

CAR: Cordillera Administrative Region

At a Glance...

SOCIO-ECONOMIC PROFILE

Provinces	Abra, Apayao, Benguet, Ifugao, Kalinga, Mountain Province
Land Area	18,000 sq. kms.
Population	1,365,412
Density	61 persons / sq. km.
GRDP	PhP 27.2 billion
Top Three Sectors	<ul style="list-style-type: none"> ▪ Industry Sector ▪ Service Sector ▪ Agriculture, Fishery and Forestry Sector
Major Products	
Agricultural (Raw and Manufactured)	<ul style="list-style-type: none"> ▪ Temperate vegetables ▪ Temperate fruits ▪ Cut flowers
Non-Agricultural	<ul style="list-style-type: none"> ▪ Gold ▪ Copper ▪ Silver

Source: National Statistical Coordination Board (NSCB)

A. ENERGY SITUATIONER

A.1 ENERGY RESOURCES

a. Geothermal

Based on preliminary assessment, the region has three provinces with estimated geothermal resource potential of 510 megawatts (MW) as indicated in Table 1.

Table 1. LOCATIONS OF GEOTHERMAL POTENTIAL RESOURCES

Province	Estimated Capacity (MW)
Kalinga	200
Ifugao	190
Mountain Province	120
Total	510

b. Hydropower

Resources for hydropower likewise abound in the region. In the case of small hydropower potential, a total of 65 sites with an estimated capacity of 659 MW has been identified, as seen in Table 2.

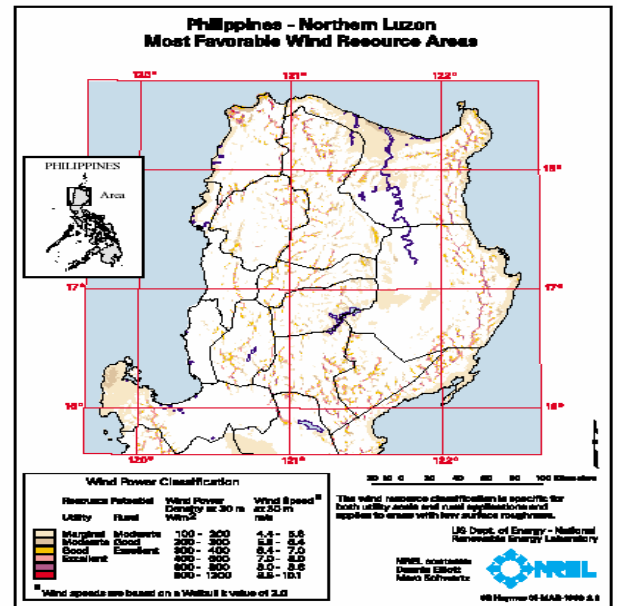
Table 2. LOCATIONS OF HYDROPOWER POTENTIAL RESOURCES

Province	Number of Sites	Estimated Capacity (MW)
Abra	20	196
Benguet	9	79
Ifugao	3	32
Kalinga	30	318
Mountain Province	3	34
Total	65	659

c. Wind

The estimated wind power density in the region ranges from 100 to 600 Watt per square meter (W/m^2) as illustrated in Figure 1.

Figure 1. POTENTIAL WIND ENERGY SITES



Note: Based on the NREL benchmark, areas with at least 5 kWh/sq.km./day of climatological solar radiation (CSR) have good solar power potential.

A.2 DOWNSTREAM FACILITIES

The region currently hosts a number of oil downstream facilities composed of 50 gasoline stations, one depot and five liquefied petroleum gas (LPG) refilling plants. The distribution of these facilities is indicated in Table 3.

Table 3. DISTRIBUTION OF DOWNSTREAM OIL FACILITIES

Province	Depots		LPG Refilling Plants	Gasoline Stations
	Number of Units	Storage Capacity (MB)		
Abra	-	-	-	4
Apayao	-	-	-	3
Benguet	1	0.50	5	26
Mountain Province	-	-	-	3
Ifugao	-	-	-	5
Kalinga	-	-	-	9
Total	1	0.50	5	50

A.3 POWER AND ELECTRIFICATION

There are 16 power plants actively operating in the region with a total installed capacity of 565.41 MW. All plants which are located in Benguet are fueled by hydropower. Table 4 shows the breakdown of capacity per plant.

