2009 TRANSMISSION DEVELOPMENT PLAN

Volume 1

FINAL REPORT

NATIONAL GRID CORPORATION OF THE PHILIPPINES

2009 TRANSMISSION DEVELOPMENT PLAN

NOVEMBER 2009

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Foreword

This Transmission Development Plan (TDP) comes at an auspicious time when much is expected from the energy sector's newest entity.

The NATIONAL GRID CORPORATION OF THE PHILIPPINES (NGCP) has officially taken over the nationwide transmission grid operations starting January 15, 2009. As such, NGCP is tasked to operate and maintain the country's power transmission grid.

Without a doubt, as a newly privatized company, NGCP remains at the forefront of the reforms being undertaken for the benefit of power customers nationwide as envisioned by the Electric Power Industry Reform Act of 2001.

The TDP reflects NGCP's vision of building the strongest power grid and maintain the best power utility practice in Southeast Asia. This ten-year plan is also NGCP's roadmap for transmission development required to meet demand growth, support incoming generation facilities and sustain its transmission business operations while ensuring compliance with technical and regulatory framework of the electric industry.

The plan will guarantee the upgrading and expansion of NGCP's transmission facilities thus contributing to social and economic development of the nation and at the same time satisfying the stakeholders' needs.

As a commitment for ensuring a reliable transmission system today and in the future, NGCP will be investing billions to roll out new transmission infrastructures. These transmission network upgrade and expansion initiatives are expected to bring about positive, far-reaching changes, not only in the reliability and quality of transmission service, but also in helping improve the economy of the country.

For the first time, this edition of the TDP will be released in three separate volumes. Volume 1 will cover major network upgrades and expansions resulting from centralized transmission system planning activities. Volumes 2 and 3 will cover other network developments relating to NGCP's key service areas such as Operations and Maintenance (O&M) and System Operations (SO), respectively.

The capital expenditures (capex) outlined in the three volumes of the TDP shall form the major component of NGCP's submissions to the Energy Regulatory Commission for the Third Regulatory Period (2011-2015). However, not all of the projects in the TDP might be included in NGCP's forecast capex for the Regulatory Reset.

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I. Preliminaries

1. Preliminaries

1.1 About NGCP

1.1.1 Organization/Operation

NGCP's functions as the Transmission Service Provider involve the transmission of electricity in response to system and market demands:

(1) From generator connection points to distribution network connection points and the direct connection points of a number of large end-users.

(2) Between the three major regions of the Philippines, namely: Luzon, Visayas and Mindanao, thereby increasing reliability and reducing the overall cost of generation nationally.

In order to undertake the above services, NGCP operates a substantial control and delivery network, the key elements of which include:

(1) High-voltage transmission network including submarine cable, equipped with protection system;

(2) The Supervisory Control and Data Acquisition system (SCADA);

(3) Regional control centers;

(4) Numerous substations and depots, each of which are linked back to the central system;

(5) Converter stations (HVAC - HVDC); and

(6) A comprehensive metering system at substations, and direct customer delivery points.

For business management purposes, NGCP's obligations can be grouped into six (6) key service areas described as follows:

(1) System operations: managing the national power grid, dispatching generation and managing the system, including the arrangement for ancillary services.

(2) Network reliability: providing the appropriate levels of network reliability in accordance with the reliability requirements set forth in the Grid Code.

(3) Connection service: NGCP's obligations, primarily to customers and prospective customers (e.g. generators, distributors and large end users) to provide effective, timely and efficient connection services, including metering and relevant services.

(4) Safety: NGCP's obligations, primarily to its stakeholders (e.g. staff, other electricity industry employees and the community) to deliver its services with appropriate priority given to human safety.

(5) Environmental: NGCP's obligations, primarily to its stakeholders (e.g. the community and government) to deliver services in an environmentally responsible manner.

(6) Wholesale Electricity Market: NGCP's obligations in relation to the operation and development of the electricity market, by way of the provision of efficient and effective transmission services.

In addition, NGCP continues to operate a significant set of sub-transmission services from high voltage delivery points to end users. These sub-transmission assets have been offered for sale to the distribution utilities in compliance with the requirement of the Republic Act No. 9136 (Electric Power Industry Reform Act of 2001), or EPIRA.

Pursuant to ERC Resolution No. 18 series of 2009, those sub-transmission assets which have not been sold or disposed of by 31 December 2010 shall remain as NGCP's assets which shall be included into the regulatory asset base. The proposed projects to expand and upgrade these facilities are included in this Volume I (refer to Chapter 8), while those for replacement and rehabilitation are outlined in Volume II.

1.1.2 NGCP as a Regulated Entity

With the enactment of the EPIRA, generation, transmission, distribution and supply are distinguished as different business activities within the Philippine electricity industry. Among these activities, transmission and distribution exhibit natural monopoly characteristics which make regulation on them appropriate. Generation and retail sale of electricity, on the other hand, can be efficient in the competitive environment as a result of the reforms introduced by the EPIRA.

As the sole transmission service provider, NGCP is regulated under the performance-based ratemaking (PBR). The PBR is a form of utility regulation that strengthens the financial incentives to lower rates or lower costs. The PBR methodology is outlined in the Rules for Setting Transmission Wheeling Rates or RTWR.



1.2 Structure of the TDP

The 2009 TDP consists of three (3) volumes. This Volume I contains the proposed grid expansion and upgrades, which generally, are the results of system studies. The other volumes outline the capital expenditure programs of Operation and Maintenance (Volume II) and System Operations (Volume III). Those for metering services have been integrated into Volume III.

Volume I consists of nine (9) chapters.

Chapter 1 provides an overview of NGCP's organization and operation as transmission service provider and regulated entity.

Chapter 2 explains the assessments made on the existing transmission network, gives insights on the profile of the grid and identifies the existing and potential problems/constraints in the system.

Chapter 3 discusses the latest demand projections and generation capacity addition used by NGCP as input to the simulation studies to identify future transmission constraints and transmission expansion associated with load growth, new generation connections and reliability requirements. Also included in this chapter is the supply-demand outlook of the grids for the planning horizon.

The next five chapters discuss how the projects are classified, the summary of which are shown in Table 1.1.

Chapter 4 enumerates the projects that have been completed from 01 January 2008 to 30 June 2009.

Chapter 5 describes NGCP's ongoing projects in the Luzon, Visayas and Mindanao grids.

Chapter 6 identifies the projects that are needed to be completed for the period 2011-2015 and that will be filed to the regulator for approval. These projects are those already approved during the Second Regulatory Period but need to be re-filed and new projects as identified in the simulation studies.

Chapter 7 provides the list of projects beyond 2015 (indicative projects) that will be part of NGCP's submission to the regulator as small capex.

Chapter 8 contains the list of expansion/ upgrading of assets in case they are not divested by end of 2010 pursuant to an ERC resolution.

Chapter 9 contains different appendices that contain discussions on relevant topics such as the Grid Code performance standards, priority level of new projects, and other projects requested by some sectors.

There are also projects requested by some sectors that have been and/or will be filed to the ERC. A number of them have gone through

Table 1.1 2009 TDP Project Classifications

Classification	With Regulatory Approval?	Description
1. Recently Completed Projects	Yes	Completed between 01 January 2008 to 30 June 2009
2. Ongoing Projects	Yes	Construction or bidding activities are underway
3. Proposed Projects for 2011-2015		
(a) With ERC Approval	Yes	To be re-filed: either small capex or with Provisional Approval
(b) New Projects	To be filed for approval	Projects with need dates between 2011-2015 and grouped into generation-associated, load growth-driven and reliability/power quality projects
4. Indicative Projects	To be filed for approval	Projects with need dates between 2016-2018 and will be treated as small capex in the Third Regulatory Period
5. Residual Sub-transmission Assets (RSTA)	To be filed for approval	Proposed upgrading/expansion of RSTA (in case not divested by end of 2010)

regulatory process and are now waiting for decision. These projects are listed in Appendix 2.

The New Projects as described in Table 1.1 are categorized into three (3) priority levels:

(1) Priority 1 are those projects that must be completed within the Third Regulatory Period;

(2) Priority 2 refers to those projects that are needed to avoid N-1 violation and could be partially implemented in the Third Regulatory period; and

(3) Priority 3 are those projects that are needed to avoid N-1 violation but could be addressed operationally. This category includes three (3) 69 kV line projects that were already filed by TransCo to the ERC and are now awaiting decision.

Appendix 3 shows the prioritization level of each new project.

Under a high capex scenario, all of the new projects will be implemented. On the other hand, Priority 1 and Priority 2 will be implemented in case a medium capex scenario is adopted. Only the Priority 1 projects will be implemented for a low capex scenario.

2. Assessment of Transmission System

2. Assessment of Transmission System

2.1 Grid Profile

As of 31 December 2008, NGCP's managed transmission assets comprised of 19,778 circuit kilometers (ckt-km). About half of these assets, or 9,527 ckt-km are in Luzon. 4,745 ckt-km form part of the Visayas Grid and the remaining 5,506 ckt-km are in Mindanao. Roughly 78% (18,861 MVA) of the total 24,214 MVA substation capacities installed are in Luzon. The Visayas account for 3,154 MVA and Mindanao 2,200 MVA. These figures exclude transmission lines and transformer assets which had been decommissioned already.

Table 2.1 Summary of Existing Facilities

SUBSTATION CAPACITY (IN MVA)					
	2008	2007	2006	2005	2004
PHILIPPINES	24,214	24,732	24,489	24,607	24,309
Luzon	18,861	19,411	19,121	19,236	20,041
Visayas	3,154	3,171	3,268	3,371	2,571
Mindanao	2,200	2,150	2,100	2,000	1,697
TRANSMISSION LINE LENGTH (IN CKT-KM)					
	2008	2007	2006	2005*	2004
PHILIPPINES	19,778	20,129	20,236	20,236	21,319
Luzon	9,527	9,712	9,840	9,881	10,494
Visayas	4,745	4,856	4,845	4,807	5,072
Mindanao	5,506	5,561	5,552	5,547	5,753

**Note: Although there were newly-constructed and operational lines in 2008, there was a decrease in total transmission line length in ckt-km due to modification and divestment of various sub-transmission assets.*

To ensure that voltages across the network are within the levels prescribed in the Philippine Grid Code (the "Grid Code"), capacitors and reactors have been installed in appropriate locations in the different parts of the region. Currently, there are a total of 1,081.45 MVAR capacitors distributed as follows: 600 MVAR in Luzon, 226.45 MVAR in the Visayas, and 255 MVAR in Mindanao. These exclude the capacitors at the Naga HVDC converter station, which provides the MVAR requirements thereat. The total reactors are 620 MVAR for Luzon and 555 MVAR for Visayas, or a total of 1,175 MVAR. A new 90 MVAR reactor has been installed at the Kadampat Substation in Labrador, Pangasinan to prevent the occurrence of high system voltage in northern Luzon.

2.1.1 Luzon

By end of first semester 2009, Luzon has reached its peak demand for the year at 6,888 MW, which is 214 MW or 3.2% higher than the previous year. Historically, the peak load in the island occurred during the said period. Meralco accounts for about 70% of this demand. From 2001-2008, Luzon exhibited 2.56% annual average compounded growth rate (AACGR).

As of end of 2008, Luzon grid has a total dependable capacity of 10,513 MW. A total of 5,832 MW (55%) are located in the south while the remaining 4,705 MW (45%) are in the north. More than half of the capacity are coal-fired (3,327 MW or 32%) and natural gas (2,700 MW, 26%). Hydro accounts for about a fifth (2,012 MW, 19%) while diesel and geothermal have dependable capacity of 1,661 MW (16%) and 804 MW (8%), respectively. The existing wind farm (Northwind) in Luzon grid, on the other hand, has a dependable capacity of 9 MW.

2.1.2 Visayas

At 6.30% growth rate, Visayas has posted the highest AACGR among the three grids in 2001-2008. In 2008, the peak load was recorded at 1,221 MW (based on non-coincident peak), 53 MW or 4.54% higher than the previous year.

As of end of 2008, the Visayas grid has a total dependable capacity of 1,466 MW, more than half (804 MW or 55%) of which comes from the geothermal fields in Leyte. The Visayas islands remain highly dependent on diesel and oil as more than a third of the capacity are supplied by diesel (432 MW, 30%) and gas turbine (51 MW, 3%). Coal accounts for about 12% (172 MW) while hydro has about 7 MW dependable capacity.

2.1.3 Mindanao

Mindanao experienced a decrease in system peak demand in 2008. The 1,204 MW peak demand for that year was 37 MW or almost 3% lower compared to 2007. From 2001-2008, the island has a 3.16% AACGR.

As of end of 2008, the Mindanao grid has

a total dependable capacity of 1,612 MW, 845 MW of which, or about 55%, comes from hydro resources, particularly the Agus complex in Lanao. About a third is supplied by diesel (467 MW). The 200 MW STEAG coal plant is about 12% of the mix while geothermal contributes 100 MW (6%).

2.2 Features of the Transmission System

2.2.1 Luzon

In Luzon Grid, the bulk generation sources are located in the north and south parts of the Luzon Island while the load center is in Metro Manila which accounts for about 70% of the total Luzon load. Because of this system configuration, the transmission backbone must have capability to transfer large amount of power from both the north and south.

2.2.1.1 The Northern Transmission Corridor

The northern transmission corridor consists of several flow paths for transferring power from the sites located in the north to Metro Manila. The main path is the 500 kV double-circuit transmission line from Kadampat to San Manuel then to San Jose. The other paths are the three underlying 230 kV transmission lines consisting of the Labrador to Hermosa single circuit line, the recently upgraded San Manuel-Concepcion-Mexico double circuit line, and the San Manuel-Pantabangan-Cabanatuan-Mexico single-circuit line.

The Labrador and San Manuel substations are the receiving ends of generation from the north. The received power from the north is then delivered to Metro Manila mainly via Mexico and San Jose substations. The 500 kV Kadampat-San Manuel-San Jose is rated at 2,850 MVA per circuit and is capable of transferring the more than 1,800 MW generation from Masinloc and Sual Coal Plants to Metro Manila. The upgraded San Manuel-Concepcion-Mexico 230 kV Line, on the other hand, is an alternate corridor which also caters the generation capacity of the hydroelectric plants delivering power to San Manuel 230 kV substation.

2.2.1.2 The Southern Transmission Corridor

The southern transmission corridor also consists of 500 kV transmission backbone and underlying 230 kV transmission lines. The southern portion of the 500 kV transmission backbone stretches from Naga in Bicol area to Tayabas, Quezon. This 500 kV backbone segment, however, is currently energized at 230 kV voltage level. The Naga substation is also the termination point for the HVDC system that could allow the exchange of up to 440 MW of power between Luzon and Visayas grids.

From Tayabas, the 500 kV backbone also stretches to Dasmariñas substation which serves as a drawdown substation for the loads in the south of Metro Manila. Tayabas is also connected to San Jose thereby completing the link between the north and south 500 kV corridors.

The 500 kV backbone in the south facilitates the transfer of about 2,400 MW of power from Ilijan Natural Gas, Pagbilao and QPPL coal plants. The 230 kV transmission system in Batangas and Laguna area, on the other hand, caters about 2,100 MW total generation capacity of Calaca Coal and the other Natural Gas Plants (Sta. Lorenzo and Sta. Rita).

2.2.1.3 The Metro Manila Transmission Configuration

In Metro Manila, the major 230 kV substations are Balintawak, Dolores, Araneta, Sucat, Zapote and Duhat (Meralco-owned). Four (4) of these substations (Dolores, Balintawak, Araneta and Sucat) form part of the 230 kV ring that surrounds the Laguna Lake. The Balintawak-Araneta-Sucat segment of the ring, however, is a single-circuit line traversing within Metro Manila.

Presently, there are two (2) main load sectors within Metro Manila. Sector 1 consists of Balintawak, Araneta and Duhat while Sector 2 consists of Dolores, Sucat and Zapote 230 kV substations. The 115 kV distribution facilities in each Sector are looped and therefore can be supplied alternately from different 230 kV substations during contingency. Upon completion of Meralco's Paco 230 kV substation (cut-in along Araneta-Sucat line) by 2011, Meralco will reconfigure the 115 kV network into three (3) sectors. Duhat, Balintawak and Paco will be under Sector 1, Araneta and Dolores under Sector 2 while Sucat and Zapote under Sector 3.

The major supply lines for both Balintawak and Dolores are the double-circuit facilities from San Jose. As no major power plants are in place in the 230 kV system near the northern side of

Metro Manila, these substations rely heavily on the supply from San Jose 500 kV substation.

In the south, the power requirements are being drawn from Dasmariñas EHV substation and from the plants directly connected to the 230 kV system. Zapote is being supplied by a double circuit 230 kV radial line from Dasmariñas while Sucat has three-circuit supply line from Biñan.

2.2.2 Visayas

The Visayas transmission system can be divided into four different sub-system or sub-grids.

First is the Eastern Visayas Area (District 1), which is composed of the islands of Leyte and Samar. Leyte is the site of 610 MW geothermal resources that comprise the 42% of the total generation capacity in the Visayas. It has two transmission corridors which separately serve Samar and Bohol, both of which rely on power generated by Leyte's steam fields.

Second is the Central Visayas Area (District 2), which is composed of the islands of Cebu and Bohol. Cebu can be well considered as the load center of the Visayas grid. In 2008, it has a peak load of 522 MW which accounted for 44% of the grid's total demand. Bohol, on the other hand, has the highest growth rate among the sub-grids at an annual average of 5.45% for the period 2009-2018.

Third is the island of Negros (District 3). The load center is located in Bacolod City in the northern part, while the bulk of generation is in the southern part. The 10 MW Northern Negros Geothermal Plant provides the only source of voltage regulation in the north.

Finally, the Western Visayas Area (District 4) is the Panay island. The likely entry of the 164 MW PEDC coal-fired plant in La Paz, Iloilo will provide the island sufficient generation capacity up to at least 2025, assuming that the diesel plants will not be retired.

The sub-grids are interconnected by submarine cables: Leyte-Cebu (2x185 MW), Cebu-Negros (2x90 MW), Negros-Panay (1X85 MW) and Leyte-Bohol (1x90 MW). The capacities indicated are the nominal rating of the interconnections.

Taking into consideration the load flow from east to west (or vice versa) of the Visayas grid, the transmission backbone of the Visayas grid extends from the far east, at the Cabacungan CTS in Samar, all the way to Nabas Substation in Panay, in the far west. This route is comprised of approximately 895 kilometers of transmission line. It is composed of the HVDC line, overhead transmission lines and submarine cables.

The bulk generation in Visayas, which is sourced from Leyte steam fields, is transmitted to the other islands through the following transmission corridors:

(1) Leyte-Samar transmission corridor, which is composed of the Ormoc-Babatngon and Babatngon-Wright 138 kV lines. The former is a single circuit line while the latter is a double circuit line;

(2) Leyte-Bohol transmission corridor, which is composed of the following 138 kV lines: (i) Ormoc-Maasin-Guadalupe; (ii) the Guadalupe-Tugas submarine cable (Leyte-Bohol interconnection); and (iii) Tugas-Ubay. All of these lines, including the submarine cable, are single-circuit only; and

(3) Leyte-Cebu-Negros-Panay transmission corridor, which is the longest corridor. This corridor, which has transmission lines energized at 230 kV, is considered as the main transmission backbone since it allows the supply of power to the load center of the different sub-grids.

2.2.3 Mindanao

The 607 MW Agus Hydro Complex located in Lanao accounts for about 38% of Mindanao's total dependable capacity. Much of the generated output of the complex must be transmitted to the load centers located in southern part of the island. The load centers are located in southeast (Davao provinces) and southwest (SOCCSKSARGEN) Mindanao. As end of 2008, these two areas account for about 50% of the island's total demand: Davao area, 391 MW (32%) and SOCCSKSARGEN, 221 MW (18%).

Given this characteristic and considering the 225 MW Pulangi hydro plant located in north central area, the load flow generally is from north to south. Much of the power flow passes through Abaga-Tagoloan-Pulangi-Kibawe 138 kV corridor. This is being reinforced by the ongoing Abaga-Kirahon-Maramag-Bunawan backbone that is designed at 230 kV.

2.3 Problems and Issues

2.3.1 Luzon

The increasing load in Metro Manila would necessitate either expanding the existing

substations or developing new ones. The existing 230 kV substations within Metro Manila have space limitations already in accommodating future capacity expansion. As a common problem in an urbanized area, acquiring right-of-way for new transmission lines and area for new substations would be difficult. Moreover, the capital region is geographically unique as the land area between the Manila Bay and Laguna Lake is rather narrow (with about 10 km width only).

Developing power generating power plants within Metro Manila is actually ideal in order to reduce power imports. However, the environmental concerns, area congestion, and high cost of realty would make the implementation difficult.

Presently, San Jose EHV substation is experiencing congestion due to its limited capacity. Being the merging point of bulk power coming from the north and the south, San Jose has been a critical substation. While the transformer replacement project is already underway to increase the capacity of the substation and the reliability of the 500/230 kV transformers, the reliability of the ring-bus configuration of San Jose EHV will remain a concern as the substation is vulnerable to bus splitting during faults on the connected circuits. It is the only drawdown substation supplying the north part of Metro Manila and any bus splitting problem in the substation could lead to the separation of the northern and southern 500 kV backbone.

Reconfiguration of San Jose to breaker-and-a-half scheme would be necessary in order to improve the reliability of the substation and to provide operational flexibility. The reconfiguration activities, however, which would require total shutdown of San Jose EHV substation could result in power supply deficiency in Metro Manila. As such, a new 500 kV drawdown substation will have to be developed first which could temporarily perform the function of San Jose 500 kV substation. This second 500 kV drawdown substation in the area would significantly boost the supply capability and grid reliability for Metro Manila and at the same time decongest San Jose EHV.

In South Luzon, the Biñan-Sucat 230 kV corridor is posing constraints to the maximum allowable dispatch of the associated power plants due to its limited capacity in maintaining the provision for N-1 contingency. The Kalayaan-Makban corridor is another 230 kV line in the area that is due for upgrading to allow all possible generation dispatch scenarios. The reinforcements of these two (2) important corridors would be further necessary upon entry of new power plants and expansion of existing plants in south Luzon.

The transmission facilities serving the north-eastern and north-western regions of Luzon Island have no provisions for N-1 contingency. In the north-western side, the reinforcement of the facilities would be required to provide a strong connection point for the in-coming wind farm power plants in the area. To date, about 389 MW additional wind capacity in Ilocos Norte are expected to be built from 2010 to 2013. In the north-eastern side, reinforcing the long single-circuit transmission line in Isabela and Cagayan is also necessary to reliably serve the increasing demand in the region.

Moreover, there are generation expansion projects that will require the upgrading or reinforcement of the dedicated lines for the power plants. These include the upgrading of Magat-Santiago and QPPL-Tayabas 230 kV lines in order to provide N-1 during maximum dispatch of Magat HEP and QPPL Coal Plant, respectively. The required upgrading projects, however, have not been lined up in the TDP since these will be undertaken by the generator proponents consistent with the existing policy of the ERC.

2.3.2 Visayas

The Visayas Grid has been in critical power situation the past years. Panay, for instance, has been dependent on the submarine cable to meet its power requirements. The completion of the Cebu-Negros Interconnection Uprating in February 2007 further increased the power flow between these islands, thus allowing more power that could be pushed to Panay.

The increase in the demand in each of the Visayas sub-grid must be met with corresponding installation of additional capacity within the island, otherwise the upgrade of existing submarine cables may be considered an option. However, the Visayas grid cannot rely entirely on the submarine linkages to source power from one island to the other. Economics, higher system losses and lack of voltage support are important considerations in deciding which option to take. In many respect, distributed generation in the islands can better address these issues. On the part of NGCP, it will propose the required transmission infrastructures in case no new generation capacity will come in.

Additional transformers will be proposed for the Third Regulatory Period to provide redundancy to a number of substations and also to

avert overloading during N-1. These transformers are grouped into Substation Expansion Project I, Substation Reliability Project I, Substation Reliability Project II and Substation Reliability Project III. The first one, which is for load growth, should be completed in 2011 while the other three, which are for reliability, are scheduled to be completed in 2013, 2014 and 2015, respectively. It should be noted that most of those transformers for N-1 have been identified in the previous plans but were not implemented by TransCo due to capex limitation.

Construction of additional circuits is proposed to the major transmission line corridors in Leyte, Cebu and Negros to comply with the N-1 requirement. As a load center, the major backbone in Cebu may need to be upgraded to 230 kV in the long term.

The lack of local generation within the islands has caused low voltage problems in many areas. The low voltage problem is very evident particularly in Negros and Panay.

The following discussions will provide an overview of the existing and potential problems and issues in each of the sub-grid:

2.3.2.1 Leyte-Samar

The outage of the single circuit Ormoc-Babatngon 138 kV line, which is the main corridor for the supply of power to Samar, will cause power outage in the island. On the other hand, the outage of the Ormoc-Maasin 138 kV line will result to power outage in Maasin substation, thus also cutting the power flow to Bohol coming from Leyte. This will result in Bohol relying on its own inland generating power plants which are not sufficient to serve the total demand of the island. The same will be experienced in Bohol, as unavailability of Maasin-Guadalupe line will result in power outage in the island. In order to prevent this and also to comply with the N-1 requirement, the Ormoc-Maasin-Guadalupe has to be expanded to a double-circuit line.

With the recent approval by the ERC of the Sta. Rita-Quinapundan 69 kV transmission line, NGCP will propose to upgrade its design to 138 kV in its Third Regulatory filing to the ERC. As pointed out in the ERC Decision, the completion of the said line will result in the reclassification of Wright-Taft-Borongan-Quinapundan (Buenavista) as Transmission Assets. With this reclassification, NGCP may consider upgrading the design of the proposed line to 138 kV due to its length. The Wright-Taft corridor may also need to be upgraded to 138 kV.

2.3.2.2 Bohol

Unless new generating facilities are installed in the island, Bohol will continue to rely heavily on Leyte for its power requirements. The island has few inland generating plants - Bohol diesel, Janopol hydro and Loboc hydro - the combined 23 MW capacity of which is not sufficient to supply the entire demand in the island. For this reason, the outage of the Leyte-Bohol interconnection will result in huge power interruptions in Bohol. For the interconnection with Leyte, initial results of the studies indicate that a second submarine cable must be in place by 2018, assuming that no new generators will be installed in Bohol.

The ongoing Bohol Backbone Project (Ubay-Corella 138 kV line) will provide the island a reliable transmission backbone. Currently, the island relies on single circuit 69 kV woodpole backbone.

2.3.2.3 Cebu

A total of 446 MW, or more than half of the 848 MW proposed capacity addition for the Visayas grid for 2010 to 2015, will be located in Cebu. These power plants are CEDC's 2x82 MW (2010) and 82 MW (2011) coal-fired plants in Cebu City, and KEPCO's 2x100 MW coal-fired in Naga. These power plants will necessitate the expansion of New Naga-Banilad 138 kV transmission line in order to accommodate the power flow from these new plants to the load centers in Cebu, which are the Banilad, Mandaue and Mactan substations. Unless upgraded, the New Naga-Banilad and New Naga-Quiot lines will be overloaded by 2014. This is based on a scenario where the Cebu coal plants are maximized, and that Panay and Negros are self-sufficient. The Talavera-Sigpit-New Naga 138 kV corridor must also be reinforced due to the entry of the new Toledo plant.

2.3.2.4 Negros

In Negros, the overhead lines that are linked to the Cebu-Negros submarine cable must be upgraded by installing additional 1-795 MCM circuit, otherwise the lines will be overloaded by 2011 during N-1 assuming that there is minimum generation in Panay. This corridor consists of the Amlan-Mabinay, Mabinay-Kabankalan and

Kabankalan-Bacolod 138 kV lines.

Low voltage problems are being experienced in northern Negros, particularly in Bacolod which is the load center. This is due to the lack of inland generating plants, and that the generators are located in the southern part far from the load center.

2.3.2.5 Panay

Although a number of diesel plants and power barges are located in the island, these are all peaking plants and therefore cannot provide the base load requirements. The Pinamucan Diesel which was transferred from Luzon in order to address the generation deficiency has a de-rated capacity.

