No. 29

The Follow-up Study for the Study on the Institutional Capacity Building for the DOE under a Restructured Philippine Electric Power Industry in the Republic of the Philippines

Final Report

(Summary)

December 2004

Japan International Cooperation Agency
Economic Development Department

ED
JR
04-046

Preface

In response to a request from the Government of the Republic of Philippine, the Government of Japan decided to conduct the “The Follow-up Study for the Study on the Institutional Capacity Building for the DOE under a Restructured Philippine Electric Power Industry in the Republic of the Philippines" and entrusted the Study to the Japan International Cooperation Agency (JICA).

JICA sent a Study Team, headed by Mr. Hiromi Sakakibara of the Chubu Electric Power Co., Inc. and constituted of members of Chubu Electric Power Co., Inc. and Mitsubishi Research Institute, Inc. to Philippine five times from July 2004 to December 2004.

The Team held discussions with the officials concerned of the Government of Philippine and conducted related field surveys. After returning to Japan, the Team conducted further studies and compiled the final results in this report.

I do hope that this report will contribute to the development of Electric Power Sector and to the enhancement of amity between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Philippine for their close cooperation throughout the Study.

December 2004

Tadashi Izawa
Vise President
Japan International Cooperation Agency

December 2004

Mr. Tadashi Izawa
Vise President
Japan International Cooperation Agency
Tokyo, Japan

Dear Mr. Izawa,

Letter of Transmittal

We are pleased to submit to you the report of “The Follow-up Study for the Study on the Institutional Capacity Building for the DOE under a Restructured Philippine Electric Power Industry in the Republic of the Philippines". This study was implemented by Chubu Electric Power Co., Inc. and Mitsubishi Research Institute, Inc. from July to December 2004 based on the contract with your Agency.

This study is the follow up to the former study, "The Study on Institutional Capacity Building for the DOE under a Restructured Philippine Electric Power Industry in the Republic of the Philippines", which was conducted from September 2002 to March 2004. The follow-up study was aimed to implement further technical skill transfer for the independent PDP preparation by the Department of Energy (DOE).

The Study Team provided the capacity building for the DOE counterparts to prepare the PDP. There are indications already that DOE is in the process of enhancing its capability to prepare the PDP by themselves in the near coming years. We hope that sustainable capacity building within the DOE will be implemented to continue the skill transfer and improve on the capability.

Moreover, based on the DOE requests to support the PDP preparation, JICA has provided the DOE with the PDP data management system which was officially launched in November 2004. We hope that the system supports data gathering, data analysis for the DOE.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs and the Ministry of Economy, Trade and Industry. We also wish to express our gratitude to the organizations which have supported and assisted our activities throughout the Study, namely the Philippine DOE, Embassy of Japan in the Philippines, JICA Philippine Office, and other agencies concerned in the Philippines.

Truly yours,
Hiromi SAKAKIBARA

Team Leader
The Follow-up Study for the Study
on the Institutional Capacity Building for the DOE
under a Restructured Philippine Electric Power Industry
in the Republic of the Philippines

Abbreviations

ABB	Asea Brown Boveri
ADB	Asian Development Bank
AF	Adjustment Factor
AGMO	Autonomous Group Market Operator
ASEAN	Association of South East Asian Nations
BOI	Board of Investments
BOO	Build Own Operate
BOT	Build Operate Transfer
CAPEX	Capital Expenditure
CBRED	Capacity Building to remove Barriers to Renewable Energy
DDP	Distribution Development Plan
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DSM	Demand Side Management
DTI	Department of Trade & Industry
DU	Distribution Utility
EC	Electric Cooperative
EIPO	Energy Investment Promotion Office
EPIMB	Electric Power Industry Management Bureau
EPIRA	Electric Power Industry Restructuring Act
EPRI	Electric Power Research Institute
ERB	Energy Regulatory Board
ERC	Energy Regulatory Commission
EXECOM	Executive Committee
GDP	Gross Domestic Product
GENCO	Generation Company
GRDP	Gross Regional Domestic Product
EIF	Energy Investment Forum
JICA	Japan International Cooperation Agency
IMO	Independent Market Operator
IPP	Independent Power Producer
IRR	Implementing Rules and Regulations
LF	Load Factor
LOLP	Loss of Load Probability
MEDP	Missionary Electrification Development Program
MERALCO	Manila Electric Company
MMS	Market Management System
NEA	National Electrification Administration
NEDA	National Economic Development Authority
NPC	National Power Corporation

OSAC	One-Stop Action Center
PDP	Power Development Program
PEMC	Philippine Electricity Market Corporation
PEP	Philippine Energy Plan
PIOU	Private Investors Owned Utilities
PJM	Pennsylvania – New Jersey – Maryland
P/S	Power Station
PSALM	Power Sector Asset & Liability Management Corporation
PSE	Philippine Stock Exchange
PSS/E	Power System Simulator for Engineering
SEC	Securities and Exchange Commission
SPS	Special Protection Scheme
SPUG	Small Power Utilities Group
S/S	Sub Station
TRANSCO	National Transmission Company
TDP	Transmission Development Program
TOU	Time of Use
TSC	Transition Supply Contracts
UNDP	United Nations Development Program
WESM	Wholesales Electricity Spot Market

The Follow-up Study for the Study on the Institutional Capacity Building for the DOE under a Restructured Philippine Electric Power Industry in the Republic of the Philippines

Final Report(Summary)

Table of Contents

List of Figures

List of Tables

1. Overview of the Study

1.1 Background

The Electric Power Industry Reform Act of 2001 (EPIRA) was enacted on June 8, 2001 and effective on June 26 of the same year in the Republic of the Philippines. The law aims to establish a framework for reforms in the electric power industry. The structural reforms affect distinct sectors, namely generation, transmission, distribution and supply sectors, under the oversight of the Department of Energy (DOE).

The role of the DOE is mandated pursuant to the 17 clauses in Section 37 of EPIRA. EPIRA identified new tasks for the DOE and the latter external needs support to perform their new obligations.

In response to DOE's request for assistance, the government of Japan appointed JICA as the government agency to support the DOE. JICA conducted the study entitled "The Study on the Institutional Capacity Building for the DOE under a Restructured Philippines Electric Power Industry in the Republic of the Philippines" from October 2002 through March 2004.

In this study, JICA accomplished the following four tasks to improve the institutional capacity and to enhance the human resources capability of the DOE:

1. Support for the formulation of the Power Development Plan (PDP) (including coordination with the subordinate plans);
2. Support for the formulation of the Missionary Electrification Development Plan (MEDP);
3. Support for the approval of the Transmission Development Plan (TDP) submitted to the DOE by the National Transmission Corporation (TRANSCO); and
4. Support for the development of the Energy Investment Promotion Office (EIPO) information system.

The planned consultation period of the study was two (2) years in view of the perceived difficulties associated with technology acquisition and assurance of technology transfer to the DOE. However, the period was shortened to one (1) year because the DOE had to present the PDP 2004 to the Congress by September 15, 2003.

In preparing the PDP, the DOE recognized the need for further support to fulfill its obligation on its own for the succeeding years and requested the follow-up study to JICA.

1.2 Objectives

The objectives of the follow-up study are as follows:

- Support for the strengthening of the DOE capacity for the formulation of the PDP.

- Establishment of data management systems for regular updating or monitoring of data/information.
- Support for the strengthening of the EIPO information system.

One of the main objectives of the study is to provide the DOE staff members with the capability to prepare the PDP by themselves through appropriate capacity building activities. Considering this, the JICA Study Team supported the DOE with the basic policy, *"The study team just supports the DOE in preparing the PDP, and it does not prepare the PDP directly."*

The Electric Power Industry Management Bureau (EPIMB) is a new DOE bureau created as a result of new mandate given to DOE by virtue of the EPIRA. The EPIMB lacks the required manpower resources to perform its functions. In order to realize the sustainable capacity building in the DOE, the JICA study team set the following target objectives:

- *Short-term objective:* To consolidate the institutional form and human resources to formulate the PDP for succeeding years; and
- *Medium and long-term objective*: To establish the institutional form to implement the capacity building for self-improvement in the DOE.

In this fiscal year, four persons have been assigned to the DOE. The DOE is highly motivated. The JICA study team contributes maximum support to the DOE with the greatest care so that DOE can formulate the PDP independently.

2. Electric Power Demand Forecasting

2.1 Demand Forecasting Using Econometric Model

2.1.1 Assumptions of the Econometric Model

The JICA Study Team revisited the assumptions used in the demand forecasting done last year. Consequently, the Team together with the DOE defined and updated some of the assumptions and there are the following:

- Update estimation of future Gross Regional Domestic Product (GRDP) shares among regions. In Mindanao, historical GRDPs in Region X, Region XII, CARAGA and ARMM are merged. Then future GRDP shares in Mindanao for those areas were forecasted as one region.
- Review EC regional groupings in Mindanao. The validated EC groupings was applied to regression models in Macro approach.
- Sales data in year 2002 and 2003 of each PIOU and EC are collected from ERC and NEA. In the next PDP process, sales data for 2004 will be collected from DDP data collection system.
- AF (Adjustment Factor) and LF (Load Factor) for each area are updated considering NPC statistics regarding its recent 5 years sales kW and MWh data. The results are on the next Table.

Table 2.1 Updated AF and LF

Grid	AF (Adjustment Factor)		LF (Load factor)	
Luzon	23%	NPC Direct Sales 7% Transmission Loss 8% Self consumption in Station 8%	62%	5 years average 61.6%
Visayas	33%	NPC Direct Sales 7% Transmission Loss 8% Self consumption in Station 8%	50%	5 years average 49.6%
Mindanao	40%	NPC Direct Sales 7% Transmission Loss 8% Self consumption in Station 8%	58%	5 years average 57.4%

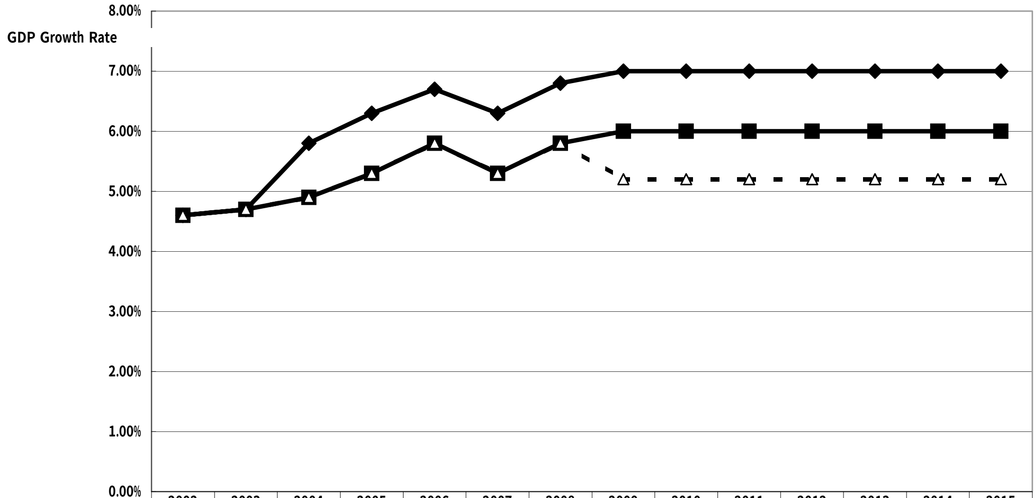
The start point of demand growth curve, that is the system peak in 2003 for each area, is defined by the DOE based on DDP data and information from system operators.

Table 2.2 System Operators Peak and Embedded demand , PDP2005

	SO Peak	Embedded (Estimated)	Total
Luzon	6,149	198	6,347
Visayas	924	108	1,032
Mindanao	1,131	35	1,166
Philippines	**8,204**	**342**	**8,546**

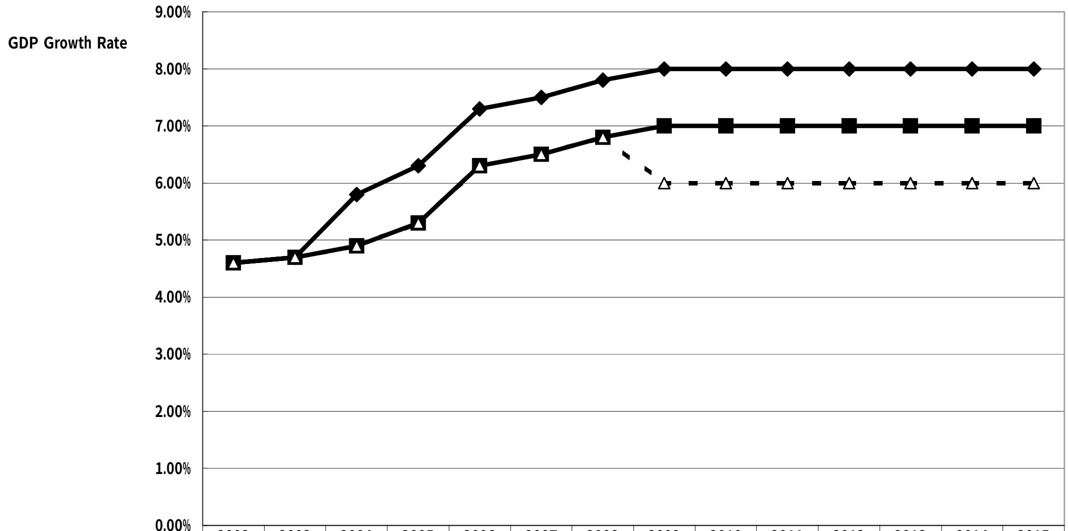
2.1.2 GDP assumption

NEDA disclosed new GDP forecast in the middle of September 2004. The GDP 2004 forecast is higher than the GDP forecast in 2003; especially, after year 2007, each scenario is 1 point higher than previous GDP scenario. The bullish GDP forecasts in 2004 will result to higher demand growth assumption in the macro approach using the econometric model.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE	4.60%	4.70%	5.80%	6.30%	6.70%	6.30%	6.80%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%
NEDA Low GDP CASE	4.60%	4.70%	4.90%	5.30%	5.80%	5.30%	5.80%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
LOWER GDP Modificated CASE	4.60%	4.70%	4.90%	5.30%	5.80%	5.30%	5.80%	5.20%	5.20%	5.20%	5.20%	5.20%	5.20%	5.20%

Figure 2.1 New GDP forecast released by NEDA in September 2004



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE	4.60%	4.70%	5.80%	6.30%	7.30%	7.50%	7.80%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
NEDA Low GDP CASE	4.60%	4.70%	4.90%	5.30%	6.30%	6.50%	6.80%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%
LOWER GDP Modificated CASE	4.60%	4.70%	4.90%	5.30%	6.30%	6.50%	6.80%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%

Figure 2.2 GDP forecast released by NEDA in May 2003

2.1.3 Outline of the results of Macro Approach in PDP2005

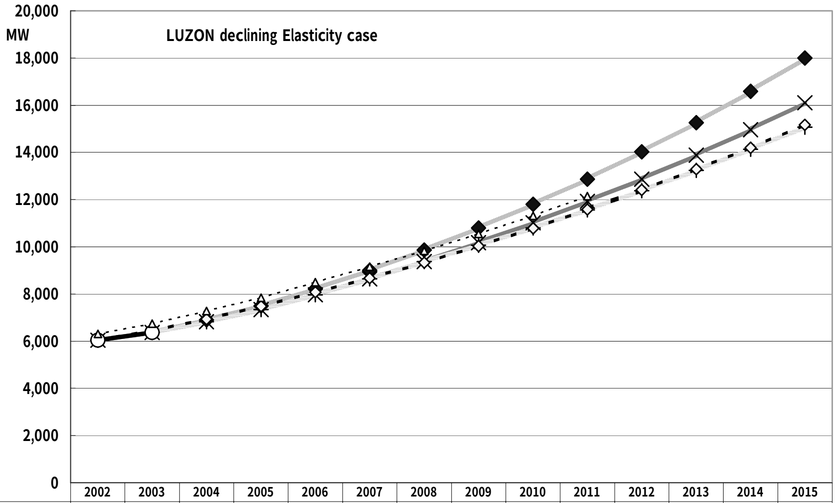
(1) *Demand Growth in each Area*

The results for main grids based on assumptions above are shown on the following figures (Figure.3.1 – Figure.3.8). From the results, future demand growth in each area is described below:

(i) Luzon. The forecasted demand (Low GDP, declining elasticity) is a little higher than the previous forecast (PDP2004) and the result in PDP2004 is almost same as modified LOW GDP, declined elasticity case.

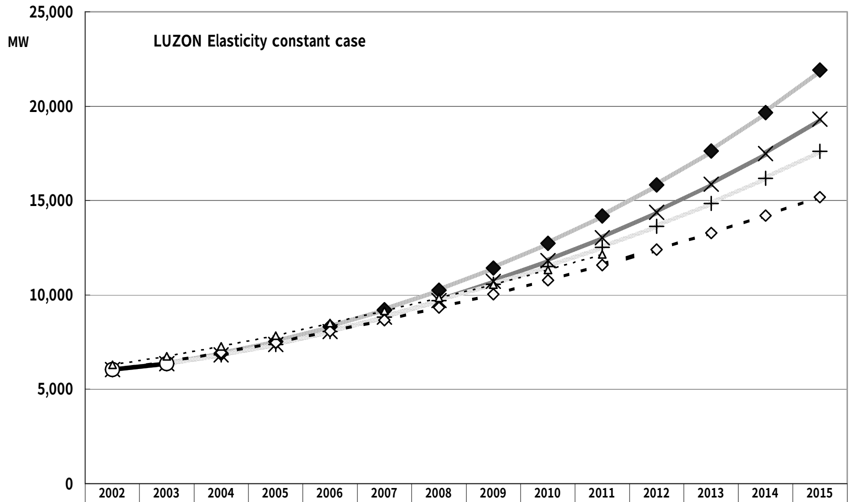
(ii) Visayas. Also, the forecasted demand (Low GDP, declining elasticity) is a little higher than the last year forecast; the variance is very small.

(iii) Mindanao. There is some confusion on ECs regional groupings in historical data. Also, in 2003, Mindanao experienced high peak demand growth. Due to both factors, forecasted demand growth in Mindanao becomes significantly higher than the result of previous study.



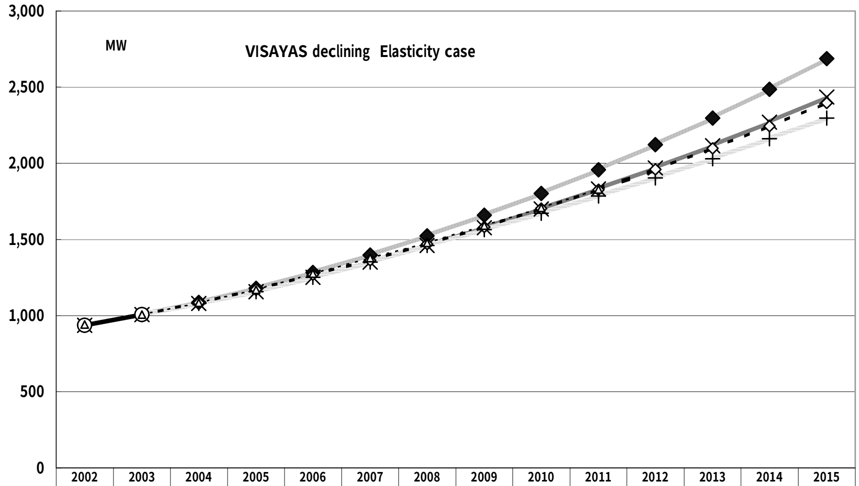
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE Luzon	6,039	6,365	6,899	7,498	8,215	8,994	9,853	10,791	11,796	12,871	14,023	15,258	16,582	18,002
NEDA LOW GDP CASE Luzon	6,039	6,365	6,829	7,343	7,964	8,635	9,372	10,171	11,018	11,917	12,871	13,884	14,959	16,103
LOWER GDP Modified CASE Luzon	6,039	6,365	6,829	7,343	7,964	8,635	9,372	10,069	10,802	11,572	12,382	13,234	14,131	15,074
PEP2004 LOW GDP Declined elasticity Case Result Luzon	6,039	6,454	6,937	7,473	8,076	8,662	9,323	10,036	10,786	11,575	12,406	13,280	14,201	15,171
Luzon Actual	6,039	6,365												
PEP2003 Result	6,308	6,752	7,275	7,835	8,503	9,161	9,830	10,548	11,319	12,149				

Figure 2.3 Demand forecasting results in Luzon (Decline Elasticity Cases)



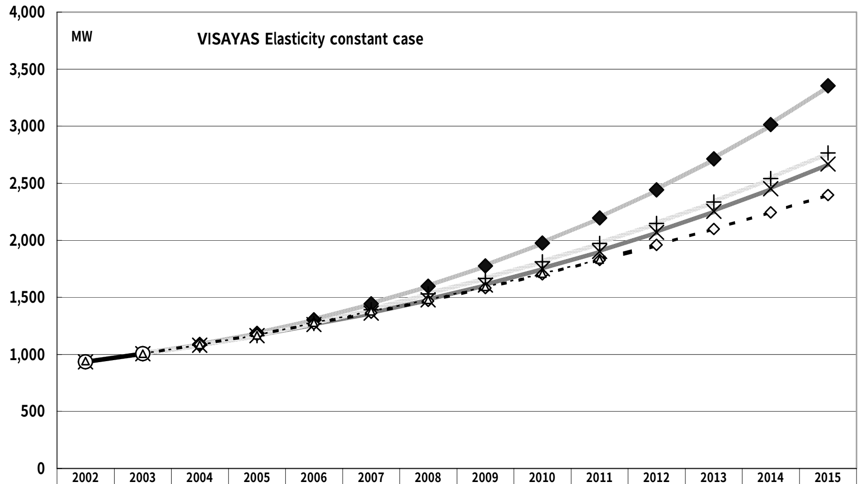
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE Luzon	6,039	6,365	6,899	7,526	8,315	9,211	10,242	11,418	12,728	14,189	15,817	17,632	19,655	21,911
NEDA LOW GDP CASE Luzon	6,039	6,365	6,829	7,366	8,052	8,824	9,709	10,710	11,815	13,033	14,377	15,859	17,494	19,298
LOWER GDP Modified CASE Luzon	6,039	6,365	6,829	7,366	8,052	8,824	9,709	10,570	11,508	12,529	13,641	14,851	16,168	17,602
PEP2004 LOW GDP Declined elasticity Case Result Luzon	6,039	6,454	6,937	7,473	8,076	8,662	9,323	10,036	10,786	11,575	12,406	13,280	14,201	15,171
Luzon Actual	6,039	6,365												
PEP2003 Result	6,308	6,752	7,275	7,835	8,503	9,161	9,830	10,548	11,319	12,149				

Figure 2.4 Demand forecasting results in Luzon (Constant Elasticity Cases)



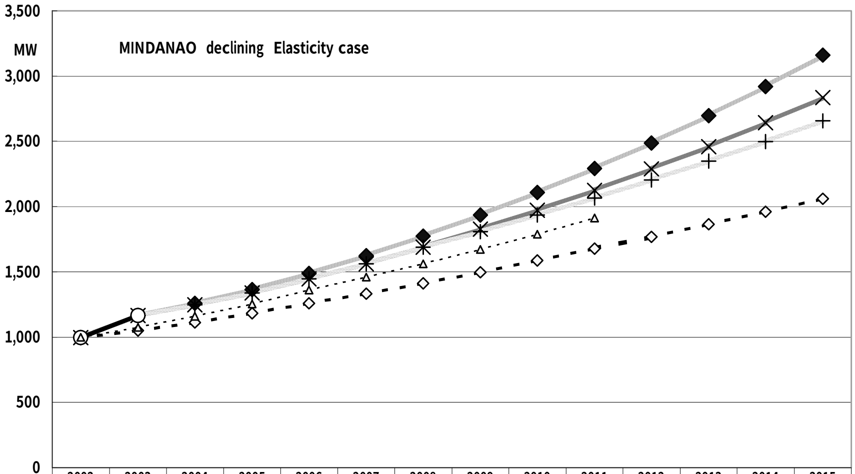
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE Visayas	936	1,006	1,088	1,178	1,284	1,398	1,523	1,658	1,803	1,957	2,122	2,297	2,486	2,687
NEDA LOW GDP CASE Visayas	936	1,006	1,078	1,158	1,251	1,351	1,460	1,577	1,700	1,831	1,969	2,115	2,270	2,434
LOWER GDP Modified CASE Visayas	936	1,006	1,078	1,158	1,251	1,351	1,460	1,563	1,672	1,785	1,904	2,029	2,160	2,297
PEP2004 LOW GDP Declined elasticity Case Result Visayas	936	1,006	1,085	1,172	1,269	1,363	1,469	1,582	1,702	1,827	1,959	2,097	2,243	2,397
Visayas Actual	936	1,006												
PEP2003 Result	941	1,007	1,084	1,168	1,276	1,377	1,477	1,592	1,707	1,829				

