: The establishment of a functioning mechanism for sustained periodic review, updating and enforcement of policies, standards, guidelines and programs on EEL applications, and implementation of Minimum Energy Performance Standards (MEPS) for EEL products.
Component 2: EEL Applications Institutional and Technical Capacity Development Program
Goal: Capacity Building of relevant government agencies Contents: Developing capacity of relevant government agencies on EEL Product testing, labeling, development, market monitoring, and enforcement of standards with the consumers, including technical capacity development support for local manufacturers.
Component 3: EEL Application Consumer Awareness Improvement Program
Contents: To empower consumers in making informed decision in choosing EEL products.
Component 4: EEL Initiatives Financing Assistance Program
Contents: To design a financing mechanism to make EEL products more accessible and affordable to consumers.
Component 5: EEL System Waste Management Assistance Program
Goal: To develop guidelines and programs for proper waste management and disposal. Contents: To address the potential negative environmental impacts of mercury-containing lamp waste.

(Source: DOE website)

(3) United Nations Environment Programme (UNEP) / Swedish International Development Cooperation Agency (SIDA)

Greenhouse Gas Emissions Reduction from Industry in the Asia Pacific (GERIAP) Project was coordinated by UNEP, funded by SIDA, and implemented in nine (9) countries through the National Focal Points (NFPs). NFPs are institutions or government agencies with C/P and energy efficiency experience. Their role is to implement the three project components in the nine GERIAP countries.

1) Capacity Building
2) Demonstration of Cleaner Production
3) Promotion for factories and a survey of the barriers of Energy Efficiency

(4) ASEAN Centre for Energy (ACE) / European Union (EU)

The Energy Efficiency Practitioners Association of the Philippines (ENPAP) is implementing the Energy Management Gold Standard (formerly called the AEMAS Project), funded by the Switch Asia Programme of EU through ACE.

AEMAS is designed to be complementary to existing environmental and energy management systems and the advantages of achieving real and quantifiable energy savings and CO2 emissions reductions. This project will implement the accreditation of the Energy Manager and Energy Auditor and also aims to increase the professional standing of accredited energy managers and energy auditors. Furthermore, it aims to increase a corporation’s competitiveness in the area of energy efficiency.

Country Experts, Trainees. Auditors, and five hundred Energy Managers will be trained and accredited in the Philippines. The scope of the number of representatives of a private company is expected to train in for being the accredited energy managers. Furthermore, representatives from 500 firms are expected to undergo training to become accredited energy managers.

(5) United Nations Industrial Development Organization (UNIDO)

The Industrial Energy Efficiency Project, funded by UNIDO-GEF, led by the DOE and DTI-BPS, aims to promote Energy Efficiency with industries' energy optimization system and capacity building. The project is implemented with two energy efficiency programs as follows. In 2010, UNIDO also held seminars and workshops on energy efficiency and management for the agricultural sector in the Philippines.

- Energy management standards (IEC for Energy Management Standard)
- Industries energy optimization (Demonstration project of energy efficiency for factories of cement, food, and chemicals)

(6) Other International Cooperation Activities

An Expert Group on Energy Efficiency and Conservation (EGGEC) Cooperative Energy Efficiency Design for Sustainability (CEEDS) under the Asia Pacific Economic Cooperation (APEC) is addressing the Energy Efficiency Scheme in ASEAN. Seminars and workshops of the labeling scheme were held in Taiwan in 2009, at Japan in 2010 by EGGEC and CEEDS, also workshops concerning building codes were held in Thailand in 2010 and in Hong Kong in 2011.

The UNEP and ICA created a joint proposal of a labeling scheme of air-conditioners and refrigerators for ASEAN. The Economic Research Institute for ASEAN & East Asia (ERIA) is now examining the Analysis on Energy Saving Potential in East Asia.

3.8.3 Summary

As can be seen in the overview provided in Table 3-23, there is a variety of donor aid activity from devising systems for labeling schemes to equipment distribution projects geared towards for example the switchover to more efficient lighting. Although, these activities seems to be a slightly over concentrated in the residential sector, overall, implementation is being evenly applied to all sectors.

Table 3-35 Activities of International Cooperation Classified Sectors

Activities / Projects	Contents	Industry	Commerce	Government	Residential
PEEP					
Analysis on Energy Saving Potential in East Asia	Replacement of equipments	―	―	○	―
Nationwide Residential Lighting Program	Replacement of equipment	―	―	―	○
Public Lighting Program	Replacement of equipment	―	―	○	―
Energy Efficiency Testing and Lamp Waste Management	Capacity Building	―	―	―	○
Super ESCO	Promotion of ESCO	―	○	○	―
Efficient Building Initiative	Designing the Building Code	○	○	○	○
Communication and Social Mobilization	IEC	―	―	―	○
PELMATP	Designing the EEL	―	―	―	○
Industrial Energy Efficiency Project	IEC	○	―	―	―
AEMAS Project	Accredited Energy Manager	○	○	―	―
APEC	Designing the labeling scheme	―	―	―	○
ERIA	Analysis on EE potential	―	―	―	―
UNEP	Designing the labeling scheme	―	―	―	○
ICA	Designing the labeling scheme	―	―	―	○
JICA	Institution of EE&C Bill	○	○	○	○

3.9 Overview of Current Situation and Issues

This section is trying to show an overview of the current situation and EE&C issues based on sectoral characteristics (3.5), existing measures and activities (3.6), and activities by supporting organizations (3.7).

Table 3-36 Sectoral Characteristics and Issues

Sector	Power	Industrial	Commercial	Governmental	Residential
Energy Consumption *2	Generation losses etc.: 303 ktoe T&D Loss: 646 ktoe	5,768 ktoe (24.2 %) <3rd position>	2,404 ktoe (10.1 %)	NA	6,117 ktoe (25.7 %) <2nd position*1>
Power Consumption *2	(Approx. half of primary energy is consumed in the shape of power	1,469.3 ktoe (33.57 %) Power ratio: ave. 25% <2nd position>	1,269.0 ktoe (28.99 %) Growth rate is high. Power ratio: ave. 53% <3rd position>	NA	1,508 ktoe (34.45 %) Power ratio: ave. 25% <1st position>
Number of Energy Consumers	IPP: TRANSCO PU: 10, EC: 120	115,898*3 (large companies: 1,099)	648,460*3 (large companies: 1,575)		18,452,000*4
Large energy consuming industries	-	Food: 37% (mainly, sugar), Cement (24%)	Large energy consuming industries seem to be hotels, hospitals and shopping malls, but no data is available	―	-

Unit Price of power (approx. calculation)	-	Approx. 8-9 PHP/kWh (overall unit price of MERALCO)	Approx. 8-9 PHP/kWh (overall unit price of MERALCO)	(unknown)	Approx. 8-10 PHP/kWh (overall unit price of MERALCO)
Characteristics and Issues	- This is an energy transformation sector and at the same time, also a large energy consuming sector. - There are regulations and incentives on energy consumption for generation, transmission and distribution sectors.	- A large energy consuming sector - No benchmarking data are available - It is difficult for outsiders to be involved in the process. - in-house engineers - Energy price is high compared to other countries. This affects international competitiveness - There are some voluntary companies which apply for an energy consumption reporting system and award. - Payback period, one of the criteria of investment is as short as 2 to 3 years. - It is possible to accept energy audits. - PCCI can be a focal pint.	- A large power consuming sector - No benchmarking data is available. - not so much willingness to invest - almost no in-house engineers - There are some voluntary companies which apply for energy consumption reporting system and the award - Payback period, one of the criteria of investment is short as 2 to 3 years.	- GEMP is in place - 10% reduction from the 2004 or 2005 energy consumption. - This sector should be a good model for other sectors.	- Total energy consumption volume is next to the industry, but each amount of individual energy consumption is small. - The gap between the rich and poor is wide. (The target of EE&C is limited.) - Appliances in use are limited.
Existing Supporting Activities	No particular activities	- Voluntary participation in an energy consumption reporting system and award - Training and accreditation programs for energy Managers and energy auditors (AEMAS)		- GEMP	- MEPS and labeling scheme for home appliances - IEC activities
		- Training program for engineers via the UNIDO project - Energy management manual etc. by the project of PROMEEC		- Retrofit for EE&C by ADB project	- CFL provision by ADB project
Direction of Support	NA	- Awareness raising on the worthiness and effectiveness of EE&C is necessary. A measure mandating that they adopt a PDCA cycle like the Energy Management System is possible for large companies. - Financial support measures (subsidies, tax reductions etc.)		- Continuance of GEMP - Gaining publicity of GEMP as a success model	
		- Training for engineers will be effective.	- Introduction of energy audits and know-how by outsiders due to lack of in-house engineers		

*1: the 1st position is the transport sector.
*2: "Energy Balance as of 2009", EPPB, DOE
*3: "Distribution of Establishment by Industry and Firm size (2009)", NSO
*4: "2009 Family Income and Expenditure Survey (FIES)", NSO

(Source: Energy Balance as of 2009, EPPB etc.)

The following is a summary description.

- ✓ The power sector is an influential sector whose efficiency improvements affect the efficiency of a nation's power consumption. Incentives for improving efficiency have been provided through the process of tariff approval, but it is once a year or several years. Although energy consumption and the power generation amount have been reported continuously, it is worth considering the measures to promote continuous energy management or to support such measures.
- ✓ The industrial sector consumes a large amount of energy per unit and holds in-house engineers and their energy efficiency affects its international competitiveness. Thus, the basis for EE&C has been ready. There is still room to introduce practical EE&C measures (operational and maintenance measures). Measures to promote energy management and training would be effective.
- ✓ The commercial sector shows a high power consumption growth rate compared to the industrial sector. The energy consumption per unit is not so large and there are no in-house engineers in most of the cases. Thus, when implementing measures to promote energy management, it requires supporting measures from outside experts.
- ✓ Governmental sectors accomplish energy consumption reduction under GEMP, which is a successful EE&C case. It should be a model sector and the continuance of EE&C activities is required.
- ✓ Second to the industrial sector, the residential sector consumes the most energy, although the energy consumption per unit is very small. As electrification proceeds, final energy consumption seems to be decreasing (due to the counting of final energy consumption). On the other hand, although home appliances owned and in use are limited at this moment, they will increase in the future. It is difficult to apply measures on an individual basis, and it is effective to approach the whole sector through mass media such as an IEC campaign or measures, which are already in place, to improve market efficiency through MEPS and a labeling scheme for home appliances.

Chapter 4 EE&C Bill

4.1 Current Situation

4.1.1 Legal System

The general legal framework of administrative laws in the Philippines is described below. The EE&C law will be implemented based on such a system.

(1) Act

Acts are the highest rule in the legal structure in the Philippines and an act will be effective after congressional resolution. The congress is a law-making body having a bicameral system consisting of the Senate and House of Representatives. Only Lawmaker-initiated legislation is allowed and the government would not submit any bill. To establish an act, first a senator or a member of the House of Representatives will draft a bill. The bill shall be submitted to the Senate or the House of Representatives for discussion accordingly. Two-thirds of the members of the Senate and House of Representatives shall agree to pass the bill, and if approved, it shall be enacted. Some special bills such as appropriation bills, revenue or tariff bills, and private bills, shall originate exclusively in the House of Representatives, but the Senate may propose or concur with amendments. Once approved through reading sessions (from the First reading up to the Third reading) by both the Senate and the House of Representatives, the bill shall be approved by the Bicameral Committee, and after that, the bill shall be presented to the President, and become a law after signing for approval. (If the contents of the bill are the same between the Senate and the House of Representatives, the discussion in the Bicameral Committee is not required.) The President has the power to veto a bill, and such a bill shall be returned to the House where it originated for reconsideration. The process of law enactment is described below.

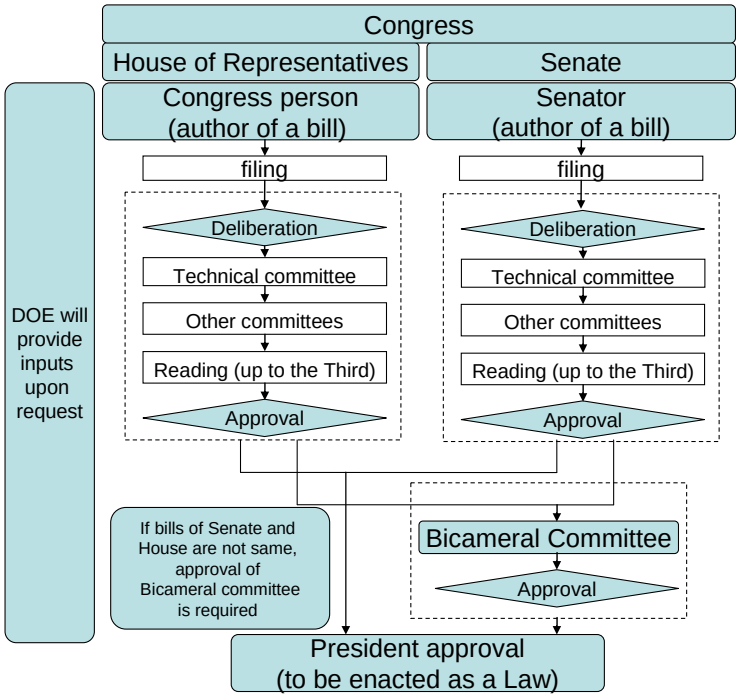


Figure 4-1 Process of Establishment of a Law

On the issue of the prioritization of the bills to be discussed, the Philippines have system named LEDAC (Legislative Executive Development Advisory Council), which decides the priority list by which bills shall be discussed in turn accordingly. For a prompt start of the discussion, it is important for a bill to be included to the priority list, however, the discussion of some bills has already begun without being listed, having been already understood as an important bill to be discussed prior to the others.

If a discussion does not finish within the congress session, the bill cannot only be enacted, but also needs to be re-discussed from first at the other congress session. Therefore, if a bill is expected to require long time for discussion, it is required to start discussion at a time when there remains much time until the end of the congress session.

(2) Implementing Rules and Regulations（IRR）

Implementing Rules and Regulations (IRR) consist of administering provisions. An IRR shall be attached to an act, and it shall include provisions such as rules for administering and numbers for judgment standards. An act can be effective only when accompanied by an IRR, and an IRR often includes contents essential to the implementation of a policy, it is required the IRR be extensive for higher feasibility and effectiveness of the act. The enactment of an IRR does not require any approval by the congress, and ministries having jurisdiction over policies aimed by the act will lead to their establishment. To enact an IRR, the President must sign on it, and the President has the power to veto an IRR such as a bill.

(3) Executive Order(EO）, Administrative Order (AO）

When an act is difficult to be established and the government wants to implement a policy, sometimes

the government places an order that does not required any congressional approval. An Executive Order (EO) is an order issued by the President directly without legislative body approval, in order to exercise executive power regarding matters entrusted by the law, and an EO has the same legal power as an act. EOs have been ordered for the implementation of policies, which would take substantial times for enactment. EOs are also used for organizational establishments or changes. In addition, the ministries will issue an Administrative Order and it regulates execution procedures. Both the AOs and EOs are easily implemented compared to an act, therefore, several AOs and EOs regarding EE&C were issued to promote EE&C activities in governmental and private sectors in the Philippines with no EE&C law. While AOs and EOs can be functionally implemented or amended, their administrative power is limited as it is difficult to regulate a wide range of sectors or items. In addition, the legal power of AOs and EOs is less than acts, and if AOs or EOs includes contents having conflict to any act, the contents of the act shall be effective even if the act is enacted later than the AOs or EOs.

(4) Others

Other systems such as the Memorandum Circular by the ministries or programs act as a complement to the legal system above, and a Memorandum Circular by DOE and programs such as NEECP have been implemented for EE&C promotion. However, restricted legal binding power or limited corroboration between each program still limits participants or activities.

4.1.2 EE&C Law and EE&C Bills in the past

EE&C law was enacted in the Philippines in 1980 as a temporary legislation, and expired in 1987. After that, no EE&C laws were enacted. Several EE&C bills have been developed, but not enacted. Consequently, the government of the Philippines has promoted EE&C through administrative orders or programs, which have been effectively easier than an act. However, as legal binding powers of such orders are limited and comprehensive approach has been insufficient, EE&C in the Philippines has not achieved a satisfactory outcome. The EE&C law and the EE&C in the past are described below.

(1) Former EE&C Law (BP73, 1980)

In 1980, under the Marcos Administration, “BP73 An Act to Further Promote Energy Conservation and for Other Purposes (1980-1985)” (hereinafter referred to as “BP73”) was implemented, and “BP172 An Act amending Sections ten and fourteen of BP73 [Extending BP] Empowerment of Ministers of various Ministers to perform certain acts; and, extension of BP273 for another 5-year period (1985-1990)” (hereinafter referred to as “BP273”) was implemented in 1985. However, this BP273 expired because of the implementation of the New Constitution and establishment of the congress after the displacement of President Marcos. In addition, during moves to change the government, several EE&C bills were developed, but none of them were enacted.

In “BP 73”, some regulations were provided such as 1) for transportation, banning of import or retail of cars that do not meet the specified performance, 2) for appliances or buildings, setting a standard for EE&C

performance for appliances and building codes, 3) for large consumers in industrial, commercial and transportation sectors, requirement to submit periodical energy consumption reports, appointment of energy managers, and conducting energy audits. The law also defined to promote quality control of fuels, and reuse of waste oil. Many measures included in the law can also be applied to the new EE&C law; however, due to a lack of data, it is difficult to determine how each measure caused the real effect or compliance level of the EE&C law at that time. Therefore, for the introduction of similar rules, it is better to study if each measure is suitable in consideration of the current situation. For example, to set a threshold for specifying designated energy users (under the former EE&C law, energy consumers with 1,000 kloe/year were required to submit annual reports), under a situation where actual data such as the covering scale (numbers of designated users, energy consumption covered by the regulation) or the percentage of users who actually submitted the reports is not clear, we need to examine the level of threshold suitable for the current situation.

"BP73" (and following "BP273") includes contents described below.

Table 4-1 Contents of BP73

Sec	Contents
Sec 3	The below Activities are prohibited or limited - Prohibition on importation, manufacturing or assembling of gasoline-powered motor cars with engine displacement of over 2,800 cc or kerb weight exceeding 1,500 kg, including accessories (kerb weight: total weight of a vehicle with standard equipment, all necessary operating consumables) - Limitation on the use of neon and advertising lights (6:00-9:00) - Prohibition on the use of government vehicles other than official business
Sec 4	The Ministry of Energy is empowered to - Establish and administer a fuel allocation and rationing program - Require distribution and the sale of alcohol/gasoline or other energy blends to increase domestic energy use - Set standards of energy consumption for oil-powered or electric-driven machinery, equipment, appliances, devices, and vehicles - Require industrial, commercial and transport entities or establishments to collect or cause the collection of waste oil for recycling as fuel or lubricating oil - Fix the oil refineries' production yields and product quality - Require industrial, commercial and transport establishments consuming more than one million (1,000,000) fuel oil equivalent liters of energy including liquid fuels and electricity annually to submit fuel and electric consumption as well as production and sales statistics - Set energy use standards for industrial, commercial and transport establishments - Require industrial, commercial and transport establishments consuming more than two million (2,000,000) fuel oil equivalent liters of energy annually to employ qualified engineers to act as energy managers, and to submit energy conservation programs and energy audits - Require permission issued by the Ministry for all new or additional air-conditioning equipment to be installed
Sec 5	The Ministry of Labor and Employment is empowered to - Stagger the working hours in industrial and commercial establishments and in offices, - Fix the number of working days per week in such establishments or offices
Sec 6	The Ministry of Education and Culture is empowered to - Fix the schedule of school hours in urban centers
Sec 7	The Ministry of Trade is empowered to - Limit and fix the operating hours of business and entertainment establishments, except those business establishments which by their very nature have to operate on a twenty-four hour basis
Sec 8	The Ministry of Human Settlements is empowered to - Set standards in accordance with accepted engineering principles and practices in the use of building materials and the designs for private offices, commercial, and industrial buildings - Make plans and find ways to enable people to reside at a convenient distance from the place where they work and/or study.
Sec 9	The Ministry of Transportation and Communication is empowered to regulate the use of motor vehicles, including but not limited to - Restricting the use of certain type of vehicles during peak hours - Requiring the organization of car pools in specific areas - Fixing a minimum number of passengers for certain types of motor vehicles - Fixing speed limits on certain highways or streets; or requiring certificates of roadworthiness - Denying registration to vehicles which do not meet the set standards of energy consumption
Sec 11	- Any person who willfully violates any provision of Section three hereof or any rule or regulation promulgated pursuant to the authority granted in this Act shall, upon conviction, be punished by a fine of not less than one thousand (1,000) pesos but not more than five thousand (5,000) pesos, or by imprisonment of not less than one month nor more than one year, or both, under the discretion of the court:

(2) EE&C Bills in the past

After the expiration of “BP73” and “BP273”, several bills were established, such as “House Bill No. 5734” (1993), “House Bill No. 2358” (1995), “House Bill No. 4849” (1998), and “House Bill No. 3018”(2002) as new EE&C bills. As the latest example, “Energy Efficiency and Conservation Act of 2010 (Senate Bill No. 2027)” (hereinafter referred to as “Senate Bill No. 2027”) was submitted by Senator Angala to the Senate in July 2010.

None of the above bills were discussed thoroughly in Congress and were not enacted. According to the DOE, the IRR for the bills were not prepared yet, therefore it is difficult to know the details of the regulations. The DOE provided the JICA Study Team with copies of “House Bill No. 3018” and “Senate Bill No. 2027”.

“House Bill No. 3018” (2002) was sponsored by Representative Arnulfo P. Fuentebella, and it includes contents similar to “BP 73”. On the other hand, the bill also attempts to strengthen the regulations and improve policy measures. For example, concerning strengthening regulations, the threshold of the designation of large energy users required to submit the periodical reports lowered from 1,000 kloe /y to 500 kloe /y. In terms of policy measure improvements, provisions such as the active promotion of DSM and the establishment of the EE&C Fund and tax incentives were defined. As IRR for the bill did not introduced, we cannot identify how each system was going to implement in detail. For example, the EE&C Fund was designed to be funded by industrial, commercial and transport establishments consuming more than 2,000 kloe /y, and to be used for projects such as the installation of BEMS or VAVS, etc, but it is unclear how and by whom the fund would be collected and distributed.

“Senate Bill No. 2027” (2010) was sponsored by Senator Engardo J. Angala, and was discussed in the Senate. The bill covers the contents included in the former bills and contains measures strengthening the EE&C activities of the power and transportation sectors. Under the bill, the power sector and transportation sector shall sponsor the EE&C Fund, and 10% of the fund shall be used for R&D and 90% shall be used for the construction and maintenance of equipment for the sectors. “BP73”. On the other hand, the bill also attempt to strengthen the regulations and improve policy measures. For the power sector, the new system such as monitoring or R&D for power producers and power distributors, and the TOU tariff system are included in order to improve power generation efficiency or reduce system loss. Regarding the transportation sector, new measures have been established to promote the shift from individual cars to mass public transportation. Measures for transportation sector seem to aim at not only the reduction of fuel consumption volume, but also relieve chronic traffic congestion, which has been a long-time concern in the Philippines. “Senate Bill No. 2027” also does not have an IRR yet, so detailed implementation plans are not clear enough. The contents of the “House Bill No. 3018” and “Senate Bill No. 2027” are as follows.

