REGION III: Central Luzon

At a Glance…

SOCIO-ECONOMIC PROFILE

Provinces	Bulacan, Pampanga, Tarlac, Nueva Ecija, Bataan, Zambales, Aurora
Land Area	21,470 sq. kms.
Population	8,204,742
Density	490 persons / sq. km.
GRDP	PhP 99.3 billion
Top Three Sectors	▪ Industry Sector ▪ Service Sector ▪ Agriculture, Fishery and Forestry Sector
Major Products	
Agricultural (Raw and Manufactured)	▪ Rice ▪ Onion ▪ Corn
Non-Agricultural	▪ Textile ▪ Leather products ▪ Gravel and sand

Source: National Statistical Coordination Board (NSCB)

A. ENERGY PROFILE

A.1 ENERGY RESOURCES

a. Geothermal

A lone site for possible geothermal exploration in Region 3 is situated in Mt. Natib, Bataan, which has a potential capacity of 185 megawatts (MW). Of this, 40 MW was offered in the Philippine Energy Contracting Round (PECR) 2005.

b. Hydropower

For hydropower resources, the region has two sites with a combined capacity of 16 MW as indicated in Table 1.

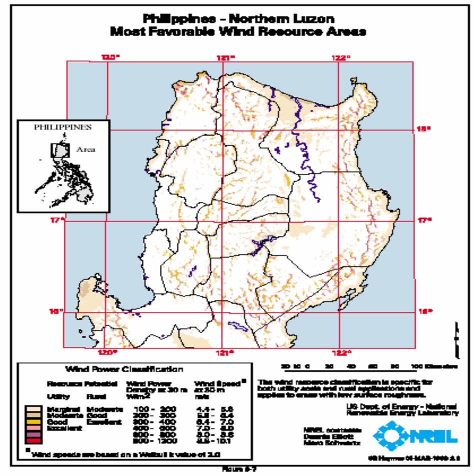
Table 1. POTENTIAL HYDROPOWER IN REGION III

Province	Number of Sites	Estimated Capacity (MW)
Tarlac	1	6
Aurora	1	10
Total	**2**	**16**

c. Wind

A 50-MW resource potential in Carranglan, Nueva Ecija is being considered under the Wind Investment Promotion Round. The other potential wind energy sites are shown in Figure 1.

Figure 1. POTENTIAL WIND ENERGY SITES



A.2. DOWNSTREAM FACILITIES

Table 2 shows the current inventory and distribution of existing downstream oil facilities in the region. The region has a storage capacity of 4,433 thousand barrels (MB) and boasts of 11 depots, 505 gas stations and 47 LPG refilling plants.

Table 2. DISTRIBUTION OF DOWNSTREAM OIL FACILITIES

Province	Depots		LPG Refilling Plants	Gasoline Stations
	Number of Units	Storage Capacity (MB)		
Aurora	-	-	1	5
Bataan	5	1,583.88	4	35
Bulacan	1	39.25	17	144
Nueva Ecija	-	-	6	102
Pampanga	4	394.39	11	130
Tarlac	-	-	6	48
Zambales	1	2,415.00	2	41
Total	**11**	**4,432.52**	**47**	**505**

A.3 POWER AND ELECTRIFICATION

The installed capacity of existing power-generating facilities in Central Luzon are some of the highest in Luzon.

The two biggest power plants located in the region are the 600-MW Limay combined-cycle gas turbine plant and the two-unit Masinloc coal-fired plant with installed capacity of 600 MW.

Table 3 shows the power plants in this region which have a combined capacity of 1,948 MW sourced from coal, diesel, gas turbine and hydropower power plants.