Figure 2.5 Demand forecasting results in Visayas (Decline Elasticity Cases)



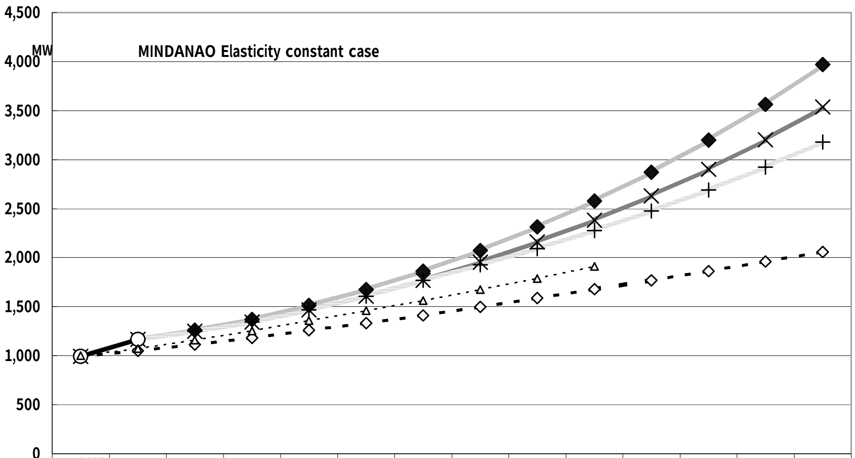
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE Visayas	936	1,006	1,088	1,183	1,304	1,441	1,598	1,776	1,974	2,195	2,440	2,712	3,015	3,352
NEDA LOW GDP CASE Visayas	936	1,006	1,078	1,163	1,262	1,360	1,476	1,607	1,748	1,903	2,071	2,253	2,452	2,668
LOWER GDP Modified CASE Visayas	936	1,006	1,078	1,163	1,270	1,391	1,530	1,665	1,812	1,972	2,146	2,335	2,541	2,765
PEP2004 LOW GDP Declined elasticity Case Result Visayas	936	1,006	1,085	1,172	1,269	1,363	1,469	1,582	1,702	1,827	1,959	2,097	2,243	2,397
Visayas Actual	936	1,006												
PEP2003 Result	941	1,007	1,084	1,168	1,276	1,377	1,477	1,592	1,707	1,829				

Figure 2.6 Demand forecasting results in Visayas (Constant Elasticity Cases)



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
NEDA High GDP CASE Mindanao	995	1,166	1,260	1,364	1,490	1,625	1,774	1,935	2,108	2,292	2,488	2,697	2,921	3,160
NEDA LOW GDP CASE Mindanao	995	1,166	1,247	1,337	1,445	1,562	1,689	1,827	1,972	2,126	2,288	2,460	2,642	2,834
LOWER GDP Modified CASE Mindanao	995	1,166	1,247	1,337	1,445	1,562	1,689	1,809	1,935	2,066	2,204	2,348	2,499	2,658
PEP2004 LOW GDP Declined elasticity Case Result Mindanao	995	1,049	1,112	1,181	1,259	1,331	1,412	1,498	1,586	1,676	1,769	1,864	1,960	2,060
Mindanao Actual	995	1,166												
PEP2003 Result	1,000	1,074	1,159	1,254	1,360	1,459	1,563	1,673	1,789	1,912				

Figure.2.7 Demand forecasting results in Mindanao (Decline Elasticity Cases)



	PEP2003 Result													
NEDA High GDP CASE Mindanao	995	1,166	1,260	1,371	1,513	1,675	1,861	2,075	2,312	2,577	2,871	3,199	3,564	3,970
NEDA LOW GDP CASE Mindanao	995	1,166	1,247	1,342	1,467	1,608	1,770	1,955	2,158	2,382	2,630	2,903	3,204	3,536
LOWER GDP Modified CASE Mindanao	995	1,166	1,247	1,342	1,467	1,608	1,770	1,925	2,094	2,276	2,475	2,691	2,925	3,180
PEP2004 LOW GDP Declined elasticity Case Result Mindanao	995	1,049	1,112	1,181	1,259	1,331	1,412	1,498	1,586	1,676	1,769	1,864	1,960	2,060
Mindanao Actual	995	1,166												
PEP2003 Result	1,000	1,074	1,159	1,254	1,360	1,459	1,563	1,673	1,789	1,912				

Figure.2.8 Demand forecasting results in Mindanao (Constant Elasticity Cases)

(2) Demand Growth of each island in Visayas

Demand forecasting results for each island in Visayas are shown in Figure, 3.10 –Figure 3.15. Figure 3.9 below presents the comparative demand growth 2004 – 2005 forecasts for each island in Visayas. As mentioned before, demand forecasting in Visayas grid is not so different from the previous study in PDP2004. Therefore, generally each island peak forecasting result is also not so different from the previous. However, demand forecast result for Cebu is a little higher than the previous forecasted result. On the other hand, demand forecast result for Leyte-Samar is lower than the results of the previous year study. The results were strongly affected by the actual peak in year 2003.

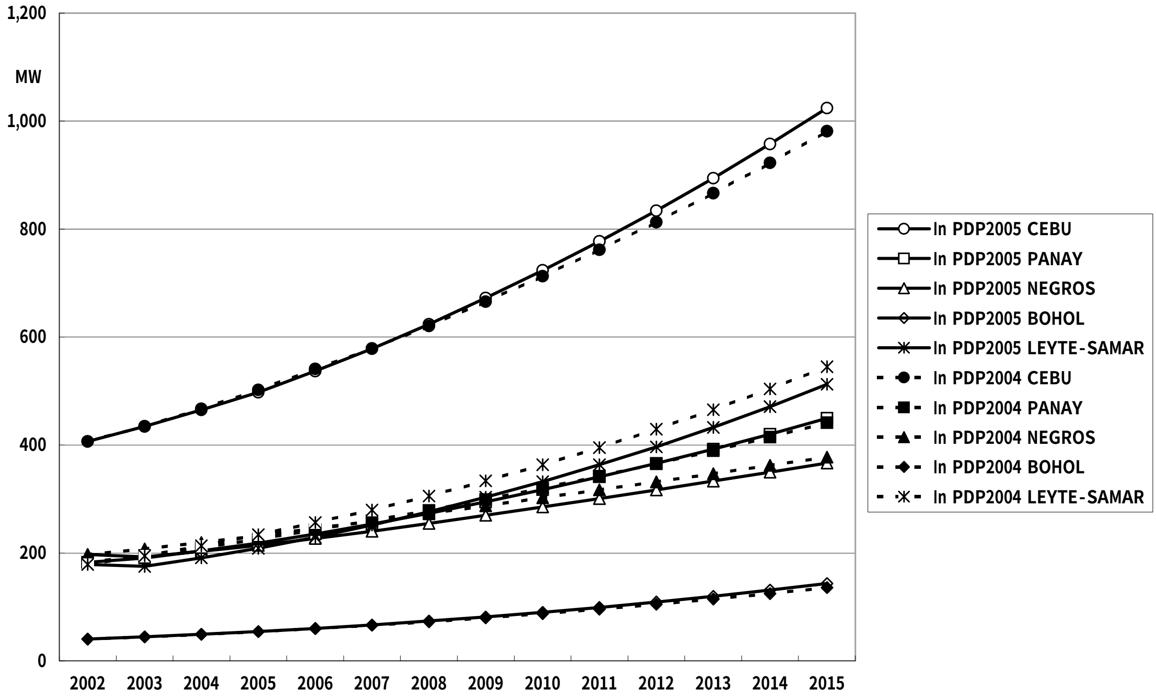
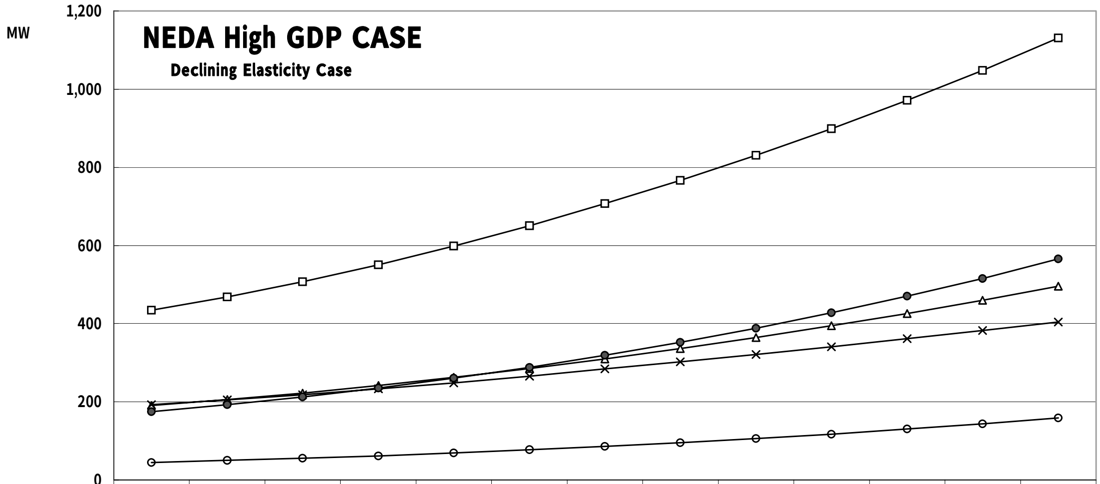
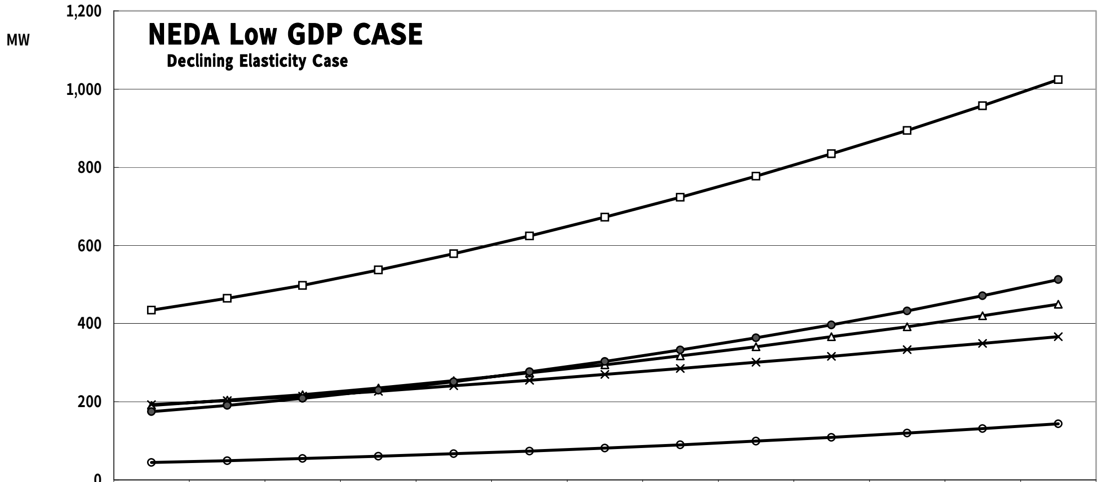


Figure.2.9 Comparison demand forecast result for Visayas Island with previous study



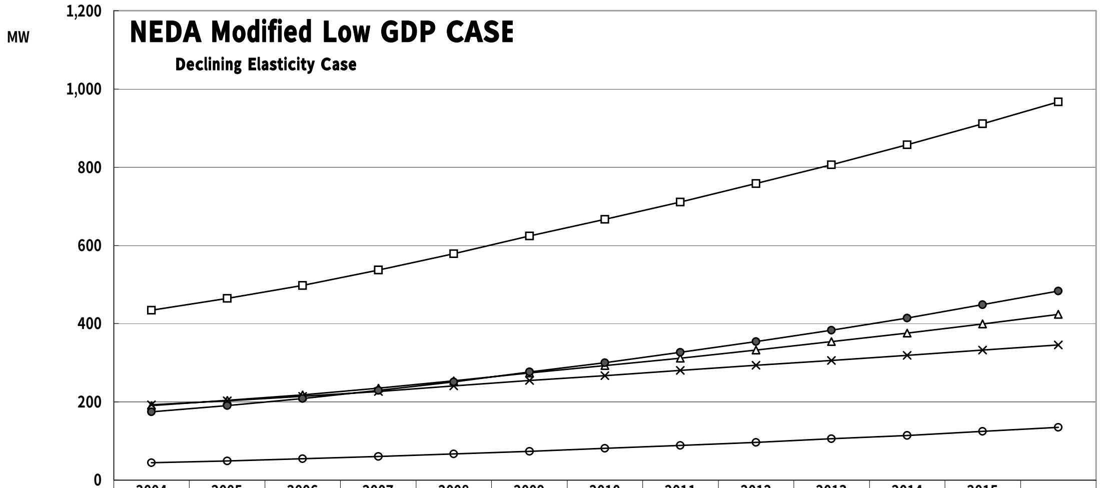
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CEBU	434.4	468.7	506.6	550.9	598.6	650.7	707.1	767.1	830.9	898.8	971.2	1,048.4	1,130.9
PANAY	190.4	205.4	222.0	241.5	262.4	285.3	310.0	336.4	364.4	394.2	426.0	459.9	496.1
NEGROS	192.7	204.7	217.7	232.8	248.8	265.8	283.8	302.3	321.5	341.2	361.7	382.8	404.6
BOHOL	44.8	49.7	55.3	61.8	69.0	77.0	85.8	95.4	105.9	117.4	129.9	143.5	158.3
LEYTE-SAMAR	175.1	192.6	212.2	235.2	260.4	288.2	318.9	352.2	388.3	427.3	469.7	515.7	565.6

Figure 2.10 Results for Visayas islands (NEDA High GDP –Decline Elasticity)



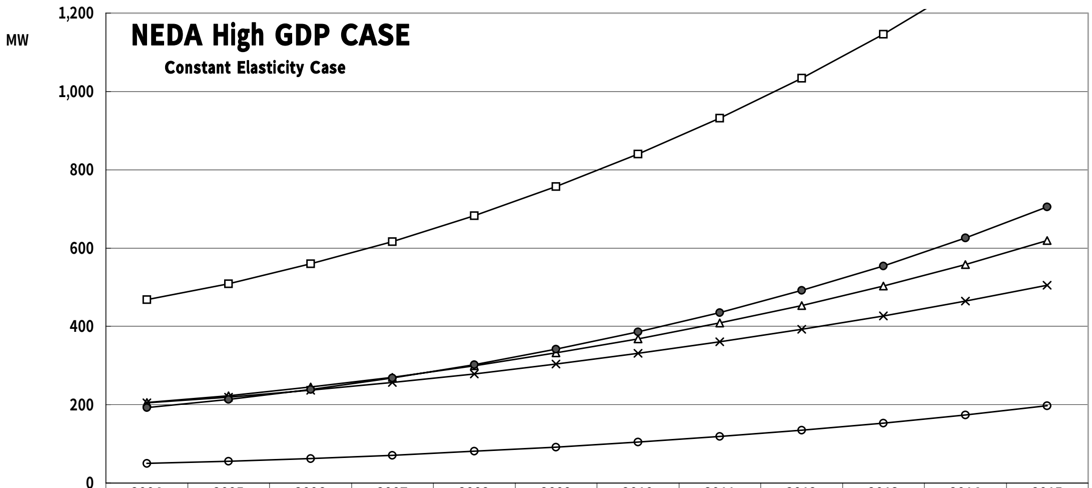
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
CEBU	434.4	464.8	497.9	536.8	578.5	623.7	672.3	723.5	777.4	834.2	894.2	957.5	1,024.4
PANAY	190.4	203.7	218.2	235.3	253.6	273.4	294.8	317.2	340.9	365.9	392.2	420.0	449.4
NEGROS	192.7	203.0	213.9	226.9	240.4	254.7	269.8	285.1	300.7	316.7	333.0	349.6	366.5
BOHOL	44.8	49.3	54.3	60.2	66.6	73.8	81.6	90.0	99.1	109.0	119.6	131.0	143.4
LEYTE-SAMAR	175.1	191.0	208.6	229.2	251.6	276.3	303.2	332.2	363.2	396.6	432.5	471.0	512.4

Figure 2.11 Results for Visayas islands (NEDA Low GDP –Decline Elasticity)



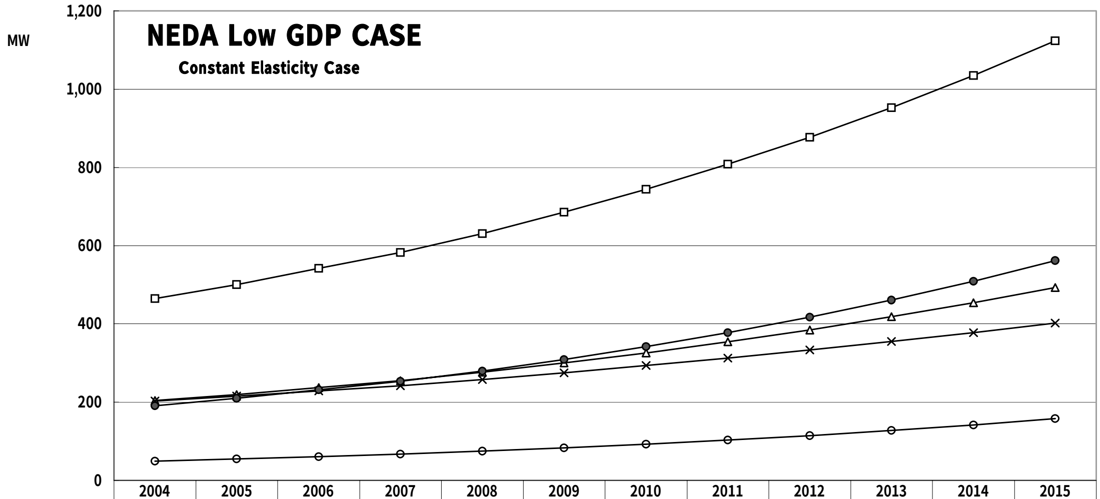
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
CEBU	434.4	464.8	497.9	536.8	578.5	623.7	666.6	711.3	758.0	806.8	857.7	911.0	966.8
PANAY	190.4	203.7	218.2	235.3	253.6	273.4	292.3	311.9	332.4	353.8	376.2	399.6	424.1
NEGROS	192.7	203.0	213.9	226.9	240.4	254.7	267.5	280.3	293.3	306.3	319.4	332.6	345.9
BOHOL	44.8	49.3	54.3	60.2	66.6	73.8	80.9	88.5	96.6	105.4	114.7	124.7	135.4
LEYTE-SAMAR	175.1	191.0	208.6	229.2	251.6	276.3	300.6	326.6	354.2	383.6	414.8	448.1	483.6

Figure 2.12 Results for Visayas islands (NEDA Modified Low GDP –Decline Elasticity)



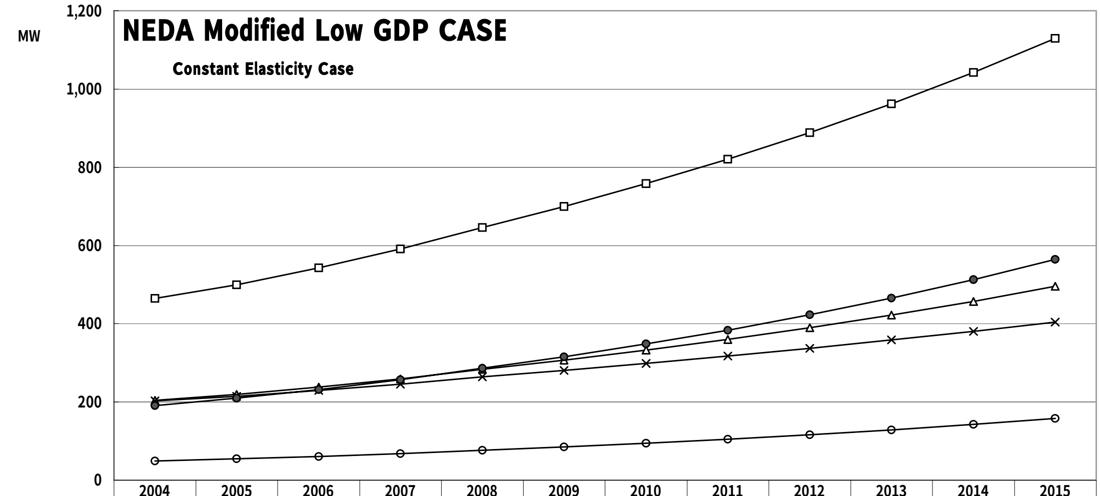
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CEBU	468.7	508.9	559.6	616.9	682.7	757.3	840.0	931.8	1,033.6	1,146.6	1,271.8	1,410.8
PANAY	205.4	223.1	245.3	270.5	299.3	332.0	368.3	408.6	453.3	502.9	557.9	618.9
NEGROS	204.7	218.7	236.5	256.4	278.8	303.9	331.0	360.5	392.4	427.0	464.3	504.7
BOHOL	49.7	55.5	62.8	71.1	80.7	91.9	104.5	118.8	135.0	153.3	174.1	197.5
LEYTE-SAMAR	192.6	213.2	238.9	268.3	302.4	341.6	385.7	435.4	491.4	554.6	625.6	705.7

Figure 2.13 Results for Visayas islands (NEDA High GDP –Constant Elasticity)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CEBU	464.8	500.0	541.5	582.5	630.9	685.1	743.9	807.8	877.2	952.5	1,034.3	1,123.1
PANAY	203.7	219.1	237.4	255.4	276.6	300.4	326.2	354.2	384.7	417.8	453.7	492.7
NEGROS	203.0	214.8	228.8	242.1	257.7	274.9	293.2	312.5	333.0	354.7	377.6	401.8
BOHOL	49.3	54.6	60.7	67.1	74.6	83.1	92.5	103.0	114.6	127.4	141.6	157.3
LEYTE-SAMAR	191.0	209.5	231.2	253.4	279.4	309.0	341.6	377.5	417.1	460.7	508.8	561.8

Figure 2.14 Results for Visayas islands (NEDA Low GDP –Constant Elasticity)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CEBU	464.8	499.4	542.7	591.1	646.1	699.7	757.8	820.7	888.8	962.5	1,042.4	1,129.0
PANAY	203.7	218.9	237.9	259.1	283.3	306.8	332.3	359.9	389.8	422.2	457.3	495.3
NEGROS	203.0	214.6	229.4	245.6	263.9	280.8	298.6	317.5	337.4	358.4	380.6	403.9
BOHOL	49.3	54.5	60.9	68.1	76.4	84.9	94.3	104.6	116.1	128.7	142.7	158.1
LEYTE-SAMAR	191.0	209.2	231.7	257.1	286.2	315.6	347.9	383.5	422.6	465.5	512.8	564.7

Figure 2.15 Results for Visayas islands (NEDA Modified Low GDP –Constant Elasticity)

2.2 Demand forecasting by aggregating the DDP demand (based on the DDP)

2.2.1 Methodology of aggregation of DDP demand

Beside of PDP 2005 works, the DOE established DDP data collecting scheme. Aggregating information of each utilities demand forecasting, the DOE has created DDP aggregated demand forecasting results. These results were derived by following process.

- Summing up all of utilities' demand forecasting result by kW for the target area.
- Adjust growth curve to fit start point that means actual peak in the target area.

This is a first trial for the DOE to collect supply and demand information from Distribution Companies.

2.2.2 Deviation between Aggregated and Macro Approach Demand Forecasts

Figure 2.9 shown below is a comparison between Macro approach results mentioned in Section 2.1 and Aggregated demand forecasts by DUs. Typically the result of aggregated DU demand forecast is relatively lower than the result of the Macro approach. In year 2014, aggregated forecast demand is almost 20% lower than demand derived by Macro approach.

