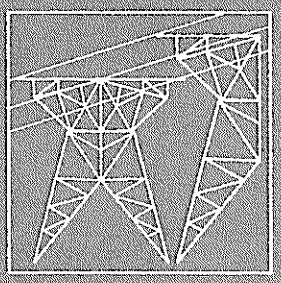
JAPAN INTERNATIONAL COOPERATION AGENCY

Comprehensive Basic Study of the Autonomous Region in Muslim Mindanao in the Republic of the Philippines

Final Report



POWER SECTOR

March 2004

PKII ENGINEERS
ENGINEERING CONSULTANT

COMPREHENSIVE BASIC SURVEY OF THE AUTONOMOUS REGION IN MUSLIM MINDANAO

POWER SECTOR

FINAL REPORT

MARCH 2004

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Electricity Supply Situation in the ARMM Provinces

This report presents basic information on the current electricity supply situation in each of the provinces of the Autonomous Region in Muslim Mindanao (ARMM). Ongoing efforts to speed up the energization of remote barangays in the ARMM are also discussed.

Households in the ARMM provinces and Marawi City generally get their electricity through the distribution lines of seven (7) existing electric cooperatives.

Power supply to two (2) of these electric cooperatives in mainland Mindanao – the Lanao del Sur Electric Cooperative (LASURECO) and the Maguindanao Electric Cooperative (MAGELCO) – is transmitted through the Mindanao Grid, a network of big hydroelectric plants owned and operated by the National Power Corporation (NPC) and diesel or geothermal power plants owned and operated by Independent Power Producers (IPPs).

In the small island grids of Basilan, Sulu and Tawi-Tawi, smaller-sized NPC diesel power plants and power barges are the main power supply sources of the five (5) electric cooperatives operating in these areas.

More recently, the government's Expanded Rural Electrification (RE) Program embarked on the integration and acceleration of rural electrification of sitios and barangays nationwide, with the objective of energizing all of the 41,945 barangays by 2006. As of December 2003, 4,197 barangays nationwide remain unenergized, more than half of which are in Mindanao.

In the ARMM provinces, a total of 1,549 of the 2,473 barangays (or 63%) have been energized as of the end of December 2003. It may be noted, however, that only about 32% of total potential households covered by electric cooperatives in the ARMM had electricity connections as of the same period.

The AMORE Program, a joint undertaking of the DOE, the ARMM Regional Government, USAID, Mirant Philippines, Inc. and Winrock International, Inc., aims to provide 177 remote barangays in Western and Central Mindanao, including the ARMM, access to electricity through the development and installation of solar and micro-hydro systems. As of October 2003, a total of 94 barangays in the ARMM provinces have been provided such systems.

1. INTRODUCTION

This report presents basic information on the current electricity supply situation in each of the provinces of the Autonomous Region in Muslim Mindanao (ARMM). The data contained in this report were obtained from various sources and includes official documents of the National Electrification Administration (NEA), the National Power Corporation (NPC), the Department of Energy (DOE), the Winrock International Office for its Alliance for Mindanao Off-Grid Renewable Energy (AMORE) Program, as well as staff and operational reports normally prepared by concerned personnel of said agencies/entities in the course of business operations. Meetings and consultations were likewise made with concerned officials/staff of the said agencies/entities mainly to seek a better understanding of the reports generated.

Because of the non-contiguous nature of the ARMM, electricity supply in this region can be discussed in terms of the Mindanao Grid (in the case of Lanao del Sur, including Marawi City, and Maguindanao) and of separate and independent small island grids (as in the case of Basilan, Sulu and Tawi-tawi). In this light, the succeeding chapters explain the electricity supply situation in each of the ARMM provinces and highlight power sources, transmission and distribution facilities, households and population covered and other key performance indicators. This paper also discusses the status of ongoing assistance, both foreign and local, in bringing electricity to the unenergized barangays of the ARMM provinces.

This report is organized as follows:

Chapter 1 - Introduction

Chapter 2 - Institutional Aspects of the Power Sector in the ARMM

Chapter 3 - Electricity Supply in the Mindanao Grid

Chapter 4 - Electricity Supply in the Small Island Grids

Chapter 5 - Selected Performance Indicators of Generating Plants and Electric Cooperatives

Chapter 6 - Ongoing Expanded Rural Electrification Program in the ARMM

2. INSTITUTIONAL ASPECTS OF THE POWER SECTOR IN THE ARMM

The national energy agencies which are responsible for providing policy directions, project development and implementation, and plant operation and maintenance are the Department of Energy (DOE), the National Power Corporation (NPC), the National Transmission Corporation (TRANSCO) and the National Electrification Administration (NEA).

Electric distribution facilities reaching end-consumers, on the other hand, are the responsibility of electric cooperatives and investor-owned electric utilities.

2.1 Department of Energy (DOE)

The central role of the DOE is in the formulation and implementation of energy policies and programs to ensure sustainable, stable, secure, sufficient, accessible and reasonably priced energy. Through the Expanded Rural Electrification Program, the DOE is currently spearheading the task of providing electricity to all barangays in the country by 2006. This Program is discussed further in Chapter 6 below.

2.2 National Power Corporation (NPC)

NPC owns and operates the majority of power plants all over the country. NPC also buys electricity supplied by Independent Power Producers (IPPs). It provides electricity through the major transmission grids to the electric cooperatives, investor-owned electric utilities and a few big-consuming private industries.

2.3 National Transmission Corporation (TRANSCO)

TRANSCO owns and is responsible for the operation and maintenance of the major transmission grids in the big islands of the Philippines. The power supply from NPC and other Independent Power Producers (IPPs) utilize these grids. In mainland Mindanao, the Mindanao Grid consists of a network of transmission lines and substations linked to the island's load centers.

2.4 National Electrification Administration (NEA)

NEA is the national agency providing technical and financial support to the 119 electric cooperatives operating in the Philippines. It secures financial assistance from multilateral and bilateral institutions for re-lending to electric cooperatives. It also receives technical assistance from these institutions, which are then passed on to the technical staff of electric cooperatives.

2.5 Electric Cooperatives

In the ARMM, there are seven (7) electric cooperatives in operation, which provide electricity to end-users in the main load centers within their respective areas of coverage. The coverage areas and operational statistics of these electric cooperatives are discussed in succeeding chapters.

2.6 Investor-Owned Electric Utilities

These electric utilities owned by the private sector also provide electricity to end-users in their coverage areas, mostly in the cities where large concentrations of the population exist. One such investor-owned electric utility is the Cotabato Light and Power Company, which provides electricity to Cotabato City and two (2) adjacent municipalities (Sultan Kudarat and Datu Odin Sinsuat) in Maguindanao.

2.7 Role of ARMM Regional Government and ARMM LGUs in the Sector

The identification of potential power projects is one basic role and contribution played by the ARMM LGUs and the ARMM Regional Government in the sector. The LGU officials and staff have the advantage of knowing the local conditions and terrain. Such potential power projects, when endorsed through the ARMM Provincial and Regional Governments, to the national agencies such as DOE, NPC and NEA, are subjected to further studies and in-depth investigations whenever necessary.

3. ELECTRICITY SUPPLY IN THE MINDANAO GRID

The National Power Corporation (NPC) supplies electricity in the mainland of Mindanao from various energy sources such as hydroelectric, diesel and geothermal. The so-called Mindanao Grid (see Table 3-1 and Figure 3-1) consists of these various energy sources, which are owned and operated by NPC or Independent Power Producers (IPPs), and a network of transmission lines and substations, which are owned and operated by the National Transmission Corporation (TRANSCO). To distribute electricity in the main population centers of the island, electric cooperatives and private utility companies are connected to the Mindanao Grid. Two of these electric cooperatives, the Lanao del Sur Electric Cooperative (LASURECO) and the Maguindanao Electric Cooperative (MAGELCO), distribute electricity to consumers within their respective coverage areas.

3.1 Lanao del Sur (including Marawi City)

Marawi City and 25 municipalities in the province of Lanao del Sur are provided with electricity by the Lanao del Sur Electric Cooperative (LASURECO). Ten (10) municipalities in the southern part of the province, however, are still not currently served by LASURECO. These are the municipalities of Binidayan, Bayang, Lumbatan, Lumbayanague, Butig, Pagayawan, Marogong, Tubaran, Balabagan and Kapatagan. However, as discussed in Chapter 6 below, there are some barangays in these municipalities that are now provided with electricity.

