OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

23114

October 20, 2005

R·W·BECK

Mr. Marco Matteini
Project Manager Associate Expert
United Nations Industrial Development Organization (UNIDO)
Wagramer Strasse 5
A-1220 Vienna, Austria

Subject: 2005 DOMLEC Loss Reduction Study

Dear Mr. Matteini:

We have completed our work in connection with the preparation of the 2005 Loss Reduction Study for Dominica Electricity Services, Ltd. (DOMLEC). The Executive Summary encapsulates the results of our studies and sets forth our conclusions and opinions. The data, information, and results of the analysis which support our conclusions and opinions are described in detail in subsequent sections of the Report.

We wish to acknowledge the cooperation and assistance received from the management and staff of UNIDO and DOMLEC in the conduct of our studies and the preparation of the Report.

Respectfully Submitted,
R. W. BECK, INC.

James W. Baxter

Jim Baxter
Vice President, Utility Engineering

cc: Ms. Mounira Latrech
Mr. Joel Huggins
Mr. Rawlins Bruney
Mr. Mark Riddle

400 Professional Park Drive, Suite 100, Goodlettsville, TN 37072-2100
Phone (615) 859-3900 Fax (615) 851-6066

R. W. BECK, INC.
ELECTRIC LOSS STUDY
DOMINICA ELECTRICITY SERVICES, LTD.

Table of Contents

List of Tables

Section 1
EXECUTIVE SUMMARY

1.1 Background

The United Nations Industrial Development Organization (UNIDO), in conjunction with Dominica Electricity Services, Ltd. (DOMLEC), has authorized R. W. Beck, Inc. (R. W. Beck) to investigate existing electric losses on DOMLEC's transmission and distribution systems and related intervention strategies on Dominica Island. This report satisfies the requirements set forth in such Contract, as specified in R. W. Beck's Scope of Services found in proposals dated December 15, 2004 and February 24, 2005.

DOMLEC faces considerable geographic challenges in provisioning electric service to its constituents. The majority of its domestic (residential) and business customers are located along Dominica's perimeter, primarily in two cities (Roseau and Portsmouth) while the interior of the island is relatively rugged and covered in mountainous rainforests and national parks. The island's shape is an oval with an approximate length of over 35 miles and width of 12 miles. Roseau and Portsmouth are approximately 28 miles apart. Routing transmission or distribution lines must account for these challenges as well as a significant focus on environmentalism and eco-tourism, which are also considered to be fundamental ingredients to local economic development.

This report contains an examination of DOMLEC's electric transmission and distribution systems and provides specific intervention options to reduce losses on those systems. Reviews and analyses of DOMLEC's generation systems are not included in the Scope of Work for this project. The aim of this project is to provide DOMLEC with the necessary information to develop and implement an electric loss reduction program. It is further anticipated that such information would be useful to DOMLEC in the financing of such projects. The recommendations contained in this report are founded upon economical and practical perspectives and include the following information for each measure:

- Expected reduction in annual electric losses
- Capital cost and operating expense
- Expected annual savings
- Cost/benefit analysis

It is R. W. Beck's opinion that electric loss intervention is dynamic in nature and that DOMLEC should consider this report to be a living document, requiring periodic updates and analyses as the system evolves and new information becomes available.

This report does not contain a review of DOMLEC's financial condition or its ability to support the potential debt financing that might be associated with new capital projects. While this report could be used to support a future loan application by DOMLEC, it is not intended to serve as a loan application on its own.

It must also be pointed out that the power flow analyses contained in this report are founded upon the input base case provided by DOMLEC. While the mutually agreed upon Scope of Work assumed that this input data base would be sufficient, it is R. W. Beck's opinion that there are significant short comings in DOMLEC's input data base, including the absence of distribution transformer models, single phase loads are simulated as balanced three phase loads and the inclusion of non-operational capacitors.

The remainder of this section summarizes the conclusions that are described in greater detail throughout this report.

1.2 Loss Intervention Recommendations: Cost/Benefit Perspective

The results of this study find that not all of the intervention options are equally valuable from a financial perspective. Key attributes that are unique to each option are the associated capital costs, operating expense, reduction in annual losses (kWh/Yr) and cost/benefit ratio. It must also be pointed out that some of the options investigated in this report are qualitative in nature and associated costs and benefits can not be accurately quantified. The evaluation of such options is therefore limited to R. W. Beck's opinion and experience.

DOMLEC's existing parameters were assessed to determine effective loss intervention methods. However, the results of this evaluation are limited by the level of sophistication found in DOMLEC's power flow input database. The following table illustrates the sources of technical losses evaluated on the system.