Looking at difference of growth rate of each approach (Figure 2.10), generally growth rates forecasted by DUs are 1 – 2% lower than growth rates estimated using the Macro approach, except in Mindanao in 2004 – 2005.. The variance in the growth rate using the two methodologies is estimated to reached 20% by year 2014. If NEDA's Low GDP scenario will be used as GDP growth assumption, the variance in growth rates means that forecast demand by DDP aggregation assess the value of elasticity lower than trend. In other word, each DU estimated lower growth rate based on lower economic growth than NEDA.
About demand forecasting of each island in Visayas, DDP aggregated demand forecasting result and the result of Macro approach can also be compared with each other. For example, in Visayas, in Cebu and Bohol island Macro approach derives higher forecasting result than DDP aggregation. However, in Panay, DUs forecast very optimistic demand growth, as average demand growth rate is almost 8 – 9%. So, DDP aggregated demand forecasting result becomes 20% higher than the result of Macro approach.

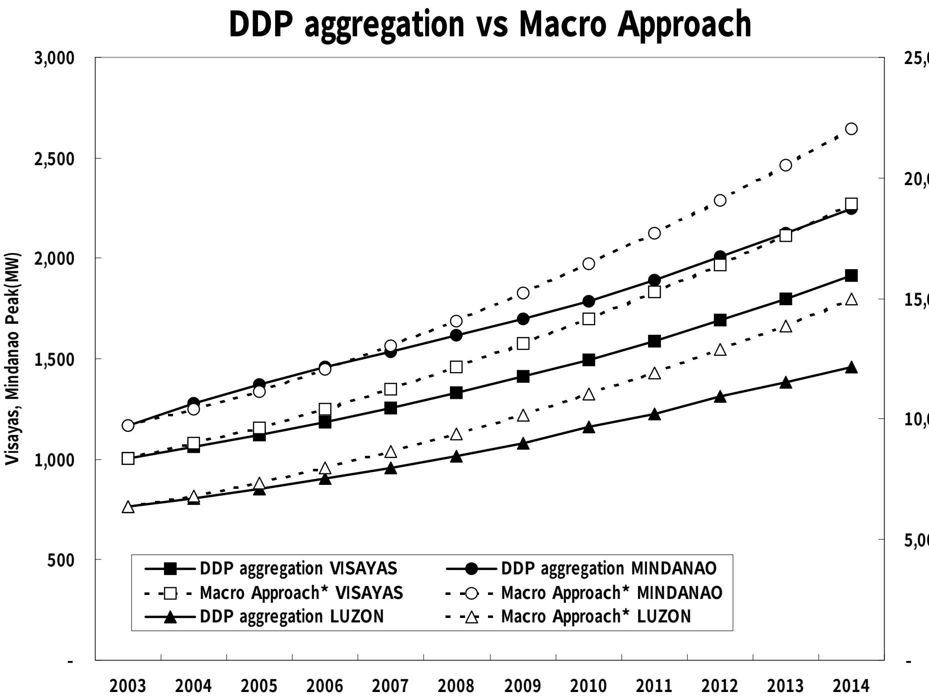


Figure 2.16 Comparison between Macro results (NEDA Low declining elasticity) and DDP Aggregation

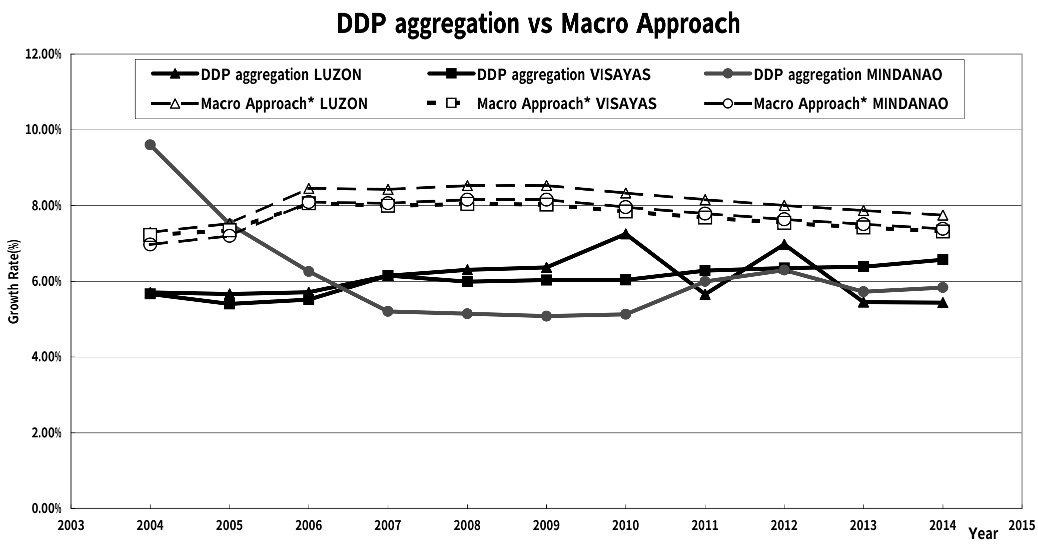


Figure 2.17 Comparison of growth rate between Macro results (NEDA Low declining elasticity) and DDP Aggregation

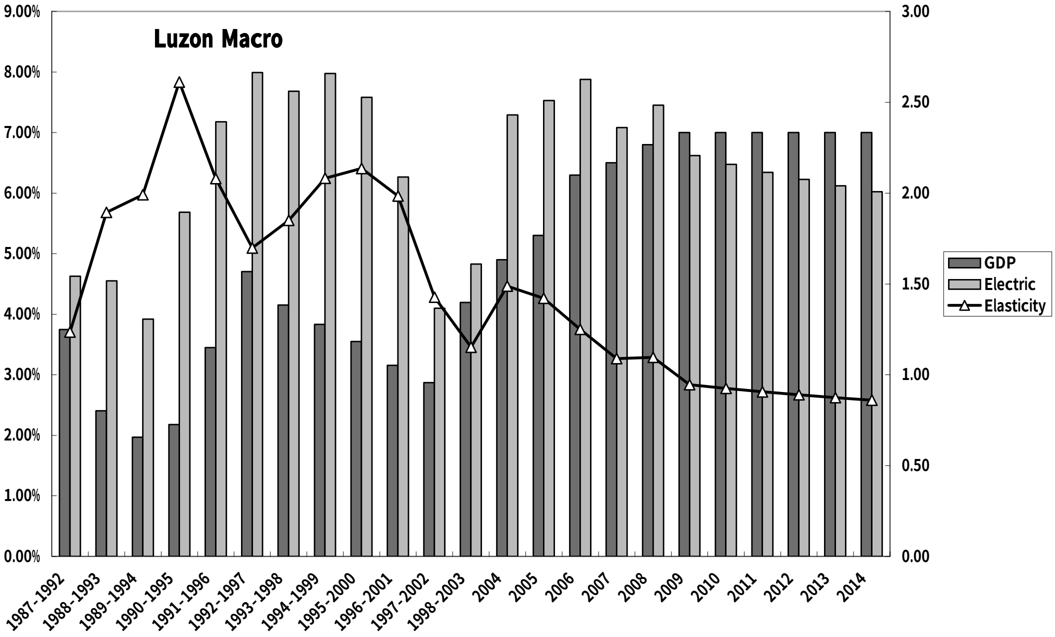


Figure 2.18 Historical (5 years moving average) and Forecasted Elasticity and GDP, Electric demand growth rate in the case of Macro approach (NEDA Low GDP scenario declined elasticity)

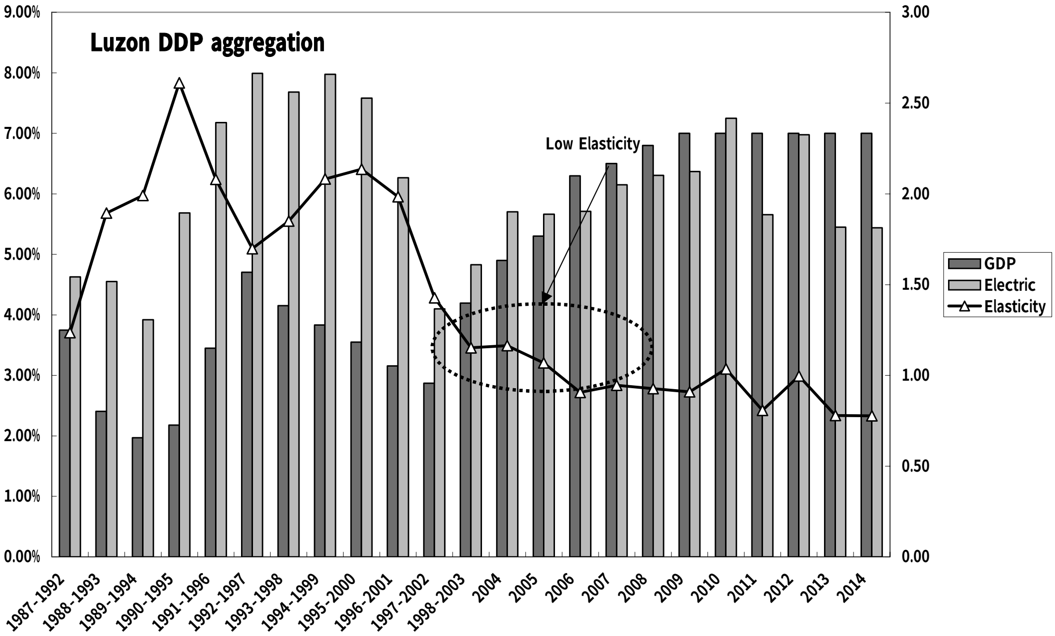


Figure 2.19 Historical (5 years moving average) and Forecasted Elasticity and GDP, Electric demand growth rate in the case of DDP against aggregated with NEDA Low GDP scenario

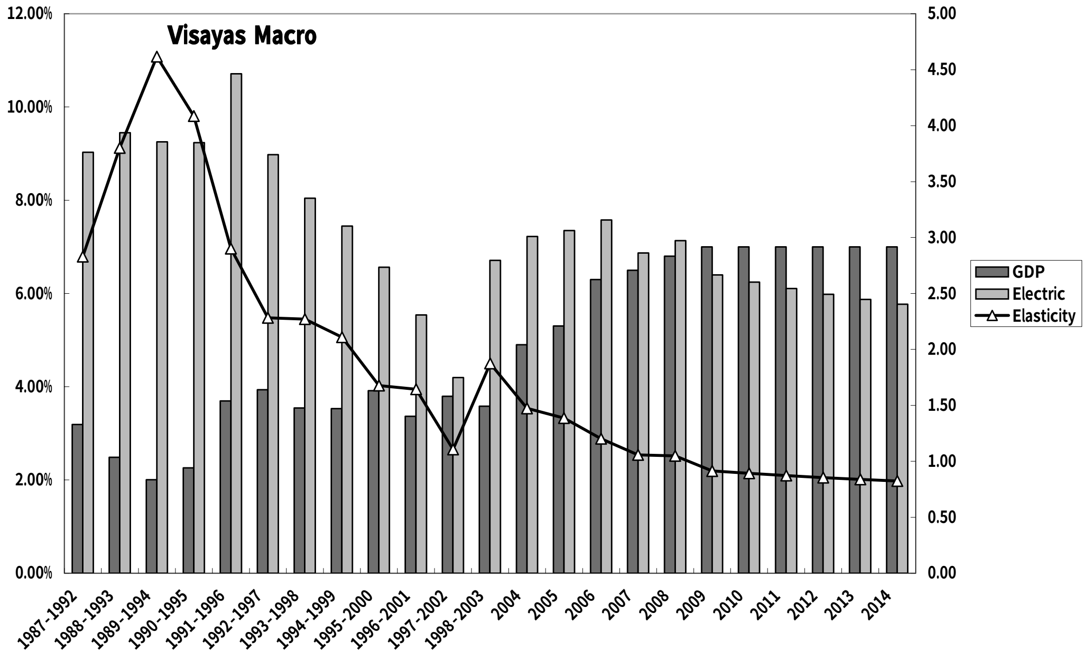


Figure 2.20 Historical (5 years moving average) and Forecasted Elasticity and GDP, Electric demand growth rate in the case of Macro approach (NEDA Low GDP scenario declined elasticity)

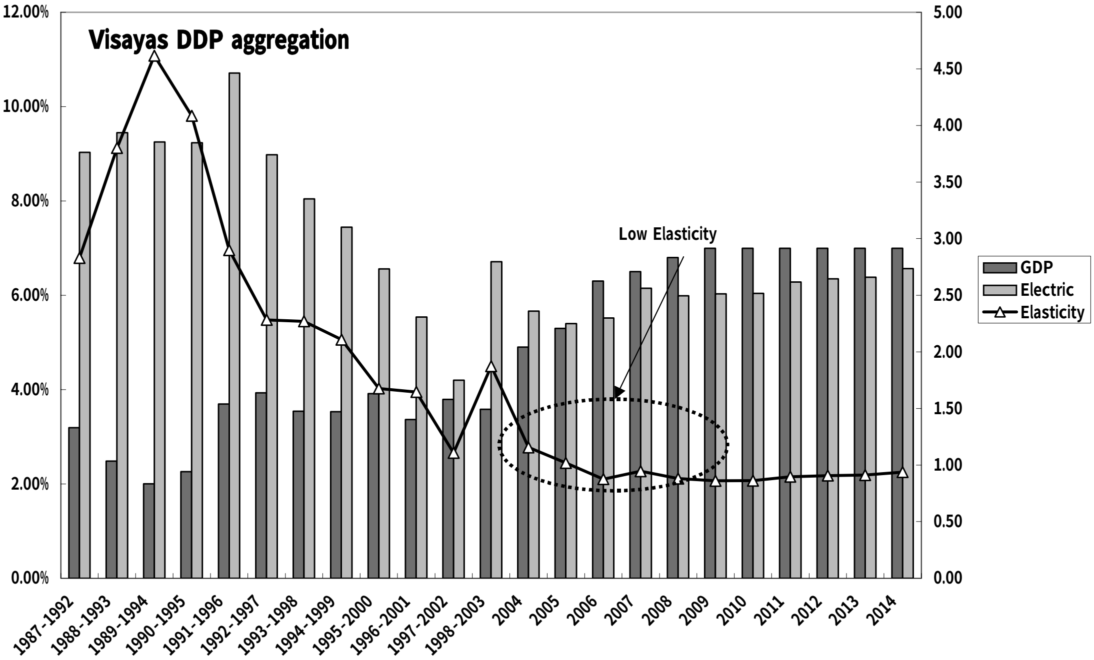


Figure 2.21 Historical (5 years moving average) and Forecasted Elasticity and GDP, Electric demand growth rate in the case of DDP against aggregated with NEDA Low GDP scenario

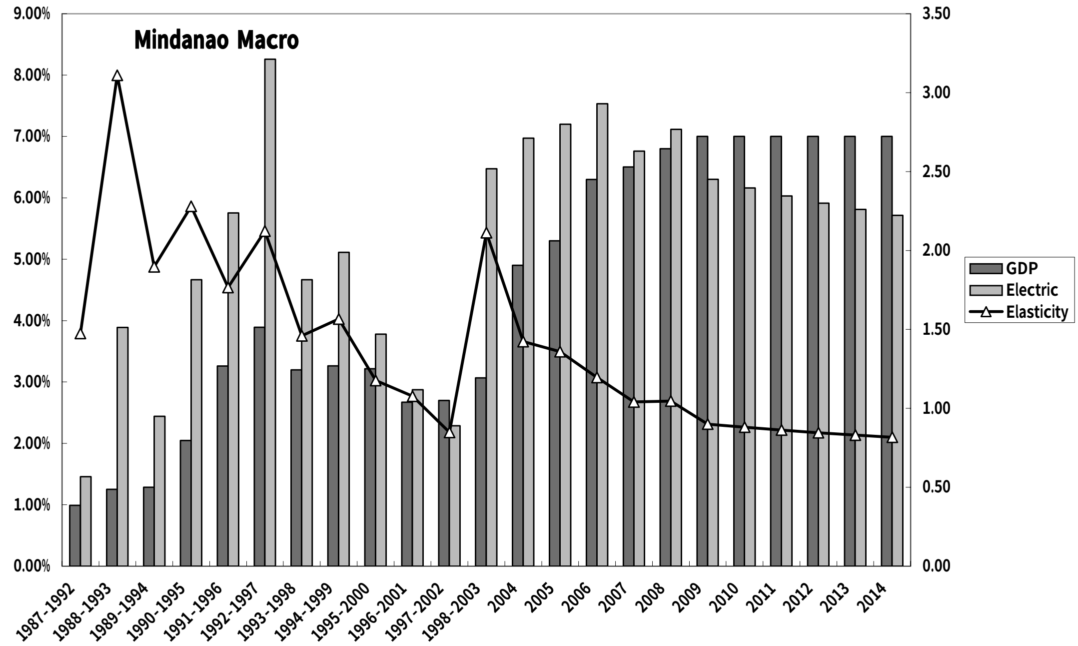


Figure 2.22 Historical (5 years moving average) and Forecasted Elasticity and GDP, Electric demand growth rate in the case of Macro approach (NEDA Low GDP scenario declined elasticity)

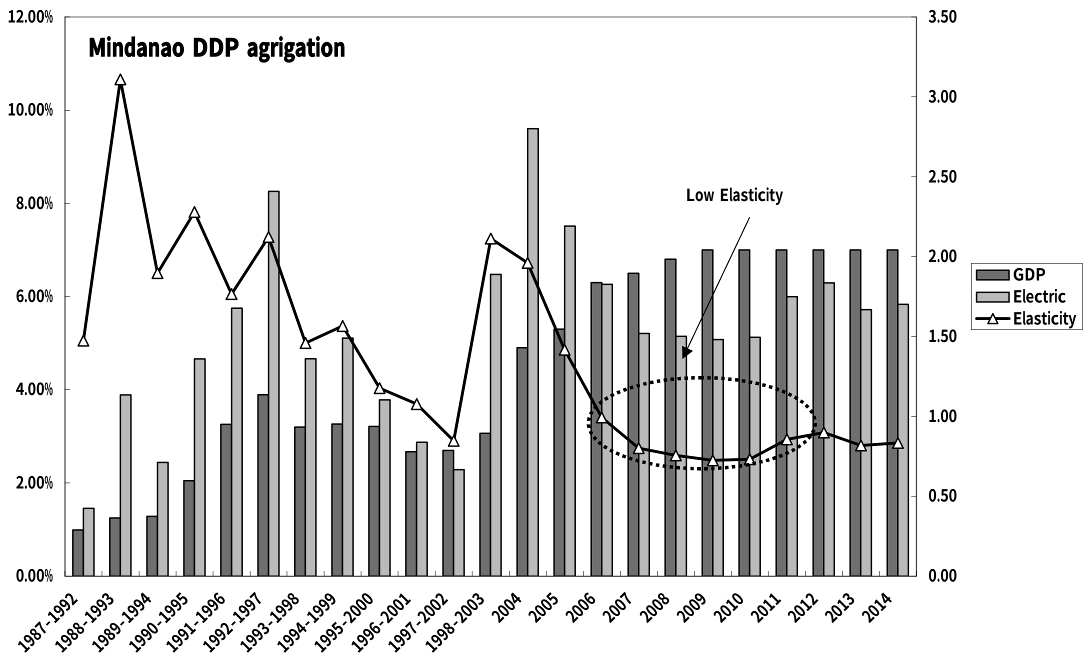


Figure 2.23 Historical (5 years moving average) and Forecasted Elasticity and GDP, Electric demand growth rate in the case of DDP against aggregated with NEDA Low GDP scenario

This means the DOE should be careful about difference of each utility's assumption regarding to forecasting of future demand in distribution system.

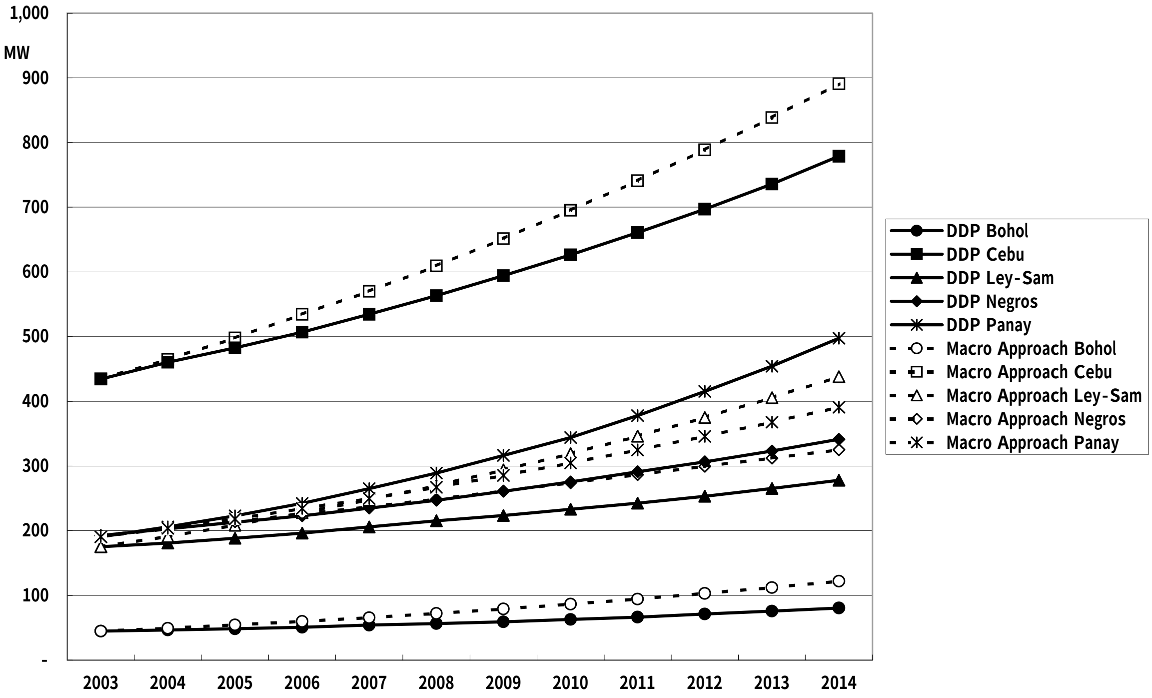


Figure 2.24 Macro(NEDA Low declining elasticity) vs. DDP in Visaya

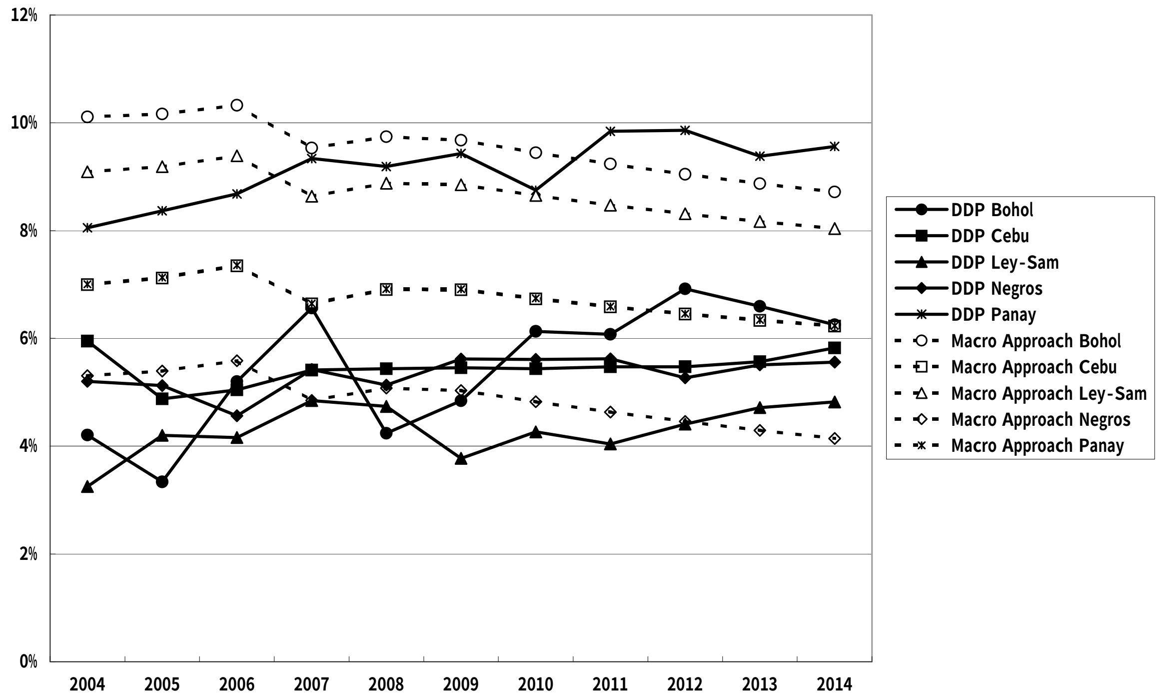


Figure 2.25 Forecasted growth rate in Visayas

2.3 Recommendation for Future Development of Survey

2.3.1 Multi – Purpose Demand Forecasting Approaches

In electric power system, there are several time horizon for planning. These are the following:

(i) Long term (10 –20 years): Usually, long term power system planning is applied for the purposes such as evaluation of impact of utilities' investment on future rate, energy usage in power sector or impact of electric power sectors consumption on environmental.