Table 4. EXISTING POWER PLANTS

Plant	Capacity (MW)		Location
	Installed	Dependable	
Hydropower			
San Roque	345.90	85.00	Benguet
Hedcor	25.35	25.35	Benguet
NIA-Baligatan	6.00	6.00	Benguet
NMHC	12.10	6.00	Benguet
Ambuklao	75.00	-	Benguet
Binga	100.00	100.00	Benguet
Philex	0.50	0.50	Benguet
Club John Hay	0.56	0.56	Benguet
Total	565.41	223.41	

The region is under the service areas of five electric cooperatives (ECs), namely: Abra Electric Cooperative (ABRECO), Benguet Electric Cooperative (BENECO), Ifugao Electric Cooperative (IFELCO), Kalinga-Apayao Electric Cooperative (KAELCO), and Mountain Province Electric Cooperative (MOPRECO).

Table 5 indicates the performance of each EC in terms of electricity purchased or generated, electricity sales and system loss.

Table 5. REGIONAL ELECTRICITY PROFILE BY ELECTRIC COOPERATIVE, 2005

Name of Cooperative	Electricity Purchased/Generated (GWh)	Electricity Sales (GWh)	System Loss (%)	Classification
ABRECO	32	27	13.4	L
BENECO	292	260	11.0	ML
IFELCO	10	8	14.0	M
KAELCO	17	14	14.2	L
MOPRECO	12	11	14.0	L

ML-Mega 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

The total number of barangays energized as of end-2005 is 1,114 out of a total of 1,172 barangays, registering a 95.0 percent electrification level in the REGIONAL ENERGY PROFILE Cordillera Administrative Region

region (Table 6). The remaining unenergized barangays, especially in Apayao, are in far-flung areas. Majority of these are located in off-grid areas.

Table 6. STATUS OF BARANGAY ENERGIZATION BY PROVINCE, as of 2005

Province	Coverage	Energized Barangays	Energization Level (%)
Abra	303	303	100.00
Apayao	131	98	74.81
Benguet	269	264	98.14
Ifugao	175	168	96.00
Kalinga	150	137	91.33
Mountain Province	144	144	100.00
Total	1,172	1,114	95.05

The region has a total of 244,900 households. Out of this number, 203,186 households or 83.0 percent have been energized as of 2004.

A.4 BENEFITS TO HOST COMMUNITIES

As of 2005, the region has received a total of PhP 57.7 million in financial benefit under Energy Regulations (ER) 1-94. This money has been used to implement projects falling under three types of funds: electrification fund (EF), development and livelihood fund (DLF) and reforestation, watershed management, health and/or environmental enhancement fund (RWMHEEF).

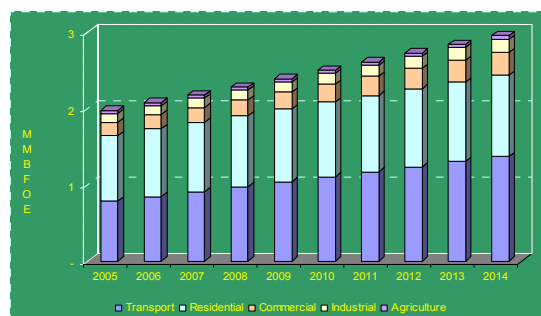
Table 7 summarizes the projects that have been implemented using the ER 1-94 funds.

Table 7. SUMMARY OF APPROVED PROJECTS, as of 2005

Type of Fund	Number of Projects	Total Amount (PhP million)
EF	17	31.81
DLF	48	10.57
RWMHEEF	47	15.31
Total	112	57.69

B. ENERGY DEMAND FORECAST

With the major economic sectors' promising growth, energy demand is projected at an average volume of 2.5 MMBFOE (0.4 MTOE), which will grow at an average of 4.6 percent during the planning period. The region's energy demand will account for 1.2 percent in the total energy demand of the country which is 202 MMBFOE (29.2 MTOE)).

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

Among the major sectors, transport will post the highest energy demand (Figure 2). Thus, in terms of fuel requirements, petroleum products and renewable energy resources will comprise the bulk (Table 8).

Residential

The residential sector will account for 39.2 percent of the total energy demand of the region, with an expected increase of around 2.5 percent per annum. In the period 2006 to 2014, residential energy demand will post an average volume of 1.0 MMBFOE (0.1 MTOE). Of this demand, biomass will account for an average share of 26.8 percent, followed by petroleum products, which will register at 20.8 percent.

Transport

With a 44.1 percent share in the total energy demand of the region, the transport sector's fuel requirements will post an average volume of 1.1 MMBFOE (0.2 MTOE), growing at an average rate of 6.4 percent over the planning period.