Table 4-2 Contents of House Bill No. 3018

Sec	Contents
Sec 4	The Department of Energy is empowered to - Plan, develop and implement overall national energy efficiency and the conservation program - Set standards of energy consumption for oil-powered or electric-driven machinery, equipment, appliances, devices, and vehicles - Periodically review fuel consumption patterns in the transport sector and recommend appropriate measures to the sector - Require industrial, commercial and transport establishments consuming more than five hundred thousand (500,000) fuel oil equivalent liters of energy including liquid fuels and electricity annually to submit fuel and electric consumption as well as production statistics (* comparing BP73, threshold of the annual energy use has been changed from 1,000,000 loe to 500,000 loe) - Set energy use standards for industrial, commercial and transport establishments - Require industrial, commercial and transport establishments consuming more than two million (2,000,000) fuel oil equivalent liters of energy annually to submit energy conservation programs, employ qualified engineers to act as energy managers, and submit energy conservation programs and energy audits - Regulate the use of air conditioners in offices and in commercial and industrial establishments - Require industrial, commercial and transport entities or establishments to collect or cause the collection of waste oil for recycling as fuel or lubricating oil - Require public and private power generation and distribution utilities to participate in the IRP and DSM programs of DOE - Require the distribution and sale of alcohol/gasoline or other energy blends to increase domestic energy use - Launch a nationwide information campaign on energy conservation
Sec 4	- DTI shall require manufacturers, importers, dealers or oil and electric-consuming devices, equipment, appliances and vehicles to show the energy requirements and consumption efficiency of their products. - DECS shall support the schools in incorporating EE&C curricula into their education system - DENR shall institute programs to encourage the use of energy efficient vehicles and institutionalize Anti-Smoke Belching Programs. - All government-owned and controlled financial institutions shall set aside funds for lending to energy-related and energy conservation projects - All national government agencies shall adopt measures to conserve energy and set examples of efficient energy utilization
Sec 5	Private and Non-Government Agencies are required to - Conduct an inventory and an analysis of energy flows , energy audits, technical training, energy management advisory services, and technology application projects on energy efficient utilization, an educational package on energy-efficient technology procurement
Sec 6	Energy Efficiency and Conservation Projects listed below shall be entitled to the incentives - Installation of BEMS, VAVS, VSMD or HEEM
Sec 7	Energy Efficiency and a Conservation Fund is created and - To be funded by Industrial, commercial and transport establishments consuming the equivalent of more than two million (2,000,000) fuel oil annually, including liquid fuels and electricity. - To be used for providing benefits to the most energy-efficient establishment periodically.
Sec 8	Incentives for Energy Efficiency and Conservation Projects - Tax and duty-free importation of capital equipment shall be applied under certain conditions - Tax Credit on domestic capital equipment shall be applied under certain conditions
Sec 11	- Any person who willfully violates any provision of Section three hereof or any rule or regulation promulgated pursuant to the authority granted in this Act shall, upon conviction, be punished by a fine of not less than ten thousand pesos (P10,000) but not more than five hundred thousand pesos(P500,000), or by imprisonment of not less than six (6) months but not more than one (1) year or both, under the discretion of the court: (* amount of the penalty and length of imprisonment were changed)

Table 4-3 Contents of Senate Bill No. 2027

Sec	Contents
Sec 5	Functions and Powers of Government Organizations - DOE shall plan and implement energy conservation and energy efficiency programs - DENR shall coordinate with the DOE in establishing and enforcing restrictions in the exploitation of indigenous energy resources - DOST shall coordinate with the DOE in institutionalizing a strategic research and development program aimed at facilitating the development of energy efficient technology - DTI shall set standards for energy consumption and efficiency for machineries and appliances - DOTC shall set the standards in motor vehicle efficiency and emissions - DOF shall define the applicability of incentives to energy efficiency and conservation projects - DepEd and CHED shall integrate energy efficiency and conservation concepts in education - ERC shall perform the regulatory functions in relation to the energy efficiency and conservation programs of the distribution and supply sectors - NEA shall endeavor to enhance the operational capability of Electric Cooperatives
Sec 6	Contributions from Private and Non-Government Agencies - Private and Non-Government organizations are encouraged to participate in energy efficiency and conservation endeavors
Sec 7	The Energy Efficiency and Conservation Fund is created and - The fund is to be funded by distribution utilities, generation companies and transport entities - ERC shall administer the fund for distribution utilities and DOTC shall administer the fund for transport entities - 10% of the fund shall be used for R&D, and 90% of the fund shall be used for upgrading, repairs, maintenance, expansion of existing facilities or to enhance the performance and efficiency of existing infrastructures.
Sec 8	Plant Efficiency - NPC shall develop and undertake a plan to improve plant efficiency - BOI shall establish a targeted tax relief mechanism for imported machinery - DOE shall develop an incentive mechanism - All government and private generation companies are required to improve their plant's efficiency levels and the ERC shall monitor the plant efficiency improvement programs implemented by the companies
Sec 9	Waste Recovery and Cogeneration Plants - An inter-agency technical committee organized by DOE and other agencies shall explore new markets for waste recovery and cogeneration and exploit the possible benefits of cogeneration - DOST shall undertake R&D programs in cogeneration and waste recovery technologies
Sec 10	Imposition of System Loss caps for distribution utilities - ERC shall design comprehensive mechanisms in determining the system loss caps - ERC shall required the distribution utilities to submit the annual financial statements
Sec 11	Enforcement of the Anti-Pilferage Law - The Anti-Pilferage Law is to be strengthened to prevent system loss from pilfering
Sec 12	Technology Development Transfer - DOE shall sponsor and intensify R&D in system loss reduction technologies. - DOE shall intensify technology transfers on efficient transmission and delivery systems - ERC shall impose submission among the distribution utilities of the monthly performance report
Sec 13	Installation of Efficient Transmission and Distribution - Distribution utilities shall bi-annually submit electricity distribution network enhancement plans
Sec 14	DSM and LPM - ERC shall undertake an assessment of the country's DSM program - ERC shall encourage private and public sector participation in setting clear and measurable targets for the performance of distribution utilities - An equitable incentive mechanism shall be determined - ERC shall formulate a strategic monitoring mechanism(s) in determining the baseline energy

	consumption of the distribution utilities and electric cooperatives - ERC shall create a demand monitoring decision that shall strictly monitor the performance of distribution utilities - An inter-agency committee headed by the DOE shall conduct education about DSM to consumers. Private distribution utilities and electric cooperatives shall be required to allocate a reasonable percentage of their gross revenue to fund their DSM-LPM programs. - NEA shall conduct a nationwide stakeholder consultation with distribution utilities and submit their evaluation to ERC for their approval. Upon approval, constant monitoring and fund allocations shall be conducted. - ERC jointly with DOF shall determine the feasibility of granting tax relief to distribution utilities, which shall be channeled to the DSM fund.
Sec 15	Time of Use Rates (TOU) - ERC shall determine the appropriate TOU rate determination mechanism. - ERC shall take charge of educating the distribution utilities to ensure their operational competence in adopting the scheme.
Sec 16	Energy Efficient Appliance and standards - DOE shall encourage R&D in new technologies - DOE and DOST shall design a strategic plan for technology development - An inter-agency committee shall be created towards advancing university-based energy technology centers. - DOE, in collaboration with relevant agencies, shall set up appliance standards, as well as associated procurement policies. DOE shall set the minimum criteria for compliance, and shall strictly enforce the said criteria. DOE shall conduct a yearly evaluation of the standards. - DOE shall create additional testing laboratories and centers to facilitate energy efficiency labeling. - DOE shall ensure appliance labeling of energy efficiency ratings by 2010. Distributors and manufacturers are compelled to acquire DOR certification and labels for their appliances.
Sec 17	Fuel Efficiency - DOTC shall set the standards in motor vehicle efficiency and emissions - DOTC shall promulgate rules and regulations in the registration and banning of motor vehicles - DOE shall encourage the technology development for motor energy efficiency - A classification shall be made in terms of the fuel consumption rate and appropriate registration and purchase taxes shall be imposed.
Sec 18	Mass Transport System - DOTC shall formulate a Mass Transport System Infrastructure Program - Mass transport system projects utilizing light rail system shall be granted to duly identified investors through BOT scheme or a government-private sector partnership - DOTC shall intensify the regulation and administration of the registration among public utility vehicles - DOTC shall permanently designate strategic loading stations/terminal for public utility vehicles.
Sec 19	Promotion of Energy Conservation and Management - DOE shall design and embark on an extensive Energy Management Education Program - DOE shall educate various sectors through the use of television, radio and newspaper media regarding EE&C - DOE shall study the incorporation of energy conservation and management subjects in the education curricula of school.
Sec 21	Incentives for EE&C Projects - Tax and duty-free importation of capital equipment shall be applied under certain conditions - Tax Credit on domestic capital equipment shall be applied under certain conditions

(3) EOs and AOs

In order to promote EE&C without EE&C law, several EOs and AOs have been enacted. They are still effective, however, there are some problems with them, for example, they only cover limited items, their legal binding power is still small, and their regulations are too focused on discrete individual efforts as opposed to taking a comprehensive approach.

Table 4-4 EOs and AOs regarding EE&C

NO	Contents
EO 418 (1990.8)	Direction for immediate implementation of an energy conservation program
EO 422 (1990.9)	Direction for activating and reorganizing the Energy Operation Board as the administrative machinery for the efficient and equitable allocation and distribution of energy under certain condition
EO 433 (1999.11)	Direction for immediate implementation of additional energy conservation measures
EO 123 (1993.9)	Direction for institutionalizing the committee on power conservation and demand management
EO 472 (1998.3)	Direction for institutionalizing the committee on fuel conservation and efficiency in road transport
AO 110 (2004.10)	Direction for the use of energy efficient lighting/ lighting systems in government facilities
AO 103 (2004.8)	Direction for continued adoption of austerity measures in the government
AO 117 (2005.3)	Direction for provision of 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.
AO 126 (2005.8)	Direction for strengthening measures to address the extraordinary increase in world oil prices, directing the enhanced implementation of the government's energy conservation program, and for other purposes
AO110-A (2006.3)	(Amendment of AO 110) Direction of the institutionalization of a government energy management program
AO 183 (2007.7)	Direction of the use of energy efficient lighting/ lighting systems in government facilities
AO 228 (2008.8)	Direction of the energy consumption reduction in government buildings and vehicles addressing the rising cost of energy (accompanied by Circular Letter No. 2008-9 issued by the Department of Budget and Management)

(4) DOE Memorandum Circular No. 93-03-05

The "DOE Memorandum Circular No. 93-03-05" is a memorandum circular issued by DOE, and it provides regulations requiring large consumers in industrial, commercial, and transportation that use 1,000 kloe/y or larger to submit a periodical report quarterly, and in addition, those who uses 1,000 kloe/y or larger to submit an EE&C plan. As the circular does not have legally binding power, some companies do not follow its regulations. According to DOE, the numbers who submit aforementioned reports is around 200, as there should be 1,000 companies covered by the regulations.

(5) NEECP

NEECP is a program implemented in 2004, aiming to mitigate the influence of price increases of petroleum products and electricity tariffs, cut utility costs not maintaining corporate activity, and contribute to environmental protection. The NEECP also does not have legal binding power, but it targets various kinds of sectors and contents, and it has many measures that can be introduced into the new EE&C law.

4.2 Obstructive Factors to EE&C Law Enactments

Concerning the interview with the DOE and other government stakeholders, we broke down several potentially obstructive factors to EE&C law enactments as follows

(1) Delaying discussion at the Congress

Concerning the interview with the DOE and other government stakeholders, they reached consensus on the demand of the new EE&C law. However, none of the EE&C bills have yet to be successfully enacted. According to the DOE, the main reason is that the bills were not selected in the priority bill list in congress, and therefore, the bills did not come up for discussion, which is required if the bill is to be enacted as a law. If this is the only reason the bill is not enacted, the main issue arise from not the contents of the EE&C bill but the priority of the bill to be enacted among other bills. Therefore, more negotiations with related authorities such as the DOE to cause the EE&C bill to be included in the priority list is required

Attempts to prioritize a bill via LEDAC discussion are one of the most certain ways. However, as LEDAC will be held at random times, another approach will be required, too. If a bill cannot passed by the end of a congressional session, such bill cannot be enacted and the discussion would be carried over to the next session. Therefore, efforts should be made to accelerate starting the discussion and prepare the discussion points in advance. As of this JICA study, the 15th Congress is being held, and the next election would be in May, 2013.

(2) Limited time for ordering issues

EE&C national policies and roadmap, which should be established before the EE&C law, are currently under discussion in parallel. The relevancy and feasibility (in terms of economics, manpower) of each measure planned to be included in the bill or other regulatory system is not marshaled, and this situation may be listed as a cause for worry when congressional discussion of the bill is initiated.

(3) Lack of conditioning among related government agencies and other groups

The EE&C law will involve a lot of sectors, and much work to be implemented by government agencies will arise. Also, there is an aspect of the law that limits the private economic activities and lifestyles per the legal binding power of the government. If the government agencies would not fulfill their expected roles, there is a high possibility that the EE&C system will not function properly. Therefore, the appropriate distribution of works for the government agencies, adjustment of duties and powers, and confirmation of actual workflow should be required. If the contents of the measures and the degree of economic burden or manpower are too great, regulated sectors may not agree and become obstacles against the establishment of the law, having the possibility to impact the discussion of the Congress, so preparation in obtaining

understanding and cooperation from the targeted sectors via explanations and hearings with them are necessary.

(4) Financial weakness

The measures required by the EE&C bill requires a certain amount of budget for means such as the replacement of equipment, introduction of management tools, etc., and there are plans to introduce monetary supportive measures for incentives. It is important to develop a financial foundation and secure budget. A bill that does not have financial backing is called an “Unfunded bill”, and the discussion of such a bill might be difficult to practically implement.

4.3 Establishment of the EE&C Bill

4.3.1 Items to be noted when establish the EE&C bill

Items or issues to be noted in establishing the EE&C bill are listed below.

(1) Compliance with National Policies

The regulatory measures of the EE&C law are the means to promote the implementation of national energy policies, so it is required to make the bill compliant with national energy and environment policies at the present time and mid and long term basis and include all the necessary system components to realize such policies. In addition, as the law targets efficient energy use, it is required to quantify the goals and effects to some extent. It is important to estimate the numerical effect and monitor the consequences periodically after implementation of EE&C law, in order to verify the role and contribution of the EE&C law in the whole energy management policy. Therefore, it is important to organize the structure to make it possible to calculate monitoring values such as energy usage amount accurately and efficiently, aggregate analysis by the government, and conduct consecutive checking and application to renew the EE&C system.

(2) Effectiveness of the means to achieve the goal of EE&C policy

In order to ensure that the achievement of each goal reaches its expected level, it is required to consider if each measure in the EE&C bill (i.e. Goal: EE&C by general consumers, Means: Labeling on appliances) is appropriate as a means of achieving the goals. In making this determination, it is required to consider if the targeted EE&C effect will be achieved by the adoption of the measure, if the measure is acceptable in terms of 1) cost-benefit performance (if the government and designated consumers can secure cost-effectiveness at the proper level), 2) labor productivity (if the manpower required for compliance with regulations can be secured at a proper level), and 3) legal binding level (if the levels of obligation, effort, and penalties are suitable). If the law limits targeted users to a given category such as large consumers, it is also required to determine if the judgment standard or numbers for appointment of the targeted users are reasonable for the targeted level and work forces of the regulatory agencies, or if the levels of penal codes for the violation of each measure are reasonable. In addition, the roles, structures, authorities, and responsibilities of the regulatory agencies and acting agencies including those newly established (and including those who act as regulatory agencies on behalf of them by assignment) are to be settled clearly, so

that the targeted organization from various sectors shall follow orders by DOE and related authorities to ensure smooth operation of the EE&C system.

(3) Compliance to the Other Relevant Laws (i.e. Renewable Energy Act)

The EE&C law needs to be compliant with relevant existing laws such as the Renewable Energy Act, and other laws related to energy, environment, and transportation to avoid contradiction or overlap. Also if some clauses can be sited (incorporated by reference) from other existing laws, such sites can also be considered. In addition, some measures that can be referenced from existing programs could be implemented, too. The EE&C bills in the past contain clauses for compliance to the other relevant laws.

For example, the EE&C law should comply with the energy laws such as; “Electric Power Industry Reform Act (No. 9136)” , stipulating technical standards and management rules for power sector, “Renewable Energy Act of 2008 (No. 9513)” and “Biofuels Act of 2006 (No.9367)”, stipulating promotion and shift to renewable energy. In addition, other laws as tax laws, financial laws, and accounting regulations related to financial incentives, and “Department of Energy Act of 1992 (No.7638)”, stipulating roles and authority of the DOE, are also to be taken into consideration.

(4) Fairness and Effectiveness

The EE&C law should be applied fairly and equally, not to the disadvantage of some types of energy consumers, or technologies, or categories of energy. In addition, in order to encourage compliance by all people intended by the law, the establishment of compliance system containing such stipulations as penalties for violations or a surveillance system to monitor violators is important.

(5) Clarity and Transparency

It is important that the EE&C law be clear and transparent, in order to introduce the measures and implement them smoothly. For example, important phrases such as targeted energy, targeted users, operation flow of each measure, should be defined and explained clearly, so that readers can understand the rules comprehensively. In addition, a complicated measure such as labeling where obliged people and targeted people are different and requires a complex system, each person involved need to understand both each rule to be applied him/herself and the whole system, so that the whole system works smoothly. Moreover, if some part of the regulation system is to be delegated, or if some national license created, such procedures and delegation or qualification standards should be clearly stated in the law and made transparent via the establishment of a system for preventing arbitrary and /or opaque ways of procurements or accreditations. Japanese EE&C law has many clauses for the qualification of energy managers and energy officers, standards for qualification for designated agencies who act as a government authority based on delegation.

To make the EE&C comprehensive, it is important to pay attention to definitions and explanations, the framework of clauses in the law, and the balance between the law and the IRR, to make the law more easily digestible and understood.

It is primarily important for articles of laws to prevent possibility of having more than one interpretation, and to be easily understood by object people. To give laws clarity, clarifying terms and explanations, simple

structure of the articles, and the balance between Acts and IRRs are important.

(6) Feasibility and Sustainability

To realize EE&C at the state level, continuous system administration is required, so when drafting the EE&C bill, the sustainability of each measure needs to be secured. Regarding the application, approval, and documentary examination, it is necessary to establish clear and sustainable procedures and cycles for both the government and the private sector. In addition, securing sustainability from the aspect of reasonable cost-benefit and labor-productivity for both the government and private sectors is also important. In order to ensure economic efficiency, EE&C laws in other countries such as Japan include monetary incentives such as subsidies and tax rebates, and they are important systems for consideration, too.

In addition, there will be various measures and sectors to be included under the EE&C law. It would be effective to start the regulation only with large energy consumers at the beginning phase of the implementation of EE&C law, and then broaden the target adjusting regulations where needed. At the beginning stages when EE&C law is enacted or new regulations are established, these laws will first be applied to large consumers capable of both complying with new regulations and effectively reducing energy consumption. As experience was gained in the public and private sectors, these laws were gradually expanded to cover other entities.

(7) Persuasiveness as a law

EE&C activity requires not only compliant behavior but also a positive approach from each participant targeted. Regulation by the law sometimes forces decisions that do not match business judgments only based on the market mechanism. However, to achieve the national goal of EE&C, it is essential to ensure cooperation, understanding, and sustainable activities. Therefore, in addition to the aforementioned issues such as fairness, transparency, and sustainability, persuasiveness of goals and contents, standard level, reason of requirement of threshold, adequacy, and possibilities are also required.

(8) Approach for prompt discussion and enactment

This factor is not about the contents of the bill itself, an approach to accelerate discussions and the enactment process of the Congress should also be required. In addition, to remove the aforementioned obstructive factors, develop a common understanding of EE&C law demand via persistent promotion efforts with sponsoring senators or members of the House of Representatives are also required.

4.3.2 Contents to be included to EE&C Bill

During the third and fourth mission of this study, the JICA Study Team discussed the EE&C Bill with DOE, and held workshops to correct stakeholder opinions. The first draft as a draft bill has been almost completed. Thereafter, it will be revised upon discussions with Senators or Members of the House of Representatives who will sponsor the bill, and then will be filed and delivered to Congress. The specific schedule is not clear at this moment, however, in consideration of the current term of the session of Congress, it is supposed to be better to accelerate the aforementioned procedures.

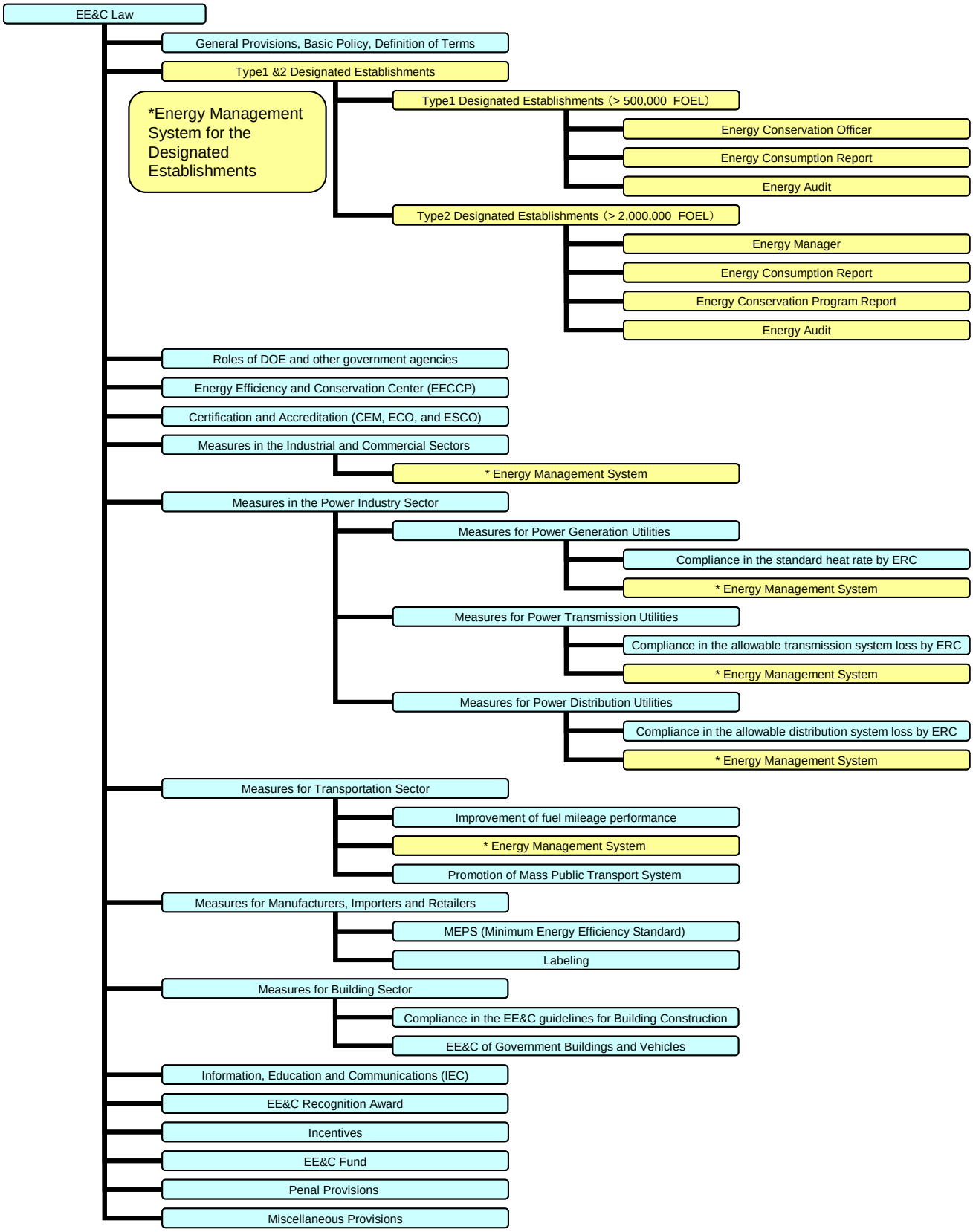


Figure 4-2 Structure of the EE&C Bill Draft

Table 4-5 Articles of the EE&C Bill Draft

Chap.1 Title and Declaration of Policy
Sec.1 Short Title
Sec.2 Policy Declaration
Sec.3 Roles of Energy Users
Sec.4 Scope
Sec.5 Definition of Terms
Chap.2 Type 1 and Type 2 designated Establishments
Sec.6 Type 1 Designated Establishment
Sec.7 Obligations of Type 1 Designated Establishment
Sec.8 Type 2 Designated Establishment
Sec.9 Obligations of Type 2 Designated Establishment
Chap.3 Roles of the Department of Energy and Other Concerned Government Agencies
Sec.10 Responsibilities of the DOE
Sec.11 Responsibilities of Other Concerned Government Agencies
Chap.4 Creation of the Energy Efficiency and Conservation Center of the Philippines
Sec.12 Creation of the Energy Efficiency and Conservation Center of the Philippines(EECCP)
Chap.5 Certification for Professional Competency and Accreditation for Professional Services
Sec.13 Certified Energy Manager (CEM) and Certified Energy Conservation Officer(ECO)
Sec.14 Accreditation of Energy Service Company (ESCO) and other Energy Efficiency Service Provider (EESP)
Chap.6 Measures in the Industrial and Commercial Sectors
Sec.15 Measures for Industrial and Commercial Sectors
Chap.7 Measures in the Power Industry Sector
Sec.16 Measures for Generation Utilities
Sec.17 Measures for Transmission Utility
Sec.18 Measures for Distribution Utilities
Chap.8 Measures in the Transportation Sector
Sec.19 Measures for Designated Freight and Passenger Carries for Fleet Management
Sec.20 Mass Transport System
Chap.9 Measures for Manufacturers, Importers and Retailers
Sec.21 Measures for Manufacturers, Importers, and Retailers
Chap.10 Measures for Building Sector
Sec.22 Measures for New and Retrofitted Building Construction
Sec.23 Measures for Government Buildings
Chap.11 Awareness through Information, Education, and Communication (IEC)
Sec.24 Measures for Information, Education, and Communication
Chap.12 Energy Efficiency and Conservation Recognition Award
Sec.25 Energy Efficiency and Conservation Recognition Award
Chap.13 Incentives for Energy Efficiency and Conservation Projects
Sec.26 Incentives for Energy Efficiency and Conservation Projects
Chap.14 Energy Efficiency and Conservation Fund
Sec.27 Energy Efficiency and Conservation Fund
Chap.15 Miscellaneous Provisions
Sec.28 Recommendation, Disclosure and Order
Sec.29 Reports and On-site Inspections
Chap.16 Final Provisions
Sec.30 Implementing Rules and Regulations
Sec.31 Prohibited Acts
Sec.32 Penalties
Sec.33 Contingency Powers
Sec.34 Separability Clause
Sec.35 Repealing Clause
Sec.36 Effectivity

The analysis results from a legal structural perspective and the factors described in 4.3.1 are as follows. Meanwhile, comments for each measure are described in the corresponding chapters.

(1) General issues and legal structure

The structure of the EE&C bill consists of contents such as the energy management and reporting system for large energy users in the first half, the promulgation of high efficient devices, IEC, and financial incentives also targeting general public consumers in the latter half, accompanied by general clauses as definitions of terms, penalties, and roles of related players.

The bill covers many kinds of large energy-consuming sectors, however, the balance between the regulatory measures and supportive measures are to be considered. In addition, large numbers of targeted energy users and various kinds of measures will bring about a lot of work for corresponding government agencies. In other words, this bill requires cooperation between governmental agencies or institution-building tools such as the establishment of a control system in order to effectively implement the measures. In addition, as for quantifiable targets and/or effects and the validation, and readjustment, it is required to establish an operation system which enables actions to be taken, such as figuring out important numbers such as the energy usage amount to be used as a management indicator accurately and effectively, aggregating calculations by the government, monitoring, and continuing validation, in order to check the EE&C system in a long way and improve it. Among the aforementioned issues, as an action to be added, the government should show a reasonable plan and management standard.

After the enactment of the EE&C law, the preparation of the introduction of new regulations appropriate to the scale of targeted sectors is required. The Japanese EE&C law covered only large factories (currently the first type of designated factories) at the beginning, and then expanded its coverage of regulatory measures sequentially to smaller factories as well as other sectors after having both government and private sector experience. However, the EE&C bill in the Philippines plans to introduce the energy management system for factories, building, transportation, and power sectors from the beginning (The details are described in Chapter 6). Therefore, more preparation will be required than the Japanese case.

(2) Compliance with National Policies

The current version of the EE&C bill, being different from Japanese law, does not mention the responsibility of the government to plan and publicize the national basic policy. In addition, it does not mention any special policies or plans. In the current energy plan in the Philippines, no numerical targets are mentioned. However, in order to check if the EE&C law is reasonable and fair, it is required to clarify the standpoint of the EE&C law in the energy policy, and check the effect of EE&C measures periodically especially in terms of numerical targets and results.