The likely entry of the 164 MW PEDC coal-fired plant in La Paz, Iloilo will provide the island sufficient generation capacity up to at least 2018, assuming that the diesel plants will not be retired. Based on recent updates from the proponent, the proposed 100 MW DMCI coal plant in Concepcion may no longer be pursued. Panay island at present remains dependent on the submarine cable to augment its power deficiency. The need for the second submarine cable as forecasted, however, has been delayed due to the lower actual demand of the island. The latest forecast indicates that it will be needed beyond 2010. In determining the appropriate timing for the implementation of the submarine component of the Negros-Panay Interconnection Uprating Project within the Third Regulatory Period, some assumptions have to be made: (1) The provision of the renewable energy act on must dispatch of renewable energy plants will be strictly observed; (2) The WESM in Visayas will already be in place in 2011; and (3) The 164 MW PEDC coal plant in Panay as well as the 246 MW CEDC and 200 MW KEPCO coal plants in Cebu will be on stream as scheduled in 2011. The worst case would be if the coal plants in Cebu will have priority dispatch over the coal plant in Panay. With this scenario, the second submarine cable will be needed by 2013.

The complete 138 kV looping of the Panay grid can be considered in the long term. The two ongoing projects – Northern Panay Backbone (Panitan-Nabas) and Southern Panay Backbone (Sta. Barbara-Sibalom) - have paved the way for this looping to happen. In addition, the Eastern Panay Backbone (San Juan-Sara-Panitan) has been proposed already to allow connection of new coal plant to be developed in Concepcion. At the western side, the proposed Culasi-Sibalom 69 kV transmission line has been approved already by the ERC. The design of the said line can be upgraded and implemented at 138 kV.

2.3.3 Mindanao

Currently, the main corridors connecting the Agus complex to the grid are the Agus 2-Kibawe and Abaga-Tagoloan 138 kV lines. The tripping of the Agus 2-Kibawe line in the past due to bombing incidents had resulted in huge power swing to the other corridors, one of which is the Pulangi-Kibawe line, resulting in N-1 loading violation.

The ongoing Abaga-Kirahon-Maramag-Bunawan transmission line projects will address this problem. With this 230 kV-designed corridor, which extends from the Agus hydro complex in the north to the Bunawan substation in the southeast, the huge hydro capacity of Agus (about 38% of the total grid) will have a reliable backbone to allow the delivery of its output to the major load centers located in southern Mindanao (about half of the island's total demand).

Security problem, as what has been experienced in the bombing of Agus 2-Kibawe and other installations, remains a serious concern. There were also foiled attempts of bombings in key facilities. Implementation of projects, as in the case of the Tacurong-Nuling 138 kV transmission line, cannot be pursued due to security threats. This proposed line will complete the looping of transmission network with southwestern Mindanao, i.e., Gen. Santos in the southernmost part to Kibawe Substation in central Mindanao. If not implemented, Gen. Santos area will experience low voltage (0.92 p.u.) during outage of Matanao-Gen. Santos 138 kV line (based on the assumption that Gen. Santos-Tacurong line has been reinforced already).

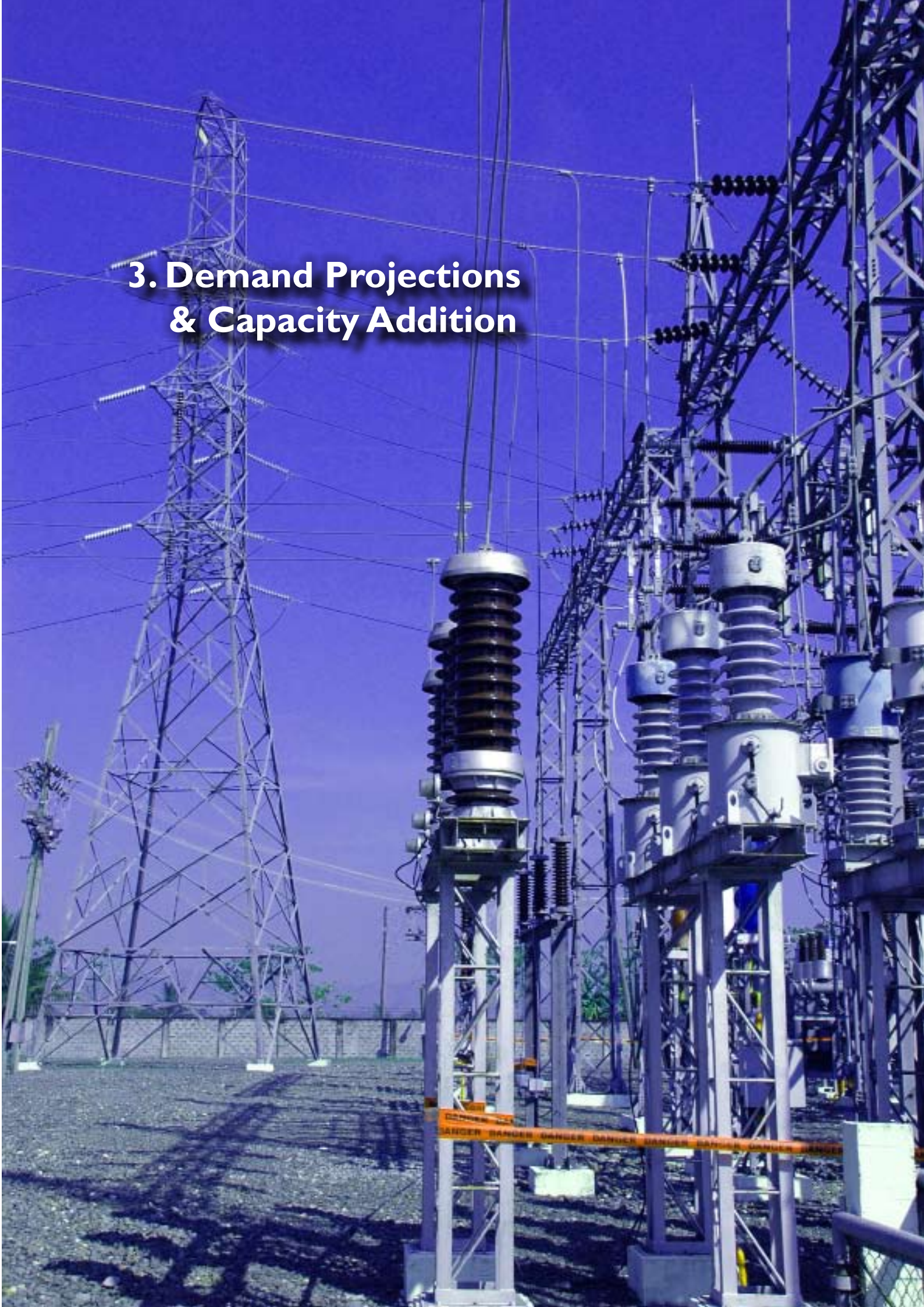
Mindanao has part of its network requiring provision for N-1, but some are being addressed by ongoing and projects to be implemented. Additional transformers, with a total of about 1,550 MVA, are proposed for the Third Regulatory Period to provide redundancy to a number of substations and also to avert overloading during N-1. These transformers are grouped into Substation Reliability Project I (2013), Substation Reliability Project II (2014), Substation Reliability Project III (2015) and Mindanao Substation Expansion II (2014).

Another weak point is the single circuit line in the eastern corridor. Although looped, the

approximately 300 km single circuit line from Butuan to Tindalo may need to be reinforced. Ongoing studies are being conducted to determine the appropriate timing for such upgrading.

The remaining old 138 kV woodpole backbone will be replaced by steel tower, double circuit line. The ongoing Gen. Santos-Tacurong Transmission Reinforcement Project will accomplish this. Aside from replacing the old dilapidated old structures, the reinforcement will prevent occurrence of low voltage problems in Tacurong and Gen. Santos in case of outage of Gen. Santos-Matanao line.

Unless new power plants come in, Mindanao will experience power shortage by 2010.



3. Demand Projections & Capacity Addition

3. Demand Projections & Capacity Additions

The two (2) important input parameters in the preparation of the TDP are the updated load forecast and generation capacity addition program prepared by the DOE. This section discusses these parameters used in the 2009 TDP.

3.1 Final Determination on Demand Forecasts

In the FD (Section 2.11.4), the ERC adopts the DOE forecast which intends to provide a signal to the investor that the demand forecast used came from an independent body. The demand forecasts adopted by the ERC are shown in Table 3.1.

Table 3.1 Demand Forecasts Adopted by the ERC for 2006-2010

GRID	2006	2007	2008	2009	2010
Luzon	6,728	6,981	7,252	7,552	7,878
Visayas	1,154	1,214	1,289	1,364	1,448
Mindanao	1,293	1,363	1,440	1,525	1,620
TOTAL	**9,175**	**9,558**	**9,981**	**10,441**	**10,946**

3.2 TDP Power Demand Projection

The forecast for the 2009 TDP follows the latest demand projections from the DOE. The DOE projections refer to the total electricity demand of the end-users including embedded generation.

Basis of the forecast

The DOE undertakes its forecasting exercise in consultation with key power industry entities and government economic planners. The forecast reflects the existing power consumption profile of Distribution Utilities (DUs) and the expected growth of the economy, as it is closely linked with the demand for electricity.

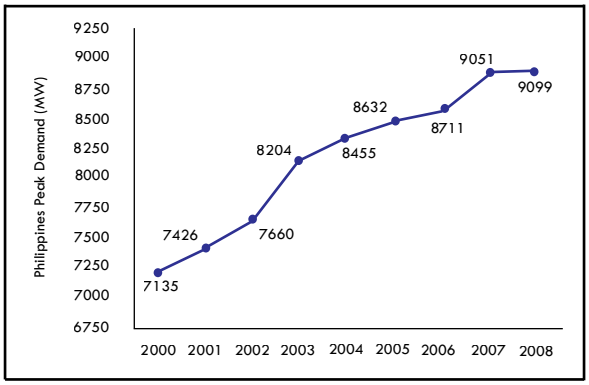
In coming up with the power demand projection, the DOE first aggregated the projected energy requirement of the DUs, as documented in their respective Distribution Development Plans (DDPs). Added to this aggregate figure are the projected energy requirements from non-utility customers directly connected to NGCP. Basically, this is a bottom-up approach.

The initial projected growth rates of the aggregated energy requirement are then substantiated by the forecasted economic growth provided by the National Economic Development Authority (NEDA). The NEDA provides a medium-term forecast on the Gross Domestic Product (GDP) and Gross Regional Domestic Product (GRDP). Aside from reflecting the government's target economic growth, these forecasts also consider the current global trends that may affect the nation's economy. Chief among these current trends is the ongoing financial crisis.

Historical demand for electricity (2001-2008)

The following shows the Peak Demand (MW) for the three grids (Luzon, Visayas, Mindanao) and the Philippines from 2001-2008. These values do not include demand from embedded generators that are not directly connected with the grid.

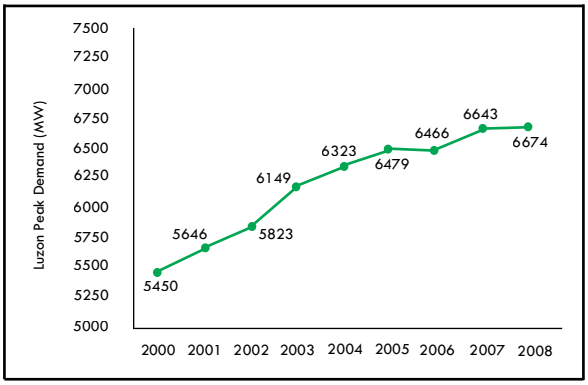
Philippines



The Philippines has posted an Average Annual Compounded Growth Rate (AACGR) of 3.08% for the period 2001-2008. The growth rate of the Philippines follows the trend of Luzon as it has the largest share of the load in the country.

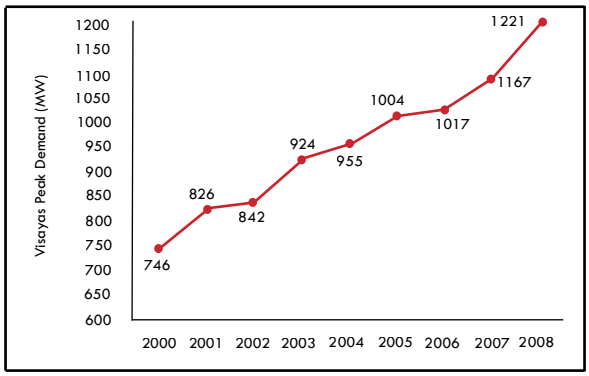
Luzon

The Luzon grid has posted an Average Annual Compounded Growth Rate (AACGR) of 2.56% for the period 2001-2008. Consistent steady growth has been recorded for the Luzon grid except for the decrease in demand observed in



2006. This is due to the reduction in the power consumption of Meralco during the year, whose demand accounts for at least 70% of the system peak demand.

Visayas



The Visayas grid has posted an AACGR of 6.30% for 2001-2008, the highest among the three grids. This is largely due to the fast economic growth in the region. The fastest demand expansion has been recorded in distribution utilities in Panay,

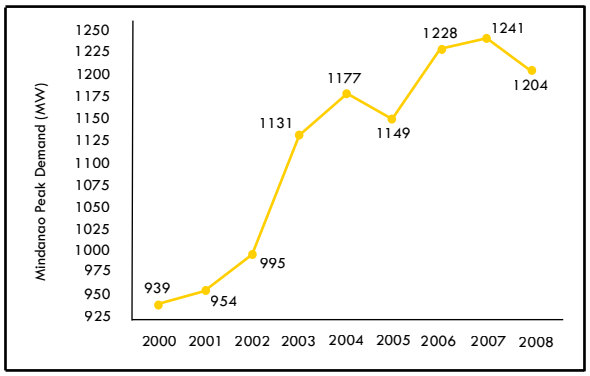
Table 3.2 Summary of Projected Demand per District (Based on DOE Forecasts-High Scenario)[1]

DISTRICT	AREA	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
LUZON		**7,036**	**7,270**	**7,582**	**7,934**	**8,309**	**8,710**	**9,123**	**9,553**	**9,945**	**10,393**
Meralco		4,888	5,076	5,327	5,576	5,843	6,129	6,426	6,727	6,999	7,314
NCR		3,659	3,808	4,000	4,188	4,388	4,603	4,826	5,052	5,256	5,492
North		122	126	133	140	148	155	162	170	177	185
South		1,107	1,142	1,194	1,248	1,308	1,372	1,438	1,505	1,566	1,637
NLRC		1,561	1,595	1,639	1,715	1,793	1,873	1,953	2,045	2,130	2,225
1a	Ilocos	143	145	148	151	156	162	168	175	180	187
2	Mt. Province	129	131	134	139	145	152	158	166	174	182
3	North Central	293	300	307	331	357	374	390	408	425	443
4	Cagayan Valley	130	133	146	155	163	172	182	192	202	213
5	West Central	311	320	328	349	363	381	399	419	437	458
6	South Central	512	519	528	541	556	578	599	626	651	679
7	North Tagalog	43	46	48	50	52	54	56	58	60	63
SLRC		587	599	616	643	673	708	744	781	816	855
1	Batangas/Cavite	321	328	336	350	366	384	403	422	441	461
2	Laguna/Quezon	112	114	117	121	127	133	139	146	152	158
3	Bicol	154	157	163	171	181	191	202	213	224	235
VISAYAS		**1,331**	**1,430**	**1,448**	**1,486**	**1,545**	**1,603**	**1,666**	**1,733**	**1,797**	**1,887**
1	Panay	228	243	247	253	263	272	283	293	303	317
2a	Cebu	588	631	637	651	675	698	722	748	773	811
2b	Bohol	60	64	66	69	72	76	80	85	89	95
4	Leyte-Samar	200	217	219	225	234	243	253	263	274	288
5	Negros	255	274	279	288	301	314	328	343	357	376
MINDANAO		**1,359**	**1,421**	**1,483**	**1,549**	**1,620**	**1,692**	**1,769**	**1,852**	**1,942**	**2,031**
1	North Western	172	179	184	192	201	210	220	231	243	256
2	Lanao Area	199	224	232	244	255	265	277	289	301	314
3	North Central	203	213	219	228	238	247	257	268	279	291
4	North Eastern	110	112	116	120	125	130	135	140	147	153
5	South Eastern	438	450	483	504	528	553	580	609	641	672
6	South Western	237	243	250	261	273	286	300	314	331	347
PHILIPPINES		**9,726**	**10,122**	**10,513**	**10,969**	**11,474**	**12,005**	**12,559**	**13,137**	**13,684**	**14,311**

[1] *Based on the transformer peak demand coincident with the System Peak*
Inclusive of embedded generation

Cebu and Bohol.

Mindanao



The Mindanao grid has posted an AACGR of 3.16% for 2001-2008. After recording high annual growth rates from 2000 to 2004 (an average of 5.81%), demand growth has been sluggish from 2005 to 2008 (around 1.5%) due to the overall reduced power requirement from large non-utility customers.

TDP 2009 Projections

The power demand for the country is expected to grow at an Average Annual Compounded Growth Rate (AACGR) of 4.46% for the period 2009-2013 and 4.52% for 2014-2018. The growth rate for 2009-2013 is almost the same with that of the levels in the 2008 TDP forecast for the same period, which stood at 4.26%. The DOE is very optimistic that the economic performance of the country will normalize and will grow steadily starting 2010 onwards.

The System Peak Demand forecast for Luzon is expected to increase at an annual average growth rate of 4.30% for the period 2009-2018. Meralco, NGCP's biggest customer which accounts for at least 50% of the nation's power demand, is expected to grow at a steady rate of 4.32% from the period 2009-2018. Consistent with the historical trend, Visayas is expected to post a notable growth rate of 4.84% in electricity demand for the period and Mindanao by 5.16%.

Overall, demand is expected to increase from 9,226 MW (includes embedded generation) in 2008 to 14,311 MW by 2018 which translates to an annual compounded growth of 4.49%.

The DOE uses this set of demand forecasts to develop the generation plan. Consistent with this, NGCP uses this set of forecast to determine the necessary transmission expansion. However, when it comes to transformer capacity additions, NGCP uses its own set of demand projections.

3.2.1 Demand Projections for Substation Capacity Addition

The demand projections for substation expansion take off from the maximum load projections of customers connected to the substations. In cases where a particular customer has more than one metering point, the customer's projected demand is proportionately disaggregated into different metering points according to the current maximum demand meter readings. Projected maximum loads for all metering points connected to a given transformer are then summed up. This transformer peak becomes the basis for adding transformer capacities at the substations.

The individual demand projections for each customer are derived from historical load growth and/or new information as to potential expansion or contraction of load demand of the customer. Further, expected entry of new load customers are considered in the projections including proposed connection points.

At present, except for few substations, the transformers are not connected in parallel due to incompatible impedances and voltage taps. For this reason, the projections are made on the individual transformer load instead of the total substation load as the basis for substation capacity addition. Future procurement of transformers will be standardized so that paralleling could be made possible.

3.2.2 Demand Projections for Transmission Expansions

The system peak demand projections for each grid are used in determining the necessary transmission expansion projects. However, for these figures to be usable in the transmission network analysis software, it has to be broken down into individual substation load. The individual substation maximum demand projections determined in Section 3.2.1 are used to establish the percentage of the system peak demand that will be assumed for a specific substation.

3.3 Generation Capacity Addition

3.3.1 Supply Expansion Plan

The supply expansion plan being prepared by

the DOE is formulated to ascertain the required capacity additions in the next ten years and at the same time fulfill the key reliability and security standards as promulgated by the Grid Code, such as minimum reserve margins, loss of load probability (LOLP), among others.

The generation capacity line up being used in the TDP takes the following into consideration:

(1) the dependable capacity of all existing power plants considering the scheduled power plant retirements;

(2) the committed projects; and

(3) the generic capacities which represent the additional requirements or balancing capacities to address the anticipated gap between demand and supply.

These generic capacities are based on the best entrant or the most efficient supply options available.

Interconnection uprating projects are also incorporated in the generation planning model. Expected capacity additions are determined by the conduct of capacity expansion simulations.

(The DOE has not yet released the latest required and committed generation capacity addition as of this writing)

3.3.2 Generation Proponents

Table 3.3.2 shows the list of proposed generating plants in the Luzon, Visayas and Mindanao grid. The commissioning year of the power plants is based on the confirmation provided by the proponent.

Table 3.3.2 Proposed Capacity Additions

COMM. YEAR	PROPOSED POWER PLANT	MW CAP	LOCATION
LUZON			
2010	EDC Windfarm Phase 1	40	Burgos, Ilocos Norte
	Northeast Wind Farm	26	Pamplona, Cagayan
	Ambuklao Plant Repowering	105	Ambuklao, Benguet
2011	EDC Windfarm Phase 2	46	Burgos, Ilocos Norte
	Northern Luzon UPC Wind	80	Ilocos Norte
2012	Mariveles Coal	600	Mariveles, Bataan
	Tanawon Geothermal	50	Tanawon, Sorsogon
	Kalayaan III Expansion	360	Kalayaan, Laguna
	Pagudpud Wind	40	Ilocos Norte
	Bayog Wind Power	51	Ilocos Norte
	Buduan Wind Power	57	Ilocos Norte
2013	RP Energy Coal	300	Subic, Zambales
	Agaga Wind	37.5	Ilocos Norte
	Sapat Wind Power	37.5	Ilocos Norte
	San Pascual Natural Gas	348	Batangas City
	or San Gabriel Nat Gas	550	
2014	Binga Expansion	25	Binga
	QPPL Expansion	500	Mauban, Quezon
	Rangas Geothermal	40	Rangas, Sorsogon
	Kayabon Geothermal	40	Kayabon, Sorsogon
	Magat Expansion	40	Magat, Isabela
2017	Pagbilao Coal Expansion	375	Pagbilao, Quezon
	Sub-total	**3,198 MW**	
VISAYAS			
2010	CEDC Coal-fired	164	Toledo, Cebu City
2011	CEDC Coal-fired	82	Toledo, Cebu City
	KEPCO Coal-fired	200	Naga, Cebu
	PEDC Coal-fired	164	La Paz, Iloilo
	GGPC Biomass	15	Mina, Iloilo
2012	Nasulo Geothermal	20	Nasuji, Valencia, Negros Oriental
	DMCI Coal-fired	60	Concepcion, Iloilo
	Aklan Hydro	41	Libacao, Aklan
	Guimaras Wind	54	Guimaras
2013	Villasiga Hydro	8	Sibalom, Antique
2014	Dauin Geothermal	40	Negros Oriental
	Sub-total	**848 MW**	
MINDANAO			
2012	Kamanga Coal-fired Plant	200	Gen. Santos
	Sultan Kudarat Coal-fired	200	Sultan Kudarat
	Lakewood (Geo)	40	Zamboanga Del Sur
	NW Apo (Geo)	20	North Cotabato
	Tagoloan Hydro	68	Misamis Oriental
2013	Agus III Hydro	225	Lanao Del Sur/Norte
	Amacan (Geo)	20	North Davao
2014	Mindanao III Geothermal	50	Mt. Apo, Kidapawan North Cotabato
	SE Apo (Geo)	40	Davao Del Sur
2015	Liangan HEP	11.9	Lanao Del Norte
2016	Lake Mainit HEP	22	Agusan Norte
2017	Ampiro (Geo)	30	Misamis Oriental
2018	Bulanog MHP	150	Talakag, Bukidnon
	Sub-total	**1,076.90 MW**	
	Total	**5,122.90 MW**	

3.4 Supply-Demand Outlook

This section discusses the supply-demand outlook for each grid. The potential capacity additions are based on the line up provided by the DOE and from NGCP's own information as gathered from the different proponents. NGCP has written the various generation proponents to seek update on their expected commissioning date.

The required capacity of the system refers to the projected peak demand plus the ERC-approved reserve margin. The reserve margin, which is a percentage of the peak demand, for each grid is shown below.

Table 3.4 Required Reserve Margin

	Luzon	Visayas	Mindanao
Load Following and Frequency Regulation	2.8%	2.8%	2.8%
Spinning Reserve	10.3%	10.3%	9.1%
Back-up Reserve	10.3%	10.3%	9.1%
Total Reserve Margin	**23.4%**	**23.4%**	**21%**

3.4.1 Luzon

Between 2009 and 2018, Luzon expects about 3,198 MW additional capacity. To date, 2,678 MW have completed Grid Impact Study and will be more than sufficient to meet the required capacity of the system up to 2018. As can be seen from Figure 3.4.1, 2011 is a critical year for the Luzon grid for the proposed capacity to come on stream, otherwise power shortage will be experienced.

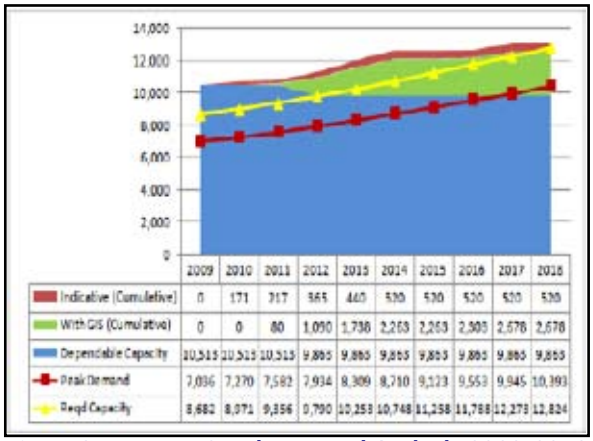


Figure 3.4.1 Luzon Supply-Demand Outlook, 2009-2018

3.4.2 Visayas

As end of 2008, the dependable capacity of the Visayas grid is just enough to meet the required capacity of the system. This leads to a situation where the generating plants cannot afford to go on preventive maintenance otherwise the very thin reserve will not be able to meet the demand. As shown in Figure 3.4.2, 2010 is a critical year for the grid. If the proposed capacity addition would not go on stream, then the situation in the Visayas will go from bad to worse.

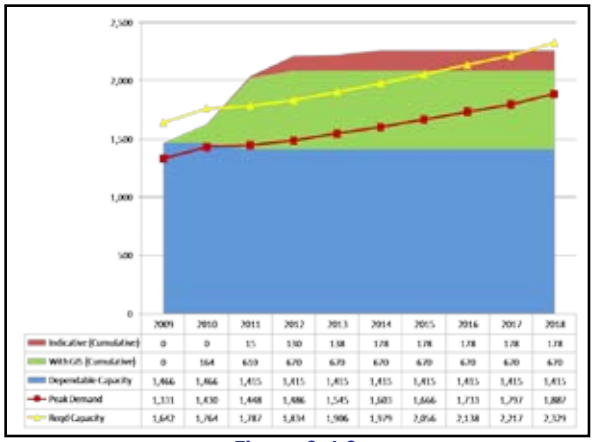


Figure 3.4.2
Visayas Supply-Demand Outlook, 2009-2018

The above supply outlook did not consider the de-rating of diesel plants over time and their retirement once the new generating plants, the coal plants in particular, become available. These factors will be considered for sensitivity analysis.

3.4.3 Mindanao

2010 will be a critical year for Mindanao grid as the existing dependable capacity would just be enough to meet the required capacity for the said year. Notably, as shown in Figure 3.4.3, the additional generation capacity will not go on stream until 2012. Should all the potential capacity materialize, Mindanao shall have sufficient capacity up to 2018.

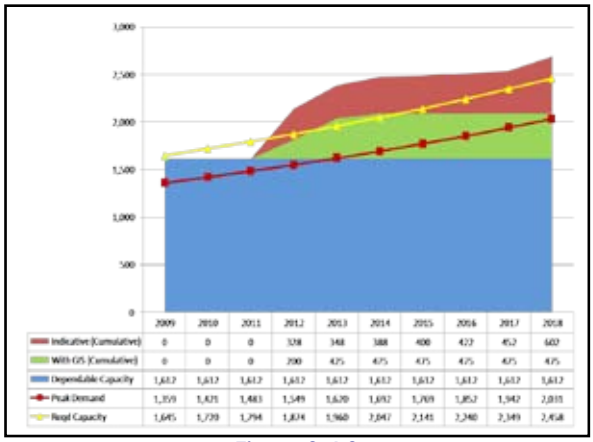


Figure 3.4.3
Mindanao Supply-Demand Outlook, 2009-2018

4. Recently Completed Projects

4. Recently Completed Projects

For the purpose of this TDP, recently completed projects refer to those projects completed between the period 01 January 2008 to 30 June 2009. For the said period, NGCP completed a total of 530.68 circuit-km of overhead transmission lines and installed 230 MVA additional substation capacity. Table 4(a) shows a summary list of the recently completed projects, including the components of Ongoing Projects that have been completed already.

