# REGION XIII: CARAGA

## At a Glance...

### SOCIO-ECONOMIC PROFILE

| | |
|---|---|
| **Provinces** | Agusan de Norte, Agusan del Sur, Surigao del Norte, Surigao del Sur |
| **Land Area** | 19,180.7 sq. kms. |
| **Population** | 3,091,208 |
| **Density** | 161 persons / sq. km. |
| **GRDP** | PhP 15.4 million |
| **Top Three Sectors** | ▪ Industry Sector<br>▪ Service Sector<br>▪ Agriculture, Fishery and Forestry Sector |
| **Major Products** | |
| Agricultural (Raw and Manufactured) | ▪ Coconut crude oil<br>▪ Canned tuna<br>▪ Rice and corn<br>▪ Cassava<br>▪ Banana |
| Non-Agricultural | ▪ Iron<br>▪ Limestones |

Source: National Statistical Coordination Board (NSCB)

## A. SITUATIONER

### A.1 ENERGY RESOURCES

*a. Geothermal*

The region has potential geothermal energy resource estimated at 55 megawatts (MW) located in Mainit, Surigao del Norte.

*b. Hydropower*

There are four existing micro-hydropower plants operating in the region with a total installed capacity of 4 kilowatts (kW). These micro-hydro power facilities, used primarily for lighting, battery charging and wood working, are located in Surigao del Sur.

There are five other identified sites for the possible development of hydropower in the region. Two sites are available in Surigao del Sur and another three in the province of Agusan del Norte (Table 1).

**Table 1. LOCATIONS OF HYDROPOWER POTENTIAL RESOURCES**

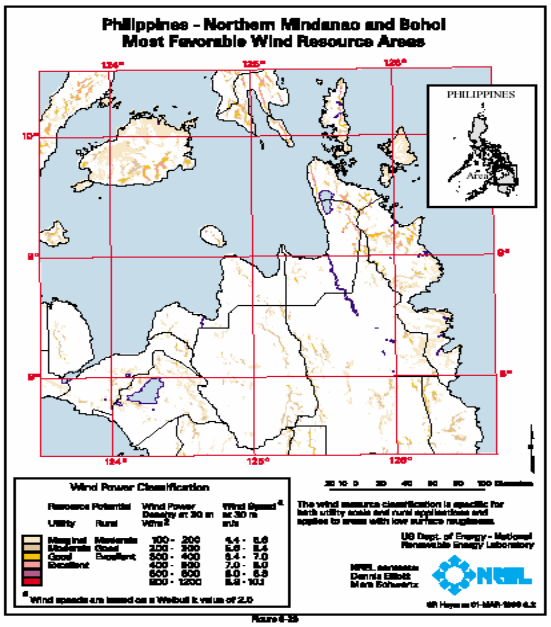
| Province | Number of Sites | Estimated Capacity (MW) |
|---|---|---|
| Surigao del Sur | 2 | 11 |
| Agusan del Norte | 3 | 18 |
| **Total** | **5** | **29** |

*c. Wind*

Wind potential in Nuventa, Surigao del Sur (15 MW) is being considered for investment under the Wind Investment Promotion Round.

Good-to-excellent wind energy potential also exists in the mountain range along Macopa in Surigao del Norte to west of Lake Mainit in Agusan del Norte, as shown in Figure 1.

**Figure 1. POTENTIAL WIND ENERGY SITES**




*d. Solar*

A number of solar power stations were put up starting in year 2001 to provide electricity in the region. To date, there are 14 units of Photovoltaic-Battery Charging Stations (PV-BCS) with a rated capacity of 1.0 kilowatt (kW) each installed in Agusan del Sur (11 units) and Surigao del Sur (3 units). Under the Solar Power Technology Support (SPOTS) project, a total of 112.62 kW of solar power was made available in the region. This provides power to barangay halls, schools, community health centers, potable water facilities and agri-water systems.

*e. Other Resources*

CARAGA region is also rich in ocean energy potential specifically in the following areas: Surigao, Hinatuan Passage and Siargao Island.