Furthermore, it should also be verified that the EE&C measures are compliant with environmental policies when setting certain standards or incentive programs in the IRR. For example, if some equipment or devices impact the environment to an excessive degree per the characteristics of the materials or fuels being used, it will be determined to not use them, even if their efficiency levels are high.

From the government point of view, promotion of R&D in EE&C field jointly by the government and the private sector is also important and the fulfillment of measures as financial incentives to assist R&D is also

required.

(3) Effectiveness of the means to achieve the goal of EE&C policy

The JICA study found that there exist some contents having less effectiveness for the achievement of the goals of the EE&C law, after considering about effectiveness of each measure contained in the EE&C bill (The goal should not be the enactment of the law itself, but should be the sustainable implementation of EE&C activity.) Especially, concerning measures for the transportation sectors and power sectors, other measures than energy management should also be promoted, because reporting system's contribution be insufficient to reduce energy usage thinking of the specialty of their business.

In the current version of the EE&C bill, similar measures for the energy management system such as reporting or controlling system have been proposed for the sectors, as well as factories or buildings. However, there are some factors beyond their control and they need to implement measures other than operational improvements to achieve EE&C, therefore, the effect of the energy management system in the current idea does not seem to be enough for those sectors.

The transportation sector is out of the scope of this JICA study, therefore, the Study Team could not acquire enough information of the current situation, however, means other than the coverage of the EE&C bill, such as the expansion of roads or other modes of public transportation, the introduction of high quality fuels, should be more effective.

And regarding the power sector, there might be the possibility of the limited effect from the fact that they cannot adjust the power supply as they would like, but also regulation is expected to be doubled with that by the ERC. The ERC was established separately from the DOE to regulate the power sector. So if both the DOE and the ERC mandate the power sector to report to them, such a rule might be recognized as a violation of ERC's organizational independency. According to the ERC, in general for all sectors not only the power sectors, one of their aims for the reporting system is monitoring the energy usage status of energy users. If so, regarding the power sector as data for the energy usage status has been already submitted to the ERC by the power producers and alternative methods for acquirement of data such as receiving data from the ERC directly should also be considered.

Regarding measures of energy managers, energy audits, it seems to be difficult and the effect might be limited if such measures are produced on the same basis as factories or buildings, as the technology issues required are too specialized and totally different from factories or buildings.

(4) Compliance to the Other Relevant Laws (i.e. Renewable Energy Act)

At this moment, there in no mentioning or consulting other laws directly. However, some measures such as heat recovery, or the display of performances would be connected to other laws in the environment, economy, and tax fields. Hereafter, when more details of the measures are fixed, it is required to consider cooperation with other laws to the EE&C bill and IRR, if necessary.

(5) Fairness and Effectiveness

This bill contains many mandatory measures in the first half, on the other hand, the preventing system for the violators of the law seems not to be enough. Violations, which will impact a large amount of people or the awareness of others concerning compliance requirements, should be penalized to promote

compliance.

In particular, prohibited acts and penalties for them are regularized in Sec. 31 “Prohibited Acts” and Sec. 32 “Penalties”. Currently, the targets of Sec.31 are limited to (a) Failure and/or willful refusal to submit periodic reportorial compliance reports to the DOE; (b) Failure and/or willful refusal to appoint a Certified Energy Conservation Officer and Certified Energy Manager; and (c) Failure to comply with the Order by the DOE and willful refusal to submit an energy audit report. However, in addition, fraudulent leveling on the labeling system that would impact many people, etc. should be prohibited and added in Sec. 31. The penalties are imprisonment for 6 months – 1 year, or fines of 100,000 – 500,000 pesos. When applying such penalties, the DOE may consider certain processes which are (a) provision of recommendations to the violators, (b) disclosure of the names of the violators, and the (c) issuance of orders to the violators to take measures. In addition, the DOE may pay surprise visits to targeted establishments to inspect energy-consuming facilities, verify energy monitoring records and other documents.

The current penal provisions mainly target the violators of the measures for large energy consumers. On the other hand, it is also required to add the penal provisions for violations of measures which may influence large numbers of energy consumers, even if each consumes a small amount of energy. For example, violations of the labeling system would be listed.

In addition, some surefire means to find violators of the reporting system, such as random monitoring should be implemented.

(6) Clarity and Transparency

There are definitions of terms in Sec.5., however, some words such as the types of energy to be covered or what is a labeling system, that are supposed to be included, are skipped and the definitions of terms for those words are carried over to IRR. Hereafter, through fulfillment of IRR, it is required to make the concepts of those kinds of important words clearer to avoid misunderstanding depending on readers.

In addition, some statements will be easier to understand if revised a little. For example, regarding the designation of establishments, specific kinds of industry are exemplified. However, in the fact other business kinds shall be covered if not noted in the clause. Therefore, it would be better not to specify any specific business fields to avoid confusion.

(7) Feasibility and Sustainability

In order to make the EE&C system more feasible and sustainable, each measure should be checked from the perspective of reasonable cost-benefits and labor-productivity for both the government and private sectors, ensuring its continuous realization. Some issues from this perspective are as follows.

The first issue is a concern of the limit to the effectiveness of the system caused by the limit of EE&C options arising from the lack of budgets. In this bill, many sectors such as factories and buildings are required to submit reports of their energy usage amounts and mid and long term plans. These reporting systems will be counted towards the visualization of the actual status that has been vague, and will contribute to the rearrangement of the issues. As a result, a large amount of energy users will intend to improve or replace their old equipment. When making a decision concerning equipment investment,, the reasonable financing arrangement and cost-benefit are big issues. Furthermore, investment in equipment

might have the highest effect among the EE&C methods basically, however, it is difficult for business establishments that have no access to additional financing. Therefore, the enhancement of a financial support system will be expected. However, in the current version of the EE&C bill, the contents of the supporting system does not seem to meet the expected demand. In order to realize the financial supporting system, securing budget for the DOE is also necessary.

As the second point, there is the issue of overabundance with regard to coverage of targeted energy users and reporting frequency from the aspect of the workforce of both the government and private sectors. In the bill, there are a lot of targeted sectors to be covered, in addition, the threshold to settle the designation is set at a low level, and causes even middle energy users to be covered by regulatory measures with reports to be submitted twice a year by each establishment. The broad and detailed measures can cover a wide range of energy users. On the other hand, however, middle energy users, whose EE&C potential are relatively smaller than large users, and too many reports cannot expect additional output to meet additional workforce or costs. (If such additional powers were available, is should be used for more effective measures.) Therefore, hereafter, to realize the most effective amount of reports based on an additional study to find an actual situation in consideration of such issues should be required. It is usually difficult to specify the most appropriate thresholds and frequency of reports in advance of the introduction of measures, so it should be highly recommended to put such numbers or contents in the IRR instead of the bill to be easily adjusted later.

(8) Persuasiveness as a law

In order to promote better understanding amongst the people of the Philippines, and implement the measures provided in the bill in a positive fashion, persuasiveness measures to make the needs of the law, merits of the law for the nation and people, and the reasonableness of each measure and standard understood is also required. As a matter of form, the general clause as a general purpose and target of the law (which is stated in Sec.2,3, etc.) would be written in simple way. However, persuasive measures in support of the law would be strengthened if the explanation of each measure was made more precise and detailed, explaining the relationship between methods and objectives, and provide the reasons underlying the introduction of the new systems. For example, articles that contain general explanations and objectives of each measure (described at the beginning of each chapter), supporting measures for people who comply with the law, penal provisions for violators of the law, are recommended to be more precise and detailed than the current version. In addition, it is also impossible to set judgment standards and target numbers to be set pursuant to the law within a reasonable level.

4.3.3 Contents Recommended for Reconsideration in the Current Version of the EE&C Bill

Taking into consideration the issues explained above, with the understanding that the EE&C Bill can be revised hereafter (according to the DOE and other stakeholders, a bill can be revised during discussion in the Congress), contents or items, which are recommended to be changed are listed below.

Table 4-6 Proposal to the Current Version of Draft EE&C Bill

Sec	Comments
Several sections	**Specific numbers, dates, and amount** Considering the possibility of later changes, in order to provide more flexibility, it is not recommended to specify specific numbers or the dates below mentioned in the bill (it can be mentioned in the IRR) Sec 5,6, and 8 Designated Establishment :Type 1:>500,000 FOEL, Type 2:> 2,000,000 FOEL Sec 7 and 9 (reports to be submitted by) "every 30th of June and 30th of December" Sec 15 and 19 "improve average SEC by at least 1% per year" Sec 23 "1600 cc and 2500 cc for gasoline and diesel engines" Sec 27 "initial funding of PHP 10 billion"
Several sections	**Symmetry relation should be defined : Role of Energy users / Role of governmental agencies for supervising them** Regarding some mandatory measures, it is not clear which governmental agencies would have regulatory authority and supervise the related energy users. Both the measures for energy users and actions by the related government authority should be specified in symmetry relation to describe procedures that are more suitable and clearer. For example, designated establishments shall comply with the requirements and provisions of Sec 7 or Sec 9, which requires the reporting and employment of CEMs or CEOs. However, it is not clear which of the listed governmental agencies shall be responsible to require the establishments to comply with the provisions and deal with the corresponded procedure for each. If the DOE shall cover duties for all sectors and supervise all aspects of their procedures, then it should be mentioned clearly in the bill.
Sec 5	**Definition of Terms** - Definitions of terms describing the technical definition, systems, or rules should be added in the bill (not in IRR), to avoid confusion and make it more understandable ; Examples: Fuel: Crude oil, volatile oil, heavy oil and other oil products specified by the DOE, flammable natural gas, and coal, coke and other coal products specified by the DOE, which are used for combustion and other usages. Energy: All types of energy available commercially, including natural gas (liquid natural gas and liquid oil gas), all heating and cooling fuels (including district heating and cooling) , coal, transport fuels and renewable energy sources. Energy Management: The most extensive set of regulatory, organizational, incentive and technical measures and activities of energy consumption supervision, which are determined and implemented by the state administration bodies, local administration bodies and energy consumers, which their competence, aiming at increased energy efficiency. MEPS (Minimum Energy Performance Standard): A performance standard, which prescribes a minimum level of energy efficiency ratio for machinery and equipment, which is set with the aim of improving energy efficiency performance of the machinery and equipment. Energy Labeling: Labels containing such information as energy efficiency performance, rating, etc. to inform consumers of the energy efficiency performance of each appliance, machinery and equipment. - Definitions of the governmental organization should be required Example: DOE: "Department of Energy (DOE)" refers to the government agency created pursuant to Republic Act No. 9136"
Sec 6 Sec 7	**Type 1 / Type 2 Designated Establishments : business categories** - To avoid any doubts or confusion, it is not recommended to list the business categories of each sector (such as commercial buildings, hotels) in the bill. Based on the current idea of DOE, the designated establishments should not be limited to those from the listed categories.
Sec 8 Sec 9	**Type 1 / Type 2 Designated Establishments : Obligations Designated Establishments** - Regarding ECO and CEM, it is recommended to use the term "appoint" instead of "employ" in order to allow flexibility to the designated establishments, based on the practical situation. - It is not enough if the designated establishments only "Set up" targets and plans for implementation of EE&C. They also should "implement the plans and endeavor to meet the targets". The aforementioned clause should be revised to encourage the establishments to promote endeavors.

Sec 10	**Responsibilities of the DOE** -It should be mentioned that the DOE shall be responsible to implement provisions of the Enercon Law and the DOE shall have regulatory authority / have responsibility to require energy users to comply with the Enercon Law. -It should be the role of DOE to formulate and publicize the national basic policy of energy efficiency, and standards of judgment (for energy management). Otherwise, energy users cannot find the goal and standard level to aim at. -On the other hand, the DOE should discuss with other governmental agencies regarding power and authority for EE&C measures, in order not to prejudice to the right of other agencies set by the government. In addition, if any function of the DOE and other agencies overlap or are contradicted, it would generate disruption for energy users.
Sec 11	**Energy Regulatory Commission (ERC)** -It is mentioned that the ERC shall perform the regulatory functions in relation to the EE&C in the power sector. It is required to specify which of the ERC or DOE should be the regulatory agency for the sector regarding EE&C, in order to avoid any confusion.
Sec 12	**EECCP** - It would be better to mention the purpose of the creation of EECCP.
Sec 13 Sec 14	**Difference between "formulated and developed" and "implemented"** - Some measures are planned to be "formulated and developed", not to be "implemented". However, all the measures should be implemented at the time of enforcement of the act, not just be formulated and developed. Sec 13 CEM and ECO: "The CHED shall formulate and develop appropriate training course modules Sec 14 "the DOE shall formulate and develop an ESCO accreditation System"
Sec 15	**SEC (Specific Energy Performance)** - In Section 15(a), 8 measures are listed for the designated establishments. However, (8) "SEC improvement" would not be realized individually, but would be achieved as a result of the implementation of the measures listed from (1) to (7). The clause of the SEC should be placed separately from the other measures of 15(a) - In addition, it is supposed to be impossible to improve the average SEC at 1% (per year? not mentioned). To make the clause more reasonable, it is recommended to define it as the target, which the designated establishments should endeavor to achieve, but not mandatorily. In addition, it is recommended to replace "1 %" to the "target specified by the DOE" to allow the target to be more flexible.
Sec 16 Sec 17 Sec 18	**Measures for Generation Utilities** **Measures for Transmission Utilities** **Measures for Distribution Utilities** - The measures for those utilities are very similar to those of the industrial and commercial sectors. However, the measures would overlap with existing regulations for the power sectors by ERC. It is not only being wasteful, but also confusing. - Conducting energy audits seems not to be suitable for those utilities. Especially for transmission and distribution utilities who are using energy only by the system loss.
Sec 19	**Measures for Designated Freight and Passenger Carriers for Fleet Management** - One of the measures is "improving fuel mileage performance by at least one percent per year based on the result registered in the last two years". But it seems to be difficult to comply with such a high target. And also is there any system to register fuel mileage performance? - The measures for those utilities are very similar to those of the industrial and commercial sectors. However, considering the difference of how energy is used, it seems not to be suitable to set measures that is the same as those sectors. Especially, conducting energy audits for the transportation sector is not realistic.
Sec 20	**Mass Transport System** - Clause (c) is requires a public utility to make their vehicles to comply to MEPS. However, the measures would be limited to newly introduced vehicles. Otherwise, it might be very difficult to operate a public utility service.
Sec 21	**Measures for Manufacturers, Importers and Retailers** - It is recommended to define what kind of machinery and equipment would be covered in this section. For example, it is not clear if vehicles are covered. - It is recommended to define what is the "Sales Volume Report" in clause (d).
Sec 22	**Measures for the Building Sector** - "Guidelines on Energy Conserving Design in buildings" is an important guideline and will have a large impact on building construction, as it's compliance is mandatory when conducting a building construction. It must be prepared carefully and promptly, with consultation by related government agencies or other stakeholders related to building construction. - It is not clear what the "energy efficient building design" of clause (b) means. If measures, targets, or standards are unclear, the energy users cannot understand and implement the aim of the clause.

Sec 23	**Measures for Government Buildings** - The measures for the government include measures for vehicles. Therefore, it seems better to revise the title to "Measures for Government Buildings and Vehicles". - The Mass Transport System in Sec 20, should introduce vehicles complying with MEPS. If so, when purchasing government vehicles set as (b) the government should also follow MEPS. Limiting the engine size is not enough.
Sec 24	**Measures for Information, Education and Communication (IEC)** Promotion of ESCO does not seem to be categorized as an IEC activity. If the DOE want to promote the awareness of the importance of using such assisting services, then the clause should be revised to mention the DOE's responsibility in promoting EE&C assistance tools as a whole, and ESCO should be mentioned as an example.
Sec 26	**Incentives** - There is no mention of specific financial incentive measures, such as income tax holidays, subsidies for R&D, etc. However, it is doubtful whether financial incentives be introduced without any reference in the bill. This clause is expected as one of the keys to success for the development and sustainable practice of EE&C and should be more fulfilling. Given that many establishments, which will try to replace old and inefficient machinery and equipment in consequence of their EE&C plans under the energy management system would find it difficult to budget money for initial investment without supportive measures.
Sec 27	**EE&C Fund** - The intended purpose of the fund is unclear. "1) promote efficient use of energy" seems to cover all activities related to EE&C (with this aspect, 2) and 3) are not necessary). Implementation of preferred EE&C projects or R&D can be included.
Sec 29	**Reports and On-site Inspections** - There can be a clause to enforce the feasibility of the on-site inspections by DOE. For example, "Establishments should be subject to and cooperate with the such a surprise visit if conducted".
Sec 30	**Prohibited Acts** - The coverage of prohibited acts are expected be reconsidered. There should be more prohibited acts applied. In particular, violation of MEPS and Labeling by retailers or manufacturers should have a more broadly adverse impact on consumers, than the failures of listed acts such as the submission of the reports. On the other hand, regarding the three acts listed, the DOE should explain why the acts are especially taken as important measures among all the measures.

Chapter 5 Organizational Structure

5.1 Current Situation

5.1.1 Organizing Existing Activities

Activities for EE&C have been implemented in cooperation with related organizations with DOE-EUMB-EECD (Department of Energy, Energy Utilization Management Bureau, Energy Efficiency and Conservation Division) at the core or on an individual basis. The list of the related organizations and brief explanation of their roles are described in 3.6 (also refer to Table 5-3.)

The details of the activities are described in the corresponding sections and Table 5-1 shows the relationships of the main organizations and the supporting organizations in light of the organizational structure. It indicates that the DOE formulates each cooperative relationship with organizations and implements various EE&C measures as far as their capabilities.

Table 5-1 Main and Supporting Organizations for EE&C Promotion

	Measure/Scheme	Major Organization	Supporting Organization	Remark
1	Information, Education and Communication Campaign	DOE-EUMB-EECD	PIA DOTC DAP	Programs or cooperation are not permanent but on a per project basis.
2	Energy Audit Service	DOE-EUMB-EECD DOST-PCIEERD DOST-ITDI ENPAP MERALCO ESCOs and others	Each organization provides energy audit services separately with difference objectives.	There is no sharing of data & know-how.
3	Voluntary Agreement	DOE	Private organizations: McDonalds etc.	They are not permanent.
4	GEMP (Government Energy Management Program)	DOE-EUMB-EECD	Governmental agencies	Not all the agencies have responded.
5	Standard and Labeling System for Home Appliances	DOE-EUMB-EECD DOE-LATL, DOE-ERTLS DTI-BPS	Manufacturers are under DTI	Current system works well, but it seems that DTI would like to remove energy performance standards from the National Standard.
6	Energy Consumption Reporting Program	DOE-EUMB-EECD	-	This is a completely voluntary scheme.
7	Don Emilio Abello Award	DOE-EUMB-EECD	**Technical Committee Members:** Pilipinas Shell Petroleum Corporation, DOE, PECCI, ENPAP, MERALCO, Chevron Philippines, Inc. **Steering Committee Members:** DOE, Petron corporation, NPC, MERALCO, Pilipinas shell Petroleum Corporation, PNOC, Chevron Philippines, Inc., EDUFI, ENPAP, PECCI	
8	ESCO Accreditation	DOE-EUMB-EECD	-	
9	Energy Conserving Guideline in Buildings	DOE-EUMB-EECD	DPWH (not yet in cooperation)	DOE prepared guidelines, but it has no mandatory power. It needs to cooperate with DPWH.
10	Energy Database	DOE-EUMB-EECD	DOE-ITMS, (DOE-EPPB)	DOE would like to collect energy consumption data from private organizations.
11	EE&C Curriculum (Input EE&C into curriculums)	DepEd	DepEd conduct it by itself without any request from DOE..	
12	AEMAS	ACE/ENPAP	DOE supports AEMAS (To be confirmed by DOE)	
13	BERDE	GEBC	DOE supports BERDE (To be confirmed by DOE)	
14	ADB's Project: PEEP	DOE	-	
15	UNIDO	DOE	-	

5.2 Issues

In this section, the issues in promoting EE&C are analyzed in light of the organizational structure.

5.2.1 Issues Identified in the Existing Report

The existing report[1] analyzes the relationship amongst the stakeholders to promote EE&C and the organizational issues have been reported as follows;

"There are individual activities by each organization, but there is no common direction and a lack of

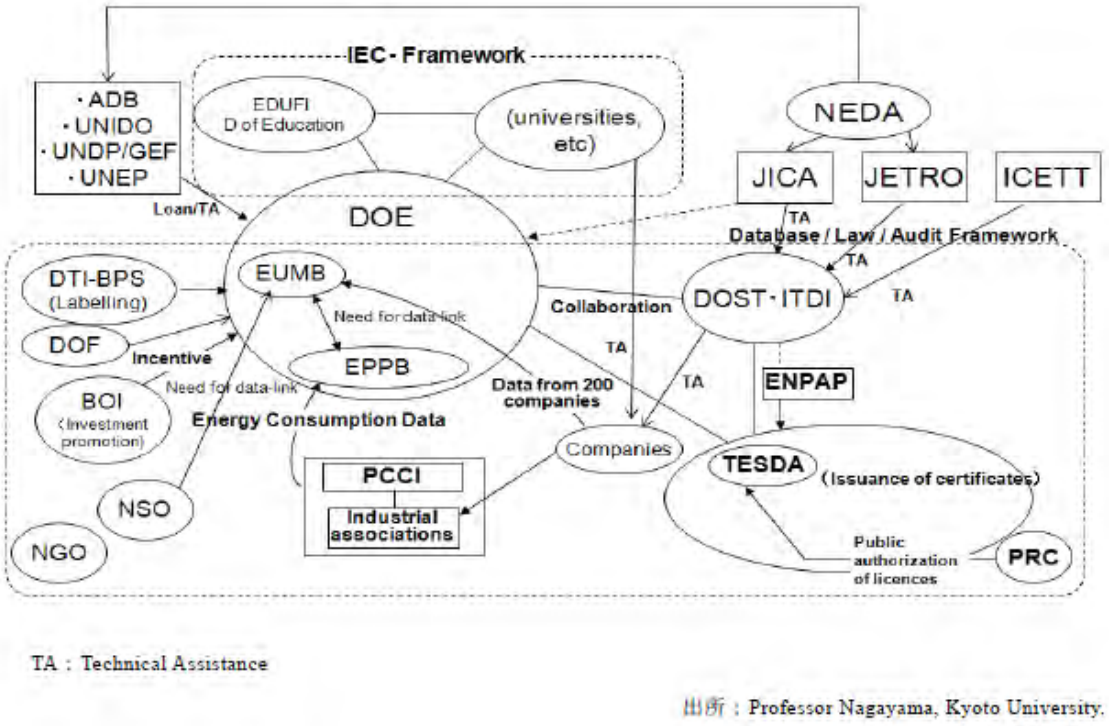
[1] "Detailed Plan Decision Investigation Survey", 2011, JICA Report in Japanese

cooperation. Therefore, it is necessary to have a national comprehensive framework.

There are many and various organizations involved in EE&C such as DOE, DOST-PCIERD, DOST-ITDI and even DOTC for the transport sector.

(snip)

The issues involving organizational structure are the lack of a cross-sectional platform within the governmental agencies and that most of the private companies are not under the supervision of DOE (which means that they are not influenced without a legal basis)."



TA : Technical Assistance

出所：Professor Nagayama, Kyoto University.

（Source: "Detailed Plan Decision Investigation for EE&C in the Philippines", JICA Report, Feb. 2011）

Figure 5-1 Relationships amongst EE&C Stakeholders

In conclusion, the issues and future direction are summarized as follows;

- ✓ No harmonious direction and lack of cooperation
- ✓ Necessity of national comprehensive framework
- ✓ No cross-sectional platform within the governmental agencies
- ✓ Most of the private organizations are outside of DOE supervision.

5.2.2 Analysis through the Study

In this Study, in order to grasp the issues, we questioned the members of SWGM (Stakeholders Working Group Meeting) as to the issues or problems they might be facing in providing services for EE&C. However, the reaction of participants of SWGM implied that there weren't any issues or obstacles. The following issues were picked up based on the observation of the Team during the interviews to DOE and related organizations. The issues of each measure are described in corresponding chapters and here shows only overall issues.

Table 5-2 Current Situation and Analysis on the Organizational Structure

	Current Situation	Analysis
1	The DOE has budget and human resource limitations.	It is necessary to consider the utilization of outside resources (other governmental agencies and the private sector)
2	The DOE directly conducts energy audits or seminars. Thus, it is difficult for the DOE to focus on more upstream issues such as EE&C policy planning etc.	It may be possible to establish an implementing agency beside the DOE.
3	It seems that the DOE has been cooperating well with other organizations per each project. For example, the DOE cooperates with ENPAP for AEMAS, with members of the Technical Committee and the Steering committee for the Award. The DOE has good communication with companies of best practices.	This is not an issue at this moment.

Based on the observation of the current situation, it is possible to say that despite the budget and human resource limitations, the DOE has been implementing possible measures to the extent of their capabilities.

As shown in Item 1, however, it may be effective for the DOE to utilize outside resources such as other government organizations or the private sector rather than to conduct energy audits by themselves. As a result, it is possible for the DOE to focus on more upstream issues. For example, one possibility is to establish an EE&C center as an implementing agency. In addition, if the center is comprised of both the public and private sectors, it may improve cooperation within the private sector.

Regarding the point that most of the private organizations are not under the DOE's influence, it is inevitable under current regulations: e.g. the fundamental government agency of the labeling scheme is DTI and the manufacturers and importers are under DTI. The DOE, however, cooperates with them through a committee and there seems to be no problems at this moment.

On the other hand, in the future, it is necessary to consider the possibility of establishing an organization or platform for direct relationships. The cases mentioned later will be good reference: one is the Advisory Committee for Natural Resources and Energy, Japan and the other is the National Renewable Energy Board, the Philippines. Proposals will be described in the next section.

5.3 Proposal

First, the organizations and its roles to be stipulated in the EE&C Bill are described. Second, the results of the two possible organizational choices, i.e., EE&C center and EE&C committee, to be adopted in the Philippines, based on the discussion with the DOE, are proposed, herewith.