Table 4(a) Recently Completed Projects

	MVA	CKT-KM	DATE OF COMPLETION
New Batangas-New Makban A/ BTRP		70.52	January 2008
New Makban A-Calamba Tower 50/ BTRP		33.6	December 2008
New Makban A-Makban C Transmission Line Rehabilitation/ BTRP		2	
Calamba Tower 50 – Biñan Substation/ BTRP		36.4	March 2009
San Manuel-Concepcion/ Luzon Transmission Line Upgrading Project 1		159.32	June 2009
Concepcion-Mexico/ Luzon Transmisison LIne Upgrading Project 1		74.84	June 2009
Cebu-Negros Interconnection Uprating Project (Schedule 2)	80	151	July 2008
San Francisco 138 kV Substation	50	3	May 2008
COMPLETED COMPONENTS OF ONGOING PROJECTS			
Pitogo Substation (new)/ Zamboanga City 138 kV Transmission Line	100		March 2008
Sangali Substation (exp)/ Zamboanga City 138 kV Transmission Line			March 2008
TOTAL	**230**	**530.68**	

4.1 Batangas Transmission Reinforcement Project

This reinforcement project is needed to allow the full dispatch of the natural gas plants being supplied by Malampaya gas field (1,000 MW Sta. Rita and 500 MW San Lorenzo).

The 230 kV Batangas-Makban A line is yet to be energized when the protection equipment of the line becomes available and the Transient Recorder and Sequence of Event Recorder at Makban Substation have been replaced.

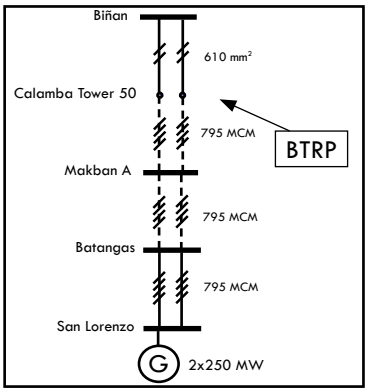
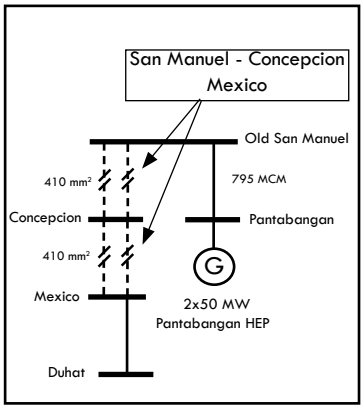


Table 4.1 Batangas Transmission Reinforcement Project

PROJECT COMPONENT	DESCRIPTION
230 kV Transmission Line	
San Lorenzo – Batangas (Completed March 2005)	ST-DC, 4-795 MCM, 8.913 km
New Batangas-New Makban A	ST-DC, 4-795 MCM, 35.26 km
New Makban A-Calamba Tower 50	ST-DC, 4-795 MCM, 16.8 km
New Makban A-Makban C Transmission Line Rehabilitation	ST-SC 1-795 MCM, 2.0 km
Calamba Tower 50 – Binan S/S	SP-DC, 2-610mm² TACSR, 18.2 km
Substation Upgrade/Expansions	
Batangas Substation (Completed March 2007)	12 – 230 kV PCB + Acc.
Makban A Switchyard	19 – 230 kV PCB + Accessories
Binan Substation	19 – 230 kV PCB + Accessories

4.2 Luzon Transmission Line Upgrading I



The main activity of this project is the construction of new 234.16 ckt-km San Manuel-Concepcion-Mexico 230 kV T/L, including substation protection system and the expansion of affected stations through additional switching facilities to terminate the lines.

a. San Manuel-Concepcion-Mexico 230 kV T/L

The project aims to maintain the provision for N-1 on the San Manuel-Concepcion-Mexico transmission corridor to allow unconstrained dispatch of the power plants in Northern Luzon. The tripping of the Pantabangan-Cabanatuan 230 kV line is the critical event that would lead to the overloading of the existing lines. Without this project, the situation may be remedied by reducing the generation dispatch in north Luzon by as much as 19% to 33% of the total generation capacity, for the period 2005 to 2010.

Table 4.2(a) Luzon Transmission Line Upgrading 1

PROJECT COMPONENT	DESCRIPTION
230 kV Transmission Line	
San Manuel - Concepcion	ST-DC, 2-410 mm² TACSR, 79.66 km
Concepcion - Mexico	ST-DC, 2-410 mm² TACSR, 37.42 km
Substation Upgrade/Expansions	
San Manuel	6-230 kV PC
Concepcion	12-230 kV PCB, 5-69 kV PCB
Mexico	6-230 kV PCB

4.3 Cebu-Negros Interconnection Uprating (Schedule 2)

Schedule 2 of the project involves the upgrading/ expansion of transmission lines and substations

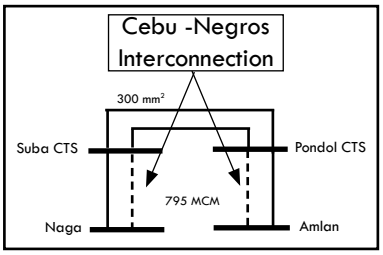
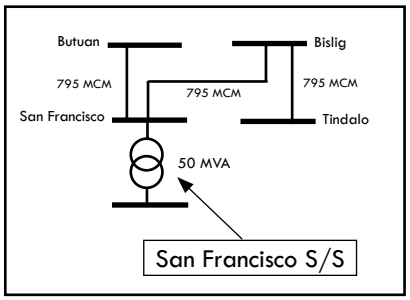


Table 4.3 Cebu-Negros Interconnection (Schedule 2)

PROJECT COMPONENT	DESCRIPTION
138 kV ACSR/AS Transmission Line	
Naga Substation-Ginatilan	ST-DC1, 1-795 MCM, 94 km
Ginatilan-Suba CTS	ST-MC2, 1-795 MCM, 8 km
Amlan-Pondol CTS	ST-DC1, 1-795 MCM, 6 km
69 kV ACSR/AS Transmission Line	
Suba CTS-Alcoy CTS	S/CP-SC, 1-336.4 MCM, 35 km
Substation Upgrade/Expansions	
Amlan (Expansion)	1-50 MVA 138/69-13.8 kV Transformer 3-138 kV PCB, 2-20 MVAR Capacitors
Old Naga (Salcon)	2-138 kV PCB
New Suba	1-30 MVA 138/69-13.8 kV Transformer 5-138 kV PCB, 1-69 kV PCB
New Pondol CTS	CTS equipment, materials, etc.

associated with the uprating of the existing submarine cable between Cebu and Negros.

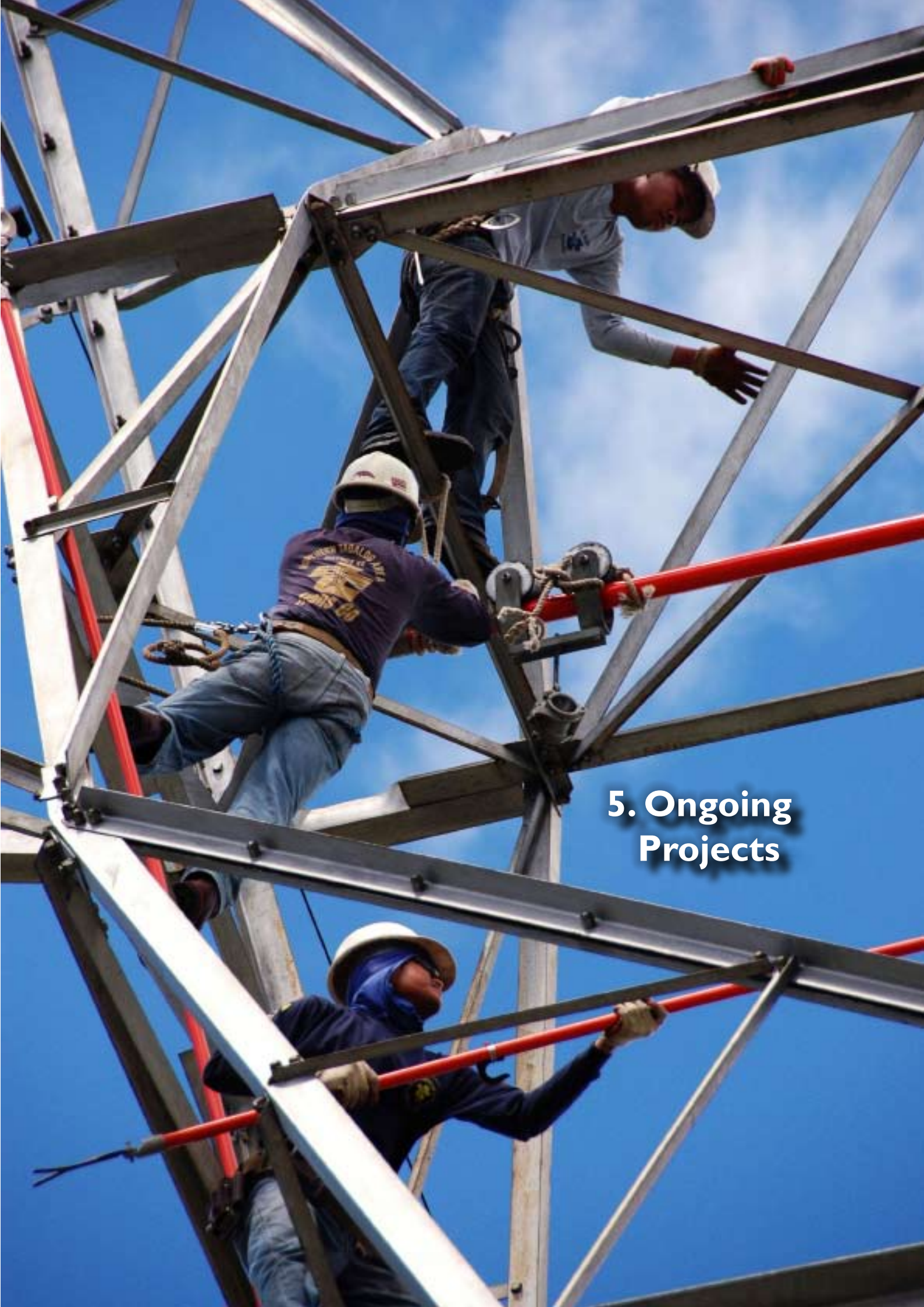
4.4 San Francisco 138 kV Substation



The substation, which was energized in March 2008, serves as a new power interchange in Agusan del Sur which before relied on a long and unreliable 69 kV transmission lines from Butuan to Bislig. It will likewise provide operational flexibility in eastern Mindanao, considered as the weakest part of the transmission network. In addition, this substation will relieve the loading of the existing 69 kV transmission lines at Agusan del Sur, improve the reliability of power supply at Surigao del Sur and unload the 30 MVA Bislig substation.

Table 4.4 San Francisco 138 kV Substation

PROJECT COMPONENT	DESCRIPTION
San Francisco Substation Cut-In point (Butuan-Bislig line)	138 kV ST-DC, 1-795 MCM, 1.0 km
San Francisco Substation-San Francisco Load end	69 kV SP-SC, 1-336.4 MCM, 1.5 km
San Francisco Substation (new)	1-50 MVA 138/69/13.8 kV Transformer 3-138 kV PCB + Accessories 3-69 kV PCB + Accessories



5. Ongoing Projects

5. Ongoing Projects

This chapter discusses in detail the ongoing projects being implemented by NGCP. Tables 5(a), 5(b) and 5(c) show the lists of ERC-approved ongoing projects for the Luzon, Visayas and Mindanao grids, respectively.

For latest updates on these projects, please visit www.ngcp.ph.

Table 5(a) Luzon Ongoing Projects

PROJECT NAME	PURPOSE	ETC
Binga-San Manuel 230 kV T/L (Stage 1)	To provide N-1 during maximum dispatch of the generating plants in north Luzon	2012
Binga-San Manuel 230 kV T/L (Stage 2)		2013
Binan-Sucat 230 kV Transmission Line	To provide N-1 security to the south Luzon corridor and allow full dispatch of the associated power plants in the area	2010
Dasmarinas-Rosario 115 kV Transmission Line	To provide sufficient line capacity and with better line availability	2012
Hermosa-Balintawak 230 kV Transmission Line Relocation	To give way to road widening project of the Department of Public Works and Highways (DPWH)	2010
Luzon PCB Replacement Project	To replace old PCBs to improve reliability	2011
Luzon Substation Expansion 1	To provide additional transformer capacity to meet load growth	2011
Luzon Transmission Equipment Upgrade	To install the second Labrador-Kadampat tie-line and reactors at 500 kV substations in north luzon	2010
Luzon Transmission Line Upgrading 1	To replace the damaged transformer unit in Dasmarinas	2010
Tap Hermosa-Balintawak 230 kV T/L	To transfer the cut-in of Duhat Substation to maintain N-1 provision	2010

Table 5(b) Visayas Ongoing Projects

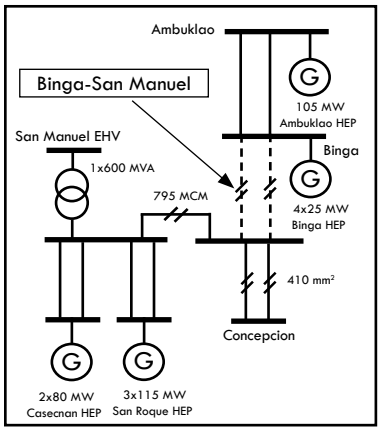
PROJECT NAME	PURPOSE	ETC
Bohol Backbone Transmission Project	To accommodate load growth, address voltage problems and improve system reliability and flexibility in Bohol	2012
Negros V Transmission Line	To provide new transmission corridor to accommodate load growth and attain higher reliability	2012
Negros-Panay Interconnection Uprating	To upgrade existing submarine cable to meet load growth	2011
New Naga Substation	To provide termination point for the proposed 200 MW coal plant and the Cebu-Negros uprating	2011
Northern Panay Backbone Project	To provide 138 kV backbone in Panay to avert overloading of 69 kV lines	2010
Southern Panay Backbone Project	To accommodate load growth and address the low voltage problem in Southern Panay	2011
Visayas Capacitor Project 1	To maintain the voltages at a number of substations	2010
Visayas PCB Replacement Project	Replace old and antiquated PCBs	2011
Wright-Calbayog Transmission Line	To provide new transmission corridor to accommodate load growth and attain higher reliability	2010

Table 5(c) Mindanao Ongoing Projects

PROJECT NAME	PURPOSE	ETC
Abaga-Kirahon 230 kV T/L	To provide new transmission corridor to Agus Hydro for higher reliability	2011
Aurora-Polanco 138 kV T/L	To accommodate load growth and improve system reliability	2011
Gen. Santos-Tacurong 138 kV T/L	To replace old facilities to meet load growth and attain higher reliability	2011
Kirahon-Maramag 230 kV Transmission Line	To complete the transmission corridor from northern to southern Mindanao	2011
Maramag-Bunawan 230 kV Transmission Line	To complete the transmission corridor from northern to southern Mindanao	2010
Mindanao Mobile Transformer Project	Deferred. Refer to Section 5.3.6	2012
Mindanao PCB Replacement Project	To replace old and antiquated PCBs	2011
Mindanao Substation Expansion- 2005	To upgrade existing substations to meet load growth	2010
Reliability Compliance Project 1-Mindanao	To provide N-1 security to critical 138 kV lines in Mindanao and maintain the voltage profile at various substations within the prescribed limit	2013
Zamboanga City 138 kV Transmission Line	To provide new transmission corridor to meet load growth and attain higher reliability	2010

5.1 Luzon

5.1.1 Binga-San Manuel 230 kV T/L



This project involves the construction of a new double circuit Binga-San Manuel 230 kV transmission line (40 km) using new right–of-way, including the installation of switching facilities at both Binga Switchyard and San Manuel Substation. Instead of constructing a new Binga Substation, the existing switchyard will be expanded, departing from the original plan of putting up an entirely new substation. The project aims to provide N-1 contingency during maximum dispatch of the generating plants, particularly hydro, in north Luzon. The existing line, as well as the breakers at Binga substation, has already surpassed its economic life, having been constructed/installed in 1956. Moreover, there are developments in the power plants associated with the power flow at Binga-San Manuel line. These include the repowering of Ambuklao HEP by 2010 to a new capacity of 105 MW (previously at 75 MW capacity) and the completion of Binga HEP expansion by 2014 to an additional capacity of 25 MW.

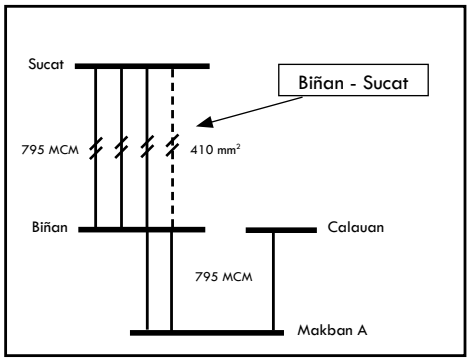
Although approved under the Final Determination, this project was deferred so that its approved disbursement could be allocated to Southern Panay Backbone Project (SPBP). This reallocation would allow the SPBP to be prioritized, as the project was originally proposed to be implemented later than the Binga-San Manuel 230 kV Transmission Line Project.

NGCP, however, will accelerate the implementation of the substation components at Binga which include the installation of a new 75 MVA 230/69 kV transformer and a new control room. The transformer will be serving the Binga-Itogon 69 kV line (a transmission asset) to ensure continuous reliable supply to Baguio PEZA upon disconnection of the said 69 kV line from the 30 MVA 13.2/69 kV transformer inside the Binga HEP switchyard.

Table 5.1.1 Binga-San Manuel 230 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Binga – San Manuel T/L (Stage 2)	230 kV, ST-DC, 2-795 MCM, 40 km
Substation	
Binga Substation Expansion (Stage 1)	1-75 MVA 230/69-13.8 kV Transformer 10-230 kV PCB + Accessories 2-69 kV PCB + Accessories
San Manuel Substation Expansion (Stage 1)	2-230 kV PCB + Accessories

5.1.2 Biñan-Sucat 230 kV T/L



This project involves the construction of the fourth Biñan-Sucat 230 kV transmission line (14 km) circuit, including the installation of switching facilities at both Biñan and Sucat substations. The project aims to provide provision for N-1 during maximum dispatch of generating plants in south Luzon by increasing the transfer capacity of the Biñan-Sucat transmission corridor. The overloading during N-1 condition is triggered by the tripping of any Biñan-Sucat 230 kV circuits.

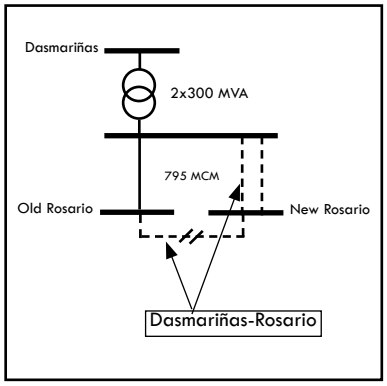
Although the overloading could be remedied without the project, it would require the generation dispatch in south Luzon to be reduced by as much as 11% to 18% of the total maximum

Table 5.1.2 Biñan-Sucat 230kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Binan – Sucat line 4	230 kV, SP-SC, 2-410 mm² TACSR, 14 km
Substation	
Binan S/S Expansion	1-230 kV PCB
Sucat S/S Expansion	1-230 kV PCB

generation capacity, for the period 2005 to 2010. This would affect many generators making them unable to participate fully in the WESM.

5.1.3 Dasmariñas-Rosario 115 kV T/L



This project involves the construction of a 16 km, 115 kV transmission line mounted on steel poles and steel towers, including the corresponding expansion of Dasmariñas and Rosario Substations through the installation of additional switching facilities.

The project aims to improve line availability and provide additional capacity to the existing but unreliable wood pole Dasmariñas-Rosario 115 kV line. The improvement of power supply reliability in the area would further encourage more investors to put up business in Cavite Ecozone.

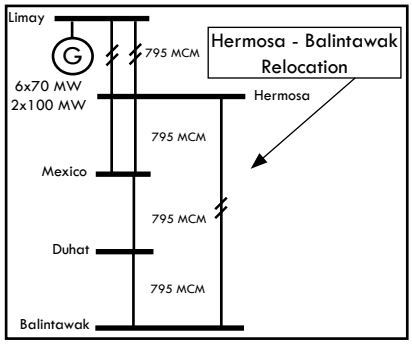
Table 5.1.3 Dasmariñas – Rosario Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Dasmariñas S/S - New Rosario S/S	115kV , ST/SP-DC, 1-795 MCM, 14.5 km
New Rosario S/S - Old Rosario S/S	SP – SC, 2 x 795 MCM, 1.5 km
Substation	
Dasmariñas S/S Expansion	2-115 kV PCB + S/S Acc
Old Rosario S/S (replacement of PCB)	1-115 kV PCB + S/S Acc

5.1.4 Hermosa-Balintawak 230kV Transmission Line Relocation

The project involves the relocation of a portion of Hermosa-Balintawak 230 kV transmission line, with a total length of 14.73 km. The structures, a combination of steel poles and towers, will be relocated along North Luzon Expressway parallel to the viaduct portion from San Simon to Pulilan Exits.

This was requested by the Department of Public Works and Highways due to its ongoing road widening activity (from two to six lanes). This road widening is one of the priority projects of the government to decongest traffic at the Manila North Road (formerly McArthur Highway) and provide comfort and alternative route to motorists using the highway.



Originally targeted for completion by October 2007, the implementation of the project has to give way to the force majeure projects in southern Luzon as the facilities damaged by the 2006 typhoons have to be prioritized.

Table 5.1.4 Hermosa-Balintawak 230 kV T/L Relocation

PROJECT COMPONENT	DESCRIPTION
Dismantling/Retiring of Steel poles	
Calumpit, Bulacan	2.49 km, 11 steel poles
Apalit, Pampanga	6.73 km, 43 steel poles
Pulilan, Bulacan	5.51 km, 31 steel poles
Relocation (12.5 km)	
Viaduct portion	5 km, 18 towers
Remaining portion	7.5 km, 36 steel poles

5.1.5 Luzon Power Circuit Breaker Replacement Project

Under the 2006 TDP, there were 24 underrated PCBs originally lined up under this project, which included those for Hermosa and San Jose substations (now already included in the Mariveles Coal Transmission Reinforcement Project, Section 6.1.1.5). Considering the latest update on the replacement of underrated breakers in the Luzon grid, the components of this project were revised to cover the next set of PCBs intended to replace the old units in order to improve reliability. The 115 kV PCBs included in this package are all classified as transmission assets.

Table 5.1.5 Luzon PCB Replacement Project

SUBSTATION LOCATION	DESCRIPTION
San Jose	9-115 kV PCB + Accessories
Labo	3-230 PCB + Accessories
Malaya	4-230 kV PCB + Accessories
Gumaca	2-230 kV PCB + Accessories

5.1.6 Luzon Substation Expansion I

This project involves the installation of

additional transformers to accommodate load growth and provide N-1 at various substations. The project components prioritization was based on the latest update on the substation loading forecast. In Mexico, there are five (5) existing 100 MVA transformers and to increase the substation capacity, three (3) of which will be replaced with higher capacity units (2-300 MVA transformers). The replaced unit will then be deployed in other substations needing capacity additions: Bauang, Cruz Na Daan and Naga. Cabanatuan and Biñan substations, on the other hand, will have new 200 MVA and 300 MVA transformer units, respectively. To provide N-1, additional 50 MVA capacity will be installed in Bantay while the existing 20 MVA unit in Laoag will be replaced with a new 50 MVA transformer.

Table 5.1.6 Luzon Substation Expansion 1

SUBSTATION	ADDITIONAL TRANSFORMER
Mexico	2-300 MVA 230/69 kV
Bauang	1-100 MVA 230/69 kV
CND	1-100 MVA 230/69 kV
Naga	1-100 MVA 230/69 kV
Cabanatuan	1-200 MVA 230/69 kV
Laoag	1-50 MVA 115/69 kV
Bantay	1-50 MVA 115/69 kV
Biñan	1-300 MVA 230/115 kV

5.1.7 Luzon Transmission Equipment Upgrade

This project involves the installation of the second Labrador-Kadampat 230 kV tie-line and the installation of 2-90 MVAR shunt reactors at the 500 kV substations in north Luzon. The implementation of the first component was accelerated by TEAM Energy as they own the directly affected plant (Sual) by the constraints in the said tie-line. It involved the bus-in of BPPC and Bauang 230 kV lines at Kadampat substation with the remaining portion of Labrador-BPPC and Labrador-Bauang (bundled together) serving as the second Labrador-Kadampat tie-line. This project will provide N-1 in this 230 kV segment and would allow the full dispatch of Sual/Masinloc.

The second component aims to address the overvoltages in the Luzon grid during system off-peak load conditions. Several instrument transformers were already damaged due to the excessive high voltages, prompting the emergency procurement of reactors for Kadampat and San Jose substations. The installation of the reactors is targeted to be completed by first quarter of 2010.

The components of this project have undergone "reprioritization", with all project components new, superseding the previously FD-approved components. The ERC, as expressed in their letter to TransCo in 2007, recognizes that circumstances may change within a regulatory period and that the transmission service provider is given flexibility to implement projects which are necessary in performing its mandate. The necessary supporting documents for the new components, however, will have to be submitted to the ERC.

The other components under this project previously included in the 2008 TDP were already moved to other projects. The capacitor component for Laoag has been included in the San Esteban-Laoag 230 kV Transmission Line project package while the power circuit breaker component for Santiago substation is already made part of Luzon Substation Expansion Project 2.

There are 300 MVA 230/115 kV transformers for Dolores and Araneta substations originally included in the ERC-approved components for Luzon Transmission Equipment Upgrade (LTEU). However, these components were deferred as early in the 2006 TDP due substation space limitations in accommodating the installation of additional transformer. But the incident in Dolores substation in October 2009 where one (1) transformer unit was burnt necessitate NGCP to immediately procure a replacement unit as the said substation is one of the very important substations supplying the power requirements of Metro Manila. In the case of Araneta, the test conducted on the existing transformers showed the critical condition of the oil insulation. In 2008, TransCo filed an application with the ERC for Provisional Authority (PA) to immediately procure a 300 MVA transformer for Araneta that could make way for the rehabilitation of the

Table 5.1.7 Luzon Transmission Equipment Upgrade

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Labrador-Kadampat tie line 2	230 kV, ST-DC/SP-SC, 2 x 795 MCM ACSR, 0.319 km and Bauang/BPPC Bus-in at Kadampat 230 kV Substation
Sual-Kadampat	Replacement of OHGW with OPGW of existing Sual-Kadampat 230 kV T/L
Substation	
Kadampat	6-230 kV PCB + Accessories () 2-230 kV PCB + Accessories (Replacement) 1 – 90 MVAR, 500 kV Shunt Reactor
San Jose	1 – 90 MVAR, 500 kV Shunt Reactor
Dolores	1-300 MVA 230/115 kV Transformer
Araneta	1-300 MVA 230/115 kV Transformer

transformers one at a time. The additional 300 MVA capacity will eventually become a spare unit. With these developments, the projects for Dolores and Araneta are now being returned back under LTEU. Also, the Araneta transformer project with PA would no longer be filed separately in Third Regulatory Period.

5.1.8 Luzon Transmission Line Upgrading 1

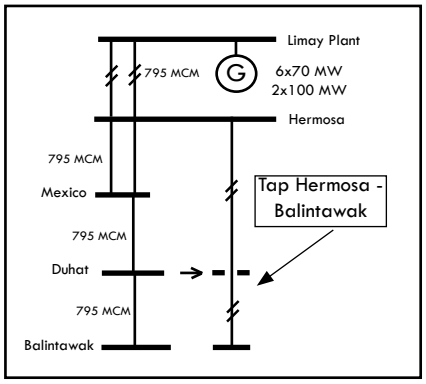
The San Manuel-Concepcion-Mexico 230 kV transmission line, which is the major component of this project, was already completed. The remaining component to be implemented is the installation of a 300 MVA transformer at Dasmariñas. This component originally aims to provide N-1 (as the third 300 MVA transformer) at the substation but will now be installed as a replacement to the damaged unit in Dasmariñas.

While the completion of Meralco's Amadeo 230 kV substation has relieved the loading at Dasmariñas, the installation of a third transformer unit in Dasmariñas is still required to maintain N-1 provision for the transformers as load continues to grow in the coming years. The additional transformer will be included in NGCP's application with the ERC for the Third Regulatory Period.

