



Parsons Brinckerhoff Associates

**OPTIMIZATION OF
ASSETS OF DECORP**

CONFIDENTIAL

FOR

ERC & DECORP

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EXECUTIVE SUMMARY

1. Background & Objectives

The objective of this report is to propose adjustments to the Decorp ODRC asset register, in accordance with the principles espoused in the ERC Asset Valuation Guidelines. Optimization adjustments that are validated will be made as a single entry, transparent adjustment to the ODRC register.

2. Approach

Optimization must be undertaken in accordance with Section 4.1.8 of the ERC Position Paper - Regulatory Reset for the Privately Owned Distribution Utilities Subject to Performance Based Regulation (PBR) for July 2007 to June 2011, whereby the load at the end of a planning horizon period is tested against the planned firm (N-1) capacity of assets.

In practice optimization is carried out in accordance with the following principles:

- a) Exclude stranded assets;
- b) Optimize the configuration of the network;
- c) Optimize the capacity of elements in the network;
- d) Optimize network engineering; and
- e) Optimize stores and spares.

3. Conclusions

After due consideration of the available data, PB Associates recommends that the ERC adopts the following amounts of optimization for Decorp for purposes of an asset valuation:

Table 1 Proposed DECORP Optimization

DWRG Category		Optimization (Pesos)
A3	Station Equipment	
A3A	Power Transformers	Nil
A3B	Switchgear	Nil
A3C	Protective Equipment	
A3D	Metering & Control	Nil

DWRG Category		Optimization (Pesos)
A3E	Communications Equipment	Nil
A3F	Other Substation Equipment	Nil
A4 & A5	Poles, Towers & Fixtures	Nil
A6 & A7	Overhead Conductors & Devices	Nil
A8 & A9	Underground Conduits	Nil
A10 & A11	Underground Conductors & Devices	Nil
A12 & A13	Line Transformers	16,260,000
A14	Power Conditioning Equipment	Nil
A15	Services	Nil
A16 & A17	Meters, Instruments & Metering Transformers	Nil
A20	Streetlights & Signalling	Nil

PB Associates finds that there is a case for optimization of overhead conductor spares by Php 22.6 Million.

Surplus land and buildings are identified under a separate report prepared by Asian Appraisals CI.

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1. INTRODUCTION

1.1 DECORP NETWORK

Decorp receives power via a 230kV transmission network at 2 major TRANSCO Bulk Stations.

Power is sourced from the National Power Corporation (NPC).

From Transco Bulk Stations, electricity is delivered through a sub-transmission network to major distribution substations throughout the supply area. This network is currently owned by Transco and operates at 69 kV.

The company operates 2 sub-transmission substations (with 5 power transformers). The total substation capacity is 88 MVA.

At the distribution substations, the HT voltage is converted to 13.8 kV.

Electricity is conveyed through a primary distribution network of approximately 377 km of primary overhead lines and 624 km of secondary overhead lines.

A total of 1887 distribution line transformers are used in the network to convert the distribution voltage levels to low voltage (220 V single phase and three-phase). Total line transformer capacity is 102 MVA.

1.2 ERC OPTIMIZATION PRINCIPLES

Optimization of the network proceeds in two parts:

System Optimization – the system is reconfigured resulting in a lower value network with no loss of adequacy, security or reliability; and

Network Optimization – components of the network are replaced with components of a lower value with no loss of adequacy, security or reliability.

In practice, care must be taken to ensure that the optimization process does not result in a breach of the service levels stipulated under the Grid and Distribution Codes.

Furthermore, optimization must be undertaken in accordance with Section 4.1.8 of the ERC Position Paper - Regulatory Reset for the Privately Owned Distribution Utilities Subject to Performance Based Regulation (PBR) for July 2007 to June 2011, whereby the load at the end of a planning horizon period is tested against the planned firm (N-1) capacity of assets.

As the load peak in the Philippines occurs in summer prior to 30 June, and the effective date of commencement of the regulatory reset period is 30 June 2007, the planning horizon commences from year 2008.