Table 1-1: Source of Technical Losses

Source of Losses	Total Losses (kWH/yr) (1)	% of Total Losses
Transformers at Generation Stations	803,491	6.9%
11kV System	1,906,394	16.4%
11,000V - 400V transformers (2)	405,036	3.5%
11,000V - 230V transformers (3)	671,899	5.8%
400V Secondary (2)	5,308,867	45.6%
200V Secondary (3)	2,538,286	21.8%
Total	11,633,985	100.0%

Notes:
(1) Load Factor of 69.3% used to calculate kWH/yr. [= (Load Factor)*(Peak KW Losses)*(8760 Hours)]
(2) Losses determined by power flow losses of Bath Road 3-phase circuit, Bath Road transformer kVA, total number of 400V circuits, and total 400V kVA
(3) Losses determined by power flow losses of Grand Bay 1-phase circuit, Grand Bay transformer kVA, total number of 230V circuits, and total 230V kVA

An important outcome of these detailed analyses is the cost/benefit ratio for each loss intervention measure. All of the costs reported in this report are in Eastern Caribbean Dollars (EC$) and, when necessary, an exchange rate to United States Dollars (US$) was assumed to be EC $2.70: US $1.00. Based solely on the perspective of cost/benefit analyses and decisions regarding choices between similar options, the following measure is recommended:

- Install 1,650kVAR of additional capacitors (Option 10, cost/benefit equals 0.78)

In addition, there are several options that should be considered which slightly exceed the optimal cost/benefit ratio. These are

- Track Possible Cases of Theft (Option 25, cost/benefit equals 1.06)
- Replace Distribution Transformers due to loading (Option 20, cost/benefit equals 2.42)
- Reconductor 400V Secondary with Wasp (Option 3, cost/benefit equals 2.46)

The following table depicts key features of the 20 quantitative electric loss intervention measures that were investigated in this report.

Table 1-2: Summary of Loss Intervention Options and Cost/Benefit Ratios

		COST ANALYSIS		BENEFIT ANALYSIS		
OPTION	CASE	TOTAL CAPITAL COST (EC$) (1)	PRESENT VALUE OF 20 YR COST (EC$) (2)	REDUCTION FROM BASE LOSSES (kWh/YR) (3)	PRESENT VALUE OF 20YR LOSS REDUCTION (EC$) (4)	COST/BENEFIT RATIO
0	Base Case	$ -	-	-	$ -	-
1	Reconductor 11kV feeders with 175mm Elms	6,505,200	17,401,286	443,347	880,830	19.76
2	Reconductor 11kV feeders with 150mm Ash	5,421,000	14,501,071	473,714	941,161	15.41
3	Reconductor 400 V Secondary with Wasp	5,568,000	14,894,293	3,042,700	6,045,147	2.46
4	Reconductor 400 V Secondary with 70mm ABC	5,568,000	14,894,293	1,378,628	2,739,019	5.44
5	Reconductor 400 V Secondary with 150mm ABC	8,939,703	23,913,534	3,668,245	7,287,962	3.28
6	Reconductor 230 V Secondary with Wasp	18,721,111	50,078,614	1,627,632	3,233,731	15.49
7	Reconductor 230 V Secondary with 70mm ABC	18,721,111	50,078,614	540,520	1,073,888	46.63
8	Install Additional Capacitors - 900 kVAR	27,500	108,753	46,764	92,909	1.17
9	Install Additional Capacitors - 1,350 kVAR	47,500	165,938	105,067	208,745	0.79
10	Install Additional Capacitors - 1,650 kVAR	66,637	220,655	141,507	281,142	0.78
11	Install Additional Capacitors - 1,950 kVAR	104,007	347,972	173,088	343,886	1.01
12	FC-SL 20 kV Line at 75mm Willow with Midpoint Sub	9,216,000	36,446,094	(92,313)	(183,406)	(198.72)
13	FC-SL 20 kV Line at 150mm Ash with Midpoint Sub	11,308,000	44,719,230	308,521	612,961	72.96
14	FC-SL 33 kV Line at 75mm Willow with Midpoint Sub	11,146,000	44,078,576	(1,215)	(2,413)	(18,265.37)
15	FC-SL 33 kV Line at 150mm Ash with Midpoint Sub	13,058,000	51,639,875	346,175	687,771	75.08
16	FC-SL 66 kV Line at 75mm Willow with Midpoint Sub	12,758,000	50,453,479	287,872	571,936	88.22
17	FC-SL 66 kV Line at 150mm Ash with Midpoint Sub	15,020,000	59,398,907	394,154	783,094	75.85
18	Replace Distribution Transformers (20%)	33,550	89,746	729	1,448	61.98
19	Replace Distribution Transformers (30%)	35,100	93,892	1,093	2,172	43.23
20	Replace Distribution Transformers (Loading)	7,155	19,139	2,429	7,899	2.42

(1) Total Capital Costs assume that each Option is operational at the beginning of year 1.
(2) The Present Value of 20 Year Cost includes all costs with the exception of the cost of losses and is discounted at a rate of 9%.
(3) Assumes that losses are constant over 20 years. Annual kWh = (Load Factor)*(Peak kW Losses)*(8760 Hours)
(4) Assumes cost of losses is $1,321.81 EC/kW

Sorting the above loss intervention measures by their respective cost/benefit ratios results in a ranking that can be used to guide future project implementation, as shown in the following table.