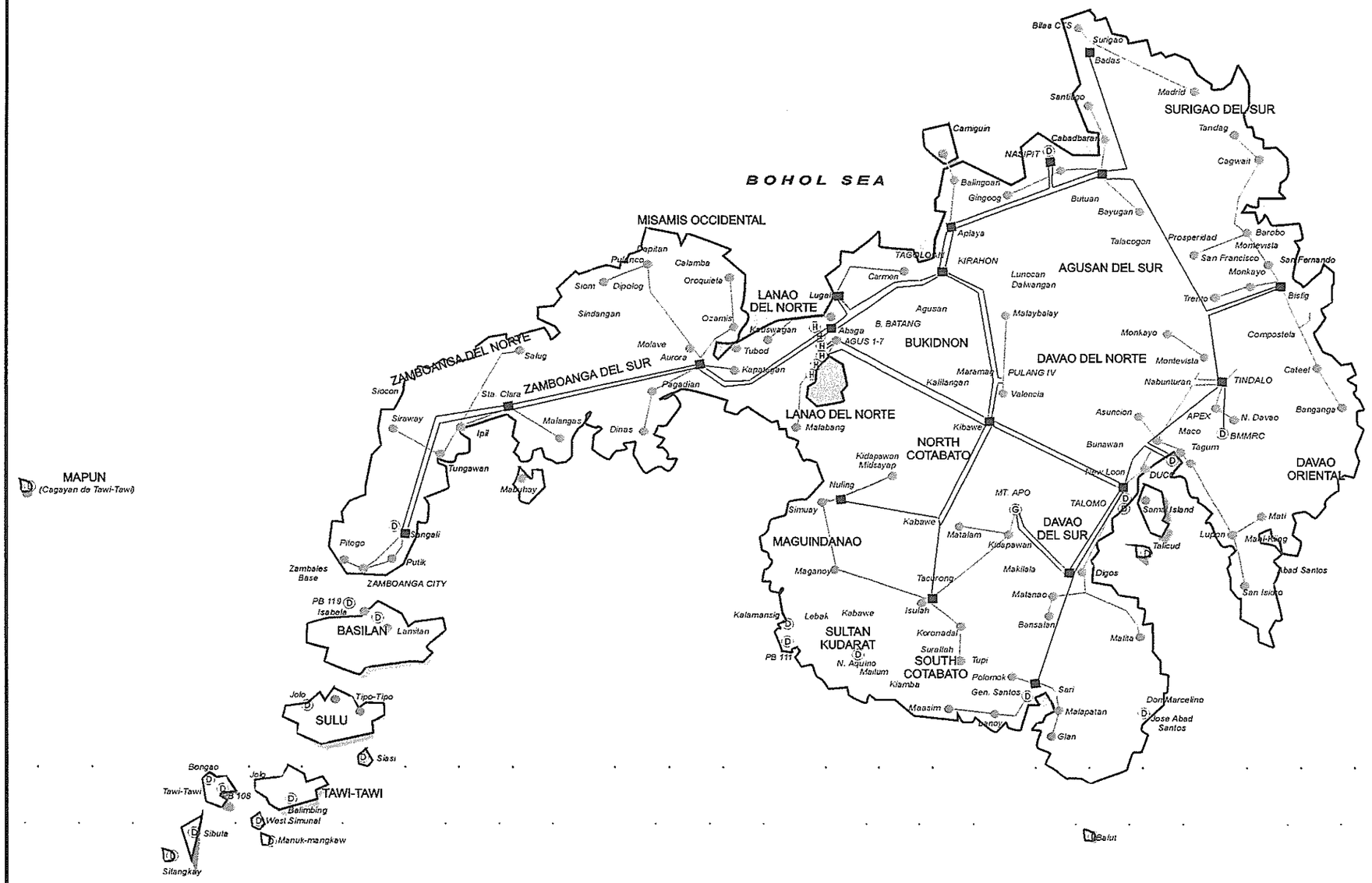
On the other hand, two (2) municipalities in the southeastern part of the province are served by other entities. The municipality of Bumbaran is served by the municipal government itself, while the municipality of Wao is served by the First Bukidnon Electric Cooperative (FIBECO).

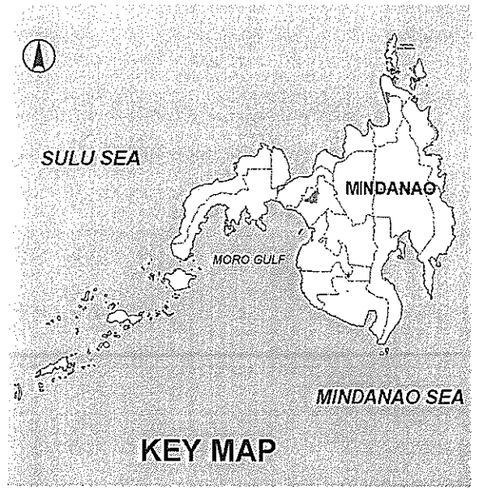
It may also be noted that four (4) Lanao del Norte municipalities are also served by LASURECO because of technical and financial feasibility considerations. These are municipalities of Baloi, Pantao Ragat, Pantar and part of Tagoloan. Figure 3-2 shows the coverage area of LASURECO.

Table 3-1 Generating Plants in the Mindanao Grid and Small Island Grids in ARMM, as of December 2002

Plant Name	Location	Inst. Cap.
Mindanao Grid – NPC Owned/Operated		**987.22**
Talomo Hydro	Mintal, Davao	3.52
Agusan Minihydro	Damilag, Bukidnon	1.60
Agus VI	Fuentes, Iligan City	200.00
Agus II	Saguiaran, Lanao del Sur	180.00
Agus VII	Fuentes, Iligan City	54.00
Agus V	Ditucalan, Iligan City	55.00
Agus IV	Baloi, Lanao del Norte	158.10
Pulangui IV	Maramag, Bukidnon	255.0
Agus I	Marawi City, Lanao del Sur	80.00
Mindanao Grid – NPC Owned/IPP Operated		**200.0**
Power Barge 117	Nasipit, Agusan del Norte	100.00
Power Barge 118	Maco, Davao	100.00
Mindanao Grid – IPP Owned/Operated		**351.25**
NMPC I	Dalipuga, Iligan City	58.00
NMPC II	Dalipuga, Iligan City	40.00
Zamboanga Diesel	Zamboanga del Sur	100.00
General Santos Diesel	General Santos City	50.00
Mt. Apo Geothermal I	Kidapawan, N. Cotabato	47.00
Mt. Apo Geothermal I	Kidapawan, N. Cotabato	48.25
Busco Biomass Cogen	Quezon, Bukidnon	8.00
Small Island Grids – NPC Owned/Operated		**27.303**
Basilan DPP	Isabela City, Basilan	1.672
Power Barge 119	Isabela City, Basilan	7.200
Sulu DPP	Jolo, Sulu	5.400
Siasi DPP	Siasi, Sulu	1.080
Tawi-Tawi DPP	Bongao, Tawi-Tawi	2.680
Power Barge 108	Bongao, Tawi-Tawi	7.200
Manuk-Mangkaw DPP	Manuk-Mangkaw, Tawi-Tawi	0.163
Sibutu DPP	Sibutu, Tawi-Tawi	0.423
Sitangkay DPP	Sitangkay, Tawi-Tawi	0.217
West Simunul DPP	West Simunul, Tawi-Tawi	0.368
Tandubas DPP	Tandubas, Tawi-Tawi	0.054
Balimbing DPP	Balimbing, Tawi-Tawi	0.326
Cagayan de Tawi-Tawi DPP	Mapun, Tawi-Tawi	0.520
Small Island Grids – Coop Owned		**0.950**
Kumalarang Mini-Hydro	Lantawan, Basilan	0.680
Balagtasan Mini-Hydro	Lantawan, Basilan	0.270

Source: National Power Corporation





LEGEND:

Existing Transmission Lines

- 138KV
- 69KV

Existing Substations

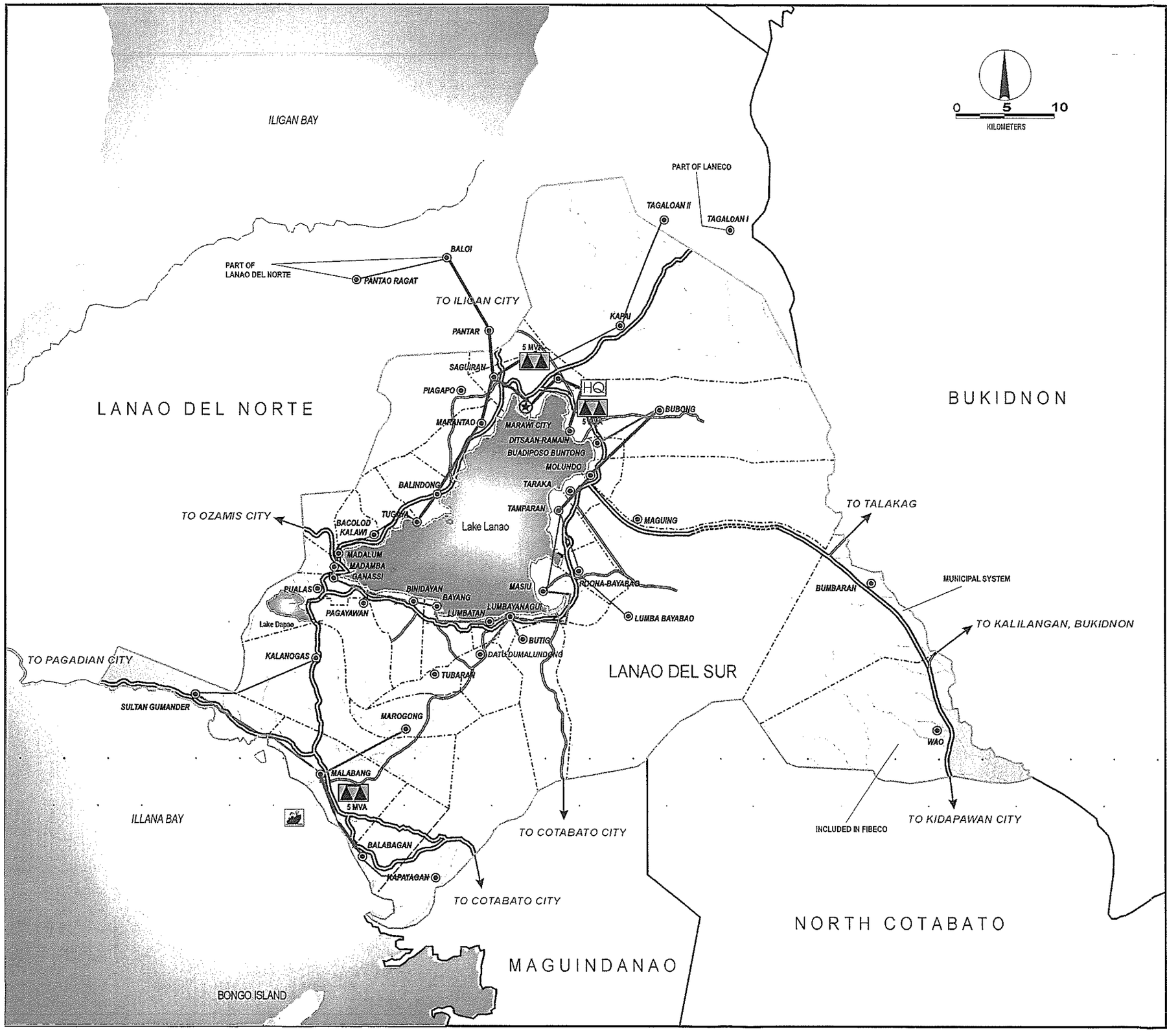
- 138KV
- 69 KV (NPC - Owned)