Accordingly, for forecasting purposes the end of the planning horizon is as follows:

Table 2: ERC Specified Planning Horizons

Network Components	Planning Horizon	Forecasting Year for End of Planning Horizon
<ul style="list-style-type: none"> • Sub-transmission lines • Substations (excluding transformers) • Primary distribution circuits¹ • Points of connection to transmission network 	15 years	2022
<ul style="list-style-type: none"> • Substation Transformers 	10 years	2017
<ul style="list-style-type: none"> • Distribution Line Transformers² • Secondary distribution circuits • Low voltage network • Other distribution assets 	5 years	2012

1.3 REPORT STRUCTURE

This report comprises four sections:

Section 1 comprises this Introduction;

Section 2 contains proposals for optimising the assets of Decorp by DWRG asset category;

Section 3 examines and proposes spares optimization; and

Section 4 provides a verification of the robustness of Decorp load forecasting.

¹ PB Associates considers primary distribution circuits to be primarily used for load transfer / backup purposes, or for supply to dedicated customer substations, even though in some cases there are connected line transformers supplying customers.

² PB Associates has included a 5 year planning horizon for line transformers in accordance with international regulatory practice in other jurisdictions for distribution transformers.

2. OPTIMIZATION BY DWRG CATEGORY

2.1 SUBTRANSMISSION OPTIMIZATION

2.1.1 Network Optimization - Grid Exit Points (GXP)

Optimization of GXPs is performed by removing GXPs one at a time, and determining whether load can be supplied by alternative supply sources e.g. by an adjacent GXP or by substations in the area.

The load that is considered is the load at the end of the 15 year planning horizon.

Calasiao substation is supplied by a 1 x 100 (as of July 4, 2006) MVA (T-3) power transformer at the Labrador substation of TRANSCO, approximately 25 km from the substation. The 50 MVA (T-2) transformer formerly serving Decorp is now used as a spare. Another 50 MVA (T-1) transformer at Labrador supplies two other Electric Cooperatives. During contingencies, it is understood that TRANSCO share the available capacity among the three transformers. Under system normal conditions, the 100 MVA transformer and the 69 KV subtransmission line are dedicated to Decorp's Calasiao substation.

San Jacinto substation is supplied by 1 X 100MVA power transformer at the San Manuel substation of Transco. The transformer also supplies two Electric Cooperatives (Panelco III and Cempelco) and a cement plant. This 100 MVA transformer feeds 3 x 69 KV subtransmission lines: One line is dedicated to the cement plant, one to PANELCO III, and the third line supplies San Jacinto substation, Panelco III and Cempelco substations.

The two (2) GXPs and their capacity are shown in the following table:

Table 3: GXP Network Configurations

GXP	Transformers	Overall Firm Capacity	Peak Load (MVA) at end of 2022	Optimal ? (Y/ N)
Labrador	1 x 100MVA 1 x 50MVA 1 x 50MVA	100MVA	127MVA	Y
San Manuel	<1 x 100MVA (say 1 x 50MVA)	50MVA		

The table shows that at the end of the 15 year planning horizon, there is no spare capacity at either of the GXPs.

As discussed further in Section 2.2, there is also no spare capacity at adjacent substations that could accommodate the removal of any existing GXP supply point.

PB Associates has determined that GXP supply points cannot be optimised.

2.1.2 Network Optimization - Subtransmission Lines

Optimization of the subtransmission network begins with the 69 kV subtransmission overhead lines.

The subtransmission lines supplying Decorp were engineered by Transco. The lines are single circuit lines and do not currently meet N-1 criteria.

In this case the ratings of the line are determined by the standard conductor sizes employed by Transco for 69kV.

The conductor configuration and sizes of the 69kV overhead conductors are as follows:

Table 3: Subtransmission Standard

Voltage	Conductor	Conductor Configuration	Maximum Rating
69 kV	1 x 336.4MCM ASCR	3-phase, Single Circuit, Single Conductor	63MVA ³

PB Associates has made a simple test comparison of 100% of the theoretical line (conductor) rating against the peak load at the end of the 15 year planning horizon.

Table 4 below lists the subtransmission lines included in the test and the results in terms of spare capacity at the end of the planning horizon. Subtransmission lines that do not achieve a peak load greater than the 100% threshold on maximum rating would usually qualify to be considered for a reduction of the line capacity to a smaller conductor size.