Table 3. EXISTING POWER PLANTS

Plant	Capacity (MW)		Location
	Installed	Dependable	
Coal			
Masinloc I	300.00	290.33	Masinloc, Zambales
Masinloc II	300.00	290.33	Masinloc, Zambales
Diesel			
Enron Subic 2	116.00	100.00	Subic, Olongapo City
Edison Global (BEPZA)	64.20	50.00	Mariveles, Bataan
Angeles PI DPP	30.00	30.00	Angeles City, Pampanga
FCVC DPP	32.00	32.00	Cabanatuan, Nueva Ecija
Tarlac Electric	18.90	12.60	Capas, Tarlac
Gas Turbine			
Limay CCGT	600.00	540.00	Limay, Bataan
Hydropower			
Masiway	12.00	11.00	Pantabangan, Nueva Ecija
Casecnan	140.00	140.00	Pantabangan, Nueva Ecija
Pantabangan	100.00	80.00	Pantabangan, Nueva Ecija
Angat	245.00	226.00	Norzagaray, Bulacan
Peñaranda RIS	0.30	0.30	Peñaranda, Nueva Ecija
Total	**1,948.40**	**1,802.56**	

The region hosts a total of 18 distribution utilities (DUs) : Angeles Electric Corporation (AEC), Aurora Electric Cooperative Inc. (AURELCO), Cabanatuan Electric Corporation (CELCOR), Nueva Ecija I Electric Cooperative (NEECO I), Nueva Ecija II Electric Cooperative (NEECO II), NEA Management Team (NMT), Peninsula Electric Cooperative (PENELCO), Pampanga Rural Electric Cooperative (PRESCO), Pampanga I Electric Cooperative (PELCO I), Pampanga II Electric Cooperative (PELCO II), Pampanga III Electric Cooperative (PELCO III), Tarlac I Electric Cooperatives (TARELCO I), Tarlac II Electric Cooperative (TARELCO II) and Zambales I Electric Cooperatives, inc. (ZAMECO I), Zambales II Electric Cooperative (ZAMECO II), San Jose City Electric Cooperative (SAJELCO), Tarlac Electric (TEI) and San Fernando Electric Light & Power Company, Inc. (SFELAPCO).

Table 4 highlights the performance of the utilities in terms of electricity purchase and sales, system loss and average electricity rates.

Table 4. REGIONAL ELECTRICITY PROFILE BY DISTRIBUTION UTILITY, 2005

Name of Distribution Utility	Electricity Purchased/ Generated (GWh)	Electricity Sales (GWh)	System Loss (%)	Classification
AEC	381	350	7.9	-
AURELCO	21	18	13.0	L
CELCOR	168	147	12.6	-
NEECO I	117	100	14.0	EL
NEECO II	115	90	20.9	EL
NMT	107	157	-	EL
PENELCO	261	230	11.5	ML
PRESCO	24	31	-	M
PELCO I	137	112	18.1	EL
PELCO II	281	229	18.6	ML
PELCO III	212	177	16.2	EL
TARELCO I	138	123	11.0	ML
SAJELCO	No data			
SFELAPCO	380	353	9.5	-
TEI	230	205	10.0	-
TARELCO II	141	125	11.0	EL
ZAMECO I	70	65	14.5	L
ZAMECO II	90	78	12.5	EL

ML-Mega Large, EL-Extra Large, L-Large, M-Medium
Note: Classification is based on the following criteria: (i) volume of average MWh Sales; (ii) number of service customers (iii) average kilometers of lines

Under the barangay electrification program, 3,084 of the 3,099 total barangays in the region have been energized, which represent a 99.5 percent electrification level. Four provinces, namely Tarlac, Bataan, Nueva Ecija and Bulacan, are 100 percent energized, while Zambales, Pampanga, and Aurora all have electrification levels of 93.4 percent or more.

Table 5. STATUS OF BARANGAY ENERGIZATION BY PROVINCE, as of 2005

Province	Coverage	Energized Barangays	Energization Level (%)
Aurora	151	141	93.38
Bataan	237	237	100.00
Bulacan	568	568	100.00
Nueva Ecija	849	849	100.00
Pampanga	537	534	99.44
Tarlac	510	510	100.00
Zambales	247	245	99.19
Total	**3,099**	**3,084**	**99.52**

As of 2004, a total of 818,071 out of 901,244 households have been energized. This represents a 90.8 percent energization level, leaving 83,173 households yet to be electrified.

A.4 BENEFITS TO HOST COMMUNITIES

As of 2005, the region has received accumulated financial benefit amounting to PhP 277.4 million for 249 projects. These funds, which are sourced from one percent of one centavo for every kilowatt-hour sold, are used to fund the electrification (EF), development and livelihood (DLF) and reforestation, watershed management, health and/ or environmental enhancement (RWMHEEF) projects of the host barangay, town or province (Table 6).

