REGION II: Cagayan Valley

At a Glance...

SOCIO-ECONOMIC PROFILE

Provinces	Cagayan Isabela Nueva Vizcaya Quirino Batanes Islands
Land Area	26,838.0 sq. kms.
Population	2,813,159
Density	109 persons / sq. km.
GRDP	PhP 25.0 billion
Top Three Sectors	▪ Industry Sector ▪ Service Sector ▪ Agriculture, Fishery and Forestry Sector
Major Products	
Agricultural (Raw and Manufactured)	• Rice ▪ Tobacco ▪ Corn ▪ Onion ▪ Garlic
Non- Agricultural	• Copper • Iron • Nickel

Source: National Statistical Coordination Board (NSCB)

A. ENERGY SITUATIONER

A.1 ENERGY RESOURCES

a. Geothermal

Estimated geothermal reserve in the region is 160 megawatts (MW), 135 MW of which is possible reserve while the remaining 25 MW is probable reserves.

b. Hydropower

The region hosts 42 sites for possible hydropower potential totaling 432 MW (Table 1).

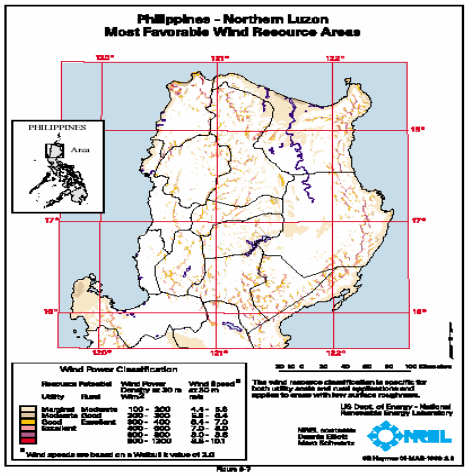
Table 1. LOCATIONS OF HYDROPOWER POTENTIAL RESOURCES

Location	Number of Sites	Estimated Capacity (MW)
Isabela	8	72
Quirino	19	179
Nueva Viscaya	15	181
Total	**42**	**432**

c. Wind

From the wind energy mapping studies, the combined Batanes and Babuyan Island wind farms has been identified as one of the six Philippine sites with the highest wind energy potential, generating 50 watts per square meter (W/m^2). Dinapigu, Isabela is also being considered as an additional potential site under the Wind Investment Promotion Round. Wind energy estimates are presented in Figure 1.

Figure 1. POTENTIAL WIND ENERGY SITES



d. Coal

The region has an *in-situ* reserves estimated at 82.6 million metric tons (MMMT) located in the Cagayan Basin. The basin covers several towns in Cagayan and Isabela provinces.

e. Other energy sources

Identified potential sites for ocean energy in the region are Batan Island and Babuyan Island in Batanes province.

As for gas, the Cagayan basin has an area of 24,000 square kilometers (sq. kms) with an estimated gas reserves of 2 billion cubic feet (BCF).

A.2 DOWNSTREAM FACILITIES

As of 2005, the region has an oil storage capacity of 175.2 thousand barrels (MB). The region hosts a depot, 160 gas stations, 5 liquefied petroleum gas (LPG) bulk and 5 LPG refilling plants (Table 2).

Table 2. DISTRIBUTION OF DOWNSTREAM OIL FACILITIES

Province	Depots		LPG Refilling Plants	Gasoline Stations
	Number of Units	Storage Capacity (MB)		
Cagayan	-	-	2	56
Isabela	1	175.2	2	72
Nueva Vizcaya	-	-	1	25
Batanes	-	-	-	-
Quirino	-	-	-	7
Total	**1**	**175.2**	**5**	**160**

When the San Antonio gas producing field was discovered in Echague, Isabela in the 1990s, the Philippine National Oil Company – Energy Development Corporation (PNOC-EDC) put up and operated a 3-MW mine-mouth power plant. Recognizing the potential non-power use of natural gas, a compressed natural gas (CNG) pilot refueling station was likewise constructed in the San Antonio Gas Plant in 2000, through the ASEAN-New Zealand Cooperation Program *Natural Gas Utilization in Transport.* The project looks into the potential of CNG as an alternative fuel to the transport sector, and has since served as a major source of CNG for PNOC vehicles in the area, as well as a demonstration center for CNG initiatives.