However, in this case the lines are owned by Transco and optimization is not applicable for this valuation. The test is included as a consideration for the future when the subtransmission line ownership transfers to Decorp.

Table 4: Subtransmission Lines

Sub-trans Line	Voltage (kV)	Conductor	100 % of Rating MVA	Peak Load MW at end of planning horizon	Optimal ? (Y/N)
Incoming	69 kV	1 x 336.4	63	15 MVA	Y

³ 75⁰C cond, 35⁰C ambient

Sub-trans Line	Voltage (kV)	Conductor	100 % of Rating MVA	Peak Load MW at end of planning horizon	Optimal ? (Y/N)
San Jacinto		MCM ACSR	(30% shared with Panelco III and Cenpelco)		
Incoming Calasiao	69 kV	1 x 336.4 MCM ACSR	63	73 MVA	Y

The table shows that at the end of the 15 year planning horizon (30% shared with Panelco III and Cenpelco).

However, it is understood that it is a Transco standard to employ 1 x 336.4 MCM ACSR for 69kV subtransmission lines. PB Associates considers this choice of conductor is appropriate for a 69kV voltage rating. Mechanical robustness is a necessary consideration from a security of supply perspective, particularly where subtransmission lines are not configured in a mesh or loop.

PB Associates has determined that the subtransmission lines cannot be optimised to lower standard ratings.

2.1.3 System Optimization – Subtransmission

Following consideration of equipment optimization of the GXP's and subtransmission lines, the subtransmission system is now considered holistically.

The subtransmission network is expected to comply with the Grid and Distribution Codes promulgated by the ERC:

- i. Subtransmission lines shall be designed to operate under the N-1 reliability criterion, i.e. an outage of any subtransmission line or delivery point power transformer shall not cause overloading of remaining facilities;
- ii. The loading level of the subtransmission lines shall be limited to 50% - 60% of their rated capacity under normal operating conditions and maximum 100% loading level under emergency operating conditions;
- iii. Under the normal operating conditions the bus voltage level at the high-voltage side of all Decorp substation transformers shall be within +/- 7% and +/- 10% under emergency conditions;
- iv. The overall system losses on the subtransmission network shall be less than 2%;

- v. The overall power factor at Transco connection or metering points shall not be lower than 90% lagging; and
- vi. System fault level shall not exceed the equipment short circuit ratings.

As previously mentioned, the present configuration of the subtransmission network supplying Decorp does not meet the N-1 reliability criterion.

The subtransmission lines do not have parallel paths at this time, nor do any of the major substations designed to N-1 (dual power transformers of same rating).

A schematic of the subtransmission system is provided in Appendix A.

Overall, PB Associates finds that the subtransmission system configuration is designed in an optimal manner with regard to both system adequacy and security.

2.2 SUBSTATIONS

2.2.1 Network Capacity Optimization – Power Transformers

In general terms, optimization of substations is performed by comparing the firm capacity of the substation against the load at the end of a 10 year planning horizon.

The ERC Asset Valuation Guidelines require the valuer to assess the power transformers using an N-1 loading criterion of 70% of installed capacity under normal operating conditions. In some cases Decorp substations have only a single transformer. In such cases where a transformer loss cannot be backstopped by the adjacent transformer, PB Associates has made a test comparison of forecast average peak demand against a 100% utilization target criterion. In other cases there are two transformers of different capacity. PB Associates considers the firm capacity to be that of the smallest capacity transformer, in accordance with reliability of supply considerations.

Table 5 below lists the substations included in the test and the results in terms of spare capacity in 2012, five years before the end of the planning horizon.

Table 5: Power Transformers and Utilization 2012

Substation	Transformer Capacity	Firm Capacity Utilization Target	Forecast Average Peak Utilization 2012	Optimal? (Y / N)
San Jacinto	10 MVA	33%	89%	Y
	5 MVA			

Calasiao	20 MVA	70%	140%	Y
	20 MVA			
	33 MVA			

The table shows that the utilization target is surpassed in 2012 for all established substations, well before the end of the 10 year planning horizon.

PB Associates finds that Decorp power transformers cannot be optimised.

2.2.2 Network Engineering Optimization – Substations

The standard configuration of Decorp established substations is shown in Appendix A.