Table 5.1.8 Luzon Transmission Line Upgrading 1

PROJECT COMPONENT	DESCRIPTION
Substation	
Dasmariñas S/S Expansion	1-300 MVA, 230/115 kV, 7-230 kV PCB; 6-115 kV PCB

5.1.9 Tap Hermosa-Balintawak 230 kV Transmission Line

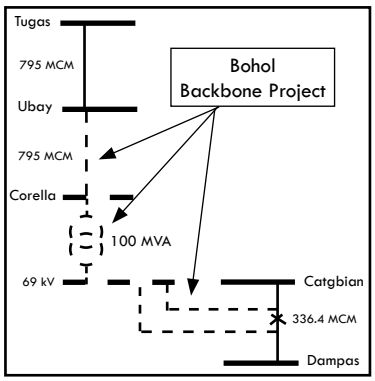


The project will implement the transfer of Duhat substation from its present cut-in connection at Mexico–Balintawak 230 kV line to Hermosa– Balintawak 230 kV line. This will involve about 1.2 km steel pole, single circuit 2-795 MCM ACSR line extension.

The Hermosa-Balintawak line has twice the capacity of the Mexico-Balintawak line presently supplying Duhat. To adequately serve the load of Duhat substation (at 2-300 MVA capacity) without line overloading during N-1 contingency, this transfer of cut-in connection is necessary.

5.2 Visayas

5.2.1 Bohol Backbone Transmission Project



The project involves the installation/ construction of a total of 96 kilometers of 138 kV overhead transmission line utilizing steel tower structures, installation of a 100 MVA power transformer at the new Corella Substation. In addition, the Ubay Substation will be upgraded.

The project is expected to be completed by 2012. The proposed Ubay-Corella 138 kV line is necessary to prevent the overloading of Ubay-Trinidad 69 kV line during outage of Ubay-Alicia 69 kV transmission line, and vice versa, starting 2011. On the other hand, the new substation in Corella will provide a new delivery point in Bohol and prevent the overloading of Ubay Substation starting 2011.

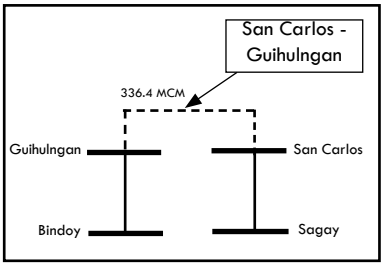
Table 5.2.1 Bohol Backbone Transmission Project

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Ubay – Corella	138 kV ST-DC1, 1-795 MCM, 95 km
69 kV Tie-line (Dampas-Catigbian Line)	69 kV SP/CP-DC, 1-336.4 MCM, 0.5 km
Substation	
Ubay	2-138 kV PCB + Accessories
Corella	1-100 MVA 138/69/13.8 kV Transformer 1-138 kV PCB + Accessories 3-69 kV PCB + Accessories

5.2.2 Negros V Transmission Line

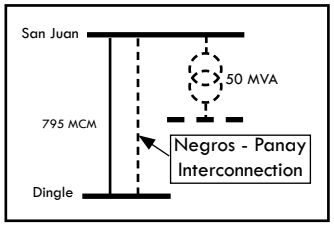
This project is intended to accommodate increasing power demand in the northeastern part of Negros island by building a 69 kV transmission loop from Cadiz to Amlan. This loop, from San

Carlos to Guihulngan through an approximately 52 km 69 kV, SC-ST, 1-336.4 MCM, will ensure the security of power supply to western Negros.



5.2.3 Negros-Panay Interconnection Uprating

The loading of the Negros-Panay interconnection depends on the deficiency or excess in generation within Panay. Big generation capacities are expected to come in Panay during the period 2011-2012. The total capacities of the incoming plants together with the existing plants exceed the projected demand of Panay. If all the excess generation will be exported, the existing Negros-Panay interconnection is expected to be overloaded starting 2011.



However, the existing plants in Panay are peaking plants such as diesel plants and power barges. Without the existing plants, and considering only the incoming plants, the existing Negros-Panay interconnection will be overloaded in 2011 but starting 2012, it will be sufficient due to the increase in demand in Panay, thus, decreasing the exported power coming from Panay.

On the other hand, the maximum power flow from Negros-Panay will occur when all the generation in Cebu, Negros, Leyte and Bohol are at maximum while the plants in Panay are minimized. During this condition but taking into consideration that baseload plants are prioritized, the Negros-Panay interconnection will be overloaded from 2011 to 2012. But starting 2013, there will be no more overloading due to increase in demand, thus, decreasing the imported power to Panay. The generation deficiency in Panay will be supplied by its inland generation.

This project is divided into two parts: Phase I (Panay Side) and Phase II (Submarine and Negros Side); The former is expected to be completed in the 2nd Regulatory Period while the latter in the 3rd Regulatory Period.

The initial phase of this project involves the installation of 68 ckt-km, 138 kV overhead transmission line utilizing steel tower structures as well as the expansion of existing substation (Dingle) and construction of a new substation (San Juan).

This aims to: (1) accommodate load growth and address the low voltage problem; (2) improve the system reliability and operational flexibility; and (3) extend service to previously un-electrified areas. This will also interconnect the 60 MW DMCI Coal Power Plant in Concepcion, Iloilo.

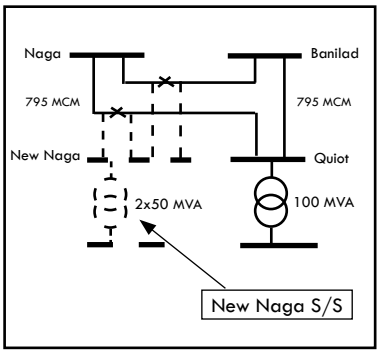
Under the Final Determination, the project was initially optimized at 49% and benchmarked at known submarine cable. The cost was further optimized down to 25% citing the assumption made by TransCo that there would be no "new generation" in Panay Island. The assumption was based on DOE's PDP, the official plan used as reference for transmission planning. TransCo has sought ERC clarification if the TWRG provides the mechanisms in making the proper adjustments to allow NGCP recovery of the costs in case TransCo's assumptions were correct.

Table 5.2.2 Negros-Panay Interconnection Uprating (Phase 1)

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
San Juan CTS-Dingle S/S	138 kV, 1-795 MCM ACSR, ST-DC1, 34 km
Substation	
Dingle S/S Expansion	2 x 138 kV PCB + accessories
San Juan Substation (New)	1 x 50 MVA, 138/69-13.8 kV Transformer 4 x 138 kV PCB + accessories 3 x 69 kV PCB + accessories

5.2.4 New Naga Substation

The New Naga Substation is intended to provide a termination point for the Cebu-Negros Uprating. The substation will also establish the asset boundary between NGCP assets and the power plant by separating the control of Salcon Power Complex from NGCP's substation.



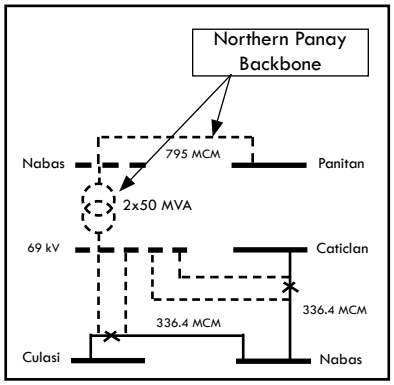
In addition, the substation will serve as the receiving station of the proposed KEPCO 200 MW coal-fired power plant as the old Naga

substation is already congested and can hardly accommodate any expansion.

Table 5.2.3 New Naga Substation

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Banilad-Quiot-New Naga Cut-in Line	138 kV ST-DC, 1-795 MCM, 0.5 km
Suba L1 and L2 Extension	138 kV ST-DC, 1-795 MCM, 1.5 km
Sigpit and Suba L3 Extension	138 kV ST-DC1, 1-795 MCM, 1.5 km
Old Naga-New Naga Tie-line (Reconductoring)	138 kV ST-DC, 1-410 mm^2 TACSR, 1.0 km
New Naga 69 kV Line Extension (VECO and Sibonga Feeders)	69 kV SP/CP-DC, 1-336.4 MCM, 1.5 km
Substation	
New Naga Substation	2-50 MVA 138/69/13.8 kV transformer 13-138 kV PCB + Accessories 5-69 kV PCB + Accessories
Old Naga Substation (Expansion)	2-138 kV PCB + Accessories

5.2.5 Northern Panay Backbone Transmission Project



Panay Island is one of the islands that has shown promising economic progress in recent years. The projected demand of the island is expected to reach 228 MW in 2009 and 317 MW by the year 2018. In order to meet the projected demand of the island, the existing transmission backbone must be augmented to meet any generation capacity addition. For one, the Panitan-Nabas 69 kV transmission line will not be sufficient to meet the projected load growth.

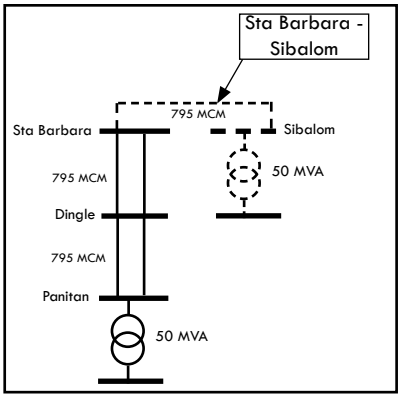
The project is part of the Panay Power Transmission Backbone Project which is divided into northern and southern Panay.

The project involves the installation/ construction of a total of 97 kilometers of 138 kV and 69 kV overhead transmission line utilizing steel tower structures and aims to: (1) accommodate load growth and address the low voltage problem; (2) improve the system reliability and operational flexibility; and (3) extend service to un-electrified areas.

Table 5.2.4 Northern Panay Backbone Project

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Panitan-Nabas	138 kV ST-DC1, 1-795 MCM, 95 km
Nabas S/S Cut-in to Nabas-Culasi 69 kV T/L	69 kV ST-DC, 1-336.4 MCM, 1.0 km
Nabas S/S Cut-in to Nabas-Caticlan 69 kV T/L	69 kV SP-SC, 1-336.4 MCM, 1.0 km
Substation	
Nabas S/S (new)	2-50 MVA 138/69/13.8 kV Transformer 3-138 kV PCB + Accessories 5-69 kV PCB + Accessories
Panitan S/S (exp)	1-138 kV PCB + Accessories

5.2.6 Southern Panay Backbone Transmission Project



The project is part of the Panay Power Transmission Backbone which involves the installation/ construction of a total of 109 kilometers of 138 kV and 69 kV overhead transmission line utilizing steel tower structures. The new transmission backbone will accommodate load growth and address the low voltage problem in southern Panay. In particular, the new facilities will avert the overloading of the Sta. Barbara-Sibalom 69 kV transmission line and the Sta. Barbara Substation.

Table 5.2.5 Southern Panay Backbone Project

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Sta. Barbara-Sibalom	138 kV ST-DC1, 1-795 MCM, 107 km
Sibalom Substation to Cut-in to San Jose -Sibalom 69 kV Line	69 kV ST-DC, 1-336.4 MCM, 2.0 km
Substation	
Sibalom Substation (new)	1-50 MVA 138/69/13.8 kV Transformer 2-138 kV PCB + Accessories 3-69 kV PCB + Accessories
Sta. Barbara (Expansion)	2-138 kV PCB + Accessories

5.2.7 Visayas Capacitor Project 1

The function of a Shunt Capacitor Bank, a prime component of power system, is critical for the efficient and sound operation of an electric network. The installation of capacitors at various nodes of the Visayas Grid is intended to improve the voltage regulation and the reactive power balance in areas where low voltage problems have been occurring, increase the power transfer capability of the existing 69 kV lines, allow a better utilization of the network components and reduce the transmission system losses.

This project, which involves the installation of 14-7.5 MVAR capacitors in different locations, was classified by ERC as sub-transmission asset. To date, no reply has been issued by the regulator on the motion filed by TransCo to clarify the said classification.

Based on the results of latest simulations, the installation of a number of capacitors will not only have impact to one electric cooperative but will also benefit others, and even NGCP's own substation. In such cases, the capacitors should be reclassified as Transmission Assets. NGCP is still waiting for ERC's clarification on this.

5.2.8 Visayas PCB Replacement Project

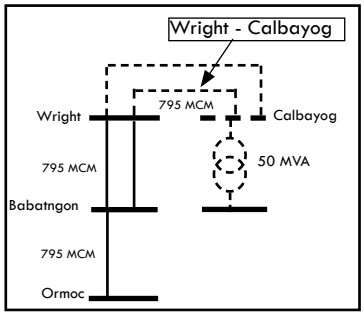
A Power Circuit Breaker (PCB) is a prime component of power system and is critical for the efficient and sound operation of an electric network. This equipment must be constantly dependable and responsive at any given time. The purpose of this project is to replace old/antiquated PCBs installed in a number of substation facilities including PCBs which will become inadequate in terms of their technical capability (duties, mechanical, etc.)

Under this project, the PCBs in the following substations will be replaced: Amlan, Bacolod, Compostela, Dingle, Mabinay, Panitan and Sta. Barbara.

Table 5.2.6 Visayas PCB Replacement Project

SUBSTATION LOCATION	DESCRIPTION
Priority 1	
Amlan	5-138 kV PCB + Accessories
Bacolod	2-138 kV PCB + Accessories
Mabinay	3-138 kV PCB + Accessories
Priority 2	
Compostela	1-138 kV PCB + Accessories
Dingle	5-138 kV PCB + Accessories
Panitan	2-138 kV PCB + Accessories
Sta. Barbara	1-138 kV PCB + Accessories

5.2.9 Wright-Calbayog Transmission Line



To support the long term power requirements of Samar and improve the delivery of quality and reliable power in the island, NGCP is constructing the 138 kV Wright-Calbayog transmission line. The new line will replace the old 69 kV woodpole transmission line and will address the overloading of Wright Substation.

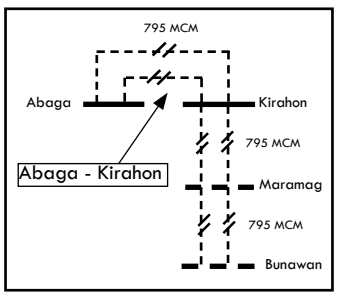
The absence of reliable transmission infrastructure is probably one of the factors that hamper the economic development of the island. For years, Northern Samar relies on the 69 kV woodpole structures, which are susceptible to trippings that caused power interruptions. Without this project, Calbayog will have a load curtailment of as much as 21 MW to 32 MW for the period 2011 to 2017.

Table 5.2.7 Wright-Calbayog 138 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Wright-Calbayog	138 kV, ST-DC, 1-795 MCM, 65 km
69 kV tie line	69 kV, SP/CP-DC, 1-336.4 MCM ACSR/AS, 0.2 km
Substation	
Wright S/S	1 x 138 kV PCB + Accessories
Calbayog S/S	1 x 50 MVA, 138/69/13.8 kV Transformer 3 x 138 kV PCB + Accessories 3 x 69 kV PCB + Accessories

5.3 Mindanao

5.3.1 Abaga-Kirahon 230 kV T/L



The proposed project will provide additional transmission corridor to the 844.78 MW Agus Hydro Complex, which accounts for about 50% of Mindanao's total dependable capacity. Currently, Agus 2-Kibawe and Abaga-Tagoloan 138 kV lines serve as Agus

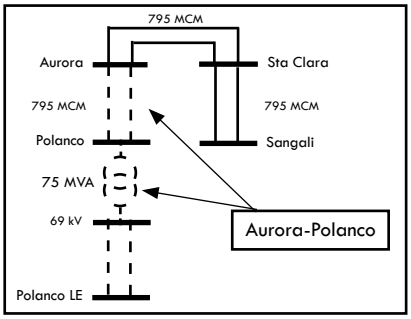
Complex's link to the grid. Over time, the N-1 being provided by these lines to the Agus Complex has been lost due to the increase in demand, i.e., load flow to each of the line. As a result, the bombing of the Agus 2-Kibawe line in the past resulted in huge power swing to the other corridor, the Abaga-Tagoloan, leading to cascaded trippings of substations and then to system collapse. The Abaga-Tagoloan line will not be able to carry the additional 71% to 90% load as a result of the outage of Agus 2-Kibawe line.

This project will also serve as an initial step in developing a higher capacity transmission highway from north to south of the grid to meet the increasing demand in Davao area. Due to constraints in acquiring right-of-ways, 230 kV level is deemed necessary for higher transmission capacity that will serve the long-term requirements of the grid. However, this 230 kV-designed transmission line will be energized initially at 138 kV.

Table 5.3.1 Abaga-Kirahon 230 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Abaga-Kirahon	230 kV ST-DC, 2-795 MCM, 120 km
Substation	
Kirahon Substation (new)	16-138 kV PCB + Accessories
Abaga Substation	5-138 kV PCB + Accessories

5.3.2 Aurora-Polanco 138 kV Transmission Line



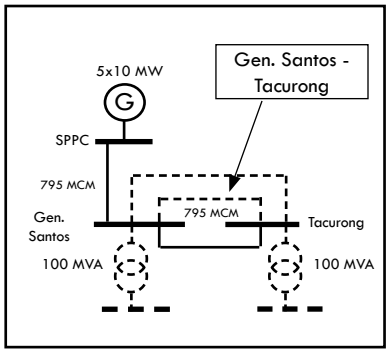
The proposed Aurora-Polanco 138 kV line and the new Polanco Substation are intended to serve the growing power demand of Dipolog City and neighboring load centers. These new facilities will ensure a continuous and reliable power supply in the area. At present, the City of Dipolog including its neighboring cities and towns, draw their power requirements from Aurora Substation through a very long 69 kV single circuit woodpole transmission line with a capacity of 47 MW.

Without the proposed facilities, the Aurora-Dipolog 69 kV transmission line and Aurora Substation will be overloaded starting 2011.

Table 5.3.2 Aurora-Polanco 138 kV Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Aurora-Polanco	138 kV ST-DC, 1-795 MCM, 79 km
Polanco-Polanco (LES)	69 kV SP/CP-DC 1-336.4 MCM, 11 km
Cut-in 69 kV Line	69 kV SC-SP/CP 1-336.4 MCM, 4 km
Substation	
Polanco Substation (new)	1-75 MVA 138/69/13.8 kV Transformer 5-138 kV PCB + Accessories 4-69 kV PCB + Accessories
Aurora Substation (exp)	3-138 kV PCB + Accessories
Polanco LES	3-69 kV Air Break Switch

5.3.3 Gen. Santos-Tacurong 138 kV T/L



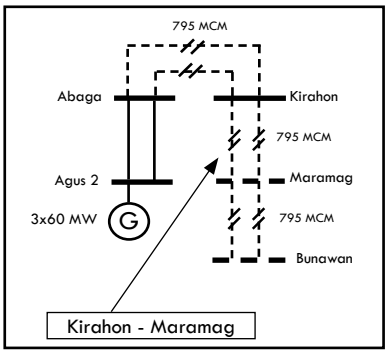
The proposed reinforcement of the Gen. Santos-Tacurong 138 kV line is intended to replace the existing 138 kV single circuit woodpole structures with a double circuit, steel tower transmission line. This will increase the reliability and power transfer capability of the bulk power system in SOCCSKSARGEN areas. The project also involves the upgrading of the Gen. Santos and Tacurong substations.

With increasing demand in the area, the grid cannot afford the continued use of the unreliable (dilapidated) woodpoles due to reliability concerns.

Table 5.3.3 Gen. Santos-Tacurong 138 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Gen. Santos -Tacurong	138 kV ST-DC, 1-795 MCM, 80 km
Substation	
Gen. Santos Substation (Expansion)	1-100 MVA 138/69/13.8 kV power transformer 3-138 kV PCB + Accessories 4-69 kV PCB + Accessories
Tacurong Substation	1-100 MVA 138/69/13.8 kV power transformer 3-138 kV PCB + Accessories 4-69 kV PCB + Accessories

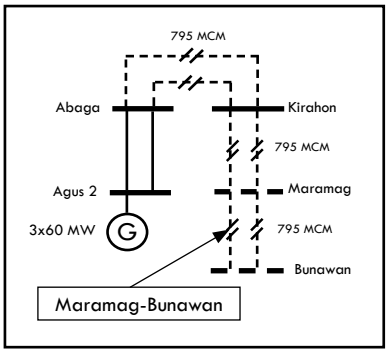
5.3.4 Kirahon-Maramag 230 kV T/L



This approximately 108-kilometer 230 kV, double circuit, steel tower, 2-795 MCM transmission project will complete the Mindanao 230 kV Transmission Backbone linking northern and southern Mindanao.

Without this line, the Tagoloan-Maramag 138 kV transmission line will be overloaded by around 21% during N-1 contingency starting 2010. The line will be initially energized at 138 kV.

5.3.5 Maramag – Bunawan 230 kV T/L



The proposed project is the extension of Abaga-Kirahon 230 kV Transmission Line Project and part of the proposed Mindanao 230 kV Transmission Backbone aimed to strengthen the existing transmission system, thereby ensuring the stability, reliability and efficiency transmission of power in the entire Mindanao Grid. The proposed 230 kV transmission network, which will be initially energized at 138 kV level, will serve as the transmission corridor from northern to southern Mindanao where the output of the Agus Hydroelectric Power Complex and Maramag IV Hydroelectric Plant can be transmitted.

Without the Maramag-Bunawan line, the Kibawe-New Loon 138 kV transmission line will be overloaded by around 5 % to 37 % for the period 2009 to 2011 during N-1 contingency. However, even with the outage of Kibawe-New Loon 138 kV double circuit transmission segment, power output from the hydroelectric power plants can still be delivered to load center in the south (Davao) via the proposed Maramag-Bunawan transmission line.

Table 5.3.4 Maramag-Bunawan 230 kV Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Maramag-Bunawan	230 kV ST-DC, 2-795 MCM, 102 km
Maramag 69 kV Tie line	69 kV SP/CP-SC 1-336.4 MCM, 1.5 km
Substation	
Maramag S/S (new)	7-138 kV PCB + Accessories
Bunawan S/S (exp)	1-50 MVA 138/69/13.8 kV Transformer 3-138 kV PCB + Accessories 1-69 kV PCB + Accessories
Tagoloan S/S (exp)	1-100 MVA 138/69/13.8 kV Transformer

5.3.6 Mindanao Mobile Transformer Project

NGCP has decided to defer indefinitely the implementation of this project. In its place, the installation of the following 138/69 kV transformers for N-1 will be prioritized: 1-75 MVA in Nuling Substation and 1-100 MVA in Tindalo Substation, both are components of Mindanao Substation Reliability Project I, a new project to be filed in the Third Regulatory Period.

5.3.7 Mindanao PCB Replacement Project

This project involves the replacement of old power circuit breakers on the substations listed below. By June 2011, all these PCBs will be replaced.

Table 5.3.5 Mindanao PCB Replacement Project

SUBSTATION LOCATION	DESCRIPTION
Priority 1	
Bislig	1-138 kV PCB + Accessories
Tacurong	1-138 kV PCB + Accessories
Gen. Santos	1-138 kV PCB + Accessories
Sangali	2-138 kV PCB + Accessories
Nuling	1-138 kV PCB + Accessories
Aurora	1-138 kV PCB + Accessories
Davao	2-138 kV PCB + Accessories
Tindalo	3-138 kV PCB + Accessories
Priority 2	
Anislangan	1-138 kV PCB + Accessories
Tindalo	1-138 kV PCB + Accessories
Davao	1-138 kV PCB + Accessories
Abaga	2-138 kV PCB + Accessories
Sta. Clara	3-138 kV PCB + Accessories
Kibawe	2-138 kV PCB + Accessories

5.3.8 Mindanao Substation Expansion-2005

The project involves the installation of additional transformers at the substations identified in Table 5.3.7 in order to meet load growth. In recent years, load growth in these substations' coverage areas has significantly increased and expected to continue. The new transformers would also provide N-1 capability to the other substations to mitigate supply interruption during planned and unplanned outages of transformers.

Table 5.3.6 Mindanao Substation Expansion- 2005

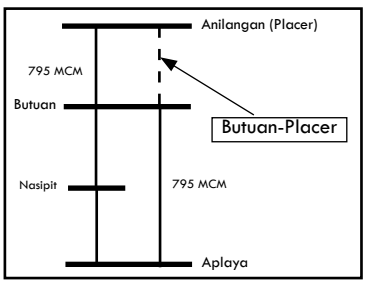
PROJECT COMPONENT	DESCRIPTION
Sta. Clara	1-50 MVA 138/69/13.8 kV 1-138 kV PCB + accessories
Kibawe S/S	1-75 MVA 138/69/13.8 kV 2-138 kV PCB + accessories (To be installed at Maramag Substation)
Butuan S/S	1-100 MVA 138/69/13.8 kV 2-138 kV PCB + accessories 3-69 kV PCB + accessories
Bislig S/S	1-50 MVA 138/69/13.8 kV 2-138 kV PCB + accessories 3-69 kV PCB + accessories (To be installed at Matanao Substation)
New Loon S/S	1-150 MVA 138/69/13.8 kV 1-69 kV PCB + accessories
Tindalo S/S	1-100 MVA 138/69/13.8 kV 2-138 kV PCB + accessories 2-69 kV PCB + accessories (To be installed at Maco Substation)

5.3.8 Reliability Compliance Project I - Mindanao

This project involves the provision of N-1 security to a number of critical 138 kV transmission lines in the Mindanao grid and the installation of shunt reactors. The project's components will be repackaged into the following individual projects:

(a) Butuan-Placer 138 kV T/L;
(b) Matanao-Gen. Santos 138 kV T/L; and
(c) Mindanao Shunt Reactors and Capacitors.

a. Butuan-Placer 138 kV T/L (Phase 1)

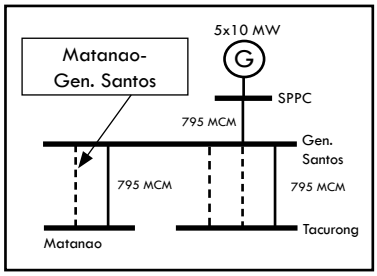


This project will install the second circuit to the approximately 100-kilometer existing Butuan-Placer (Anislagan) 138 kV transmission line. It will provide N-1 to the existing line and reduce transmission loss and further improve the voltage level in Surigao del Norte. The expected completion of this project is July 2012.

Table 5.3.7 (a) Butuan-Placer 138 kV T/L

NAME	DESCRIPTION
Transmission Line	
Butuan-Placer	138 kV ST-SC, 1-795 MCM, 100 km
Substation	
Placer Substation (exp)	2-138 kV PCB + Accessories
Butuan Substation (exp)	2-138 kV PCB + Accessories

b. Matanao-Gen. Santos 138 kV T/L (Phase 2)



The proposed line will provide N-1 to the Matanao-Gen. Santos 138 kV transmission line. In case of an outage of the existing Matanao-Gen. Santos line, the Tacurong-Gen. Santos line will not be able to accommodate the load of Gen. Santos Substation starting 2015.

Table 5.3.7 (b) Matanao-Gen. Santos 138 kV T/L

NAME	DESCRIPTION
Transmission Line	
Matanao-Gen. Santos	138 kV ST- SC, 1-795 MCM, 70 km
Substation	
Gen. Santos Substation (exp)	2-138 kV PCB + Accessories
Matanao Substation (exp)	2-138 kV PCB + Accessories

c. Mindanao Shunt Reactors and Capacitors

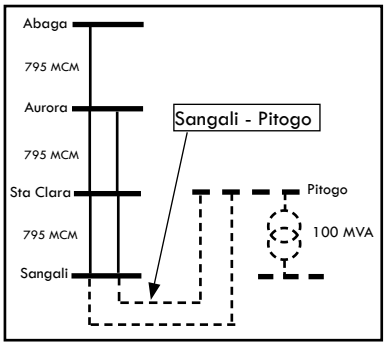
The original components of this project namely: Butuan-San Francisco, San Francisco-Bislig and Bislig-Tindalo, all of which are 138 kV lines, have been deferred. In lieu of this components, shunt reactors have been proposed for Bislig and Sta. Clara Substations intended to correct the

Table 5.3.7 (c) Mindanao Shunt Reactors and Capacitors

PROJECT COMPONENT	DESCRIPTION
Substation	
Bislig	3-7.5 MVAR 138 kV Shunt Reactors 3-138 kV PCB + Accessories
Sta. Clara	2-7.5 MVAR 138 kV Shunt Reactors 2-15 MVAR 138 kV Capacitors 2-138 kV PCB + Accessories

overvoltage during off-peak condition.