Table 6. SUMMARY OF APPROVED PROJECTS, as of 2005

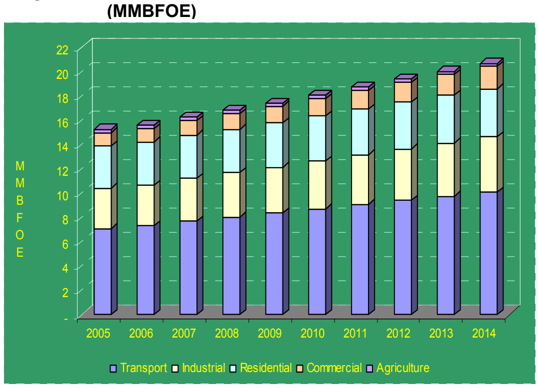
Type of Fund	Number of Projects	Total Amount (PhP million)
EF	84	94.41
DLF	93	85. 89
RWMHEEF	72	97.14
Total	**249**	**277.44**

B. ENERGY DEMAND FORECAST

The average share of the region in the country's total energy demand will register at 8.9 percent. Its average energy demand level will reach about 18.0 MMBFOE (2.6 MTOE), translating to a 3.4 percent average growth rate during the planning period.

The transport sector will have the largest energy demand in the region, constituting about 48.1 percent of the total (Figure 4). Meanwhile, consumption in the commercial sector will grow fastest at an average rate of 6.0 percent owing to various duty free shops and theme parks located in the area.

Figure 4. FINAL ENERGY DEMAND, BY SECTOR (MMBFOE)



Petroleum products will continue to dominate the region's fuel requirements, accounting for 64.7 percent of the total followed by biomass and electricity at 14.3 percent and 12.9 percent, respectively (Table 7).

Table 7. SECTORAL ENERGY DEMAND (MMBFOE)

	2005	2006	2010	2014
Grand Total	**15.23**	**15.57**	**17.96**	**20.54**
Oil and Oil Products	9.68	9.90	11.71	13.61
Coal	1.26	1.27	1.33	1.40
Biomass	2.50	2.51	2.57	2.66
Other Renewables	nil	0.01	nil	nil
Electricity	1.79	1.89	2.30	2.82
Natural Gas	-	-	0.12	0.21
Industry	**3.32**	**3.33**	**3.86**	**4.49**
Oil and Oil Products	1.31	1.27	1.46	1.78
Coal	1.26	1.27	1.33	1.40
Biomass	0.38	0.41	0.51	0.64
Other Renewables	nil	nil	Nil	Nil
Electricity	0.37	0.38	0.45	0.53
Natural Gas	-	-	0.11	0.14
Commercial	**1.09**	**1.13**	**1.45**	**1.84**
Oil and Oil Products	0.50	0.51	0.69	0.91
Biomass	0.04	0.04	0.04	0.05
Other Renewables	nil	nil	nil	nil
Electricity	0.55	0.58	0.71	0.88
Residential	**3.51**	**3.54**	**3.72**	**3.98**
Oil and Oil Products	0.55	0.55	0.57	0.61
Biomass	2.08	2.07	2.02	1.96
Other Renewables	nil	nil	nil	nil
Electricity	0.87	0.92	1.13	1.41
Transport	**7.05**	**7.30**	**8.68**	**10.03**
Oil and Oil Products	7.05	7.30	8.67	9.97
Natural Gas	-	-	0.02	0.06
Agriculture	**0.27**	**0.27**	**0.26**	**0.25**
Oil and Oil Products	0.27	0.27	0.26	0.25

Total may not tally due to rounding off

Residential

About 20.8 percent of the region's total fuel requirement will go the residential sector, which will register 3.7 MMBFOE (0.5 MTOE) across the planning period. Biomass and electricity will comprise the bulk of the demand in this sector with an average share of 53.9 percent and 30.7 percent, respectively.

Transport

During the planning period, average demand in the transport sector will amount to 8.7 MMBFOE (1.2 MTOE), accounting for 48.2 of the energy sector's total requirement. Diesel and gasoline will remain to be the primary fuels for the sector.

The use of natural gas for transport is envisioned to start in 2010, at an initial volume of 0.02 MMBFOE. This is projected to increase at an average rate of 41.4 percent until the end of the planning period.