This concept is very important for utility's cooperative planning or political and governmental issues.

(ii) Middle term (seasonally – 5 years): Usually, middle term planning is applied for the purpose such as transmission planning and reliability study, coordination of maintenance schedule or evaluation of impact of utilities' operation on future rate.

(iii) Short term (Day ahead – weekly ahead): Usually, short term planning is applied to weekly ahead or daily ahead operation of power system or generation. This concept is very important for system operator or players in electric market.

Accordingly, the varying time horizon of planning for demand forecasting presents the following concepts:

(i) Long term. Usually, demand curve is treated as annual duration curve due to capability to present multi-year generation mix. Therefore, forecasting method estimates peak demand and total consumption (or generated) energy, and then estimate annual duration curve directly.

(ii) Middle term. Usually, a weekly demand curve is applied. The steps in developing weekly demand curve are as follows:.

- Set weekly load profile curve by month or season
- Estimate monthly or weekly peak and energy from other approach
- Multiplying load profile and peak demand to create first weekly demand curve
- Adjust demand curve to fit weekly energy consumption

(iii) Short term. Daily or weekly curve is estimated by some tools directly. These tools are based on regression method, Time Series Analysis such as ARIMA model or Neuron computing. Usually, these tools may be developed in-house. However there are some package tools available.

2.3.2 Treatment of DSM and problem of applicability

Demand Side Management (DSM) became popular in early 90's in developed countries such as the USA. "Load Management" concept was introduced in the electric power industry. The "Load Management" tool is used for direct and/or indirect control of demand especially for peak shaving.

In the '90s, the green house effect became an environmental concern leading to political debates and concrete actions. As a consequence, energy conservation was integrated into the DSM system. Some examples of new technologies include efficient lighting, more efficient air conditioner, well insulated water heater or well insulated and ventilated house structural designs. To promote these technologies, several incentive packages to customer and utilities were developed and adopted through the 90's.

However, some DSM programs did not succeed and electric power industry deregulation then is just in its early stage of implementation even in developed countries. These led to the decline of DSM applications. With the above experiences, the following insights can be considered:

(i) Evaluation of DSM effect on load profile.

The effects of DSM program are generally evaluated based on medium to long term planning scenarios, specifically its application in the production management. The impact of DSM is evident in the resulting.total demand profile (shape) of a power plant. Particularly, the impact DSM programs, softwares or tools are evaluated from the load profile/shape due to the difficulty of modeling using full end-use load shape aggregate. Moreover, the common practice of evaluating the impact of DSM is through comparison of the demand profile before and after application of DSM.

(ii) Methods of Estimating Impact of DSM

To estimate effect of DSM on load shape, end-use load profile is measured. For example, if we would like to know the effect of changing from electric bulb to fluorescent, measurement of load shape of lighting before and after implementation is needed. Usually over 100 samples are enough to estimate typical (average) load shape of DSM effect per customer. Total effect of DSM is calculated by multiplying the number of participants and typical (average) effect on load shape per ocustomer.

(iii) Lifecycle of DSM

Typical DSM programs have short life cycle comparison with supply side options such as construction of new plant or transmission line, because life cycle of end use facilities and equipments in customer side are usually shorter than the supply side facilities. Therefore, it is very important to apply present value evaluation in the production cost evaluation.

(iv) Incentives for DSM

To promote the DSM programs, utilities must provide incentives to participants because efficient facilities, equipments and gadgets are understandably more expensive than ordinary counterpart models.

From the viewpoint of utilities, energy conservation type of DSM results to reduction in revenue. Therefore, there is no incentive for the utilities to promote DSM. In California, the state government did not allow recovering lost profit as a result of DSM implementation. The situation created friction between the utilities and the California government or the regulatory body; the case amplified and was said to be contributory to the California power crisis. The foregone profit as a result of DSM implementation can be recovered from customers, and the mechanism works in the same manner as the universal charge in rate regulation. In the case of deregulated market, this kind of control does not work well. The cost recovery scheme should be charged as tax on the payment of electricity bill.

(v) Time of Use (TOU) Rate-Setting for DSM

TOU rate-setting methodology for DSM is well – accepted for improving load factor. Most utilities in the world use TOU rate. To design the appropriate TOU rate, measurement of hourly price elasticity is very important.

In late 80s, Electric Power Research Institute (EPRI) in the USA promoted several TOU project to measure price elasticity in the state of Wisconsin. In the studies, several behaviors of price elasticity were tested to explain price elasticity on the customer side. On the other hand, the demand forecasting software called "REEPS" developed by EPRI adopted a very simple linear function with 0 intercept for the elasticity. In this case, the comparison of load shapes between participants and non-participants is enough for determining the coefficient of the linear function.

2.3.3 Price elasticity in demand forecasting and market operation

Recently, several market operators and regulators do trials of introducing concept of price elasticity in power market to keep reliability in market operation after California crisis. Looking at the report "Demand-Response Research Plan to Reflect the Needs of the California

Independent System Operator (CAISO)" prepared for California Energy Commission Public Interest Energy Research Program by Consortium for Electric Reliability Technology Solutions (February 2004), there are two type of load.

This report mentioned "there are two basic categories of demand response: elastic load and dispatched load. Elastic load responds continuously to the price of electricity through market mechanisms. It provides an inherent level of market response. If the price signals presented to the load reflect the locational and temporal constraints on the bulk power system, then elastic load can increase system reliability and decrease system costs." Also this report mentioned "Demand elasticity exists when some customers elect to reduce consumption of a particular commodity during periods of high price. When the demand for the commodity is reduced in response to high price, the demand is considered to be elastic."

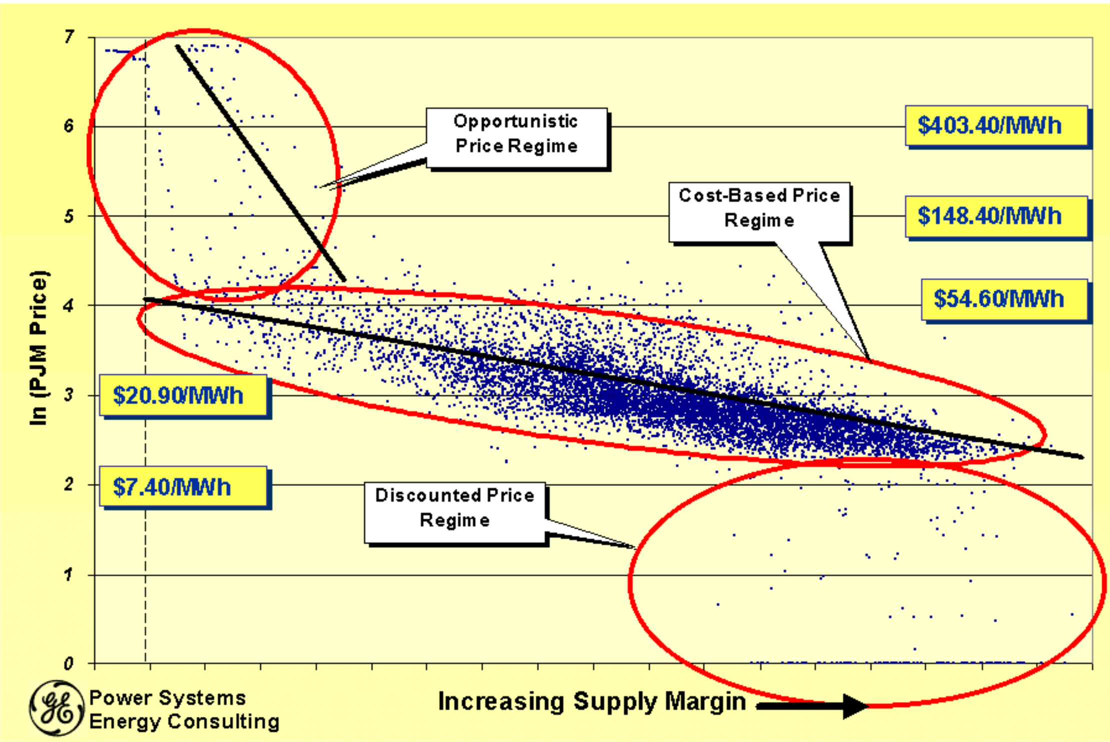


Figure 2.26 Relationship settlement price and demand in PJM (analyzed by GE)

Principally, power market has less price elasticity, so volatility of electricity price become larger. The figure shown above is historical data of relationship settlement price and demand in PJM in the end of 90s. On this figure, supply margin becomes less price becomes higher rapidly. This phenomenon can be explained as follow. Peaking unit with low capacity factor becomes marginal in the situation of less supply margin. Such generation must recover investment cost in very short period, so those generator bid very high price. On the other hand, demand has less price elasticity, so volatility of electricity price is reflected by those high marginal cost generation.

After experience of price spike and California crisis, system operators are trying to introduce more price elasticity in the market. If utilities buying energy from wholesale market sells its energy with flat rate in retail market, it is difficult to expect price elasticity in those retail customers. Thus, usually system operator or government recommends introducing demand side bidding into their market. Also accepting interruptible contract for large customer buying electricity from wholesale market, or introducing ability to get electricity from its own generator might be action increase price elasticity. Such efforts bring price elasticity into the market and mitigate volatility of electric price. In the case of Philippines, large customers might have self-generator due to low reliability of power system. Therefore, principally price elasticity might be larger than developed countries.

Usually, price elasticity is negative number because demand must reduce when price goes up. Therefore, high elasticity means large absolute value of elasticity in this report.

About measurement of price elasticity, many literature suggested measure precisely the change in demand for electricity due to a change in price (price elasticity) using rigorous econometric analysis. We can refer many document and literature about those surveys.

In the long term planning, price elasticity should be considered as relationship between primary energy price and economical index such as GDP. Because future electric price in planning is effected by future primary energy price strongly. Also future GDP is influenced by future primary energy price. Therefore, forecast of primary energy price is important and reflect its influence on economic model, which is used for deriving future GDP growth rate.

2.4 Recommendation through the study

Below are the following recommendations proposed from a demand forecasting viewpoint:

(i) Data collection when WESM starts.

All wholesale electricity trading, regardless of the mode of transaction, will be coursed through the WESM. Thus the data requirement for the preparation of the PDP can be obtained from the WESM. However, in Mindanao where the market implementation may come much later, the data will be collected from the Mindanao System Operations (SO). These data will be used to update the AF and LF in the econometrics approach in demand forecasting

(ii) Requirements for Demand Forecasting using Aggregated DU Demand (DDP)

For this year, the DOE aggregated DUs forecast peak demand (measured in kW). Another approach may be considered and this is the aggregation of sales energy (measured in MWh). The process is as follows:

- Evaluation of purchased and generated energy of each DUs including embedded generation;
- Aggregation of forecasted energy generation and purchase of DUs in target area;
- Translation of aggregated energy generation and purchase to system peak demand through AF and LF used in Macro approach;
- Adjust start point of demand growth using same method as Macro.

(iii) Load survey for study of DSM

In consideration of the application of DSM for the Philippines' electric power industry, load information are very important. Application of DSM programs may be considered for medium-term planning and it is important the both pre- and post DSM information on relevant parameters in the production model are measured and recorded. For evaluating new DSM programs, following processes are needed.

- Total Load profile data: These data can be collected from the system operator. .
- Difference of target end use load shape before and after introducing DSM: These data should be collected through end use load survey. .
- Number of Participants (End Use): To estimate total effect of DSM from difference of target end use load shape before and after introducing DSM, estimation of participants is required.
- Evaluation on the production model: Effects of DSM are usually evaluated considering the production model using chronological load shape.

(iv) Study of price elasticity in the market

Creating price elasticity in the power market is still a big issue in the established market. Therefore, long term effort will be required to develop the know-how of market analysis and controlling elasticity.

In the Philippines, most of the large customer might have their own generation facilities due to power reliability requirements and potentially these customers will exhibit price elasticity than customers in developed countries.

It might be possible to estimate price elasticity in the market through survey of self –generators. In the survey, if marginal price of self-generation and opinion about access to open market are investigated, it might be helpful to estimate price elasticity in the new open market in Philippines.

3. Power Development Plan

3.1 Assistance of PDP Formulation

3.1.1 Current Status of PDP Preparation

The EPIRA mandates that the DOE shall submit to the Congress the annual PDP Update every 15th of September of each year. In the 2004 PDP Update, some delays in the activities such as the regional consultations and meetings on the Distribution Development Plan (DDP) and the issuance of the official macro-economic targets were brought about by prioritization of activities in support of the national election on May 2004.

In the preparation, review and approval of the TDP, the critical factor for this year is the current financial crisis in the Philippines and this led to the setting of cap on the transmission projects expenditures. This requires the prioritization of projects within a specified ceiling. There are three scenarios being studied by a third party.

With these constraints, the DDP consultations and meetings with the distribution utilities (DUs) were conducted from last week of June through August 2004. The gross domestic product (GDP) targets for the Arroyo Administration was released by National Economic Development Authority (NEDA) in September 2004; so this is the only time when the peak demand estimation based on the econometrics approach was done.

The PDP was presented to the DOE EXECOM, Energy Family EXECOM and industry players in several meetings, for their comments and confirmation on the projected demand and projects to meet the simulated required capacity additions.

3.1.2 DOE's Capability in Preparation of the PDP

The main objective of this study is the institutional capacity building of the DOE for the preparation of the PDP. The present capability of DOE may be described as follows:

Demand Forecasting. For the preparation of the PDP (2005-2014), the DOE applied two methods for the demand forecast, i.e. (1) aggregation of the DDP demand prepared by DUs, and (2) previous macro econometric method. The former forecast was conducted by the DOE themselves this year. The latter forecast was also conducted by the DOE using the model developed by JICA from which the demand forecast was prepared accordingly. However, it is important for the DOE to study the related fields, such as statistics, in order to understand the results of the simulation model.

PowerDevelopment Plan. For the preparation of PDP (2005-2014), the initial run of WASP-IV was done by the JICA Study Team. After that, the DOE performed the WASP-IV run and updated the PDP by themselves. Also, the DOE is now capable of revising the input data and preparing the initial siting of power plant units by using the reserve margin as an index.

However, it must be noted that the most important point to remember when using the simulation software is not simply to get the resulting figures but to understand or evaluate the simulation results. In this regard, the DOE requires more experience and continuing guidance.

Optimal Siting of Units and Power Flow Analysis. The JICA Study Team has turned over to the DOE the GTMax to calculate and determine the optimal location/siting of plants and power flow. The GTMax was used for studying the feasibility of Leyte-Mindanao interconnection. However, only one staff of the DOE can handle it so far. To study the power flow using the GTMax, extensive time and manpower are required. Thus, with current human resources of the DOE , it seems difficult for the DOE to use the GTMax efficiently and effectively.

The capability of staff members of the DOE is at a fairly good level compared to other Southeast Asian countries. However, lack of experience in the use and analysis of simulation results should be supplemented through the self-training plan.

Table 3.1 DOE's Capability to Prepare the PDP

Activity	DOE Capability
Demand Forecasting	- DOE can prepare the demand forecast by aggregating the DDP. - DOE can prepare the demand forecast by using the macro-econometric model. However, they need to study more on refining the model in the area of statistics etc.
Power Development Plan (Supply Plan)	- DOE can handle the WASP-IV.
	- DOE can determine the generator's location by using the reserve margin as a guide
Power Development Plan (Optimal Location, Power Flow)	- - DOE needs to handle the GTMax to solve these issues by using the provided model.
	- DOE does not have the capability to prepare the model by itself.
	- GTMax is necessary to determine the necessity of transmission projects, therefore, DOE needs to study harder to gain the ability to handle the GTMax.

3.2 Issues and Suggestions on PDP Formulation

3.2.1 DOE Lack of Manpower

DOE Lack of Manpower. As indicated in the previous study, the Power Planning & Development Division (PPDD) of EPIMB remained undermanned. Therefore, the PDP preparation work is implemented only by a couple of staff members. For the short-term period, it seems to be efficient. However, the following issues and potential problems are expected to emerge in the long term-period:

1. A technical vacuum will be created when existing staff performing the work will in the future transfers, or retires or simply unable to work due to illness; and
2. There is no allowance to do further studies.

The first issue was touched in the previous study and the second issue is addressed in this study.. During the study implementation, it was observed that one staff member worked every weekend to prepare the necessary documents. From the viewpoint of work efficiency, it seems reasonable to concentrate most of the job to staff members who possess the greatest skill. However, from the viewpoint of sustainable capacity building, it is not efficient because of the following: (1) The staff will perform the job based only on their knowledge. 2) The staff member will not have extra time to expand their knowledge, by reading related documents and/or learning the simulation skills.

As will be described in Section 4, in order for the PDP to be prepared by the DOE in a credible and sustainable manner, self-training or instruction are necessary activities for the DOE. Therefore, being continuously undermanned is a potential cause of severe problems for the DOE for the medium to long-term. This issue should expected to be addressed as soon as possible.

Submission of the PDP to Congress. Pursuant to EPIRA, the PDP has to be submitted to the Congress by September 15th every year. However, the definition of `submission` is not clear. The DOE, due to some circumstances not within their control, has in the past submitted the PDP in its draft form. Requisites to the preparation of the PDP are the following:

- Issuance of the NEDA GDP forecasts on June every year;
- Submission of DDPs of DUs on or before 15 March every year;

To comply with the provision of the EPIRA, DOE has to review the preparation schedule of the PDP and must ensure effective arrangements among the concerned officies and organizations. Specifically, it is possible to facilitate the preparation schedule of power demand forecasting by using the tentative GDP rate submitted by NEDA. On the other hand, if the DOE will use the aggregated demand forecasts contained in the DDPs, the DOE can expedite the determination of the demand forecast by more than three months. It must be noted though that the DDPs submitted used the previous year`s NEDA GDP forecasts. Certainly, there are compromises in preparing the PDP more efficiently.

Energy Price for Long Term Prospection. As will described in Chapter 4, the DOE used the present energy price as long-term energy price. However, since the present energy price is always fluctuating, it would not be appropriate to use it directly as it stands.

In the process of the PDP (2005-2014) preparation, the increasing prices of coal and oil price need to be discussed. The rise in coal price is considered to be a result of the boom in Chinese economic activity. The rise in the oil price is considered to be a result of unstable oil supply associated with the Iraq War. The present price is expected to continue in the short term, however, for the long-term plan use, the price should be determined deliberately.

In principle, the DOE also has the responsibility to stabilize the energy price through their energy strategies. Of course, the electricity industry requires extensive energy. Therefore, the impact of the amount of energy used in the electricity industry on energy price should be considered. However, the PDP should be prepared in parallel with the energy policy of the country. In this sense the DOE has to determine the energy price trends before preparing the PDP.

Sustainable Capacity Building for DOE. As will described later in Chapter 8, the DOE has the basic capability to prepare the future PDPs. However, the institutional capability may be reduced by for example, retirement or transfer of staff in the future. To avoid a future reduction in capability and/or to increase their capability, the self-instruction of the DOE is considered to be very important.

To achieve this, the capacity building program has to be a systematic program consisting of (1) "On the job training (OJT)" through the actual preparation work, and (2) Self-instruction by using the materials provided, and has to have the specific target level set, i.e., "to be able to prepare the PDP including all related responsibilities within two years".

3.3 PDP Trial Calculation

3.3.1 Demand Forecast used in this calculation

The DOE calculated the PDP based on two demand scenarios, namely, (i) demand forecasting by aggregating the DU forecast demands and (ii) demand forecasting based on the Macro econometric method.

The DOE determined the demands used for the PDP deliberately from the viewpoint not only of the technical aspects such as reliability, but also the economic impacts. As a result, the peak demand for Luzon was based on macroeconometric method, while Visayas and Mindanao were based on the DDP aggregation. Considering the sever impact of potential power deficit in Luzon on the national economic situation, this choice seems much reasonable. Table 4.6 shows the demand forecast for the PDP(2005-2014)

Table 3.2 Demand forecast (PDP(2005-2014)

Year	Luzon	Visayas	Visayas Island(Coincident Peak)					Mindanao	Philippine Total
			Cebu	Panai	Negros	Bohol	Leyte-Samar		
2003	6,365	1,006	414	187	189	44	172	1,166	8,537
2004	6,829	1,060	439	199	199	46	177	1,271	9,160
2005	7,343	1,113	460	212	209	47	185	1,371	9,827
2006	7,964	1,170	483	226	219	50	193	1,458	10,592
2007	8,635	1,238	509	243	231	53	202	1,535	11,408
2008	9,372	1,308	537	262	242	55	211	1,615	12,295
2009	10,171	1,383	566	283	256	58	219	1,697	13,251
2010	11,018	1,463	597	305	270	62	229	1,784	14,265
2011	11,917	1,550	630	331	286	65	238	1,883	15,350
2012	12,871	1,644	664	360	301	70	249	2,001	16,516
2013	13,884	1,742	701	389	317	74	260	2,124	17,750
2014	14,959	1,849	742	420	335	79	273	2,256	19,064

Note: Macroeconometric method was used for the demand forecasting for Luzon.

DDP aggregation method was used for the demand forecasting for Mindanao and Visayas.

3.3.2 Power Development Plan for the Luzon Area

Similar to the previous year PDP preparation, simulation was conducted for the three different areas such as, Luzon, Visayas and Mindanao. Table 4.7 shows the PDP for Luzon area. In the chart, the committed projects are treated as existing capacities. Aside from the committed projects, the necessary capacity addition（2005-2014) reaches 7,200MW.

On the type of power plant for capacity addition, the simulation result says indicates that capacity addition are mainly combined cycle power plant, meanwhile the previous plan consisted of coal fired power plants. The surge in coal prices make the coal-fired power plants less cost-effective option. The appropriate energy price should be discussed in future, considering the present energy price.

Table 3.3 Power Development for Luzon Area

Luzon								
	Demand	Ex.Cap	Install Cap.				Total	G.R.M
			GT15	CC30	CL30	Acc		
2004	6,829	9570				0	9570	40.1%
2005	7,343	11436				0	11436	55.7%
2006	7,964	11438				0	11438	43.6%
2007	8,635	11438				0	11438	32.5%
2008	9,372	11438	150			150	11588	23.6%
2009	10,171	11258	450	600		1200	12458	22.5%
2010	11,018	10608	150	1500		2850	13458	22.1%
2011	11,917	10608	450	600		3900	14508	21.7%
2012	12,871	10608	150	900		4950	15558	20.9%
2013	13,884	10608	150	900		6000	16608	19.6%
2014	14,959	10608		1200		7200	17808	19.0%

Here GT15：Gas Turbine（150MW）
CC30：Combined Cycle（300MW／Gas）
ＣＬ30：Coal（300MW）

On the type of power plant for capacity addition, the simulation result says indicates that capacity addition are mainly combined cycle power plant, meanwhile the previous plan consisted of coal fired power plants. The surge in coal prices make the coal-fired power plants less cost-effective option. The appropriate energy price should be discussed in future, considering the present energy price.

3.3.3 Power Development Plan for Visayas

The PDP for the Visayas area is presented in Table 4.8. In 2003 , power deficit in Panay - Negros island in Visayas area was predicted and it was recognized , that urgent power development projects are necessary. As a result, some power plants, such as the diesel power plants of Mirant, were prepared, and it is expected that the power deficit will be relieved.

As in Luzon PDP, the committed projects are treated as existing generation capacities. Necessary capacity addition for the 2005-2014 reaches 600MW. In the previous plan, the necessary capacity addition（2004-2013） was estimated at 900MW. In order to augment the power supply in the region, the interconnection between Cebu- Negross- Panay is constructed. Figures 4.2 - 4.4 show demand -supply balances of Visayas area in 2010 considering the power flow between islands. It seems that the reinforcement of the transmission line allows for the utilization of geothermal power plants in Leyte during midnight.