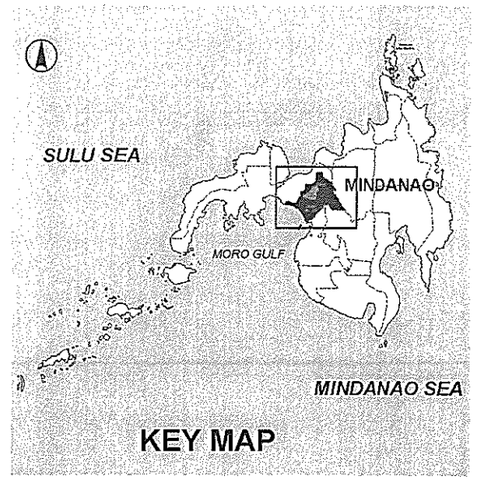
Existing Generating Plants

- (H) Hydroelectric
- (G) Geothermal
- (D) Diesel

Source: National Power Corporation
2002 Annual Report

Figure 3-1
NATIONAL POWER CORP.
MINDANAO GRID
AND SMALL ISLAND
GENERATING PLANTS





LEGEND:

- Provincial Boundary
- Municipal Boundary
- River
- National Road
- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- HQ Location
- SS Location & Capacity
- 3 PH Backbone Lines
- V PH
- 1 PH

Source: Rural Electrification Chronicle

Figure 3-2
COVERAGE AREA OF LASURECO (Lanao del Sur Electric Cooperative)

As of June 2003, a total of 786 barangays and 29,674 connections in these areas had access to electricity within the coverage area of LASURECO. In terms of percentage accomplishment, these connections translate to 67% of barangays energized but only 26% of potential connections served.

Table 3-2 LASURECO Accomplishments, as of June 2003

Indicator	Statistic
Potential Connections	113,000
Served	29,674
% Accomplished	26%
Total Barangays	1,174
Energized	786
Unenergized	388
% Accomplished	67%

Source: National Electrification Administration

3.2 Maguindanao

The Maguindanao Electric Cooperative (MAGELCO) serves a major part of the province of Maguindanao and some parts of the province of North Cotabato. MAGELCO provides electric service to 17 municipalities of Maguindanao and six (6) municipalities of the province of North Cotabato. Figure 3-3 shows the areas covered by MAGELCO.

Although part of Maguindanao, the municipalities of Sultan Kudarat and Datu Odin Sinsuat get their electricity from a private utility firm, the Cotabato Light and Power Company. These municipalities are adjacent to Cotabato City, which is also served by the same utility company.

On the other hand, three (3) municipalities of southeastern Maguindanao (Buluan, Datu Paglas and S. K. Pendatun) near the province of Sultan Kudarat, get their electricity from the Sultan Kudarat Electric Cooperative (SUKELCO).

LANAO DEL SUR

TO MALABANG

MATANOG

BARIRA

BULDON

Serviced by:
COTABATO LIGHT & POWER CO., INC.

0 10 20 30

KILOMETERS

ILLANA BAY

BONGO ISLAND

PARANG

ALAMADA

PART OF
NORTH COTABATO

NORTH COTABATO

SULTAN MASTURA

SULTAN KUDARAT

PIGKAWAYAN

LIBUNGAN

COTABATO CITY

MIDSAYAP

ALEOSAN

KABUNTALAN

PAGAGAWAN

TO DAVAO

TALITAY

PIKIT

PAGALUNGAN

DATU ODIN SINSUAT

HQ

NORTH UPI

DATU PIANG

INCLUDED IN
SUKELCO

MINDANAO
SEA

TALAYAN

Liguasan Marsh

MAMASAPANO

DATU SAUDI UY

SULTAN SA BARONGIS

DATU UNSAY

GUINDULUNGAN

TO KIDAPAWAN CITY

SHARIFF AGUAK

SOUTH UPI

AMPATUAN

TO TACURONG

S.K. PENDATUN

PAGLAT

DATU PAGLAS

TO LEBAK

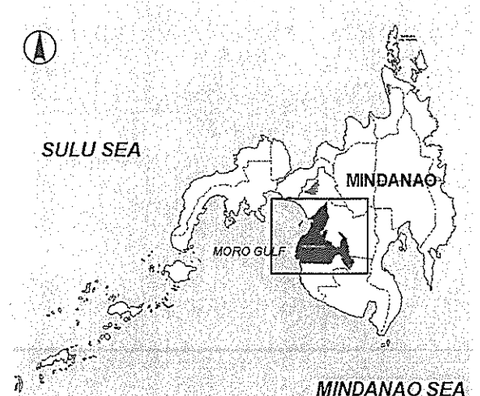
TO GEN. SANTOS CITY

BULUAN

TO TACURONG

SULTAN KUDARAT

Lake Buluan



KEY MAP

LEGEND:

- Provincial Boundary
- Municipal Boundary
- River
- National Road
- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- HQ Location
- SS Location & Capacity
- 3 PH Backbone Lines
- V PH
- 1 PH

Source:
Rural Electrification Chronicle

Figure 3-3
COVERAGE AREA
OF MAGELCO
(Maguindanao Electric Cooperative)

As of the end of 2003, a total of 348 barangays and 33,965 connections covered by MAGELCO had access to electricity. In terms of percentage accomplishment, these connections translate to 58% of barangays energized and 55% of potential connections served.

Table 3-3 MAGELCO Accomplishments, as of 31 December 2003

Indicator	Statistic
Potential Connections	62,000
Served	33,965
% Accomplished	55%
Total Barangays	598
Energized	348
Unenergized	250
% Accomplished	58%

Source: National Electrification Administration

4. ELECTRICITY SUPPLY IN THE SMALL ISLAND GRIDS

This Chapter presents the electricity situation in the island provinces of Basilan, Sulu and Tawi-Tawi. Power supply is provided by the National Power Corporation (NPC), which owns and operates diesel generating plants and power plant barges. In the island of Basilan, there are an additional two (2) mini-hydro power plants owned and operated by the Basilan Electric Cooperative. Four (4) electric cooperatives distribute electricity in the provinces of Sulu and Tawi-tawi.

4.1 Basilan

The province of Basilan gets its power supply from three (3) sources: a) a land-based diesel power plant; b) a power barge (#119); and c) two (2) mini-hydro power plants (Kumalarang and Balagtasan). Total dependable capacity of these power sources, as of December 2003, is 6.9 MW. The diesel power plant and the power barge are owned and operated by the NPC while the mini-hydro power plant is owned and operated by the Basilan Electric Cooperative (BASELCO).

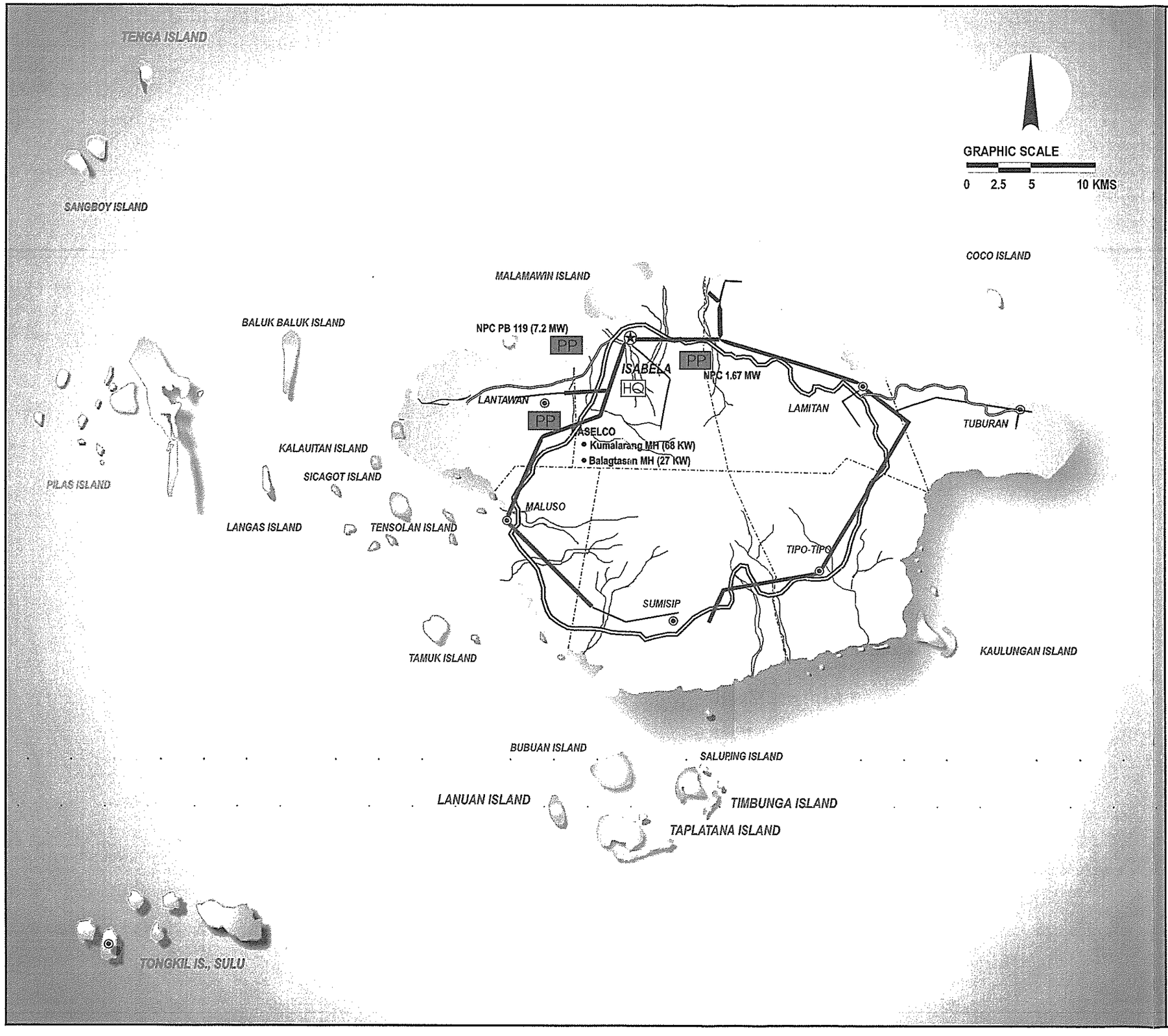
From these power sources, BASELCO constructed backbone distribution lines through one (1) city and six (6) municipalities of Basilan. The island municipality of Tongkil, Sulu is also part of the coverage area of BASELCO. Figure 4-1 shows the areas covered by BASELCO.