Among the petroleum products, diesel will be the main fuel comprising 76.5 percent of the sector's total energy demand, continually growing at an average rate of 6.9 percent. On the other hand, 21.8 percent of the sector's demand will be gasoline, increasing at a rate of 4.6 percent over the planning period.

Industrial

The sector will account for a 5.7 percent share in the total energy demand of the region. Energy demand will modestly increase at an average annual rate of 4.3 percent during the planning period, averaging 0.1 MMBFOE (19.8 KTOE). Petroleum products will account for 61.7 percent of the sector's energy demand.

Electricity will rank next, accounting for 24.9 percent of the sector's total energy demand. Mainly used for manufacturing, electricity demand is foreseen to increase by a modest 4.8 percent.

Commercial

Being the second fastest growing sector of the region due to the opening of major commercial, recreational and shopping complexes, the commercial sector is expected to take 9.5 percent of total energy demand of the region. For the planning period, an average consumption of 0.2 MMBFOE (34.5 KTOE) of the sector will be registered, increasing at an average rate of 5.9 percent annually.

Energy requirement in this sector will be comprised largely of petroleum products, growing at an average rate of 6.9 percent or translating to a 46.9 percent share of the total demand of the sector. Electricity will follow, constituting 34.1 percent of the total energy demand of the region and increasing at a rate of 5.7 percent annually.

Agricultural

The agriculture sector will register the lowest demand share, equivalent to 1.7 percent of the total energy demand of the region. Demand is projected to post an average of 0.1 MMBFOE (6.2 KTOE) during the planning period, representing an average growth of 1.9 percent annually. Petroleum products, which will grow at an average rate of 1.9 percent annually, will be the dominant fuel of the sector, accounting for 99.8 percent. Electricity, which will grow at an average rate of 5.7 percent, will account for the remaining 0.2 percent.

Table 8. SECTORAL ENERGY DEMAND (MMBFOE)

	2005	2006	2010	2014
Grand Total	1.98	2.08	2.50	2.95
Oil Products	1.24	1.33	1.70	2.08
Biomass	0.51	0.51	0.51	0.52
Other Renewables	0.01	0.01	0.01	0.01
Electricity	0.21	0.22	0.28	0.34
Industry	0.12	0.12	0.14	0.17
Oil Products	0.07	0.07	0.09	0.11
Biomass	0.01	0.01	0.01	0.01
Other Renewables	0.01	0.01	0.01	0.01
Electricity	0.03	0.03	0.03	0.04
Commercial	0.18	0.19	0.24	0.30
Oil Products	0.08	0.08	0.11	0.15
Biomass	0.04	0.04	0.04	0.05
Electricity	0.06	0.06	0.08	0.10
Residential	0.86	0.89	0.97	1.07
Oil Products	0.27	0.29	0.35	0.41
Biomass	0.46	0.46	0.46	0.45
Electricity	0.12	0.13	0.16	0.20
Transport	0.78	0.84	1.11	1.37
Oil Products	0.78	0.84	1.11	1.37
Agriculture	0.04	0.04	0.04	0.05
Oil Products	0.04	0.04	0.04	0.05

Total may not tally due to rounding off

C. SECTORAL PLANS AND TARGETS

❖ POWER DEVELOPMENT PLAN

LUZON GRID

To support the growing electricity demand in the region, 1,950 MW of new capacity addition is needed for Luzon during the planning period.

SMALL ISLAND GRIDS

Electricity Demand Forecast

During the planning period, peak demand is expected to increase at an average annual rate of 15.4 percent as indicated in Table 9. Power generation and electricity sales are likewise expected to grow at almost the same pace of 14.0 percent.

Table 9. SMALL ISLAND GRIDS DEMAND AND SUPPLY OUTLOOK

	2005	2006	2010	2014
Capacity Additions (MW)	-	0.50	0.50	-
Cumulative Installed Capacity (MW)	1.10	1.60	2.85	3.60
Peak Demand (MW)	0.50	0.59	1.00	1.80
Electricity Sales (GWh)	1.30	1.51	2.59	4.23
Gross Generation (GWh)	1.37	1.59	2.73	4.45
Dependable Capacity (MW)	0.85	1.30	2.43	3.10

Generation Expansion Plan

To support the growing electricity demand, a total of 2.5 MW of new generating capacities is lined-up during the planning period. This will provide for a 14.1 percent average annual increase in the total installed capacity.