A.3 POWER AND ELECTRIFICATION

Table 3 shows that Cagayan Valley is host to the biggest hydroelectric power plant in Luzon – the Magat Hydro Electric Power Plant, which has been contributing 360 MW to the Luzon grid for more than three decades now.

There are also three (3) mini-hydropower plants in the region, namely: the Magat mini-hydropower plant A and B and the Tumauni mini-hydropower plant, all in Isabela.

The PNOC-EDC-operated 3 MW small-scale mine-mouth natural gas-fueled power plant In Echague, Isabela, which was put up in 1994, has a rated capacity of 3 MW of electricity.

Table 3. EXISTING POWER PLANTS

Plant	Capacity (MW)		Location
	Installed	Dependable	
Natural Gas			
San Antonio	3.00	3.00	Echague, Isabela
Hydropower			
NIA Baligatan	16.21	16.21	Ramon, Isabela
Magat	360.00	360.00	Ramon, Isabela
Magat Minihydro A	1.44	1.44	Ramon, Isabela
Magat Minihydro B	1.08	1.08	Ramon, Isabela
Tumauni Minihydro	0.25	0.25	Tumauini,Isabela
Total	**381.98**	**381.98**	

Electric cooperatives (ECs) in the region include the Cagayan I Electric Cooperative (CAGELCO I), Cagayan II Electric Cooperative (CAGELCO II), Isabela I Electric Cooperative (ISELCO I), Isabela II Electric Cooperative (ISELCO II), Nueva Vizcaya Electric Cooperative (NUVELCO), Quirino Electric Cooperative (QUIRELCO) and Batanes Electric Cooperative (BATANELCO). System loss and the electricity purchased and sales of each EC are indicated in Table 4.

Table 4. REGIONAL ELECTRICITY PROFILE BY ELECTRIC COOPERATIVE, 2005

Name of Cooperative	Electricity Purchased/ Generated (GWh)	Electricity Sales (GWh)	System Loss (%)	Classification
BATANELCO	5	4	6.0	S
CAGELCO I	128	110	13.0	EL
CAGELCO II	77	64	16.0	EL
ISELCO I	216	184	14.5	ML
ISELCO II	104	86	16.6	EL
NUVELCO	77	69	9.7	EL
QUIRELCO	39	34	13.6	L

ML-Mega Large, EL-Extra Large, L-Large, S-Small
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, 2,213 of the 2,311 total barangays in the region have been energized as of end 2005, which represents a 95.8 percent electrification level (Table 5).

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

Province	Coverage	Energized Barangays	Energization Level (%)
Batanes	29	29	100.00
Cagayan	820	781	95.24
Isabela	1,055	1,020	96.68
Nueva Viscaya	275	251	91.27
Quirino	132	132	100.00
Total	**2,311**	**2,213**	**95.76**

The region's household energization status as of 2004 stood at 84.5 percent, representing a total of 440,319 households energized out of the total 521,200 potential households.

A.4 BENEFITS TO HOST COMMUNITIES

As of 2005, the region has received an accumulated financial benefits amounting to PhP 52.3 million for the implementation of 93 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

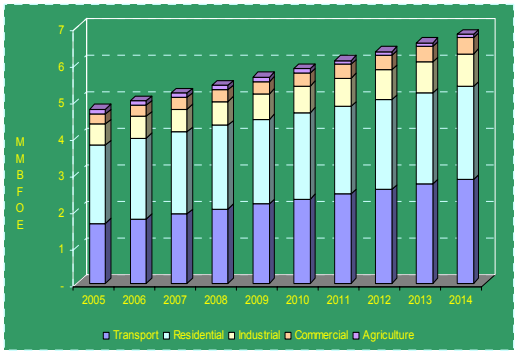
Type of Fund	Number of Projects	Total Amount (PhP million)
EF	29	28.05
DLF	33	9.03
RWMHEEF	31	15.25
Total	**93**	**52.33**

B. ENERGY DEMAND FORECAST

Total regional energy demand will register an average volume of 5.9 MMBFOE (0.8 MTOE), with demand growth posted at 4.1 percent annually. The region's energy demand will account for 2.9 percent of the total energy demand of the country.

The importance of energy in the economic development of the region is highly evident in the residential and transport sectors, which will account for the biggest shares in the regional energy demand (Figure 2).