The common configuration employed for the fully established substations is a single 69kV bus with a single 13.8kV bus.

The substation configuration chosen by Decorp is known as a 'single bus' or 'H-bus' arrangement.

A single bus switching arrangement offers the lowest reliability performance of all substation configurations, and the lowest cost. It is commonly used in other countries. For example in Australia and New Zealand substation configuration is commonly chosen as follows:

- An H-bus configuration is used for non-critical substations.
- A Selectable Double Bus configuration is used where increased operational flexibility is required.
- A Breaker and a Half configuration is used for voltages above 200kV or for generator busses.

An H-bus configuration presents the least opportunity for optimization as it is the simplest configuration. Furthermore, Decorp employs reclosers as a low cost solution to circuit breaker needs.

During site inspections the assets within the substations were found to be standard requirements for the type of substation configuration in use by Decorp.

Accordingly, PB Associates has determined that Decorp substations cannot be optimised from a network engineering perspective.

2.3 PRIMARY & SECONDARY DISTRIBUTION FEEDERS

2.3.1 Network Optimization - 13.8 kV Feeders

PB Associates has examined the feeder ratings, feeder and load forecasts to the end of a 5 year planning horizon.

The ratings of the feeder are determined by the conductor sizes employed by Decorp.

The standard conductor configuration and size of 13.8kV overhead conductor between the feeder exit and the first substation or lateral is as follows:

Table 6: Standard Conductor Configuration & Ratings

Voltage	Conductor Type	Line Configuration	Theoretical Rating
13.8 kV	336.4 MCM ASCR	3-phase, Single Circuit	11.4 MVA

For emergency purposes, there are typically interconnections between feeders providing opportunities to resolve transformer or feeder failures through switching; allowing overhead feeders to be operated closer to the maximum full-time rating of the conductor.

With consideration of the N-1 planning criterion, and where there are two feeders emanating from a substation of the same voltage, PB Associates has made a test comparison of 67% of the theoretical line (conductor) rating against the peak load at the end of the 5 year planning horizon.

Table 7 below lists the distribution feeders included in the test and the results in terms of spare capacity at the end of the planning horizon. Distribution feeders that do not achieve a peak load greater than the utilization threshold on theoretical rating would qualify to be considered for a reduction of the line capacity to a smaller conductor size.

However, as Table 7 shows, there are no feeders that are underutilised at the end of the planning horizon.

Table 7: Distribution Feeders

Sub	Feeder Exit Rating	Utilization Target	Forecast Average Peak Utilization 2012	Optimal ? (Y / N)
F2	7.2MVA	67%	88%	Y
F3	4.8MVA	67%	132%	Y

Sub	Feeder Exit Rating	Utilization Target	Forecast Average Peak Utilization 2012	Optimal ? (Y / N)
F5	4.8MVA	67%	68%	Y
F6	7.2MVA	67%	113%	Y
F7	7.2MVA	67%	101%	Y
F8	7.2MVA	67%	74%	Y
F9	7.2MVA	67%	94%	Y
F10	7.2MVA	67%	141%	Y
F11	7.2MVA	67%	105%	Y
F12	7.2MVA	67%	123%	Y
F14	7.2MVA	67%	127%	Y
F15	7.2MVA	67%	77%	Y
F21	7.2MVA	67%	65%	Y
F22	4.8MVA	67%	165%	Y
F23	7.2MVA	67%	101%	Y

2.3.2 Network Optimization – 13.8 kV Circuit Breakers

Bus-tie and feeder circuit breakers must be rated for the maximum fault level at the bus and feeder exits respectively.

The following table summarises the breaker rating and fault level:

Table 8: Fault Levels

By Transco	3Ø Bus fault level	1Ø Bus fault level	CB fault rating	Optimal? (Y / N)
Substation HT Bus				
SIEMENS33	2009	1440	25kA	Y
ABB20	2010	1440	25kA	Y
PHILEC	2011	1742	25kA	Y

Substation LT Bus				
SIEMENS33	5506	6714	25kA	Y
ABB20	5534	6767	25kA	Y
PHILEC	4762	5645	25kA	Y

The minimum breaker rating available generally in the market from switchgear manufacturers is 25kA. Accordingly PB Associates finds that the existing switchgear is optimal.