The exploration, development and production of coal prospects in Gigaquit, Surigao del Norte and Tandag-Tago-Lianga-Bislig, Surigao del Sur are also being offered under the 2005 Philippine Energy Contracting Round (PECR).

## A.2 DOWNSTREAM FACILITIES

The downstream oil industry activities in the region have relatively progressed following the passage of Republic Act 8479 or the Deregulation of the Downstream Oil Industry Act. As of 2005, the region's total storage capacity is 69 thousand barrels (MB), while the number of gasoline stations has reached 68 outlets (Table 2).

**Table 2. DISTRIBUTION OF DOWNSTREAM OIL FACILITIES**

| Province | Depots | | LPG Refilling Plants | Gasoline Stations |
|---|---|---|---|---|
| | Number of Units | Storage Capacity (MB) | | |
| Agusan del Norte | 3 | 69.01 | 1 | 18 |
| Agusan del Sur | - | - | - | 19 |
| Surigao del Norte | - | - | - | 16 |
| Surigao de Sur | - | - | - | 15 |
| TOTAL | 3 | 69.01 | 1 | 68 |

## A.3 POWER AND ELECTRIFICATION

As of 2005, Power Barge 117 (PB 117) in Agusan del Norte is the only diesel-based PB in the region. Owned and operated by the NPC,the plant has a total installed capacity of 100 MW and is being offered to private investors with technical and financial capability to continue its operation.

Currently, the implementation of the 0.5-MW Hinubasan Mini-Hydropower Power Plant in Surigao del Norte is under the supervision of the Department of Energy (DOE). The construction of the 1-MW Sipangpang Mini-Hydropower Power Plant is also ongoing.

In terms of the island's power source, there are three diesel-fired generators located in Surigao del Norte that supply the region's off-grid power requirements. These are the Dinagat Diesel Power Plant (DPP), Hikdop DPP and Loreto DPP. The plants are rated at 193 kW, 326 kW and 440 kW, respectively.

The region's transmission and distribution facilities, and transmission voltages are rated at 69-kilovolt (kV) and 138-kV levels.

With regard to the region's electric distribution utilities, currently there are seven electric cooperatives (ECs) which serve the region, namely: Agusan Norte Electric Cooperative (ANECO), Agusan Sur Electric Cooperative (ASELCO), Surigao Norte Electric Cooperative (SURNECO), Siargao Electric Cooperative (SIARELCO), Dinagat Electric Cooperative (DIELCO), Surigao Sur I Electric Cooperative Inc. (SURSECO I) and Surigao Sur II Electric Cooperative (SURSECO II).

Table 3 shows the electricity purchased and/or generated and electricity sales of each EC. Also shown are their respective system losses for 2004 classified as either technical or non-technical losses.

**Table 3. REGIONAL ELECTRICITY PROFILE BY ELECTRIC COOPERATIVE, 2005**

| Name of Cooperative | Electricity Purchased/ Generated (GWh) | Electricity Sales (GWh) | System Loss (%) | Classification |
|---|---|---|---|---|
| ANECO | 248 | 218 | 12.0 | ML |
| ASELCO | 63 | 59 | 13.0 | EL |
| SURNECO | 85 | 68 | 19.6 | EL |
| SIARELCO | 9 | 8 | 10.5 | M |
| DIELCO | 4 | 4 | 8.8 | S |
| SURSECO I | 41 | 36 | 13.0 | EL |
| SURSECO II | 38 | 33 | 12.9 | L |

ML-Mega Large, EL-Extra Large, L-Large, M-Medium, 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

In terms of the region's barangay electrification status, energization level reached 96.1 percent in 2005 (Table 4). Of the total 1,308 barangays, only 51 barangays are to be energized until 2008, either through grid extensions or stand-alone systems. Among the provinces of Region XIII, only Agusan del Norte is 100 percent electrified.