The role allocation between the DOE, EE&C center, and EE&C committees is depicted in the following image. The DOE is in the upstream of EE&C policy making and EE&C center is an implementing agency in the downstream. EE&C committees will support the DOE through evaluation and providing advice.

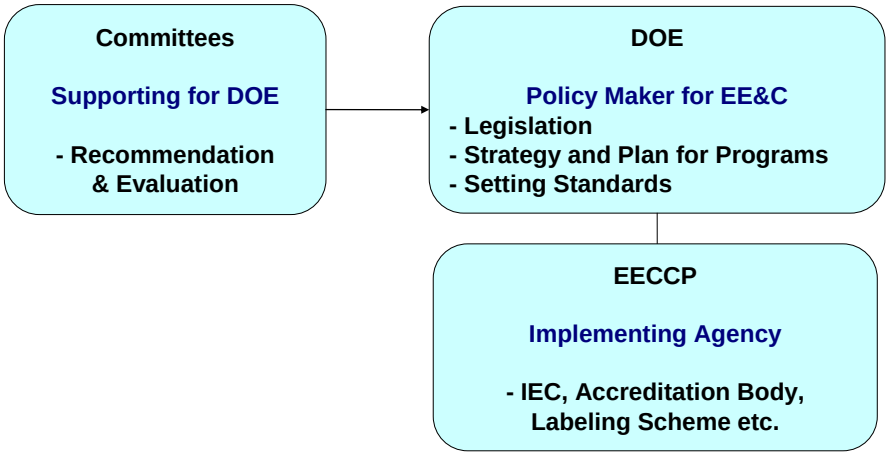


Figure 5-2 Role Allocation of Organizations

5.3.1 Organizations to be Identified its Roles in EE&C Bill

Based on the existing bills and others, the following organizations the roles of which were confirmed with the DOE are the ones to have its roles identified in the EE&C Bill. The organizations which are not mentioned in the draft DOE Bill, but in the other bills are also listed for reference.

Table 5-3 Organizations to be Identified its Roles in EE&C Bill

Organization	Responsibility/Roles <Description derives from draft of DOE bill and existing bills.>	Remark
DOE (Department of Energy)	**Primary Agency for EE&C** **The DOE shall be the primary government agency in the planning, formulation and development of energy management policies and other related energy efficiency and conservation programs and measures.** The DOE is tasked to consult and coordinate with other government agencies and the private sectors or create an inter-agency committee if so requires, for the effective implementation of energy saving policies of the government. It shall also promote collaborative efforts with the business industry, particularly the commercial, industrial, transport and the power sectors, to broaden and accelerate the efficient and judicious utilization of energy in these sectors.	DOE Bill draft
DENR (Department of Environment and Natural Resources)	**Indigenous Resource and Climate Change** The DENR, in coordination with the Department of Energy, Department of Interior and Local Government, Department of Transportation and Communication and the Metro Manila Development Authority, shall be responsible for the development of plans and programs to institutionalize the Anti-Smoke Belching campaign nationwide in road transportation. **It shall also establish and implement energy conservation and an environmental educational awareness campaign program.**	DOE Bill draft
DOST (Department of Science and Technology)	**R&D for EE&C** The DOST shall be responsible for carrying-out a strategic research and development program aimed at facilitating the development of energy efficient technologies and the promotion thereof.	DOE Bill draft
DOTC (Department of Transportation and Communication)	**Transport sector** The DOTC, in coordination with the DOE, shall be responsible for enforcing the compliance requirements of **vehicle manufacturers and importers on Minimum Energy Performance Standard (MEPS)** for road transport vehicles and **to display the energy consumption label** in coordination with the vehicle manufacturers, road transport industry associations, public transport group and Non-Government Organizations. It shall also be responsible for enforcing the compliance and enforcement of the energy management system in seaborne vessels and the air transport sectors.	DOE Bill draft
DTI (Department of Trade and Industry)	**Machineries, Manufacturers and Business entities** The DTI, in consultation with the DOE, shall require manufacturers, importers and dealers to comply with the **Minimum Energy Performance Standard and to display the Energy Label** on the packaging or product themselves of all Designated Machinery and Equipment, appliances, vehicles and other fuel-burning combustion equipment and electric devices to show the energy requirements and consumption efficiency of these products.	DOE Bill draft
DPWH (Department of Public Works and Highways)	**Building guidelines** The DPWH, in coordination with the DOE, shall be responsible for ensuring the implementation of *Guidelines on Energy Conserving Design in the Building* as part of the National Building Code.	DOE Bill draft
DILG (Department of Interior and Local	**Local government** The DILG, in coordination with the DOE, shall be responsible for enforcing compliance of all Local Government Units (LGU) in implementing energy efficiency and conservation through the adoption	

Organization	Responsibility/Roles <Description derives from draft of DOE bill and existing bills.>	Remark
Government)	of the appropriate Energy Management System.	
DepEd and CHED Department of Education and the Commission on Higher Education	**Education** The DepEd and CHED, in coordination with the DOE, shall establish energy efficiency and conservation concepts for incorporation into the educational curriculum for primary, secondary and tertiary education to reinforce the formation of strong values among Filipino students.	DOE Bill draft
NEA (National Electrification Administration)	**Electric Cooperatives** The NEA shall be responsible for lowering the distribution system line losses in all Rural Electric Cooperatives (RECs). It shall endeavor to enhance the operational capability of Electric Cooperatives through the Demand Side Management.	DOE Bill draft
ERC (Energy Regulatory Commission)	**Electric Power Sector** The ERC, in collaboration with the DOE, shall **perform the regulatory functions in relation to the energy efficiency and conservation programs of Generation Utilities, Transmission Utilities and Distribution Utilities.** It shall also be responsible for requiring all power generating plant facilities to improve power plant efficiency per the requirements under the ERC declaration on the power plant heat rate mandatory standard. It shall also be tasked to develop and implement the framework on the Demand Side Management for Distribution Utilities (DUs) and Electric Cooperatives (ECs).	DOE Bill draft
PIA (Philippine Information Agency)	**Information campaign** The PIA shall be responsible for conducting awareness, information and advocacy campaign on energy efficiency and conservation by utilizing the different forms of media such as print, radio, television, digital and interpersonal communication to ensure that needed information will reach the general population.	DOE Bill draft
GFIs Government Financial Institutions (GFIs)	**Financial schemes** The GFIs shall set aside lending funds for Energy Efficiency and Conservation Projects at concessional rates of interest to attract private sector investments on energy efficiency and conservation projects.	DOE Bill draft
The following are in existing bills (for reference). There is the possibility that they may need to be defined in the IRRs, if necessary.		
DOF (Department of Finance)	**Fiscal Incentives** DOF shall define the applicability of incentives to energy efficiency and conservation projects in accordance with existing laws.	
BOI (Board of Investments)	**Tax relief** BOI in coordination with the DOE, the DOF and the DOST shall establish a targeted tax relief mechanism for imported machinery to encourage private companies to improve their plant efficiencies.	
NPC (National Power Corporation)	**Electric Power Sector** NPC, in coordination with the DOE, shall develop and undertake a plan for plant efficiency improvement programs in all the plants it owns.	
Private and non-governmental organizations	Private and non-governmental organizations are encouraged to actively participate in the energy efficiency and conservation endeavors of the country.	

5.3.2 Energy Efficiency and Conservation Center of the Philippines: EECCP

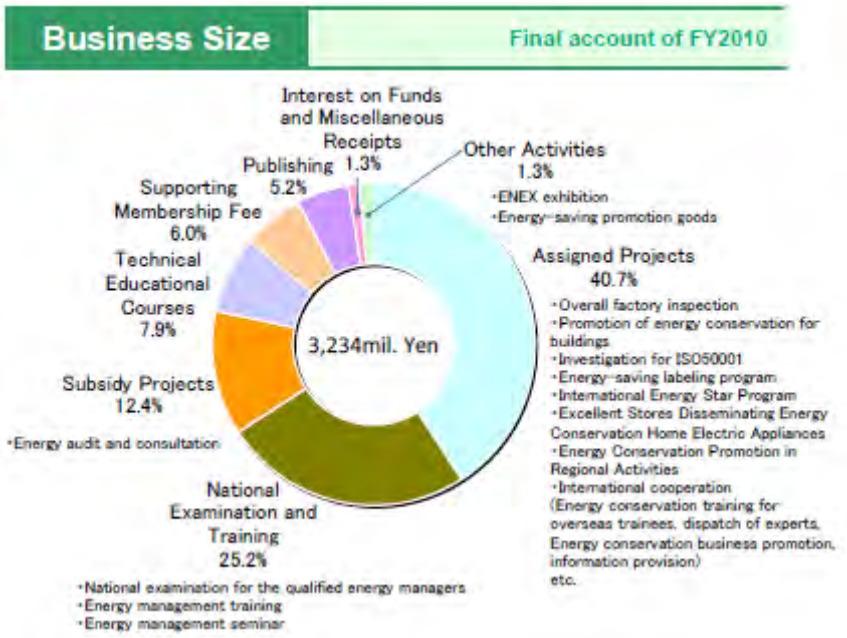
(1) Cases of Other Countries

Energy Efficiency and Conservation centers have not been established in all the countries. Some countries such as Japan and Thailand have EE&C centers. Firstly, Energy Conservation Center, Japan, ECCJ will be analyzed in light of organizational functions in order to consider applicability to the Philippines. Secondly, a case from Thailand, which is one of the neighboring countries of the Philippines and one step ahead in the field of EE&C, will be introduced in response to a request from the DOE.

1) Energy Conservation Center, Japan: ECCJ

a. Outline of ECCJ

The ECCJ was established in 1978 after the second oil crisis with an objective to promote EE&C. The ECCJ is a core organization for promoting EE&C with the current 2,680 member companies and 143 staff. It is under the Ministry of Economy, Trade and Industry, METI, and seven local offices aside from the headquarters in Tokyo. The annual budget is approximately 3.6 billion yen (about 1.8 billion pesos) which consists of commissioned work from METI (40.7%), examination and training work (25.2%), supplementary businesses (12.4%), publishing and others. A breakdown of the business is shown in the net figure.



(Source: brochure of EECJ)

Figure 5-3 Business Size of ECCJ (FY 2010)

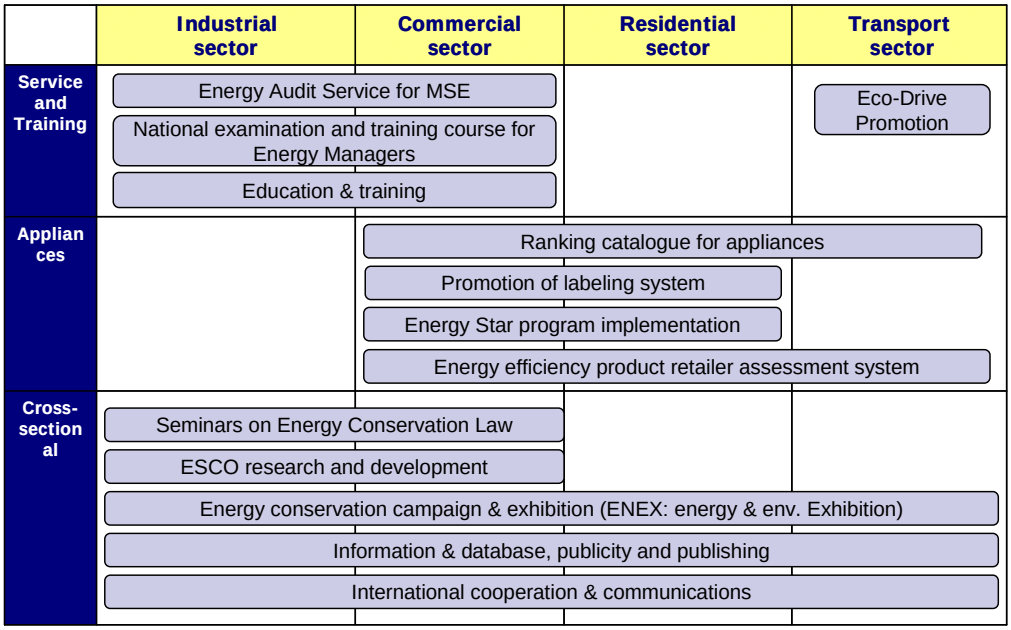
The composition of the board and councilors is shown in the next table. It is a mixed organization of both public and private entities. Although the proportion of entities from the private sector is high, persons from METI are practically placed in the top positions, the President and one of the Managing Directors so that ECCJ can garner cooperation from the private sector under the control of METI.

Table 5-4 Composition of Board and Councilors (public and private)

Position	Number	Breakdown
Chairman	1	Private
President	1	ECCJ（METI）
Managing Directors	3	1: ECCJ（METI）, 2: private
Directors	25	1: ECCJ, 24: private
		Energy utilities, manufacturers (cars, pulp, home appliances etc.
Councilors	30	NEDO, Keidanren (association) , manufacturers, university professors, commentators etc.

(Source: brochure of ECCJ)

An overview of the activities of ECCJ is described in the next figure. It provides services for all the sectors such as seminars on EE&C Law, technical training and energy audit services, guidebooks (including benchmarking data and technical know-how) etc. In addition, it has a role as an accredited institution of examination and training for energy managers.



(Source: made by Study Team based on EECJ brochures etc.)

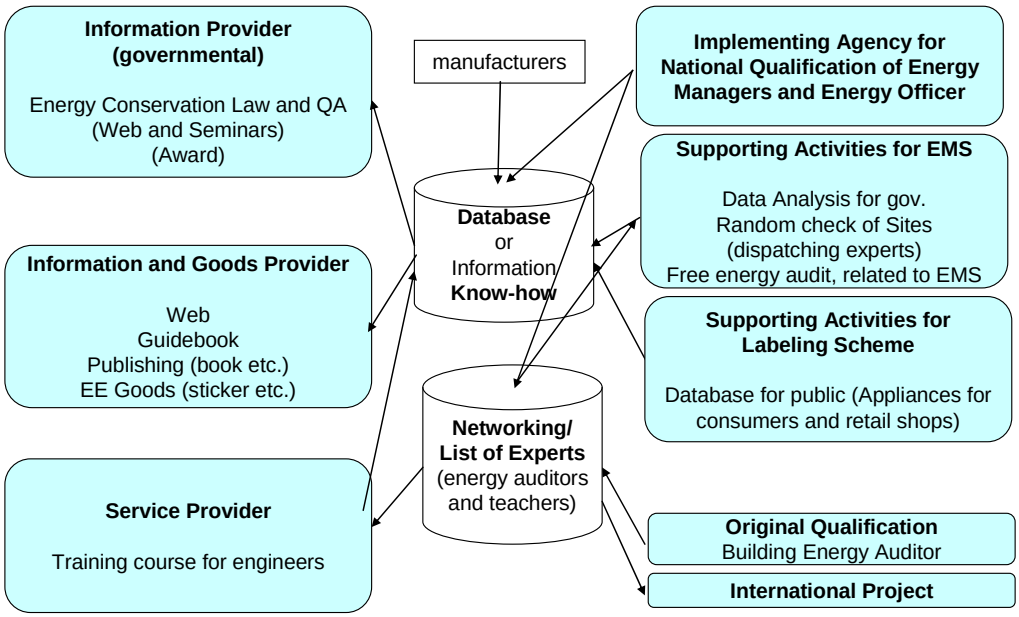
Figure 5-4 Overview of ECCJ Activities

b. Analysis on Functions of ECCJ

It seems that the ECCJ works very effectively as a focal point of information and networking. For example, when someone would like to find general information on EE&C, which are not by particular private companies, it is the most efficient to begin research by looking at the ECCJ website.

In addition, conducting various services contribute to the accumulation of know-how and data and creating a network/database of human resources. Thus, these two points seem to contribute to smooth service implementation. For example, the know-how and data are provided as guidebook, brochures and a standard manual or reference for energy audits. Creating a network of experts contributes to providing an energy audit service or dispatching experts for the Energy Management System. The next figure shows an analysis of the relationships amongst the activities with two cores of database of information and know-

how and human networking.



(Source: made by Study Team based on EECJ brochures etc.)

Figure 5-5 Relationships amongst the Activities of ECCJ

2) Energy Conservation Center, Thailand: ECCT

a. Overview

The ECCT is an organization established per the approval of the Cabinet in 1985 and it was under co-supervision of the Department of Alternative Energy Development an Efficiency, DEDE, and the Federation of Trade and Industries, FTI. Currently, it leaves the supervision and provides services competing with other private organizations as one organization.

The services provided are categorized into the following three groups; 1) Engineering Services, 2) Technical Services, 3) Training and Promotion on ENCON[2]. The ECCT provides a great number of energy audits mandated by EE&C Law, free training courses commissioned by DEDE and promotes IEC activities. Business seems to be conducted under the banner of being a public mission, it is in a competitive environment.

[2] ENCON means “Energy Conservation”

Table 5-5 Overview of Activities of ECCT

Activities	Contents
Activities 1: Engineering Services	➢ **Energy audit** compulsory program for designated factories (preliminary audit, detailed audit and target & plan audit ➢ **Energy audit** voluntary program for SME factories ➢ Air compressor efficiency improvement ➢ Load management ➢ Boiler tuning ➢ Ceramic kiln efficiency monitoring ➢ Engineering consultant
Examples of recent energy audits	➢ ECCT was assigned to be ACs (Factory) to support designated factories to submit the energy management system report yearly and checked the report for approx. 860 out of 3,600 factories in Thailand. ➢ ECCT sent an expert team to consult about 350 factories for carrying out energy audits as well as buildings.
Activities 2: Technical Services	➢ **Feasibility study,** cogeneration in textile industry ➢ Develop the **energy conservation manual** for the food and textile industry ➢ **Database for supporting the SME's** manufacturers of renewable energy equipment
Activities 3: Training and Promotion on ENCON	➢ **Free energy training program sponsored by government (DEDE)** ➢ In-house training ➢ Public seminars/ conferences ➢ Study tour ➢ Dissemination of ENCON posters, stickers, ENCON saving manuals newsletter, VCD, etc.

(Source: ECCT documents)

(2) Consideration on Applicability towards the Philippines and Proposal

Based on the analysis of the Japanese and Thailand cases (1), the following points to be considered, which are in the left-hand column of the next table, were identified in applying the EE&C center for the Philippines and the discussion results are shown in the right-hand column..

Table 5-6 Items to be Considered and Discussion Results

Items	Discussion Results
1) Objective and roles of the organization	- In principle, the DOE develops and establishes policy and EECCP is an implementing agency to support the DOE. - Role allocation table was formulated.
2) Organizational structure	- EECCP within the DOE - Public organization - Seven (7) divisions and 1 (one) office - No branch offices when starting up
3) Budget and financial resources	- Budget size is about 90 million pesos
4) Membership system	- to be adopted
5) Office building	- Energy efficient building (ZEB: Zero Energy Building)

The details of each item for discussion are as follows.

1) Objective and roles of the organization

The prime objective is to promote EE&C under the DOE. While the DOE is the prime organization for EE&C and in charge of developing and implementing EE&C policy, the EECCP is an implementing agency in cooperation with the DOE.

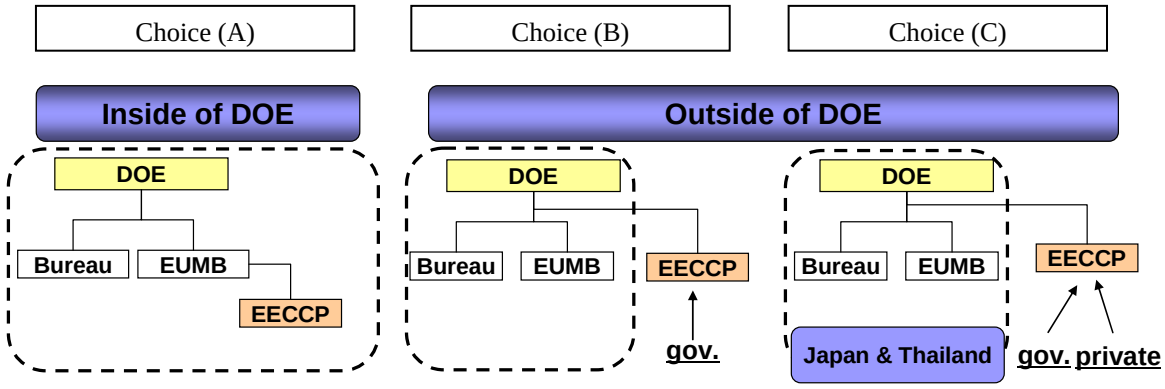
The outline of role allocation between the DOE and EECCP is shown in the next table regarding many EE&C measures which will be implemented in the future in the Philippines. Basically, DOE works in the upstream and EECCP in the downstream by implementing measures. Some roles of the items have not been allocated to either of them and put for both. The works covered here vary greatly.
In addition, the budget size is estimated in 4), based on this role allocation.

Table 5-7 Role Allocation for EE&C Measures

Function	DOE	EECCP	Remarks/ Relevant organizations
General			
Develop EE&C policies & programs	DOE		
Support DOE to implement certain programs		EECCP	
GEMP			
Implementing agency, report evaluation	DOE		
Database management		EECCP	
Information & Education Campaign <I>			
<A> Mass media campaign, giveaways, Enercon show event, recognition awards etc.	DOE	EECCP	With PIA, DepEd, CHED and private org.
<B> Training and seminars for engineers	DOE	EECCP	ENPAP etc.
Energy Management System <II>			
<A> Administration (release, designate organizations, receive reports, check reports etc)	DOE		
<B> Random check and site inspection	DOE		
<C> Penalty provision	DOE	EECCP	
Energy Audit Scheme <II>			
<A> Administration (together with Energy Management System, but needs experts to check EA reports)	DOE		
Accreditation of Energy Managers <III>			
<A> Certifying accreditation body, set standards for energy managers, training	DOE		Professional regulation commission
<B> Administration (CV check, issue certification)		EECCP	
<C> Providing examination and training		EECCP	
Accreditation of Energy Auditors <III>			
<A> Certifying accreditation body, setting standards for energy managers, training and examination	DOE		Professional regulation commission
<B> Administration (check CV, issue certification, etc.)		EECCP	
<C> Providing examination and training		EECCP	
MEPS and Labeling for home appliances <IV>			
<A> Setting standards of MEPS and classification of labeling	DOE		DTI, DOTC Association of Household Appliance Manufacturers (AHAM) etc. Manufacturers, importers
<B> Issuance of certification	DOE		
<C> Certifying testing body	DOE		
<D> Evaluation of policy & measures	DOE		
<E> Monitoring		EECCP	
<F> Provision of information and campaign		EECCP	
Database Management <V>			
<A> Data management and analysis		EECCP	
<B> Maintaining database		EECCP	
International Projects <VI>			
<A> Administration		EECCP	
Building Energy Performance <VII>.			
<A> Setting and updating guideline	DOE		Office of building, officials of LGUs, DPWH
Financial Management <VIII>*: introduction is not clear.			
<A> Fund management, if subsidies etc. are available		EECCP	

2) Organizational Structure

First, we discussed the possibilities of the following three (3) choices in terms of the overall organizational structure with a combination of the following viewpoints: whether the EECCP should be an internal organization of DOE or an independent one and whether or not the private sector should be involved.



	Choice (A)	Choice (B)	Choice (C)
Outline	➢ As a part of DOE ➢ A service division	➢ Outside of DOE ➢ Under supervision of DOE ➢ Government staff only	➢ Outside of DOE ➢ Under supervision of DOE ➢ Staff from gov. and private sector
Advantage	➢ It is easy and quick to establish. ➢ Strong governance of DOE	➢ It can work flexibly than gov. organization.	➢ It can work flexibly than gov. organization. ➢ It can utilize private sector's resources e.g. personnel, knowhow etc.
Disadvantage	➢ It is not easy to utilize private sector's resources e.g. personnel, knowhow etc.	➢ Weaker governance of DOE	➢ Ethical rules and management is necessary due to collaboration between public and private entities.

(Source: Study Team)

Figure 5-6 Advantages & Disadvantages of Organizational Structure

Choice (C) is similar to ECCJ which utilizes private sector resources and the Study Team can recommend the choice. However, the Philippines has no experience in the operation of such organizations. Choice (B) is that EECCP is outside the DOE so that the governance will be weak. Thus, we reached the conclusion that Choice (A) which places EECCP in the DOE is appropriate, because it will play public roles and requires strong governance from the DOE in the initial stages.

In addition, in order to promote EE&C activities all over the country, it seems adequate to have regional offices other than the headquarters in Manila. We discussed the necessity of regional offices in consideration of the seminar provision and report submission of EMS. We reached the conclusion that it starts without regional offices, because the seminars will be outsourced to the outside and the report submission will be through the website (although whether all the business establishments will submit online has not yet been decided).

The organizational structure of EECCP which is formulated based on the role allocation discussion in 1) is shown in the next figure. It consists of seven (7) divisions and one (1) office.

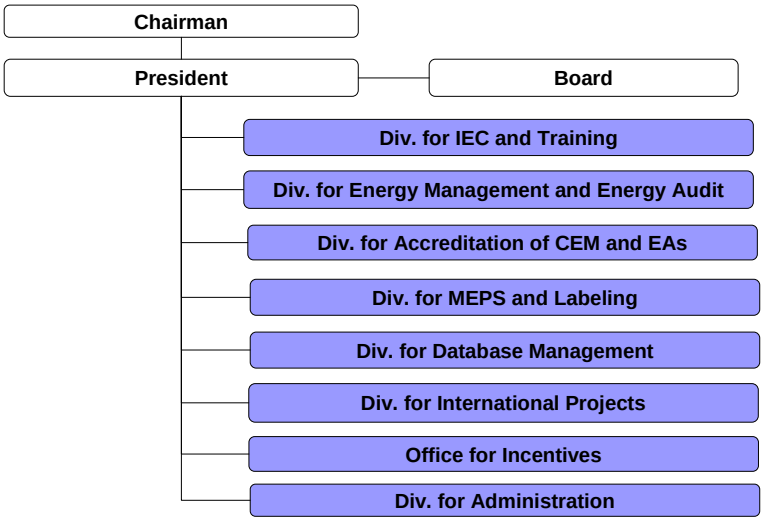


Figure 5-7 Organizational Structure of EECCP

3) Budget and Financial Resources

Regarding the financial resources, at this moment, it is assumed that it will be provided from the Energy Efficiency and Conservation Fund (10 billion pesos) which is stipulated in SECTION 27, draft DOE bill.