Table 3.4 Power Development Plan For Visayas Area

Visayas Grid

	Leyte-Samar Grid Demand	Ex.Cpa	Install	Acc	I.C. Out	Total	G.R.M	TL	Bohol Demand	Ex.Cpa	Install DS	Install GT05	Install CL05	Install acc	I.C.	Total	G.R.M	TL	Cebu Grid Demand	Ex.Cpa	Install DS	Install GT05	Install CL05	Install acc	I.C. in	I.C. out	Total	G.R.M	TL
2004	177	639		0	-209	430	142.3%	440	46	48				0	9	57	25.0%	35	439	376.0				0	200	-30	546	24.4%	200
2005	185	639		0	-253	386	108.8%	440	47	6				0	53	59	25.0%	100	460	376.0				0	200	-5	571	24.0%	200
2006	193	639		0	-320	319	65.9%	440	50	6				0	56	62	25.0%	100	483	376.0				0	264	-35	604	25.0%	400
2007	202	639		0	-319	320	58.5%	440	53	6				0	60	66	25.0%	100	509	376.0				0	259	2	637	25.0%	400
2008	211	639		0	-245	394	86.3%	440	55	6				0	63	69	25.0%	100	537	376.0				0	182	113	671	25.0%	400
2009	219	639		0	-317	322	46.8%	440	58	6				0	66	72	24.0%	100	566	376.0				0	251	75	702	24.0%	400
2010	229	639		0	-321	318	39.1%	440	62	6				0	66	72	17.3%	100	597	376.0				0	255	70	700	17.3%	400
2011	238	639		0	-315	324	36.2%	440	65	6		50		50	19	75	15.2%	100	630	296.0		100		100	296	34	726	15.2%	400
2012	249	639		0	-304	335	34.8%	440	70	6				50	24	80	14.7%	100	664	296.0		100		200	280	-14	762	14.7%	400
2013	260	639		0	-292	347	33.2%	440	74	6				50	29	85	14.0%	100	701	296.0		50		250	264	-10	799	14.0%	400
2014	273	639		0	-274	365	33.8%	440	79	6				50	35	91	15.5%	100	742	296.0		100		350	239	-28	857	15.5%	400

	Negros Demand	Ex.Cap	Install Cap. DS	Install Cap. GT05	Install Cap. CL05	Install Cap. Acc	I.C. in	I.C. out	Total	G.R.M	TL	Panay Demand	Ex.Cap	Install Cap. DS	Install Cap. GT05	Install Cap. CL05	Install Cap. Acc	I.C.	Total	G.R.M	TL	Total Demand	Ex.Cpa	Install DS	Install GT05	Install CL05	Install acc	I.C.	Total	G.R.M
2004	199	180		50		50	30	-11	249	25.0%	80	199	237.2				0	11	249	25.0%	80	1,060	1,480				0	0	1,480	39.7%
2005	209	180				50	5	26	261	25.0%	80	212	290.8				0	-26	265	25.0%	80	1,113	1,492				0	0	1,492	34.0%
2006	219	180				50	35	8	273	25.0%	80	226	290.8				0	-8	283	25.0%	80	1,170	1,492				0	0	1,492	27.5%
2007	231	270				50	-2	-30	288	25.0%	160	243	274.2				0	30	304	25.0%	160	1,238	1,565				0	0	1,565	26.4%
2008	242	320				50	-113	47	303	25.0%	160	262	274.2			100	100	-47	328	25.0%	160	1,308	1,615			100	100	0	1,715	31.1%
2009	256	320				50	-75	23	317	24.0%	160	283	274.2				100	-23	351	24.0%	160	1,383	1,615				100	0	1,715	24.0%
2010	270	320				50	-70	17	317	17.3%	160	305	274.2				100	-17	357	17.3%	160	1,463	1,615				100	0	1,715	17.3%
2011	286	320				50	-34	-7	329	15.2%	160	331	274.2				100	7	381	15.2%	160	1,550	1,535		150		250	0	1,785	15.2%
2012	301	320				50	14	-39	345	14.7%	160	360	274.2				100	39	413	14.7%	160	1,644	1,535		100		350	0	1,885	14.7%
2013	317	320				50	10	-19	361	14.0%	160	389	274.2		50		150	19	443	14.0%	160	1,742	1,535		100		450	0	1,985	14.0%
2014	335	320				50	28	-11	387	15.5%	160	420	274.2		50		200	11	485	15.5%	160	1,849	1,535		150		600	0	2,135	15.5%

Here DS: Diesel(50MW)
GT05: Gas Turbine(50MW/Oil)
CL05: Coal(50MW)

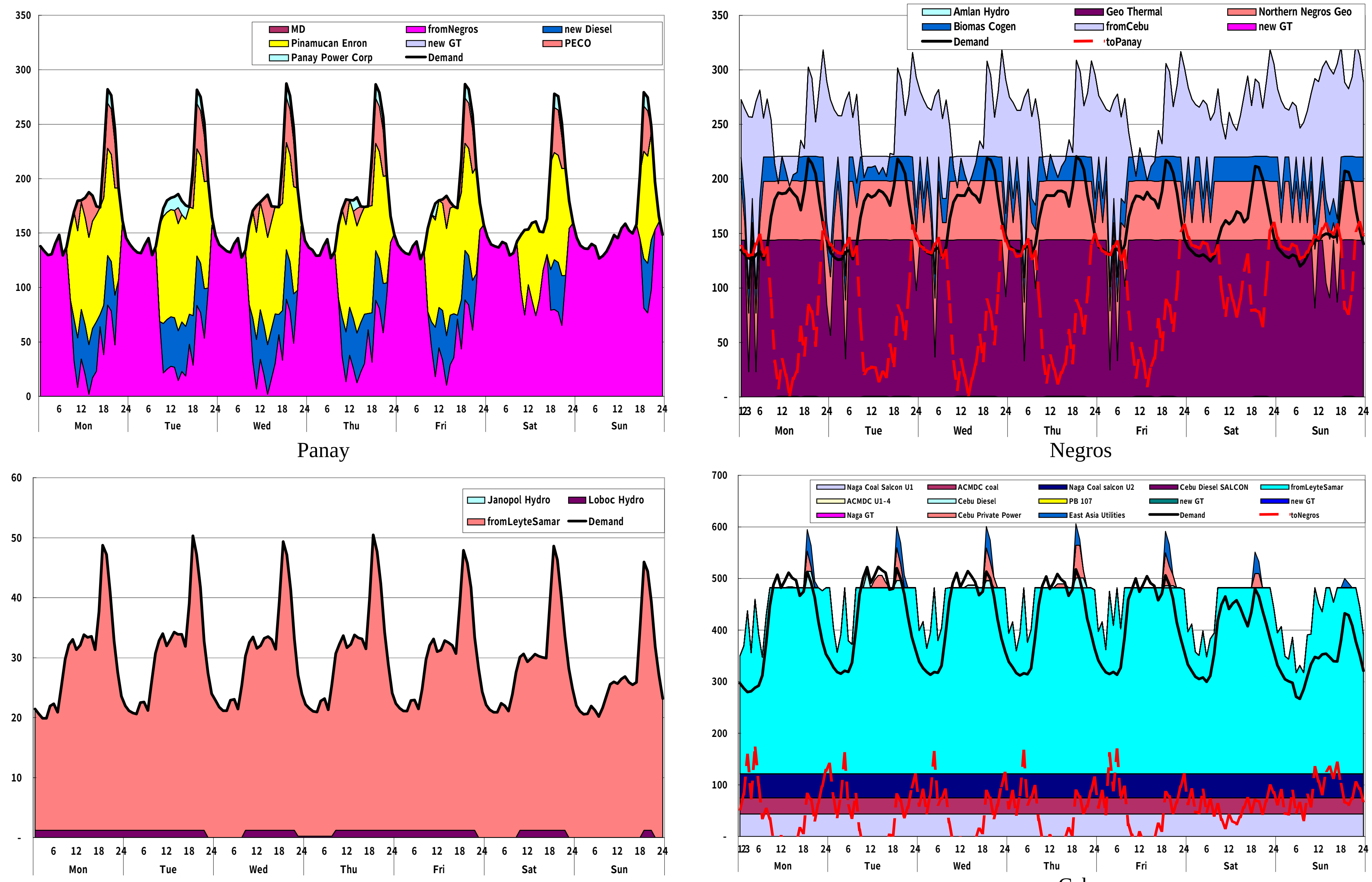


Figure 3.1 Demand -Supply Balance in Visayas Area（in 2010)

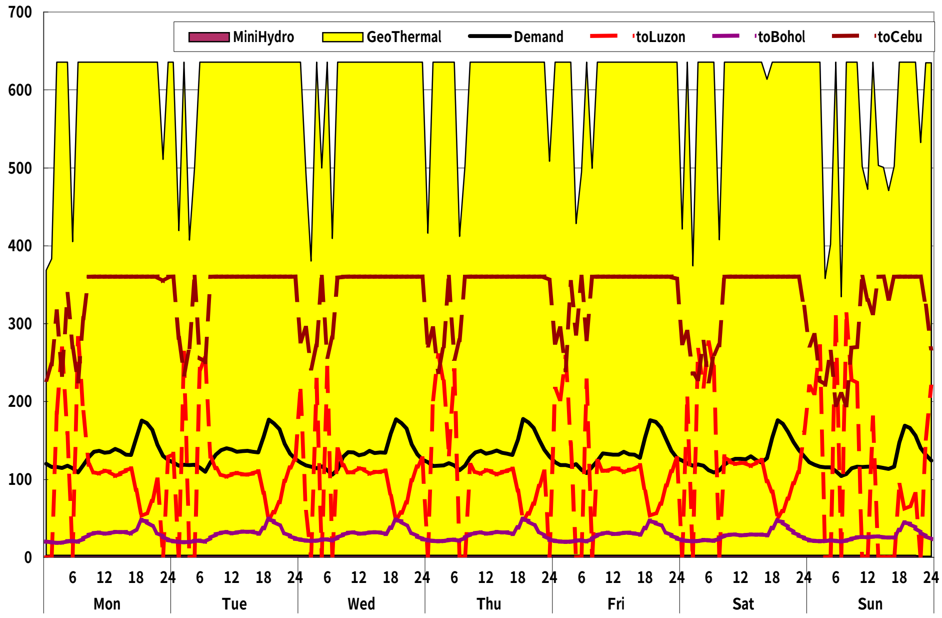


Figure 3.2 Demand Supply Balance in Leyte-Samar(in 2010)

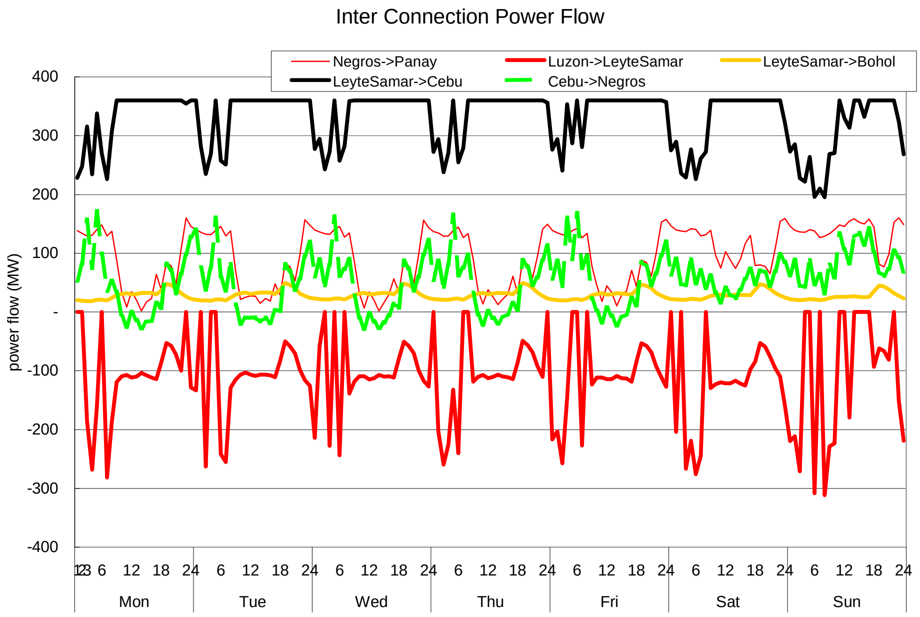


Figure 3.3 Interconnection Power Flow (in 2010)

3.3.4 Power Development Plan in Mindanao

The Table 3.5 below shows the Power Development Plan for Mindanao Area. Considering the sudden rise of demand in 2003, the demand forecast for Mindanao area is scrutinized . The result of the review revealed that the necessary capacity addition for Mindanao for the period 2005 - 2014 is increased to 850MW aside from the committed projects. In the previous plan, the necessary capacity addition（2004 - 2013） was estimated at 550MW.

Table 3.5 Power Development Plan for Mindanao

Mindanao								
	Demand	Ex.Cap	Install Cap.				Total	G.R.M
			DS	GT05	CL05	Acc		
2004	1,278	1629				0	1629	27.5%
2005	1,374	1704		150		150	1854	34.9%
2006	1,460	1679		100		250	1929	32.1%
2007	1,536	1889			100	350	2239	45.8%
2008	1,615	1889			50	400	2289	41.7%
2009	1,697	1839			50	450	2289	34.9%
2010	1,784	1839			50	500	2339	31.1%
2011	1,891	1839			50	550	2389	26.3%
2012	2,010	1839			100	650	2489	23.8%
2013	2,125	1839			50	700	2539	19.5%
2014	2,249	1839			150	850	2689	19.6%

Here DS: Diesel(50MW)
GT05: Gas Turbine(50MW/Oil)
CL05:Coal(50MW)

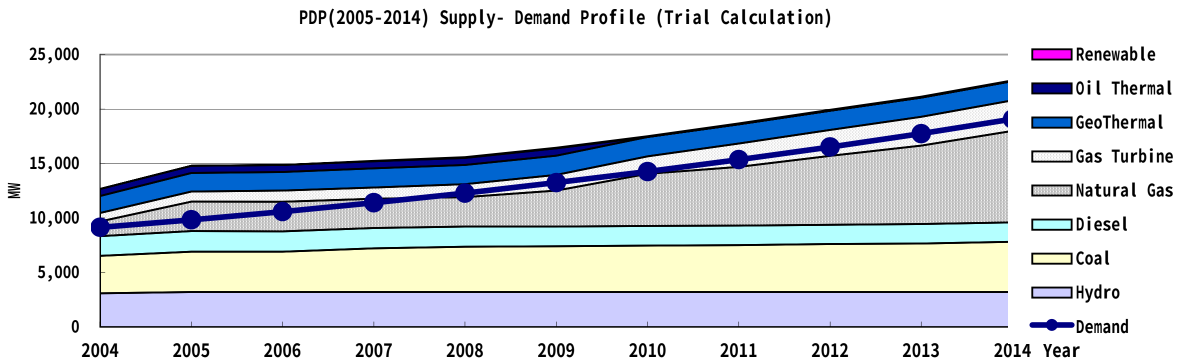
3.3.5 Profile of Supply Capacity and Power Generation

Table 3.6 shows the details of total capacity addition, both the committed and indicative projects, in the three (3) main islands. The total capacity addition is computed at 9,225MW of which about 95% are only indicative projects.

Table 3.6 Total Capacity Additions (PDP2005-2014)

	Luzon	Visayas	Mindanao	Philippines
Comitted Projects	65	225	285	575
Indicative Requirement	7,200	600	850	8,650
Base Load		100	600	700
Midrange	5,700			5,700
Peaking	1,500	500	250	2,250
Total	7,265	825	1,135	9,225

Figure 3.4 and Figure 3.5 show profiles of supply capacity and power generation.

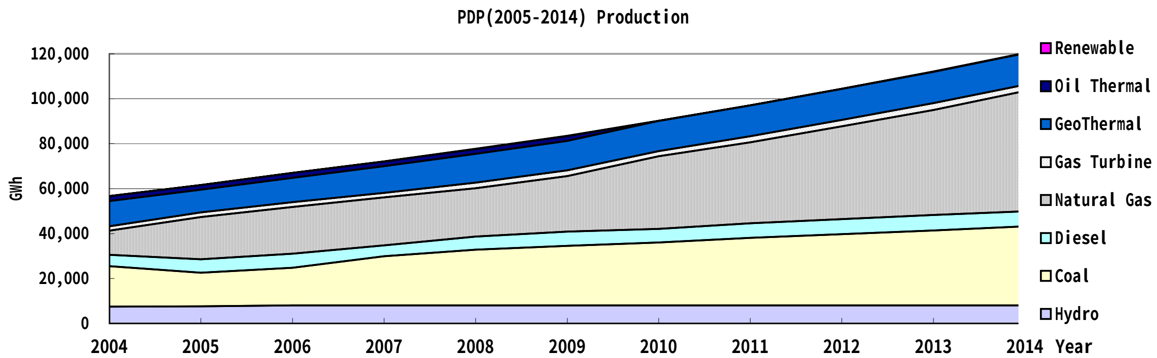


(Unit:MW)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Demand	9,160	9,827	10,592	11,408	12,295	13,251	14,265	15,350	16,516	17,750	19,064
Total Supply	12,670	14,791	14,866	15,241	15,591	16,461	17,511	18,681	19,931	21,131	22,631
Reserve Margine	38.3%	50.5%	40.3%	33.6%	26.8%	24.2%	22.8%	21.7%	20.7%	19.0%	18.7%
Coal	3,426	3,691	3,691	4,001	4,151	4,201	4,251	4,301	4,401	4,451	4,601
Diesel	1,801	1,906	1,881	1,856	1,856	1,806	1,806	1,776	1,776	1,776	1,776
Natural Gas	1,353	2,703	2,703	2,703	2,703	3,303	4,803	5,403	6,303	7,203	8,403
Gas Turbine	770	920	1,020	1,020	1,170	1,440	1,590	2,140	2,390	2,640	2,790
GeoThermal	1,568	1,703	1,703	1,763	1,763	1,763	1,763	1,763	1,763	1,763	1,763
Oil Thermal	650	650	650	650	650	650	0	0	0	0	0
Hydro	3,102	3,217	3,217	3,217	3,217	3,217	3,217	3,217	3,217	3,217	3,217
Renewable	0	1	1	31	81	81	81	81	81	81	81

Figure 3.4 Profile of Supply Capacity

Figure 4.6 shows the profile of power generation. In 2005 and 2006, the production of coal fired power plant decreased. This trend is the result of jump-up of current coal price.



(Unit:MW)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Supply	56,649	61,678	67,054	72,198	77,716	83,510	90,246	97,122	104,462	112,176	120,389
Coal	17,995	14,954	16,737	21,927	24,697	26,531	27,924	30,043	31,704	33,276	35,188
Diesel	5,070	6,002	6,325	4,805	5,936	6,249	6,104	6,482	6,696	6,927	6,715
Natural Gas	10,764	18,848	20,705	21,391	21,520	24,665	32,297	36,048	41,238	46,695	53,465
Gas Turbine	1,991	2,040	2,236	1,984	2,410	2,585	2,308	2,709	2,794	3,098	2,805
GeoThermal	11,233	10,092	10,844	11,863	12,867	13,193	13,427	13,654	13,844	13,994	14,030
Oil Thermal	2,101	2,056	2,080	2,099	2,101	2,101	0	0	0	0	0
Hydro	7,495	7,617	8,046	8,047	8,101	8,101	8,101	8,101	8,101	8,101	8,101
Renewable	0	69	81	82	84	85	85	85	85	85	85

Figure 3.5 Profile of Power Production

4. Transmission Development Program (TDP)

4.1 TDP Preparation and Evaluation

TDP 2005

As of October 2004, the TDP2005 is still being prepared by TRANSCO because DOE has not officially released the demand projections and capacity expansion plan. Under the circumstances, the JICA Study Team, during the follow-up study mission, proceeded with the evaluation of the Leyte-Mindanao interconnection.

Given the country's current tight fiscal position, the administration has directed the various government agencies to prioritize investment projects. Consequently, TRANSCO developed and presented three (3) alternative Capital Expenditure (CAPEX) scenarios in its TDP for year 2004-2009. These scenarios present CAPEX Requirements at US$ 500 Million, US$ 850 Million and US$ 1,300 Million. The four major components of these three (3) CAPEX scenarios are:

1. Transmission lines rehabilitation/expansion/improvement/spares
    - (i) Operation & Maintenance
    - (ii) Head Office/System Operation/Metering Services
2. Projects
    - (i) On-going
    - (ii) New
3. Engineering and Administration
4. Interest During Construction

The difference among the three (3) scenarios is on the new projects component as to whether the project provided in 2004 TDP will be included or omitted. To provide an objective decision on this matter, PSALM hired EA Technology to conduct a CAPEX investment review. No final report has been submitted to date but there are indications on the EA Technology draft Review Report that the scenario to be recommended is that with a CAPEX requirement of US$850 Million.

Moreover, TRANSCO needs to come up with a prioritization of the projects following the guidelines issued by ERC on the optimization of its investment.

Technical Skill Transfer to DOE

During "The Study on the Institutional Capacity Building for the DOE under a Restructured Philippine Electric Power Industry in the Republic of the Philippines" from 2002 to 2004, the JICA Study Team provided the PSS/E (Power System Simulator for Engineering) basic set for power flow calculation and short circuit calculation. In addition, the Team held technical seminars and transferred technical knowledge and skill, such as the basics of system analysis and program operation, to the DOE.

However, PSS/E has a lot of functionalities and it will take some time for the DOE to master its operation. The JICA Study Team, during the follow-up study, provided the DOE with hands-on training. However, there was limited time and concerned staff of DOE are loaded with so many other work related to transmission sector, particularly the review of CAPEX and the individual projects of 2004 TDP.

Meanwhile, transmission stability problems are expected to occur in the Luzon system in the future. The JICA provided the DOE with the dynamic simulation set and hands-on training for stability analysis during the follow-up study.

During the training, the Team adopted the Philippine Grid for the simulation and instructed the DOE not only on system analysis but also on the likely problems to occur in the Philippine Grid.

4.2 Issues and Recommendations

Manpower Requirement for TDP Evaluation. The PPDD of the EPIMB is responsible for evaluating and approving the TDP, and its integration into the PDP in the DOE. Currently, only one staff member is assigned to the TDP section, though four staff positions were planned for TDP evaluation.The section handling the TDP is also in charged with the DDP.

A new process in formulating the PDP is being introduced, i.e. a bottom-up approach using the DDP of individual utility. It must be recognized that adequate time and effort are needed in reviewing and analyzing the DDP to understand its implications to the TDP and eventually to the PDP. Given the existing manpower complement of PPDD and its current workload, JICA mentoring the staff on the functionality of PSS/E was not done and consequently , leaves little opportunity for technical knowledge and skill transfer. It is critical, therefore, that hiring and/or appointment of needed staff be pursued.

TDP Preparation Schedule. The TDP preparation and evaluation in 2003 and 2004 were very much delayed. The DOE and TRANSCO prepared the PDP and the TDP respectively for the first time in 2003 and understandably, they needed extra time to study and perform the related data processing and analyses.

In 2004, it seems that external factors, such as current tight fiscal situation of the country makes it imperative to have a CAPEX reduction. The call of the administration for reduction in investment projects particularly for the transmission sector resulted to additional tasks to be performed such as, various scenarios developed and analysed, optimization run and other related activities.

Nevertheless, it can be said that the schedules for various activities, such as DDP - TDP - PDP preparation even so with the NEDA planning, are not harmonized in order to make sure that the required inputs and data and ready for use when needed.

Considering these issues, the whole schedule for the PDP - TDP - DDP preparation needs to be re-evaluated.

Coordination between DOE and TRANSCO for the Preparation of PDP and TDP. The JICA Study Team facilitated the smooth exchange of information between DOE and TRANSCO for the preparation of the TDP and PDP. The Team has also supported the DOE to conduct the economic study on the Leyte-Mindanao interconnection.

The Team has strongly recommended that DOE and TRANSCO hold periodic meetings to coordinate the preparation and implementation of the TDP and PDP. There has been no concrete agreement reached regarding this matter and they remain to coordinate only when necessary. As yet, no internationally accepted standard methodology and/or procedures for power and transmission development planning and coordination under an unbundled power industry has been encountered. There are still much development on-going and each country is trying to develop their own methodology. The DOE and TRANSCO, therefore, should collaborate to strengthen their relationship and develop methodology and good practices leading to effective and efficient power and transmission development planning and management.

On the other hand, TRANSCO is assessing the level of power development required in each area under a scenario without system expansion and reinforcement, as one of the methods to promote power development in desirable areas. The results of the simulation will be included in the TDP2005, and the DOE needs to process the information to develop a policy on power development promotion.