**Table 4. STATUS OF BARANGAY ENERGIZATION BY BARANGAY, as of 2005**

| Province | Coverage | Energized Barangays | Energization Level (%) |
|---|---|---|---|
| Agusan del Norte | 250 | 250 | 100.00 |
| Agusan del Sur | 314 | 276 | 87.90 |
| Surigao del Norte | 435 | 429 | 98.62 |
| Surigao del Sur | 309 | 302 | 97.73 |
| Total | 1,308 | 1,257 | 96.10 |

The region's household energization on the other hand saw some 313,000 households energized out of 393,216 households, translating to 79.6 percent of the region's total household number.

## A.4 BENEFITS TO HOST COMMUNITIES

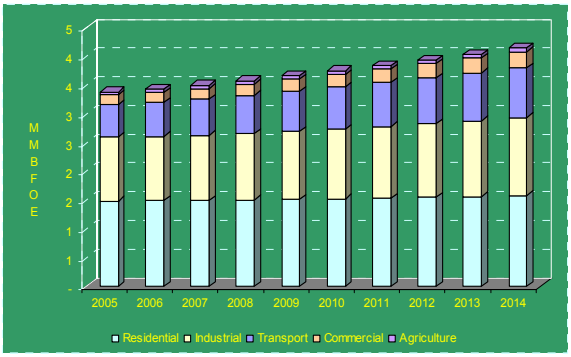
As of 2005, the region has received an accumulated financial benefit amounting to PhP 10.1 million. This amount was used to finance a total of 11 projects for development and livelihood (DLF) and reforestation, watershed management, health and/or environmental enhancement. Table 5 breaks down the summary of approved projects.

**Table 5. SUMMARY OF APPROVED PROJECTS, as of 2005**

| Type of Fund | Number of Projects | Total Amount (PhP million) |
|---|---|---|
| EF | - | - |
| DLF | 4 | 2.71 |
| RWMHEEF | 7 | 7.35 |
| Total | 11 | 10.06 |

## B. ENERGY DEMAND FORECAST

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




CARAGA's average total demand for energy is estimated at 3.8 MMBFOE (0.5 MTOE) during the planning period. This will represent an average increase of 2.3 percent annually, and will constitute 1.9 percent of the country's total requirements. Of the region's total demand, the residential sector will take the lead in utilization (Figure 2). Petroleum products will account for the bulk of the demand with an average share of 43.2 percent, followed by biomass with an average of 38.9 percent (Table 6). Significant growth will also be seen with electricity at 6.3 percent, on account of the increasing electrification level in the region.

**Table 6. SECTORAL ENERGY DEMAND (MMBFOE)**

| | 2005 | 2006 | 2010 | 2014 |
|---|---|---|---|---|
| **Grand Total** | **3.39** | **3.44** | **3.76** | **4.16** |
| Oil and oil Products | 1.42 | 1.44 | 1.63 | 1.84 |
| Coal | 0.15 | 0.15 | 0.16 | 0.17 |
| Biomass | 1.43 | 1.44 | 1.46 | 1.50 |
| Other Renewables | nil | nil | nil | 0.01 |
| Electricity | 0.38 | 0.41 | 0.51 | 0.66 |
| **Industry** | **1.11** | **1.12** | **1.22** | **1.36** |
| Oil and Oil Products | 0.67 | 0.66 | 0.68 | 0.72 |
| Coal | 0.15 | 0.15 | 0.16 | 0.17 |
| Biomass | 0.18 | 0.20 | 0.25 | 0.31 |
| Electricity | 0.11 | 0.12 | 0.14 | 0.17 |
| **Commercial** | **0.17** | **0.18** | **0.23** | **0.29** |
| Oil and Oil Products | 0.03 | 0.03 | 0.04 | 0.05 |
| Biomass | 0.02 | 0.02 | 0.03 | 0.03 |
| Other Renewables | nil | nil | nil | nil |
| Electricity | 0.12 | 0.13 | 0.16 | 0.21 |
| **Residential** | **1.49** | **1.49** | **1.53** | **1.58** |
| Oil and Oil Products | 0.10 | 0.10 | 0.12 | 0.14 |
| Biomass | 1.23 | 1.22 | 1.19 | 1.16 |
| Other Renewables | nil | nil | Nil | nil |
| Electricity | 0.15 | 0.16 | 0.21 | 0.28 |
| **Transport** | **0.57** | **0.60** | **0.73** | **0.86** |
| Oil and Oil Products | 0.57 | 0.60 | 0.73 | 0.86 |
| **Agriculture** | **0.05** | **0.06** | **0.06** | **0.06** |
| Oil and Oil Products | 0.05 | 0.05 | 0.06 | 0.06 |
| Solar | nil | nil | nil | nil |
| Electricity | 0.00 | 0.00 | 0.00 | 0.00 |