5.3.10 Zamboanga City 138 kV T/L

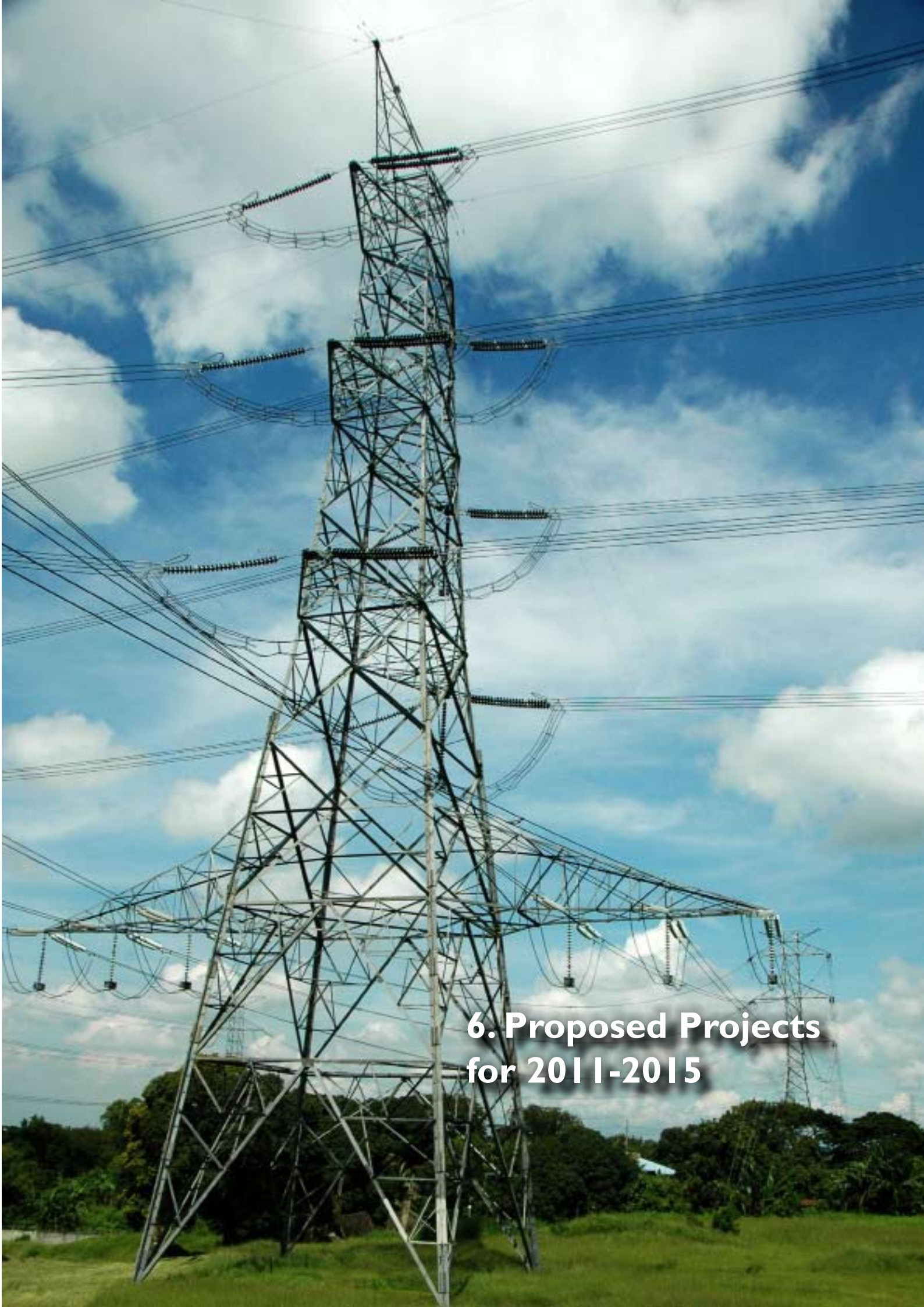


Currently, Zamboanga City is being served through a 69 kV line from the 138 kV Sangali Substation.

A 33.5-km 138 kV double circuit, steel pole transmission line is proposed to be constructed from the existing Sangali substation to a new substation in Pitogo. This augmentation will provide reliable bulk power services to western Mindanao. The project is also intended to remedy operational problem such as line outages, and at the same time meet the projected increase in power demand in the area.

Table 5.3.8 Zamboanga City 138 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Sangali-Pitogo	138 kV SP-DC, 1-795 MCM, 33.5 km
Substation	
Pitogo Substation (new)	100 MVA 138/69/13.8 kV Transformer 5-138 kV PCB + Accessories 4-69 kV PCB + Accessories
Sangali Substation (exp)	3-138 kV PCB + Accessories



6. Proposed Projects for 2011-2015

6. Proposed Projects for 2011-2015

The projects to be filed to the ERC for the Regulatory Reset of the Third Regulatory Period consist of:

ERC-Approved Projects. Most of these are Capex projects that have been included in the ERC's FD for the Second Regulatory Period but need to be re-filed to and approved by the ERC. This category includes those projects with minimal disbursements within the Second Regulatory Period, or the "Small Capex" and those that may be subject to further revisions or reprioritization.

Two (2) projects are not part of the FD but have been approved by the ERC. These are Mariveles Coal Transmission Reinforcement and San Jose Transformer Replacement projects.

New Projects. The new projects for the Third Regulatory are further grouped as follows:

(a) associated with the entry of a power plant;

(b) network expansion needed to meet load growth;

(c) in compliance with reliability and N-1 requirements of the Grid Code; and

(d) network expansion through island interconnection.

These new projects are further prioritized (as specified in Appendix 3) to reflect their urgency and necessity. Those intended to meet load growth and reliability requirements get high priority. In the case of transformers, those projected to overload are given priority over n-1 (in most cases). In addition, the projected load should be at least 70% on the 10th year after the transformer was installed to ensure optimal utilization of assets. This becomes the basis of which projects will be filed to the ERC as part of the forecast capex for the Third Regulatory Period. NGCP's intention is to come up with a capex level that will result in reasonable transmission rates but would allow it to pursue important network upgrading and expansion.

It should be noted that the proposed Sta. Rita-Quinapundan and Culasi-Sibalom line projects have been approved already by ERC but at 69 kV level. NGCP is proposing the upgrading of the design of these lines to 138 kV.

The proposed replacements of network equipment that have reached economic life are included in TDP Volume II (Operation and Maintenance).

Table 6.1 ERC-approved Projects

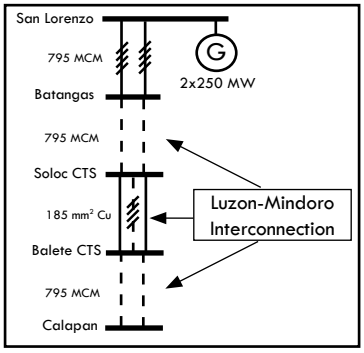
PROJECT NAME	PURPOSE	EXPECTED TIME OF COMPLETION
LUZON		
Luzon-Mindoro Interconnection	To provide Mindoro Island access to reliable and cheap electricity	2013
Luzon Substation Expansion II	To provide additional transformer capacity to meet load growth	2012
Luzon Substation Expansion III	To provide additional transformer capacity to meet load growth	2012
Luzon Voltage Improvement II	To maintain the voltage profile at various substation within the allowable limits	2013
Mariveles Coal Transmission Reinforcement	To reinforce Hermosa-Limay B line to maintain N-1 during simultaneous maximum dispatch of Mariveles Coal and Limay plants	2012
San Jose 500 kV Reconfiguration	To ensure the reliability of the existing ring-bus substation	2015
San Jose Transformer Replacement Project	To ensure the reliability of the substation and to increase the substation capacity	2010
San Jose-Balintawak Line 3	To increase transfer capacity and maintain the N-1 provision	2013
VISAYAS		
Culasi-Sibalom 69 kV Transmission Line	To provide N-1 for the existing corridor	2013
Sta. Rita-Quinapundan 69 kV Transmission Line	To provide N-1 for the existing corridor	2014
MINDANAO		
Tacurong-Nuling 138 kV Transmission Line	To provide new transmission corridor from North Cotabato to Maguindanao	2013



6.1 ERC-Approved Projects

6.1.1 Luzon

6.1.1.1 Luzon-Mindoro Interconnection



The project will connect the Mindoro Island to mainland Luzon through the installation of 25-kilometer submarine cable and 51 kilometers of overhead lines, along with the associated cable terminal stations, voltage conditioning devices and additional switching facilities.

In the FD, the ERC finds the project as long overdue. The interconnection will give Mindoro Island access to a more stable and reliable source of electricity from the main grid. This, in turn, would result in better economic growth in the island and even make the location of generating plant in the island viable. Due to small demand in Mindoro, the excess generating capacity can be exported to Luzon once the interconnection is in place.

Table 6.1.1.1 Luzon-Mindoro Interconnection

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Batangas – Soloc CTS	230 kV, ST-DC 1-795 MCM, 45 km
Balete CTS – Calapan	230 kV, ST-DC 1-795 MCM, 6 km
Substation	
Batangas S/S Expansion	2-230 kV PCB + Accessories
Calapan S/S Expansion	3-230 kV PCB + Accessories 1-69 kV PCB + Accessories 1-120 MVA, 230/69-13.8 kV Transformer
NPC-owned Calapan 69 kV	2-69 kV PCB + Accessories
Soloc CTS	3-230 kV PCB + Accessories
Submarine Line	
Soloc CTS-Balete CTS	230 kV, 4-300 mm² Cu, 1-core sub-cable, 25 km
MVAR Compensation	
San Jose S/S	5 MVAR, 69 kV Capacitor Bank
Balete CTS	60 MVAR, 230 kV Shunt Reactor
Soloc CTS	60 MVAR, 230 kV Shunt Reactor
Calapan S/S	12.5 MVAR, 69 kV Shunt Reactor

6.1.1.2 Luzon Substation Expansion II

This project involves substation capacity expansion to meet load growth and provide N-1 contingency at various substations in North Luzon. It includes the installation of the third 300 MVA transformer unit for Mexico and additional 100 MVA capacity for the group of steel plant loads being served by the substation. These capacities may even be enough if the operation of the embedded generators in the area will discontinue. The 2-75 MVA transformers at La Trinidad, on the other hand, will be replaced with 2-150 MVA to increase the capacity and provide N-1 contingency for the substation. One of the replaced units will then be installed at Ambuklao to serve the Ambuklao-Beckel 69 kV line (a transmission asset) to further improve the reliability of supply to the customers in the area. For Concepcion, the additional transformer (the third 100 MVA unit) will be coming from the replaced unit in Mexico substation.

Table 6.1.1.2 Luzon Substation Expansion II

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER
Mexico	1-300 MVA 230/69 kV 1-100 MVA 230/69 kV
Concepcion	1-100 MVA 230/69 kV
La Trinidad	2-150 MVA 230/69 kV
Ambuklao	1-75 MVA 230/69 kV
Santiago	3-230 kV PCB

6.1.1.3 Luzon Substation Expansion III

This project involves the installation of a fourth 300 MVA transformer at Zapote which is among the major substations serving Metro Manila. The substation is already heavily loaded and requiring capacity addition to maintain the provision for N-1. In south Luzon, Batangas and Calaca are the other substations requiring expansion to meet the load growth. Instead of adding another 100 MVA units in Batangas substation, two units will be replaced with higher capacity transformers which will at the same time provide N-1 contingency for the substation. One of the replaced units will be installed at Makban substation for N-1. In Calaca, a new 100 MVA transformer (replacing the 50 MVA unit) will be installed to parallel with the existing 100 MVA transformer.

Table 6.1.1.3 Luzon Substation Expansion III

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER
Zapote	1-300 MVA 230/115 kV
Batangas	2-300 MVA 230/69 kV
Calaca	1-100 MVA 230/69 kV
Makban	1-100 MVA 230/69 kV

6.1.1.4 Luzon Voltage Improvement II

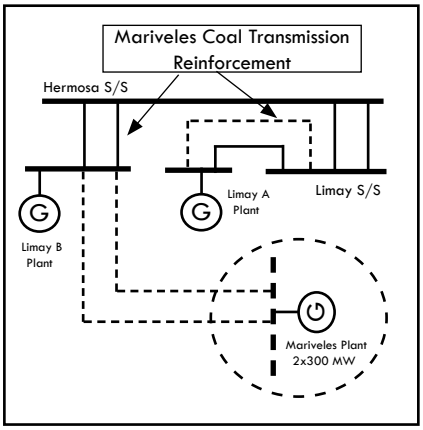
This project involves the installation of a total of 600 MVAR capacitor banks at Biñan, Dasmariñas and Mexico in order to improve voltage regulation and keep the voltages in the area within the Grid Code prescribed limits both during normal and N-1 conditions. One of the worst N-1 events for the voltage profile is the outage of Dasmariñas-Ilijan 500 kV line. The increasing load will necessitate the installation of the said capacitor banks by year 2014.

Table 6.1.1.4 Luzon Voltage Improvement II

PROJECT COMPONENT	DESCRIPTION
Dasmariñas	2-100 MVAR, 230 kV Capacitors
Biñan	2-100 MVAR, 230 kV Capacitors
Mexico	2-100 MVAR, 230 kV Capacitors

6.1.1.5 Mariveles Coal Transmission Reinforcement

This project involves the associated grid reinforcements needed to allow the full dispatch of both the proposed Mariveles 600 MW Coal-Fired Power Plant (CFPP) and Limay Combined-Cycle Power Plant (CCPP).



The Mariveles CFPP will be delivering power to the grid through the Limay B-CCPP switchyard, which will be split (isolated) from Limay A-CCPP in order to avoid the need to replace all existing breakers thereat due to increased fault level.

The grid reinforcement involves the reconductoring of the existing Hermosa-Limay B-CCPP 230 kV line (using the existing towers) to maintain the N-1 provision of the line during maximum dispatch of both Mariveles CFPP and Limay B-CCPP units. Additionally, the interrupting capacities of some PCBs at San Jose and Hermosa will also be exceeded and should be replaced. The replacement of these PCBs has been prioritized by NGCP and to date, is under tendering/procurement process.

The Provisional Authority (PA) to implement the project was secured in March 2008 while the permanent approval for the proposed project was issued by the ERC in August 2008.

Table 6.1.1.5 Mariveles Coal Transmission Reinforcement

PROJECT COMPONENT	DESCRIPTION
Transmission Lines	
Limay-Limay A-CCPP Tie Line Upgrade	230 kV, SP-DC, 1-410 mm^2 TACSR, 0.95 km
Hermosa-Limay B-CCPP Line Upgrade	Reconductoring with 2-410 mm^2 TACSR, 44.6 km
Substation	
San Jose	9-230 kV PCB + Accessories (Original components of Luzon PCB Replacement Project)
Hermosa	7-230 kV PCB + Accessories (Original components of Luzon PCB Replacement Project)

6.1.1.6 San Jose 500 kV Reconfiguration

This project originally involves both the reconfiguration of the substation and the

installation of additional 600 MVA transformer at San Jose substation. However, due to the problem in the existing transformers at San Jose and the recent development to completely replace the transformers with higher capacity, the installation of additional 600 MVA capacity would no longer be required.

The project aims to increase the reliability of the San Jose 500kV substation by converting it to breaker-and-half configuration. The existing ring bus configuration does not provide flexibility and reliability as it is vulnerable to bus splitting during faults on the connected circuits. Unlikely circuit combinations during bus splitting could lead to transformer overloading and possible separation of the northern and southern 500 kV backbone system.

In conducting the reconfiguration activities, complete shutdown of San Jose substation would be required which would greatly affect the supply of power to Metro Manila. As such, the construction of a new 500 kV drawdown substation (Antipolo 500 kV) to allow San Jose reconfiguration should be completed first. The reconfiguration project is already approved by the ERC as a "small capex" during the Second Regulatory Period while the proposed Antipolo 500 kV substation is yet to be filed with the ERC for approval.

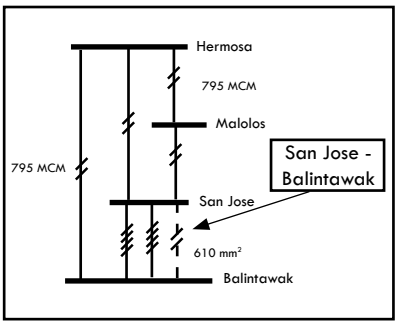
Table 6.1.1.6 San Jose 500 kV Reconfiguration

PROJECT COMPONENT	DESCRIPTION
Substation	
San Jose Reconfiguration	4-500 kV PCB + Accessories

6.1.1.7 San Jose Transformer Replacement Project

This project involves the replacement of the existing 500/230 kV transformer banks at San Jose Substation which have been in critical conditions. Any failure in the existing transformers in this substation would result in a more expensive generation dispatch condition as the generation from the coal plants delivering power to the 500 kV system will be constrained. In order to maintain the provision for N-1 contingency, the replacement units also aim to increase the capacity of the substation from 2400 MVA to 3000 MVA. During the implementation of the project, a temporary transformer bank will be installed in order to maintain at least four (4) operational transformer banks at San Jose. The ERC has granted the Provisional Authority in March 2009 to implement this project.

6.1.1.8 San Jose-Balintawak Line 3



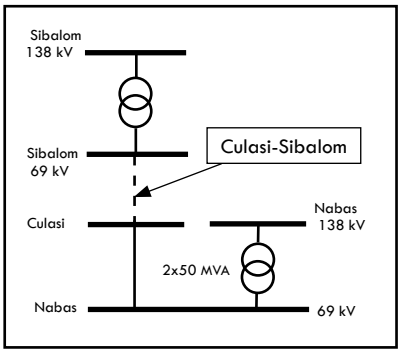
This project involves the construction of the third circuit for San Jose-Balintawak 230 kV transmission corridor. This will increase the transfer capacity of the line to address the overloading problem during tripping of one of the San Jose-Balintawak circuits at peak load condition. Without this project, the dispatch of the power plants delivering power to the 500 kV system will have to be limited to maintain the N-1 provision for the line.

Table 6.1.1.7 San Jose-Balintawak Line 3

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
San Jose-Balintawak	230 kV, SP-SC 2-610 mm² TACSR, 22 km
Substation	
San Jose	2-230 kV PCB + Accessories
Balintawak	2-230 kV PCB + Accessories

6.1.2 Visayas

6.1.2.1 Culasi-Sibalom 69 kV Transmission Line



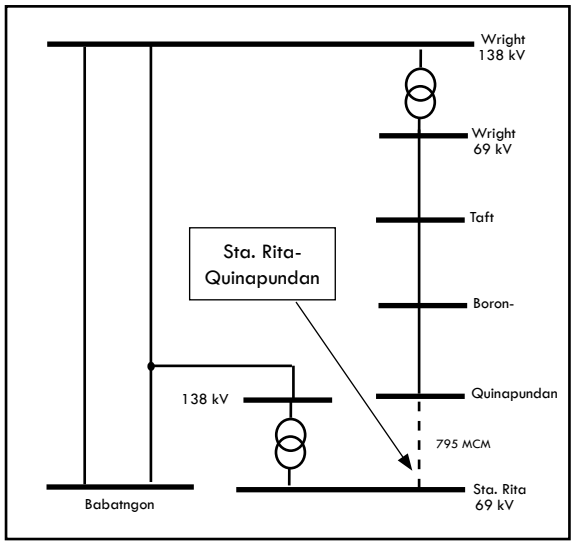
In its order dated 9 February 2009 under ERC Case No. 2007-532 MC, the ERC approved the proposed Sibalom-Culasi 69 kV Transmission Line as transmission asset. This approximately 86 kilometer line will provide Sibalom Substation alternate source of power and will connect the

north and south Panay on the western side.

Table 6.1.1.7 Culasi-Sibalom 69 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Culasi Load End- Sibalom (initially energized at 69 kV)	138 kV ST-SC, 1-795 MCM, 86 km
Substation	
Sibalom Substation	2-69 kV PCB + Accessories
Culasi Load End Substation	1-69 kV Air Break Switch

6.1.2.2 Sta. Rita-Quinapundan 69 kV Transmission Line



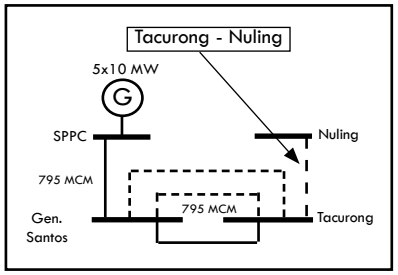
In its order dated 9 February 2009 under ERC Case No. 2007-520MC, the ERC approved the proposed Sta. Rita-Quinapundan 69 kV Transmission Line Project. The approximately 103-kilometer proposed line is primarily intended to make Quinapundan Substation closer to its source of power and thus provide more reliable power supply. Currently, the Quinapundan Substation is getting its power from NGCP's 138 kV Wright Substation through a long stretch of approximately 191 km, 69 kV woodpole line (Wright-Taft-Borongan-Quinapundan). This corridor has been prone to trippings and due to distance, low voltage problems and high system loss are also being experienced in the area. Although still a long route, the proposed line will provide an alternate corridor to the eastern Samar substations (Oras, Taft, Borongan and Quinapundan) in case of tripping along Wright-Taft line. The new line will also relieve the Wright Substation and thus prevent overloading.

Table 6.1.2.2
Sta. Rita-Quinapundan 69 kV Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Sta. Rita Load End–Quinapundan Load End (initially energized at 69 kV)	138 kV, ST-SC, 1-795 MCM, 103 km
Substation	
Sta. Rita Load End Substation (Expansion)	2-69 kV PCB + Accessories
Quinapundan Load End	2-69 kV Air Break Switch

6.1.3 Mindanao

6.1.3.1 Tacurong-Nuling 138 kV Transmission Line



The proposed project will provide a new 138 kV single circuit, steel tower transmission corridor from north Maguindanao (Nuling) to North Cotabato (Tacurong). Aside from addressing load growth, the line will complete the looping of transmission network within South Western Mindanao Area (SWMA), i.e., Gen. Santos-Tacurong-Nuling-Kibawe link, thereby providing robust transmission backbone to ensure reliable delivery of power.

6.2 New Projects

This section discusses the new projects which are classified into: (1) generation-associated projects; (2) load growth-driven projects; (3) reliability projects; and (4) island interconnection.

NGCP has also identified the equipment and facilities that have already reached and will reach their economic life in the Third Regulatory Period. However, the conditions of the said assets have been subjected to further assessment. Asset management and replacement plans are based on, among other factors, the asset's age and conditions, potential obsolescence of the asset and the probability and impact of any failure. The assets that NGCP will propose for replacement are included in Volume II of the TDP.

Table 6.2.1 Generation-Associated Projects

GENERATION PROJECT	REQUIRED GRID REINFORCEMENT(S)	ETC	REMARKS
LUZON			
Mariveles Coal 600 MW	Reconductoring of Hermosa-Limay 230 kV Line	2011	refer to Section 6.1.1.5
	Hermosa-Mexico 230 kV Line Upgrading	2015	New Project
RP Energy Coal 300 MW	Hanjin-Olongapo Line Reinforcement	2013	New Project
Kalayaan III 360 MW	Binan-Sucat Line 4	2010	Ongoing Project; refer to Section 5.1.2
	Upgrading of Kalayaan-Makban	2012	New Project
San Gabriel Natural Gas 550 MW or San Pascual 348 MW	Binan-Sucat Line 4	2010	Ongoing Project; refer to Section 5.1.2
	Upgrading of Kalayaan-Makban	2012	New Project
Quezon Power Coal 500 MW and Pagbilao 350 MW	New 600 MVA 500/230kV transformer at Tayabas (Tayabas S/S Expansion I & II)	2012/ 2014	New Project
	New line or reconductoring of QPPL-Tayabas Line		Connection asset
Ambuklao Repowering 150 MW / Magat Expansion (40 - 180 MW)	Reinforcement of Ambuklao-Binga	2014	New Project
VISAYAS			
CEDC Coal 246 MW	Reinforcement of Talavera-Sigpit-New Naga Line	2013	New Project
DMCI Coal 60 MW	Eastern Panay Backbone Project	2013	New Project
MINDANAO			
Kamanga Coal 200 MW	Reinforcement of Matanao-Gen. Santos 138 kV Line	2011	Part of "Reliability Compliance Project I-Mindanao"; refer to Section 5.3.8 (b)

6.2.1 Generation-Associated Projects

6.2.1.1 Ambuklao-Binga 230 kV T/L Upgrading Project

This project aims to upgrade the existing line in order to maintain the provision for n-1 taking into consideration the repowering of Ambuklao plant to a new capacity of 105 MW and the proposed expansion of Magat plant (40 to 180 MW additional capacity). The Line 1 of the existing Ambuklao-Binga 230 kV corridor is more than 50 years old already having been commissioned in 1956. Line 2, on the other hand, was commissioned in 1981.

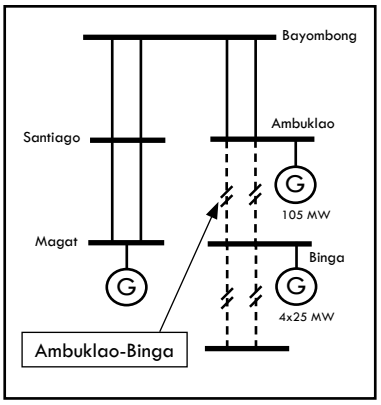
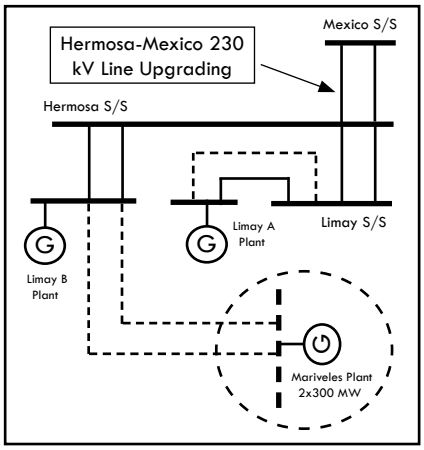


Table 6.2.1.1 Ambuklao-Binga 230 kV T/L Upgrading

NAME	DESCRIPTION
Transmission Line	
Ambuklao-Binga	230 kV ST-DC 2-410 mm² TACSR, 11 km
Substation	
Ambuklao	6-230 kV PCB + accessories
Binga	5-230 kV PCB + accessories (already included in the Binga-San Manuel 230 kV T/L Project)

6.2.1.2 Hermosa-Mexico 230 kV Line Upgrading

This project involves the upgrading of Hermosa-Mexico 230 kV corridor (existing: 1-795 MCM) to 4-795 MCM ACSR. This is to maintain the N-1 provision for the line during maximum dispatch of Mariveles Coal, Limay and RP Energy Coal. The power flow direction will be mainly from Hermosa to Mexico. It can be noted that Mexico is a heavily loaded substation with an installed capacity of up to 1,100 MVA within the period 2011 to 2015.



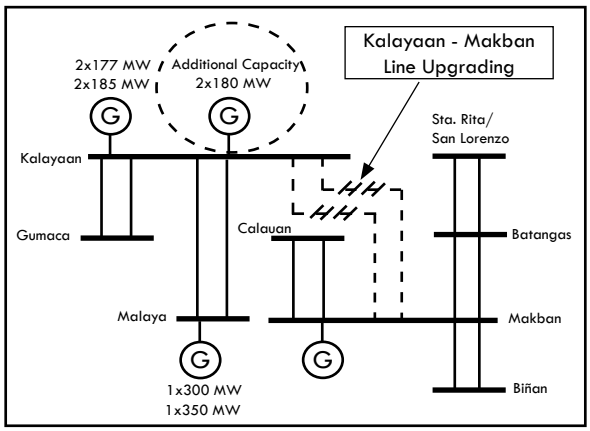
This upgrading also anticipates the expansion of the generation capacity in Bataan which

includes the possible conversion of Limay plant to another fuel type and the entry of new power plants in the area.