CAPEX Reduction of TRANSCO. TRANSCO needs to apply the N-1 rule to prepare the TDP to comply with the Philippine Grid Code. However, the administration recently ordered the reduction of programmed CAPEX for the transmission sector. Consequently, TRANSCO needs to prioritize projects and this may result to deferment of some projects for several years.

Under the circumstances, a methodology for prioritizing transmission-line projects should be developed. The JICA Study Team proposed principles and methodology to the DOE for prioritization of the projects, considering necessity (e.g. measures against N-0 or N-1) and the impact of faults. The DOE is currently reviewing the Team's recommendation along with other possible determinants.

5 Distribution Development Plan

This chapter describes the activities undertaken by the JICA Study team in assisting for the review and consolidation of the DDP. The activities are, focused on the following two themes, namely, (1) the efficient and effective collection of the DDP from DUs, and (2) maximum utilization of the DDP.

DUs are responsible for distributing electric power in their franchise area. In view of this, it is necessary to prepare the distribution-supply and demand plan based on a long-term considerations in the area. The DUs'DDPs include the supply, demand and facility expansion plans.

When the plan for power distribution - supply and demand balance is prepared, the DU should prepare the distribution-supply plan based on the demand forecast in its franchise area. However, there are potential difficulties that may be encountered since this task is new to DUs. In this regard, the JICA study team supported the DOE in DDP aggregation and analysis

5.1 Outlook of DDP

5.1.1 Legal Mandate

Pursuant to the Rule 7 Section 4 of the EPIRA IRR, distribution utilities (DUs) have a responsibility to prepare a five-year distribution development plan and submit it to the DOE by March 15th every year. Speaking in detail:

(i) ECs must submit annual DDP to NEAby the end of November. NEA will then integrates, evaluates, consolidates them as NECDDP, which is a grid extension plan prepared and to be submitted to the DOE;

(ii) Private Investors Owned Utilities (PIOUs will individually submit annual DDP to the DOE directly.

The PDC (Philippine Distribution Code 6.2.5) likewise stipulated that DUs ascertain the demand plans of important customers in the franchise area and determine the exact demand forecast. It also reiterated that a DU prepares a DDP every year and submits it to DMC (Distribution Management Committee) and the DOE.

The work flow for the DDP preparation is presented in Figure 5.1. The DOE collects all data and complete the National DDP. The consolidated DDPs then is integrated by DOE into the

PDP.

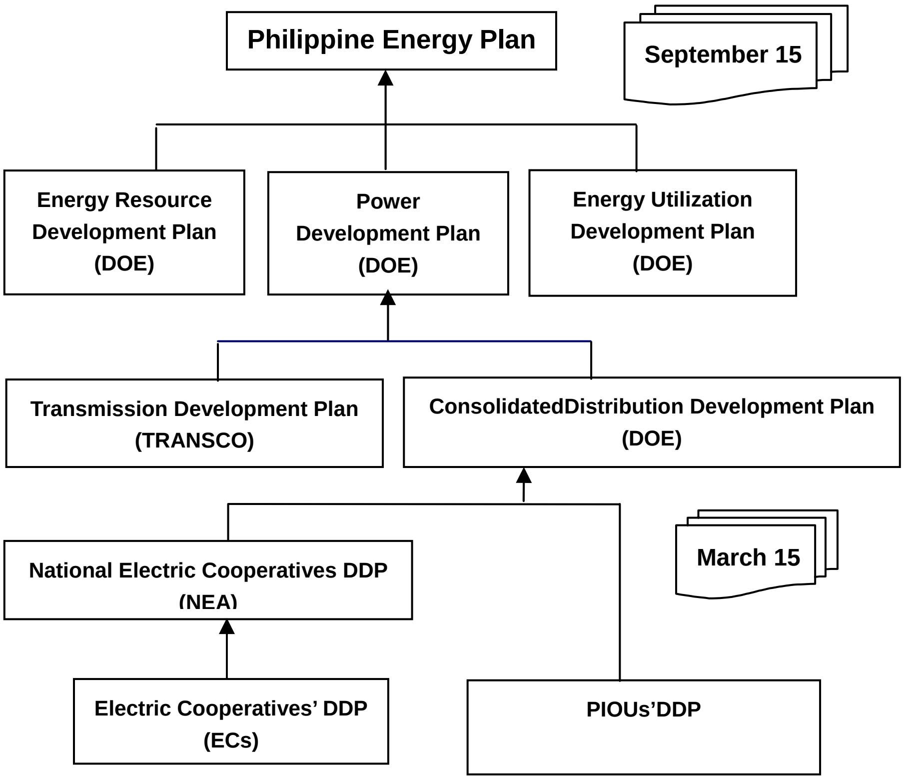


Figure 5.1 Work flow of the DDP preparation

5.1.2 The Elements of the DDP

The salient components of the DDP include the following:

- Supply and Demand forecasts;
- Sub-transmission capacity expansion;
- Distribution substation siting and sizing;
- Distribution feeder routing and sizing;
- Distribution reactive power compensation plan;
- Other distribution reinforcement plans; and
- Summary of the technical and economic analysis conducted to justify DDP.

The In the former study, the data-gathering form was established to collect wide range of data efficiently. The PDC also prescribes that a DDP should contain the following five items:

1. Demand forecast;
2. Supply facility plan;
3. Distribution development plan;
4. Critical point; and
5. Capital Plan.

Basically, each DU should prepare a five-year plan for each items. With regards to the demand forecast and supply facility plan, each DU should prepare a ten-year plan based on a long-term perspective and submit it to the DOE. The DOE aggregates them and prepares a National DDP.

5.2 Approach to DDP Submission

5.2.1 DDP Submission Flow Diagram

In 2004, the DOE ordered the DUs to prepare the DDP, submit it to the DOE twice and attend the workshop on the DDP under the cooperation with the JICA Study Team. Figure 5.2 shows the flow diagram of the DDP submission.

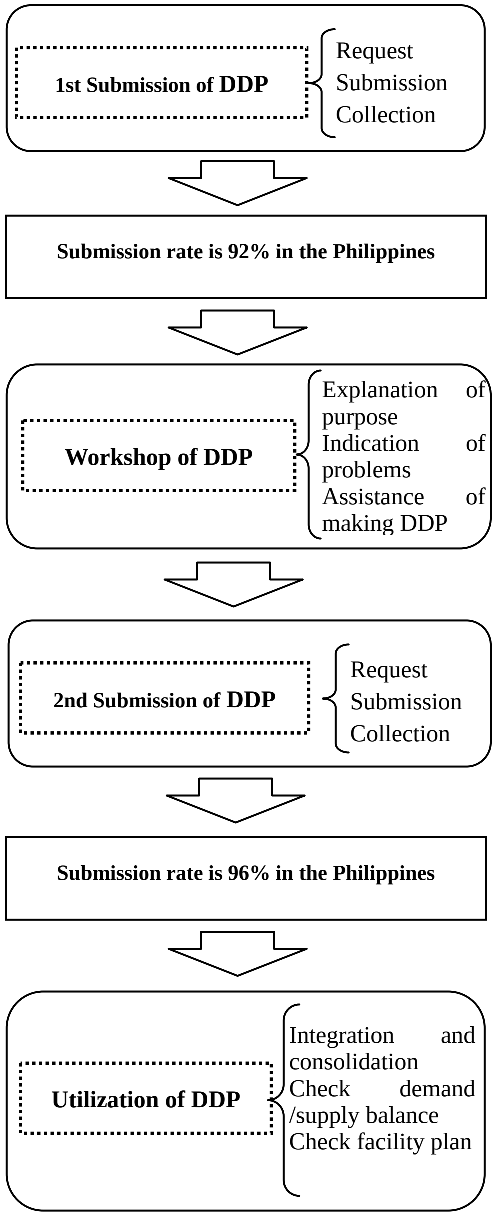


Figure 5.2 DDP submission flow diagram

For the first DDP submission, the DOE wanted to make sure that each DU could submit to the DOE a properly accomplished DDP data-gathering form because DUs did not have experiences to submit the DDP. The submission rate was 92% and delayed.

The conduct of workshop on the DDP was aimed to orient and guide the DUs on proper filling up of the form in order to solve the many mistakes in the first submitted DDP. In addition, the DOE explained the purpose and the significance of DDP submission and ordered the re-submission of the DDP.

The accuracy of DDP contents and the submission rate, that is 96%, were improved with the second DDP submission. ,
With regard to the utilization of DDP, the way to evaluate the DU's and regional supply and demand balance was proposed. In addition, the way to grasp and analyze DDP efficiently was also proposed.

5.2.2 First DDP Submission

The DOE ordered the DUs to submit the DDP in the form described in Section 5.1.1. The submission rate is shown in Table 5.1. To evaluate the submission situation, islands are divided into nine main islands and the other small islands as shown in Table 5.2. Although the rate of DDP submission is 92% for the whole Philippines, the submission rate is lower (82%) for the other small islands as shown in Table 5.2.

Table 5.1 Situation of DDP collection (Each main Island)

Island	Luzon		Mindoro	Panay		Negros	Cebu		Bohol	
EC or PIOU	EC	PIOU	EC	EC	PIOU	EC	EC	PIOU	EC	PIOU
Number of DUs submitted	41	8	2	6	0	5	4	1	2	1
Number of All DUs	44	9	2	6	1	5	4	2	2	1
Rate	**93%**	**89%**	**100%**	**100%**	**0%**	**100%**	**100%**	**50%**	**100%**	**100%**

Island	Leyte	Samar	Mindanao	
EC or PIOU	EC	EC	EC	PIOU
Number of DUs submitted	7	4	25	4
Number of All DUs	7	4	26	4
Rate	**100%**	**100%**	**96%**	**100%**

Table 5.2 Situation of DDP collection (All Philippines)

Island	Main Island		Other small Island		All Philippines		
EC or PIOU	EC	PIOU	EC	PIOU	EC	PIOU	Total
Number of DUs submitted	96	14	18	-	114	14	128
Number of All DUs	100	17	22	-	120	17	139
Rate	96%	82%	82%	-	93%	82%	92%

There are several problems, such as data mismatch, encountered in the preparation of the DDP and these are discussed below:

- Regarding the demand forecast and electrification plan, there were data inconsistencies between the latest EC Chronicle (Official record in NEA) and DDP;

- Regarding the demand forecast, supply facility plan, Distribution Development Plan and capital plan, there were missing data in the DDP;
- Regarding the Distribution Development Plan, there were data elements that do not match the Capital plan.

The factors contributing to the encountered problems in the preparation of the DDP are the following.

- Unaccustomed to the job because of the first try of DUs to prepare the DDP;
- Typical troubles on information technology (e.g. unreadable files, or the computer viruses in floppy disks);
- DUs transmit the DDP data in floppy disks due to unavailability of internet facilities in the local areas;
- Lack of sanction or punishment for non-submission of DDP as described in Section 1.3.3.

Table 5.3 Sample of the checklist

No	Electrical Utilities	Area (REGION)	File Name	Style of Documents	Contents			
					General Provision			
					1-4 info of Dus	5a-5b Brief description	6 Electrification level(Barangay)	7 Electrification level(Household)
LUZON								
1	Ilocos Norte -Dingras	Region 1	Revised DDP INEC	Electronic data	Complete	Complete	Complete	Complete
2	Ilicos Sur -Santlago	Region 1	REVISED-DDP03ISECO	Electronic data	Complete	5b is blank	Complete	Over 100%
3	La Union -Aringay	Region 1	Revised LUELCO DDP	Electronic data	Complete	Complete	Complete	Complete
4	PangasinanI -BanI	Region 1	No data					
5	C.Pangasinan -San Carios City	Region 1	No data					
6	PangasinanIII -Urdaneta City	Region 1	No data					
1	Batanes -Basco	Region 2						
2	CagayanI -Solana	Region 2						
3	CagayanII -Aparri	Region 2	revised DDPO CAGELCO2	Electronic data	Complete	Complete	Complete	Complete
4	IsabelaI -Aliia	Region 2						
5	IsabelaII -Ilagan	Region 2	Revised DDP-ISELCO 2-REP	Electronic data	Complete	Complete	Complete	Complete
6	Nueva Vizcaya -Dupax del sur	Region 2	DDPNUVELCO revised	Electronic data	Complete	Complete	Complete	Complete

The work of checking the DDP data is not easy because of the large volumes of data involved. A checklist was used to improve the data check efficiency. Table 5.3 shows a sample of the checklist.

In order to solve problems, such as data missing or un-submission of DDP, the DOE conducted the additional workshop as described in the Section 5.2.

5.2.3 The Regional DDP Workshops

The DOE conducted additional workshop in selected regions with the following purposes:

- To notify each DU of the objective and the significance of DDP submission;
- To improve the accuracy of DDP contents with regard to the demand, supply, distribution and other concerns;
- To orient the DUs on how to apply DDP for the determination of the infrastructure requirements that will ensure reliability of distribution and supply of power.

The schedules of the regional DDP workshops are shown in Table 5.4.

Table 5.4 Schedule of Regional DDP Workshops

Region	Date of Conduct, 2004
Davao	June
Cagayan	July
Cebu	July
Iloilo	July
Metro Manila 1	July
Metro Manila 2	July
Luzon PIOUs	August

The main topics covered in the workshop are the following:

- Power Development Plan Framework
- Salient Elements
- Legal Framework
- Pertinent DOE Issuances
- Flow of Work in the Preparation of DDP
- Information Requirements of DDP
- Methodology in Assessing the DDP

In collaboration with NEA, DOE conducted the following trials in the workshop in order to improve the quality of DDP submission:

(1) The name of the ECs that has not submitted DDP yet, or that submitted DDP but with insufficient and inadequate data;
(2)Reconciliation of data between the NEA Chronicle and the DDP;
(3)DOE instructed each ECs how to evaluate and simulate the supply and demand balance in consideration of the indicative supply in order to prepare the plan of supply and demand efficiently.

At the end of the workshop, the DOE directed the DUs to resubmit the DDPs by the next

Friday after the workshop.

The workshop conducted last July 2003 that was led by the former JICA Study Team while the workshop undertaken under the follow-up study was already led by the DOE. Table 5.5 briefly shows the comparison of the conduct of the workshops.

Table 5.5 Comparison with the last workshop

DDP workshop	Main staff	The main contents
The last workshop	JICA	- Request of DDP submission - Explanation of the data gathering form -Data entry guide on the forms (example of an entry)
This workshop	DOE (NEA)	- Result of DDP submission - Explanation of the purpose and the use of DDP (example of use) - Training on preparing DDP using actual data of Supply, Demand and Facilities and so on.

The workshop was a good opportunity to learn DDP preparation for many DUs. The DOE's taking leadership in conducting the workshops and other related activities under the follow-up study demonstrates the capacity building effect.

5.2.4 Second DDP Submission

A profile of the re-submission of DDP after the workshop is shown in Table 5.6 and Table 5.7. The rate of DDP submission improved increasing the DDP submission incidence from 92% to 96%.

The high rate allows the DOE to use the DDP to evaluation in each island and National Grid.

There were several improvements in the quality of the second submission of DDP and these are cited below:

- Many DUs filled in the black space on the form;.
- Wrong data inputted such as wrong unit and mismatch were improved;
- DUs rewrote the data according to the input form (Cumulative data or Yearly data).

On the other hand, there were still some problems encountered in this trial runs. For example, some DUs could still not meet the deadline for the submission, and some DDPs still have wrong data inputted and blank spaces.

It is deemed necessary for DOE to continue with the conduct of similar workshops in the next two to three years to further enhance the capability of the DUs in preparing the DDP.

Table 5.6 Situation of DDP collection (Each main Island)

Island	Luzon		Mindoro	Panay		Negros	Cebu		Bohol	
EC or PIOU	EC	PIOU	EC	EC	PIOU	EC	EC	PIOU	EC	PIOU
Number of DUs submitted	43	8	2	6	1	5	4	2	2	1
Number of All DUs	44	9	2	6	1	5	4	2	2	1
Rate	**98%**	**89%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Island	Leyte	Samar	Mindanao	
EC or PIOU	EC	EC	EC	PIOU
Number of DUs submitted	7	4	25	4
Number of All DUs	7	4	26	4
Rate	**100%**	**100%**	**96%**	**100%**

Table 5.7 Situation of DDP collection (All Philippines)

Island	Main Island		Other small Island		All Philippines		
EC or PIOU	EC	PIOU	EC	PIOU	EC	PIOU	Total
Number of DUs submitted	98	16	20	-	118	16	134
Number of All DUs	100	17	22	-	122	17	139
Rate	**98%**	**94%**	**91%**	**-**	**97%**	**94%**	**97%**

5.3 DDP Utilization

5.3.1 Supply and Demand Profile

DUs are responsible for the distribution of power in their franchise area. Corollary to this, DUs must prepare a plan that will ensure reliable supply of electricity.

The DU plan will include a power supply and demand balance taking into consideration the franchise area's demand forecast. , The task of preparing the supply and demand balance was not easy since it was the first time for many DUs to undertake such activity.

The DOE prepared a process and templates for the DDP analysis. Using the initial submissions of the DUs, the DOE reviewed, validated and developed standard data analysis output forms and presented them in the regional workshops.

During the DDP regional workshops, the DOE directed the DUs to prepare a summary output presentation and present the outputs on the final day of the workshop. This trial exercise was expected to achieve the following objectives:

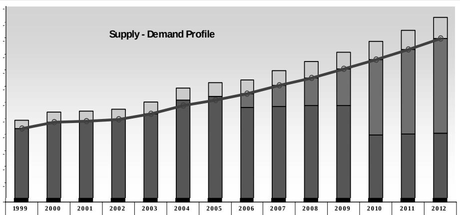
- Each DU can double check their actual supply and demand balance; This becomes the basis for ensuring the security of supply for the future demand;
- DOE can easily aggregate the demand forecast of the island, or region to develop regional supply and demand balance. This becomes the basic data for the optimization of the PDP based on regional supply and demand balance.
- The work period is limited; only three months for preparing the demand forecast based on the macro-economy after the GDP is disclosed by NEDA in June until deadline of PDP submission to Congress, September 15th. For the demand forecast that was based on DDP which was submitted no later than 15th of March, there are about 6 months available to prepare PDP .

In order to understand the DDP data efficiently, the DOE and the JICA Study Team prepared a template for each DU's DDP summary profile called as "one-page DDP summary".

Figure 5.3 shows the sample of a one-page DDP summary profile allowing easy and quick characterization of the DU's operations and plans. Also, the data and information contained in the DDP can be useful to the investors to gauge potential business or investment opportunities with the DUs.analyze the DU because the number of customers and a distribution development plan are also described in DDP.

ELECTRIC COOPERATIVE A

General Information	
Address	
Contact Person	
Position	
Tel. No:	
Fax No:	
E-mail Address	
Franchise Area	775 sq. kms.
Franchise Coverage	Our franchise area covers the whole city of Iligan, part of Lanao del Norte province located in the northwestern part of Mindanao, comprising of fourty-four (44) barangays



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Add'l Cap to meet at least 13.2%RM	28.48	31.39	31.71	32.43	34.88	38.02	40.49	43.14	46.23	49.55	53.12	56.97	61.12	65.58
Indicative Supply (MW)	0.0	0.0	0.0	0.0	0.0	-18.2	-11.7	44.3	64.7	86.7	113.8	235.8	263.3	292.8
Firm Supply (MW)	215.78	237.79	240.23	245.70	264.28	306.23	318.45	282.52	285.48	288.66	288.63	195.79	199.76	204.04
PEAK LOAD (MW)	215.782	237.786	240.232	245.697	264.278	288.024	306.752	326.798	350.191	375.362	402.453	431.618	463.024	496.851

Firm Supply -reported power supply in the DDP covered by contract or commitment to be available at all times.
Indicative Supply – ***Historical***- unaccounted supply source but was delivered and most probably from NPC Plants.
- ***Projected***- power supply needed to meet the demand

Supply-Demand Highlights

- Provide the methodology and assumptions used in load forecasting
- Cite whether there are indicative plans for commercial and industrial sectors

No. of Customers	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Residential	33,863	34,864	35,895	36,956	38,048	39,173	40,331	41,523	42,751	44,015
Commercial	6,021	4,756	3,757	2,968	2,345	1,852	1,463	1,156	913	721
Industrial	14	14	17	17	17	17	17	17	17	17
Others	475	484	490	495	500	505	510	515	520	525
Total	**42,377**	**40,119**	**40,159**	**40,436**	**40,910**	**41,547**	**42,321**	**43,211**	**44,201**	**45,278**

Level of Electrification	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Barangay Level (%)	89%	91%	93%	95%	98%	100%	100%	100%	100%	1
No. of Barangays Energized (On-Grid)	39	40	40	40	40	40	40	40	40	40
No. of Barangays Energized (Off-Grid)	-	-	1	2	3	4	4	4	4	4
Total	**39**	**40**	**41**	**42**	**43**	**44**	**44**	**44**	**44**	**44**
Household Level (%)										
No. of Household Energizzed (On-Grid)	33,863	34,864	35,895	36,956	38,048	39,173	40,331	41,523	42,751	44,015
No. of Household Energizzed (Off-Grid)	-	-	114	319	400	474	488	503	518	533
Total	**33,863**	**34,864**	**36,009**	**37,275**	**38,448**	**39,647**	**40,819**	**42,026**	**43,268**	**44,548**

Projected Infrastructure Requirements	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Distribution/Sub-transmission Facilities		1,673.70	1,715.91	1,722.13	1,764.23	1,811.10	1,863.09	1,920.62	1,984.23	2,054.51
Expansion	319	358	400	406	448	495	547	605	668	739
Rehabilitation/Upgrading	1316	1316	1316	1316	1316	1316	1316	1316	1316	1316
Substation Capacity (MVA) Expansion	82	82	82	82	82	82	82	82	82	82
Substation Capacity (MVA) Retirement		10	10	30	-	-	-	-	-	-
Reactive Power Compensation Plan (KVAr)	8,250	9,450	9,450	9,450	10,650	10,650	10,650	10,650		

Capital Investment Requirements (in Million PhP)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Distribution/Subtransmission Facilities	64.50	183.24	154.88	242.60	85.14	93.77	94.03	165.85	174.88	181.22
Expansion	35.46	155.33	69.65	68.42	59.64	78.91	77.69	87.87	95.11	99.47
Rehabilitation/Upgrading										
Substation Capacity	29.04	27.91	85.23	174.18	25.50	14.86	16.34	77.97	79.77	81.75
Electrification Projects	50.24	43.00	209.30	52.03	57.24	62.96	69.26	76.18	83.80	92.18
Total	**179.25**	**409.49**	**519.06**	**537.23**	**227.52**	**250.49**	**257.32**	**407.87**	**433.56**	**454.62**

Figure 5.3 Sample of one-page DDP Summary

5.3.2 Regional Supply and Demand Balance

The JICA Study Team proposed that the supply and demand balance provided in the DDP should be evaluated to gain insights on the security of supply.

Figure 5.4 shows the geographic locations of the regions. At the beginning of this study, DOE requested to divide Luzon and Mindanao area into several sub-regions. Also, the sub-regional demand forecast has been considered in the PDP.

With regard to PDP, the DOE also requested the JICA Study Team to take the area division into consideration to some degree. However, in the Luzon and Mindanao area, loop operation is used in the system. Also, there is the different voltage level in the loop Therefore, it is very difficult to figure out the limit without detailed analysis to the whole electric power system.

The JICA Study Team decided not to complement the detailed analysis because the effect is not so much compared with the level of effort required by the analysis.

Table 5.8 shows power balance between supply and demand. The supply and peak demand was described using the information from the first and second submission of the DDP.