Total may not tally due to rounding off

### Residential

About 41.0 percent of CARAGA's energy needs will be attributed to this sector, which will require an average volume of 1.5 MMBFOE (0.2 MTOE), and increase at an average rate of 1.0 percent annually. Biomass, used mostly for cooking, will comprise around 78.0 percent of the sector's fuel demand. Of this, coconut residues will contribute 37.9 percent, while fuelwood will account for 34.0 percent. Petroleum products will account for 8.0 percent of the total sectoral demand.

### Commercial

Energy demand in this sector is projected to register an average volume of 0.2 MMBFOE (33.1 KTOE) and grow at a rate of 6.4 percent annually within the planning period. Its share in the total fuel requirement of the region will be around 6.0 percent. Among the fuel requirements of the sector, electricity will constitute around 71.4 percent. Oil products, mainly diesel, fuel oil and LPG (used for generating electricity in commercial establishments), will account for around 17.1 percent.

### Industrial

The industrial sector is the second largest energy-consuming sector in CARAGA. During the planning period, the sector will account for an average share of 32.5 percent of the total regional demand. The sector's fuel needs will be recorded with an average growth rate of 2.3 percent, as average volume requirement will reach 1.2 MMBFOE (0.2 MTOE) over the planning period. Majority of the industries will rely on petroleum products, particularly fuel oil, which will constitute about 36.3 percent of the total sectoral demand. Coconut residue, which is projected to account for 18.8 percent of the sector's total demand, will be the second most dominant fuel in the sector, followed by diesel with an 18.4 percent share.

### Transport

The fuel needs for transport is estimated to account for an average share of 19.3 percent of the region's total energy demand. Average consumption is projected to reach 0.7 MMBFOE (0.1 MTOE) over the planning period, with an average growth rate of 4.8 percent. Petroleum products will constitute the bulk of the sector's demand, with diesel sharing an average of 67.2 percent and motor gasoline with 28.4 percent.

### Agricultural

The sector's fuel requirement will account for 1.6 percent average share of the region's energy demand. It is projected to expand at a rate of 1.8 percent annually. Over the reference period, the sector will require an average volume of 0.6 MMBFOE (8.6KTOE). Petroleum products, particularly diesel, will dominate the region's fuel mix with an average share of 83.2 percent. Solar energy and electricity on the other hand, will account for a very minimal share.

# C. SECTORAL PROGRAMS AND TARGETS

## ❖ POWER DEVELOPMENT PLAN

### SMALL ISLAND GRIDS

#### Electricity Demand Forecast

Electricity demand in the region's small island grids will grow at an average annual rate of 14.0 percent over the planning period. Likewise, peak demand is estimated to grow at an average annual rate of 15 .0 percent (Table 7).

**Table 7. SMALL ISLAND GRIDS DEMAND AND SUPPLY OUTLOOK**

| | 2005 | 2006 | 2010 | 2014 |
|---|---|---|---|---|
| Capacity Additions (kW) | 1,500 | 1,250 | 500 | - |
| Cumulative Installed Capacity (kW) | 3,370 | 3,903 | 5,903 | 7,403 |
| Peak Demand (kW) | 1,367 | 1,853 | 2,969 | 4,653 |
| Electricity Sales (MWh) | 4,228 | 5,057 | 8,549 | 13,945 |
| Gross Generation (MWh) | 4,503 | 5,323 | 8,999 | 14,679 |
| Dependable Capacity (kW) | 3,370 | 3,415 | 5,215 | 6,565 |

#### Generation Expansion Plan

The installation of additional generating sets with a total capacity of 4,033 kW is envisioned to support the islands' expected growth between 2006 and 2010.