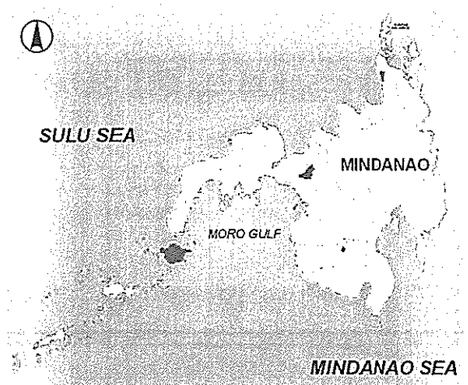
As of the end of 2003, BASELCO provided electricity to a total of 227 barangays and 22,540 connections in the province. In terms of percentage accomplishment, these connections translate to 84% of barangays energized and 35% of potential connections served within BASELCO's coverage area.

Table 4-1 BASELCO Accomplishments, as of 31 December 2003

Indicator	Statistic
Potential Connections	64,000
Served	22,540
% Accomplished	35%
Total Barangays	269
Energized	227
Unenergized	42
% Accomplished	84%

Source: National Electrification Administration





KEY MAP

LEGEND:

- Provincial Boundary
- Municipal Boundary
- River
- National Road
- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- HQ Location
- Power Plant
- 3 PH Backbone Lines
- 1 PH

Source: Rural Electrification Chronicle

Figure 4-1
COVERAGE AREA OF BASELCO
(Basilan Electric Cooperative)

4.2 Sulu

The province of Sulu also gets power supply from land-based diesel power plants owned and operated by NPC. In Jolo Island, the total dependable capacity of the diesel power plant is 4.7 MW, as of December 2003. In Siasi Island, the total dependable capacity of the diesel power plant, as of the same date, is 0.49 MW.

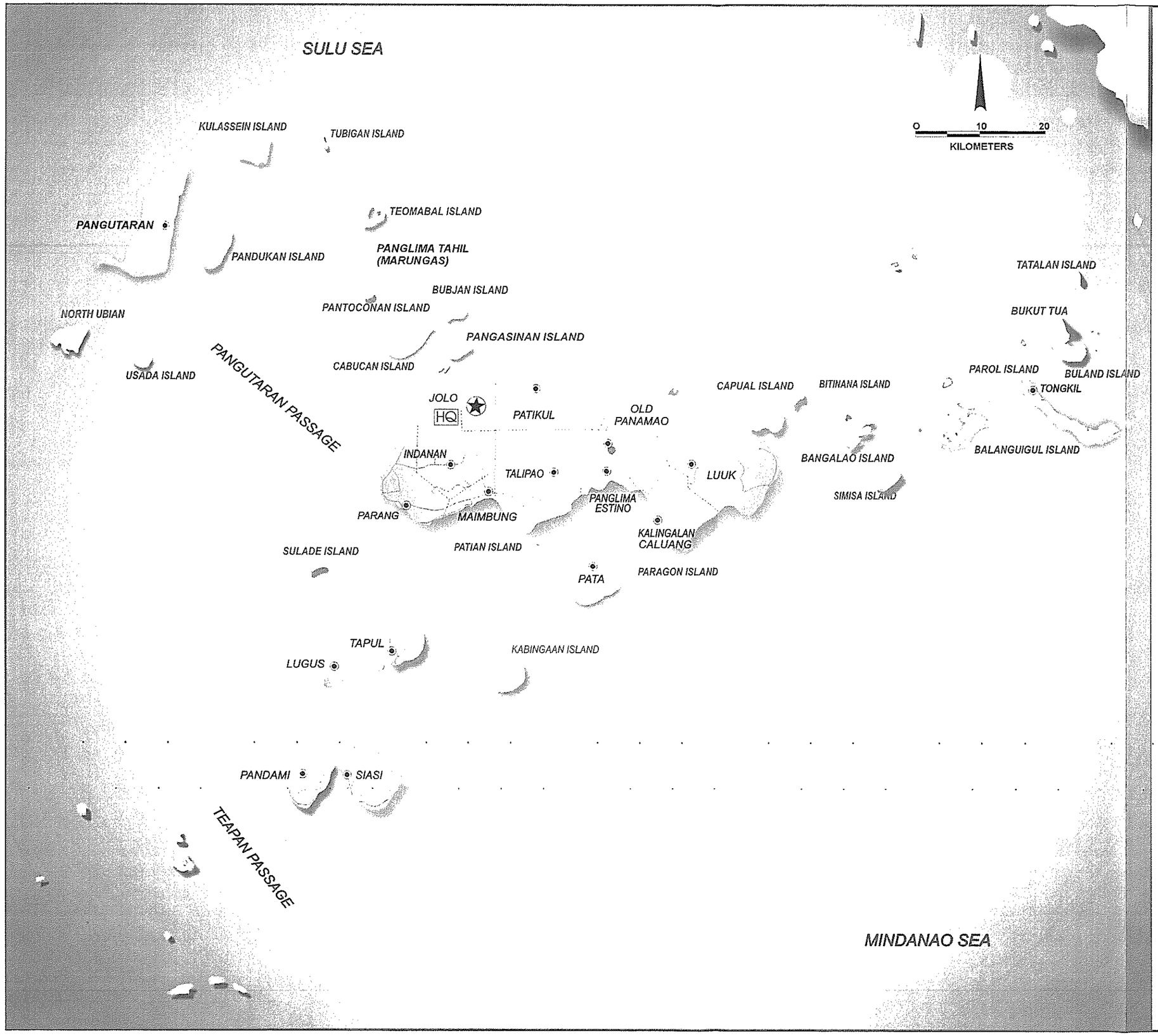
The Sulu Electric Cooperative (SULECO) distributes electricity from the diesel power plant to the 10 municipalities of the province in Jolo Island. Figure 4-2 shows the areas covered by SULECO.

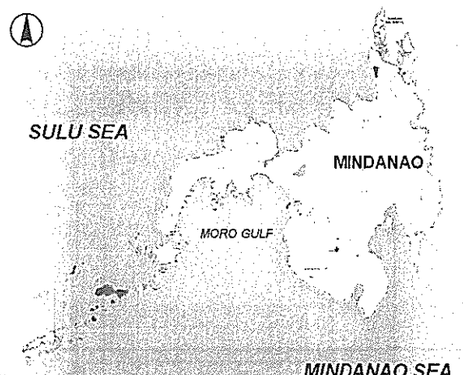
As of the end of 2003, SULECO provided electricity to a total of 182 barangays and 15,247 connections in said island. In terms of percentage accomplishment, these connections translate to 55% of barangays energized and a low 19% of potential connections served within SULECO's coverage area.

Table 4-2 SULECO Accomplishments, as of 31 December 2003

Indicator	Statistic
Potential Connections	82,000
Served	15,247
% Accomplished	19%
Total Barangays	330
Energized	182
Unenergized	148
% Accomplished	55%

Source: National Electrification Administration





KEY MAP

LEGEND:

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- Municipal Boundary
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- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- HQ Location

Source:
Rural Electrification Chronicle

Figure 4-2
COVERAGE AREA
OF SULECO
(Sulu Electric Cooperative)

On the other hand, the Siasi Electric Cooperative (SIASELCO) distributes electricity in the Siasi and the adjacent Pandami island-municipalities. Figure 4-3 shows the areas covered by SIASELCO.

As of the end of 2003, SIASELCO provided electricity to a total of 22 barangays and 1,767 connections in Siasi island. In terms of percentage accomplishment, these connections translate to 33% of barangays energized and only 18% of potential connections served within SIASELCO's coverage area.