Table 1-3: Loss Intervention Options Sorted by Cost/Benefit Ratio

		COST ANALYSIS		BENEFIT ANALYSIS		
OPTION	CASE	TOTAL CAPITAL COST (EC$)[1]	PRESENT VALUE OF 20 YR COST (EC$)[2]	REDUCTION FROM BASE LOSSES (kWh/YR)[3]	PRESENT VALUE OF 20YR LOSS REDUCTION (EC$)[4]	COST/BENEFIT RATIO
10	Install Additional Capacitors - 1,650 kVAR	66,637	220,655	142,721	281,142	0.78
9	Install Additional Capacitors - 1,350 kVAR	47,500	165,938	106,282	208,745	0.79
11	Install Additional Capacitors - 1,950 kVAR	104,007	347,972	174,302	343,886	1.01
8	Install Additional Capacitors - 900 kVAR	27,500	108,753	47,979	92,909	1.17
20	Upgrade transformers due to loading	7,155	19,139	2,429	7,899	2.42
3	Reconductor 400 V Secondary with Wasp	5,568,000	14,894,293	3,043,915	6,045,147	2.46
5	Reconductor 400 V Secondary with 150mm ABC	8,939,703	23,913,534	3,669,460	7,287,962	3.28
4	Reconductor 400 V Secondary with 70mm ABC	5,568,000	14,894,293	1,379,843	2,739,019	5.44
2	Reconductor 11kV feeders with 150mm Ash	5,421,000	14,501,071	474,928	941,161	15.41
6	Reconductor 230 V Secondary with Wasp	18,721,111	50,078,614	1,628,847	3,233,731	15.49
1	Reconductor 11kV feeders with 175mm Elms	6,505,200	17,401,286	444,562	880,830	19.76
19	Upgrade to low-loss transformer (30% imp. savings)	35,100	93,892	1,093	2,172	43.23
7	Reconductor 230 V Secondary with 70mm ABC	18,721,111	50,078,614	541,734	1,073,888	46.63
18	Upgrade to low-loss transformer (20% Imp. savings)	33,550	89,746	729	1,448	61.98
13	FC-SL 20 kV Line at 150mm Ash with Midpoint Sub	11,308,000	44,719,230	309,736	612,961	72.96
15	FC-SL 33 kV Line at 150mm Ash with Midpoint Sub	13,058,000	51,639,875	347,390	687,771	75.08
17	FC-SL 66 kV Line at 150mm Ash with Midpoint Sub	15,020,000	59,398,907	395,369	783,094	75.85
16	FC-SL 66 kV Line at 75mm Willow with Midpoint Sub	12,758,000	50,453,479	289,087	571,936	88.22
12	FC-SL 20 kV Line at 75mm Willow with Midpoint Sub	9,216,000	36,446,094	(92,313)	(183,406)	(198.72)
14	FC-SL 33 kV Line at 75mm Willow with Midpoint Sub	11,146,000	44,078,576	(1,215)	(2,413)	(18,265.37)

(1) Total Capital Costs assume that each Option is operational at the beginning of year 1.
(2) The Present Value of 20 Year Cost includes all costs with the exception of the cost of losses and is discounted at a rate of 9%.
(3) Assumes that losses are constant over 20 years. Annual kWh = (Load Factor)*(Peak kW Losses)*(8760 Hours)
(4) Assumes cost of losses is EC $1,321.81/kW

1.3 Additional Considerations

The above options have been assessed solely on the basis of cost/benefit analyses. Discussions regarding the cost/benefit approach are motivated by the terms and conditions stated in UNIDO's Subcontracting Terms of Reference, dated November 2004, and, its value as a useful and straight forward metric for assessing and comparing a variety of loss intervention options. While this approach is considered to be valuable, it is recognized that other factors could also influence the decision making process and, thus, need to be taken into account. The following examples are provided to illustrate this point even though their analysis is outside of the Scope of Work for this project.

- Access to capital could be partially limited, causing DOMLEC to implement only some of the capital projects noted above.

- The available labor force may be limited in specialized expertise, making certain labor intensive options more difficult.
- The environmental impact of each loss intervention option is likely to be unique and such effects could preclude or alter the implementation of any particular option. R. W. Beck understands that the island of Dominica is interested in promoting its tourist industry. The island's National Park has recently received recognition from the United Nations as a World Heritage Site and that there is an inherent link between intelligent economic development and ecology. Consequently, each of the above loss intervention measures should be further evaluated on the basis of environmental effects.
- Implementing loss intervention measures subsequently reduces the amount of energy that DOMLEC would need to produce and related airborne particulates. While such potential improvement in air quality is readily acknowledged, the quantification of this effect or an assessment of its value to Dominica is outside of the Scope of Work for this project.
- Implementing cost effective loss intervention measures would reduce DOMLEC's gross energy production and diesel fuel purchases. In light of the impact that the cost of diesel fuel has on DOMLEC, it is expected that reductions in fuel purchases could positively affect DOMLEC's financial health.
- Many recommended interventions require the acquisition of plant or equipment that is not produced or readily available on Dominica. Purchasing and delivery processes could cause delays that, in some cases, might be significant, thereby potentially influencing decisions regarding the order of implementation.
- Apart from losses, there are numerous valid reasons for launching a capital project (e.g. system stability, reliability, interconnections for future generation resources, etc.). Such motives and losses may not be mutually independent and capital should be evaluated through multiple points of view.
- The evaluation of each loss intervention measure is based on comparisons to a static system. This benchmark is simulated in power flow software, which attempts to capture the existing distribution and transmission systems. However, the adoption of any measure would clearly change the "existing" system and the quantity of resultant losses. The dynamic effects of adopting various loss intervention measures have not been examined in this report.

Section 2
METHODOLOGY

Accomplishing the objectives stated in UNIDO's Contract with R. W. Beck included an agreed upon Scope of Work and set of tasks to be undertaken. During the execution of the Scope of Work, three requested changes were authorized. The first change pertained to R. W. Beck's on-site staff (illness required the replacement of one individual). The second change called for the addition of certain R. W. Beck staff to assist in the review and assessment of using DOMLEC's Trimble unit. The third change was to replace the on-site field data collection and modeling of two 400 V circuits with one 400 V circuit and one 230 V circuit. The last change was jointly recommended by DOMLEC and R. W. Beck.