Regarding the budget size of EECCP, there are many undecided items in the details of the measures. Thus, it is just an approximate estimate based on many assumptions in order to grasp the rough size. It can be revised according to change in future conditions.

The budget is calculated in the following steps.

- ✓ Estimate of necessary number of staff and calculation of personnel costs for each measure
- ✓ Estimate of project cost for each measure
- ✓ Estimate of the total cost by adding managerial or facility costs

The cost for the office building of ZEB has been excluded in this estimation.

Unit prices and their data sources are shown below.

Table 5-8 Unit Price for Cost Estimation

Personnel cost	Unit in PHP or cost ratio	Data source/ remarks
Chairman/ president	Not estimated	
Director/ Division chief	PHP 500,500	DOE 500,500 = 35,000 x 13 x 1.1* *Social welfare cost ratio: 1.1
Staff	PHP 214,500	DOE: - almost equivalent to DOE staff 214,500 = 15,000 x 13 x 1.1* *Social welfare cost ratio: 1.1
Managerial cost or facility cost		
Same amount of managerial cost	100%	DOE This seems high. It can be 30 % to 50%

a. Estimation of Cost

Outline of the estimation results and special issues in the calculation are shown herewith. (Refer to

Appendix IV for project cost calculation) It is an organization with 50 to 60 staff. The measures targeting the transport sector are not considered in this calculation due to insufficient details.

Table 5-9 Cost of EECCP

	Number of Staff	Personnel Cost (PHP)	Project Cost (PHP)	Remarks for Calculation Conditions
Division for IEC	1 director 2 staff	929,500	40,000,000	- Half of the project cost might be for DOE.
Division for Energy Management System and Energy Audit Scheme	1 director 28 staff	6,077,550 429,000	5,500,000	<EMS> - 6,000 reports. - 300 reports/ staff to handle - hiring experts for random check etc. <Energy Audit> - 1,000 reports (more than 2 Mloe) - hiring experts to check reports
Division for Accreditation of Energy Managers and Energy Auditors	1 director 6 staff	1,358,550 429,000	9,200,000	- CEM: 1,000, CECO: 5,000 - examination is assumed to be provided by ECCP. Actually, other organizations can be a certified body for examination and training.
Division for MEPS and Labeling	1 director 1 staff	715,000	6,000,000	- Most of the work is allocated to DOE.
Division for Database Management	1 director 4 staff	1,358,500	750,000	- EMS reports: 6,000 - Energy audit reports: 1,000 - CEM: 1,000, CECO: 5,000 - Energy Auditors:300 persons
Division for International Projects and others	1 director 1 staff	715,000	0	
Office for Financial Incentives	1 director 3 staff	1,144,000	0	- fund to handle: PHP 10 billion
Division for Administration	1 director 4 staff	1,358,500	0	- Staff number: about 50
Total	7 directors 49 staff	14,514,000	61,450,000	

When maintenance and other operating costs are added, the total cost is approximately 90 million pesos per year, which is shown in the next table.

Table 5-10 Overall Cost of EECCP (rough estimate)

Personnel Cost	PHP 14,514,000	
Project Cost	PHP 61,450,000	
Maintenance and other operating cost	PHP 14,514,000	100 % of personnel cost (from DOE)
Total	PHP 90,478,000	

A supplementary explanation is provided for measures with large costs, the Energy Management System (EMS), Energy Audit Scheme, and Accreditation Scheme (Energy Managers and Energy Auditors). The next table shows the breakdown of their costs.

Table 5-11 Cost Breakdown of EMS etc. (Unit: PHP)

Function	Personnel Cost	Project Cost	Remarks
EMS and Energy Audit			
Energy Management System <II>	6,077,550	2,200,000	
<A> Administration (release, designate organizations, receive reports, check reports etc)	(20 staff)		
<B> Random check and site inspection	(6 staff)		
<C> Penalty provision		2,200,000	Hiring experts
Energy Audit Scheme <II>	429,000	3,300,000	
<A> Administration (together with Energy Management System, but needs experts to check EA reports)	(2 staff)	3,300,000	Hiring experts
Accreditation			
Accreditation of Energy Managers <III>	1,358,550	6,200,000	
<A> Certifying accreditation body, set standards for energy managers, training	(DOE)	2,000,000	Hiring experts: this may need to be done once in 3 years.
<B> Administration (CV check, issue certification)	(3 staff)		
<C> Providing examination and training	(1 staff)	4,200,000	
Accreditation of Energy Auditors <III>	429,000	3,000,000	
<A> Certifying accreditation body, setting standards for energy managers, training and examination	(DOE)	2,000,000	Hiring experts: this may need to be done once in 3 years.
<B> Administration (check CV, issue certification, etc.)	(1 staff)		
<C> Providing examination and training	(1 staff)	1,000,000	

<Energy Management System>

The personnel cost of EMS reaches 5.6 million pesos. The reports to be submitted (assumed number of targeted designated business establishments) are estimated to be 6,000 and one staff is assumed to be able to handle 300 reports. Thus, the necessary number of staff reaches 20. The work includes all the procedures until receiving complete and acceptable reports such as reminding them of report submission, checking the contents, and instructing the revision of the reports. Even in the case of Japan, an acceptable report rate at the first submission is not so high that the staffs in charge have to instruct them. The reports become acceptable after these processes. The situation in the Philippines would be harder. This procedure will not be greatly lightened even in the case of online submissions (the data is inputted into the database in other processes in Japan) and the amount of work is estimated with reference to Japan.

When the report submission rate is low, this cost can be reduced. However, assuming a low submission rate is not appropriate for the objective of this measure, since it means the acceptance of non-submissions from designated establishments. Thus, the estimation here assumes the total number of the designated business establishments.

In addition, EMS requires experts to conduct random checks and site inspections. The cost is calculated as the project cost of commissioning the work to outside experts.

<Energy Audit Scheme>

The Energy audit scheme as well as EMS requires large costs for checking the submitted energy audit reports. The number of reports are estimated to be 1,000 which assumes energy consumers with more than or equal to 2 Mloe. It is assumed that the checking of reports will be commissioned to outside experts, since it is difficult to have government staff check them. This is counted as a project cost.

<Accreditation Scheme>

- Setting Standards etc.

The accreditation scheme for Energy Managers and Energy Auditors requires setting standards for training and examination and preparing examination documents etc. They are assumed to be developed in a committee with academes and experts or to be commissioned to outside experts and, thus, are counted as a project cost. It may be enough for once in three years, as noted in the table remarks.

- Cost of Examination and Training

The operation of an accreditation scheme yields costs due to the examination and training. When the fee for examination and training is collected, the cost will be reduced. Thus, all the total cost calculated here is not necessary. At this moment, we are not at the stage of calculating the balance of cost and revenue in details. Only the cost is estimated herewith. However, the examination and training is supposed to be outsourced or commissioned to outside organizations. It should be financially sustainable, which means 5.2 million pesos out of 9.2 million pesos should be balanced out. The necessary cost becomes 4.0 million pesos in this case.

4) Membership System

As is the case with other countries, EECCP is supposed to introduce a membership system that collects membership fees. In addition to general IEC activities such as web-information and training provision, it plans to develop closer relationships with the members by providing information through a membership channel. The details will be studied in the detailed design by the DOE.

5) Office Building

An office building which accommodates EECCP, the DOE assumes an advanced or state-of-the-art energy efficient building such as a Zero Energy Building (ZEB). However, it is difficult to maintain advanced performance. In addition, an office building is not a high priority amongst the items to be considered for EECCP and the DOE has its own concept. Thus, the analysis or proposal of an office building is out of the scope of this Study.

For reference, the DOE believes that an advanced office building with EE&C technologies which itself exemplifies “Seeing is Believing” is absolutely necessary for IEC activities in the Philippines. The size of the EECCP will be no bigger than that of 50 to 60 staff members and it will be a small building of 2 or 3 stories.

(3) Cost of the DOE (Reference)

In allocating EECCP roles, the necessary number of staff and the cost of the DOE were estimated for the abovementioned measures. The results are shown in the next table for reference. In total, the number of staff is 14 and the personnel cost is approximately 4 million pesos. The project cost is included in the cost of the EECCP.

The size is a little smaller than the current EECD and EECD will commission most of the implementation work to EECCP. The DOE will be in position of managing and instructing EECCP. In the initial stage of EECCP establishment, the DOE staff will need to handle EECCP staff.

Table 5-12 Number of Staff and Estimated Cost of the DOE

	Number of Staff	Personnel Cost (PHP)
Policy making	1 director 2 staff	500,500 429,000
IEC	2 staff	429,000
GEMP	2 staff	429,000
Energy Management System and Energy Audit Scheme	2 staff	429,000
Accreditation of Energy Managers and Energy Auditors	4 staff	429,000 429,000
MEPS and Labeling	3 staff	643,500
Database Management	-	
International Projects and others	-	
Financial Incentives	-	
Administration	1 staff	2114,500
Total	14 staff	3,932,500

5.3.3 EE&C Committees

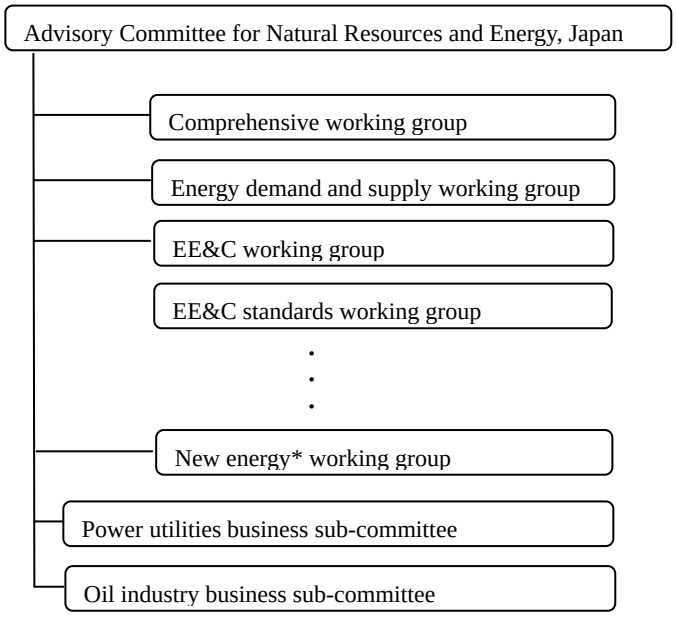
As for reference to consider a platform in the Philippines, two cases are introduced: one is a similar organization from Japan, the Advisory Committee for Natural Resources and Energy, and the other is a similar organization from the Philippines, the National Renewable Energy Board.

(1) Cases of Other Countries

1) Advisory Committee for Natural Resources and Energy, Japan

An advisory Committee for Natural Resources and Energy, Japan is facilitated by METI and acts as a platform for discussing not only EE&C but overall energy policy. The discussions amongst the governmental agencies, however, seem to be held separately. The committee provides opportunities for discussion between the public (METI) and private sector or meetings to discuss the standards or regulations by collecting information from the private sector. When applied to the Philippines, the meeting is not only for DOE-EUMB-EECD, but also for the whole DOE.

The committee of Japan consists of approximately 20 members (29 as of July, 2010: public-3, private-26). There are 14 sub-committees under the committee and a breakdown of them is shown below.



*: New energy in Japan is similar to renewable energy but covers a slightly wider range.

Figure 5-8 Structure of Advisory Committee for Natural Resources and Energy, Japan

The EE&C sub-committee consists of 28 members and is facilitated by the EE&C group of METI. The head of the sub-committee is a university professor and it comprises members from the Tokyo local government, university professors, a commentator, private associations, and board members of private companies (energy companies, merchant companies, manufacturers etc.).

2) National Renewable Energy Board, the Philippines

There is a similar organization to the Japanese Advisory Committee for Natural Resources and Energy stipulated in the RE Act of the Philippines, which is the National Renewable Energy Board (NREB). In Japan, discussions amongst the other governmental agencies seem to be implemented separately. The NREB is a huge meeting covering other governmental agencies and all related private stakeholders. The following (an extract from the Act) is a list of the members.

- ✓ DOE、DTI、DOF、DENR、NPC
- ✓ TRANSCO、PNOC
- ✓ RE developers, Governmental financial institutions
- ✓ Private distribution utilities, electricity cooperatives, electricity suppliers
- ✓ Non-governmental organizations, industry associations
- ✓ All to be appointed by the President

(2) Analysis of Applicability and Proposal

Based on the cases of Japan and the `Philippines, the feasibility and advantages & disadvantages of the following three (3) possibilities were discussed as a platform for EE&C.

A) National Energy Efficiency Board
   - ✓ All the governmental departments/agencies
   - ✓ All the stakeholders in the public and private sector

B) Advisory Committee on EE&C
   - ✓ DOE
   - ✓ All the stakeholders in the public and private sector

C) Committees per theme
   - ✓ DOE and related organizations according to the theme

The concept figure of the committee structure is shown in the next figure. (A) is a huge committee covering all the related governmental agencies. (B) is similar to the Advisory Committee for Natural Resources and Energy, Japan and will be facilitated by the DOE. The DOE needs to call related organizations when necessary or hold discussions separately. Both (A) and (B) host the Advisory Committee as a head and sub-committees per theme. The discussion on each theme will be held at the corresponding sub-committees. (C) is a choice of committees per theme so that it will be a small organization and easy to control. However, adjustment or discussions on different themes by the DOE is required. Matters in the fields not under DOE supervision, e.g. transport sector measures, require prior contact from the agencies in charge, e.g. DOTC, towards the private sector.

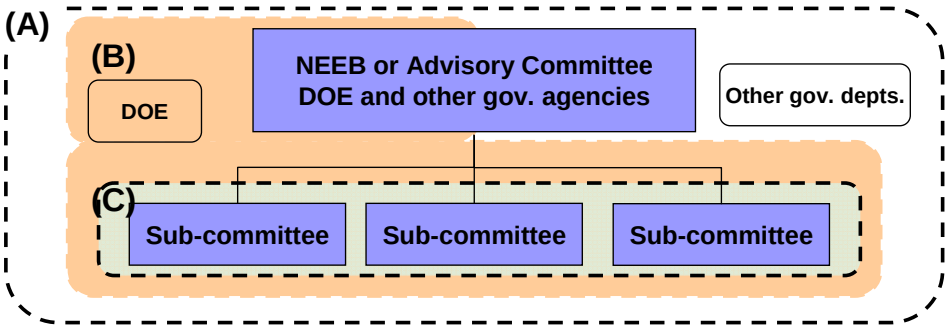


Figure 5-9 Concept of Committee Structure

Table 5-13 Characteristics and Advantages &Disadvantages of Committees

	(A) National Energy Efficiency Board (intergovernmental)	(B) Advisory committee for DOE under DOE	(C) Some committees per theme under DOE
Characteristics	➢ similar to NREB ➢ An advisory committee ➢ All the related governmental departments and agencies ➢ All the stakeholders in the public and private sector ➢ Sub-committees under the Advisory Committee	➢ Similar to Japan ➢ Only DOE ➢ All the stakeholders of the public and private sector ➢ Sub-committees under the advisory committee	For example: ➢ Technical committee for MEPS (standard setting, data collection of appliances) ➢ Labeling scheme ➢ EMS (Setting standards and threshold etc.) ➢ Power sector committee
Advantage	➢ This can collect opinions and cooperation from the private sector ➢ This will be a platform to control the opinions amongst governmental agencies ➢ Redundancy and discrepancy can be avoided	➢ This can collect opinions and cooperation from the private sector ➢ This is more controllable than (A) ➢ DOE can decide EE&C matters	➢ This can collect opinions and cooperation from the private sector ➢ This is more controllable than (B) in establishing and managing.
Disadvantage	➢ DOE-EUMB-EECD needs to handle a big committee ➢ DOE has to coordinate opinions amongst the gov. agencies.	➢ DOE-EUMB-EECD needs to handle a slightly big committee. ➢ DOE has to coordinate with gov. agencies when necessary	➢ Coordination amongst the themes should be managed by DOE. ➢ DOE has to establish a network with the private sector, in advance

As a result of the discussion with the DOE, (A) was not adopted due to difficulty in controlling this big committee. Regarding (B) and (C), it is not necessary to stipulate anywhere by law so that it may not be implemented. Thus, it would be better to define a committee in order to realize it. In addition, through the discussions with the stakeholders, it seems that they would like to have a cross-sectional relationship. Therefore, the recommendation from the Study Team is (B). However, it would not solve the issue concerning the lack of inter-governmental platform. The DOE needs to develop relationships with other related governmental agencies per the theme under the EE&C Law. Although neither choice requires stipulation by law, it is necessary for the DOE to choose and implement one of them according to enforcement of the EE&C Law.

5.4 Summary

In this chapter, the Stuey Team surveyed the current situation, identified the issues and made a proposal regarding the organizational structure to promote EE&C. There are various organizations acting for EE&C in the Philippines. They hope to have a platform for cooperation. After discussion with the DOE, two organizations have been proposed; the Energy Efficiency and Conservation Center of the Philippines and an advisory committee. Role allocation concept between them is as follows; DOE is in the principal position in charge of establishing policy, EECCP is an implementing agency and committees are in position of providing advices and recommendations and conducting policy evaluation.

Regarding EECCP, the following items were discussed: organizational structure, role allocation of the work, the size and the internal organization, and the amount of necessary costs. The cost estimation is quite

rough, since many details of the measures have not yet been decided, and the basis of the unit price is not so strong. The necessary cost is estimated to bed approximately 90 million pesos. The process and items of calculation are described for the future revision by the DOE. In addition, the cost for the DOE is also estimated herewith.

Regarding committees, three choices were proposed and discussed: a committee similar to NREB, which covers all the governmental agencies and all the stakeholders, a committee similar to the Advisory Committee for Natural Resources and Energy, Japan, and committees per theme. Although we could not reach one conclusion, the recommendation of the Study Team is similar to Japan's committee. They are described here for reference, since it is not necessary to have the committees stipulated in the law.

Chapter 6 Energy Management System

6.1 Current Situation

6.1.1 Energy Management System Outline

The energy management system is based on ISO50001 - energy management international standards, and is defined as the “set of interrelated or interacting elements to establish an energy policy and energy objectives, and processes and procedures to achieve those objectives” Figure 6.1 shows a model of Energy management System for these standards, and shows in outline continuous improvement based on PDCA.

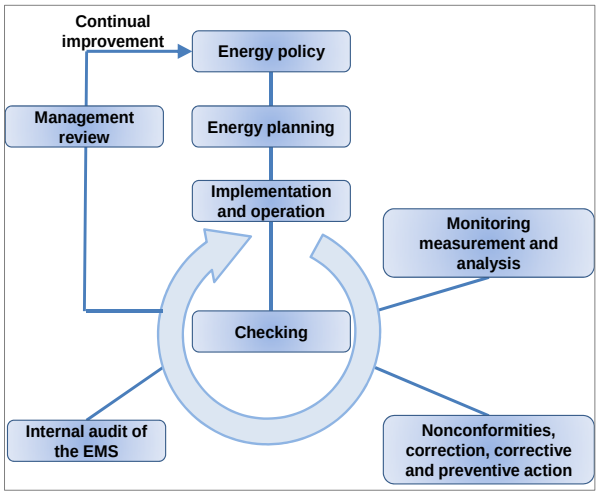


Figure 6-1 Energy Management System Model

Continuous energy management activities will move towards plan implementation and application, starting with the setup of energy policy and input on energy planning. Expense forms, actual measurement data, equipment lists, energy usage etc. are a part of the input of energy planning, and it is important that this information is gathered precisely and incorporated into the energy plan.

Particularly, taking into account the energy usage conditions for each facility should be considered as a prerequisite to these activities, and this study should emphasize checking the energy usage of each facility and reporting conditions to the DOE.

This kind of energy management outline has been introduced under the national training program for energy managers under the auspices of the DOE, and under the AEMAS training implemented by ENPAP. There is also the influence of the ISO50001 standards issued in June of this year, its prevalence is likely to further increase in the Philippines in the future.

6.1.2 Current Energy Report System

In the Philippines, in government facilities, and private establishments such as offices, commercial buildings and factories, separate energy management systems are employed as a part of the energy management system being promoted, and outlined in the above paragraph. The activity of energy consumption reporting to the DOE is common to both the government and private sector, and an outline of each system follows.

In table 6-1, the energy consumption reports systems in government and private facilities were introduced. The major difference between the two parties is the degree of responsibility expected. In government facilities, it is a legally enforced requirement, while in the private sector it is on a voluntary basis.

Table 6-1 Current Energy Report Systems

	Government facilities	Private facilities
Title	Government Energy Management Project(GEMP)	Quarterly energy consumption report (form CU1) Energy conservation report(form CU2)
Year of introduction	2005	1991
Basic provisions etc.	Administrative Order: AO No.103, No.110, No.126, No.110-A	Memorandum circular No.93-03-05
Target of report	Electrical consumption at all government buildings and fuel consumption of all public vehicles. Energy Conservation Program	CU1: Private buildings with 1,000,000 loe p.a. & vehicles on premises (DOE assumption is 3,000facilities) CU2: Private buildings with 2,000,000 loe p.a. (DOE assumption is 1,000 facilities)
Mandatory reporting	Obligatory	Voluntary
Targeted energy	Secondary energy (expenses form based)	Primary energy (crude oil equivalent)
Reduction goals	Electrical: 10% reduction of benchmark from 2004 Jan to June monthly average amount used. Fuel: 10% reduction of benchmark from 2005 Jan to June monthly average amount used.	None
Reduction results	2005, Sept to 2008, May energy cost reduction results were PHP1,009 million (Electrical - PHP 853 million + Fuel PHP156 million), taken from the DOE website	None

(1) Government facilities reporting system

An outline diagram of this system was introduced in Figure 6-2. A report of energy and fuel consumption of all facilities (fuel for public vehicles) is submitted to the DOE monthly, the rate of reduction from the annual benchmark is indicated in the report. Additionally, a plan for the energy conservation program is submitted to the DOE annually.

In parallel with these activities, unannounced spot checks are carried out in turn at each facility, and a grading is finally provided from 4 levels (A ~ C & F, F is a 'fail'), based on a checklist containing 20 items. A sign indicating this grading is displayed at the entrance to each facility.

Based on the information in the monthly reports for government facilities, in cases where the annual reductions in consumption are remarkable, the DOE submits a certificate to the DBM (Department of Budget and Management), and the facilities concerned receives a rebate equivalent to the amount of the reduction. This policy serves as an incentive for the staff to endeavour to save energy.

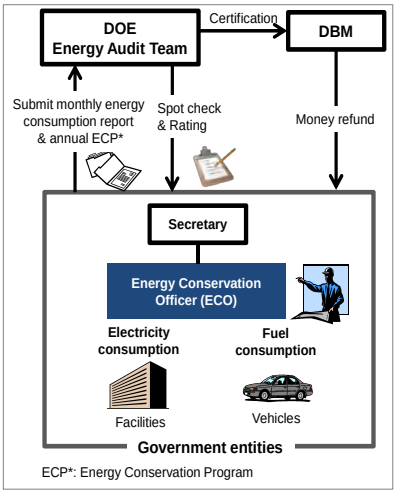


Figure 6-2 Reporting System Outline for Government Facilities

(2) Private establishments reporting system

In private sector, establishments with an annual energy consumption above 1,000,000 loe record their quarterly electrical and fuel consumption on form CU1 and report to the DOE. At establishments with annual energy consumption above 2,000,000 loe, they indicate an energy saving plan and implementation on form CU2, in addition to the quarterly report (CU1), which are then reported to the DOE. This is not legally enforced and is a voluntary system, so only about 100 of the applicable 3,000 establishments made submissions to the DOE (based on results for 2009).

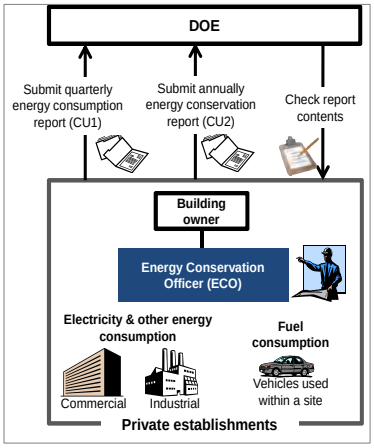


Figure 6-3 Reporting System Outline for Private Establishments

In the quarterly report, there are also columns for gross floor area and factory production volume, calculation of specific energy consumption (SEC) is possible however, SEC is not currently reported to the DOE, so an important energy management index is missing.

The data in the quarterly reports is used in the decision on the candidate facilities in awarding the Don

Emilio Award. Candidate facilities are notified by the DOE, and applicants submit reports for examination by the prize steering committee and prizewinners are selected based on local inspections.

(3) Comparison of the report systems

Figure 6-4 shows an outline of the Japanese report system, and Table 6-2 shows the items recorded in forms CU1 & CU2. The periodical report (shown in the figure) is similar to the Philippines CU1 document while the mid & long term plan report (shown in the figure) is close to the CU2 document.

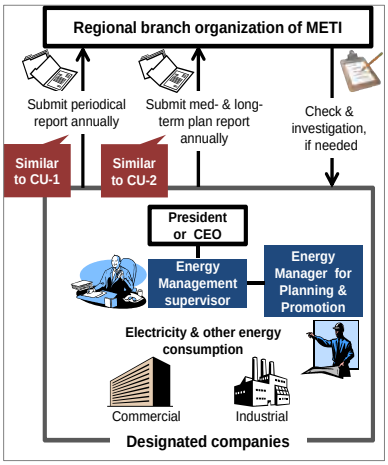


Figure 6-4 Outline of the Japanese Report System

Table 6-2 Items Recorded in CU1 & CU2

	CU1	CU2
Main items	• Energy consumption of various sorts (loe) • Transport energy consumption on premises(loe) • Amount of electricity generated, fuel classification, operating time etc. • Supplied quantity of steam, fuel classification, operating time etc. • Usage of electricity and steam (production, support, loss) • Usage of waste oil • Energy consumption according to production processes	• Amount of reduction from started energy saving measures, investment • Amount of reduction from completed energy saving measures, investment • Amount of reduction from energy saving measures being implemented, investment • Outline of mid to long term energy saving plans • Energy saving goals according to process
Submission period	1st quarter End of April 2nd quarter End of July 3rd quarter End of October 4th quarter End of January of following year	End of January of following year

Table 6-3 shows a comparison of the systems currently in place in Japan and the Philippines. Regarding the scope of the report, a major difference is that in the Philippines they are building units, while in Japan they are company (enterprise) units based on a revision of the energy conservation law, and in addition there are points of difference with regards to the person responsible for submissions, penalties and the presence of energy saving units. Additionally, in Japan, evaluation criteria are established based on the law with proprietors determining the management standards, and the PDCA cycle required by ISO50001 is promoted by enforced reporting of those situations and practice however, this is not present in the Philippines.