Table 4-3 SIASELCO Accomplishments, as of 31 December 2003

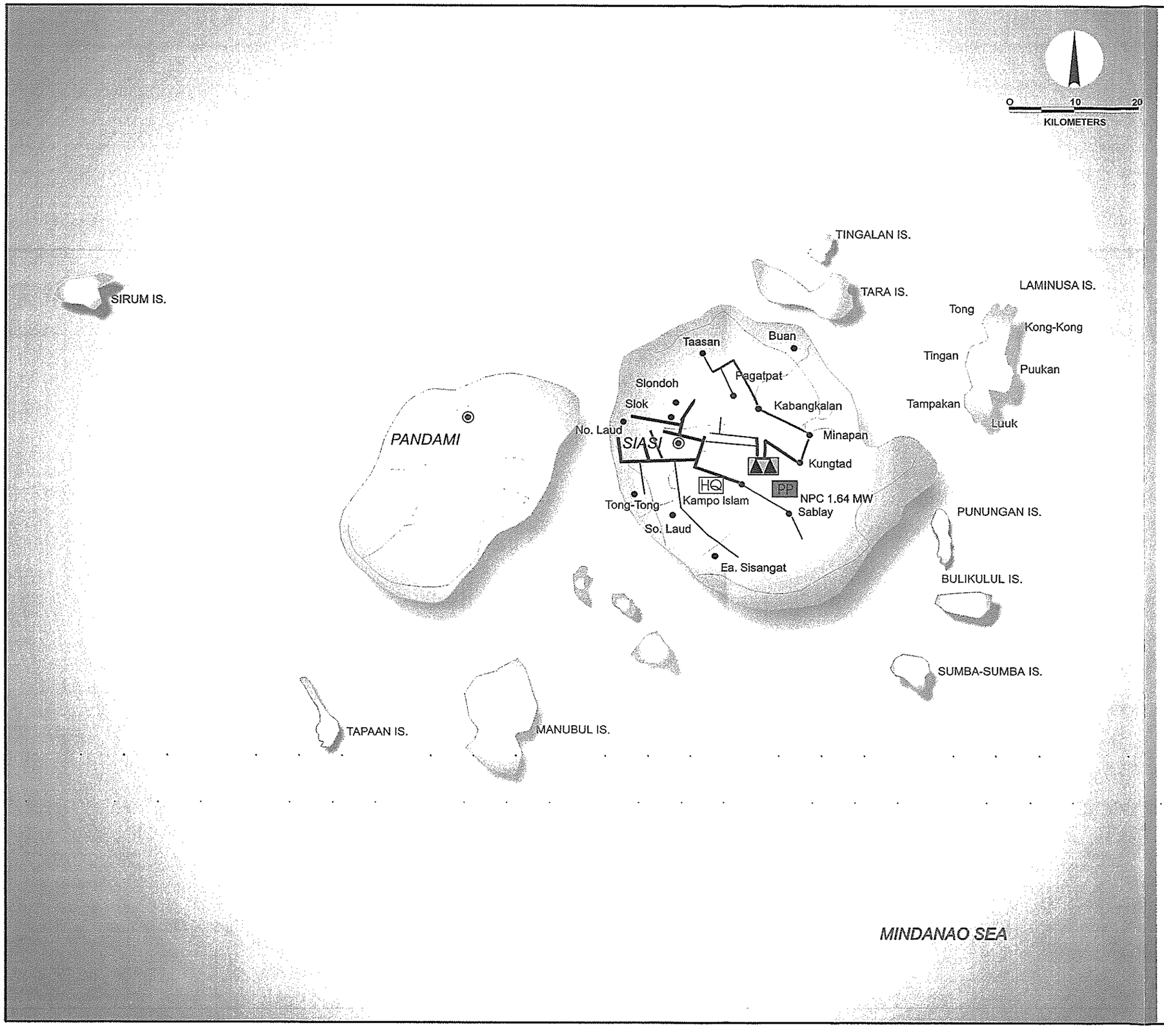
Indicator	Statistic
Potential Connections	10,000
Served	1,767
% Accomplished	18%
Total Barangays	66
Energized	22
Unenergized	44
% Accomplished	33%

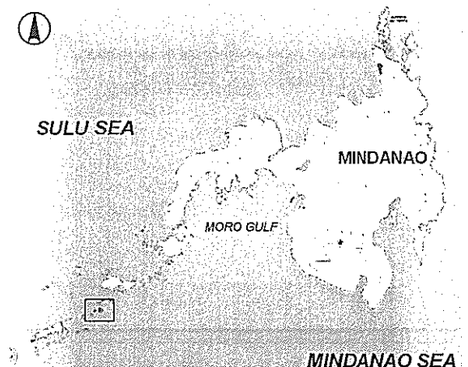
Source: National Electrification Administration

4.3 Tawi-Tawi

Since 1992, the National Power Corporation has installed several diesel power plants and moored one power barge in some of the islands of Tawi-Tawi province. The largest power plants in the province of Tawi-Tawi are in Bongao island, where total dependable capacity, as of December 2003, of the Bongao Diesel Power Plant and a power barge (#108) is 4.8 MW.

Five (5) small island-municipalities each have small diesel generating sets installed and operated by NPC. These are in Manuk-Mangkaw (150 KW), Sibutu (300 KW), Sitangkay (50 KW), West Simunul (100 KW) and Tandubas (50 KW). Numbers in parentheses after each island-municipality are dependable capacities. In mainland Tawi-Tawi, the Balimbing Diesel Power Plant has a dependable capacity of 300 KW.





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- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- HQ Location
- SS Location & Capacity
- Power Plant
- 3 PH Backbone Lines
- V PH
- 1 PH

Source: Rural Electrification Chronicle

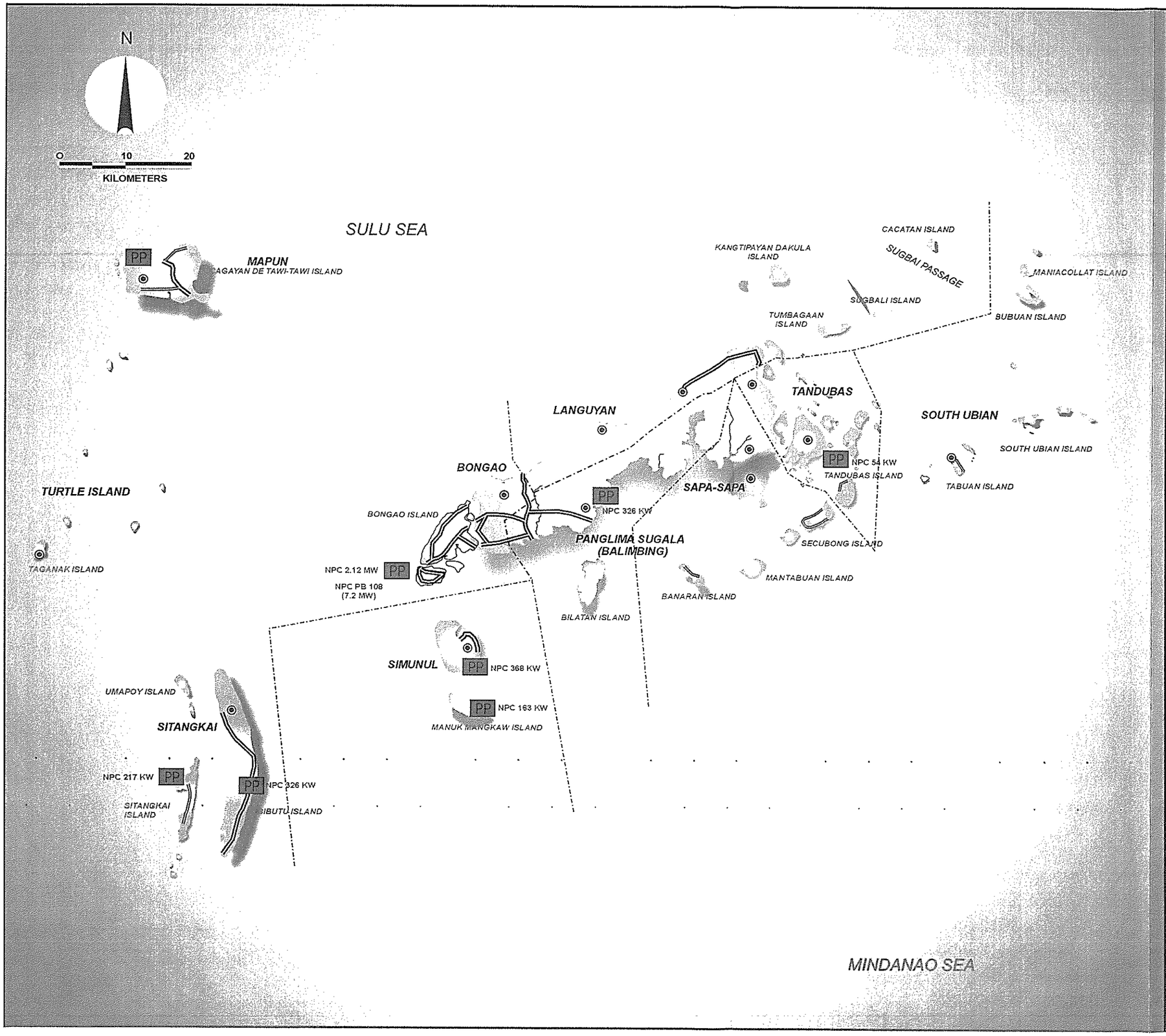
Figure 4-3
COVERAGE AREA OF SIASELCO
(Siasi Electric Cooperative)

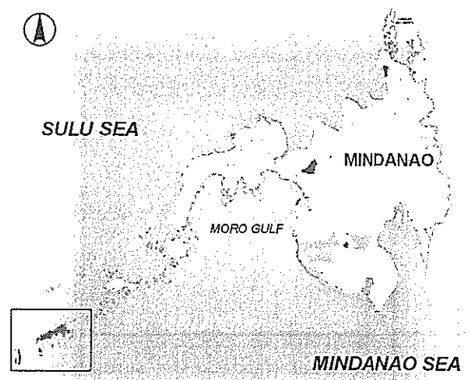
The Tawi-Tawi Electric Cooperative (TAWELCO) distributes electricity in Tawi-Tawi province where the generating plants mentioned above are installed (see Figure 4-4). As of the end of 2003, TAWELCO provided electricity to a total of 113 barangays and 7,719 connections. In terms of percentage accomplishment, these connections translate to 61% of barangays energized and 41% of potential connections served within TAWELCO's coverage area.