Industrial

Average energy consumption in the industrial sector is estimated at 3.9 MMBFOE (0.6 MTOE), accounting for 21.6 percent of the total requirement of the region. Energy consumption of the sector is expected to increase at an average rate of 3.4 percent during the planning period. Coal, diesel and fuel oil will be the most utilized fuels in the sector with shares estimated at 34.3 percent, 17.3 percent and 15.2 percent, respectively.

Meanwhile, natural gas for industrial use will post an initial volume of 0.1 MMBFOE (0.01 KTOE) in 2007 and is projected to increase annually by an average of about 9.8 percent.

Commercial

The commercial sector in the region will grow fastest with an average energy demand of 7.0 percent, consuming an average volume of 1.5 MMBFOE (0.2 MTOE). This will translate to about 8.1 percent of the total energy demand in the region. Electricity will be the major fuel in the sector contributing about 49.3 percent to the total demand, followed by LPG (27.0 percent) and diesel (13.6 percent).

Agricultural

Energy demand in the agriculture sector will comprise only about 1.5 percent of the region's total energy requirement. On the average, demand level is about 0.3 MMBFOE (37.6 KTOE) and is projected to decline at the rate of 0.6 percent annually. Petroleum products particularly gasoline, kerosene, diesel and fuel oil will be the main fuel source in the sector, accounting for 99.9 percent share.

C. SECTORAL PLANS AND TARGETS

❖ POWER DEVELOPMENT PLAN

LUZON GRID

To support the growing demand in the Luzon grid, 1,950 MW of capacity addition is needed to be put up within the planning period. The region can contribute 3,340 MW to this requirement. Table 8 shows the list of indicative projects found in Region III.

Table 8. POTENTIAL CAPACITY ADDITIONS

Plant Addition	Installed Capacity (MW)	Location	Year Available
Tarlac Bioenergy	40	Tarlac, Tarlac	2008
Limay Conversion	600	Limay, Bataan	2010
Greenfield Plant	600	Limay, Bataan	2010
Greenfield Plant	600	Limay, Bataan	2012
LNG Power Plant	1,000	Limay, Bataan	2011
LNG Power Plant	500	Limay, Bataan	2012
Total	3,340		

SMALL ISLAND GRIDS

Peak demand in the region's small island grids is expected to increase at an average annual growth rate of 13.2 percent. Electricity sales will likewise exhibit an increasing trend, with average annual growth rate of 13.2 percent during the period (Table 9).

Generation Expansion Plan

With the expected increase in electricity demand, a total of 2.0 MW of new generating capacity is needed during the planning period.

Table 9. SMALL ISLAND GRIDS DEMAND AND SUPPLY OUTLOOK

	2005	2006	2010	2014
Peak Demand (MW)	0.88	0.99	1.62	2.67
Capacity Additions (MW)	1.00	-	-	-
Cumulative Installed Capacity (MW)	2.19	2.19	3.19	4.19
Dependable Capacity (MW)	1.63	1.63	2.53	3.43
Electricity Sales (GWh)	2.91	3.29	5.41	8.88
Power generation (GWh)	3.07	3.46	5.69	9.35

❖ TRANSMISSION DEVELOPMENT PLAN

The required transmission infrastructure projects needed to ensure reliability, adequacy and stability of power supply during the planning period are listed in Table 10:

Table 10. TRANSMISSION LINE PROJECTS

Project Name	Description	Target Date of Completion
Projects that will relieve constraints in the Luzon Grid		
Mexico-Balintawak 230 kV T/L Project	To relieve Mexico-Balintawak	2010
Mariveles LNG 1200 MW associated project	To relieve Hermosa, Mexico, Balintawak and Duhat Line	2010
Pantabangan-Cabanatuan T/L Upgrade	To relieve Pantabangan-Cabanatuan Line	2011
San Jose-Balintawak Line 3 Project	To relieve San Jose-Balintawak line	2011
San Jose 500 KV Reconfiguration	To relieve the San Jose 600 MVA transformer	2011
Projects to increase dispatch in Luzon		
Luzon Transmission Line Upgrading	To constraint element at San Manuel-Concepcion line and Concepcion-Mexico Line	Jun 2007
Mariveles LNG 1200 MW Associated project	To relieve constraint element at BTPP-Hermosa Line, Hermosa-Mexico Line and Mexico-Balintawak Line	Dec 2010
Ongoing Transmission Projects		
Luzon T/L Upgrading Project 1	To avert overloading of the existing San Manuel-Concepcion-Mexico 230 KV T/L	2007
Grid Code Compliance Project for Implementation		
Tap Hermosa-Balintawak	To address overloading problem of Mexico-Duhat line during outage of Duhat-Balintawak line.	*Sep 2005*
Indicative Project – Generation Associated		
Mariveles LNG 1200 MW Associated Project	To transport power from Mariveles LNG	2010
Indicative Project – Transmission		
Mexico-Balintawak 230 kV T/L Project	To replace old, existing lines and avert overloading due to load growth.	2011
Pantabangan-Cabanatuan T/L upgrade	To avert overloading of existing lines due to load growth.	2011
San Jose 500 kV Reconfiguration	To accommodate additional transformer at San Jose.	2011
New Munoz 230 kV S/S	To remove transmission function from non-Transco S/S.	2014
Angat-San Jose Reconductoring	To remove transmission function from non-Transco S/S.	2014
San Jose-Balintawak Line 3 Project	To avoid overloading of remaining circuit during N-1 condition as a result of larger power flows due to load growth and entry of new plants connected to the 500 kV backbone.	2011

❖ DISTRIBUTION DEVELOPMENT PLAN

To ensure reliability of supply at the distribution level, the distribution development plan in Region III is shown in Table 11.

Table 11. DISTRIBUTION DEVELOPMENT PLAN

Name of Cooperative	2005	2006	2010	2014
Number of Customers				
Residential	917,687	958,654	1,141,354	1,358,780
Commercial	56,833	58,523	66,553	76,243
Industrial	8,215	8,370	9,037	9,907
Others	23,106	23,700	26,527	30,046
TARELCO I				
System Loss (%)	11.0	10.5	9.3	9.0
Electricity Purchase/Generated (GWH)	138	146	187	240
Electricity Sales (GWH)	123	131	169	218
TARELCO II				
System Loss (%)	10.4	10.2	8.8	8.2
Electricity Purchase/Generated (GWH)	141	151	169	255
Electricity Sales (GWH)	125	134	153	223
NEECO I				
System Loss (%)	14.0	13.0	8.0	6.0
Electricity Purchase/Generated (GWH)	117	127	180	261
Electricity Sales (GWH)	100	111	165	245
NEECO II				
System Loss (%)	18.9	18.9	18.9	18.9
Electricity Purchase/Generated (GWH)	115	125	175	249
Electricity Sales (GWH)	90	98	138	196
SAJELCO	*No Data*			
PRESCO				
System Loss (%)	11.6	11.0	9.3	9.3
Electricity Purchase/Generated (GWH)	24	26	38	57
Electricity Sales (GWH)	21	23	35	52
PELCO I				
System Loss (%)	18.1	17.1	10.1	9.1
Electricity Purchase/Generated (GWH)	137	148	201	298
Electricity Sales (GWH)	112	122	181	270
PELCO II				
System Loss (%)	18.6	16.6	12.1	12.1
Electricity Purchase/Generated (GWH)	281	308	401	556
Electricity Sales (GWH)	228	256	352	489
PELCO III				
System Loss (%)	16.2	11.6	0.54	0.54
Electricity Purchase/Generated (GWH)	212	210	226	280
Electricity Sales (GWH)	177	185	224	278
PENELCO				
System Loss (%)	11.5	10.8	8.8	7.4
Electricity Purchase/Generated (GWH)	261	279	366	485
Electricity Sales (GWH)	230	248	332	446
ZAMECO I				
System Loss (%)	14.5	14.0	10.0	9.0
Electricity Purchase/Generated (GWH)	70	78	118	190
Electricity Sales (GWH)	59	66	106	172
ZAMECO II				
System Loss (%)	12.5	11.5	9.0	8.6
Electricity Purchase/Generated (GWH)	90	96	126	170
Electricity Sales (GWH)	77	84	114	155
NMT				
System Loss (%)	13.9	12.9	8.4	7.1
Electricity Purchase/Generated (GWH)	107	115	153	207
Electricity Sales (GWH)	91	99	140	191
AURELCO				
System Loss (%)	13.0	12.0	9.0	6.0
Electricity Purchase/Generated (GWH)	21	23	31	39
Electricity Sales (GWH)	18	20	28	37
AEC				
System Loss (%)	7.9	8.0	8.1	8.8
Electricity Purchase/Generated (GWH)	380	394	451	520
Electricity Sales (GWH)	350	362	414	474
SFELAPCO				
System Loss (%)	9.5	9.5	9.5	9.5
Electricity Purchase/Generated (GWH)	392	398	420	440
Electricity Sales (GWH)	353	359	379	396
TEI				
System Loss (%)	10.0	9.7	9.1	8.7
Electricity Purchase/Generated (GWH)	229	247	322	414
Electricity Sales (GWH)	205	221	291	377
CELCOR				-
System Loss (%)	12.6	11.9	9.7	8.9
Electricity Purchase/Generated (GWH)	168	173	194	221
Electricity Sales (GWH)	147	152	175	201