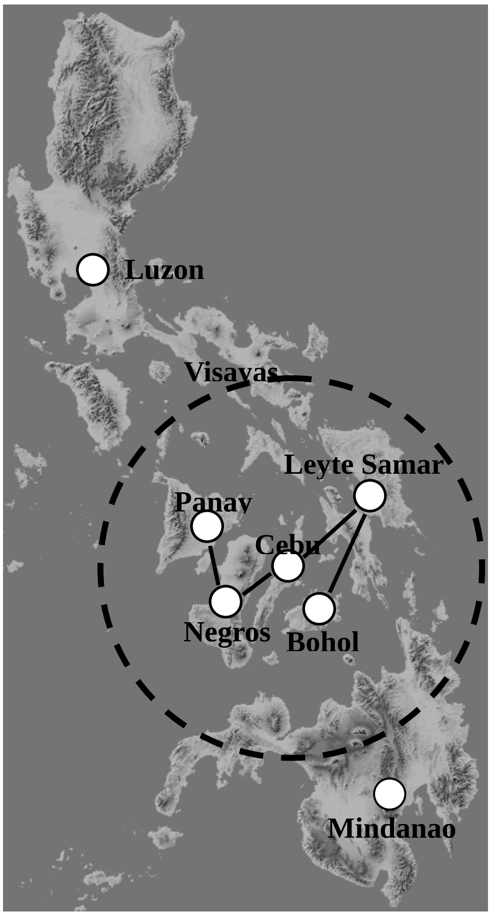


Figure 5.4 Geographic locations of the regions

Table 5.8 Example of supply and demand balance from submitted DDP

Demand / Supply balance from DDP in Luzon

EC or PIOU	DU name	Region	Source	data	Name	Contents	unit	1998	1999	2000
EC	INEC	Region 1	1st Submission	Supply data	?(Blank)	Installed Capacity	KW	2,000	2,000	2,000
						Net Dependable Capacity	KW	1,600	1,600	1,600
					Supply from NPC	Contracted Demand	KW	24,050	25,350	26,650
					Supply from NPC's Transition Supply Contract	Contracted Demand	KW	6,000	6,000	6,000
					Supply Total	Contracted Demand	KW	31,650	32,950	34,250
				Demand data	Peak Demand		KW	24,785	26,522	28,741
				balance data	balance		KW	6,865	6,428	5,509
EC	ISECO	Region 1	1st Submission	Supply data	Supply from NPC	Contracted Demand	KW	17,667	18,800	19,800
					Supply Total	Contracted Demand	KW	17,667	18,800	19,800
				Demand data	Peak Demand		KW	22,623	23,531	25,423
				balance data	balance		KW	-4,956	-4,731	-5,623
EC	LUELCO	Region 1	2nd Submission	Supply data	Amburayan Mini-Hydro Plant	Installed Capacity	KW			
						Net Dependable Capacity	KW	160	160	180
					Supply from NPC	Contracted Demand	KW	17,392	17,392	18,150
					Supply from NPC's Transition Supply Contract	Contracted Demand	KW			
					Supply Total	Contracted Demand	KW	17,552	17,552	18,330
				Demand data	Peak Demand		KW	17,683	18,104	20,123
				balance data	balance		KW	-131	-552	-1,793
EC	PANELCO	Region 1	No DDP							
EC	CENPELCO	Region 1	No DDP							
EC	PANELCO 3	Region 1	2nd Submission	Supply data	Supply from NPC's Transition Supply Contract	Contracted Demand	KW	11,000	11,000	11,000
					Supply Total	Contracted Demand	KW	11,000	11,000	11,000
				Demand data	Peak Demand		KW	29,022	29,106	31,971
				balance data	balance		KW	-18,022	-18,106	-20,971
PIOU	DECORP (Dagupan Electric Corporation)	Region 1	1st Submission	Supply data	Supply from NPC	Contracted Demand	KW			
					Supply Total	Contracted Demand	KW	0	0	0
				Demand data	Peak Demand		KW		29,365	35,273
				balance data	balance		KW	0	-29,365	-35,273

Table 5.8 shows an actual peak demand and forecasted demand taken from the data in DDP. DUs , buys electric energy from the TRANSCO in substations in their franchise area. Total of DUs and large customers'demand in the target area differs from the demand of one of the whole system that is used for demand forecasting and PDP which is measured at the

generator end (gross generation). Therefore, it is necessary to compensate the system loss between the net demand and gross demand. A system loss consists of (1) energy consumption for power station own use, (2) transmission loss. Moreover, the peak demands of all DUs do not occur at the same time.

The total of the peak demand of all DUs differs from the one of the whole system because the peak demands of all DUs do not occur at the same time. This also causes the difference between the aggregated demand peak and the system demand peak in the target area, which is used for PDP since last year.

There is a need to adjust the factor one by one. However, it is difficult to show the value for each each factor individually. To estimate the peak demand of the whole system by DDP aggregation, the adjustment coefficient was assumed to be the correction factor and was calculated as follows;

$$Correction\ factor = \sum \frac{(Power\ generatation\ in\ the\ power\ plants)}{(Peak\ demand\ in\ DUs\ and\ L\arg e\ customers)} \quad (5\cdot 1)$$

*All data were measured through TRANSCO system operator, in 2003

$$Forecasted\,peak\,demand = Correction\,factor \times Forecasted\,peak\,demand\,by\,DDP\,aggregation \quad (5\cdot 2)$$

The power crisis that occurs in the Panay island can be forecasted through the regional supply and demand analysis as shown in Figure 5.5. For example, it is necessary to secure enough supply when the supply from outside of area is limited by transmission capacity. When a construction period of the power plant, which include lead time until construction, is assumed to be five years, there is a possibility of power crisis if the power supply after five years will not satisfy a forecasted peak demand.

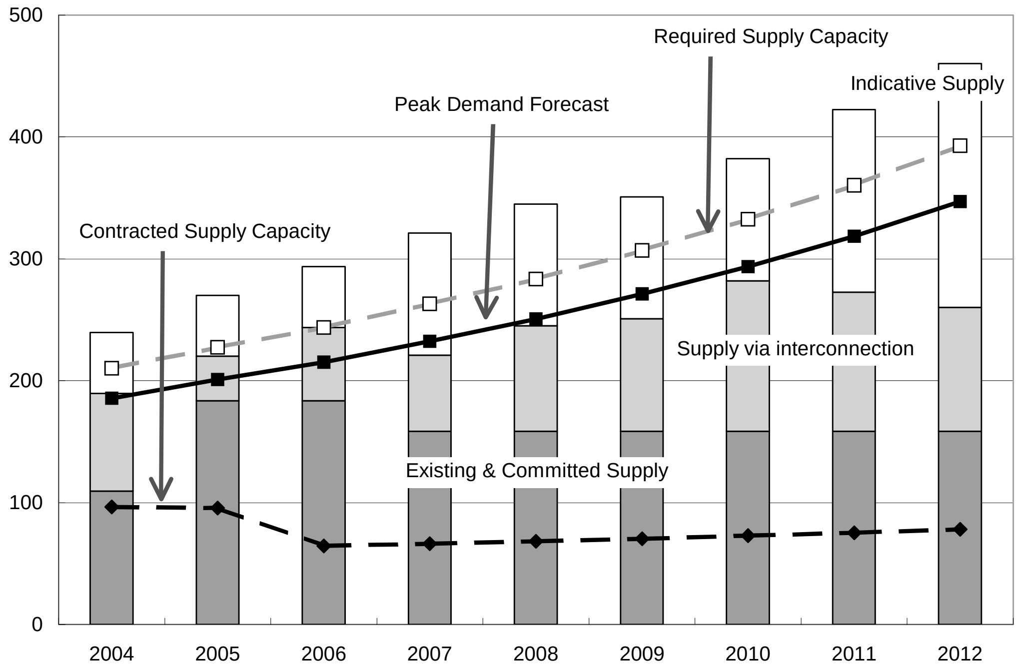


Figure 5.5 Supply and demand balance at Panay island

* The power development plan in the Philippines is prepared to satisfy certain LOLP value (LOLP=1day/year). However, figure 5.5 assumes that generation reserve margin is constant.

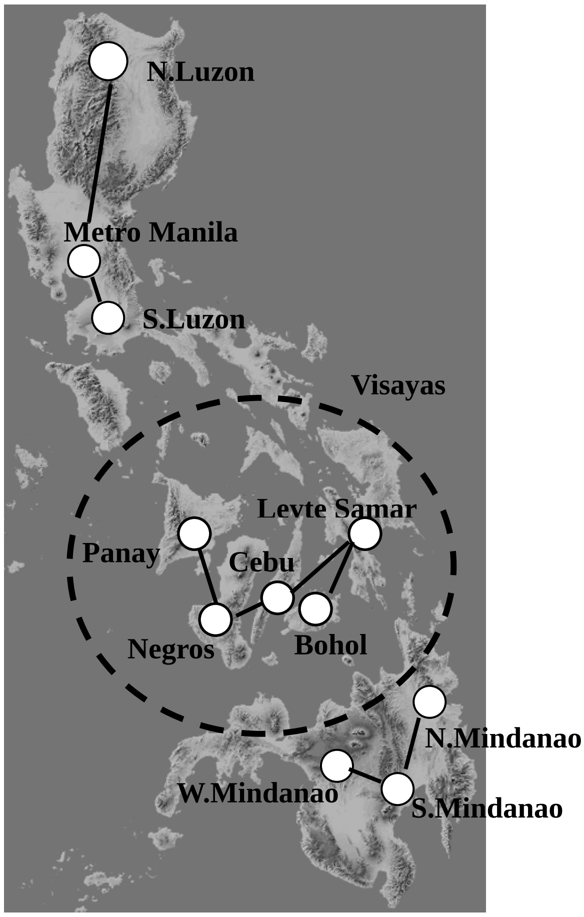


Figure 5.6 Geographic locations of the regions

As shown in Figure 5.5, in 2004, the contracted supply capacity is one - third of the forecasted peak demand .

There is a big difference on the individual DU's capability to prepare the DDP and seemingly the size classification of the DU is a factor. The large-scale DU has the capability to prepare the DDP. On the other hand, the small-scale DU needs support in preparing the DDP.

A DU presented in the workshop that the electric energy supply in their franchise area is almost similar to the peak demand forecast. When they were asked about their consideration about the supply of power, they optimistically explained that NPC will supply enough power in the future just like the present. A DDP based on this optimistic forecast , it will be impossible to evaluate the proper supply and demand balance in the area. This presents the necessity for a continuing guidance in the preparation of the DDP.

5.3.3 DDP as a basis of Power Development Plan

PDP of the Philippine is prepared for Luzon, Visayas and Mindanao area. From the viewpoint of the power development plan, followings are achieved by use of DDP;
(1) Evaluation of Optimal Siting of power Plants
(2) Data Gatering Tool for the PDP

(1) Evaluation of Optimal Siting of power Plants

In PDP2003, the optimal siting of power plants in Visayas was determined by using WSAP-IV and operation cost analysis with consideration of power flow by calculating the GTMax.

By comparing the above supply demand balance with the DDP, regional supply - demand balance and optimal location can be evaluated more precisely in future. Regarding the demand in the previous PDP,, demand forecast in divided area was made by using the regional economic index, information from NEA and TRANSCO. However, in future, the peak demand forecast in each area with further sub-division or contracts of new customer can be made possible by using the DDP. Therefore, the DDP is considered as a very important subordinate program in order to gather and evaluate the fundamental data of the PDP.

As mentioned earlier, the DOE requested the JICA Study Team to take the area division into consideration to determine the optimal location. However, in contrast with the simple visayas system, loop operation is adopted in the Luzon and Mindanao system. Also, there is the different voltage level in the loop Considering this, the JICA Study Team decided not to complement the detailed analysis because the effect is not so much compared with the level of effort required by the analysis.

On the other hand, If a new power plant is introduced in the northern or southern part of Luzon, another transmission line or substations would be required to convey electric energy to Metro Manila, the largest load center in Luzon. Therefore, DOE wants to induce the power development to the center of Luzon area in order to reduce the investment in the new transmission facility. A sub-regional power development planning maybe necessary depending on the progress of power development. In this case DDP can be fully used for this study.

(2) Data Gathering Tool for the PDP

In PDP 2003, the number of embedded generator was estimated from TRANSCO's information to discount PDP, because it was difficult to gather actual capacity. . In PDP 2004, the number of embedded generators is collected from the DDP submission from DUs. In order to check the embedded generators, the following items are added to the DDP form:

- Self – Generation/ Production Facilities
- Supply from other sources

An indicative plant which is required in the distant future (with enough time for construction period) can be considered as a signal for the investor to join the electric power market. However, an indicative plant which is required in the near future (not enough time for construction period) must be considered as a signal for an impending crisis.

5.4 Incorporating DDP data into PDP Data Management System

It is an effective method to summarize DDP profile in order to grasp the DUs' characteristic as described in Section 5.3. The DOE intends to make the summary profile for each of the DU every year.

As the result of discussion with the DOE, the responsibility of preparing the DU summary profile can be done automatically by using the submitted DDP as input and developed as one function of PDP Data Management System.

5.4.1 Output from DDP

JICA and the DOE decided to apply the summary form which the DOE uses in their work to the summary form in PDP Data Management System. However, only this summary is not the quantitative and efficient method by itself to grasp and analyze the correlation relationship among a demand forecast, a distribution facilities development plan, capital plan and the comparison among the same-scale DUs.

In order to understand and analyze the relationship , Performance Index of each DU was developed as one function in PDP Data Management System.

5.4.2 Performance Index

Contents of Performance Index

For the purpose of understanding and analyzing the correlation quantitatively and accurately, , Performance Index is composed of the following elements:

(i) To validate further the consistency of projected energy/demand forecast
- ✓ Energy Sales / Number of Customer
- ✓ Demand / Number of Customer

(These contents are prepared by each type of Customer)

(ii) To determine the reasonableness of the network expansion plan with their corresponding investment cost
- ✓ System Peak Demand / Aggregate Substation Capacity

(Utilization Performance)

(iii) Asset Efficiency
- ✓ Total Investment Cost / Total Customer
- ✓ Total Investment Cost / Total Energy Sales

(iv) Facilities Direct Cost
- ✓ Capital Investment / Total ckt-km
- ✓ Capital Investment / Total MVA
- ✓ Capital Investment / Total KVAR

The use of these indexes every year is useful in order to check the balance between the demand forecast and the distribution facilities development plan, and to check the balance between the distribution facilities development plan and the capital investment on each DU..

Comparison of DUs by Performance Index

The DDP data of only one DU can not make it possible to evaluate whether the data in the DDP are valid numbers or not. Then, in order to check the DDP data, it is necessary to make the approach to the DDP at macro-level analysis. For example, it is useful to check whether the capital investment to meet the peak demand power is reasonable and whether the demand growth is reasonable compared with the growth of customers number. As the result of discussion with the DOE, the DOE tried to analyze the data by reviewing the historical five years average values of the main Performance Index items. It is important to compare between same-class DUs (e.g. same regional characteristics, same demand density and same growth rate). In this study, the NEA's classification to each EC is applied to the default classification.

Figure 5.7 show the comparison sample by use of the Performance Index. From now on, the following three processes are deemed important:

- To accumulate the data of the Performance Index continuously;
- To classify DUs originally based on the DOE's decision by use of the accumulated data;
- To evaluate each DDP by comparing the Performance Index.

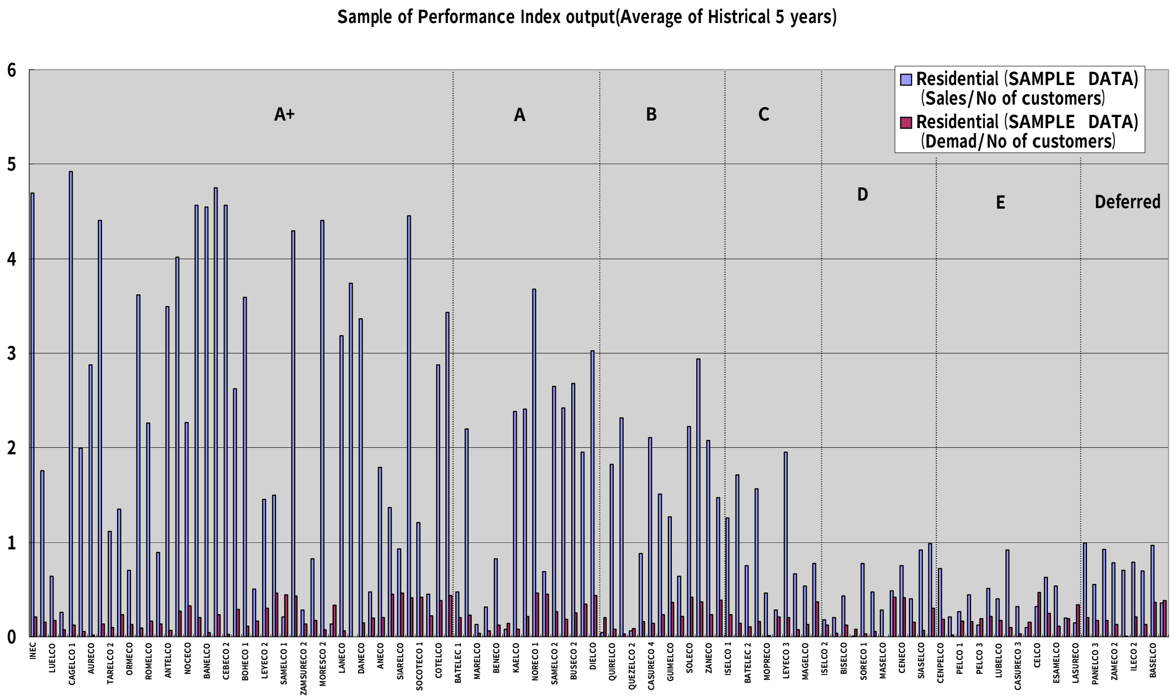


Figure 5.7 A sample graph of the comparison with Performance Index

6. PDP data management System

The JICA Study Team developed the PDP Data Management system which aim to facilitate a seamless workflow system which covers data gathering, data analysis and result reporting, based upon those the DOE request, in order to improve accuracy and reduce time consumption.

The PDP system which was developed by the JICA Study Team consists of two kinds of application;

- The application which manages the PDP data and DDP data, hereinafter we refer to as PDP system
- The application which manages the TDP data comparison analysis, hereinafter we refer to as TDP system

This application implements the basic fundamental functions which might be necessary to manage the PDP/DDP data, and to compare the two TDP data.

For the DOE, these data management system is a brand new system. Usually it will take time to specify the exact system requirement, such as data format and various functions. The JICA Study Team and the DOE have held meeting at several times to specify the requirements. This application covers not only all those requirements which have been proposed by the DOE, but also other functions, such as search function, which are not necessarily requested by the DOE, but considered to be essential to operate this application in the long run, based upon the past experience of the JICA Study Team.

This PDP Data Management system consists of two different applications,

- PDP system
- TDP system

The PDP system supports the data gathering format generation, report generation, search and sort data function, data export/import function and the administration function. TDP system is a simple application which analyzes the difference between two comparative set of data of the same - formatted. It supports the TDP project profile data and the TDP project progress data.

6.1 Purpose of the PDP Data Management System

Up until this time, as the Philippine Department of Energy has been gathering PDP related data by paper, FAX media, and then the DOE has been manually typing those data into system and been processing those data.

So that, there are some problems, such as;

- it takes time to gather data;
- there might be some manual errors;
- it takes time to analyse data; and
- the result might be inaccurate.

The DOE officials have recognized these concerns, and have requested the development of a seamless system to support PDP data gathering and analysis.

The PDP Data Management System consists of two different applications:

- PDP system
- TDP system

The PDP system supports the PDP and DDP data gathering format generation, report generation, search and sort data function, data export/import function and the administration function. The TDP system, on the other hand, is a simple application which analyzes the difference between two compararive sets of data of the same - format.

The purpose of the two systems is to make a seamless workflow system that covers data gathering, data analysis and the result reporting, based upon the DOE request which aims to improve the accuracy and reduce the time consumed for PDP preparation and TDP – DDP review and/or approval.

6.1.2 Outline of the PDP Data Management System

The scope of the PDP system shall be as follows:

- PDP data gathering format generation
- PDP data Search and reporting
- Administration function

The PDP data management system covers not only PDP data but also covers DDP data. This application has several functions, and followings are the feature of those functions. Below is the sample shot of this application, PDP data gathering format generation. There are eight tabs inside the screen, which will navigate users to its specific page.

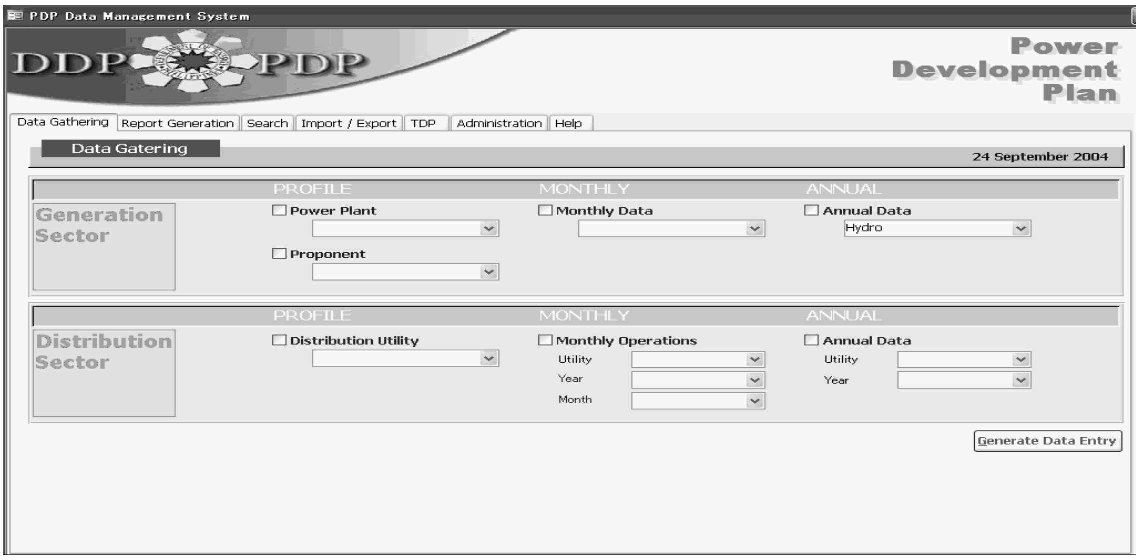


Figure 6.1 Main form : data gathering form generation

(i) Data gathering. The data entry forms consist of Profile, Monthly form and Annual form for PDP and DDP. The Profile form covers the profile of power company for PDP, and of EC for the DDP. The DOE will gather data on a monthly and annual basis. To generate monthly data, the DOE can specify the power company name and exact month/year for PDP data. The data gathering form which will be generated automatically covers the blank form for the power company to accomplish, and also covers the previous months (or years) data which the power company filled up and submitted to the DOE. The form covers the previous data to help them with their data entry operation and avoid possible input error. There are some identifiers for the ECs and the power company that are embedded and hidden in the Excel form generated, and the identifiers could assist this application when the data is imported to insert/update the exact data.

(ii) PDP reporting. The DOE staffs currently prepare various reports manually and it's a time and labor consuming task. and it might be prone to manual operations' errors. This function will assist the DOE staff to prepare reports efficiently, accurately and on time. This function covers the following typical reports:

For the PDP

- List of existing plants for a specified year;
- List of Power statistic report for a specified year;
- List of Installed capacity report for a specified year;

- Dependable capacity report for annual, semi-annual, quarterly, and monthly;
- Power generation report for annual, semi-annual, quarterly, and monthly.

For the DDP

- Annual summary report for each EC;
- Performance index summary report, and specific report for each EC;
- Monthly operation report for each EC.

(iii) Search. After large volume of data are recorded, a user might have trouble searching for the specific data. A user might also need to sort data based on certain requirements and/or parameters such as the capacity, generation, the number of customers, etc. The search function was not requested by the DOE, however based on past experiences of the JICA Study Team, the later recognizes that the search function is one of the crucial functions for the DOE in the long run. The DOE can identify either specific data or two different data for two data comparison; for example, DOE can get a sorted PDP list which has the biggest generation during the specified period, by the power generation amount order. Data can be sorted by Installed capacity, Dependable capacity and Generation.

(iv) Import/Export. The import function is required when the DOE imports the data which are submitted by power generation companies and ECs. The DOE is required to check the form and value of submitted data before it is imported. This function is coupled with the export function which could transform registered data into CSV format compliany to other analysis tools, GTMax and WASP-IV.

(v) Link to TDP directory. There is a link icon, "Open TDP Directory", to easily move to TDP directory. One needs to settle the exact path on the administration tab before the function can be used.

(vi) Administration. This function consists of three major features. The first function allows the DOE to revise the data by themselves. This function can be performed in case the new data, revised information reach the DOE by fax or other media channel, and the DOE must input the data by not using Import function mentioned on (iv). The second is the tool/utility for user control. This application could support two kinds of users, one for the administrator, and other, the general user. Only the administrator is allowed to handle the user maintenance, user monitoring and set TDP path because of security reason. If a new user will be registered or the profile of existing users changed, user maintenance function is used to follow those situations. The administrator is alco capable of checking other users' activity through user monitoring, and set TDP path on the exact data directory. For the general users, they might use the same PC but if the designated user is changed, the new user is required to change his/her ID using this function. The third is the historical indicator input function. To analyze PDP/TDP data, some statistical data are required. This function allows the DOE to input/update the statistical data.