In the Philippines, the Energy Conservation Officer (ECO) submits the report. However, specialized knowledge or experience is not always required. In Japan, on the other hand, the person in general charge of energy is selected from the executive rank, an energy manager for planning & promotion who has completed and energy management course submits the report in a supporting role.

Table 6-3 Comparison of Report Systems

	Current System in the Philippines				Reference System
	Government entities with Government Energy Management Program (GEMP)		Private establishments (Commercial, industrial, etc.)		Current System in Japan
Report scope	Per government entity		Per site basis		Per company (enterprise) basis No classification for government and private Transport is excluded
Report prepared by:	Energy Conservation Officer (ECO)		Enercon (Energy conservation) Coordinator or Enercon Officer		Energy management supervisor
Energy consumption	No regulation numerical value		Sites annually over 1 M loe	Sites annually over 2 M loe	Company (enterprise) over 1.5 M loe annually
Report format	Monthly electricity consumption report	Monthly fuel consumption report	Quarterly energy consumption report (CU1)	Annual energy conservation report (CU2)	Periodical report and Long- & mid-term plan report
Main contents	Building Electricity consumption (kWh), Comparison to average monthly consumption	Vehicle fuel consumption (liters), Comparison to average monthly consumption	Energy consumption (loe)	Energy conservation plan, measures during progress and after completion	Energy consumption (loe), Specific energy consumption, Plan for energy saving measures and effect
Submission intervals	Monthly	Monthly	Quarterly	Annually	Annually
Database	No, however it has been prepared by the ITMS		Already prepared and maintained by the DOE		Already prepared
Site inspection	Spot check report assigning score out of 5 level, based on on-site survey by the DOE		Site inspection is carried out only for Don Emilio Awards		In case of insufficient contents of the report, site checking should be implemented by the authority
Incentive for report submission	Administrative order (AO) The refund money correspond to the reduction Posting of grades in government buildings		Don Emilio Awards		Legally mandatory
Penalty	N/A		N/A		In case of no submission & false return, a fine of JPY 500,000 (PHP 250,000) or less
Obligation for energy consumption reduction	At least 10% benchmarked on the average monthly consumption		A certain reduction required for the application of Don Emilio Award		Annually 1 % reduction of specific energy consumption (target)

(4) Organization of current system

As a result of the current system study, GEMP is a well thought out system for government facilities, and should be continuously applied. The following points are a good feature of GEMP.

- Energy consumption baseline and reduction goals are set.
- Results of spot checks by the DOE & energy management conditions are scored.
- Scores are announced on the website, and awarded grades pasted onto the facility entrance.
- DOE certifies the energy reductions for each facility and the equivalent amount of money is reimbursed.
- The current system forms continuous energy management activities.

Regarding the reporting system for energy used by private establishments, the items that should be studied to move towards legal enforcement are as follows.

- The minimum energy consumption threshold that determines whether energy consumers are to be subject to reports.
- The number of energy consumers subject to the system and the total rate of coverage. (the effectiveness of this energy saving system needs to be calculated).
- The necessity of introducing specific energy consumption units and penalties
- Are the reductions in specific energy consumption to be enforced or made goals?
- Setting the method of the denominator in the case of the introduction of specific energy consumption
- Handling of targeted energy, (primary or secondary energy) and reusable energy etc.
- Targeted sectors
- Government's administration system
- The requirements for a support system (training, financial mechanisms, commendations etc.)
- Consistency with ISO50001

6.1.3 Current Energy Manager System

(1) Energy managers in the current system

Energy managers in the system currently in place in the Philippines are concerned with all energy management activities in facilities (organizations), and are regarded as the key persons to promote continuous activities. Therefore, as part of this study, we submit proposals regarding the status and improvement of energy managers. Table 6-4 shows a comparison with the system in Japan regarding the status of energy managers in the Philippines and the organization.

The main difference is that there are no preconditions for the appointment of energy managers in the Philippines and there are no visible role. At government facilities, the formally appointed energy manager carries out their duties as an Energy Conservation Officer (ECO). On the other hand, at private establishments there are no regulations, so the function and necessary qualifications are vague.

Additionally, at large-scale class enterprises where the annual energy usage exceeds 2,000,000 (loe) per annum, we can find cases where the Energy Conservation Officer (ECO) are designated, notwithstanding the lack of a regulatory system. They are concerned with the total energy management of the enterprise

concerned, and also carry out the preparation and submission of CU1 and CU2 under the voluntary system, mainly for entry for the Don Emilio Award.

Table 6-4 Energy Manager System Comparison

	Current activities in the Philippines		Reference			
	Government entities	Private establishments	Japanese Case (Designated institutions & companies)			
Designated person	Energy Conservation Officer (ECO)	Energy Conservation Officer (ECO)	Energy Management Supervisor	Energy Manager for Planning & Promotion	Energy Manager	Energy Officer
Annual energy consumption	N/A	1) More than 1 Mloe up to less than 2 M loe for CU1 2) 2 Mloe and above for CU2	Companies consuming more than 1.5 Mloe	Companies consuming more than 1.5 Mloe	Factories consuming more than 3 Mloe	1) Buildings consuming more than 3 M loe 2) Factories & buildings consuming more than 1.5 M loe
No. of designated persons	1 person per entity	1 person per site	1 person per whole company	1 person per whole company	Depends on consumption level of the factory	1 person per site
Prerequisites	A senior official	N/A	Level of board member	Qualified energy manager or a person who has completed one day training course conducted by ECCJ	Certified person who has passed the examination for the license	Certified energy manager or a person who has completed one day training course conducted by ECCJ
Roles	1) Preparation and submission of the ECP 2) Resubmission of the ECP 3) Preparation and submission of monthly energy consumption reports	Preparation and submission of the energy consumption report (CU1) & the energy conservation report (CU2)	1) Promotion on EE&C activity thinking of management perspective 2) Preparation affairs of med- & long-term plans 3) Supervision of field work & planning on site	Assist energy management supervisor with respect to the affairs described in the left column	Field work management related to EE&C for designated factories	Field work management related to EE&C for designated factories & buildings
Notification	Officially designated by head of Agency	ECO has to fill out his/her name in CU1	Notification should be submitted to METI in case of designation of the person or end of tenure	Notification should be submitted to METI in case of designation of the person or end of tenure	Notification should be submitted to METI in case of designation of the person or end of tenure	Notification should be submitted to METI in case of designation of the person or end of tenure
Penalty	N/A	N/A	No designation: Penalty (below 1M Yen) No submission or false return: Penalty (20,000 Yen)			

(2) AEMAS certification project

ACE/EC are donors and promote the training of energy managers in various ASEAN countries. In the Philippines, from 2011, activities were initiated and the first AEMAS (ASEAN Energy Manager Accreditation Scheme) training course was held in May 2011. This project is limited to a four year period, and ENPAP is the organization implementing it in the Philippines so it was recognized as a private project by the DOE. An outline of the project based on details from consultations with ACE/EC is shown below.

- The project in the Philippines is as shown in the following diagram. There are already two country experts who completed the training last year in Thailand, and the training carried out by these country experts has given rise to 25 local trainers under ENPAP. However, the training for local trainers is ongoing.

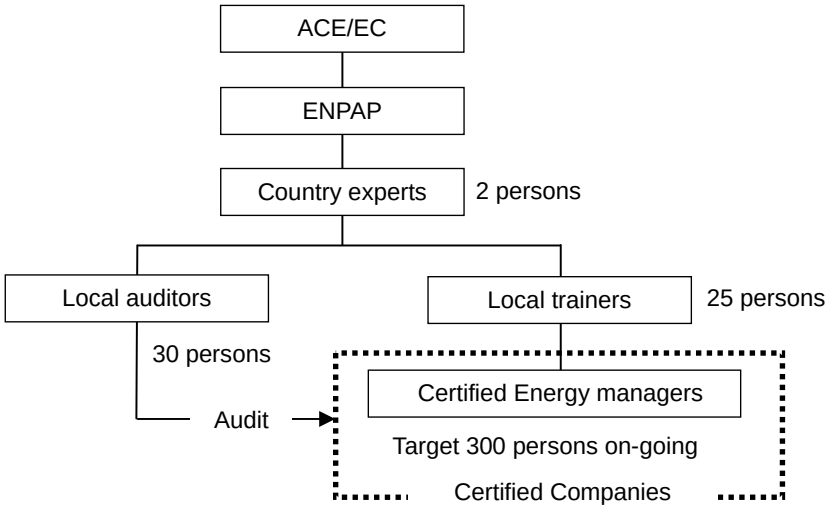


Figure 6-5 AEMAS Project System Diagram

- Regarding the energy manager training in which local trainers teach as instructors, AEMAS certification is conferred by ENPAP on those passing a test upon completion of 3-days training using the ENPAP manual, and they become certified energy managers.
- The goal is to create 300 certified energy managers by 2014. Additionally, AEMAS certification will be carried out for enterprises that employ certified energy managers.
- The features of AEMAS training do not place emphasis on the technical side, but centre on economy and management. It aims for administrators who can give advice on energy management at the management level. Therefore, the participants should be of a type who are of executive rank or those who can coordinate with executives.
- ACE does not provide a concrete training manual, and each country will create their own manual, and they will ask that the contents are compatible with ISO50001.
- ACE is monitoring the progress of each ASEAN country with regards to this program, and also fulfils a role in providing information and advice etc. The goal is to create 3,500 certified energy managers and 2,500 certified enterprises in ASEAN countries.

6.2 Issues

The following is a list of issues raised by government and public in relation to the present situation.

(1) Government facilities (GEMP)

1. Although fixed results (for energy cost reductions) are given however, and data is supplied for each type of energy consumption, statistical analysis to understand general trends is difficult to implement.
2. ECOs at each facility desires provision of training and information related to continuous energy saving.
3. GEMP is focused on energy saving measures at the operational level. However, countermeasures with a short term payback, in a few years, are desirable for further reductions in energy consumption.
4. Regarding the results, we believe that official announcements and presenting the best practices to the public are insufficient.

(2) Private establishments

1. As it is a voluntary system, there a few participants, or even where an energy consumption report is submitted from an applicable establishment, there are many cases where not all quarters are reported, or there is incomplete data. The next section contains proposals for the conceptual design of the system where it is made compulsory.
2. Although there is an energy database at the DOE, the system is obsolete and the analytical functions are inadequate. Additionally, there is data they possess that is not made use of. This is examined under Chapter 10 (Databases).

6.3 Proposal

6.3.1 Considered Proposals

Items for study regarding proposals for the energy management system are shown below.

Table 6-5 System Study Items

	government facilities	private establishments
Energy consumption report	1) Review of reduction goals 2) Create database of report contents 3) Data usage (statistics, trend analysis) 4) Introduction of energy saving measures (scope for further energy saving measures) 5) Disclosure to the public of best cases.	1) The need for review of the current CU1 and CU2 annual energy consumption regulations. 2) Who prepares and submits the report? 3) Introduction of report on Specific Energy Consumption (SEC). 4) Are the SEC to form an index for continuous energy saving activities? 5) If the above units are to form an index, are they just targets or mandatory? 6) Should energy management conditions be included as in Japan? 7) Introduction of penalties for failing to submit reports or falsification.
Energy manager	1) Sharing of ECO energy saving technology (information services from DOE or ECO) 2) Implement specialized training for the ECO	1) What is required in order to become an energy manager? (training, testing, degree etc.) 2) Clarification of the role of energy manager 3) Does the number of energy managers vary according to the size of the facility? 4) Consistency with AEMAS certified energy managers
Others	1) Specify the typical organization of energy saving at each facility 2) Determine the ESCO issues (based on application)	1) Consistency with ISO50001 standards 2) The introduction of outside specialists for energy survey.

Discussions with the DOE on the main items of those detailed above have been carried out. (indicated Table 6-6 & Table 6-7). Table 6-6 shows the energy consumption report system for private establishments, and it was judged that there are no issues with the system targeting government facilities (GEMP) as reflected in the draft bill. Table 6-7 shows the energy manager system.

These two systems are the critical factors in the energy management system and the adoption plan was formulated at a succession of meetings of the DOE and stakeholders to form the draft bill. However, there are differences between the current draft bill and the recommendations of the study team, and those effects are mentioned.

6.3.2 Proposals for Energy Management System

Here we shall consider 2 aspects of the energy management system, the energy consumption reporting system and the energy manager system, and offer proposals.

First, Figure 6-6 shows a flow chart of the energy management system. It can be summarized as follows.

- Targeted energy users make a declaration to the DOE. (Currently not specified in the DOE draft bill.)
- The DOE make the energy user a designated establishment.
- Designated establishments (Type 1 & Type 2) submit an energy consumption report (CU1) twice a year and an energy conservation report (CU2) annually.
- The designated establishment, depending on Type, nominates either a CECO or a CEM. (Whether full-time employment or not is subject to discussion.)
- After checks, the DOE accept the report.
- The DOE may also impose penalties in the event of site inspection, non-submission or misrepresentation etc.
- Additionally, the CU1 report is treated as documentation for candidature for the Don Emilio Award.

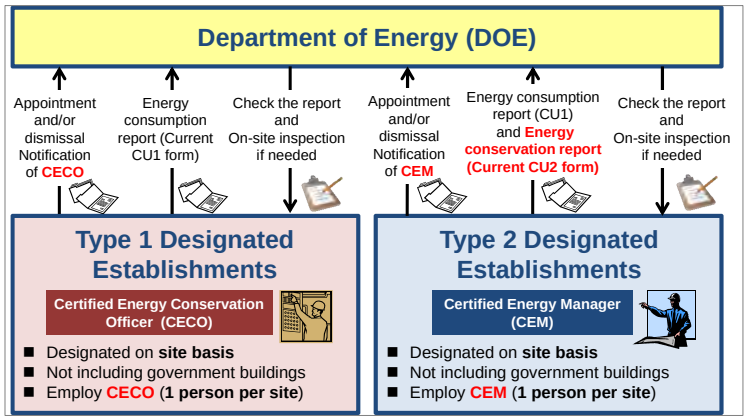


Figure 6-6 Energy Management System Flow

(1) Proposals for energy consumption report system

GEMP intended for government facilities is omitted here, as there are no principal improvements for the draft bill. The proposed improvements (Proposal C) to the system for private establishments are shown in the next table. Details of items requiring special discussion are shown below (please refer to Table 6-6).

- Establishments with energy consumption of between 500,000~2,000,000 loe are designated as “Type 1 facility”, while those with consumption of over 2,000,000 loe are designated as “Type 2 facility”.
- There is a request from the DOE to work towards expanding the scope of the report, and the

minimum value (threshold) for designation as a Type 1 facility was reduced from 1,000,000 loe to 500,000 loe. The expansion of the target is to expand the volume of data on the database and to use it as to create a benchmark for classification of industries and facilities.

- Originally, the important factor was to understand how many applicable establishments there were however, it was difficult due to a lack of information. Moreover, it was difficult to understand the number of targets at 500,000 loe, but it could be estimated to be at least 6,000 or more, giving rise to concerns that this would exceed the administrative capacity of the DOE. The system started out targeting a small number of establishments, and once the feasibility was ascertained and some experience had been gained, the range of targets was expanded. There was a similar situation in Japan.
- Reports for Type 1 establishments are currently submitted every quarter, and there was discussion of inquiry commission recommendation of an annual submission however, a twice a year submission was selected due to The Don Emilio Award offer. On the other hand when the frequency of the reports increases, regardless of the increased work load on the DOE and on the energy consumer. We think that there might be possibilities for applicants to submit report if the purpose of the report is only for selection of the prize winner (and there is no feedback from the DOE)
- A new column should be added for specific energy consumption (SEC) in the CU-1 report format, to be regarded as an indicator of energy saving activities with the aim of achieving a 1% reduction in the annual average. Discussions on whether this value should be made a target or enforced were held and the policy settled on was that it should be enforced. In enforcing a target of 1%, it is necessary to determine a basic unit denominator with a strong relationship to energy consumption however, as it is very difficult except for certain industries (cement and steel etc.) treating it as a target was proposed. On the other hand, there were discussions on the system simulating PDCA, such as Japanese judgment criteria and management standards, in the Philippines however, as this was not adopted, it could be interpreted that the effectiveness of targets is weak.

Table 6-6 Proposals for the Energy Consumption Report System

	Proposal-A		Proposal-B		Proposal-C 【Proposed scheme】	
Report scope	Per site basis		Per site basis		Per site basis	
Report prepared by:	Sites annually over 1 M loe up to less than 2 M loe	Sites annually over 2 M loe	Sites annually over 0.5 M loe up to less than 2 M loe	Sites annually over 2 M loe	Sites annually over 0.5 M loe up to less than 2 M loe	Sites annually over 2 M loe
Appointment of Energy Managers etc.	Certified Energy Manager of more than 1 M loe consumer		Enercon officer of more than 0.5 M loe consumer	Certified Energy Manager of more than 2 M loe consumer	Enercon officer of more than 0.5 M loe consumer	Certified Energy Manager of more than 2 M loe consumer
Report format	Energy consumption report (CU1)	Energy conservation report (CU2)	Energy consumption report (CU1)	Energy conservation report (CU2)	Energy consumption report (CU1)	Energy conservation report (CU2)
Main contents	Energy consumption (loe), Specific energy consumption should be added	Energy conservation plan, measures during progress and after completion	Energy consumption (loe), Specific energy consumption should be added	Energy conservation plan, measures during progress and after completion	Energy consumption (loe), Specific energy consumption should be added	Energy conservation plan, measures during progress and after completion
Submission intervals	Quarterly	Annually	Quarterly	Annually	Semiannually	Annually
Database	To be redeveloped using current IT technology		To be redeveloped using current IT technology		To be redeveloped using current IT technology	
Site inspection	In case of insufficient contents of the report, site checking should be implemented by the DOE		In case of insufficient contents of the report, site checking should be implemented by the DOE		In case of insufficient contents of the report, site checking should be implemented by the DOE	
Incentive for report submission	Legally mandatory Don Emilio Abello Energy Efficiency Awards		Legally mandatory Don Emilio Abello Energy Efficiency Awards		Legally mandatory Don Emilio Abello Energy Efficiency Awards	
Penalty	In case of no submission & false return, penalty should be introduced		In case of no submission & false return, penalty should be introduced		In case of no submission & false return, penalty should be introduced	
Obligation for energy consumption reduction	Annually 1 % reduction of specific energy consumption (target)		Annually at least 1 % reduction of average specific energy consumption (target)		Annually 1 % reduction of average specific energy consumption (mandatory)	

(2) Proposals for energy manager system

As with the energy consumption report system, improvements are also proposed for the the energy manager system in private establishments. Details of items requiring special discussion are shown below.

- There is the obligation for establishments with annual consumption of between 500,000 and 2,000,000 loe to designate a Certified Energy Conservation Officer (CECO), and for establishments with annual consumption of over 2,000,000 loe to designate a Certified Energy Manager (CEM), of which the DOE must be notified.
- As selection criteria, a CECO should be a university graduate and have more than 1 year work experience, a CEM should be a university graduate and possess an engineer license registered with the Professional Regulation Commission, and have more than 5 year work experience. As there is an obligation for CU-2 (mid- & long- term plan) in Type 2, an engineer license is required however, it will not be required for Type 1 in consideration of the burden it would place on the target establishments, due to the expansion of report targets.
- It was accepted that CECO should have over 1 year's actual work experience while CEM should have over 5 years' actual work experience, with the addition of the working level required by the energy manager.
- Both a CECO and CEM personnel should have completed a DOE approved training course (with completion test).
- There shall be penalties imposed for failure to appoint either a ECM and CEM, or for failure to notify the DOE of selection.

Table 6-7 Proposals for Energy Manager System

	Proposal-A for private establishments		Proposal-B for private establishments 【Proposed scheme】	
Designated person	Energy Conservation Officer (ECO)	Certified Energy Manager (CEM)	Certified Energy Conservation Officer (CECO)	Certified Energy Manager (CEM)
Annual energy consumption	More than 0.5 M loe up to less than 2 M loe	2 M loe and above	More than 0.5 M loe up to less than 2 M loe	2 M loe and above
No. of designated persons	1 person per site	1 person per site	1 person per site	1 person per site
Minimum recommended prerequisites	Practical experience in at least 1 year on site	1) Engineer license 2) Complete DOE accredited training course including examination	1) Bachelor degree 2)More than 1 year work experience 3)Complete DOE accredited training course including examination	1) Bachelor degree 2) Engineer's license 3) More than 5 years of work experience as licensed engineer 4) Complete DOE accredited training course including examination
Roles	1) Preparation and submission of CU-1 2) Assistance in CEM affairs	1) Preparation and submission of CU-2 2) Promotion on EE&C activity thinking of management perspective 3) Supervision of field work & planning on site	1) Preparation and submission of CU-1 2) Promotion on EE&C activity thinking of management perspective 3) Supervision of field work & planning on site	1) Preparation and submission of CU-2 2) Promotion on EE&C activity thinking of management perspective 3) Supervision of field work & planning on site
Notification	Notification should be submitted to DOE in case of designation or removal of the person	Notification should be submitted to DOE in case of designation or removal of the person	Notification should be submitted to DOE in case of designation of the person or end of tenure	Notification should be submitted to DOE in case of designation of the person or end of tenure
Penalty	Penalty should be applied in case of no designation of the person, no submission or false return of the report		Penalty should be applied in case of no designation of the person, no submission or false return of the report	

The contents covered so far target items applying to the current stage of the draft bill however, consultations shall held with the DOE as part of the conceptual design regarding enforcement order and the implementation of rules and regulations (IRR) once the law has been established. From now on application of the draft IRR shall be considered. Please refer to Table 6-8 for summaries.

Table 6-8 Additional Proposals for Energy Manager System

	Certified Energy Conservation Officer (CECO)	Certified Energy Manager (CEM)
Work condition	Non full-time CECO can have another post and/or other roles in their companies	Non full-time CEM can have another post and/or other roles in their companies
Outsourcing	Not acceptable	Conditionally acceptable Requires a written contract between candidate and company Submit contract to DOE CECO is appointed in Type 2 establishment
Skill as a CECO & CEM	1)Management perspective on EE&C 2)Direct access to and have support from a top management 3)Understanding of energy consumption report contents and ISO50001 if possible. AEMAS training course covers the above contents	1)Management perspective on EE&C 2)Direct access to and have support from a top management 3)Understanding of energy consumption report contents and ISO50001 if possible. AEMAS training course covers the above contents
Skills as a CEM	Not acceptable	Be able to draw up EE&C plan in med- & long- term period Understanding of energy conservation plan report contents

The following is a supplementary explanation

- Under the current draft bill the word “employ” is used for regarding employment conditions for CECO & CEM however, just the professional duties of the CECO & CEM will place a considerable burden on enterprises, and it will be ineffective if the person responsible for supervision of main equipment fails to fulfill their duties. In view of this, based on the following table it is proposed that both CECO & CEM positions should be combined with other roles.
- The CEM needs to be involved in mid- & long- term planning however, in the case of factories there are also technicians who can smoothly carry it out, which is not the case with commercial buildings. Therefore, it will be possible to entrust it to an outside specialist.

Additionally, the flow up to receipt of DOE certification for energy managers is shown in Figure 6-7. The energy manager is not authorized directly after implementation of the EE&C law, and as there is the fear that this will hinder the implementation of the energy management system, so the approval flow is proposed in Figure 6-8 as a provisions measure.

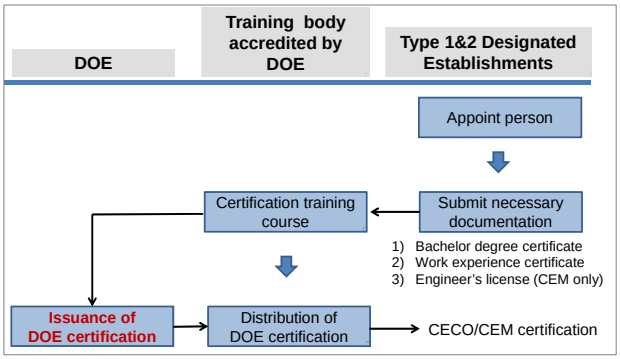


Figure 6-7 CECO＆CEM Approval Flow

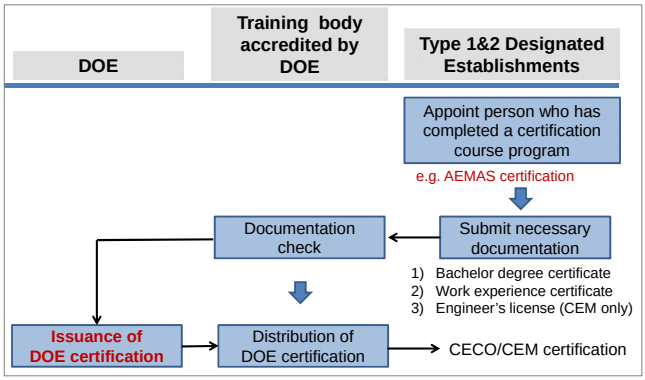


Figure 6-8 CECO＆CEM Approval Flow (options for transitional period)

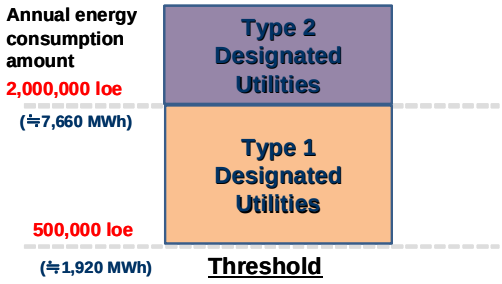
6.4 Power Sector

6.4.1 Contents of the EMS for Power Sector in the Draft Bill

In Japan, the target of EMS in the Power sector is the generation department only. However, all departments of the power sector are designated as targets of the EMS by the same scheme with the industrial and commercial sector on the DOE's draft bill. On the other hand, there are differences in some points in comparison to the industrial and commercial sector. The outline of the EMS for the power sector on the DOE's draft bill and its problems are taken into the consideration here.