Figure 2. FINAL ENERGY DEMAND, BY SECTOR (MMBFOE)



Petroleum products are the main fuels in the region (Table 7). Major petroleum products to be used will be diesel, basically for the transport sector, and LPG, primarily for cooking in the residential sector.

Table 7. SECTORAL ENERGY DEMAND (MMBFOE)

	2005	2006	2010	2014
Grand Total	**4.75**	**4.98**	**5.86**	**6.81**
Oil and Oil Products	2.52	2.71	3.41	4.12
Biomass	1.95	1.97	2.08	2.23
Other Renewables	nil	nil	nil	Nil
Electricity	0.28	0.30	0.37	0.46
Industry	**0.56**	**0.59**	**0.73**	**0.90**
Oil and Oil Products	0.08	0.08	0.09	0.10
Biomass	0.44	0.47	0.59	0.74
Other Renewables	nil	nil	nil	nil
Electricity	0.04	0.04	0.05	0.05
Commercial	**0.28**	**0.30**	**0.36**	**0.43**
Oil and Oil Products	0.11	0.11	0.14	0.17
Biomass	0.09	0.10	0.11	0.13
Other Renewables	nil	nil	nil	nil
Electricity	0.08	0.09	0.11	0.13
Residential	**2.14**	**2.21**	**2.36**	**2.53**
Oil and Oil Products	0.57	0.63	0.76	0.90
Biomass	1.41	1.40	1.38	1.36
Other Renewables	nil	nil	nil	nil
Electricity	0.16	0.18	0.22	0.27
Transport	**1.64**	**1.76**	**2.30**	**2.84**
Oil and Oil Products	1.64	1.76	2.30	2.84
Agriculture	**0.13**	**0.12**	**0.11**	**0.10**
Oil and Oil Products	0.13	0.12	0.11	0.10
Electricity	nil	nil	nil	nil

Total may not tally due to rounding off

Residential

Households will account for 40.2 percent of the regional energy demand over the planning period. Demand in this sector is estimated at an average volume requirement of 2.4 MMBFOE (0.3 MTOE).

Major fuel used in households is renewable energy, with an average share of 58.5 percent. Petroleum products will rank second with an average share of 32.4 percent followed by electricity, which will account for an average share of 9.2 percent of the sector's energy demand.

Transport

This sector will account for an average share of 39.2 percent of the region's total energy demand. Over the planning period, the transport sector will post an average volume requirement of 2.3 MMBFOE (0.3 MTOE).

Petroleum products will be the dominant fuels in the sector. Demand for diesel and gasoline are estimated to account for an average share of 74.5 and 24.1 percent, respectively.

Industrial

About 12.5 percent of the region's energy demand will be shared by the industrial sector, which will post an average volume requirement of 0.7 MMBFOE (0.1 MTOE) for the planning period.

Major fuels in this sector are renewable energy, with an average share of 81.4 percent, followed by petroleum products with an average share of 12.2 percent. Electricity will account for an average share of 6.4 percent of the total sectoral energy demand.

Commercial

Energy requirement in this sector will account for 6.2 percent of the region's total energy demand. Over the reference period, the commercial sector will require an average volume of 0.4 MMBFOE (52.1 KTOE) to fuel its growing enterprises.

Major fuels in this sector are petroleum products, which will account for an average share of 39.3 percent, followed by biomass with an average share of 30.7 percent.

Agricultural

Energy requirement in agriculture will account for 1.9 percent of the region's total energy demand. Considered the least energy-intensive among the sectors, energy requirement in agriculture is projected to post an average volume requirement of 0.1 MMBFOE (16.2 KTOE) over the planning period.

Petroleum products will be the dominant fuels in the sector. Demand for diesel is estimated at an average share of 88.2 percent. Fuel oil will follow, with an average share of 8.4 percent.

C. SECTORAL PLANS AND TARGETS

❖ TRANSMISSION DEVELOPMENT PLAN

Table 8 lists the transmission infrastructure projects required to meet customer demand and to ensure reliability, adequacy and stability of the nationwide transmission system during the planning period.

Table 8. TRANSMISSION LINE PROJECTS

Project Name	Description	Target Date of Completion
Projects to increase dispatch in Luzon		
Magat-Santiago Reinforcement project	To relieve constraint element at Magat-Santiago 230 lines	Dec 2012
Transmission Project for Implementation		
New Gamu S/S project	To provide new delivery point to ISELCO II.	2007
Indicative Project – Transmission		
Magat-Santiago Reinforcement	To allow full dispatch of Magat Plant that could not be maximized due tolack of provision for N-1.	2012

❖ DISTRIBUTION DEVELOPMENT PLAN

To ensure reliability of supply at the distribution level, the distribution development plan of ECs in Region II is shown in Table 9.