As discussed in R. W. Beck's previously provided proposals, the approach utilized in this project is founded upon the following steps:

Task 1: Project Launch and Management

- A conference call was conducted between DOMLEC, UNIDO and R. W. Beck to review project objectives and schedule and to identify the overall project team.
- R. W. Beck developed and provided DOMLEC with a request for pertinent data.
- DOMLEC expeditiously provided its response to the data request.

Task 2: On-Site Analysis of DOMLEC's Transmission and Distribution System

The following steps took place after completing Task 1 and R. W. Beck's review of DOMLEC's response to the data request:

- Meet on-site with DOMLEC's managers in key areas to discuss data needs and expected analyses while on-site.
- Analyze current practices in planning and operating DOMLEC's transmission and distribution systems through on-site interviews and data collection.
- Identify main sources of technical losses in DOMLEC's transmission and distribution system through on-site interviews and data collection.
- Identify main sources of non-technical losses in DOMLEC's transmission and distribution system through on-site interviews and data collection (e.g. meter calibration and testing, theft, construction metering, accounting and billing).
- Meet with operations staff to review practices (e.g. capacitor switching, distribution feeder re-configuration and voltage regulators).
- Meet with finance department staff to review key data to be used in financial analyses (DOMLEC's internal cost of funds, cost of debt, and cost of electric production and distribution).

- Develop estimates of the contribution of each source of losses to overall losses in order to define a baseline for future efficiency improvements (conducted off-site).
- Provide expert advisory services to DOMLEC while on-site, and through telephone calls and review of the draft and final reports.

Task 3: Develop Pipeline of Loss Reduction Measures

In order to expedite the overall project, Task 3 commenced prior to the completion of Task 2. Task 3 focused on quantifying specific cost and benefit attributes. Most of this task was conducted off-site.

- Cost analysis included:
  - Estimated annual energy and power loss reduction
  - Implementation costs
  - Expected annual savings
  - Cost/benefit analysis (including net present value and sensitivity analysis with respect to cost of electricity production and distribution)
- Provided recommendations for the development of a comprehensive T&D efficiency improvement program.
- Provided expert advisory services to DOMLEC engineers and managers as well as UNIDO project manager through on-site interviews and completion of final report.
- Conducted certain field reviews of electric facilities.
- Investigated and analyzed available electric system and loss data, as supplied by DOMLEC.
- Created quantitative estimates of losses through in-depth power flow analyses.
- Estimated the capital costs and operating expenses associated with each loss intervention option.
- Calculated cost/benefit indices for intervention measures.
- Developed priorities to guide the implementation of intervention measures.

It is R. W. Beck's opinion that each of the above tasks has been adequately completed.

Section 3
GENERIC SOURCES OF ELECTRIC LOSSES

3.1 Background

Electric system losses generally result from two general areas; intrinsic losses associated with electric current flowing through a medium (technical losses) and the administration of operating an electric utility (non-technical losses). From a generic perspective, each of these sources of losses is briefly discussed below.

3.2 Generic Sources of Losses: Technical

The primary sources of intrinsic losses are in the production of electric energy, the primary distribution system, substations and transformers, and the secondary distribution system. Each of these areas is absolutely necessary to provide customers with adequate and reliable electric power, and to some extent, associated losses are unavoidable. In contrast, administrative sources include metering, accounting, billing and decisions regarding the responsibility for various losses. Here, losses are associated with human actions and can be minimized. Each of these sources of losses is briefly described below.

Production Output and Metering

Losses within power plants can be caused by the efficiency of individual generating units (e.g. heat rate) and the metering of on-site requirements. Principal examples of on-site requirements are water pumping stations located at the plant, auxiliary power, and power transformation (e.g. step-up transformers). Options to reduce such losses are increased unit maintenance, replacement of older equipment with newer more efficient models, and careful metering practices to ensure accurate accounting for on-site loads.

Transmission and Primary Distribution System

One source of intrinsic losses is the electric transmission or primary distribution systems. In the DOMLEC system, electric current flows through the primary distribution system at 11 kV, which is fundamentally used as a transmission system and losses, are based on the current squared times the electrical resistance of transmission conductors (I^2R). Intervention options to reduce such losses include power factor correction, alternative conductor configurations; phase balancing, voltage regulation, reconductoring existing circuits, operating the transmission system at a higher voltage and utilizing express lines. The value derived from such actions varies widely due to required capital investments. Such options were examined in this study and findings are presented later in this report.

Substation and Distribution Transformers

DOMLEC's voltage transformation takes place on transformers located at the power plant (step-up transformers) and along the distribution system (between the primary and secondary distribution systems). Transformers can be an important source of losses and are comprised of load loss (copper and stray losses) and no-load loss (apparent, core, hysteresis and eddy-current losses), as noted below.

- Load and Windings Losses: The load current through the primary and secondary winding's (copper or aluminum) resistance creates I^2R losses that heat the windings and cause voltage drop.
- Stray Losses: Caused by capacitance and leakage inductance that exists between individual winding turns, between each winding and between each winding and the core.
- Apparent Losses: Caused by the magnetizing current in the primary winding.
- Core Losses: Caused by time-varying fluxes in the core.
- Hysteresis Losses: Based on the volume of the iron core and frequency of flux.
- Eddy-Current Losses: Circulating current in the iron caused by electro-magnetic fields in the core.