2.3.3 System Optimization - 13.8 kV Feeders

In accordance with the ERC Asset Valuation Guidelines, PB Associates has not optimised the distribution feeders. The distribution feeder network comprises an interconnected network with the capability to transfer load to meet operational requirements. A range of operating conditions and network constraints, e.g. voltage and thermal constraints, means that it is infeasible to optimise the feeder network from an economic perspective.

2.4 OVERHEAD CONDUCTORS & DEVICES

2.4.1 Network Optimization – Overhead Conductors

Optimization of overhead conductors is dealt with under Section 2.1.2 and 2.3.1.

2.4.2 Network Optimization – Line Switches

In general terms, line switches are positioned for operational flexibility and for reliability of supply purposes i.e. for load transfer and supply restoration. PB Associates has examined the switch placements with reference to Decorp Single Line Diagrams and finds that there is no scope for optimising out Decorp line switches.

2.4.3 Network Optimization – Overhead Devices

Overhead line devices are installed for specific purpose and experience suggests that such assets do not offer significant opportunities for optimization.

2.5 LINE TRANSFORMERS (DT'S)

Optimization of line transformers has been assessed in accordance with the ERC Asset Valuation Guidelines.

From an engineering design perspective, the number of customers per line transformer is an indicator of the efficient matching of load and location. The number of customers per line transformer is shown in Table 9:

Table 9: Customers per Line Transformer

Sector	Customers per Line Transformer
Decorp	49.0

This figure is at the high end of the range observed amongst the Philippines DUs – a range of between 40 to 50 customers per DT.

Accordingly, PB Associates finds that there is no scope to optimise DTs from an engineering design perspective.

From the perspective of capacity optimization, the relevant utilization targets for DTs are taken from the ERC Asset Valuation Guidelines as follows:

Table 10: ERC Utilization Targets

Existing DT Capacity	Class Assumption	Utilization at 5 yr planning horizon	Actual kVA loading	Optimise to RC ⁴ of DT with capacity of?
15kVA	Residential	> 0%	Up to 15kVA	15kVA
25kVA	Residential	< 50%	<12.5kVA	15kVA
37.5kVA	Residential	<50%	<18kVA	25kVA
50kVA	Residential	<50%	<16kVA	25kVA
75kVA	Commercial	<50%	<37.5kVA	50kVA
100kVA	Commercial	<50%	<50kVA	75kVA
167kVA	Industrial	<50%	<70KVA	100kVA
250kVA	Industrial	<50%	<125kVA	167kVA
333kVA	Industrial	<50%	<167kVA	167kVA

⁴ RC – Replacement Cost

The Decorp asset register holds a total of 1887 DTs in use.

The most common (standard) sizes of DTs used by Decorp are as follows:

Table 11: Decorp Standard DTs

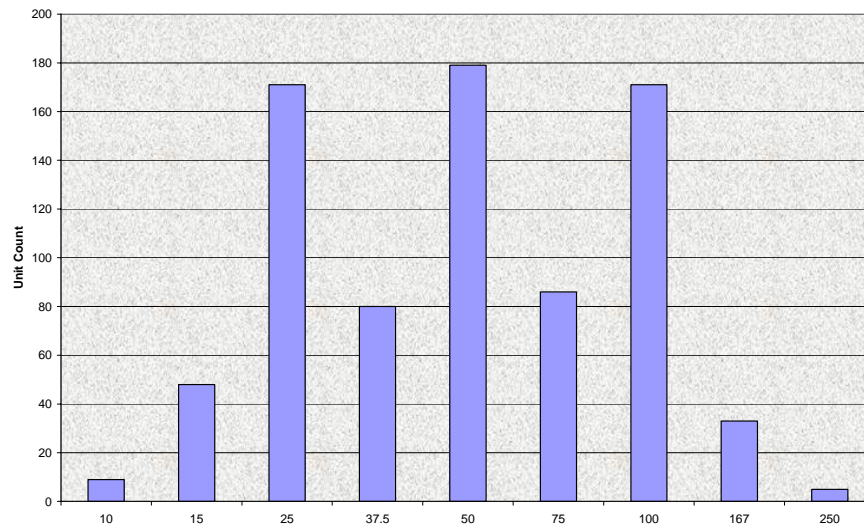
DT Type by Voltage	DT Rating	% of Count
13.8 (13.2) kV-240/120V; 1PH; Pole Mounted	25kVA	27%
13.8 (13.2) kV-240/120V; 1PH; Pole Mounted	50kVA	25%
13.8 (13.2) kV-240/120V; 1PH; Pole Mounted	100kVA	15%