❖ TRANSMISSION DEVELOPMENT PLAN

To complement the Power Development Plan (PDP), upgrading of transmission infrastructures will be pursued in the region. By year 2010, the 230-kV Binga-San Manuel transmission project is targeted for implementation to increase power transfer capability from North to Central Luzon.

❖ DISTRIBUTION DEVELOPMENT PLAN

To ensure reliability of supply at the distribution level, the distribution development plan of cooperatives in CAR is shown in Table 10.

Table 10. DISTRIBUTION DEVELOPMENT PLAN

Name of Cooperative	2005	2006	2010	2014
Number of Customers				
Residential	187,289	198,604	251,521	318,610
Commercial	15,399	16,120	19,521	23,657
Industrial	303	314	360	423
Others	12,861	13,234	15,118	17,247
ABRECO				
System Loss (%)	13.4	12.5	8.6	8.0
Electricity Purchase/Generated (GWH)	32	33	40	51
Electricity Sales (GWH)	27	29	36	47
BENEKO				
System Loss (%)	11.0	10.3	8.5	6.7
Electricity Purchase/Generated (GWH)	292	303	361	454
Electricity Sales (GWH)	260	272	330	424
IFELCO				
System Loss (%)	14.0	13.0	9.0	7.0
Electricity Purchase/Generated (GWH)	10	10	11	13
Electricity Sales (GWH)	8	9	10	12
KALCO				
System Loss (%)	14.2	12.7	9.7	7.4
Electricity Purchase/Generated (GWH)	17	18	25	36
Electricity Sales (GWH)	14	16	23	33
MOPRECO				
System Loss (%)	14.0	12.8	9.0	9.0
Electricity Purchase/Generated (GWH)	12	13	17	25
Electricity Sales (GWH)	10	11	16	23

❖ EXPANDED RURAL ELECTRIFICATION

The Expanded Rural Electrification Program remains a priority program of the energy sector. Consistent with the objective of attaining 100 percent barangay electrification nationwide by 2008, a timetable covering the period 2006-2008 will be implemented in the region (Table 11).

Table 11. EXPANDED RURAL ELECTRIFICATION PROGRAM

Year	Barangays	Expansion		Line Rehabilitation (ckt.-kms.)
		Distribution Lines (ckt.-kms.)	Substations (MVA)	
2006	16	29.62	30	135.12
2007	22	46.20	5	117.78
2008	20	47.96	-	60.27
2009	-	28.93	55	95.48
2010	-	4.00	-	117.10
2011	-	10.20	-	49.06
2012	-	-	5	51.72
2013	-	14.00	-	37.52
2014	-	14.00	-	331.82
Total	58*	194.91**	95**	995.87**

* Source: DOE

**Source: NEA

❖ ENERGY RESOURCE DEVELOPMENT

Geothermal

Within the planning period, the region can contribute 140 MW of indicative capacity additions, as shown in Table 12.

Table 12. INDICATIVE GEOTHERMAL CAPACITY ADDITIONS

Plant	Location	Potential Capacity (MW)	Year Available
Batong Buhay	Kalinga	60	2011
Buguias Tinoc	Ifugao	60	2012
Daklan	Benguet	20	2012
Total		140	

The indicative projects will cover a total of 39 wells to be drilled starting in 2007. Based on the assumption of a successful sustained discovery, the cumulative steam availability from the region will reach 148 MW in 2014 (Table 13).

Table 13. GEOTHERMAL MEASURABLE SECTORAL TARGETS

	2005	2006	2010	2014
Number of wells to be drilled	-	-	8	-
Steam Availability (Cum. MW)	-	-	132.61	148.07

Hydropower

During the planning period, indicative hydropower resources from the region are envisioned to supply a total of 643.5 MW to be generated from four large hydropower plants and two mini-hydropower plants.

Feasibility studies have been conducted for three large hydropower plants, as indicated in Table 14. Meanwhile, the Philippine National Oil Company (PNOC) is working on the evaluation of the 5.6-MW Talubin Project and the 22-MW Pasil Project.

Table 14. INDICATIVE HYDROPOWER CAPACITY ADDITIONS

Plant	Location	Classification	Potential Capacity (MW)	Year Available
Pasil	Kalinga	Large	22.0	2011
Talubin	Mt. Province	Mini	5.6	2012
Can-ao	Mt. Province	Mini	5.9	2012
Agbulu*	Apayao	Large	360.0	2012
Binongan*	Abra	Large	175.0	2014
Nalatang*	Benguet	Large	75.0	2014
Total			643.5	

* With feasibility study