

REGION I: Ilocos Region

At a Glance...

SOCIO-ECONOMIC PROFILE

Provinces	Ilocos Norte, Ilocos Sur, La Union, Pangasinan				
Land Area	12,840 sq. kms.				
Population	4,174,000				
Density	325 persons / sq. km.				
GRDP	Php 34.1 billion				
Top Three Sectors	<ul style="list-style-type: none"> ▪ Agriculture, Fishery and Forestry Sector ▪ Service Sector ▪ Trade Sector 				
Major Products	<table border="0"> <tr> <td style="padding-right: 10px;">Agricultural (Raw and Manufactured)</td> <td> <ul style="list-style-type: none"> ▪ Tobacco ▪ Rice ▪ Corn </td> </tr> <tr> <td>Non-Agricultural</td> <td> <ul style="list-style-type: none"> ▪ Limestone ▪ Feldspar ▪ Copper </td> </tr> </table>	Agricultural (Raw and Manufactured)	<ul style="list-style-type: none"> ▪ Tobacco ▪ Rice ▪ Corn 	Non-Agricultural	<ul style="list-style-type: none"> ▪ Limestone ▪ Feldspar ▪ Copper
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Source: National Statistical Coordination Board (NSCB)

A. ENERGY SITUATIONER

A.1 ENERGY RESOURCES

a. Geothermal

The overall geologic setting, chemistry of thermal springs and extent of hydrothermal alteration in the region point to the existence of a probable geothermal field. Initial integrated geoscientific investigations in the area showed some promising sites in Cervantes, Ilocos Sur, San Fernando, La Union, and Balungao, Pangasinan.

b. Hydropower

For hydropower, Table 1 indicates the abundance of this resource potential in Region I.

Table 1. LOCATIONS OF HYDROPOWER POTENTIAL RESOURCES

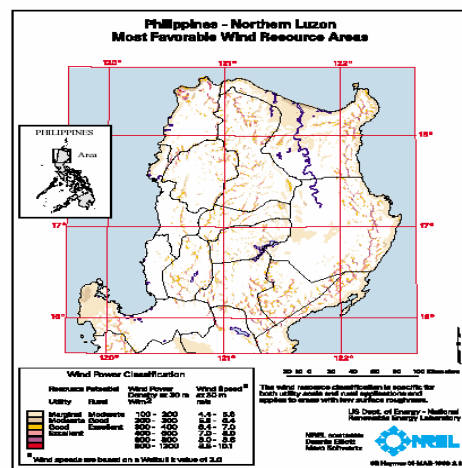
Province	Number of Sites	Estimated Capacity (MW)
Ilocos Norte	3	22
Ilocos Sur	4	40
La Union	6	35
Pangasinan	4	26
Total	17	123

c. Wind

Meanwhile, several wind potential areas in the region are considered under the Wind Investment Promotion Round. These include the potential sites in the following areas: (i) Pagudpud, Ilocos Norte (40 MW); (ii) Burgos, Ilocos Norte (15 MW); and; (iii) Sual, Pangasinan (25 MW). Two additional potential sites, namely, Bani and Bolinao, both in Pangasinan, are also presently being considered for investment promotion.

In terms of wind assessment, good-to-excellent wind resources exist in Ilocos Norte, particularly along the coastal hills extending from Agaga to Dumalneg, as shown in Figure 1.

Figure 1. POTENTIAL WIND ENERGY SITES



d. Other energy sources

Likewise, owing to its long coastline, Ilocos Norte is a potential site for ocean energy, which is a resource option being considered by the country.

A.2 DOWNSTREAM FACILITIES

The region hosts a number of downstream facilities for oil and coal. For downstream oil facilities, five depots, 14 liquefied petroleum gas (LPG) refilling plants, and 237 gas and service stations are strategically located all over the region as indicated in Table 2. Of the total 237 gas stations, 217 stations or 91.6 percent are from the big three oil companies while the remaining 8.4 percent is owned by the new players.