R. W. Beck examined the DOMLEC's available transformer data and purchasing processes to search for cost effective approaches to reducing substation and transformer losses.

Secondary Distribution and System

After electricity is generated at the power plant and flows through the primary distribution system, it is transformed to a lower voltage (e.g. 220 V or 400 V) to be useful to residences and businesses. Losses on the secondary distribution system are similar to the primary system, as noted above, and are examined later in this report.

3.3 Generic Sources of Losses: Non-Technical

Accounting for Special Customer Classes

Losses can also be affected by the accounting treatment which an electric utility applies to special customer classes, such as internal loads (own use), power plant station service, street lights, water pumping stations and business offices, religious organizations, government and donations. If such sales are not billed and included in losses, then the total losses could become overstated. Verbal reports provided to R. W. Beck suggest that DOMLEC is aware of such potential pitfalls and that the recording of sales and losses is appropriate.

Meter Reading, Billing and Accounting

An inaccurate measure of total electric losses could also come from errors or problems in meter reading, billing and accounting. Illustrative scenarios include incorrectly read meters, incorrect billing addresses, payments made in-person without bills, and readings being taken when meters are being changed-out. As discussed later in this report, it is R. W. Beck's opinion that corrective actions regarding metering might provide DOMLEC with significant benefits at a relatively low cost.

Energy Theft

Energy theft generally occurs when customers tamper with meters in a manner which results in the recording and subsequent billing that is lower than actual or correct data. A brief test for this potential problem was conducted by interviewing various DOMLEC staff and on-site field inspections during R. W. Beck's collection of data for two secondary circuits.

Planning and Design Processes

Utility staff engages in numerous processes that result in the planning and design of electric transmission and distribution systems. To guide such processes and ensure that a minimum level of service quality or reliability is achieved, many utilities adopt a set of formal planning and design criteria. Reviews of available reports during R. W. Beck's on-site meetings indicate that DOMLEC utilizes a formal set of design standards, but does not have a formal set of planning criteria. The creation and adoption of planning criteria could positively affect electric losses, as discussed later in this report.

Section 4
DATA COLLECTION, INTERVIEWS AND FIELD INVESTIGATIONS

4.1 Data Collection

Prior to conducting any investigations in the field, R. W. Beck provided DOMLEC with a data request to ascertain a broad and detailed understanding of its electric system. The following table summarizes all of the requested items and the status of the DOMLEC collection process. It must be noted that DOMLEC staff were exceptionally conscientious and diligent in its collection and dissemination of data. R. W. Beck's data request and DOMLEC's status of provisioned data, as of the date of this report, was summarized in the table found in the Appendix to this report.

It is R. W. Beck's opinion that a sufficient amount of data has been collected and shared to enable this study. Items that are not available do not significantly impede this project.

4.2 Interviews

R. W. Beck's first step in reviewing the non-physical sources of losses was to conduct informal interviews with the DOMLEC staff to obtain perspectives and observations about the items thought to most significantly contribute to losses. The following table summarizes the verbal information gleaned from such interviews, in decreasing order of importance.

Table 4-1: Sources of Losses

Source of Losses	Importance
Distribution Secondary	High
Transformers	High
Metering	Moderate-High
Transmission or Primary Distribution	Moderate
Accounting/Billing	Low
Production	Low
Theft	Low

It must be noted that such heuristic data is not empirical, is based on limited interviews and discussions with DOMLEC staff and review of data. While the above data may be of limited value, it does provide a qualitative starting point. This informal

survey was utilized for informational purposes only and did not directly influence subsequent quantitative analyses.

4.3 Field Investigation

Historical Losses

DOMLEC staff maintains data bases that capture sales, gross generation, internal use, net generation and losses. These data are collectively used to estimate the amount of percent losses on the entire system. Annual losses reported over the past several years, have been roughly 14 to 19 percent and are summarized in the following table and plot.

Table 4-2: Summary of Historical Losses [1]

Year	Sales (kWh)	Gross Generation (kWh)	Net Losses (kWh)	Losses [2] (%)
1995	45,125,000	56,209,000	9,908,000	17.8%
1996	48,581,000	60,093,000	10,447,000	17.4%
1997	52,293,000	65,742,000	12,303,000	18.7%
1998	57,294,000	70,300,000	11,732,000	16.7%
1999	60,594,000	73,977,000	12,065,000	16.3%
2000	62,005,000	77,515,000	14,142,000	18.5%
2001	63,914,000	80,965,000	15,449,000	19.4%
2002	64,194,000	80,132,000	14,430,000	18.2%
2003	62,735,000	78,434,000	14,046,000	18.2%
2004	66,419,000	79,229,000	11,329,000	14.5%

1. Source: DOMLEC's Annual Reports
2. Prior to 2000, DOMLEC reported losses as being based on Gross Generation. Year 2000 and thereafter, losses are based on Net Generation.