Table 4-4 TAWELCO Accomplishments, as of 31 December 2003

Indicator	Statistic
Potential Connections	19,000
Served	7,719
% Accomplished	41%
Total Barangays	186
Energized	113
Unenergized	73
% Accomplished	61%

Source: National Electrification Administration





KEY MAP

LEGEND:

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- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- PP Power Plant

Source:
Rural Electrification Chronicle

Figure 4-4
COVERAGE AREA
OF TAWELCO
(Tawi-Tawi Electric Cooperative)

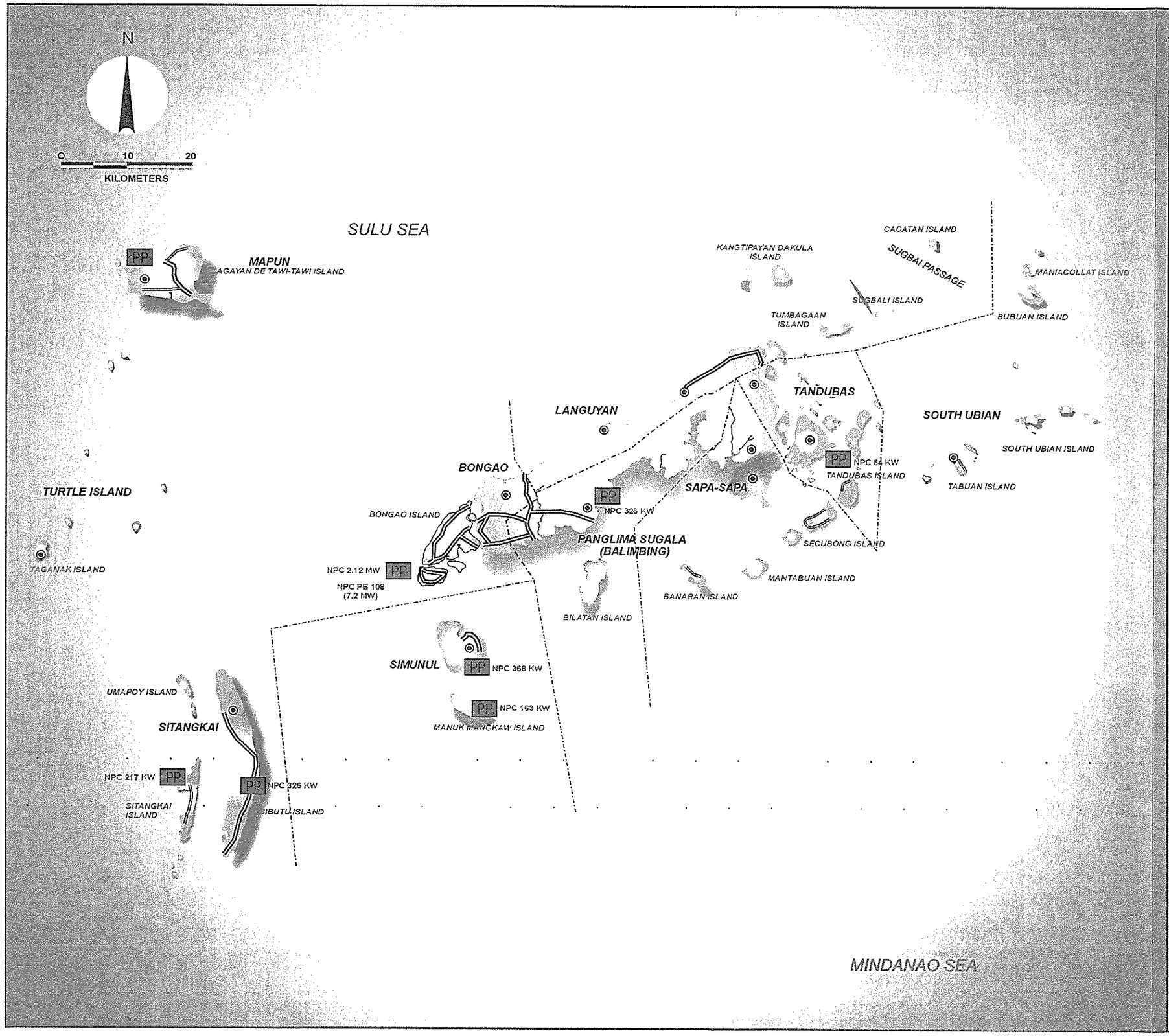
In a remote island named Mapun (formerly called Cagayan de Sulu), NPC also installed diesel generating sets with a total dependable capacity of 500 KW. The Cagayan de Sulu Electric Cooperative (CASELCO) distributes electricity to consumers in this island. Figure 4-5 shows the areas covered by CASELCO.

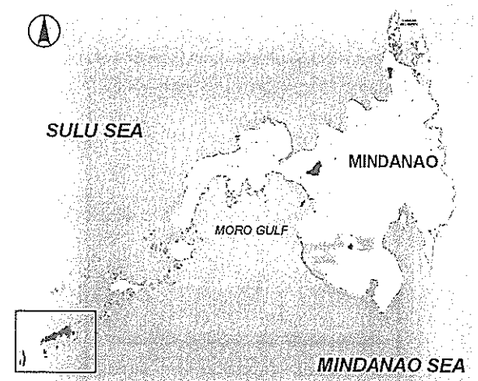
As of the end of 2003, electricity already reached eight (8) barangays and 758 connections in the island of Mapun. In terms of percentage accomplishment, these connections translate to 47% of barangays energized but only to 25% of potential connections served within CASELCO's coverage area.

Table 4-5 CASELCO Accomplishments, as of 31 December 2003

Indicator	Statistic
Potential Connections	3,000
Served	758
% Accomplished	25%
Total Barangays	17
Energized	8
Unenergized	9
% Accomplished	47%

Source: National Electrification Administration





KEY MAP

LEGEND:

- Provincial Boundary
- Municipal Boundary
- River
- National Road
- Non-Passable National Road
- Provincial Road
- City Center
- Town Center
- PP Power Plant

Source:
Rural Electrification Chronicle

Figure 4-4
COVERAGE AREA
OF TAWELCO
(Tawi-Tawi Electric Cooperative)

5. SELECTED PERFORMANCE INDICATORS OF GENERATING PLANTS AND ELECTRIC COOPERATIVES

The selected indicators of the NPC generating plants in the small island grids and of the seven (7) electric cooperatives operating in the ARMM provinces are shown in Tables 5-1 and 5-2, respectively. Discussed below are some of the highlights of these indicators.

5.1 NPC Generating Plants in Small Island Grids

The hours of operation of the NPC power plants in the small island grids (see Table 5-1) ranged from a minimum of 6 to 8 hours daily, particularly in the case of the island-municipalities of Tawi-Tawi, to a maximum of 24 hours daily for the major load centers such as those in Basilan, Jolo island and Bongao, Tawi-Tawi.

As may be expected, the system demands in each of the major load centers were higher compared to those in the island municipalities. It may be noted though that dependable capacities of power plants normally have net reserves compared to the system demand. However, these net reserves disappear when generating units connected to the grid encounter operational problems, such as the cases reported in December 2003 in Basilan, Jolo island, in Siasi (Sulu) and West Simunul (Tawi-tawi) when generating units installed in these islands encountered engine problems. Bringing back these units into operation depends largely on the availability of spare parts.

While considered an important performance indicator in the power supply sector, outages of power generating sets were not reflected in the operational statistical report that NPC generated. Monthly field reports include such statistic but for some reason, the Small Power Utilities Group (SPUG) in the NPC Head Office does not include it in its consolidated operational statistical report. It may be noted, however, that said report gives the status of the generating sets, i.e., whether operational or not, and the reasons for not being in operation. Also, these reports indicate the cumulative number of hours of operation of each generating set from commissioning date.

Table 5-1 Operational Statistics of Small Power Plants in ARMM, As of December 2003