## ❖ TRANSMISSION DEVELOPMENT PLAN

To maintain the stability of the region's power system and accommodate the growing electricity demand, several transmission projects have been identified for implementation during the planning period (Table 8).

**Table 8. TRANSMISSION LINE PROJECTS**

| Project Name | Description | Target Date of Completion |
|---|---|---|
| ***Ongoing Transmission Projects*** | | |
| Mindanao Substation Expansion – 2005 (Butuan & Bislig substations) | To increase the substation capacities in Butuan and Bislig, | 2007 |
| ***Ongoing Sub-Transmission Projects*** | | |
| Mindanao Sub-Transmission Projects I (KM 13-Surigao City) | To serve additional power customers & minimize distribution loss. | 2007 |
| ***Transmission Project for Implementation (Priority 1)*** | | |
| San Francisco 138 kV S/S project | To serve the demand in San Francisco area and relieve the long radial 69 kV line from Bislig. | 2006 |
| ***Transmission Project for Implementation (Priority 2)*** | | |
| Mindanao Reliability Project – 1 (Butuan-Anislagan, Butuan-San Francisco, San Francisco-Bislig, Bislig-Tindalo, Matanao-Klinan) | In compliance with the reliability requirement of the Grid Code | 2012 |
| Power Circuit Breaker Replacement Program (Bislig & Butuan substations) | To replace defective and inadequate PCB's | 2010 |
| ***Indicative Project – Sub-Transmission*** | | |
| Caraga Subtransmission Project<br><br>Note: Projects are subject for further study and for clarification on ERC's Connection Charging Policy. | To serve additional power to customers and minimize distribution loss. | 2013 |
| Mindanao Capacitor Project III part only of 26-7.5 Mvar (sites for further study) | To maintain the voltages limit prescribed by the Grid Code | 2012 |
| ***Grid Code Compliance – Indicative*** | | |
| Mindanao Reliability Compliance Project - 2 (San Francisco S/S) | In compliance with the reliability requirement of the Grid Code | 2013 |
| ***Indicative Project – Interconnection*** | | |
| Small Island Grids Interconnection Project - Mindanao-Dinagat | To provide reliable supply to small islands | 2014 |

## ❖ DISTRIBUTION DEVELOPMENT PLAN

Table 9 shows the distribution development plan for Region XIII, which will ensure the reliability of supply at the distribution level.

**Table 9. DISTRIBUTION DEVELOPMENT PLAN**

| Name of Cooperative | 2005 | 2006 | 2010 | 2014 |
|---|---|---|---|---|
| *Number of Customers* | | | | |
| Residential | 201,916 | 213,296 | 262,449 | 318,486 |
| Commercial | 14,862 | 15,153 | 16,435 | 17,844 |
| Industrial | 965 | 979 | 1,036 | 1,096 |
| Others | 15,356 | 15,678 | 17,130 | 18,797 |
| ***ANECO*** | | | | |
| System Loss (%) | 12.0 | 11.0 | 8.6 | 8.2 |
| Electricity Purchase/Generated (GWh) | 248 | 252 | 274 | 303 |
| Electricity Sales (GWh) | 218 | 224 | 250 | 278 |
| ***SIARELCO*** | | | | |
| System Loss (%) | 10.5 | 10.3 | 9.5 | 8.7 |
| Electricity Purchase/Generated (GWh) | 9 | 10 | 16 | 23 |
| Electricity Sales (GWh) | 8 | 9 | 14 | 21 |
| ***SURSECO I*** | | | | |
| System Loss (%) | 13.0 | 12.0 | 9.0 | 9.0 |
| Electricity Purchase/Generated (GWh) | 41 | 42. | 50 | 60 |
| Electricity Sales (GWh) | 35 | 37 | 45 | 55 |
| ***SURSECO II*** | | | | |
| System Loss (%) | 12.9 | 12.3 | 8.5 | 7.3 |
| Electricity Purchase/Generated (GWh) | 39 | 43 | 62 | 86 |
| Electricity Sales (GWh) | 34 | 37 | 56 | 80 |
| ***DIELCO*** | | | | |
| System Loss (%) | 8.8 | 8.8 | 8.7 | 8.6 |
| Electricity Purchase/Generated (GWh) | 4 | 5 | 7 | 13 |
| Electricity Sales (GWh) | 4 | 4 | 8 | 10 |
| ***SURNECO*** | | | | |
| System Loss (%) | 19.2 | 14.0 | 6.4 | 5.6 |
| Electricity Purchase/Generated (GWh) | 85 | 87 | 114 | 161 |
| Electricity Sales (GWh) | 68 | 74 | 106 | 151 |