Decorp provided PB Associates with DT utilization statistics from current day to the end of a 5 year planning horizon (2012). PB Associates reviewed the basis for forecasting and is satisfied that the approach is robust. Decorp assume an annual load growth of 6%.

Decorp statistics show that thirty six percent of DTs (698) will achieve a loading of less than 50% by the year 2012. Of this count, PB Associates has identified 11 DTs as stranded (Nil utilization).

Figure 1 shows the breakdown by capacity and count.

Figure 1: Capacity and Count of DTs < 50% Utilized by 2012



The following table provides the revised count for application of the lower standard replacement cost for each capacity of DT:

Table 12: Suboptimal DTs

Existing DT Capacity	SubOptimal Count	Optimal Size	Unit Cost Difference (Pesos)	Total ORC Adjustment (Pesos)
Stranded DTs	11	Various ⁵	Various	808,361
10kVA	9	10kVA	0	0
15kVA	42	15kVA	0	0
25kVA	147	15kVA	12,360	2,458,575
37.5kVA	67	25kVA	16,725	812,509
50kVA	158	25kVA	12,127	1,916,224
75kVA	78	50kVA	12,128	2,995,200
100kVA	163	75kVA	38,400	6,259,200
167kVA	33	100kVA	38,400	966,900
250kVA	1	167kVA	29,300	40,570
Total				16,260,000

2.6 POWER CONDITIONING EQUIPMENT

2.6.1 Line Capacitors

The optimization of line capacitors follows the optimization of line transformers because power factor adjustment is a function of the reactive power drawn by line transformers.

PB Associates observes that the total capacity of Decorp installed line capacitors is only 11.5MVar. This compares to around 102MVA of installed line transformer capacity.

⁵ Stranded DTs as follows: - 10kVA – 0; 15kVA – 0; 25kVA – 1; 37.5kVA – 3; 50kVA – 7; 75kVA – 0; 100kVA – 0; 167kVA – 0; 250kVA – 0.

PB Associates finds that the penetration of line capacitors appears to be very low with no potential for optimization.

2.7 LV SERVICES

The optimization of low voltage services is a function of the number of customers per line transformer. Based on these statistics we would expect to find that the optimal count of LV Services per DT would be around 50 LV services per DT as per Section 2.5 of this report.

Decorp has 76,317 service cables.

The ODRC register contains 2,047,247 meters of service cables.

With a DT count of 1887, the count of LV services per DT is 40.4, about 20% lower than expected.

A count of 49 LV services per DT, would equate to an average of 22 metres of LV service cable per service. (This compares to an average of 29 for Cepalco). PB Associates considers this to be a reasonable average.

Accordingly, PB Associates do not propose to optimise LV service cables.

2.8 OTHER ASSET SUBCATEGORIES

PB Associates does not propose to optimise minor or specialised asset subcategories as the decision to install such assets is determined by customer needs. Such needs relate to reliability - reclosers, line switch placements are examples - or community needs - streetlights are an example. Experience shows that there is minimal scope for optimization and in any case materiality is not affected.

3. SPARES

PB Associates has examined the spares holding reported by Decorp in spreadsheet "quantities-delta2006.xls".

3.1 SUBSTATION ASSETS

We find that Decorp does not hold substation spares and accordingly do not recommend any optimisation.

3.2 REPETITIVE ASSETS

In summary, PB Associates considers that the stockholding of repetitive assets is appropriate and does not find that spares should be optimized out.

Meters

Decorp reported holding approximately 1300 spare residential meters spares.

Line Transformers

Decorp reported that they currently hold no line transformer spares.

PB Associates recommends that Decorp hold some spares for supply reliability.

Switches, Capacitors and Line Breakers

There are no spares of these items held by Decorp.