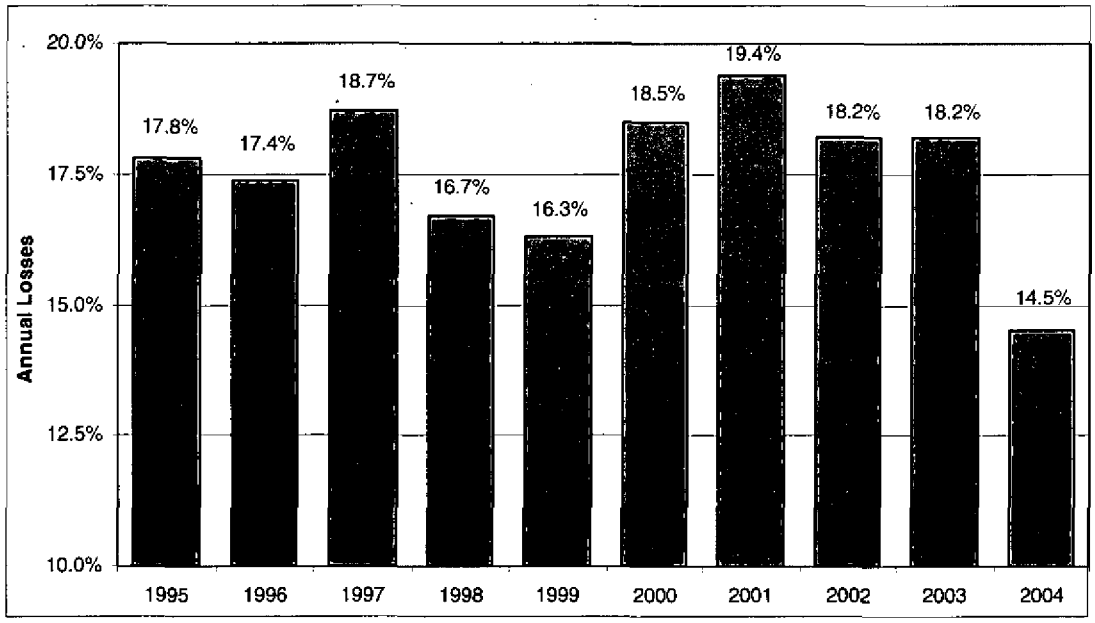

Figure 4-1 Historical Summary of Total Electric Losses

From a system-wide perspective, R. W. Beck finds that DOMLEC's total losses are relatively high. In comparison, available data from 12 other island electric systems from 1986 to 1988 shows total losses to range from roughly 4 to 20 percent, with the average being approximately 9 percent.

Fundamentally, the sources of electric losses are found in the physical characteristics of the system (technical losses) and the accounting for loads (non-technical losses). The individual physical characteristics that comprise DOMLEC's electric systems include power production, substations, transmission and distribution. Each of these areas is potentially an important source of electric losses and is briefly discussed in this section. Non-technical losses, such as accounting errors and metering, are also discussed below.

Accounting and Billing

R. W. Beck's experience in similar projects has found that non-technical problems in accounting or billing processes could result in unbilled sales, thereby resulting in an increase in computed losses. Interviews with numerous DOMLEC staff revealed general satisfaction with its existing accounting (ACCPAC) and billing (CIS Infinity) software.

Asset Management

Some DOMLEC staff expressed concern about the age of its assets and whether time related equipment degradation could affect losses. Unfortunately, DOMLEC does not utilize an asset management system or software that is suitable to provide any meaningful data about the age of assets or age by asset class, making it difficult to quantitatively test this hypothesis. From an accounting point of view, this shortcoming

is outside of the Scope of Work for this project, but is still of some concern since equipment replacement could affect losses and overall reliability.

Unit Commitment, Dispatch and the Cost of Energy

Assessing the financial cost of losses requires an understanding of the cost of energy production. This data is not only important to loss analysis, but also essential to the economic commitment and dispatch of generating units. Based on conversations with DOMLEC staff, incremental generating unit heat rates and costs are not available and unit dispatch is based on a spreadsheet based stacking order. R. W. Beck recommends that DOMLEC investigate utilizing formal unit commitment and economic dispatch software.

Transmission and Primary Distribution Systems: Background

DOMLEC utilizes a combination of radial and looped 11 kV distribution feeders to serve electric customers that are sometimes relatively far away from generating stations. It is R. W. Beck's opinion that such configurations can have a significant impact on system losses. Locating loads electrically closer to their sources reduces the total impedance between source and load and thereby reduces losses. The conductors in use today on the primary 11 kV network are summarized below (lengths are circuit distances).

Table 4-3: Feeder Conductor Summary (1)

Feeder	Ant (km)	Ash (km)	Willow (km)	Pigeon(1) (km)	Elm (km)	Total (km)
Belfast	0	5.75	21.50	0	0	27.25
Sugar Loaf East	0	0	0	26.50	0	26.50
East Coast	0	0	0	28.75	0	28.75
Lower Goodwill	0	0	0	3.50	0	3.50
North	0	3.00	7.75	0	0	10.75
Portsmouth	0	0	41.75	0	0	41.75
South	1.39	9.76	10.75	0	5.50	27.40
Total	1.39	18.51	81.75	58.75	5.50	165.90

(1) Source: Verbal reports from DOMLEC staff.