The DOE is expected to be accustomed with this application. This application implements the fundamental requirements which are identified at this time. For example, the folder management where each data should be recorded and organized remains to be chosen by the DOE. The JICA Study Team hopes that the DOE will gain the knowledge and skills to manage large volume of data effectively using this application.

6.2 TDP system

The function of TDP system is to analyze the difference of two data sets with the same format, and provide with a view that highlights the main differing points among the two files. TDP system accepts two kinds of data as an input;

1. TDP project profile
2. TDP project progress

TDP generates the one Excel file which identify the different points with a easy looking view. Followings are the snapshot of data comparison analysis result on project profile record.

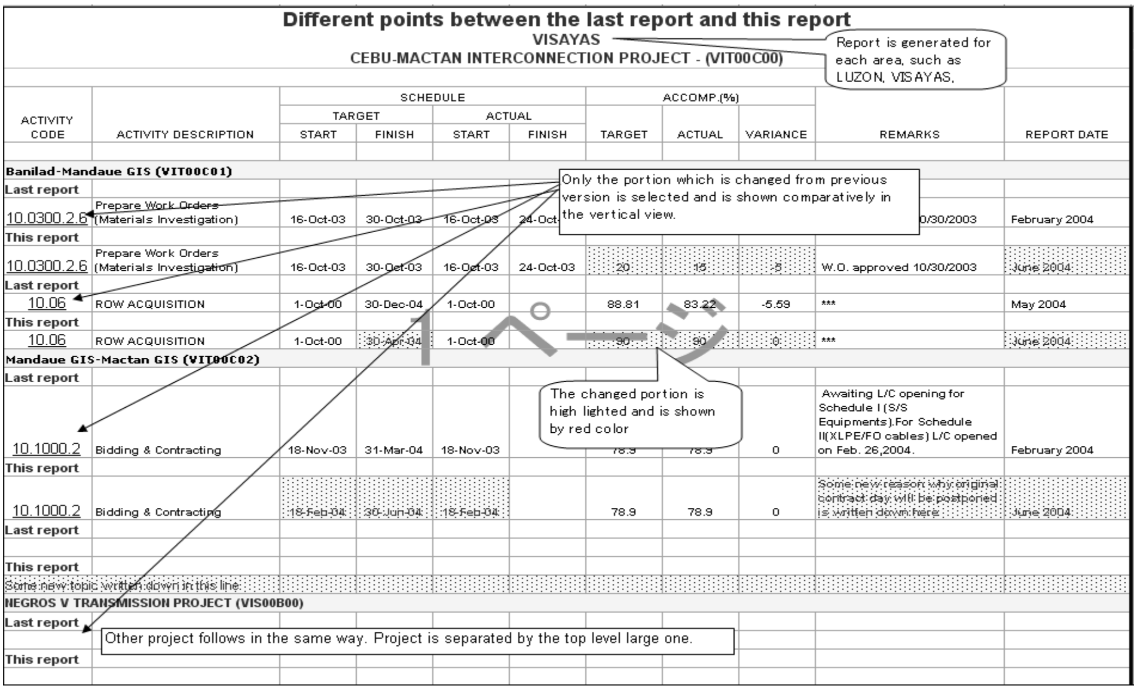


Figure 6.2 Project data comparison

6.3 Utilization of PDP Data Management System

The System performs the following functions, namely, data gathering, analysis and reporting,. The system it is expected to have the following effects:

- Improve the accuracy of data gathering, reduce the consumption time
- Improve the convenience of data analysis, reduce the consumption time
- Downsize the human manual operation

To operate this system, the following points are suggested.

(i) Directory management. All the generated data gathering forms, reports in the PDP data management system and the result comparison file in the TDP system will be located in the default directory. Since this application is a MS Office application, anybody could easily copy it on any directory in his/her own PC. Each user should manage the location of those generated files in his/her own PC environment at their best convenience.

(ii) Security. This application is a MS Office application and copy free application which is different from the EIPO system that is an Oracle application. The DOE is advised to control this application and data to the specific PC so that non-authorized person cannot have access to the data to copy, revise, delete or tamper them. Also, the administrator of this application is advised to check the activity of the other user periodically, to avoid the miss-operation and other troubles.

(iii) Output customization. The report and the downloaded data as a result of search function is in Excel format. Excel has its own tools and functions to edit and transform the excel file data. The DOE is advised to be accustomed to use the Excel function to edit and transform the output data for their additional requirements, to make the original, additional report which is not covered by this application.

(iv) System recovery. The DOE staff who is in charge of data management and system management should understand how to recover the system in case of application technical trouble. This application is a MS Office application so that simple periodical backup to other PC will be the easiest and essential way to avoid technical trouble.

(v) System revision. If the DOE would like to revise System, or need to recover technical trouble which might happened after system release, the DOE is advised to make a maintenance contract with its system development company.

7. Strengthening of Energy Investment Promotion Office

7.1 Introduction

The previous study implemented in October 2002-March 2003 pointed out that three potential risks, i.e. (1) political and regulatory risks, (2) business risk in the IPP market and (3) non-transparent investment process, might prevent private sector investments. Particularly, political and regulatory risks demonstrated by long and tedious process of business approval, non-transparent approval process, and inconsistency between legal document and practical process are critical issues to be addressed by the Energy Investment Promotion Office of the DOE.

To tackle the remaining tasks, this chapter consists of three sections. The first section statistically examined recent developments on the Philippine power sector reforms and identified the factors that prevent the inflow of direct and security investment. The second chapter examined how the market information is transacted between investors and sellers in the electricity market and carried out comparative analysis between the EIPO and other information provider that have already existed in the Philippines. The third section examined how the EIPO should be enhanced in the future from the viewpoint that mitigates asymmetric information between investors and the government.

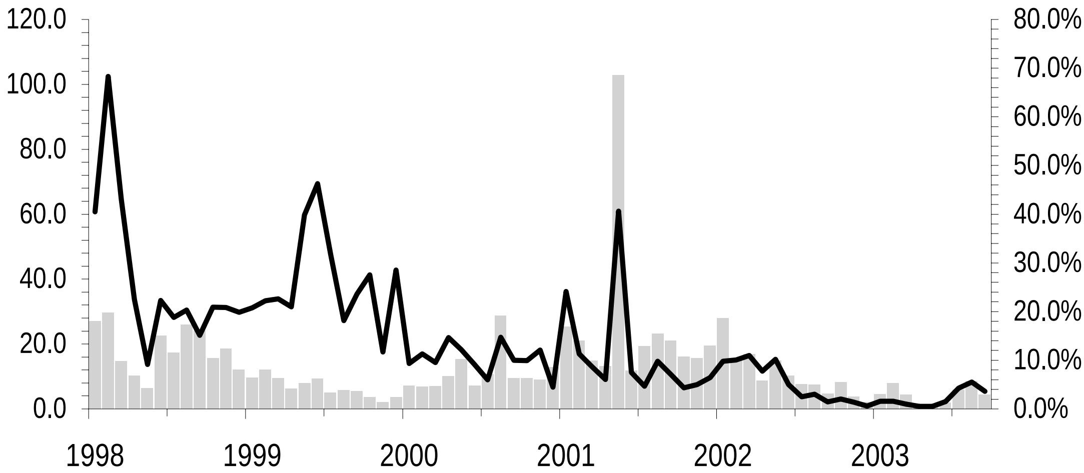
7.2 The Philippine Electricity Sector Reforms and Investment

Although the Philippine government has promoted IPPs since the mid 1990s, recent inward securities investment to power sector is continuously diminishing. The incoming securities investment to power sector temporarily exceeded 100 million USD per month in 1998, but the upward trend conversely turned in 2000 and it extremely got stagnated especially in 2003.

Table 7.1 suggests that inward securities investment records big growth during the Estrada administration in 1998 and the Arroyo administration in 2001. The trend seems to support observation that foreign investors always expected that the new administration would provide preferential treatments to foreign investors. Accordingly, it is expected that the first period of the Arroyo administration in May 2004 will record increase of incoming securities investment temporarily. However, it must be noticed that downward trend of the investment in the first Arroyo administration is much steeper than that of Estrada administration. In particular, the incoming investment decreased to 0.8 million USD per month in December 2002 – June 2003. Therefore, it can be expected that the investment temporarily recovers when there is a new administration but the downward trend is remarkable in the long-term period.

A decrease in inward foreign direct investment (FDI) to the power sector is also remarkable. According to FDI data published by the BOI, the inward FDI to the power sector expanded from 17.1 billion USD to 3.63 billion USD in 1996-1998. The FDI and the foreign securities investment, in 1998 started to decline.

Table7.1 Inward Foreign Securities Investment in the Philippine Power Sector



Source: Bangko Sentral ng Pilipinas

Note: Left axis –Inward Securities Investment in the Power Sector Mil USD,

Right axis – Inward Securities Investment in Power Sector / Total Inward Securities Investment

7.3 Infomediary System in the Philippine Power Sector

7.3.1 BOI's One Stop Action Center

The BOI's One Stop Action Center (OSAC) is established not only for power sector investors, but for all the fields of investors. The OSAC provides market information to investors and also offers man-to-man counseling to investors. Since incoming foreign investment is under the authority of the BOI, the OSAC can monitor each approval procedure and provide advisory supports to applicants. The OSAC provides the following information:

- Procedure when foreign firms establish business offices in the Philippines;
- Procedure on applying for working visa;
- Procedure on converting from sightseeing visa to working visa;

- Procedure on obtaining preferential tax treatments and incentives;
- General information concerning investment environment in the Philippines.
-

7.3.2 CBRED: Capacity Building to Remove Barriers to Renewable Energy

The CBRED is a technical assistance initiative financed by the UNDP with the DOE is the executing agency. The purpose of the project is to eliminate barriers that have historically prevented the development of renewable energy in the country. The above program will implement the following activities:

- Capacity building of legal and planning system;
- Legislative arrangements of the service in renewable energy market;
- Information system service;
- Arrangements of electricity distribution system and funding mechanism;
- Human resource development;
- Technical support.

7.3.3 ERC Homepage

The ERC as the regulator of the energy industry has been providing information concerning regulatory guidelines, and procedures, among others, through its homepage. The ERC and the DOE are primarily concerned when an investor plans an investment project. In this regard, most investors first take a look at the ERC's homepage to obtain information regarding permission (e.g. accreditation) process guidelines and other relevant regulatory guidelines and issuances.

7.3.4 PSALM Homepage

While the ERC provides investors with regulatory related information, the PSALM offers asset sales information under the privatization process. The PSALM's information is praised by many investors since it contains many useful micro-data regarding each power plant.

Asset sales information includes micro-data of power plants, electric power distribution equipments and IPPs. The privatization schedule is periodically updated. Information that PSALM provides includes many contents that the EIPO does not contain. Accordingly, the EIPO should contemplate optimal coordination with the PSALM to enhance its website contents.

7.4 Towards An Optimal Infomediary System in Power Sector Market

One of the original objectives in establishing the EIPO system is to mitigate asymmetric information problem existing between sellers and buyers in the power sector market. In the previous section, this study reviewed the major existing power sector infomediaries and discussed the relationship between the EIPO and others. It was suggested in the previous section that in order to achieve one of the EIPO's goal, "One Stop Shopping Center," the EIPO's contents should be enhanced by coordination with other government agencies and consolidation of the contact details of all electric power industry participants into the EIPO system.

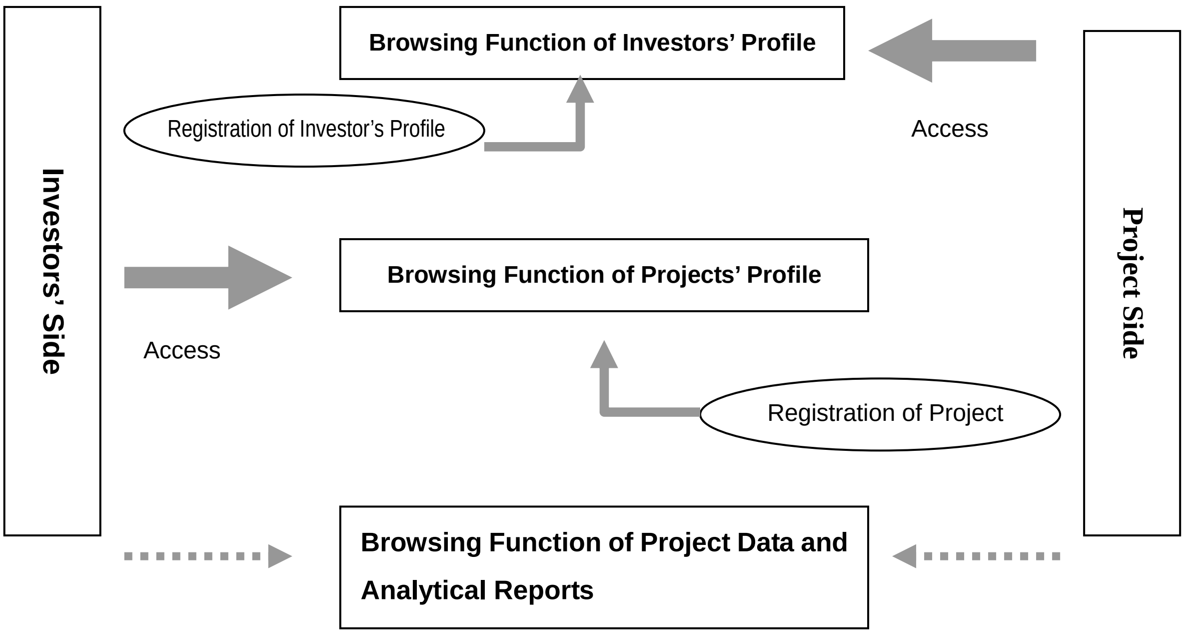


Figure7.1 Conceptual Scheme of the EIPO System

Source: MRI based on Department of Energy

7.5 Energy Investment Forum

7.5.1 Objective

As noted in the previous section, one of the key issues that the EIPO must address immediately is increasing the number of subscribers of the EIPO web-site. As of end of November 2004, 46 projects are registered in the site, but the investor' profiles uploaded are very few. To increase the number of investor subscriber, the EIPO held a forum titled "Energy Investment Forum" in cooperation with JICA team at Mandarin Oriental Hotel Manila on

December 3, 2004 with 125 participants and/or investors.

7.5.2 Program

The program has three parts, namely, Session I: "Energy Sector Market and Investment Opportunity", Session II: "Energy Investment Opportunity", and Session III: "Energy Financing Facilities".

The Session 1 included presentations by Secretary Vincent. S. Perez of the DOE ("Overview on the Energy Situation and Investment Opportunities in the Philippines") and Comissioner Rauf A.Tan of ERC ("Energy Regulatory Environment"). President Lasse Holopainen of PEMC gave a presentation under Session 2. On the other hand,, three (3) presentations were delivered in Session III and these are by Mr. R. G. David of the Development Bank of the Philippines (DBP), Mr. J. G. Tirona of LGU Guarantee Corporation (LGUGC), and Mr. Vipul Bhagat of the International Finance Corporation (IFC).

7.5.3 Abstracts of Presentations

Session I

Overview on the Energy Situation and Investment Opportunities in the Philippines"
Vincent S. Perez, Secretary of Department of Energy

In Secretary V. Perez's presentation, he explained the demand and supply forecast of the electricity market in 2005-2014. Along with the long-term forecast, he also explained the privatization schedule of the Philippine power sector in 2005-2014. The Secretary further advocated a new conceptual policy of the Philippine power sector structural reform titled "Energy Independence Package". Concretely, the package consists of the following five reform plans.

1. Increase reserves of indigenous oil and gas;
2. Aggressively develop renewable energy potential such as biomass, solar, wind and ocean resources;
3. Increase the use of alternative fuels;
4. Form strategic alliances with other contries; and
5. Strengthen and enhance energy efficiency and conservation programs.

At the end of his presentation, he encouraged the investor- participants to visit DOE and EIPO web-site..

Energy Regulatory Environment, Rauf A. Tan, Commissioner of ERC

Mr. R.A. Tan, Commissioner of ERC, first explained the purpose and background of the ERC's creation. He also added recent trends of ERC' regulation in the Philippine power sector. He emphasized the differences between the ERC and the former ERB and how the ERC became different since the enactment of EPIRA. He finally mentioned the introduction of the universal charge system and explained how it will influence future pricing policy.

Session II

Energy Investment Opportunities: Wholesale Electricity Spot Market (WESM), Lasse. A. Holopainen, President of the Philippine Electricity Market Corporation

Pres. L.A. Holopainen provided an explanation regarding recent trends in the Philippine electricity wholesale market. He first mentioned the wholesale market trend after the EPIRA' enforcement and then presented the current status and structure of the market. His presentation helped participants and investors to understand the system of the newly deregulated market in the Philippines.

Session III

Energy Financing Facilities

Session III provided presentations regarding what public financial schemes are available for investors. The presentors from DBP, LGUGC and IFC explained their loan and investment portfolio, as well as opportunities for availment of their loan packages for the power sector market in the Philippines.

The DBP presentor emphasized that the bank has a variety of financial tools including two-step loan. Here, DBP speaker mentioned that international cooperation with governments in industrialized countries are necessary to prepare two step loans. LGU Gurantee Corp is not financial institution, but an organization that provides guarantee. Mr. Tirona noted that their loan guarantee policy related to the power sector is very important. Mr. Bhagat, on the other hand, explained histrical achievement of World Bank Group in power sector loan disbursement since the 1980s and they will continue to extend the loan in East Asia.

8. Sustainable Capacity Building for the DOE

8.1 Capacity Building for the DOE

The activities undertaken by the team strengthened the capability of the DOE-EPIMB in the following areas of work:

Short-term objective: To consolidate the institutional form and human resources to formulate the proceeding PDP

- With regard to demand forecasting and PDP, the DOE can conduct the demand forecasting and PDP in the next year by themselves. However, the DOE is not yet ready to conduct the optimal siting of power plants nor Power flow analysis by themselves;
- With regard to evaluation of TDP, the person in charge had to spend time to evaluate the transmission line project in advance of the evaluation of TDP, and that person could not spend enough time on evaluating TDP.
- With regard to DDP aggregation, the DOE is fully capable of handling the review and consolidation of the DDPs.

Overall, the capability and skills of the DOE staff to perform related tasks have been improved dramatically However, the number of staff is still not sufficient to undertake the required review and analytical studies. This is a serious problem the DOE is facing in preparing PDP independently.

Medium and longer term objective: To establish the institutional form needed to implement the capacity building within the DOE for the necessary self-improvement.

With regard to the structure of the capacity building for the DOE, the proposal is outlined in Chapter 9.

The continuing lack of personnel results to (1) weakness of the self-development in the DOE and (2) lack of staff to take over the skill to the other.

8.2 Issues and Recommendations for Capacity Building in DOE

There is a limit to the period of the JICA Study Team support. Sufficient technical skill is provided to the DOE. However, the institutional capability may deteriorate in the near future because of possible transfer or retirement of staff trained by the JICA Study Team. To avoid such deterioration, and to improve such capability, sustainable capacity building within the DOE is necessary.

In order to conduct the sustainable capacity building in the DOE, a Training Program for internal capacity building in the DOE was prepared. Table 8.1 shows the elements of the plan.

Table 8.1 Target Level for the Capacity Building

Activity	Necessary Input	Target Date
To provide the necessary assistance in the preparation of PDP	Assistance in PDP preparation on at least one occasion, plus self-study using the relevant materials.	At the end of the first year.
To prepare the PDP	PDP preparation at on at least one occasion, plus self-study by using the relevant materials.	At the end of the second year.

To conduct the sustainable capacity building in the DOE, the capacity building scheme consisted of distribution of training materials and on-the-job training in the preparation for the PDP as shown in Figure 8.1.

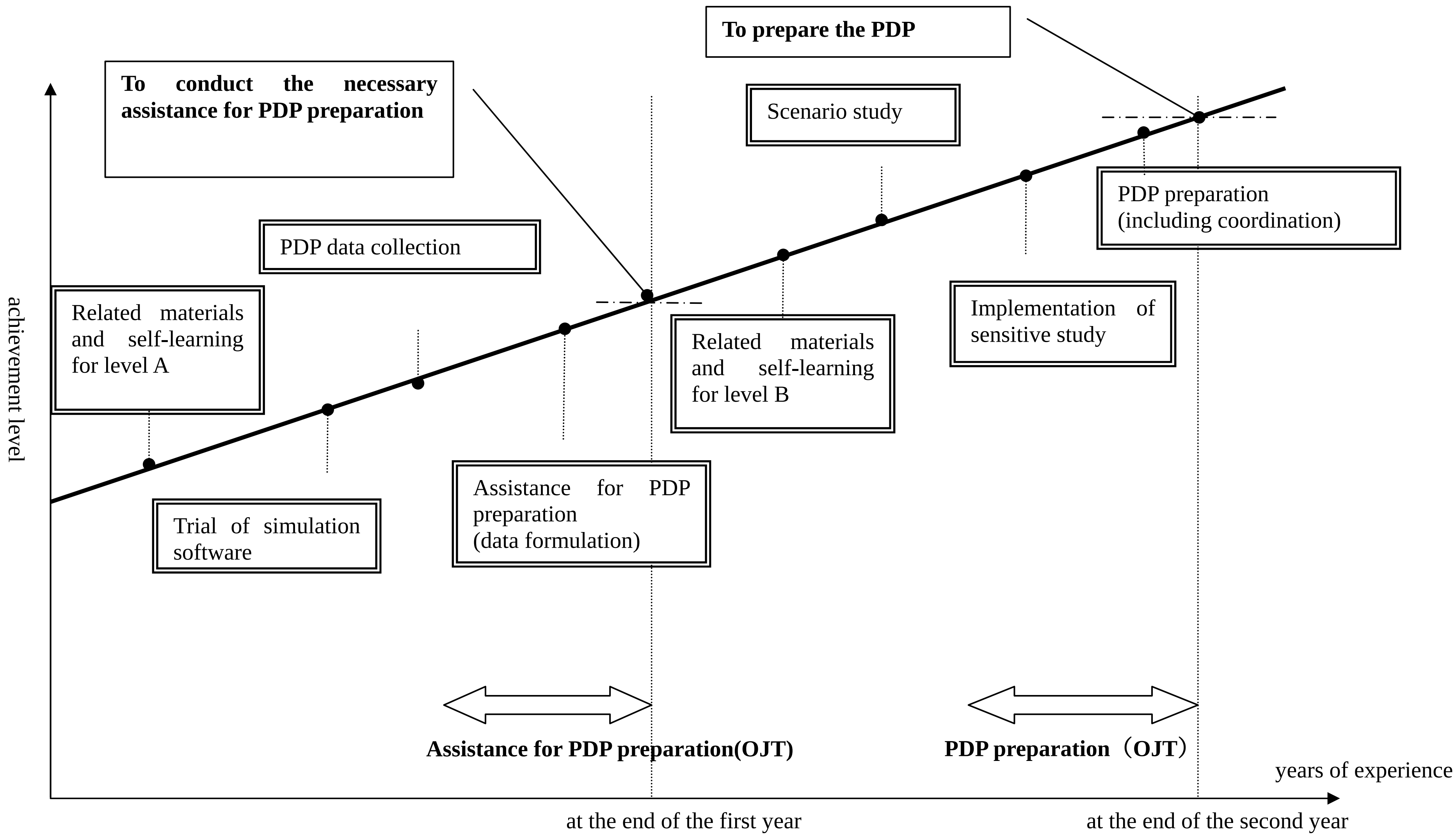


Figure 8.1 Capacity Building Scheme

Table8.2 shows materials for the capacity building program.

Table8.2　Materials for capacity building program

Years of experience	Materials
First year	（General documents） - PDP Preparation Manual(JICA） - PDP Data Management System Manual(JICA) （Demand Forecasting） - STATISTICA Manual （Power Development Plan） - WASP-IV Manual - GTMax　Manual （Transmission Development Plan) - PSS-E manual - Elements of Power System Analysis (Mc.Graw-Hill)
Second year	（Demand forecasting・Power development plan） - Least Cost Electric Utility Planning / Harry G. Stoll (John Wiley & Sons) (Power Development Plan） - WASP-III plus manual （Transmission Development Plan） - Power System Analysis / Hadi Saadat (Mcgraw-Hill)