LAND/PLANT BARGE (Operating Hours) Date Reported	GENSETS PARTICULARS UNIT NO.	MAKE	RATED CAP. (MW)	DEP. CAP. (MW)	ACCUM. RUNNING HOURS	SYSTEM DEMAND (MW) MAX.	MIN.	AVE.	NET RESERVE/(DEFICIENCY)	COMM"SNG. DATE	REMARKS
A. BASILAN ISLAND		**Total-Grid**	**9.822**	**6.900**		**6.000**	**2.500**	**3.600**	**0.900**		Landbased synchronized to PB119
1. BASILAN DPP	1	CKD	1.224	-	5,722.42					07-Sep-97	NOT OPERATIONAL Under maintenance/awaiting for bearing cap.
(24)	2	CKD	0.448	0.300	5,246.11					07-Sep-97	OPERATIONAL
December 25, 2003		**Sub-total**	**1.672**	**0.300**							
2. POWER BARGE 119	1	DAIHATSU	1.800	1.500	19,886.88					01-Jun-95	OPERATIONAL
(24)	2	DAIHATSU	1.800	1.500	42,902.50					01-Jun-95	OPERATIONAL
December 25, 2003	3	DAIHATSU	1.800	1.500	41,270.78					01-Jun-95	OPERATIONAL
	4	DAIHATSU	1.800	1.500	37,652.50					01-Jun-95	OPERATIONAL
		Sub-total	**7.200**	**6.000**							
3. KUMALARANG MINIHYDRO c/o Coop			0.680	0.500							OPERATIONAL
4. BALAGTASAN MINIHYDRO c/o Coop			0.270	0.100	19,174.58						OPERATIONAL
B. JOLO ISLAND, SULU											
1. JOLO DPP	1	DAIHATSU	1.800	1.550	56,243.00					01-May-95	OPERATIONAL
(24)	2	DAIHATSU	1.800	1.650	55,211.65					01-Jul-95	OPERATIONAL
December 25, 2003	3	DAIHATSU	1.800	1.500	52,942.43					01-Sep-95	OPERATIONAL
	4	DALE-PERKINS	0.560	-	19,647.58					01-Jun-95	NOT OPERATIONAL /Auxiliary genset only
		Sub-total	**5.960**	**4.700**		**4.800**	**2.200**	**2.887**	**(0.100)**		
2. SIASI DPP	1	DALE-PERKINS	0.560	-	28,140.72					19-Feb-97	NOT OPERATIONAL Awaiting for spare parts
(18)	2	DALE-PERKINS	0.260	0.120	40.107.97					1-Oct-91	OPERATIONAL
December 25, 2003	3	DALE-PERKINS	0.260	0.120	32,438.72					1-Oct-91	OPERATIONAL
	4	DALE-PERKINS	0.560	0.250	33,113.56						OPERATIONAL
		Sub-total	**1.640**	**0.490**		**0.600**	**0.200**	**0.466**	**(0.110)**		
C. TAWI-TAWI											
Bongao Is., Tawi-tawi		**Total-Grid**	**9.320**	**4.800**		**1.600**	**0.610**	**0.870**	**3.000**		
1. BONGAO DPP	1	CKD	1.224	-	6,221.10					01-Jul-99	NOT OPERATIONAL Awaiting for the main bearing
(24)	2	CKD	0.448	0.300	20,113.08					06-May-95	OPERATIONAL
December 25, 2003	3	CKD	0.448	-	22,112.37					16-Jun-96	NOT OPERATIONAL Awaiting for con-rod & main bearing
		Sub-total	**2.120**	**0.300**							
2. POWER BARGE 108	1	DAIHATSU	1.800	-	31,113.10					1-Mar-92	NOT OPERATIONAL Lacking spare parts
(24)	2	DAIHATSU	1.800	1.500	13,392.93					1-Mar-92	OPERATIONAL
December 25, 2003	3	DAIHATSU	1.800	1.500	42,040.30					1-Mar-92	OPERATIONAL
	4	DAIHATSU	1.800	1.500	38,413.20					1-Mar-92	OPERATIONAL
		Sub-total	**7.200**	**4.500**							

Source: Small Power Utilities Group (SPUG), National Power Corporation

LAND/PLANT BARGE (Operating Hours) Date Reported	GENSETS PARTICULARS UNIT NO.	MAKE	RATED CAP. (MW)	DEP. CAP. (MW)	ACCUM. RUNNING HOURS	SYSTEM DEMAND (MW) MAX.	MIN.	AVE.	NET RESERVE/(DEFICIENCY)	COMM"SNG. DATE	REMARKS
3. BALIMBING DPP	1	DALE-PERKINS	0.163	0.150	10,447.82					13-Jan-97	OPERATIONAL
(10)	2	DALE-PERKINS	0.163	0.150	7,192.85					1-Jul-98	OPERATIONAL
December 25, 2003		**Sub-total**	**0.326**	**0.300**		**0.130**	**0.060**	**0.093**	**0.170**		
4. CAG. DE TAWI TAWI DPP	1	DALE-PERKINS	0.260	0.250	19,049.96					26-Sep-92	OPERATIONAL
(8)	2	DALE-PERKINS	0.260	0.250	10,379.19					26-Sep-92	OPERATIONAL
December 25, 2003		**Sub-total**	**0.520**	**0.500**		**0.200**	**0.105**	**0.148**	**0.300**		
5. MANUK-MANGKAW DPP	1	DALE-PERKINS	0.163	0.150	12,975.78					14-Jul-97	OPERATIONAL
(6)											
December 25, 2003		**Sub-total**	**0.163**	**0.150**		**0.080**	**0.070**	**0.073**	**0.070**		
6. SIBUTU DPP	1	DALE-PERKINS	0.163	0.150	11,186.90					28-Jul-97	OPERATIONAL
(6)	2	DALE-PERKINS	0.163	0.150	1,150.47						OPERATIONAL
December 25, 2003		**Sub-total**	**0.326**	**0.300**		**0.240**	**0.080**	**0.178**	**0.060**		
7. SITANGKAY DPP	1	VISA-PERKINS	0.054	0.050	4.83					24-Jun-00	OPERATIONAL Unit overloaded due to high load demand. Unit standby.
(6)	2	DALE-PERKINS	0.163	-							
December 25, 2003		**Sub-total**	**0.217**	**0.050**		**0.050**	**-**	**-**	**0.000**		
8. WEST SIMUNUL DPP	1	VISA-PERKINS	0.054	0.050	3,581.00					1-Dec-00	OPERATIONAL
(6)	2	VISA-PERKINS	0.054	0.050	3,543.00					1-Dec-00	OPERATIONAL
	3	DALE-PERKINS	0.260	-	26,460.00					25-Sep-02	NOT OPERATIONAL Awaiting for new AVR
December 25, 2003		**Sub-total**	**0.368**	**0.100**		**0.115**	**0.080**	**0.110**	**(0.015)**		
9. TANDUBAS DPP	1	VISA-PERKINS	0.054	0.050	2,952.28					3-Jun-02	OPERATIONAL
(6)											
December 25, 2003		**Sub-total**	**0.054**	**0.050**		**0.048**	**0.025**	**0.039**	**0.002**		

5.2 Electric Cooperatives

Discussed below are some of the key statistics shown in Table 5-2 for each of the electric cooperatives in the ARMM.

5.2.1 LASURECO

The Lanao del Sur Electric Cooperative is classified as a medium electric cooperative covering 40 municipalities and serving 29,674 household connections. It is, however, categorized as "E" electric cooperative, which means "Needs Improvement". While the Fact Sheet is supposed to reflect end of 2003 figures, it may be noted that the LASURECO submission is as of June 2003 only. According to NEA, LASURECO management does not regularly submit monthly financial and statistical reports which include operating revenue, collection efficiency, energy purchases, system loss and number of employees. Its power account to NPC and TRANSCO power receivable are both overdue. These facts reflect on the cooperative's inability to manage its affairs well.

Outages reported by LASURECO for the year 2002 consisted of 467 hours due to causes in the NPC system and almost 750 hours due to local electric cooperative system causes. The total number of customers affected by these outages was reported at 20,540.

5.2.2 MAGELCO

The Maguindanao Electric Cooperative is classified as extra large, serving more than half (33,965 out of 62,000) of potential connections in its coverage area. Its category is still considered a "D" or Poor, considering among others, system loss of about 23%. On the other hand, its collection efficiency is relatively high at 85% and it is current in both its NPC power account and TRANSCO power receivable.

Outages in the MAGELCO system in 2002 totaled 1,092 hours, while those outages that could be traced to the NPC system totaled 130 hours only.

Table 5- 2 Fact Sheet of ARMM Electric Cooperatives, as of 31 December 2003

		LASURECO	MAGELCO	BASELCO	SULECO	SIASELCO	TAWELCO	CASELCO
1	2002 Category	E	D	E	C	A+	E	E
2	2002 Class	Medium	Extra Large	Medium	Medium	Small	Small	Small
3	Coverage Area (Municipalities & Cities)	40	24	8	15	2	8	2
4	Potential Connections (December 2003)	113000	62000	64000	82000	10000	19000	3000
	Served	29674	33965	22540	15247	1767	7719	758
	% Accomplished	26%	55%	35%	19%	18%	41%	25%
5	Total Barangays	1174	598	269	330	66	186	17
	Energized	786	348	227	182	22	113	8
	Unenergized	388	250	42	148	44	73	9
	% Accomplished	67%	58%	84%	55%	33%	61%	47%
6	Average Systems Rate (P/KwH)	-	3.69	7.18	7.87	7.27	7.23	9.22
7	Operating Revenue (P'000)	-	132472	94282	95860	7461	38995	1447
8	Loan Balance (P'000) (December 2003)	-724	16125	6394	53549	529	32824	1393
9	NEA Releases	278307	182324	165177	112934	22300	57143	16020
	Loans (P'000)	148080	101180	97258	37859	7063	25799	3964
	To be assumed by PSALM	128532	98943	87386	35536	7063	19403	3925
	Still to be paid by EC (Dec. 2003)	19548	2237	9872	2323		6396	39
	Subsidies (P'000) (Dec. 2003)	130227	81144	67919	75075	15237	31344	12056
10	Collection Efficiency (June 2003)	-	85%	77%	73%	90%	54%	-
11	NPC Power Account (October 2003)	Overdue	Current	Overdue/restructured	Overdue	Overdue	Overdue/restructured	Overdue
	TRANSCO Power Receivable (Dec. 2003)	14 months overdue	Current	-	-	-	-	-
12	MWH Purchased		47173	16752	18590	1135	9226	
	MWH Sold		35906	13140	12184	1026	5393	157
13	System Loss		22.93%	20.86%	33.32%	9.34%	41.26%	22.66%
14	Circuit Kms. of Line	950	4943	968	884	66	112	45
15	KW Load		13875	5980	4490	460		195
	Load Factor		52%	38%	52%	34%		24%
	Power Factor			96.00%	94.18%	71.00%		-
16	Sub-Station Capacity (kVA)	20000	27500	9950	3600	1500	750	-
17	Number of Employees		118	155	103	21	45	8
	Connection/Employee		288	145	148	84	172	95
		*As of June 2003	* January to September 2003	* January to October 2003	* January to November 2003	* January to October 2003	* January to September 2003	* January to June 2003

Source: Data Center, IT and Communication Services Department, NEA

Categories: A+ "Outstanding"; A "Very Satisfactory"; B "Satisfactory"; C "Fair"; D "Poor"; E "Needs Improvement"

As of December 2002

18	NPC Outages							
	No. of hours	466.72	130.34	2460.76	ND	1132.33	161	ND
	Consumers Affected	20540	46287	16648	ND	1926	3000	ND
	Frequency	123	86	353	ND	156	12	ND
19	Local Outages							
	No. of hours	748.81	1092.3	1246.01	3317.67	ND	113	ND
	Consumers Affected	20540	147605	16648	11673	ND	3031	ND
	Frequency	202	434	291	60	ND	12	ND

Source: Operations Division, Engineering Department, NEA

5.2.3 BASELCO

The Basilan Electric Cooperative has a medium classification, serving 22,540 household connections in eight (8) municipalities. Like LASURECO, BASELCO's category in 2002 was also E (Needs Improvement). Collection efficiency was at 77%. Its power account with NPC was also overdue after restructuring. System loss was about 21% in 2002. Although there is a mini-hydro power source, its generating capability could not be considered sufficient to lower average systems rate, which at yearend 2003, stood at 7.18 pesos per kwhr.