Transmission and Primary Distribution Systems: Feeder Configuration

R. W. Beck's inspection of DOMLEC's feeder demand data and configuration maps indicates considerable variation in loading among feeders. Some are heavily loaded while others are significantly lighter, as shown in the following tables. Part of this circumstance results from the widely varying nature of DOMLEC's service territory, which includes very sparsely located homes in rural, remote mountainous areas and high density homes and businesses in Roseau. Based on the available data,

R. W. Beck recommends that the DOMLEC conduct a study to better optimize its feeder configuration.

Distribution Phase Balancing

Electric customers are connected to DOMLEC's distribution system as single phase, two-phase and three-phase loads. As a practical matter, this almost always results in some degree of unbalance between phases on individual feeders and an increase in technical losses. DOMLEC staff verbally reports that it has informally inspected the phase loading on each feeder roughly two years ago and made related adjustments.

Phase Transposition

Many utilities transpose or roll the phases on their feeders as a low cost means to reduce the mutual inductance of the circuit and reduce losses. DOMLEC staff reports that it does not transpose phases.

Future Roseau – Portsmouth Transmission Line

DOMLEC informed R. W. Beck of the potential addition of a new transmission line between the Fond Cole (near Roseau) and Sugar Loaf (near Portsmouth) substations. Power flow analyses, discussed later in this report, analyze the impact that this line could have on losses.

Tree Trimming

The role that tree-line contact plays in technical losses is an open question. R. W. Beck is aware of some electric utilities that believe that, in addition to the obvious reliability concerns, trees could conduct a small amount of current and result in an increase in losses. While quantitative estimations of such currents are unavailable, tree trimming remains an area worth investigating. DOMLEC staff verbally reported that it does not have a formal tree trimming policy in place. Trees in close proximity to feeders and secondary located in sensitive areas (e.g. National Parks) are trimmed and not clear-cut. DOMLEC out-sources this effort to contractors. A system-wide, informal, review of tree trimming requirements was completed in 2004 and appears to occur annually. While DOMLEC is not maintaining any formal statistics on tree-trimming or tree related faults, it was verbally reported that trees play a role in 75 percent of all system interruptions.

Routine Inspections and Maintenance

Many electric utilities routinely perform visual inspections and maintenance as a way to prevent outages. DOMLEC staff verbally reported that it has no such formal inspection or maintenance program.

Infrared Camera

Many electric utilities utilize an infrared camera as a means to search for hot spots on the electric system and proactively replace or repair devices such as connectors, transformers or insulators. DOMLEC has had some prior experience in the use of

such cameras, but verbally reports that they have not been used since roughly 1999. DOMLEC's only infrared camera is reported to no longer be operational. However, it should also be noted that DOMLEC verbally reported that it intends to purchase a new infrared camera in the 2005-2006 time-frame.

Substation Additions

In most electric utilities, high voltage substations are considered to be at 66 kV or above. DOMLEC's entire network is below this voltage level and there are no current plans to add such networks or related high voltage substations. In contrast, DOMLEC does routinely add 11 kV to 400 V or 230 V transformation as new customers are connected.

Power Factor Correction and Capacitor Placement

Losses, voltage support and power factors are affected by the placement of capacitors throughout the distribution system. DOMLEC has taken a proactive approach to this issue by tracking existing capacitors and adding new ones as needed. To date, DOMLEC has added 27 capacitors on its 11 kV system, representing a total installed capacity of 5,800 kVAR. Under closer inspection, it appears that 1,850 kVAR, or nearly 32 percent, at 7 locations, are not currently functional. The exact reasons for this inadequacy vary from site to site and have not been investigated in any detail. This leaves an existing available set of 3,950 kVAR at 20 locations. It was also discovered that all of DOMLEC's active capacitor banks are operated manually and are continuously on, and none of the banks are switched seasonally, by time of day or by remote operation.

It should also be noted that verbal reports were received that suggest that DOMLEC intends to install an additional 1,500 kVAR of capacitance and that location studies are currently in progress. DOMLEC conducts capacitor location studies by reviewing load data.

The following table summarizes the status of DOMLEC's existing capacitor program.

Table 4-4: Capacitor Summary (1)

Feeder	Location	Total Size (kVAR)	Status
Belfast	Canefield	150	Continuously On
Belfast	Mahaut	150	Continuously On
Belfast	Massacre School	150	Continuously On
East Coast	Castle Bruce	150	Continuously On
East Coast	Rosalie	150	Continuously On
Lower Goodwill	New Market	400	Continuously On
North	Bath Estate	150	Continuously On
North	Fire Station	400	Continuously On
North	Valley Road (Close to DGS)	150	Continuously On
Portsmouth	Fond Cole	300	Continuously On
Portsmouth	Jimmit Stretch	150	Continuously On
Portsmouth	Layou	150	Continuously On
Portsmouth	Tebaie	150	Continuously On
South	Castle Comfort (North Side)	150	Continuously On
South	Elmshall West	150	Continuously On
South	Grandbay	150	Continuously On
South	Snug Corner	300	Continuously On
South	Soufriere (School Savannah)	150	Continuously On
Sugarloaf East	Marigot Fire Station	150	Continuously On
Sugarloaf East	Wesley	300	Continuously On
Subtotal		**3,950**	
East Coast	North End	150	Not Operational
East Coast	Riviere Cyrique (Switching Site)	150	Not Operational
North	St. Aroment	150	Not Operational
Portsmouth	Picard Coconut Beach	300	Not Operational
Portsmouth	Purple Turtle Beach	150	Not Operational
Portsmouth	Salisbury Main Road (Close to Isolator)	150	Not Operational
TFI	Fond Cole	800	Not Operational
Subtotal		**1,850**	
Total		**5,800**	

(1) Data is based on DOMLEC's report titled, "Capacitor Banks on the Network" and verbal information provided by DOMLEC staff.