Table 9. DISTRIBUTION DEVELOPMENT PLAN

Name of Cooperative	2005	2006	2010	2014
Total Number of Customers				
Residential	539,901	559,034	646,481	762,764
Commercial	34,179	35,674	45,096	60,430
Industrial	3,448	3,523	3,868	4,294
Others	50,551	52,476	68,487	123,174
CAGELCO I				
System Loss (%)	13.0	11.8	8.6	4.6
Electricity Purchase/Generated (GWH)	127	131	156	188
Electricity Sales (GWH)	110	115	142	178
CAGELCO II				
System Loss (%)	16.0	14.4	11.1	9.5
Electricity Purchase/Generated (GWH)	76	80	102	134
Electricity Sales (GWH)	64	69	91	121
ISELCO I				
System Loss (%)	14.0	13.0	8.5	7.6
Electricity Purchase/Generated (GWH)	215	224	265	334
Electricity Sales (GWH)	184	194	242	308
ISELCO II				
System Loss (%)	16.6	15.1	7.0	2.5
Electricity Purchase/Generated (GWH)	104	108	126	159
Electricity Sales (GWH)	86	91	117	155
NUVELCO				
System Loss (%)	10.4	7.9	7.1	7.1
Electricity Purchase/Generated (GWH)	77	82	120	190
Electricity Sales (GWH)	69	75	111	176
QUIRELCO				
System Loss (%)	13.6	11.7	9.3	9.3
Electricity Purchase/Generated (GWH)	20	21	30	46
Electricity Sales (GWH)	34	37	54	83
BATANELCO				
System Loss (%)	6.0	5.9	5.4	5.4
Electricity Purchase/Generated (GWH)	5	5	9	18
Electricity Sales (GWH)	4	4	8	16

❖ EXPANDED RURAL ELECTRIFICATION

Ninety-eight barangays are targeted for energization in the region by 2008. Barangay energization using line extension will need a total of 275 circuit-kilometers (ckt.-kms.) of distribution lines and a corresponding 185 megavolt amperes (MVA) of substation capacity by 2008. To maintain and improve reliability of service, another 1,638 ckt.-kms. of distribution lines have been earmarked for rehabilitation within the planning period (Table 10).

Table 10. EXPANDED RURAL ELECTRIFICATION PROGRAM

Year	Barangays	Expansion		Line Rehabilitation (ckt.-kms.)
		Distribution Lines (ckt.-kms.)	Substations (MVA)	
2006	27	57.05	20	94.95
2007	37	36.84	20	156.20
2008	34	159.38	20	112.05
2009	-	21.48	10	384.21
2010	-	-	25	249.99
2011	-	-	30	136.86
2012	-	-	20	106.87
2013	-	-	30	238.16
2014	-	-	10	158.99
Total	**98***	**274.75****	**185****	**1,638.28****

*Source: DOE
**Source: NEA

❖ ENERGY RESOURCE DEVELOPMENT

Geothermal

During the planning period, geothermal development in the region will focus on exploratory works for the possible development of the 20-MW Baua Geothermal Project located in Cagayan. The project involves the drilling of a total of 7 wells during the planning period. By 2014, steam availability is expected to reach 27.1 MW (Table 11).

Table 11. GEOTHERMAL MEASURABLE SECTORAL TARGETS

	2005	2006	2010	2014
Number of wells to be drilled	-	-	1	-
Steam Availability (Cum. MW)	-	-	15.19	27.06

Hydropower

The region can contribute a combined indicative capacity addition of 539 MW of hydropower resources during the planning period. These will be sourced from four (4) possible projects, as indicated in Table 12.

Table 12. INDICATIVE HYDROPOWER CAPACITY ADDITIONS

Plant	Location	Classification	Potential Capacity (MW)	Year Available
Adalam	Aglipay, Quirino	Large	46	2010
Diduyon*	Aglipay, Quirino	Large	345	2011
Abuan*	Ilagan, Isabela	Large	60	2013
Ilaguen*	San Ramon, Isabela	Large	88	2014
Total			**539**	

*With feasibility study