Table 2. DISTRIBUTION OF DOWNSTREAM OIL FACILITIES

Province	Depots		LPG Refilling Plants	Gasoline Stations
	Number of Units	Storage Capacity (MB)		
Ilocos Norte	1	27.61	2	38
Ilocos Sur	-	-	3	32
La Union	4	462.24	2	34
Pangasinan	-	-	7	133
Total	5	489.85	14	237

For downstream coal, one coal terminal is located in Poro Point, San Fernando City, La Union, with a total maximum handling capacity of 500 tons per hour (TPH). The terminal includes a pier with 5,000 deadweight ton (DWT) capacity and a stockyard capable of handling 20,000 metric tons (MT). It serves as a distribution point for coal users, especially for the cement industry in La Union, Pangasinan and other areas of Northern Luzon.

A.3 POWER AND ELECTRIFICATION

The region hosts ten power stations with a total installed capacity of 1,682 megawatts (MW). These power stations are fueled by four energy resources, namely: wind, hydropower, coal and oil.

With the exception of the 52-MW Trans Asia Power, all existing power plants are operated by the National Power Corporation-Independent Power Producers (NPC-IPPs) under the Build-Operate-Transfer (BOT) scheme.

Table 3 breaks down the ten existing power plants in the region and their corresponding capacities.

Table 3. EXISTING POWER PLANTS

Plant	Capacity (MW)		Location
	Installed	Dependable	
Coal			
Sual I	647.00	576.00	Sual, Pangasinan
Sual II	647.00	576.00	Sual, Pangasinan
Diesel			
FPPC – Bauang DPP	235.20	210.00	Bauang, La Union
Trans Asia Power	52.00	52.00	Bacnotan, La Union
Wind			
Bangui	24.75	24.75	Bangui, Ilocos Norte
Hydropower			
Agua Grande	4.55	4.55	Ilocos Norte
Amburayan	0.20	0.20	La Union
Dawara	0.53	0.53	Ilocos Sur
Batchelor	0.75	0.75	Pangasinan
Bakun	70.00	70.00	Alilem, Ilocos Sur
Total	1,681.98	1,514.78	

In terms of the region's access to electricity, electricity distribution is provided by eight distribution utilities (DUs), two of which are private investor-owned utilities (PIOUs). These DUs are as follows: Ilocos Norte Electric Cooperative (INEC), Ilocos Sur Electric Cooperative (ISEC), La Union Electric Cooperative (LUELCO), Pangasinan I Electric Cooperative (PANELCO I), Central Pangasinan Electric Cooperative (CENPELCO) and Pangasinan III Electric Cooperative (PANELCO III), Dagupan Electric Corporation (DECORP) and La Union Electric Company, Inc. (LUECO).

Table 4 shows the electricity purchased and/or generated and electricity sales of each DU. Also shown are their respective system losses for 2005, which can be classified as either technical or non-technical losses. A single digit system loss is targeted by 2010.

Table 4. REGIONAL ELECTRICITY PROFILE BY DISTRIBUTION UTILITY, 2005

Name of Distribution Utility	Electricity Purchased/Generated (GWh)	Electricity Sales (GWh)	System Loss (%)	Classification
INEC	195	170	11.70	ML
ISECO	163	141	13.10	ML
LUELCO	172	147	14.00	ML
PANELCO I	79	65	16.70	EL
CENPELCO	231	189	18.00	ML
PANELCO III	227	187	17.00	ML
DECORP	264	239	9.10	-
LUECO	136	121	10.20	-

ML-Mega Large, EL-Extra Large

Note: Classification is based on the following criteria: (i) volume of average MWh Sales; (ii) number of service customers (iii) average kilometers of lines

The ECs are likewise key partners of the government's ongoing Expanded Rural Electrification Program. As of end-2005, the region has one of the highest electrification levels in the country, with only nine remaining barangays to be energized (Table 5). These barangays, which are mostly located in off-grid and remote areas in Ilocos Sur, include: Bgy. Batbato, Bgy. Daddaay, Bgy. Kiat in the municipality of Alilem, Bgy. Dinwede East, Bgy. Dinwede West, Bgy. Libang and Bgy. Pilapil of the municipality of Cervantes, Bgy. Paticana in the municipality of Quirino and Bgy. Madarang in the municipality of Salcedo.