In 2002, total number of outages in the BASELCO coverage area reached 2,461 hours due to outages in the NPC system and 1,246 hours due to outages in the cooperative system itself.

5.2.4 SULECO

The Sulu Electric Cooperative was classified a medium cooperative, serving 15,247 households, (or only 19% of total potential connections) in 15 municipalities within its coverage area. SULECO's category, however, was considered "Fair", receiving a "C" category in 2002. Collection efficiency was modest at only 73%. SULECO was also overdue in its payments on its NPC power account as of yearend 2003. System loss was high at almost 33% in 2003. Since it is totally dependent on diesel generating sets, its average system rate in 2003 was 7.87 pesos per kwh.

In 2002, SULECO did not submit any information on outages caused by the NPC system but reported a total of 3,318 hours from its distribution system affecting 11,673 of its customers.

5.2.5 SIASELCO

The Siasi Electric Cooperative, with only 1,767 household connections in two (2) municipalities covered, was classified small. SULECO, however, received an "A+" category in 2002, meaning "Outstanding", considering its 90% collection efficiency and an acceptable 9.34% system loss. But it was also overdue in its NPC power account. It may be noted that SIASELCO's average system rate of 7.27 pesos per kwh had minimal effect on its collection efficiency.

SIASELCO reported total outages in 2002 of 1,132 hours due to the NPC system. There was no similar report of outages due to faults in its distribution system.

5.2.6 TAWELCO

The Tawi-Tawi Electric Cooperative was also a small cooperative, serving 7,719 households in eight (8) municipalities in seven (7) islands. It was categorized an "E" electric cooperative, meaning it needs improvement in its operations. With so many separate systems, TAWELCO's system loss was high at a little over 40%. Collection efficiency was low at only 54%. Its power account with NPC was overdue after restructuring. Average systems rate of TAWELCO was 7.23 pesos per kwh.

Compared to the other ARMM electric cooperatives, TAWELCO experienced fewer outages in 2002. NPC system outages totaled 161 hours while TAWELCO system outages totaled 113 hours.

5.2.7 CASELCO

The Cagayan de Sulu Electric Cooperative is also a small cooperative, serving only 758 households in two (2) municipalities as of yearend 2003. Its category was also an "E" (Needs Improvement), considering that it was overdue in its payments of its NPC power account. Compared with other ARMM electric cooperatives, CASELCO's system loss was only 22.66%. But, its NPC power account was also overdue. CASELCO's average system rate was the highest among the ARMM electric cooperatives at 9.22 pesos per kwh.

In 2002, CASELCO did not submit any information as to outages caused in the NPC system or those caused in the cooperative's distribution system.

6. ONGOING EXPANDED RURAL ELECTRIFICATION PROGRAM IN THE ARMM

This Chapter discusses the nature and accomplishments of the government's Expanded Rural Electrification (RE) Program in general and in the ARMM provinces, in particular. It also discusses the Alliance for Mindanao Off-Grid Renewable Energy (AMORE) Program and its contribution to energizing remote barangays in the ARMM.

6.1 Expanded Rural Electrification Program in the ARMM

The Expanded RE Program involves the electrification of remote sitios and barangays not yet reached by grid distribution lines or are located in islands without power supply source. Electricity is supplied to these remote barangays either by accelerating the extension of the grid distribution lines ahead of the electric cooperatives' program or by tapping alternative renewable energy sources such as solar, micro-hydro, wind or biomass.

The Expanded RE Program was transformed from the O' Ilaw Program in April 2003. Through a Department of Energy (DOE) Circular No. 2003-04-004, an Expanded Rural Electrification (ER) Team was created to manage and effectively integrate the country's rural electrification efforts. The ER Team is composed of representatives from the DOE, NPC-SPUG, NEA, PNOC-EDC and the private sector. Among others, the objectives of the Program are: a) to accelerate electrification through enhanced public/private participation; b) to promote cost-effective uses of new and renewable energy in the provision of electricity in remote and unviable areas; and c) to integrate all electrification initiatives and efforts in order to achieve 100% barangay electrification by 2006 and 90% of all households by 2017.

Funding sources for the Expanded RE Program are as follows: a) loans and subsidies to the electric cooperatives; b) funds collected from Energy Regulations (ER) 1-94; c) funds of the NPC and PNOC-Energy Development Corporation; d) grants from funding institutions such as the USAID; and e) private sector funds such as those coming from Independent Power Producers (IPPs).

As of December 2003, 90%, or 37,748 of the 41,945 barangays nationwide had access to electricity service. A total of 4,197 barangays nationwide remained unenergized.

As of the end of December 2003, available data gathered from the NEA (see Table 6-1) indicate that 63%, or 1,549 of the 2,473 barangays in the ARMM provinces have been energized. This leaves 924 barangays still unenergized. It may be noted, however, that only about 32% of total potential households covered by electric cooperatives in the ARMM had electricity connections as of the same period. (see Table 6-2).

6.2 Alliance for Mindanao Off-Grid Renewable Energy (AMORE) Program

The AMORE Program is a 30-month joint undertaking of the DOE, the ARMM Regional Government, USAID, Mirant Philippines, Inc., and Winrock International, Inc. It was launched in February 2002 and will end in September 2004. The Program seeks to provide a sustainable approach to electrifying remote rural communities in Western and Central Mindanao and the ARMM with clean renewable energy, as its contribution to the peace and development efforts in these regions. The Program aims to accomplish, among others, the electrification of at least 160 remote rural barangays in the provinces of Basilan, Sulu, Tawi-Tawi, Maguindanao, Sultan Kudarat, South Cotabato and Zamboanga-Sibugay, and the cities of Zamboanga and Davao. The target barangays under the AMORE Program are recorded as part of the overall Expanded RE Program, thus eliminating any double funding for the energization of a particular barangay or sitio.

The Program has tapped solar energy as one of the renewable energy sources for providing electricity in remote barangays not easily accessed by grid systems. Mirant Philippines, Inc., as part of its corporate social responsibility, is supporting the Program by providing free-of-charge the solar equipment and systems for battery charging stations (BCS) in all of the target 160 barangays.

As of October 2003, a total of 94 barangays in Tawi-Tawi, Basilan, Sulu and Maguindanao covering 2,820 households were provided electricity using solar energy. Under the AMORE Program, an energized barangay consists of 30 households. Three (3) BCS, capable of providing charging services for 10 households per BCS, are set up in the target barangay. Initially, each household is provided a solar battery at no cost. The household member brings the solar battery to the BCS for a fee of 25 pesos per charging.

Table 6-1 Status of Barangay Energization in ARMM, as of 31 December 2003

Province	No. of Barangays	Barangays Energized	% Energized
Lanao del Sur	1,138	761	67
Maguindanao	467	236	51
Basilan	255	225	88
Sulu	410	205	50
Tawi-tawi	203	122	60
Total	**2,473**	**1,549**	**63**

Source: National Electrification Administration

Table 6-2 Household Connections in ARMM Electric Cooperatives as of 31 December 2003

Electric Cooperative	No. of Households	Household Connections	% Connected
LASURECO	113,000	29,674	26
MAGELCO	62,000	33,965	55
BASELCO	64,000	22,540	35
SULECO	82,000	15,247	19
SIASELCO	10,000	1,767	18
TAWELCO	19,000	7,719	41
CASELCO	3,000	758	25
Total	**353,000**	**111,670**	**32**

Source: National Electrification Administration

Note: Except for TAWELCO and CASELCO in the case of Tawi-tawi province, the coverage areas of the other electric cooperatives in the above table do not include all municipalities in the entire province (please refer to Chapters 3 and 4).

In September 2003, a Memorandum of Agreement was signed between the AMORE Program and NPC for the provision of electricity using solar energy to seven (7) barangays in Siasi and three (3) barangays in Pandami island, both in Sulu province. Under the Agreement, NPC will provide the funds and technical know-how for the procurement and installation of solar systems in the target barangays.

Micro-hydro systems, wind energy and biomass are other renewable energy sources that are being studied and considered for implementation. Under the AMORE Program, only micro-hydro projects are in the advanced stages of project development, although none of these are located in any of the ARMM provinces. Two (2) such projects with capacities in the 7-8 KW range, both located in two (2) barangays of Sultan Kudarat, have been the subject of project feasibility studies and engineering designs. One of these, located in barangay Chua, Bagumbayan municipality, was bidded out in October 2003. This project's cost is estimated to be US$150,000. Its target date of commissioning is May 2004.