❖ *EXPANDED RURAL ELECTRIFICATION*

In terms of the region's Expanded Rural Electrification Program, full energization of barangays is envisioned by 2008 as shown in Table 12.

Table 12. EXPANDED RURAL ELECTRIFICATION PROGRAM

Year	Barangay	Expansion		Line Rehabilitation (ckt.-kms.)
		Distribution Lines (ckt.-kms.)	Substations (MVA)	
2006	4	45.87	50	416.31
2007	6	31.05	50	266.79
2008	5	32.62	65	335.70
2009	-	20.74	60	326.09
2010	-	8.70	35	160.98
2011	-	8.70	30	97.25
2012	-	8.70	30	45.93
2013	-	8.70	45	73.79
2014	-	8.70	40	91.15
Total	**15***	**165.08**	**405**	**1,813.96**

* Source: DOE
**Source: NEA

❖ *ENERGY RESOURCE DEVELOPMENT*

Geothermal

A possible 40 MW geothermal power plant located in Natib, Bataan is targeted for operation in 2010. The project necessitates drilling of 12 wells with cumulative steam availability expected to reach 46 MW in 2014 (Table 13).

Table 13. GEOTHERMAL MEASURABLE SECTORAL TARGETS

	2005	2006	2010	2014
Number of wells to be drilled	-	-	-	-
Steam Availability (Cum. MW)	-	-	42.39	45.76

Hydropower

Simulation results show that the Luzon grid can accommodate additional 430 MW of hydropower during the planning period. The region has two hydropower plants to serve as indicative capacity addition. The profile of these power plants with combined capacity of 1 MW is shown in Table 14.

Table 14. INDICATIVE HYDROPOWER CAPACITY ADDITIONS

Plant	Location	Classification	Potential Capacity (MW)	Year Available
Dinalugan	Dinalungan, Aurora	Mini-hydro	0.5	2007
Debutunan	Dipaculao, Aurora	Mini-hydro	0.5	2010
Total			**1.0**	

Biomass

A possible project during the planning period is the 5-MW rice husk fired-power plant located in Bulacan. This plant is targeted for commissioning in 2007.

Wind

There is a proposed wind energy project in Carranglan, Nueva Ecija by Coastal Power Development Corporation. There are also ongoing site assessments for the 50-MW project, which is planned for commissioning in 2008.

❖ *DOWNSTREAM SECTOR DEVELOPMENT*

Natural Gas

An LNG terminal located in the province of Bataan will provide for the gas requirement of the facilities in Region III and other parts of Luzon. It is envisioned that the main delivery infrastructure for this area will be Bataan-Manila transmission pipeline (BatMan 2). Spur lines for the area have been identified to deliver natural gas to the Limay combined-cycle power plant to fuel nearby economic zones, notably Subic and Clark, industrial plants and other Greenfield power plants that may be located along the route. The BatMan 2 pipeline is also expected to provide the gas requirement not only in Region III or Central Luzon, but also in Northern Luzon, Southern Tagalog and even NCR. BatMan 2 will connect with BatMan 1 in the Metropolitan Manila Area via a city distribution network called EDSA-Taft Loop (ET Loop).

The LNG terminal is expected to be in place by 2010. However, the early completion of the privatization of the Limay power plant could accelerate this schedule as well as the availability of additional gas supply.