Table 6.2.1.2 Hermosa-Mexico 230 kV Line Upgrading

NAME	DESCRIPTION
Transmission Line	
Hermosa-Mexico	230 kV ST-DC 4-795 MCM ACSR, 38 km

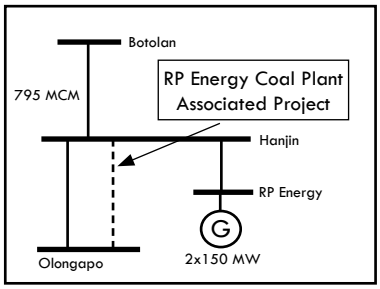
6.2.1.3 Kalayaan-Makban 230 kV Line Upgrading



This project aims to maintain the N-1 provision for the Kalayaan-Makban corridor that could allow all possible generation dispatch scenarios for the associated power plants. There are two proposed generation projects in the area that would further necessitate the upgrading of the Kalayaan-Makban 230 kV transmission line, namely: San Gabriel 550 MW (or the San Pascual 348 MW) Natural Gas power plant in Batangas and the 360 MW expansion of Kalayaan Pumped Storage Hydroelectric plant in Laguna. The overloading of the Kalayaan-Makban corridor occurs during maximum generation of southern plants (Makban, San Lorenzo, Sta. Rita and Calaca) while Kalayaan is at low dispatch, allowing the output of those plants to flow through the said line. While this may be addressed by limiting the generation of the said plants, this is not a solution being considered as the dispatch schedule is not within NGCP's control.

Even at off-peak hours, overloading also occurs when the natural gas plants (San Lorenzo and Sta. Rita) are still at high output and the Kalayaan units are operating as pumps. The proposed upgrading is a 4-795 MCM ACSR, ST-DC line, with Calauan to be supplied radially from Makban using the existing 1-795 MCM ACSR ST-DC line. The upgrading is also expected to reduce system loss during pumping of Kalayaan units (up to 640 MW load) as the Kalayaan-Makban corridor provides the shortest route from generation sources.

6.2.1.4 RP Energy Coal Plant Associated Project



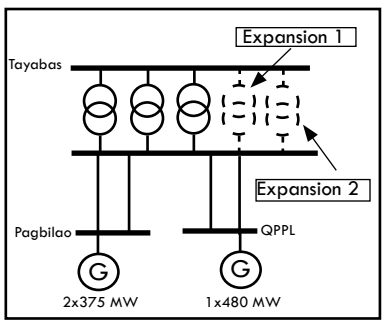
This project, which involves the construction of the second circuit for the Hanjin-Olongapo 230 kV line, is associated with the proposed connection of RP Energy 300 MW Coal plant at Hanjin substation. The overloading of the existing Hanjin-Olongapo line will occur not only during N-1 but even during normal condition when the associated power plants are at maximum dispatch. Instead of reconductoring the existing 27 km line, the installation of a second circuit for Hanjin-Olongapo line was considered in order to maintain a continuous circuit in the western 230 kV corridor of Central Luzon and maintain the reliability of supply at Hanjin and Botolan substations during the construction period.

It should be noted that the connection of RP Energy may require the reclassification of some assets, particularly the assets owned by Hanjin, i.e., the 230 kV line from the cut-in point along the Olongapo-Botolan 230 kV line to the Hanjin switchyard. Such reclassification is subject to regulatory approval.

Table 6.2.1.3 RP Energy Coal Plant Associated Project

NAME	DESCRIPTION
Transmission Line	
Hanjin-Olongapo	230 kV ST-DC 1-795 MCM ACSR, 27 km (single-circuit termination)
Substation	
Hanjin GIS	2-230 kV GIS + accessories
New Olangapo Switching Station	5-230 kV PCB + accessories

6.2.1.5 Tayabas Substation Expansion I



The expansion of Tayabas Substation, which involves the installation of additional 600 MVA 500/230 kV transformer (4th unit) thereat, is needed to allow all possible

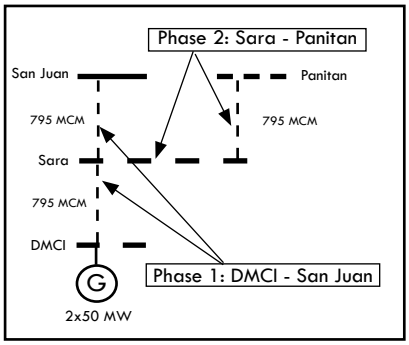
generation dispatch scenarios for QPPL and Pagbilao coal plants in Quezon and the power plants in Bicol region.

6.2.1.6 Tayabas Substation Expansion II

This project aims to accommodate the expansion of Quezon Power Philippine Limited (QPPL) coal plant (additional 500 MW) and Pagbilao coal plant (additional 350 MW) by installing another 600 MVA 500/230 kV transformer (5th unit) at Tayabas.

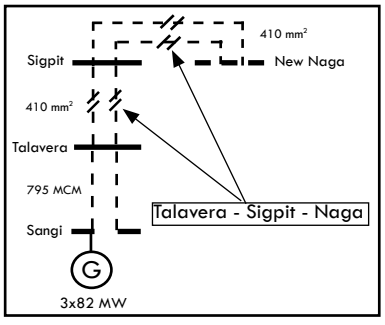
With the above developments in generation capacity in the area and the installation of additional transformers in Tayabas, the resulting fault level in Tayabas 230 kV bus will already exceed the interrupting capabilities of the existing circuit breakers. As such, PCB replacement (19 units) would also be necessary. While splitting the Tayabas 230 kV bus is also an option to address the fault level problem in the area, PCB replacement was found to be the cheaper option.

6.2.1.7 Eastern Panay Backbone Transmission Project



This project is associated with the proposed 60 MW DMCI coal-fired power plant in Concepcion, Iloilo. It will involve the connection of the new San Juan Substation (Phase I of Negros-Panay Interconnection Uprating) to the existing Panit-an Substation through a 138 kV transmission line on the eastern side of the Panay island.

6.2.1.8 Talavera-Sigpit-New Naga Line Reinforcement



The entry of 246 MW coal-fired plant in Sangi, Toledo City, Cebu being proposed by Cebu Energy Development Corporation will require the reinforcement of Talavera-Sigpit-New Naga 138 kV from 1-795 MCM single circuit to 1-410 mm^2 TACSR double circuit.

6.2.2 Load Growth-Driven Projects

The proposed load growth-driven projects under this section consist of transmission facilities expansions needed to meet load growth. In the case of transformers, the proposed capacity is based on the projected demand for the next ten years. In should be noted that there are also a number of transformers, which, aside from load growth, should also be replaced due to old age.

Table 6.2.2 Load Growth-Driven Projects

PROJECT NAME	ETC
Luzon Substation Expansion IV	2014
New Antipolo 230 kV Substation	2012
New Antipolo 500 kV Substation	2014
New CBP 230 kV and Associated Transmission Lines	2014
New Rosario 115 kV Substation	2012
Northeastern Transmission Development (Stage 1)	2012
Northeastern Transmission Development (Stage 2)	2015
New Naga-Banilad Transmission Line	2012
Visayas Substation Expansion I	2012
Mindanao Substation Expansion II	2014

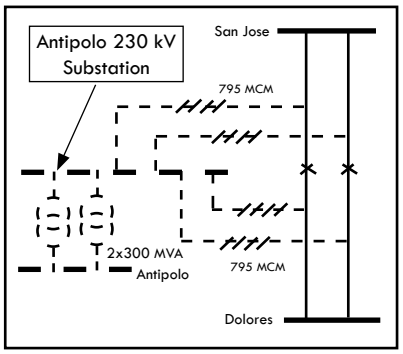
6.2.2.1 Luzon Substation Expansion IV

This project involves the installation of additional transformers at various substations to continuously meet the load growth of the customers being served. This includes the installation of the 4th transformer unit for Sucat substation in Metro Manila. The total capacity of the new transformers to be installed under this project is 950 MVA. For Bayombong and Daraga substations, the units to be installed will be coming from the replaced units in other substations.

Table 6.2.2.1 Luzon Substation Expansion IV

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER
Sucat	1-300 MVA, 230/115 kV
San Manuel	1-200 MVA, 230/69 kV
Bayombong	1-75 MVA, 230/69 kV
Limay	1-50 MVA, 230/69 kV
Tuguegarao	1-100 MVA, 230/69 kV
Santiago	2-100 MVA, 230/69 kV
Labrador	1-100 MVA, 230/69 kV
Daraga	1-100 MVA, 230/69 kV

6.2.2.2 New Antipolo 230 kV Substation



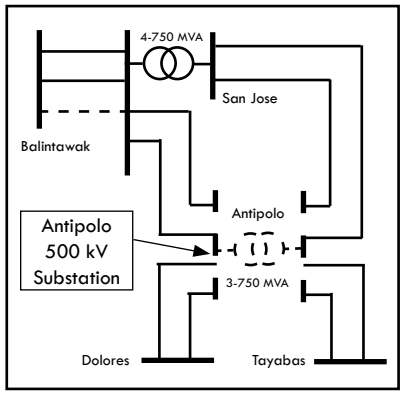
This new 230 kV substation will bus-in along the existing San Jose-Dolores 230 kV line (a 4-795 MCM ST-DC corridor). As load increases in Metro Manila and with the expansion limitation of Araneta and Dolores substations (to serve Meralco's Sector 2), developing a new 230 kV delivery substation is necessary. By year 2012, Dolores which is at 4-300 MVA capacity will be overloaded already during N-1 condition.

Initially, Antipolo 230 kV substation will be at 2-300 MVA capacity with capacitor banks to be installed for voltage support. To draw supply from Antipolo, MERALCO will have to put up line connections from their existing 115 kV substations near the area such as Masinag, Parang and Marikina.

Table 6.2.2.2 New Antipolo 230 kV Substation

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Extensions from the bus-in point along San Jose-Dolores	230 kV, ST-DC 4-795 MCM ACSR, 8 km
Substation	
Antipolo 230 kV	2-300 MVA 230/115 kV Transformers 12-230 kV PCB + Accessories 6-115 kV PCB + Accessories 2-100 MVAR 230 kV Capacitor

6.2.2.3 New Antipolo 500 kV Substation



This project involves the construction of a new 500 kV drawdown substation to bus-in along San Jose-Tayabas 500 kV line. The existing San Jose 500 kV substation has been a critical substation being the only drawdown substation in the area to supply Metro Manila and being the merging point of the bulk power coming from the north and south 500 kV backbone. The Antipolo 500 kV substation aims to increase the supply capability of the 500 kV backbone and to improve the reliability of supply to the load center.

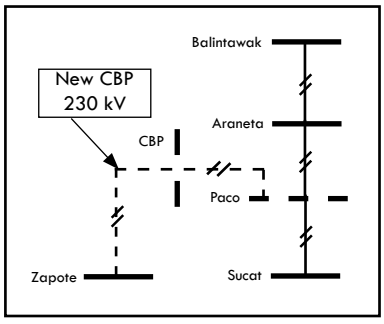
This new 500 kV substation can be well accommodated by the existing grid and could decongest San Jose substation. Also, it would make way for the reconfiguration of San Jose EHV from ring-bus to breaker-and-a-half as it could temporarily perform the function of San Jose during its shutdown for the reconfiguration activities. There are other important prerequisites, however, to mitigate the impact of San Jose shutdown which include the commissioning of Mariveles Coal Plant in Bataan. The reconfiguration of San Jose is necessary to improve the reliability of the substation and provide operational flexibility.

The Antipolo 500 kV substation will be mainly supplying Dolores substation (4-300 MVA capacity), new Antipolo 230 kV substation (up to 4-300 MVA capacity), and another new 230 kV substation for Metro Manila.

Table 6.2.2.3 New Antipolo 500 kV Substation

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Extensions from the bus-in point along San Jose-Tayabas	500 kV, ST-DC 4-795 MCM ACSR, 32 km
Substation	
Antipolo 500 kV	3-750 MVA 500/230 kV Transformers 11-500 kV PCB + Accessories 4-230 kV PCB + Accessories

6.2.2.4 New CBP 230 kV Substation and Associated Transmission Lines



This project aims to further relieve the loading of Zapote substation. While an additional transformer (4th unit) at Zapote will be installed, developing this new CBP substation (initially at 1-300 MVA capacity) is necessary to continuously provide reliable supply to the growing demand of Metro Manila. Single-circuit transmission lines from Zapote and

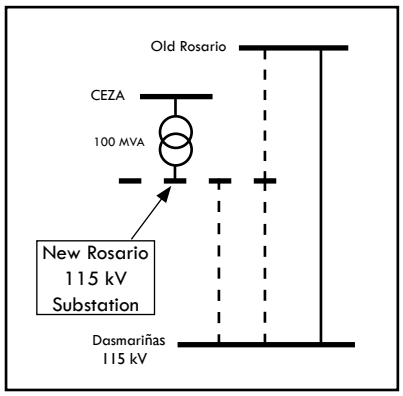
from Paco (Meralco's new substation) will be the supply lines for this new 230 kV substation. In the resulting transmission configuration, the reliability and power quality within Metro Manila during N-1 contingency will be improved.

As the new 230 kV transmission line will be traversing within Metro Manila and near the airport and the Manila Bay, underground cables were considered for this project.

Table 6.2.2.4 New CBP 230 kV Substation

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Zapote-CBP	230 kV, 6x1-core 2500mm^2 Cu XLPE, 8.5 km
CBP-Paco Line	230 kV, 6x1-core 2500mm^2 Cu XLPE, 5.4 km
Substation	
CBP 230 kV	1-300 MVA 230/115 kV Transformers 5-230 kV PCB + Accessories
Paco 230 kV	2-230 kV PCB + Accessories

6.2.2.5 New Rosario 115kV Substation



The New Rosario substation will provide additional capacity to serve the growing load of the customers in the area which include Cavite Ecozone. This new substation will also allow the termination of the new Dasmariñas-Rosario 115kV transmission facility as a double-circuit line.

Table 6.2.2.5 New Rosario 115kV Substation

PROJECT COMPONENT	DESCRIPTION
Substation	
New Rosario 115 kV Substation	100 MVA, 115/69 kV Transformer 5-115 kV PCB + Substation Accessories Fiber Optic Microwave Radio, Radio Comm System.

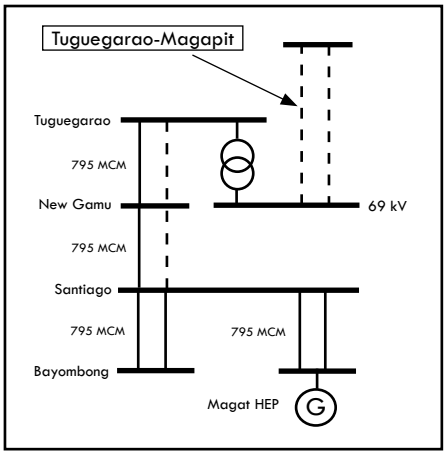
6.2.2.6 Northeastern Transmission Development

This project aims to improve the power quality and reliability of supply particularly in Cagayan which is presently being served by a very long 69 kV line. This project has two stages:

a. Installation of Capacitors at Magapit

This component involves the installation of 69 kV capacitors at Magapit as the immediate measure in addressing the voltage problems being experienced in the area. While the proposed extension of the transmission line from Tuguegarao to Magapit will improve the voltage profile in the area, its implementation will take years considering the 78 km long new right-of-way required. There are loads in the area being served by a very long 69 kV line (more than 100 km), thus the need to provide voltage support equipment.

b. 230 kV Transmission Line Extension from Tuguegarao to Magapit



This will improve the power quality and reliability of supply to the growing load in the area which includethe Cagayan Ecozone. Initially, this transmission line will be energized at 69 kV in order to avoid the immediate installation of a 230 kV substation in Magapit. This component is also part of the stage by stage development of the long-term to complete the northern Luzon 230 kV loop. Upon completion of the line, the installed capacitors will be installed in other areas requiring voltage support.

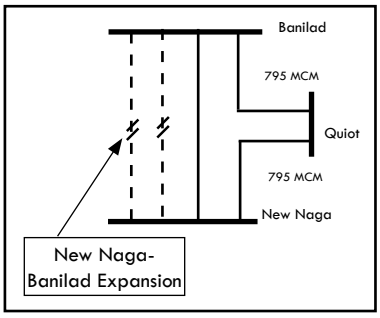
The Cagayan province, together with Ilocos Norte, has been identified to be rich in wind energy

Table 6.2.2.6 Northeastern Transmission Development

PROJECT COMPONENT	DESCRIPTION
Stage 1: Capacitors	
Magapit Substation	3-50 MVAR 69 kV Capacitors 3-69 kV PCB + Accessories
Stage 2: 230 kV Transmission Line Extension	
Transmission Line	
Tuguegarao-Magapit	ST-DC 1-795 MCM ACSR, 78 km (initially energized at 69 kV)
Substation	
New Magapit	2-69 kV PCB + Accessories
Tuguegarao	2-69 kV PCB + Accessories

potential. The initial information is the construction of a 26 MW wind farm in Pamplona, Cagayan. The new Tuguegarao-Magapit line would also provide a strong connection point for the new wind farms in the area.

6.2.2.7 New Naga-Banilad Transmission Line



By 2011, it is expected that the New Naga is already in place. The New Naga-Banilad transmission corridor is composed of a double circuit transmission line with 1-795 MCM conductor per circuit from the New Naga-Banilad; Quiot cutting-in at one circuit. It is evident that with the presence of a cut-in substation, there will be an unbalance loading between the two circuits. With two big coal plants, namely 3x82 MW CEDC and 2x100 MW KEPCO, coming in at Cebu injecting power to the New Naga substation, coupled with the increase in demand at the Cebu load center particularly at Banilad, Mandaue and Mactan substations, the New Naga-Banilad transmission corridor will be overloaded. The New Naga-Quiot line will carry the most power.

This project involves the construction of a new 138 kV double circuit transmission line utilizing two bundle of 795 MCM conductor per circuit from New Naga directly to Banilad. The new line will only be designed at 138 kV since a 230 kV transmission line from Compostela to New Naga will be the one to be adopted in the future configuration of Metro Cebu.

Table 6.2.3.7 New Naga-Banilad Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
New Naga-Banilad	138 kV, ST-DC, 2-795 MCM, 25 km
Substation	
Banilad Substation	2-138 kV PCBs + Accessories
New Naga Substation	5-138 kV PCBs + Accessories

6.2.2.8 Visayas Substation Expansion I

This project involves the acquisition of three (3) units of 50 MVA transformers. Each transformer will be installed in Ormoc Substation (Leyte), Talavera Substation (Cebu) and Kabankalan Substation (Negros). The additional substation capacities are expected to be completed by 2011 to accommodate the projected load growth.

Overall, the additional MVA capacity from this project will be 150 MVA.

Table 6.2.2.8 Visayas Substation Expansion I

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Ormoc (Leyte)	1-50 MVA, 138/69 kV	2011
Talavera (Cebu)	1-50 MVA, 138/69 kV	2011
Kabankalan (Negros)	1-50 MVA, 138/69 kV	2011

6.2.2.9 Mindanao Substation Expansion II

This project involves the acquisition of three (3) new transformer units with a total capacity of 200 MVA. The 50 MVA unit at Gen. Santos, which will be replaced by a 100 MVA will be transferred to Sangali.

Table 6.2.2.9 Mindanao Substation Expansion II

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Gen. Santos	1-100 MVA, 138/69 kV	2014
Sangali	1-50 MVA, 138/69 kV (transferred from Gen. Santos)	2014
Tagoloan	1-100 MVA, 138/69 kV	2014

6.2.3 Reliability & Power Quality Projects

6.2.3.1 Dasmariñas EHV Substation Expansion

This project involves the installation of additional capacity both in the 500 kV and 230 kV substations in Dasmariñas. The 600 MVA capacity expansion at the EHV substation is required in order to maintain the provision for N-1 contingency during maximum dispatch of Ilijan, QPPL and Pagbilao plants (including their generation capacity expansions). Similarly, the third 230/115 kV transformer in Dasmariñas will be required in order to maintain the provision for N-1 as the loads being served by the substation continue to grow.

This project also involves the replacement of the 230 kV circuit breakers at Dasmariñas as the resulting fault level at the substation would already exceed the interrupting capabilities of the existing breakers.

PROJECT NAME	PURPOSE	ETC
LUZON		
Dasmariñas EHV Substation Expansion	To maintain the provision for N-1 contingency	2012
La Trinidad-Calot Line Upgrading	To provide more reliable transmission line in La Trinidad and for the Hydroelectric plants in the area	2014
Luzon Substation Reliability I	To provide N-1 transformers at various substations	2012
Luzon Substation Reliability II	To provide N-1 transformers at various substations	2014
Luzon Voltage Improvement I	To maintain the voltage profile at various substaions within the prescribed limits	2012
Luzon Voltage Improvement III	To maintain the voltage profile at various substaions within the prescribed limits	2015
San Esteban-Laoag 230 kV T/L (Stage 1)	To strengthen the existing corridor to provide N-1 and to support the wind farm connections	2011
San Esteban-Laoag 230 kV T/L (Stage 2)		2013
San Jose-Angat 115 kV Line Upgrading	To improve the reliability of the existing corridor.	2012
San Manuel Substation Expansion	To provide N-1 and maintain the power quality in the area during contingency	2013
Santiago-Gamu-Tuguegarao 230 kV Line 2	To provide N-1 for the existing transmission corridor serving Isabela and Cagayan	2013
VISAYAS		
Amlan-Mabinay Transmission Line	To provide N-1 for the existing corridor	2012
Banilad-Mandaue-Mactan Transmission Line	To provide N-1 for the existing corridor	2015
Culasi-Sibalom T/L Upgrading	To provide N-1 for the existing corridor	2013
Mabinay-Kabankalan-Bacolod Transmission Line	To provide N-1 for the existing corridor	2013
Ormoc-Babatngon Transmission Line	To provide N-1 for the existing corridor	2013
Ormoc-Maasin Transmission Line	To provide N-1 for the existing corridor	2013
Sta. Rita-Quinapundan Transmission Line Upgrading	To provide N-1 for the existing corridor	2014
Visayas Substation Reliability I	To provide N-1 transformers at various substations	2013
Visayas Substation Reliability II	To provide N-1 transformers at various substations	2014
Visayas Substation Reliability III	To provide N-1 transformers at various substations	2015
MINDANAO		
Agus 6-Aurora 138 kV Transmission Line	To provide security and power quality to North Western Mindanao	2015
Pulangi-Kibawe 138 kV Transmission Line (Line 3)	To maintain reliability in the southern Mindanao area as additional contingency in case of outage of Agus 2-Kibawe	2013
Mindanao Substation Reliability I	To provide N-1 transformers at various substations	2013
Mindanao Substation Reliability II	To provide N-1 transformers at various substations	2014
Mindanao Substation Reliability III	To provide N-1 transformers at various substations	2015

Table 6.2.3.1 Dasmariñas EHV Substation Expansion

PROJECT COMPONENT	DESCRIPTION
Substation	
Dasmariñas	1-600 MVA 500/230 kV Transformer Bank 2-500 kV PCB + Accessories 14-230 kV PCB + Accessories
	1-300 MVA 230/115 kV Transformer 1-230 kV PCB + Accessories 2-115 kV PCB + Accessories

6.2.3.2 La Trinidad-Calot Line Upgrading

This project is intended to upgrade existing 69 kV woodpole La Trinidad-Calot line (single-circuit) which has already surpassed its economic life, having been constructed in 1956. The La Trinidad-Calot line was classified by the ERC as a transmission asset. The project will provide N-1 contingency for the connected loads and the hydroelectric plants in the area.

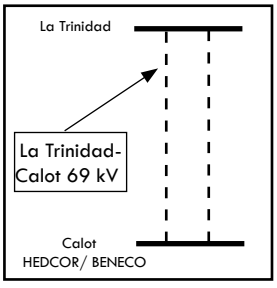


Table 6.2.3.2 La Trinidad-Calot Line Upgrading

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
La Trinidad-Calot	69 kV , ST-DC, 1-336.4 MCM, 38 km
Substation	
La Trinidad	4-69 kV PCB

6.2.3.3 Luzon Substation Reliability I

This project involves the installation of a total of 320 MVA transformer capacity to provide redundancy to various substations with single transformer unit only. The transformers for Labo and San Esteban are new units while the rest will be coming from the replaced transformers in other substations.

Table 6.2.3.3 Luzon Substation Reliability I

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER
Tayabas	1-100 MVA, 230/115 kV
Botolan	1-50 MVA, 230/69 kV
Gumaca	1-50 MVA, 230/69 kV
Labo	1-50 MVA, 230/69 kV
San Esteban	1-50 MVA, 115/69 kV
Currimao	1-20 MVA, 115/69 kV

6.2.3.4 Luzon Substation Reliability II

This project involves the installation of additional/transferred transformers to various substations to provide N-1 contingency. Due to the low projected load at Bacnotan, the existing 100 MVA will be replaced with 2-50 MVA (one new unit and one from the replaced unit in Labrador). This would be sufficient for the load of Bacnotan and at the same time would provide N-1 for the substation. The 100 MVA transformer will then be transferred to Bauang where this capacity could be fully utilized. At Gamu, the additional 40 MVA transformer will be coming from Santiago.

Table 6.2.3.4 Luzon Substation Reliability II

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER
Bacnotan	1-50 MVA, 230/69 kV
	1-50 MVA, 230/69 kV
Bauang	1-100 MVA, 230/69 kV
Cabanatuan	1-200 MVA, 230/69 kV
Hermosa	1-200 MVA, 230/69 kV
Gamu	1-40 MVA, 230/69 kV
Naga	1-100 MVA, 230/69 kV

6.2.3.5 Luzon Voltage Improvement I

Under the Final Determination, the capacitors under this project have been classified as Sub-transmission Asset (STA). The ERC has not responded yet to the motion seeking clarification on the decision. Grid users, and not a particular customer only, stand to benefit from the installation of the capacitor banks at the high voltage buses of various substations in Luzon to maintain the Grid Code's standard voltage level. In the absence of clarification from ERC on the matter, the project is being re-filed with the hope that the projects will be classified as Transmission Assets.

The project involves the installation of shunt reactors in Naga substation and capacitor banks in four (4) substations, namely: Araneta, Duhat, Sucat and Cabanatuan. The shunt reactors in Naga aim to address the overvoltage problem being experienced in the area during off-peak load condition with Tiwi plant at minimum generation. Also, the reactors will address the overvoltage during the switching of the filters in Naga HVDC Station. The capacitor components of this project, on the other hand, will improve the voltage profile during normal conditions and address the potential undervoltages during N-1 contingency conditions. Space availability is a major concern for Araneta and Sucat. In Duhat, a separate adjacent lot will be acquired. NGCP is also considering a bigger lot for the site of a possible 500 kV Duhat drawdown substation. Naga and Cabanatuan have available space to accommodate the installation of the required voltage support equipment.

Table 6.2.3.5 Luzon Voltage Improvement I

PROJECT COMPONENT	DESCRIPTION
Naga	2-25 MVAR 230 kV Reactor
Araneta	1-100 MVAR 230 kV Capacitor
Duhat	3-50 MVAR 230 kV Capacitor
Sucat	2-50 MVAR 115 kV Capacitor
Cabanatuan	1-70 MVAR 230 kV Capacitor

6.2.3.6 Luzon Voltage Improvement III

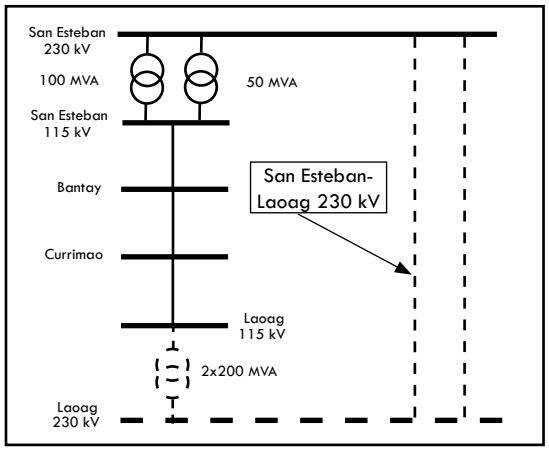
This project involves the installation of a total of 327.5 MVAR capacitors needed at various substations to keep the voltage profile within limits both during normal and N-1 contingency conditions.