Poles

Pole spares were reported to amount to 587 concrete poles (4.9% of 24,301 concrete and wood poles in use), 26 wood poles and 81 steel poles (2% of the 3,916 steel poles in use).

PB Associates considers that these stockholdings are appropriate for wood pole replacements given network expansion (the additions in first half of 2006 were more than the spares level), and for steel poles where additions were around half of the spares level. In the case of steel poles, the spares are the smallest sizes with no scope for optimization.

Conductor

Decorp has approximately 622,000 meters of conductor in stock spread evenly across the most common sizes. Included are 15kV overhead conductor at 475,000 meters and service cables at around 147,000 meters.

Decorp has approximately 1,330,000 meters of 15kV overhead conductor in use (excluding). The stockholding amounts to approximately 36% of conductor in use.

PB Associates considers the following computation is relevant to optimization:

1) Network replaced at 5% per annum – 66,500 meters per annum.
Network growth ~ 20% of stock based on 1st half 2006 additions – 95,000 meters per annum. i.e. total usage of 161,500 meters per annum.

2) $475,000 - 161,500 = 313,500$ meters excess to requirements

3) 313,500 meters of conductor with make up as follows - Bare ACSR 336.4MCM @ 40%, Bare No 4/0 AWG @ 40% and Bare No 2/0 AWG @20%.

Total optimisation is approximately Php 22.6 Million.

Decorp has approximately 3,825,000 meters of 600V overhead conductor in use. The stockholding amounts to less than 3.8% in use. Notwithstanding new service requirements, if this conductor was to be replaced at say 3% - 5% per annum (20-30 year life) the spare conductor would be consumed in one to two years.

Accordingly, PB Associates considers that the stock holding of service conductor is appropriate.

Other Line Hardware

Decorp has ~10,000 items of line hardware. Such items include bolts pole bands, clamps etc.

PB Associates considers that the majority of these items are required. Volume purchasing of these items is likely to result in favorable prices and so in those cases where some items may not be used within 5 years the value is not material to the valuation. Accordingly PB Associates does not propose to optimize stores holding for this category.

4. DECORP LOAD FORECASTING TECHNIQUES

This Section is a verification of the robustness of the Decorp load forecasting techniques.

4.1 GENERAL

Decorp forecasts electric load growth based upon the analysis of historical system load data, known major load addition plans (such as incoming bulk power customers, new commercial and industrial customers and large residential or subdivision customers), and city planning proposals.

Load data is captured from system peak distribution substation readings. The majority of the substation demand data was reported to be recorded with digital meters read and manually logged by substation tenders. The development of accurate and coincident system data collection is recognized as an important factor for future improvement of distribution system analysis and planning.

Load growth trends are developed for each feeder planning area utilizing a flat line growth assumption. Major load additions and load transfers that could result in inaccurate feeder load projections are addressed as “block loads and transfers”, independent of the load growth trend analysis for each feeder area.

As Decorp’s network is of a relatively simple configuration, PB Associates considers that the forecasting technique in use by Decorp is robust.

4.2 LOAD FORECAST CALCULATIONS

Table 17 below shows the electricity growth forecasts for the Decorp power system from 2005 to 2022.

Table 17: Decorp Electricity Growth Forecasts⁶

Year	Decorp Forecast Demand Growth (kW)	Demand Growth
2001	37,639	-
2002	40,824	8.46%
2003	43,925	7.6%
2004	46,340	5.5%
2005	45,860	-1.04%
2006	48,611	6%
2007	51,528	6%
2008	54,620	6%

⁶ Source of the data: Decorp Load Forecast : FeederForecast_PBR_Final_Draft_060627.

Year	Decorp Forecast Demand Growth (kW)	Demand Growth
2009	57,897	6%
2010	61,371	6%
2011	65,053	6%
2012	68,956	6%
2013	73,094	6%
2014	77,480	6%
2015	82,128	6%
2016	87,056	6%

While the assumption of 6% load growth could be challenged on the basis that average growth for years 2002 to 2005 was 5%, the 1% difference is not material to the consideration of optimal network capacities.

PB Associates considers the load forecasting technique provided by Decorp as robust and the forecasts as verified.