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

Province	Coverage	Energized Barangays	Energization Level (%)
Ilocos Norte	557	557	100.00
Ilocos Sur	768	759	98.83
La Union	576	576	100.00
Pangasinan	1,364	1,364	100.00
Total	3,265	3,256	99.72

In terms of the region's household energization, 88.7 percent of the total households has been energized as of 2004. This represents a total of 620,046 households energized out of the total 699,300 potential households.

A.4 BENEFITS TO HOST COMMUNITIES

As of 2005, the region has received an accumulated financial benefit amounting to PhP 93.2 million. 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

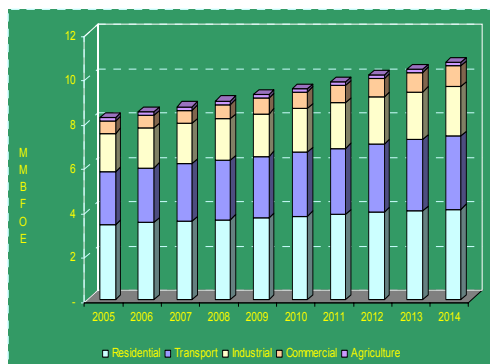
Type of Fund	Number of Projects	Total Amount (PhP million)
EF	31	28.28
DLF	18	30.41
RWMHEEF	21	34.47
Total	70	93.16

B. ENERGY DEMAND FORECAST

The total energy demand of the region is expected to register an average volume of 9.5 MMBFOE (1.4 MTOE) over the planning period. This will translate to an average growth of 3.0 percent. The average share of the region in the country's total energy demand will post at 4.7 percent.

The residential sector will register the highest energy demand requirement, while the commercial sector will post the fastest in terms of growth (Figure 2).

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



Over the planning period, petroleum products will be the dominant fuel in the region, followed by biomass, particularly fuelwood and electricity (Table 7).

Residential

Energy demand in the residential sector will constitute an average share of 39.4 percent of the total energy demand of the region. It is projected to increase by 2.2 percent annually and post an average annual volume of 3.8 MMBFOE (0.5 MTOE). Biomass resources, particularly fuelwood, will be the major fuel, comprising 52.8 percent of the total demand, followed by LPG at 25.2 percent and electricity at 20.3 percent.

Transport

Demand in the transport sector will account for an average share of 30.3 percent of the total energy demand of the region, with demand expected to grow by an average of 3.8 percent annually. In terms of volume, demand is anticipated to reach an average of 2.9 MMBFOE (0.4 MTOE) during the planning period fueled mainly by petroleum products. Diesel and gasoline will account for shares of 59.3 percent and 38.4 percent, respectively.

Industrial

The industrial sector will take up an average of 20.9 percent of the region's energy demand. With a projected average annual growth rate of 2.7 percent, demand is estimated at an average volume of 2.0 MMBFOE (0.3 MTOE). Coal

will be the dominant fuel in this sector, registering 55.3 percent share in the sector's energy consumption, followed by biomass at 15.8 percent and electricity at 12.2 percent.

Commercial

The commercial sector's energy consumption, which will cover 7.9 percent of the total demand of the region, is estimated to grow at an average rate of 6.0 percent annually. Over the planning period, energy consumption is expected to reach an average volume of 0.8 MMBFOE (0.1 MTOE). Electricity will be the major fuel in the sector with an average share of 58.4 percent, followed by LPG at 20.2 percent and diesel at 12.2 percent.