Table 6.2.3.6 Luzon Voltage Improvement III

PROJECT COMPONENT	DESCRIPTION
Binan	1-100 MVAR 230 kV Capacitor
Dasmarinas	1-100 MVAR 230 kV Capacitor
Cabanatuan	1-20 MVAR 230 kV Capacitor
Antipolo	1-100 MVAR 230 kV Capacitor
Itogon	1-7.5 MVAR 69 kV Capacitor

6.2.3.7 San Esteban- Laoag 230 kV Transmission Line

This project involves the construction of a double-circuit line from San Esteban to Laoag



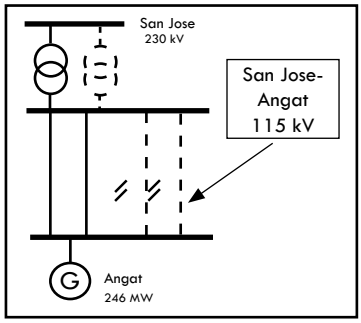
Substation. The initial plan was to energize the line at 115 kV but due to increasing wind power capacity that will connect to Laoag Substation and the expansion limitation of San Esteban 115 kV Substation, the line will be energized outright at 230 kV. Currently, there is only one circuit supplying Bantay (from San Esteban), Currimao (from Bantay) and Laoag (from Currimao). Therefore, any outage of line between these stations would result in interruption of power at the receiving stations.

Moreover, this project will strengthen the existing corridor as Ilocos has been identified as one of the areas with high potential for wind power generation. Aside from the existing wind farm (33 MW with additional 8.25 MW capacity) in the area, a total of 389 MW wind generation capacity will be connecting to Laoag within 2010 to 2013.

Table 6.2.3.7 San Esteban-Laoag 230kV T/L

PROJECT COMPONENT	DESCRIPTION
Stage 1: Associated with Wind Farm Projects	
Transmission Line	
Diversion of Currimao 115 kV Line @ Laoag Substation Expansion Area	SP-SC, 1-795 MCM, 0.50 km
Substation	
Laoag S/S Expansion (Reconfigure)	7 – 115 kV PCB + Accessories 1 x 7.5 MVAR, 115 kV Capacitor Bank
Stage 2: 230 kV Transmission System	
Transmission Line	
San Esteban-Laoag 230 kV T/L	ST-DC, 1-795 MCM, 120 km
Substation	
New Laoag Substation	6-230 kV PCB + Accessories 2-115 kV PCB + Accessories 2 x 200 MVA, 230/115-13.8 kV Transformer
San Esteban Substation Expansion	5 x 230 kV PCB + Accessories

6.2.3.8 San Jose-Angat 115 kV Line Upgrading



This project aims to ensure the reliability of the existing 115 kV transmission lines connecting Angat HEP to the grid. San Jose-Angat Lines 1 & 2 were built in 1967 while Line 3 (woodpole) was built in 1960. The proposed project is to construct a new double-circuit line using the existing right-of-way of San Jose-Angat Line 3. The capacity already anticipates the future retirement of Lines 1 & 2 which will be 50 years old already by 2017. Since there are customers connected to the existing lines through tap connection, they will be served by the existing Lines 1 and 2 (radially from San Jose substation) upon completion of the upgrading project. A 115 kV switching station along the upgraded line will be necessary later to provide a connection point for the customers.

Table 6.2.3.8 San Jose-Angat 115 kV Line Upgrading

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
San Jose-Angat	115 kV ST-DC 2-795 MCM, 18 km
Substation	
San Jose	2-115 kV PCB + Accessories

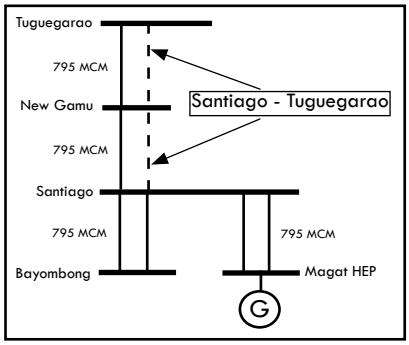
6.2.3.9 San Manuel Substation Expansion

This project involves the addition of a second transformer at San Manuel EHV and a second tie line between the old and the new San Manuel substation. During minimum dispatch of hydro plants in the area, this project will address the overloading of the tie-line and undervoltages in the area during peak load and N-1 condition.

Table 6.2.3.9 San Manuel Substation Expansion

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Old San Manuel-New San Manuel Tie Line 2	230 kV, SP-DC/SP-SC, 2-410mm^2 TACSR, 0.5 km
Old San Manuel-New San Manuel Tie Line 1 (Reconductoring)	230 kV, 2-410mm^2 TACSR, 0.5 km
Substation	
San Manuel EHV	1-600 MVA 500/230 kV Transformer 2-500 kV PCB + Accessories 4-230 kV PCB + Accessories

6.2.3.10 Santiago-Gamu-Tuguegarao 230 kV Line 2

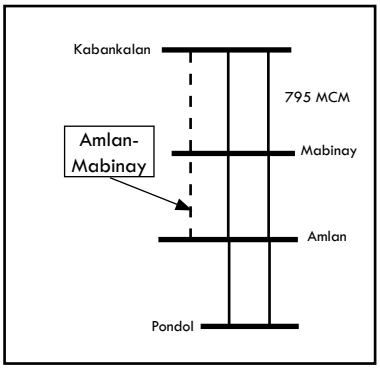


This project involves the installation of a second circuit from Santiago to Tuguegarao substations. This new line will provide reliability as tripping of the existing Santiago-Gamu and Gamu-Tuguegarao 230 kV lines will no longer result in the isolation of the customers at the load end substations in the area.

Table 6.2.3.10
Santiago-Gamu-Tuguegarao 230 kV Line 2

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Santiago-Tuguegarao Line 2	230 kV, ST-SC, 1-795 MCM ACSR, 118 km
Substation	
Santiago	2-230 kV PCB + Accessories
Gamu	4-230 kV PCB + Accessories
Tuguegarao	1-230 kV PCB + Accessories

6.2.3.11 Amlan-Mabinay Transmission Line



This projects aims to provide N-1 provision to the Negros transmission backbone, which is part of the Visayas transmission backbone, during low generation at Panay island.

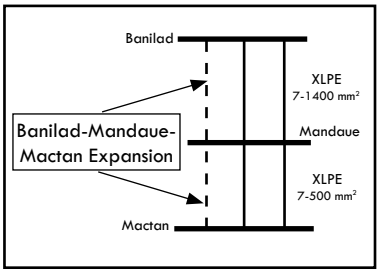
The existing Amlan-Mabinay 138 kV transmission line is composed of a double circuit transmission line with 1-795 MCM conductor per circuit. By 2011, tripping of one circuit will cause the remaining circuit to be overloaded.

In order to comply with the N-1 provision of the Grid Code and to improve the reliability of the said line, this project, which consists of the construction of a third circuit from Amlan substation to Mabinay substation, is needed. This will also allow better voltage regulation to the Northern part of Negros which currently is experiencing low voltage problems. The new transmission line will have a double circuit structure but only one circuit will be strung. This will also be designed at 230 kV but will be initially energized at 138 kV. This is in preparation to the upgrading of the main transmission backbone of Visayas to 230 kV, as the Amlan-Mabinay transmission corridor is part of the said backbone.

Table 6.2.3.11 Amlan-Mabinay Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Amlan-Mabinay	230 kV ST-DC1, 1-795 MCM, 46 km
Substation	
Amlan Substation	2-138 kV PCB + Accessories
Mabinay Substation	1-138 kV PCB + Accessories

6.2.3.12 Banilad-Mandaue-Mactan Transmission Line



The existing Banilad-Mandaue-Mactan transmission line is the transmission corridor carrying the power supply to the two major substations, namely Mandaue and Mactan, which serve the load center of Metro Cebu. Banilad-Mandaue transmission line is a double circuit line utilizing 3-1400 mm^2 XLPE underground cable per circuit. On the other hand, Mandaue-Mactan is a double circuit utilizing 3-500 mm^2 XLPE underground cable per circuit. This transmission corridor is expected to be overloaded beyond 2010 with the Banilad-Mandaue 138 kV line carrying a heavier power flow compared to the Mandaue-Mactan 138 kV line

This project involves the construction of a third circuit utilizing the same conductor as the existing cables to comply with the N-1 provision of the Grid Code. With this project, the reliability of

Table 6.2.3.12 Banilad-Mandaue-Mactan T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Banilad-Mandaue	138 kV , SC, 3-1400 mm^2, 7.2 km
Mandaue-Mactan	138 kV , SC, 3-500 mm^2, 1.5 km
Substation	
Mandaue Substation	1-138 kV PCB + Accessories
Mactan Substation	1-138 kV PCB + Accessories

power supply to Mandaue and Mactan load center substations will be improved.

6.2.3.13 Culasi-Sibalom Transmission Line Upgrading

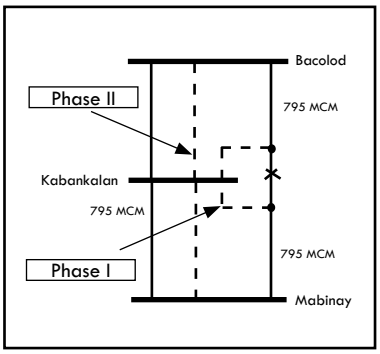
NGCP is considering the 138 kV looping of the Panay Island in the long term. The ongoing Northern Panay Backbone Project (Panitan-Nabas 138 kV line) is due for completion next year (2010), while Southern Panay Backbone Project (Sta. Barbara-Sibalom 138 kV line) is expected to be completed by 2011. In addition, the Eastern Panay Backbone Project (Sara-New San Juan and Sara-Panitan 138 kV lines) will be filed in the Third Regulatory Period.

In support of a long-term transmission plan for Panay, the design of Sibalom-Culasi line will be upgraded to 138 kV. This is in preparation for the Western Panay Backbone in the future which will provide a 138 kV backbone on the Sibalom-Culasi-Nabas corridor.

Table 6.2.3.13 Culasi-Sibalom 138 kV T/L Upgrading

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Sibalom Substation–Culasi Load-End Substation	138 kV , SP-SC, 1-795 MCM, 86 km
Substation	
Sibalom Substation (Expansion)	2-69 kV PCB + Accessories
Culasi Load End Substation	1-69 kV ABS

6.2.3.14 Mabinay-Kabankalan-Bacolod Transmission Line



This projects aims to provide N-1 provision to the Negros transmission backbone, which is part of the Visayas transmission backbone, during low generation at Panay island.

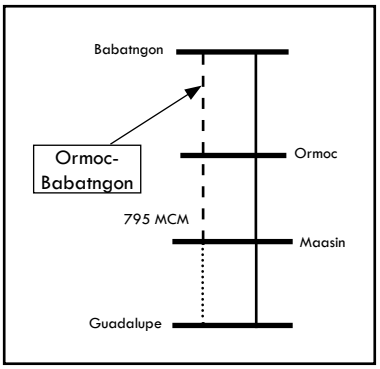
The existing Mabinay-Kabankalan-Bacolod 138 kV transmission line is composed of a double circuit transmission line with 1-795 MCM conductor per circuit but only that of Kabankalan is cut-in at one of the circuits. The normal power flow is from Mabinay, where the power from Palinpinon geothermal plants are received, to Bacolod which is the load center in Negros. Tripping of Mabinay-Kabankalan line will cause the Mabinay-Bacolod line to be overloaded. On the other hand, tripping of the Mabinay-Bacolod line will result to the overloading of the Mabinay-Kabankalan line. The N-1 loading of one circuit is higher compared to the other circuit due to the cut-in connection of the Kabankalan substation which causes unbalance loading between the two circuits.

This project involves reconfiguration of the Kabankalan connection from cut-in to bus-in and the construction of a third circuit to comply with the N-1 provision of the Grid Code and to improve the reliability of the said line. This will also allow better voltage regulation to the Northern part of Negros which is currently experiencing low voltage problems. As part of the continuation of the Amlan-Mabinay transmission line project, the third circuit will also utilize double circuit structures but single strung only. This will be designed at 230 kV but will initially be energized at 138 kV in preparation to the upgrading of the main transmission backbone of the Visayas grid to 230 kV.

Table 6.2.3.14 Mabinay-Kabankalan-Bacolod Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Mabinay-Kabankalan-Bacolod	230 kV, ST-DC1, 1-795 MCM, 103.6 km
Kabankalan Bus-in Line	230 kV ST-DC, 1-795 MCM, 0.2 km
Substation	
Mabinay Substation	2-138 kV PCBs + Accessories
Bacolod Substation	1-138 kV PCB + Accessories

6.2.3.15 Ormoc-Babatngon Transmission Line



The Ormoc-Babatngon 138 kV line is one of the two 138 kV lines that compose the Leyte-Samar transmission corridor, the Babatngon-Wright 138 kV line being the other one. The Babatngon-Wright 138 kV line is a double circuit line while the Ormoc-Babatngon 138 kV line is only single circuit. Thus outage of the Ormoc-Babatngon line will result to a blackout in Samar.

To prevent this and at the same time comply with the N-1 provision of the Grid Code, the

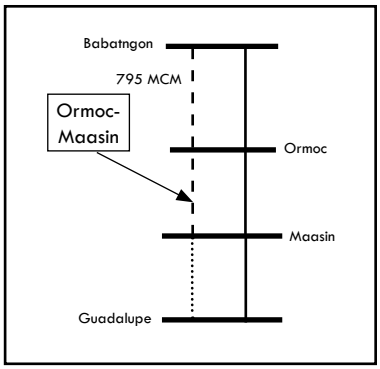
Ormoc-Babatngon 138 kV line has to be expanded to a double-circuit line.

Table 6.2.3.15 Ormoc-Babatngon Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Ormoc-Babatngon	138 kV, ST-DC1, 1-795 MCM, 78.54 km
Substation	
Ormoc Substation	1-138 kV PCB + Accessories
Babatngon Substation	1-138 kV PCB + Accessories

6.2.3.16 Ormoc-Maasin Transmission Line

The Ormoc-Maasin 138 kV line is a segment of the Leyte-Bohol transmission corridor. All the lines along this corridor, including the Ormoc-Maasin 138 kV line, are single circuit only. Outage of the Ormoc-Maasin 138 kV line will result to power outage in Bohol as well as the southern Leyte.



To prevent this and at the same time comply with the N-1 provision of the Grid Code, the Ormoc-Maasin 138 kV line has to be expanded to a double-circuit line. This will be the initial step in providing reliable power supply to Bohol.

Table 6.2.3.16 Ormoc-Maasin Transmission Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Ormoc-Maasin	138 kV, ST-DC1, 1-795 MCM, 113.97 km
Substation	
Ormoc Substation	1-138 kV PCB + Accessories
Maasin Substation	3-138 kV PCB + Accessories

6.2.3.17 Sta. Rita-Quinapundan Transmission Line Upgrading

Under the ERC Decision, the implementation of the proposed line will result in the reclassification ofWright-Taft-Borongan-Quinapundan (Buenavista) as Transmission Assets. With this reclassification, and due to the length of the line, NGCP decided to upgrade the design of the line to 138 kV and initially energize it at 69 kV. The Wright-Taft corridor may also need to be upgraded to 138 kV in the future. NGCP, consistent with its vision of providing robust transmission facilities throughout the country, has taken this initiative to provide the province access to reliable electricity infrastructures to promote economic activities and thus spur development in the province.

Table 6.2.3.17
Sta. Rita-Quinapundan Transmission Line Upgrading

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Sta. Rita Substation–Quinapundan Substation	138 kV, ST-SC, 1-795 MCM, 103 km
Substation	
Sta. Rita Substation	2-69 kV PCB + Accessories
Quinapundan Substation	2-69 kV ABS

6.2.3.18 Visayas Substation Reliability I

This project entails the installation of 700 MVA substation capacity to address overloading of various substations during N-1. For Talavera, the existing 30 MVA transformer will be replaced by 50 MVA.

Table 6.2.3.18 Visayas Substation Reliability I

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Compostela (Cebu)	1-150 MVA, 230/138 kV	2011
Ormoc (Leyte)	1-150 MVA, 230/138 kV	2013
Amlan (Negros)	1-50 MVA, 138/69 kV	2013
Bacolod (Negros)	1-100 MVA, 138/69 kV	2013
Cadiz (Negros)	1-50 MVA, 138/69 kV	2013
Babatngon (Samar)	1-50 MVA, 138/69 kV	2013
Maasin (Leyte)	1-50 MVA, 138/69 kV	2013
Suba (Leyte)	1-50 MVA, 138/69 kV	2013
Talavera (Cebu)	1-50 MVA, 138/69 kV	2013

6.2.3.19 Visayas Substation Reliability II

This project involves the installation of additional transformers to various substations to address overloading during N-1. For Sta. Barbara

Table 6.2.3.19 Visayas Substation Reliability II

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Mandaue (Cebu)	1-100 MVA, 138/69 kV	2014
Mactan (Cebu)	1-100 MVA, 138/69 kV	2014
Ormoc (Leyte)	1-50 MVA, 138/69 kV	2014
Corella (Bohol)	1-100 MVA, 138/69 kV	2014
New Naga (Cebu)	1-50 MVA, 138/69 kV	2014
Calbayog (Samar)	1-50 MVA, 138/69 kV	2014
Sta. Barbara (Panay)	2-50 MVA, 138/69 kV	2014
Compostela (Cebu)	1-50 MVA, 138/69 kV	2014
Panitan (Panay)	2-50 MVA, 138/69 kV	2014
Kabankalan (Negros)	1-50 MVA, 138/69 kV	2014
Bagolibas (Samar)	1-50 MVA, 138/69 kV	2014

Panitan and Kabankalan, the existing 30 MVA will be replaced by 50 MVA, respectively.

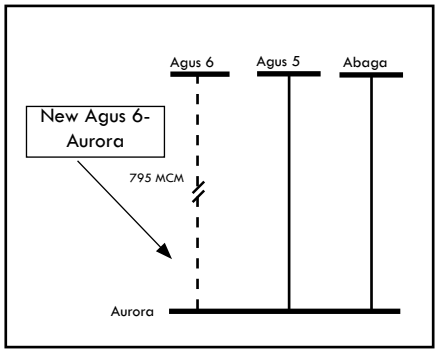
6.2.3.20 Visayas Substation Reliability III

This project involves the installation of 310 MVA additional substation capacity to various substations to address overloading during N-1.

Table 6.2.3.20 Visayas Substation Reliability III

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Ubay (Bohol)	1-100 MVA, 138/69 kV	2015
Quiot (Cebu)	1-100 MVA, 138/69 kV	2015
Sibalom (Panay)	1-50 MVA, 138/69 kV	2015
Mabinay (Negros)	1-30 MVA, 138/69 kV	2015
Isabel (Samar)	1-30 MVA, 138/69 kV	2015

6.2.3.21 Agus 6-Aurora 138 kV Transmisslon Line

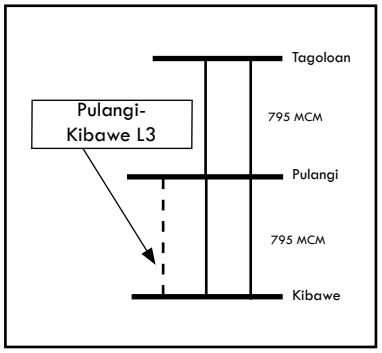


This project involves the installation of another 795 MCM conductor in a double circuit configuration from Agus Complex to Aurora Substation. It will maintain the voltage level at North Western Mindanao during outage of one of the circuits of the existing corridor. It will also enhance power security in the area since the existing facility has experienced bombings in the past.

Table 6.2.3.21 Agus 6-Aurora 138 kV T/L

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Agus 6-Aurora	138 kV, ST-DC, 1-795 MCM, 101 km
Substation	
Agus 6 (Expansion)	4-138 kV PCB + accessories
Aurora (Expansion)	4-138 kV PCB + accessories

6.2.3.22 Pulangi-Kibawe 138 kV Transmission Line (Line 3)



This project will address the overloading of the existing Pulangi-Kibawe transmission line. This project involves the installation of the third circuit of the said line. The continuous outage of the Agus 2-Kibawe line causes Pulangi-Kibawe line to lose its N-1 capability. The outage of 2 transmission lines in the north eastern corridor will overload the existing Pulangi-Kibawe line.

Table 6.2.3.22 Pulangi-Kibawe 138 kV T/L (Line 3)

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Pulangi-Kibawe	138 kV, ST-SC, 1-795 MCM, 21 km
Substation	
Pulangi Substation	1-138 kV PCB + Accessories
Kibawe Substation	3-138 kV PCBs + Accessories

6.2.3.23 Mindanao Substation Reliability I

This project involves the installation of additional 325 MVA substation capacity to provide redundancy to various substations mostly with single transformer. In the case of Aurora, the additional transformer will address the overloading of existing units during N-1.

Table 6.2.3.23 Mindanao Substation Reliability I

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Nuling	1-75 MVA 138/69-13.8 kV /1	2013
Tindalo	1-100 MVA 138/69-13.8 kV /1	2013
Aplaya	1-100 MVA 138/69-13.8 kV	2013
Bunawan	1-50 MVA 138/69-13.8 kV	2013
Aurora	1-100 MVA 138/69-13.8 kV	2013
Lugait	1-75 MVA 138/69-13.8 kV	2013

/1 Proposed replacement for Mindanao Mobile Transformer

6.2.3.24 Mindanao Substation Reliability II

This project involves the installation of additional 400 MVA substation capacity to provide

redundancy to various substations with single transformer and address overloading during N-1.

Table 6.2.3.24 Mindanao Substation Reliability II

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Pitogo	1-100 MVA 138/69-13.8 kV	2014
Polanco	1-75 MVA 138/69-13.8 kV	2014
Davao	1-150 MVA 138/69-13.8 kV /1	2014
Maramag	1-75 MVA 138/69-13.8 kV	2014
Kidapawan	1-50 MVA 138/69-13.8 kV (transferred from Davao)	2014

/1 The 1-150 MVA transformer will replace the existing 1-50 MVA, which will be transferred to Kidapawan substation.

6.2.3.25 Mindanao Substation Reliability III

This project involves the installation of additional 350 MVA substation capacity to provide redundancy to various substations with single transformer.

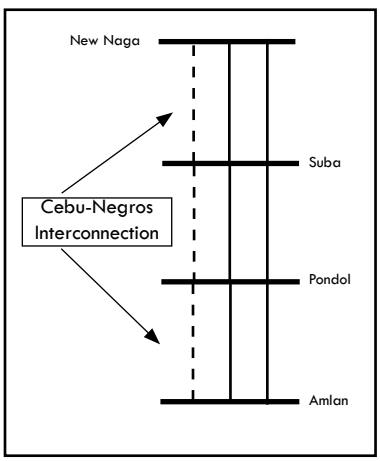
Table 6.2.3.25 Mindanao Substation Reliability III

SUBSTATION	PROPOSED ADDITIONAL TRANSFORMER	Expected Time of Completion
Abaga	1-100 MVA 138/69-13.8 kV	2015
Agus 6	1-100 MVA 138/69-13.8 kV	2015
Nasipit	1-50 MVA 138/69-13.8 kV	2015
San Francisco	1-50 MVA 138/69-13.8 kV	2015
Bislig	1-50 MVA 138/69-13.8 kV	2015

PROJECT NAME	Expected Time of Completion
Cebu-Negros Interconnection Uprating	2013
Negros-Panay Interconnection Uprating (Phase 2)	2013

6.2.4 Island Interconnection

6.2.4.1 Cebu-Negros Interconnection



Uprating

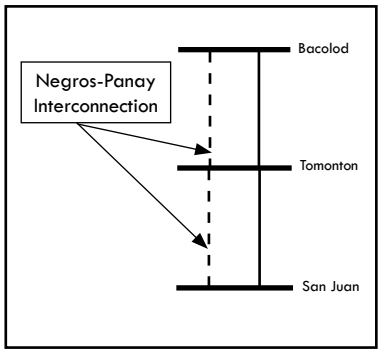
This project involves the installation of the third circuit of the Cebu-Negros interconnection utilizing a 300 mm^2 cable designed at 230 kV but

Table 6.2.4.1 Cebu-Negros Interconnection Uprating

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Suba-Pondol	230 kV, SC, 3-300mm^2, 18 km /1
Pondol-Amlan	230 kV, ST-DC1, 1-795 MCM, 3 km /1

/1 Initially energized at 138 kV

will initially be energized at 138 kV. This is needed once the WESM/ spot market is already in place in Visayas and the three major incoming coal plants namely: KEPCO, CEDC and PEDC, are already commissioned. This will address the constraints in the Cebu-Negros-Panay transmission corridor.



6.2.4.2 Negros-Panay Interconnection Uprating (Phase 2)

This project involves the installation of the second circuit of the Negros-Panay interconnection utilizing a 300 mm^2 cable. This is needed once the WESM/ spot market is already in place in Visayas and the three major incoming coal plants namely: KEPCO, CEDC and PEDC, are already commissioned. This will address the constraints in the Cebu-Negros-Panay transmission corridor.

Table 6.2.4.2 Negros-Panay Interconnection Uprating (Phase 2)

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Bacolod-Tomonton	138 kV, ST-DC1, 1-795 MCM, 30 km
Tomonton-San Juan	138 kV, SC, 3-300mm^2, 18 km

7. Proposed Projects Beyond 2015 (Indicative Projects)

7 Proposed Projects Beyond 2015 (Indicative Projects)

This section identifies network augmentation, herein referred to as "Indicative Projects" that are needed for the period 2016 and beyond. However, portions of the disbursements for the projects will be filed in the Third Regulatory Period.

These Indicative Projects are grouped as follows:

(1) load growth-driven;
(2) in compliance with power quality and reliability standards; and
(3) island interconnection.

7.1 Load Growth-Driven Projects

These projects involve the reinforcements needed by the transmission network due to load growth. They are considered indicative due to higher uncertainty of forecast in the latter years of the planning horizon and the uncertainty of the actual location of indicative power plants.

Table 7.1 Load Growth-Driven Projects

PROJECT NAME	Expected Time of Completion	PURPOSE
Cut-in to Fort Bonifacio Substation	2016	This project is being proposed to accommodate the anticipated new delivery point of Meralco inside Fort Bonifacio. The Bases Conversion Development Authority requires underground cable within the Fort Bonifacio area which may necessitate NGCP's compliance with this requirement depending on the demand for new delivery substation in the area.
New Balara 230 kV Substation	2016	This substation will be served by a new double-circuit 230 kV line from Antipolo 230 kV substation. It aims to provide a new drawdown substation to meet the load growth in Metro Manila and address the overloading of Balintawak.
Luzon Substation Expansion Project V	2016	It involves the installation of additional transformer for Batangas and Antipolo substations needed to meet the increasing demand.

7.2 Power Quality and Reliability Projects

The proposed projects under this section will involve the installation of necessary equipment in order to improve the power quality at the delivery points and also provide for N-1 contingency. These include, among others, capacitor/reactor installation for reactive support and voltage improvement, provision of new switching station and provision for additional lines/transformers for N-1 requirement.

Table 7.2 Power Quality and Reliability Projects

PROJECT NAME	Expected Time of Completion	PURPOSE
Luzon Substation Reliability III	2017	This involves the installation of additional transformers at various substations in order to maintain the provision for N-1 as required by the Grid Code.
Luzon Voltage Improvement IV	2016	This includes the installation of reactive support equipment at various substations to keep the voltage profile within the prescribed limits both during normal and N-1 conditions.
Luzon Voltage Improvement V	2017	This includes the installation of reactive support equipment at various substations to keep the voltage profile within the prescribed limits both during normal and N-1 conditions.
Visayas Voltage Improvement I	2016	To maintain the voltage level at various substations within the Grid Code prescribed limits by installing capacitors

7.3 Island Interconnection

The increase in the demand in each of the Visayas island must be met with corresponding installation of additional generation capacity within the island, otherwise the upgrade of existing submarine cables may be considered an option.