(1) Target of EMS and indicators

The utilities which use energies over the threshold in all departments of the power sector that are generation, transmission and distribution are designated utilities of EMS. Type1 and type2 designated utilities are determined by the threshold which is the same as the industrial and commercial sector. The energy consumption amount to be used for each department are as written in the following chart.



Utility	*Energy Consumption Amount*
Generation	Fuel Consumption
Transmission	Transmission System Loss Amount
Distribution	Distribution System Loss Amount

(Energy consumption amount of each department)

The indicators of energy intensity for each department are as follows.

Utility	*Standard*
Generation	Heat Rate (fossil fuel)
Transmission	Transmission System Loss
Distribution	Distribution System Loss

Heat Rate = inputted heat value/generated electricity (Btu/kWh)

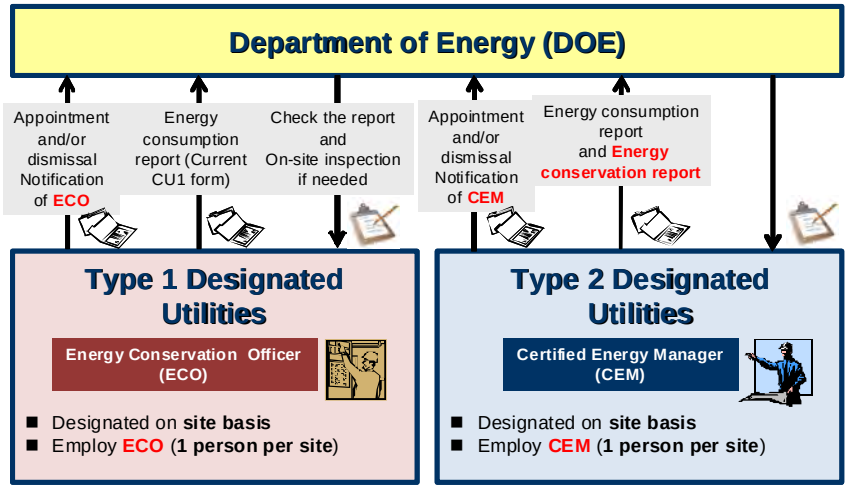
Transmission System Loss = received electricity – transmitted electricity / received electricity

Distribution System Loss = received electricity – distributed electricity / received electricity

(Note) The energy consumption at the utilities' office buildings such as the head offices of the power sector should be managed independently under the same scheme with the commercial sector.

(2) Management scheme

Each designated utility has the same obligations as the industrial and commercial sector such as the report of energy consumption and the appointment of ECO and CEM.



6.4.2 Problems of EMS in the Power Sector

The ERC has already regulated the heat rate of the thermal power plant and the loss of transmission and distribution through the approval of the tariff in the power sector and has given incentives to the utilities which improved such indicators (Refer 3.5.1 Power Sector). Each utility of the power sector has already

submitted the actual data of such indicators, not only ERC but also several related offices including the Electric Power Industry Management Bureau of DOE. The data which has already been submitted to ERC are basically same as the one for EMS.

At the time of EMS introduction, it is necessary to arrange the roles of DOE and ERC, increase understanding for the purposes and advantages of EMS per the EMS targets and reduce the workload of the targets dissolving the duplication of data submission.

(1) The roles of DOE

The following figure shows the idea of correlation between the DOE, ERC and target utilities of EMS. As mentioned above, the DOE should consult with ERC to organize each role to manage the energy consumption of the Power sector.

The DOE thinks that the regulation for the utilities should be done by ERC and wants to have the monitoring of utility energy consumption data done by DOE. The feedbacks of the result of the monitoring for the utilities should be done. It is necessary to consider the good use of the results of the monitoring. For example, the examination of new regulation standards with ERC and the application of the technical methods of top runner utilities to the others and so on by DOE might be useful.

Plant and equipment investments are necessary to improve the heat rate and transmission and distribution loss. The financial support for such investment is useful for utilities although direct technical advice is difficult for DOE.

According to the result of the questionnaires which were collected at the workshop to introduce DOE's draft bill to the stakeholders held on August 2011, many requirements for incentives, awarding and providing financial support for R&D were written and technical support from DOE was not required.

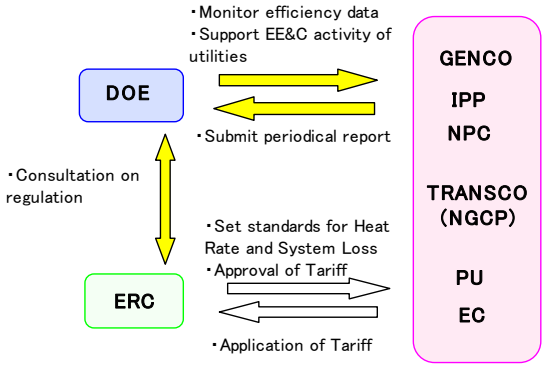


Figure 6-9 An Idea of Correlationship of DOE, ERC and Power Utilities

(2) Appointment of ECO and CEM

Some specific skills and know-how are required to reduce heat rate and transmission and distribution losses apart from general corporations in the industrial and commercial sectors. For example, the utilities of the power sector as producers are not able to control the volumes of product output and the capacities of plant and equipment. So as for the appointments of ECO and CEM, it is recommended to take the working years of the targeted work into consideration and not to identify it uniformly to other businesses. In the

case that an energy audit is mandated, it should be considered to treat the power sector separately because a useful audit can not be expected by an outsider of the sector per the same reason mentioned above.

6.5 Transport Sector (Reference)

The transport sector is outside the scope of this study, and in the main Japanese policies will continue to be introduced. Here documentation submitted to the DOE will be explained and the differences between the DOE draft bill and Japanese measures will be pointed out.

6.5.1 Introduction to Japanese Measures

The following outline of current policy under the Japanese EE&C law in relation to the transport sector was presented at the stakeholders meeting (please refer to presentation documents in Appendix III for details).

- In all sectors including industry, commercial and residential sectors, transport accounts for 23.6%, which is a 1.9 increase from 1973 to 2008, so this is an important sector for energy saving measures.
- A breakdown of fuel for the transport sector shows that coal was used in 1965 however, it had disappeared by 2008, and 98% of the total was crude oil based. (2% electric)
- Energy consumption in the transport sector is 65% passenger services and 35% freight, and 80% is vehicle (private, commercial and freight).
- Energy saving measures were added to the revised EE&C law in 2006, strengthening the obligations for submission of energy saving plans and fixed term reports for freight operators (carriers) and consigners.
- Freight operators are divided into 4 groups which are rail, road, marine and air, operators who maintain a number of vehicles or takeoff weight in excess of standards are targeted. Targeted operators (617 organizations in 2009) are to endeavor to achieve 1% annual reductions in specific energy consumption.
- Consigners consigning over 3,000 ton-kilos of freight traffic (874 organizations in 2009) are targeted, and as with freight operators are to endeavor to achieve 1% reductions in basic energy units.

6.5.2 Mention in the DOE Draft Bill

The EE&C draft bill relating to the transport sector will be independently drafted by the DOE based on the actual conditions in each region, and similar regulations and energy management system targeting private establishments in the industrial and commercial sector will be applied. Type 1 and Type 2 designated classifications and their respective obligations as regards thresholds, energy consumption reports and appointment of CECO and CEM personnel shall be identical to that of private establishments.

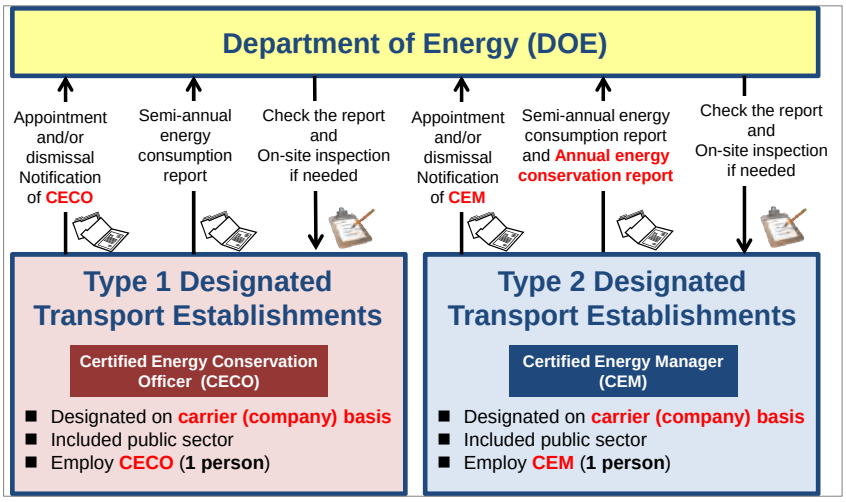


Figure 6-10 Outline of Energy Management System for the Transport Sector

6.5.3 DOE Draft Bill and Japanese Measures

Main items relating to DOE energy saving law and Japanese policy are compared in Table 6-9. It is presented here as a reference for study of the transport sector.

Table 6-9 DOE Draft Bill and Japanese Measures Comparison

	DOE draft bill	Japanese measures
Target	Transport companies (carriers) in the passenger and freight sectors	1)Transport companies (carriers) in the passenger and freight sectors 2)Consigners
Designation threshold	Type 1: Transport companies with annual fuel consumption over 500,000 (loe) Type 2: Transport companies with annual fuel consumption over 2,000,000 (loe)	Transport companies: exceeding a fixed number of freight vehicles and passengers (please refer to 6.4.1 Introduction to Japanese measures & presentation documents) Consigners: Annual shipping over 3,000 (ton-kilo)
Energy consumption report	Type 1: Energy consumption report Type 2: Energy consumption report and Energy conservation report (mid term energy saving plan)	Energy consumption report and mid- & long- term energy saving plan
Energy consumption basic units	Reductions of approx. 1% (Compulsory, average target period to be determined)	Approx 1% reductions over 5 years (target value)
Energy manager	Type 1: Appointment of CECO Type 2: Appointment of CEM	Only CECO is appointed regardless of classification as transport company or consigners.

Items to be studied in the future are as follows:

- ✓ Consultations with jurisdictional authorities
- ✓ Gain understanding of target energy consumers of the draft bill (numbers, volume, general

coverage rates)

- ✓ Method to specify targets

  In case of the DOE proposed autonomous report, whether a target is can be specified or they can be required to submit report. Otherwise, whether the method where the jurisdictional authority has a list of enterprises can be adopted.
- ✓ Various threshold to specify targets

  Looking at the system aims, energy consumption is the main factor however, in terms of realization it is feasible in terms of ton-kilos etc.
- ✓ As with the industrial and commercial sectors, will an energy manager (CEM) qualification be effective?

  As a feasible energy saving plan is different in the transportation sector and the industry/commercial sector, there is a low possibility that the same qualified personnel would be effective. (In Japan, there is no CEM qualification process set up in the transport sector.)
- ✓ Are 1% reductions in SEC realistic for all enterprises? In that case what should be the basic unit denominator?

6.6 Summary

(1) Current situation

- The current energy management system in the Philippines comprises 2 different systems for private and public sectors, and the one for the private sector lacks legal force with only the submission of an energy consumption report required. The system aimed at the public sector comprises a report, an on site check by the DOE, a scored evaluation of energy management situations, publication of the evaluation results.
- In the private sector, for the those who submit a quarterly energy consumption report there is the incentive of being selected as a candidate for the Don Emilio Award, and these are in the main large scale enterprises however, as it is a voluntary based system many target establishments do not submit a report so they are not checked by the DOE.
- The transport sector is outside the scope of this report, so no study has been carried out however, there is currently no policy being implemented to strengthen the system and it lags behind the reporting system in the private sector.

(2) Proposals

- The currently established energy management system for the government sector works well so proposals are mainly aimed at the private sector.
- This shall not be voluntary, but a compulsory system.
- Establishments whose energy consumption exceeds the threshold will be classed as designated establishments and will have to submit the Energy Consumption Report (Type 1 & 2) and Energy Conservation plan (Type 2 only) to the DOE.
- Regarding the range of targets for the system, the current system covers one standard type of

premises, while under the new system they are now divided into Type 1 at between 500,000 and 2,000,000 (loe) crude oil equivalent, and Type 2 at over 2,000,000 (loe).

- With the aim of making the system for the private sector compulsory, in consideration of the DOE workload mainly with regard to the energy consumption reports and after much discussion, it was decided to change the frequency of report submission from the current 4 times to twice a year
- Mention of the specific energy consumption is required in the report, and legal penalties were proposed for non-submission, or falsification of information in the reports.
- There is an obligation to appoint a Certified Energy Conservation Officer (CECO) for Type 1, and to appoint a Certified Energy Manager (CEM) for Type 2 which requires a higher level of management like preparation of energy conservation plan report.
- Discussions were held regarding the DOE approval procedure in relation to situations where candidates who have been approved as both CECO and CEM are required, and additional proposals were concluded for the future IRR plan.

(3) Other items for attention

- As this is a system where targeted establishments are to come forward on a voluntary basis for designation, doubts remain as to whether enterprises can be enrolled as in Japan.
- The number of targets for each of the Type 1 and Type 2 establishments is unclear, and the volume of work on the administrative side is unclear if the system is implemented as proposed. There is the possibility that a threshold of 500,000 loe will create a seriously large amount of work for the DOE.
- In the case of Japan, there is no check without public announcement of the evaluation criteria and responsibility for setting of management standards for EMS, so it is not clear whether the PDCA of the energy consumer in line with the original systems intent, so this will be subject to further scrutiny.
- Reductions in specific energy consumption are not non-binding targets but are mandated, and it is possible that compliance will be difficult.
- As completion of DOE approved training is required for approval of energy managers, not all target facilities will be able to appoint a CECO or CEM, and the expectation is that there will be cases where the report cannot be submitted. An option has been proposed to cover such situations.
- With government institutions (GEMP) the system the evaluation criteria is comprised of 20 items which are evaluated by the DOE site check, and are part of the continuous system of energy management activities at target establishments.
- An example check of compliance under the evaluation criteria and items covered in the energy consumption report under the Japanese Law (concerning the Rational Use of Energy) was presented, and although the evaluation criteria are not at the same level, a policy suited to the actual conditions in the Philippines was proposed to the DOE to make a continuous system for private establishments.
- Regarding the transport sector, there is only an introduction to the situation in Japan, and a report format is submitted that we think requires studying by the DOE.

Chapter 7 Energy Audit

The energy audit is a series of activities for energy consumers to procure their facilities' real energy consumption, to determine energy conservation measures and evaluate energy and cost reduction and investment costs in order to support energy conservation activities. It is a necessary step for energy conservation promotion and requires very special technical knowledge and experience to manage. Furthermore, the number of existing eligible auditors is very limited. If no in-house engineers exist, the only recourse is to hire outside energy auditors.

This chapter explains the urgent issues connected to energy audit such as needing to increase the number of certified energy auditors and the technical improvements required in order to realize and promote energy conservation in the Philippines through an analysis of the nation's current situation as well as that of other countries. Lastly, proposals on the energy audit system suitable for the Philippines will be presented.

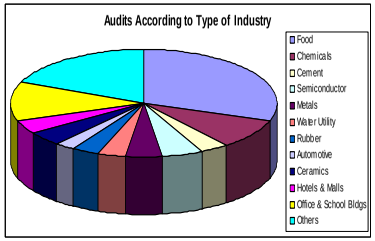
7.1 Current Situation

7.1.1 Current Situation in the Philippines

In the Philippines, an energy audit is carried out mainly through a series of public organizations such as DOE, DOST-PCIERD, DOST-ITDI etc. The technical level of energy audit has already reached the certain level, the cooperation and collaboration among them are not well organized, it seems the integration and improvement of overall audit technologies in the Philippines are not well advanced.

The current situation is summarized in Table 7-1.

Table 7-1 Major Energy Audit Organizations and their Activities in the Philippines

Organization	Activities	Number of cases	Energy audit objects	Fee	Accomplished energy conservation rate	Finance	Future prospect
DOE-EUMB-ECD	・To procure an EC (energy conservation), energy consumption structure and realize energy conservation potential	・ Started in 1986, 1,400 cases until now and 25 cases/year ・A spot check was conducted（NEECP） ・With the cooperation of GTZ、UNIDO、UNDP etc., capacity development was conducted for energy managers.	・Factories 40% ・Buildings 60%	・Average 30,000pesos/case	・1,500MWh/year	National budget	The passage of Energy Conservation Bill is needed for the promotion of Energy Conservation.
DOST-ITDI	・To promote energy conservation ・ To procure energy consumption & the energy conservation possibility of energy consumers. ・To propose EC Proposals ・To specify EC measures	・Reported 124 cases in total (1999.12 ～2011.5) ・Walk through 61 Cases (1999.12 ～2010 .7) ・10cases/year (maximum 16 cases in 2003)	・Audit cases are shown in the following pie chart （Total of 1991～2011） 	・energy audit service for private companies is charged. However, most of energy audits are by project basis, so they are actually free of charge since already subsidized. ・Latest company audited that Unilever in June 2009, wherein they paid 71,485 pesos/year for the audit for their Sulphonation Plant .	The energy consumption reduction rate for each plant or company differs depending on the nature of the implemented effective energy measures. In an example of Roel's Food Corporation, a meat processing plant, wherein their actual electrical energy consumption reduction rate was at 36% just for 6 months from September 2007 to March 2008.	As mentioned, most energy audits were done by project basis so funding came from donors such as AIT-SMI, UNEP, PCIERD, Meralco, ENMAP (now ENPAP) and DOST. Even the energy audit equipment was provided through these funding institutions.	As of today, new energy auditors were already trained in 11 regions in the country, wherein, 6 of those regions have their own complete sets of basic energy audit equipment. These Regional Energy Audit Teams (REAT) are already conducting their own energy audits in their respective regions.
ENPAP	・Assistance for energy consumers for energy savings	・Limited. 5 cases for last 10 years. ・In general done on a per project basis ・Measurement tools are rented. ・2 cases in 2010.	・Air-conditioning, Electrical facilities and EMS（Energy Management System） ・factories and plants	・10,000~50,000 pesos/case	・the case of the telephone companies 320MWh/year	・project basis ・hoping subsidies for measurement tools from the government	・It is possible to carry out 6cases if measurement tools are equipped.
ESCO companies (in the case of Thermal Solution Inc.)	under investigation	under investigation	under investigation	under investigation	under investigation	under investigation	under investigation

Note: DOST-PCIEERD has no reply for our questionnaire and it is not listed in this table about their energy audit activities.

7.1.2 Current situation in Other Countries

(1) Movement in Japan

The energy audit in Japan has been carried out mainly by ECCJ besides the voluntary activities of private companies. The Energy Conservation Law was revised in 2010 and energy conservation became stricter and from then, Energy Audits by private sectors like ESCOs have become very popular. What follows is an outline of the activities conducted by ECCJ,

- ✓ The ECCJ serves as the nucleus when it comes to supplying training curriculums for engineers concerning various kinds of energy audit technologies. Many outside experts are also hired as instructors for the seminars.
- ✓ The ECCJ supplies a series of free energy audit services for small and medium-size factories supporting their energy conservation activities using the subsidies from METI (The Ministry of Economy, Trade and Industry). Experts having energy management experience in factories are employed
- ✓ The ECCJ has already conducted over ten thousand energy audits and possesses a huge amount of technical data accessible only to ECCJ experts. Besides ECCJ, there exist some private companies supplying energy audit training courses.
- ✓ The energy audit accreditation system was started by ECCJ last year and its qualifying examination is held twice a year.

The details are shown at page 7-3 and 7-4.

<Details on Energy Audit activities by ECCJ>

a) Summary of an Energy Audit Project by ECCJ

- ✓ The purpose of the project
  It started to help introduce a strict Energy Management System for even small size factories after the first oil crisis.
- ✓ Short history
  In 1975 it started as a national support measure concerning energy conservation
- ✓ Total cases and audit objects
  4,161cases for factories and 4,357 cases for buildings (Total number of cases, 1997～2010,
  It was unclear before 1997).

year	audit objects	cases (factories)	Cases (buildings)	Cases (total)
1997	Factories and buildings	239	99	338
2001	Type 2 designated factories such as factories and buildings	193	152	345
2006	Medium-size factories and buildings consuming 300kL/year or more	300	454	754
2008	Medium-size factories and buildings consuming 3,000kl/year～300kl/year	485	604	109
2009	Medium-size factories and buildings consuming 100 kL/year～1,500 kL/year	530	668	1,190

- ✓ Auditors
  The number of recorded energy auditors was about 300 persons in 2000 and increased to around 560 persons (in May, 2010). Half of them are electrical engineers and the rest are mechanical engineers. The appropriate expert is selected according to the characteristic of the object of the energy audit.
- ✓ Audit
  One day audit. Detailed audit using measurement tools was not conducted in 2010.
- ✓ Finance
  400 million yen in 2011. Financed according to a METI contract project and Agency for Natural Resources and Energy
- ✓ Database
  Total number of audits registered was about 8,500. The data is used for the following:
  - ・Energy consumption analysis on various kinds of buildings (including an energy efficiency index)
  - ・Energy conservation measures and standardization of evaluation methods etc. (factories and buildings)

- ✓ Seminars and technical education regarding Energy Conservation technologies
  Started in 1979 (The year when the Energy Conservation Law started)

  The seminar's content on Energy Conservation technologies are as follows,

  - ・Energy conservation using inverter technologies
  - ・Energy conservation on incoming and distribution panels
  - ・Energy Management System for factories and buildings
  - ・Basic information on the lighting system and Energy Conservation Technologies etc.

As explained before, the energy audit is carried out by registered ECCJ auditors. The outline regarding the energy auditor certification system, which started in ECCJ last year, is as follows,

(b) The ECCJ Energy Auditor Certification (Private certification)

It started under the name 'Building energy conservation engineer' from last year (2010). Its details are as follows:

Purpose: Training and excavating engineers to be able to manage energy audits on site and propose effective energy conservation measures for commercial buildings.
Examinees: Building administrators, sub-contractors, consultants （※not applied to factories）
Exams: A seminar for 2 days with the qualification examination (held in Tokyo and Osaka, every year).
Number of qualifiers: The present total number of those who passed is 60 persons out of 124.

(2) Movement in ASEAN countries

In ASEAN countries, energy audit was mandated in Thailand shown in Table 7-2. Large energy consumers beyond a certain conditions must undergo an energy audit every year and report its results to the authority. Regarding Energy Auditor, there is a movement in ASEAN countries towards national or private certification.

As an example of an Energy Audit System outside ASEAN countries, in Australia the Energy Conservation Law is fixed in every state and for the first time in South Wales, an Energy Conservation Law was legalized. Its purpose was to reduce CO_2 emissions and the submission of an energy performance manifestation became mandatory at first for dwellings and then commercial buildings. The schedule is May, 2011 for dwellings and by the end of this year for commercial buildings. There exist many certification systems by private agencies but there is no public one.

(3) Movement in Western countries

(a) Examples from the U.S.

In the United States, there are regulations set down by the EPA (Environment Protection Agency) and the DOE (Department Of Energy). Its details are regulated by every state. In Nevada, a dwellings classification system regarding energy efficiency was introduced but in other states there is no such movement.

However, the energy conservation business is very popular in the U.S. and various kinds of agencies including ESCOs, utility companies, contractors and state agencies are conducting Energy Audit activities. Energy Audits by public agencies are done in principle free of charge .

(b) Examples of EU countries

As EU policy, it is a law that buildings under construction or for rent must submit an ‘Energy Certification’ to the relevant authorities. This is not actually an Energy Audit but because of having to undergo an energy audit, the creation and submission of certification plays a very important role in energy conservation promotion. There are many audit companies such as ESCOs (See the homepage of European Association of ESCO companies where major European ESCO companies are introduced.). Regarding its certification, there seems to be no public certification whereas there are many private ones existing.

Table 7-2　Energy Audit in ASEAN Countries

Item	Singapore	Indonesia	Malaysia	Thailand
1．Agencies managing Energy Audit	mainly private companies	governmental organization	mainly private companies	mainly private companies
2．Objects	buildings	factories & buildings	factories & buildings	factories & buildings
3．Main agencies	National Energy Agency, Energy Market Authorities	DGEEU	MGTC, Kettha	MOE, DEDE, ESCOs
4．Mandatory system				
①　executed	none	none	None	done
②　planned	done	done	Done	－
③　movement	EC act (2013) planned The new legislation will have EM standards for industrial facilities	at the stage of drafting	MIEEIP（Malaysian Industrial Energy Efficiency Improvement Project）	EC law, Subsidy and EC Centre
5．Accreditation				
①　Situation	none	done	Done	done
②　accreditation	private	private	National	national/private
③　organization	EMA/NEA	MEGTW	DGEEU	MOE/DEDE
④　movement	Certified Energy Manager Program	AEMAS program	AEMAS program and the governmental program	AEMAS program And EEC law

Note：

・AEMAS：ASEAN Energy Management Scheme

・DGEEU：Directorate General of Electricity and Energy Utilization

・MOE：Ministry of Education

・DEDE：Department of Alternative Energy. Development and Efficiency

・MGTC：Malaysian Green Technology Corporation

・Kettha：Ministry of Energy, Green Technology and Water

・MIEEP：Malaysian Industrial Energy Efficiency Improvement Project

・EMA：Energy Market Agency

・NEA：National Environment Agency

・MEGTW：Ministry of Energy, Green Technology and Water

7.2 Issues

7.2.1 Analysis of Issues and Consideration for the Future in the Philippines

As explained in chapter 7.1.1, various organizations are carrying out an Energy Audit. Their cooperation and coordination are not enough and there seems to be no clear policies governing the Energy Audit. There are problems such as the lack of data sharing, the centralization of know-how accumulated among them, standardization and the level-up of the technologies in the Philippines.