Table 7. SECTORAL ENERGY DEMAND (MMBFOE)

	2005	2006	2010	2014
Grand Total	8.18	8.43	9.49	10.67
Oil and Oil Products	3.74	3.92	4.63	5.38
Coal	1.04	1.05	1.10	1.15
Biomass	2.29	2.29	2.33	2.38
Other Renewables	0.02	0.02	0.02	0.02
Electricity	1.09	1.15	1.41	1.73
Industry	1.75	1.77	1.98	2.23
Oil and Oil Products	0.29	0.27	0.33	0.40
Coal	1.04	1.05	1.10	1.15
Biomass	0.23	0.25	0.31	0.39
Other Renewables	nil	nil	nil	nil
Electricity	0.19	0.20	0.24	0.28
Commercial	0.55	0.58	0.74	0.93
Oil and Oil Products	0.19	0.20	0.28	0.36
Biomass	0.03	0.03	0.03	0.04
Other Renewables	nil	nil	nil	nil
Electricity	0.33	0.35	0.43	0.53
Residential	3.36	3.47	3.74	4.08
Oil and Oil Products	0.74	0.82	0.99	1.17
Biomass	2.03	2.02	1.98	1.95
Other Renewables	0.01	0.02	0.02	0.02
Electricity	0.58	0.61	0.75	0.94
Transport	2.36	2.47	2.89	3.30
Oil and Oil Products	2.36	2.47	2.89	3.30
Agriculture	0.15	0.15	0.15	0.15
Oil and Oil Products	0.15	0.15	0.15	0.14
Solar	nil	nil	nil	nil

Total may not tally due to rounding off

Agricultural

Demand for energy in the agriculture sector, which registered an average share of 1.5 percent, is projected to decrease at a rate of 0.6 percent due to rapid urbanization and development of commercial areas in the region. The average volume of consumption will be posted at around 0.1 MMBFOE (21.6 KTOE) for the planning period. Petroleum products, specifically diesel, will be the dominant fuel of the sector with an average share of 99.4 percent. Solar energy will account for a minimal 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 within the planning period. The region can contribute 105 MW to this requirement. Table 8 shows the list of projects found in Region I.

Table 8. POTENTIAL CAPACITY ADDITIONS

Plant Addition	Capacity (MW)	Location	Year Available
Northwind Power*	25	Bangui, Ilocos Norte	2005
PNOC-EDC Wind Power*	40	Burgos, Ilocos Norte	2007
North Luzon Phase II Wind Project	40	Pagudpod, Ilocos Norte	2009
Total	105		

* Committed Projects

❖ TRANSMISSION DEVELOPMENT PLAN

Table 9 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 9. TRANSMISSION LINE PROJECTS

Project Name	Description	Target Date of Completion
N-1 Projects		
Bauang-San Esteban	L2 Stringing Project	Sep 2005
San Esteban-Bantay-elaoag	230 KV T/L	Dec 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
Ongoing Generation Associated Projects		
San Roque Hydro Associated T/L Project	To transport power from San Roque hydro plant	Dec 2005
40-MW PNOC Wind Farm Associated T/L	To transport power from PNOC wind farm	2006
25-MW NWPDC wind farm associated T/L	To transport power from NWPDC wind farm	Dec 2005
Ongoing Transmission Projects		
Bauang-San Esteban Line 2 Project	To strengthen the transmission highway in the Ilocos Region	2007
Transmission Project for Implementation		
Binga-San Manuel 230 kV T/L Project	To increase power transfer capability from the North to Central Luzon.	2010
Transmission Project for Implementation (Priority 2)		
San Esteban-Bantay-Laoag 230 kV T/L	To strengthen transmission corridor in the Ilocos region.	Dec 2011
Indicative Project – Transmission		
Bacnotan S/S Exp. & Asso. T/L	To remove transmission function at non-Transco S/S.	2014
Bauang S/S Exp. Project	To remove transmission function at non-Transco S/S.	2014

❖ DISTRIBUTION DEVELOPMENT PLAN

To ensure reliability of supply at the distribution level, the distribution development plan of ECs and PIOUs in Region I are shown in Table 10.