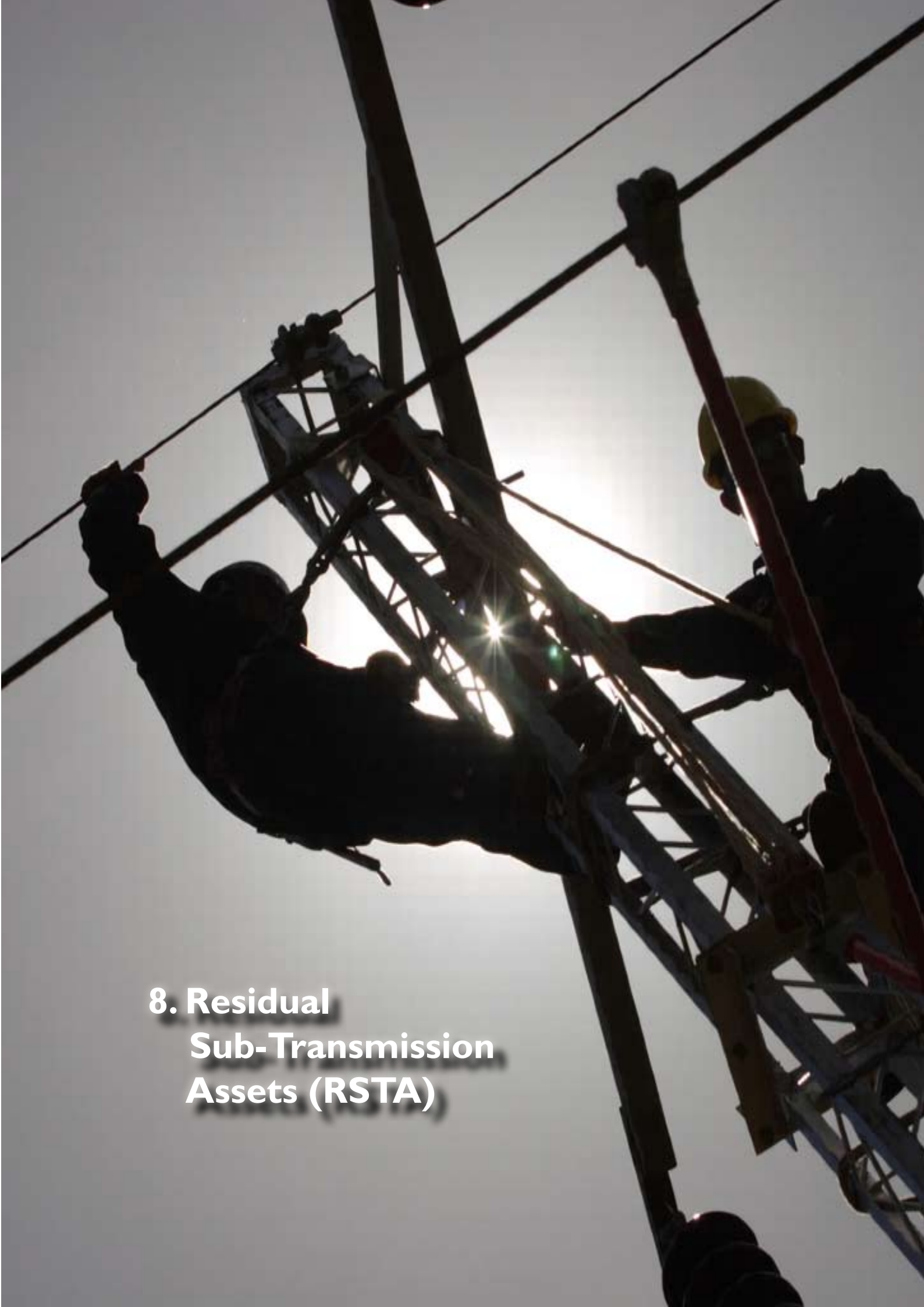


NGCP has identified the need to install additional circuit for the existing island interconnection beyond 2015, the earliest by 2016. For this reason, the Leyte-Cebu interconnection uprating will be filed as small capex in the Third Regulatory Period while the Leyte-Bohol interconnection uprating will be implemented in the fourth Regulatory Period. These upratings are needed to meet load growth and accommodate increased power transfer between the islands.

Future generation developments may change the timing of the need for the said uprating.

Table 7.3 Island Interconnection

PROJECT NAME	Expected Time of Completion
Leyte-Bohol Interconnection Uprating	2018
Leyte-Cebu Interconnection Uprating	2016
Leyte-Mindanao Interconnection	2018



8. Residual Sub-Transmission Assets (RSTA)

8 Residual Sub-transmission Assets (RSTA)

ERC Resolution No. 18 Series of 2009 provides that residual sub-transmission assets which have not been sold or disposed by 31 December 2010 shall remain as NGCP's assets. It should be noted that in the Second Regulatory Period, the ERC did not expect the financing anymore of sub-transmission projects in 3 to 4 years time. The ERC further opined that the investments needed to maintain, upgrade and expand these sub-transmission assets shall be solely borne by connected customers, who shall eventually acquire the said assets. ERC expected that projects associated with sub-transmission facilities shall already be undertaken by the concerned customers requiring such installations and upgrading.

Without any approved capex allocated for sub-transmission facilities, new investments on rehabilitation and upgrading activities depended on commercial arrangement with the customers.

The table below shows the sub-transmission assets that must be expanded by NGCP in case they are not divested within the said timeframe.

Table 8.1 Sub-transmission Expansion/Upgrading

PROJECT NAME	COMPONENT	ETC	DESCRIPTION
Kalayaan 2-69 kV Gas Circuit Breaker(GCB) and 69 kV Sub-T/L	2-69 kV GCB, 2.0 km T/L	2013	To provide additional line capacity and separate the supply line for QUEZELCO and FLECO
Daraga-Ligao 69 kV Line Upgrading	30 km T/L	2013	To improve the power quality in the area and reliability for the existing wood-pole line (built in 1977)
Daraga-Legaspi 69 kV Upgrading	6 km T/L	2013	To increase the capacity and improve the reliability for the existing wood-pole line (built in 1978)

9. Appendices

9. Appendices

Appendix 1 – Grid Code Performance Standard

Majority of the projects in the TDP are intended to meet load growth and accommodate generation capacity addition. Assumptions are simplified on the type of loads due to uncertainty of the nature of loads that will be connected in the future. For this reason, all performance standard requirements could not all be addressed by the projects in the TDP but are hopefully addressed in the Grid Impact Study (while the customer is applying for a connection), by the System Operator (in real-time), or by the local operation and maintenance personnel. If no project is proposed for the improvement of some of the performance standards, it is not due to oversight, but more on the relevance of a project in the majority of the situations. Table A1.1 summarizes the Grid Code requirements on power quality and how NGCP intends to satisfy them.

A1.1 Voltage Variation

The Grid Code requires that the long duration voltage variations be greater than 95 percent but less than 105 percent of the nominal voltage at any connection point during normal conditions (Section 3.2.3.4). The approach used to satisfy this requirement is to improve the voltage at the substations using capacitors and reactors (for inclusion in the TDP) so that it falls within this range, after the transformer taps have been adjusted and reached its limit. Generator terminal voltages are set at 1 per unit (p.u.) and MVAR output is allowed to vary according to the requirements of the Grid Code.

A1.2 System Loss Standard

The system loss of the transmission system is highly dependent on the generation dispatch. If generating plants output farthest from the load

Table A1.1 Grid Code PQ Standards and the TDP

GRID CODE SECTION	REQUIREMENTS ADDRESSED BY TDP?	REMARKS
3.2.2 Frequency Variations	Partly	The ability of the TDP to address the constraints provides the adequate corridor for spinning reserves to be made available where it is needed, resulting in the balance of generation and load. This is also addressed in real-time by the System Operator by securing sufficient load following, frequency regulation and spinning reserves.
3.2.3 Voltage Variations	Yes	Please refer to Section A1.1 Voltage Variation
3.2.4 Harmonics	No	The compensation requirements for loads that generate harmonics are determined in the Grid Impact Study that is conducted during the application of the customer for a connection. The provision for the compensators then becomes a pre-requisite for allowing the connection.
3.2.5 Voltage Unbalance	No	For planning purposes, all loads and transmission lines are assumed to be balanced. Voltage unbalance will be dealt in real-time.
3.2.6 Voltage Fluctuation and Flicker Severity	No	The compensation requirements for loads that cause voltage fluctuation and flicker are determined in the Grid Impact Study that is conducted during the application of the customer for a connection. The provision for the compensators then becomes a pre-requisite for allowing the connection.
3.2.7 Transient Voltage Variations	No	Problems related to transient voltage variations are addressed in the design stage (for expansion projects).
3.3 Reliability Standards	Partly (projects for N-1 provision)	Reliability Standards, as described in the Grid Code, are based on the total number and duration of sustained power interruption. Improvements in this aspect may be achieved not only through infrastructure projects but by some other means such as proper vegetation management, more systematic and coordinated line restoration and strategic partnership with local citizenry in the maintenance and monitoring of the lines. All of these approaches have been tried to a certain degree on various areas with promising success.
3.4 System Loss Standards	Partly	This is partly addressed through voltage improvement projects. When economically viable, higher transmission voltage is used to transfer bulk power from generators to loads.
3.5 Safety Standards	No	Safety standards requirements are factored-in in the design of the equipment/ structure that eventually become part of the specification for the respective projects.



centers are maximized, higher system loss is expected. Without any transmission constraints, the dispatch pattern is not within NGCP's control but is dictated by the transactions between the generators and the load customers. It follows, therefore, that system loss is not within NGCP's full control.

The following are the possible solutions to reduce system loss and some issues in implementing them:

- Uprating of the existing transmission line. This can be done through the use of conductors with larger diameter (and therefore higher capacity) or similar weight conductors but with higher capacity (such as TACSR). Larger but more expensive conductors translate to smaller resistance. Larger diameter conductors, although have larger capacity, would require stronger and hence, more expensive towers. The more expensive Thermal ACSR, on the other hand, are similar in weight but with higher capacity. However, the higher capacity runs the risk of being optimized down in accordance with ERC's TWRG resulting in under-recovery of investment.
- Use of higher voltages in power transmission. This is an expensive solution, and would take much time to implement. NGCP may implement this strategy whenever the entry of very large generators makes it feasible.
- Improvement of voltage profile. There are projects lined-up to improve the voltages at various substations through installation of capacitor banks. The intention for these projects is not so much to reduce the system loss but to bring the bus voltages to acceptable level. To some extent, this would also result to reduction in system loss.

For benchmarking purposes, system loss cannot be compared to that from other countries because the dispatch pattern, system configuration, generation and load locations and voltage transmission levels are not the same.

A1.3 Performance Indices

There are currently five (5) performance indices under the Performance Incentive Scheme (PIS), one of the main features in the Performance-Based Ratemaking (PBR).

(a) System Interruption Severity Index (SISI);
(b) Frequency Limit Compliance (FLC);
(c) Voltage Limit Compliance (VLC);
(d) Frequency of Trippings per 100 ckt-km (FOT/100 ckt-km); and
(e) System Availability (SA).

Generally, two different approaches are being used for improved performance. The first approach is through infrastructure additions to attain adequacy and ideally, N-1 security. The second approach would be through improved maintenance strategy and quick restoration during failures.

At the transmission level, there are still locations with no provision for N-1 (i.e., there is only a single line supplying the area). There are projects in the TDP which will specifically address this problem.

Appendix 2 - Other Projects

The projects listed in Table A2 are requested by some sectors with the hope that they would be classified and approved by the ERC as Transmission Assets. NGCP will seek ERC's approval of the projects prior to its actual implementation. It should be noted that NGCP will decide on whether to pursue the project or not depending on regulatory approval.

Table A2 New Projects for ERC Approval

PROJECT NAME	PURPOSE	EXPECTED TIME OF COMPLETION
Aglipay-Casiguran 69 kV Line	To provide more reliable power delivery system and meet the projected load growth of Aurora province through NGCP's Santiago Substation	Within Third Regulatory Period
Eastern Albay 69 kV Line	To provide reliable power delivery service and meet the projected load growth of to customers located in the eastern and southeastern parts of Albay	Within Third Regulatory Period
Tacurong-Kalamansig 69 kV Line	To provide a more reliable power delivery service to the far-flung areas in the province of Sultan Kudarat	Within Third Regulatory Period

A2.1 Aglipay-Casiguran 69 kV Line

In support of the government's thrust to develop the Aurora Province, NGCP is planning to implement a sturdier and more reliable power delivery system which will enable Aurora to source its power from NGCP's Santiago Substation. The existing Santiago– Aglipay 69 kV line needs to be extended by about 115 km up to Casiguran, Aurora.

Table A2.1 Aglipay-Casiguran 69 kV Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Tap Aglipay - Casiguran	69 kV, ST-SC, 1-336.4 MCM ACSR, 115 km
Tap Dinadiawan - Baler	69 kV, ST-SC, 1-336.4 MCM ACSR, 45 km
Substation	
Aglipay LE S/S (Exp.)	1-69 kV Air Break Switch
Dinadiawan Tapping Pt.	3-69 kV Air Break Switch
San Luis LE S/S (Exp.)	1-69 kV PCB + Accessories 2-69 kV Air Break Switch 1 X 5 MVAR, 69 kV Capacitor Bank*
Casiguran LE S/S (New)	2-69 kV PCB + Accessories 1 X 10 MVA, 69/13.8 kV Power Transformer 1 X 5 MVAR, 69 kV Capacitor Bank*

A2.2 Eastern Albay 69 kV Line

This is a 69 kV transmission line looping project from Tabaco City to Daraga (via Sto. Domingo) both in the province of Albay. It aims to provide reliable power delivery service to customers located in the three municipalities and two cities in the eastern and southeastern parts of Albay. The project would also provide oppurtunity for direct connection of big industries, e.g, coconut oil mills, cordage manufacturers, etc. including the PEZA-registered Misibis Resort and Spa located in an ecotourism zone at Cagraray Island in Bacacay, Albay. The project may likewise encourage investors to participate in the development of renewable energy sources, such as small hydropower and windpower plants situated in the economically-depressed area with big potential for economic growth.

Table A2.2 Eastern Albay 69 kV Line

PROJECT COMPONENT	DESCRIPTION
(Stage 1) Transmission Line	
Tabaco Substation–Sto. Domingo Substation	69 kV, SP/ CP - SC, 1-336.4 MCM, 18 km
Substation	
Sto. Domingo Substation (New)	2 x 69 kV PCB + Accessories & 1 x 10 MVA, 69/13.8 kV Power Transformer
Tabaco Substation (exp)	2 x 69 kV Air Break Switch
(Stage 2) Transmission Line	
Daraga Substation–Sto. Domingo Substation	69 kV, ST/ SP - SC, 1-336.4 MCM, 20 km
Substation	
Sto. Domingo Substation	1 x 69 kV PCB + Accessories
Daraga Substation	1 x 69 kV PCB + Accessories

A2.3 Tacurong-Kalamansig 69 kV Line

The project is envisioned to provide a more reliable power delivery service to the far-flung areas in the province of Sultan Kudarat. Four municipalities, namely Bagumbayan, Ninoy Aquino, Kalamansig and Lebak will benefit from the project since the power supply to these municipalities are presently being provided

by small land based and barge mounted power generating sets of the National Power Corporations's Small Power Utilities Group (NPC-SPUG). To be considered as part of the grid expansion that intends to increase NGCP's service area coverage, the project would result to the removal of government subsidy to the present power rate as an off-grid area under NPC-SPUG.

Table A2.3 Tacurong-Kalamansig 69 kV Line

PROJECT COMPONENT	DESCRIPTION
Transmission Line	
Tacurong–Kalamansig	69 kV, ST-SC, 1-336.4 MCM, 85 km
Substation	
Tacurong S/S (Exp)	1 x 69 kV PCB + Accessories

Appendix 3 - Priority List of New Projects

Table A3 (a) Luzon - Priority List of New Projects

	PROJECT	PRIORITY	ETC
1	San Esteban-Laoag 230 kV Transmission Line (Stage 1)	1	2011
2	Dasmarinas 500 kV Substation Expansion	1	2012
3	Kalayaan-Makban 230 kV Upgrading	1	2012
4	Luzon Voltage Improvement I /1	1	2012
5	New Antipolo 230 kV Substation	1	2012
6	New Rosario 115 kV Substation	1	2012
7	Northeastern Transmission Development (Stage 1)	1	2012
8	Tayabas Substation Expansion I	1	2012
9	San Jose-Angat 115 kV Transmission Line Upgrading	1	2012
10	Luzon Substation Reliability I	1	2012
11	RP Energy Coal Plant Associated Project	1	2013
12	San Esteban-Laoag 230 kV Transmission Line (Stage 2)	1	2013
13	Santiago-Gamu-Tuguegarao 230 kV Line 2	1	2013
14	Ambuklao-Binga 230 kV Transmission Line Upgrading	1	2014
15	Luzon Substation Expansion IV	1	2014
16	Tayabas Substation Expansion II	1	2014
17	Hermosa-Mexico 230 kV Line Upgrading	1	2015
18	Northeastern Transmission Development (Stage 2)	1	2015
19	San Manuel Substation Expansion	2	2013
20	La Trinidad-Calot Line Upgrading	2	2014
21	Luzon Substation Reliability II	2	2014
22	New Antipolo 500 kV Substation	2	2014
23	New CBP Substation and Associated T/L	2	2014
24	San Jose 500 kV Reconfiguration	2	2015
25	Aglipay-Casiguran 69 kV Line /2	3	2013
26	Eastern Albay 69 kV Line /2	3	2014
27	Luzon Voltage Improvement III	3	2015
28	Luzon Substation Expansion V	3	2016
29	Luzon Voltage Improvement IV	3	2016
30	New Balara 230 kV Substation	3	2016
31	Luzon Substation Reliability III	3	2017
32	Luzon Voltage Improvement V	3	2017

/1 – Approved in the Second Regulatory Period as Connection Assets
/2 – Filed by TransCo to the ERC. Awaiting decision.

Table A3 (b) Visayas - Priority List of New Projects

	PROJECT	PRIORITY	ETC
1	Visayas Capacitor Project I /1	1	2010
2	Compostela 1-150 MVA 230/138 Transformer	1	2011
3	Visayas Substation Expansion I	1	2012
4	New Naga-Banilad Transmission Line	1	2012
5	Ormoc-Babatngon 138 kV Transmission Line	1	2013
6	Ormoc-Maasin 138 kV Transmission Line	1	2013
7	Talavera-Sigpit-New Naga Line Reinforcement	1	2013
8	Visayas Substation Reliability I	1	2013
9	Visayas Substation Reliability II	1	2014
10	Banilad-Mandaue-Mactan Transmission Line	1	2015
11	Amlan-Mabinay Transmission Line	2	2012
12	Cebu-Negros Interconnection Line 3	2	2013
13	Eastern Panay Backbone Project (San Juan-Sara) Phase I	2	2013
14	Mabinay-Kabankalan-Bacolod Transmission Line	2	2013
15	Negros-Panay Interconnection Uprating (Phase 2)	2	2013
16	Visayas Substation Reliability III	2	2015
17	Culasi-Sibalom 138 kV Upgrading	3	2013
18	Eastern Panay Backbone Project (Sara-Panit-an) Phase II	3	2013
19	Sta Rita-Quinapundan 138 kV Upgrading	3	2014
20	Leyte-Cebu Interconnection Uprating	3	2016
21	Visayas Voltage Improvement I	3	2016
22	Leyte-Bohol Interconnection Uprating	3	2018

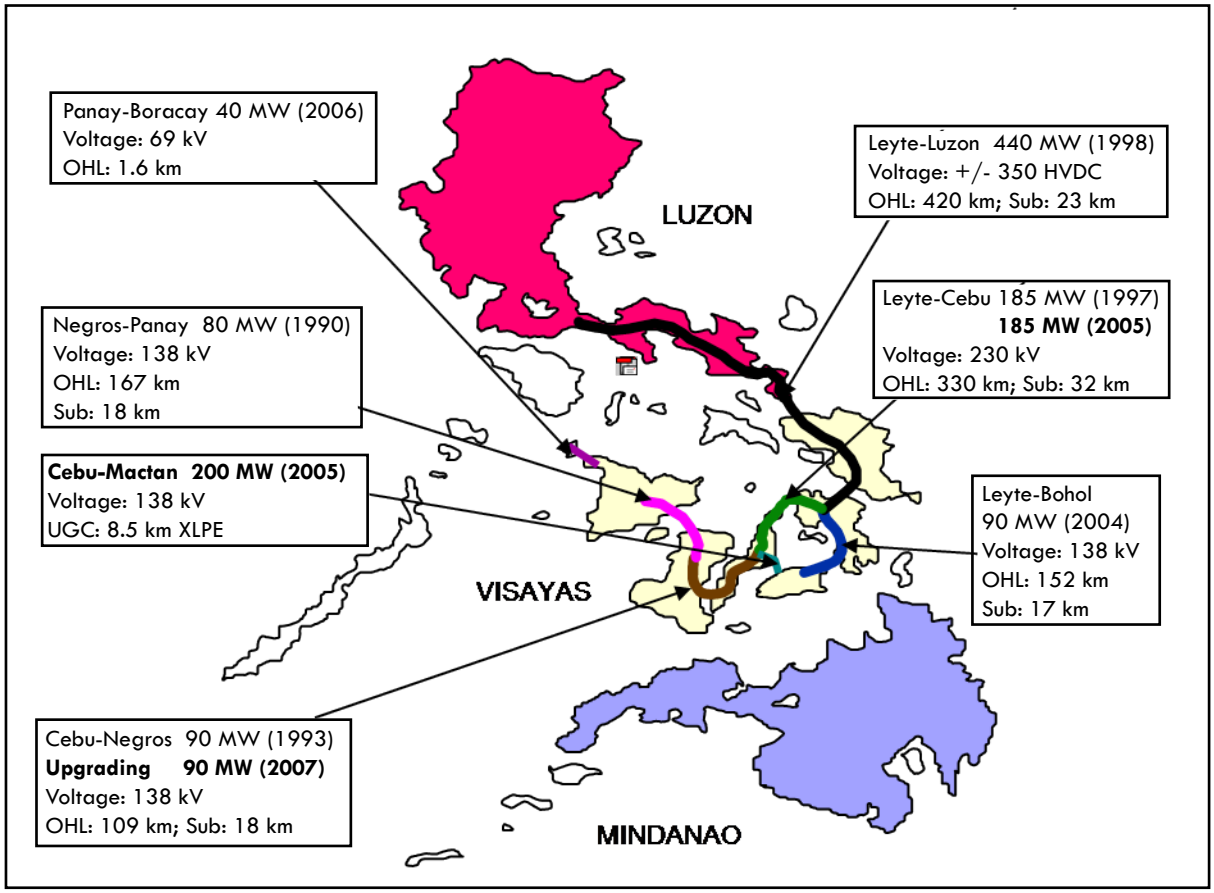
/1 – Approved in the Second Regulatory Period as Connection Assets

Table A3 (c) Mindanao - Priority List of New Projects

	PROJECT	PRIORITY	ETC
1	Mindanao Substation Reliability I	1	2013
2	Pulangi-Kibawe 138 kV Transmission Line (Line 3)	1	2013
3	Mindanao Substation Expansion II	1	2014
4	Agus 6-Aurora 138 kV Transmission	1	2015
5	Mindanao Substation Reliability II	2	2014
6	Tacurong-Kalamansig 69 kV Line	3	2014
7	Mindanao Substation Reliability III	3	2015
8	Leyte-Mindanao Interconnection	3	2018

Appendix 4 - Existing Island Interconnections

In 2005, two (2) major interconnection projects were completed: the Leyte-Cebu Upgrading (additional 185 MW) and the Cebu-Mactan Interconnection (200 MW). In February 2007, the Cebu-Negros Interconnection Uprating was completed, providing an additional 180 MW capacity between the island.



Appendix 5 - Contact Details

1. For all general inquiries regarding the TDP and for making written submissions in respect to proposed network projects described in Chapter 6, you may contact any of the following:

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Deputy Manager	Fax:	63 2 9200025
Transmission Planning Department	E-mail:	gagalang@ngcp.ph

2. For inquiries relating to load forecast information, you may contact:

Mr. Armando A. Pagayon	Tel:	63 2 9812533
Head	Fax:	63 2 9200025
Load Forecast and Research	E-mail:	aapagayon@ngcp.ph

3. For inquiries relating to ongoing feasibility studies and project approval status:

Mr. Vicente N. Loria	Tel:	63 2 9812587
Head	Fax:	63 2 9213524
Project Planning	E-mail:	vnloria@ngcp.ph

4. For inquiries relating to transmission services:

Mr. Philip DV. Dasalla	Tel:	63 2 9812595
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Endnotes:

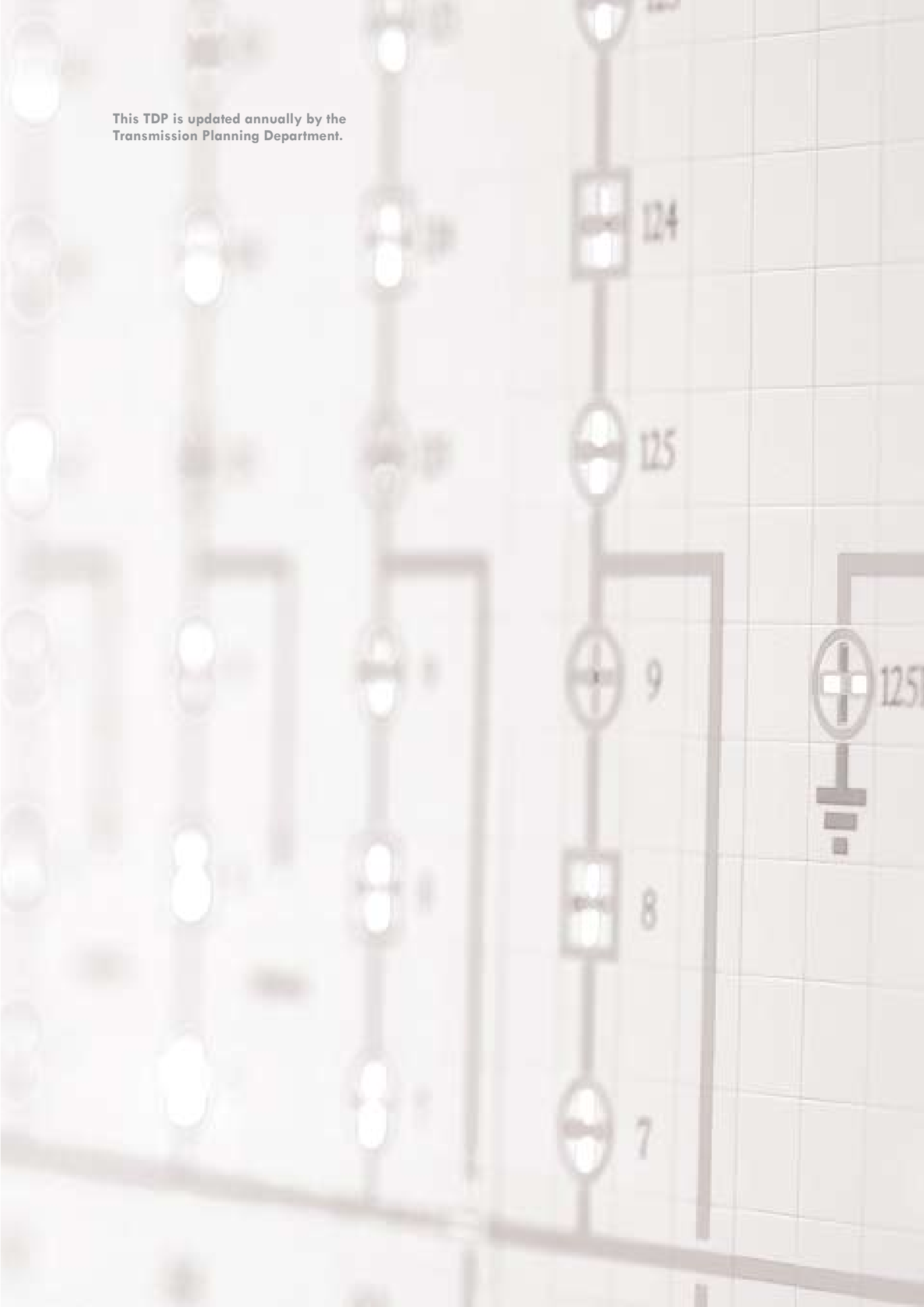
[6] Promulgated by the ERC in May 2003, the TWRG sets out the methodology to be used in setting the maximum transmission wheeling rates that may be charged for the provision of Regulated Transmission Services by TransCo as the Regulated Entity.

[7] A defined term in the TWRG which primarily refers to, among others, the provision of capability at a Connection Point to deliver electricity to or take electricity from the Connection Point.

[8] These are projects for the expansion or rehabilitation of Network assets.

[9] Excluded Service as defined in the TWRG, refers to a service that is provided in the ordinary course of an electricity transmission business that is neither a Regulated Transmission Service nor a service that is contestable (for these purposes, whether or not a service is contestable is a matter that, if disputed, will be determined by the ERC).

This TDP is updated annually by the Transmission Planning Department.



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