In order to successfully set up an Energy Audit in the Philippines, it is necessary to increase its cases and improve Energy Audit quality. For this purpose, the following measures are considered appropriate in light of the current situation of the Philippines.

1) Energy Audit Improvements
   a. Energy Audit Standardization (Service of database, manuals and examples)
   b. Energy Audit technology Dissemination (including training and technical seminars)
   c. Energy Audit Accreditation (including a. and b.)
   d. Energy Auditor Procurement
   e. Provision of measurement tools
2) Increasing chances of Energy Audit
   a. Improving the quality of the Energy Audit
   b. Alleviating the burden posed by Energy Audit fees
   c. Enhanced recognition and awareness of the merits of the Energy Audit among energy consumers
   d. Introduction of a compulsory Energy Audit

Besides the aforementioned measures, government-led capacity building is another issue that is NOT to be neglected.

(1) The quality of the Energy Audit

(a) Energy audit standardization

Regarding the Energy Audit, such organizations as the DOE, are working on improvements and the construction of an energy audit database. However, they still have not succeeded in the completion of its standardization. While the DOE, DOST and ENPAP are doing the same kind of Energy Audit, their data sharing is not well organized.

Through their cooperation and international technical cooperation such as Promeec (The Promotion of Energy Efficiency and Conservation Program) by ECCJ-METI of Japan, it is possible to realize the improvement of Energy Audit activities in the future. The AEMAS project by ACE has already started and though it has a limited number of certified Energy Auditors, these kinds of activities should be well promoted in accordance with the national activities of the Philippines.

(b) Energy Audit technology Dissemination

At present, DOST is carrying out an Energy Audit and the training of Energy Auditors is not aiming at its certification. On the other hand, the DOE is carrying out the same kind of seminars. It is possible for these organizations to do Energy Auditor training. However, in creating a market involving the civil sector, for

example, having ENPAP carry out the training is a point that should be considered.

(c) Accreditation of Energy Auditor

Energy auditor accreditation has been introduced in Malaysia (national certification) and Thailand (civil and national certification). Accreditation is one of the useful measures to disseminate the Energy Audit but there are those of the opinion that it is very difficult to meet the Energy Auditor quality requirements through the accreditation system because it requires a wide-range of knowledge and know-how concerning design, construction, operation and maintenance of facilities. For this reason, a third party's involvement should be considered.

Although the AEMAS program by ACE certifies a relatively small number of Energy Auditors (around 20 persons a year), this kind of cooperation is very important.

When we think about an accreditation system, the selection of either a national or private certification has a big effect on its later development.

(d) Procurement of a number of energy auditors

At present, the number of Energy Auditors is very limited. In big factories it is possible to procure in-house engineers by training them as Energy Auditors while for small and medium-size factories it is very difficult to find such in-house experts and it is necessary to hire them from the outside.

In case Energy Audit becomes mandate, from the point of fairness it is appropriate to apply outside auditors and DOE's measures are necessary to procure enough their number.

The following engineers are conceivable Energy Auditors

- ✓ Those having AEMAS qualifications
- ✓ ESCO firms or their engineers with DOE accreditation
- ✓ Chief engineers in factories
- ✓ Engineers of engineering companies, sub-contractors and makers
- ✓ Engineers from Energy Audit companies

(e) Procurement of measurement tools necessary for an energy audit

In Japan, the so called simple Energy Audit by ECCJ or civil entrepreneurs is normally carried out without measurement tools. However, for the detailed audit it will be necessary to use measurement tools. It has been reported that because ENPAP does not have measurement tools, this results in losing energy audit opportunities. This must also be taken into account.

Table 7-3 shows a list of handy measurement tools for energy audit generally used..

Table 7-3 List of Measurement Tools used for Energy Audit

Measurement Tools	Application	Reference
Palm size temperature and humidity meter	To check on site temperature and humidity It can measure instantaneous temperature and humidity and also their trend data	Cheap mobile temperature and humidity meter In addition to instantaneous values, trend data are also acquired. (sample)  Source: “Ondo-tori”, Sato-corporation
Radiation thermometer	To check surface temperatures of steam pipe, boiler, chilled & hot water pipes and hot water tank. Steam leakage, heat loss from bared steam pipes and insulated tank can be examined by it.	(sample)  Source: “IR-TA”, CHINO
Anemomaster for air flow measuring	To check air flow rate in duct and air flow rate from diffusers in order to examine the difference between actual and design data.	(sample)  Source: “Anemo-master”, Kanomax
ltra sonic flow meter	It can measure water flow rate from outside of a pipe. （used for detailed survey）	Measurement of cold water flow volume/rate (sample)  Source: “Portable Ultra-sonic Flowmeter”, TOKYO KEIKI

CO2 meter	To check CO2 density of rooms. It is possible to estimate the ventilation rate from CO2 difference between inside and outside of a room.	 (sample) Source: “Digital CO2 meter”, FUSO
Light meter	To check whether every room’s luminance is appropriate or not. It is used to switch off some lighting fixtures or to change lamps for energy conservation.	 (sample) Source: “AR-813A”, AS ONE
Electric power meter	To check electricity consumption by metering them on site. These data is used for the analysis of energy consumption of local systems such as lighting system of a certain area, pumps and etc. It can measure trend data.	It can measure and store trend data. (sample)  Source: “CW-240”,Yokogawa Meters & Instruments Corporation

(2) The increase of Energy Audits

(a) Reduction of Energy Audit fee

The number of Energy Audits is still limited although DOE, DOST manages such a service for free in principle and the civil sector conducts audits for a relatively small charge.

Just as ECCJ in Japan has a free Energy Audit service for small and medium-size industries, there are measures for free government Energy Audit services or government subsidies for private sector’s Energy Audits

- ✓ Energy audit subsidies
- ✓ Subsidies, low interest loans or tax cut measures for facility renewal followed after the Energy Audit
- ✓ Subsidies or low interest loans for the renewal of energy conservation

It is also considerable to charge energy consumers a fine in case they cannot fulfill the national regulations regarding energy conservation activities.

(b) Enhanced recognition and awareness of the merits of the Energy Audit

Energy Audit is not popular at present and the promotion activities via the introduction of examples of efficient Energy Audits and its nationwide campaign shall be necessary. Also the establishment of Energy Conservation Awards for efficient Energy Audits will be considered as a measure to realize improvement.

(c) Mandatory Energy Audit System

In Thailand, the Energy Audit for large energy consumers is compulsory.

- ✓ Recognition of the necessity of energy conservation and energy conservation activities
- ✓ Dissemination of the Energy Audit
- ✓ Grasping energy efficiency and conservation measures and real situations of energy consumption among large energy consumers

On the other hand, in case of mandatory energy audit by a third party/ outside energy auditors, energy consumers need extra work and spending for the energy audits. There may be objection from the industry sector. Its merits and demerits should be well examined. Regarding the risk of classified information leak, there are opinions that there would be no problems as far as companies have non-disclosure agreement.

Among the aforementioned affairs, the DOE is very much interested in the movement of Thailand which has already applied the Energy Audit mandatory system and the accreditation of the Energy Audit. Although they are very useful for the dissemination of energy conservation, it requires a certain amount of government-provided budget and a certain number of staff and the consensus of industrial fields.

The merits and demerits of every item are well examined as below and shall be for the foundation of the proposals of the Energy Audit for the Philippines.

7.3 Proposal

7.3.1 Consideration for Proposals

As shown in 7.2.1, the DOE is interested in a mandatory Energy Audit system and the Energy Auditor certification. Here all of the checking points regarding the mandatory system and the certification will be summarized. In the case of no mandatory system and no certification, the proposals shown in 7.2.1 will be applied.

(1) Mandatory Energy Audit System

There are many choices concerning the targets and ways of the Energy Audit introduction. The items to be considered are as follows,

① Targets and methodologies of the compulsory system
② Frequency of the Energy Audit
③ Energy Auditor's conditions (whether outsourced or in-house)
④ Audit by certified auditor or not
⑤ Constitution of auditors
⑥ Dates needed for Energy Audit
⑦ Expense for Energy Audit
⑧ Contents of Energy Audit report
⑨ Organization of implementation (public or private)
⑩ Organizational structure (function of every organization) and implementation schedule
⑪ Government Expenditures
⑫ The appropriate fee for the Energy Audit and measures to lighten energy consumers' payment
⑬ Penalties
⑭ Energy conservation effects
⑮ Side effects

The detail on every item is,

① Targets and compulsory measures

- ✓ In accordance with the EMS (energy management system), a mandatory system shall be introduced against large energy consumers of 2 Mloe/year or more.
- ✓ Applied to large energy consumers under limited conditions. If a large energy consumer does not fulfill the necessary energy conservation rate needed according to the EMS program, as a punitive measure, a compulsory Energy Audit shall be imposed on them.
- ✓ Not applied. The introduction of the EMS program leads to the compulsory submission of an energy conservation planning report by energy consumers to the authority and the Energy Audit will inevitably be needed in their energy reduction activities.

②Frequency

- ✓ Once a year (Too often for an energy audit)
- ✓ Every 3 years

③Energy Auditor

- ✓ Outside experts
  (even in the event that in-house engineers exist)
- ✓ In-house engineers (especially for factories. It is very difficult for outside experts to propose effective measures for energy conservation of their facilities)

④Certification

- ✓ Uncertified (Hindrance ineffective for Energy Efficiency & Energy Conservation promotion)

Certified (by National accreditation)

⑤Constitution of auditors

- ✓ Criteria of Energy Audit results for reporting is large and complicated. It needs a mechanical expert and electrical expert.

⑥Dates needed for Energy Audit

- ✓ 1 day is appropriate. Interview and date survey in the morning and walkthrough in the afternoon. Reporting needs 2~3 weeks. This is the scope of work with the limited amount of money paid.

⑦Expense for Energy Audit

- ✓ 100,000 pesos/case is necessary.

⑧Contents of Energy Audit report

- ✓ Scope of report about the results of energy audit
- ✓ Reporting the energy consumption
- ✓ Analysis of energy consumption trend
- ✓ Situation of energy conservation activities, problems and improvement measures of the energy Consumer
- ✓ Analysis on operations of the present facilities
- ✓ Conceivable measures for energy conservation

⑨Implementing organization

- ✓ DOE Energy audits are done mainly by private sectors including ESCO companies.
- ✓ Procurement of the present energy consumption situation among energy consumers by DOE

⑩Working structure (functions of every organization) and schedule

- ✓ Functions of every organization and their schedule

Table 7-4 and Fig.7-1 show regarding these affairs at the next page.

DOE as the main player, accepts energy audit reports, examines them and advice energy consumers. Regarding energy auditors, DOE accredits applicants according to the same process shown in the case of CEM certification.

Table 7-4 Roles of every organization

Organization	roles
DOE	・Notification to Energy consumers for energy audit ・Notification of submission of Energy audit results and receipt of the report ・Confirmation of the report and advise for Improvement and demand of submission ・Issuing certificate of Energy Audit
Energy Auditor	・Enforcement of hearing and walkthrough on site ・Making a report
Energy consumers	・Selection of Energy Auditors ・Execution of Energy Audit ・Reporting the results of Energy Audit to DOE
Organization of certification	・Announcement of the schedule of exam ・Execution of exam ・Announcement of successful applicants and issuing certificate

A example of flow chart of Energy Audit is shown below after it becomes mandatory.

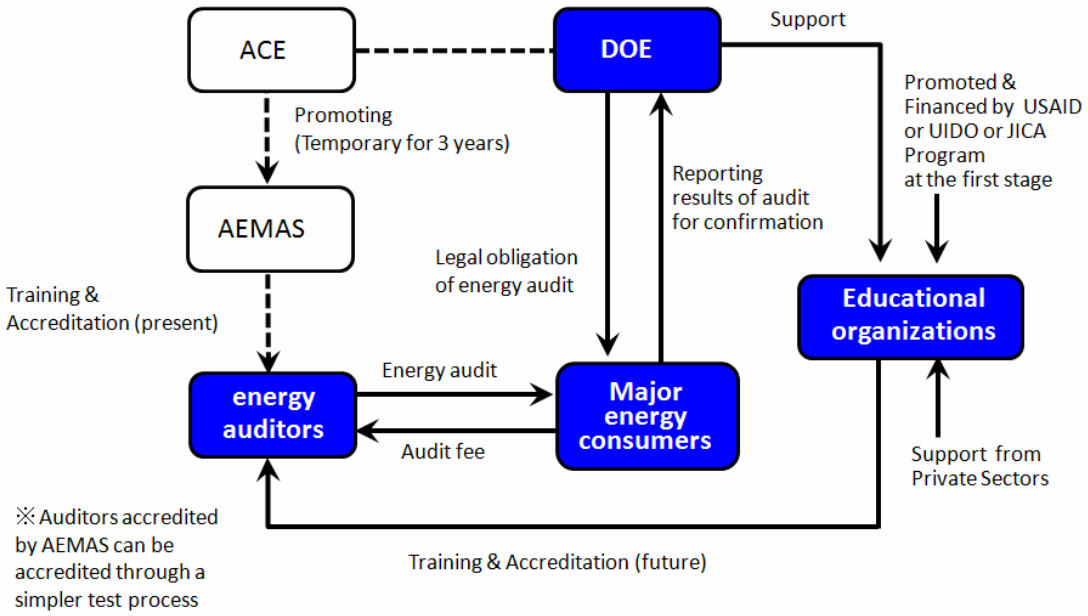


Figure 7-1 Flow Chart of Energy Audit

⑪The expenditure necessary for implementing the necessary measures

- ✓ The expenditure for implementing the necessary measures should be well deliberated

⑫Permissible audit fee and its reducing measures

- ✓ Agreeable Energy Audit fee (Around 100 thousands pesos/case is estimated.)
- ✓ Measures to lighten the Energy Audit fee
  - ・Subsidies for Energy Audit
  - ・Subsidies, low interest loan and tax reduction for Renovation

⑩Energy conservation rate

- ✓ Estimation of the energy conservation rate via energy conservation measures

⑫Penalty

- ✓ If reporting is not appropriate, some penalty shall be done against a due energy consumer by public announcement of its name or fined.

⑬Energy conservation effects

- ✓ Estimation of energy conservation effect by Compulsory Energy Audit

⑭Accompanying effects

- ✓ Effects on new business creation

Herewith shown is Table 7-5 on the conceivable energy audit system and their merits and demerits.

Table 7-5 Conceivable Proposals of Energy Audit and their Merits and Demerits

Case	A	B	C	D
Mandatory or Not	Mandatory			Not-Mandatory but some penalty in EMS
Who will be targeted	Energy consumer over 2 Mloe/year			Energy consumers over 2 Mloe/year and who are defined as malfunctioning to EMS and mandated for energy audit as penalty
How many times	once every 3 years			When penalized
Who conducts Energy Audit a)outside only or in-house b)certified or trained only or in-house anybody there are more combination shown here.	a) From outside b)certified energy auditors	a)From outside or inhouse 2) From outside or inside, but certified energy auditor	a)Inhouse b) From outside, but any energy auditors	The same possibility as the left column of A, B,C
Advantage of consumers	・Energy auditors can help make EE&C plan. ・It may become easier for Certified Energy Manager to persuade board members to invest for EE&C. ・Outside auditor is superior to inhouse auditor on openness.			Penalized energy consumers must make EE&C plan. Good energy consumers need not pay for extra charge.
Disadvantage of consumers	They have to pay charge, even if they can do it by themselves	They have to pay charge, or they have to let in-house engineers to get certification.	They have to pay charge outsides.	They have to pay charge, when penalized.
Advantage of gov. or service providers	It can create business of energy audit.			It can create business of energy audit, although impact will be smaller compared to the left.
Disadvantage of gov. or service providers	- Creation of new business - Gov. can grasp the energy consumption situations among large energy consumers			The same possibility as the left column of A, B, C (But effect for the public is small compared with the left three)

(2) Energy Audit Accreditation

The following items are examined for the creation of an Energy Audit certification system.

1) Items and their advantages and disadvantages

The items to be considered for certification of Energy Auditor are as follows,

① National or private certificate?
② The relation between DOE and certification
③ Examination only or with practice?
④ Organization for certification
⑤ Requirements for applicants
⑥ Conditions for certification
⑦ Preparation of exam and practice

The followings are advantages and disadvantages of every item,

① National certification or private one

- ✓ National certification is appropriate from the standpoint of the integration of certification. (especially in the case energy audit is mandatory)
- ✓ DOE needs a financial and human preparation.
- ✓ In order to decrease the spending for certification process, it is wise to use private organization such as ENPAP for educational certification organization.
- ✓ In case of private certification, there may happen the difference regarding their curriculums among them. DOE must positively compensate these gaps by organizing technical seminars for auditors through the Philippines.

② The relation between DOE and certification

- ✓ In case of national certification, it should be accreditated by DOE.
- ✓ In case of private certification, training institutions should be classified by DOE and good ones will be recommended by DOE, too.

③ Lectures only or plus practice?

- ✓ In Japan ECCJ is managing the combination of lectures and practices for the certification examination of energy auditor. It is not sufficient to give certificates for the applicants when having passed the examination. The following matter shall be added as a prerequisite condition
  ・Licensed engineer（at least 2 years of practical experience is needed.）

④ Duration of examination and practice

- ✓ In Japan (ECCJ）the examination period is 2 days and the content is as follows.
  －The first day
  ・Explanation of the law・・・・Energy conservation law, energy conservation technologies

・Explanation of energy conservation measures

－The second day

・Explanation of reporting

・Paper examination

- ✓ The purpose is to master the necessary technical information regarding energy audit. It depends on the level of applicants. Considering the situation in the Philippines, 2weeks (1 week for lectures and 1 week for practices) seems appropriate.

⑤ Prerequisites of applicants

- ✓ Education background
  Licensed manager (electrical, mechanical or chemical)
- ✓ Practical experience and technical knowledge
  Applicants need to have experience of designing or construction or administration of facilities and have enough knowledge on them at least 2 years of practical experience .

⑥ Conditions for qualification

- ✓ Nationality
  Fundamentally the applicant shall be a Filipino but it must be considered about the possibility for people from ASEAN countries and other foreigners to be able to be applicants from the standpoint of open door policy.
- ✓ No criminal records

⑦ Preparation of training

- ✓ Text for training
  National certification: By using abundant technical information owned by DOE, training material shall be properly made for energy auditor training. There is some possibility that DOE shall make such documents with the cooperation of ECCJ.
- ✓ Development of educational institution
  Regarding main energy conservation instrument, herewith propose that practical school, which is the core organ for EECCP's education for energy conservation shall be established to make applicants to experience the functions of instrument.
  Furthermore it is appropriate that EECCP will play a main role for the training.
- ✓ Seminars
  DOE should hold nationwide seminars several times a year by itself or by the relevant educational institutions in order to disseminate new technologies and improve the technical level of auditors.

2) Concrete proposals regarding Energy Audit

a) Concrete proposals

・The case of national certification

It is aimed to train energy auditors for the national certificate accredited by DOE. Actual qualification is managed by EECCP（The Energy Efficiency and Conservation Center, the Philippines）, ENPAP and etc. Energy auditors trained under AEMAS project by ACE will be qualified as the same kind of energy auditors in the future when ENERCON law is into effect.

It is important to control the size of budget of DOE for energy audit, by receiving financial and technical aid from overseas. Especially using the financial support from Japanese organization like JICA, DOE shall increase energy auditors' number by extending training curriculum for energy auditors throughout the country.

It is estimated that the number of energy audit cases will rapidly increase after ENERCON law is into effect and DOE will need to raise the number of certified auditors drastically. In this meaning it is wise to use the foreign or international financial aid program. Especially in order to procure the necessary number of certified auditors, the measure to expand the training seminars all over the country is essential.

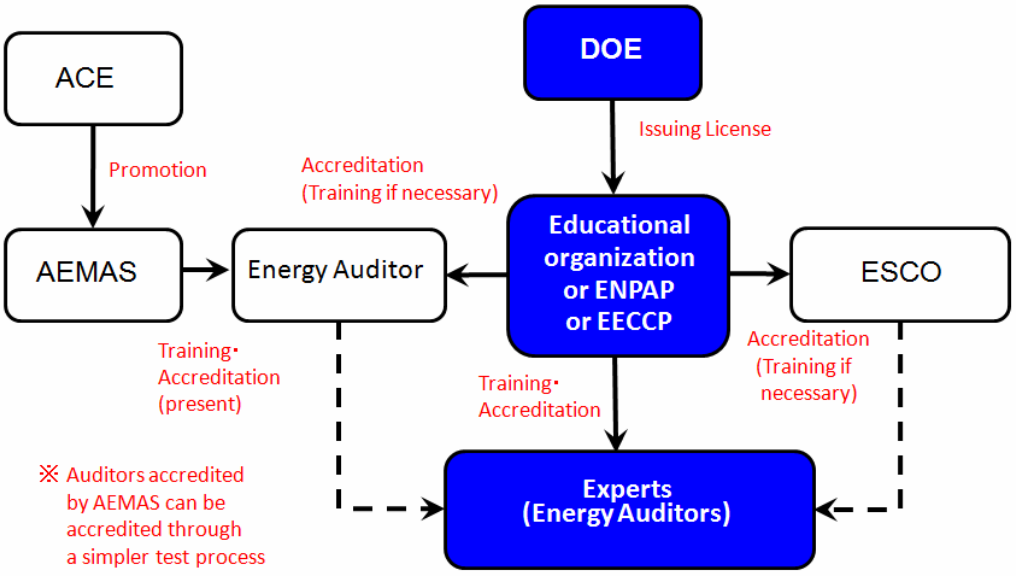


Figure 7-2 Energy Auditor and its Role (the case of national certificate)

Table 7-6 Contents of Examination and Training for Certification

items	contents
Prerequisites for applicants	(1) licensed engineer (mechanical, electrical and chemical) (2) experience of 2 years as engineer
Curriculums of Energy Audit training (example)	(1) Lectures（5days) ・Energy management system ・Energy accounting ・EE&C (Energy Efficiency & Conservation) measures ・Energy audit process ・Practices ・Oral and paper examination (2) On site practices（4 days） ・Preliminary survey ・Interview ・Walk through ・Reporting (3) Final examination (1 day)

b）The case of private certification

This is the proposal to utilize existing energy auditors accredited by AEMAS and ESCOs accredited by DOE and also train engineers for energy auditors by private sectors.

For accreditation EECCP and educational institutions can be responsible. Universities can manage energy audit itself.

DOE shall positively involve in building up the certification curriculums of private institutes by giving appropriate advices. Also it is important for DOE to extend seminars all around the country to disseminate, improve and standardize energy audit technologies in the Philippines.

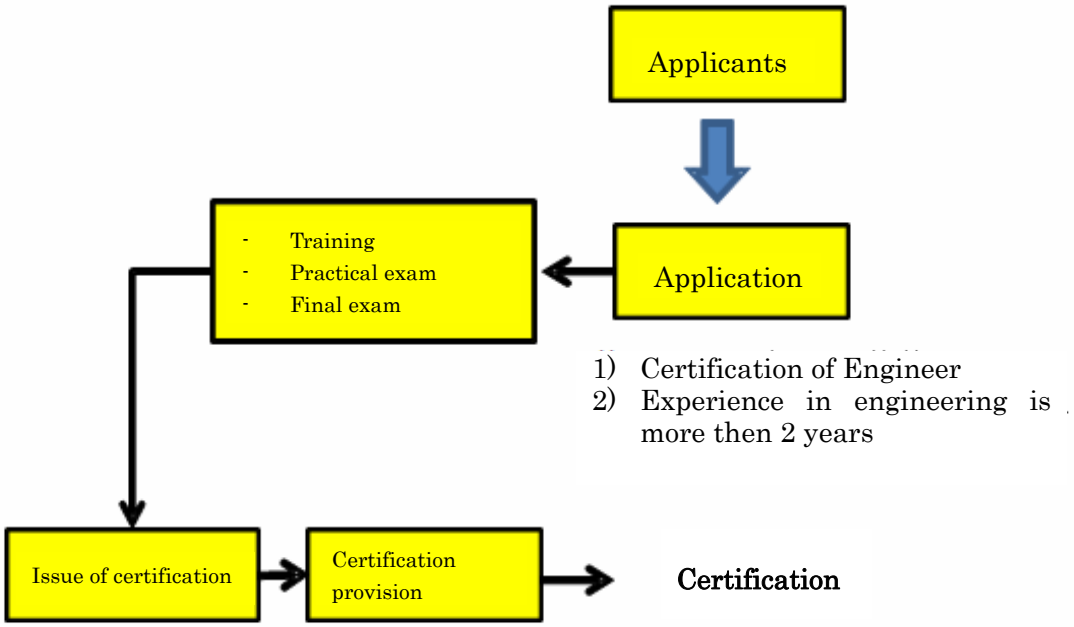


Figure 7-3 Flow Chart for Energy Auditor's Certification (the case of private certificate)

7.4 Summary

As for the Energy Audit, one of the tools to promote EE&C, the current situation of the Philippines was surveyed, factors to promote energy audits were analyzed and advantages & disadvantages and possible choices were presented.

In the Philippines, there is a momentum towards a mandatory energy audit system and certification of energy auditors and energy audits are described as mandatory in the draft EE&C bill of DOE. The outline in the draft bill is as follows:

- Designated establishments are obliged to submit energy audit reports once every three years.
- Persons who conduct energy audits shall be competent energy auditors, accredited ESCOs etc.

Despite a great number of discussions, the detailed framework of energy audits did not reach the conclusions. The mandatory energy audit scheme and the certification of energy managers mean that the DOE needs to accept responsibilities. Thus, further consideration including cost-benefit analysis is required.

As for the mandatory energy audit scheme, the proposed consideration items are 15 including the target, way of obligation, energy audit frequency, energy auditor characteristics (outside/ inside), certifications etc. The flow in the case of a mandatory scheme was also proposed. As for the certification of energy auditors, 7 items were proposed including the way of providing certification, pre-conditions of applicants etc.