Table 10. DISTRIBUTION DEVELOPMENT PLAN

Name of Cooperative	2005	2006	2010	2014
Number of Customers				
Residential	662,691	684,110	784,672	916,784
Commercial	42,706	45,248	59,584	84,646
Industrial	584	603	704	829
Others	22,334	22,927	25,724	29,986
INEC				
System Loss (%)	11.74	11.14	9.09	9.09
Electricity Purchase/Generated (GWH)	195	232	435	706
Electricity Sales (GWH)	170	204	392	636
ISECO				
System Loss (%)	13.13	12.63	9.98	9.90
Electricity Purchase/Generated (GWH)	165	172	222	297
Electricity Sales (MWH)	142	152	200	267
LUELCO				
System Loss (%)	14.03	14.03	14.03	14.03
Electricity Purchase/Generated (GWH)	172	195	280	477
Electricity Sales (GWH)	147	167	239	409
PANELCO I				
System Loss (%)	16.68	15.37	9.93	9.93
Electricity Purchase/Generated (GWH)	79	82	98	131
Electricity Sales (GWH)	65	69	88	117
CENPELCO				
System Loss (%)	18.00	16.00	9.00	7.00
Electricity Purchase/Generated (GWH)	231	242	294	368
Electricity Sales (GWH)	189	203	267	341
PANELCO III				
System Loss (%)	17.05	16.00	12.05	8.05
Electricity Purchase/Generated (GWH)	227	238	308	491
Electricity Sales (GWH)	187	198	270	451
DECORP				
System Loss (%)	9.10	9.10	9.10	9.10
Electricity Purchase/Generated (GWH)	264	282	358	443
Electricity Sales (GWH)	239	256	325	401
LUECO				
System Loss (%)	10.20	10.00	9.40	8.70
Electricity Purchase/Generated (GWH)	136	141	166	194
Electricity Sales (GWH)	121	126	149	176

❖ EXPANDED RURAL ELECTRIFICATION

The Department of Energy (DOE), in partnership with its attached agencies, other government agencies and the private sector, will undertake the full energization of the barangays in the region within the planning period. Table 11 indicates the barangay energization schedule of the region.

Table 11. EXPANDED RURAL ELECTRIFICATION PROGRAM

Year	Barangays	Expansion		Line Rehabilitation (ckt.-kms.)
		Distribution Line (ckt.-kms.)	Substations (MVA)	
2006	3	86.36	45	299.87
2007	3	89.38	25	197.55
2008	3	96.32	30	201.93
2009	-	36.18	20	139.55
2010	-	4.05	-	21.04
2011	-	4.39	15	9.67
2012	-	3.96	10	5.01
2013	-	3.99	20	4.37
2014	-	46.29	10	4.27
Total	9*	370.92**	175**	883.26**

* Source: DOE

**Source: NEA

❖ ENERGY RESOURCE DEVELOPMENT

Geothermal

Thermal manifestations capable of producing commercial quantities of steam are yet to be identified but, as indicated in earlier discussion, some promising sites are located in Cervantes in

Ilocos Sur, San Fernando in La Union and Balungao in Pangasinan.

Hydropower

Within the planning period, the region can contribute to the capacity requirement of the Luzon grid using hydropower. An ongoing feasibility study on the possible commissioning in 2008 of the Upper Agno Mini-hydropower Plant in Pangasinan is currently being conducted by the AXOR Group, Inc.

Wind

For wind energy, studies using 50 watt per square meter (W/m^2) power density criteria showed that Region I is one of the six regions in the country with high potential for wind resource development. Under the Philippine Wind Energy Investment Kit, three of the 16 sites available as indicative wind power capacity additions are located in the region (Table 12). Feasibility studies on Pagudpud and Burgos are ongoing and being conducted by the Philippine National Oil Company-Energy Development Company (PNOC-EDC). As for the 25-MW site in Sual, Pangasinan, its development was awarded to Trans-Asia Renewable Energy Corporation in December 2004.

Table 12. INDICATIVE WIND POWER CAPACITY ADDITIONS

Location	Potential Capacity (MW)	Year Available
Pagudpud, Ilocos Norte	40	2008
Burgos, Ilocos Norte	15	2009
Sual, Pangasinan	25	2010
Total	80	