## ❖ EXPANDED RURAL ELECTRIFICATION

Between 2006 and 2008, 51 barangays are programmed for energization. To ensure the operational efficiency of the distribution system, a total of 2,953 ckt.-kms. still need to be rehabilitated, while the expansion of 123 ckt.-kms. of distribution lines are programmed within the planning horizon. The planned expansion of distribution lines will require an additional 35-MVA substation in the region (Table 10).

**Table 10. EXPANDED RURAL ELECTRIFICATION PROGRAM**

| Year | Barangays | Expansion | | Line Rehabilitation (ckt.-kms.) |
|---|---|---|---|---|
| | | Distribution Lines (ckt.- kms.) | Substations (MVA) | |
| 2006 | 14 | 132.57 | 15 | 242.80 |
| 2007 | 19 | 67.93 | 10 | 176.55 |
| 2008 | 18 | 33.04 | 10 | 237.87 |
| 2009 | - | 14.87 | - | 172.34 |
| 2010 | - | - | - | 366.60 |
| 2011 | - | - | - | 367.21 |
| 2012 | - | - | - | 355.00 |
| 2013 | - | - | - | 372.00 |
| 2014 | - | - | - | 372.00 |
| 2015 | - | - | - | 409.00 |
| **Total** | **51*** | **123.38**** | **35**** | **2,952.76**** |

*Source: DOE
**Source: NEA

## ❖ ENERGY RESOURCE DEVELOPMENT

### Hydropower

Simulations for the Mindanao grid show that 300 MW of hydropower can be accommodated during the planning period. The region can contribute a total of 47 MW, as can be gleaned in Table 11.

**Table 11. INDICATIVE HYDROPOWER CAPACITY ADDITIONS**

| Plant | Location | Classification | Potential Capacity (MW) | Year Available |
|---|---|---|---|---|
| Taguibo | Butuan City, Agusan del Norte | Mini | 7 | 2008 |
| Lake Mainit | Jabonga, Agusan del Norte | Large | 22 | 2009 |
| Pugu * | Kitcharo, Agusan de Norte | Large | 18 | 2012 |
| **Total** | | | **47** | |

* With feasibility study

### Wind

Among the 16 potential sites being offered for private sector participation, one area for possible wind power plant construction is located at Surigao del Sur, which has an estimated capacity of 15 MW. The plant is expected for commissioning in 2008.

### Coal

The region's coal production is expected to increase at an average annual rate of 24.0 percent to reach 0.4 million metric tons (MMMT) by 2014. With the anticipated increase in coal production, in-situ reserves is expected to decline from the current level of 70.0 MMMT to 68.3 MMMT by 2014 (Table 12).

**Table 12. COAL MEASURABLE SECTORAL TARGETS @ 10,000 BTU/lb**

| | 2005 | 2006 | 2010 | 2014 |
|---|---|---|---|---|
| In-Situ Reserves (MMMT) | 70.03 | 69.97 | 69.59 | 68.28 |
| Production (MMMT) | 0.057 | 0.095 | 0.099 | 0.402 |