System Planning Criteria and Design Standards

Providing electric customers with reliable and uniform service across geographic regions and customer classes is often accomplished by utilizing a formal set of system planning criteria (e.g. voltage drop requirements, acceptable line loading, power factor, etc.) and design standards (e.g. minimum ground clearances, pole heights, cross arms, primary conductors, secondary conductors, etc). While these issues may not appear to be directly pertinent to losses, they do indirectly play a role here by dictating the standards that systems are designed to achieve. Meetings with DOMLEC staff indicate that DOMLEC currently utilizes design standards in the design and construction of its transmission and distribution systems. However, discussions in regard to planning criteria led to a different conclusion.

DOMLEC verbally reported that while many practices are commonly utilized in the planning of transmission and distribution systems, there is no formal set of rules. Some of the accepted practices utilized to date include:

- Acceptable voltage drop on the 11 kV and 400 V systems is defined to be +4 percent and -8 percent of nominal
- Acceptable frequencies on the 11 kV system are +/- 3 percent from a nominal 50 Hertz (48.5 Hz to 51.5 Hz)
- The distance between the 11 kV / 400 V transformer and the customer is limited to 1,200 feet
- Service drops are limited to 100 feet (the 400 V or 230 V drop to the customers)

In contrast, some of the areas where there are no existing planning criteria include the following:

- Continuous line loading
- Short-term or emergency line loading
- Customer power factor
- Continuous transformer loading
- Short-term or emergency transformer loading
- Minimum and maximum voltages
- Breaker fault duties
- Protection standards (e.g. fuse coordination)

Transformer Purchasing

Discussions with DOMLEC staff brought to light several issues pertaining to the processes surrounding transformer purchases. It appears that distribution transformers are purchased primarily on the basis of initial capital cost and that the cost of losses is a secondary issue. Computing the total life cycle cost of a transformer requires the application of the cost of energy and losses. DOMLEC is currently investigating an alternative approach to its transformer purchasing methods.

Transformer Replacement – Distribution

Based on antidotal feedback, it appears that DOMLEC's 11 kV -400 V transformers are not routinely inspected or tested. Such tests could potentially identify and proactively lead to the replacement of high-loss units.

Transformer Replacement – Power Plant Step-Up

A brief investigation was made of the step-up transformers located at DOMLEC's power plants. It is R. W. Beck's opinion that such transformers commonly have a physical life of 30 years or more, most of DOMLEC's step-up transformers are

significantly younger than this benchmark and that replacement is not eminent for technical reasons.

Primary and Secondary Distribution Conductors

The conductors used in DOMLEC's primary 11 kV distribution systems include:

- Ash 150 mm Al *
- Willow 75 mm Al
- Linnet 198.4 mm ACSR
- Pigeon 99.3 mm ACSR

The secondary distribution system (400 V and 230 V) is generally comprised of the following:

- Aerial bundled conductor (ABC) 150 mm *
- ABC 70 mm *
- Wasp 100 mm Al *
- Ant 50 mm Al
- #4 Copper
- #6 Copper

* Denotes DOMLEC's current standard.

Each conductor has its own unique impedances and costs for capital and losses (due to the relationship between impedance and losses). Based on interviews with DOMLEC staff, it appears that decisions regarding the purchase of secondary conductors do not include the cost of losses. It is R. W. Beck's opinion that the cost of losses should be included in future secondary conductor purchases, thereby reducing the future cost of losses.

Meters: Generating Stations

R. W. Beck briefly inspected DOMLEC's generating stations at Fond Cole, Sugar Loaf, Padu, Old Trafalgar, New Trafalgar and Laudat to review whether existing metering adequately accounted for station service (recorded as Own Use) to yield an accurate representation of net available plant output. This review and verbal information provided by DOMLEC staff suggest that meters are adequately measuring net generation.

Meters: Unread and Unaccounted For Meters

DOMLEC has outsourced its meter reading function to three firms and most of the new meter readers are actually displaced former meter readers. Individual meter readers are rotated from cycle to cycle every month, which minimizes the possibility of intentionally misreading a meter for personal financial gain.

Inaccurate meter data could hypothetically result in an increase in computed (non-technical) losses. Illustrative examples of circumstances that could result in bad data include:

- Some DOMLEC customers make payments in person without ever receiving a bill. In such cases, the post office might return the uncollected bill to DOMLEC, which would then potentially appear to be a bad address.
- Some DOMLEC customers are switching between traditional metering and billing to "pay as you use" meters. The transitional period of physically changing out the meter unfortunately presents an opportunity for temporary confusion. Pre-payment also causes an inherent time lapse between the time that the sale is recorded and period when energy is used.
- A locked gate might prevent access to the meter
- A dog might prevent access to the meter
- Damaged meter
- Meter tampering (theft)

DOMLEC staff verbally reported that metered customer data is tested in software for reads that are unusually high or low. Specific DOMLEC staff is assigned the responsibility to resolve such matters and often direct a meter reader to take a second reading. It appears that DOMLEC might have a backlog in resolving such problems and, in some cases, problems might still persist and a temporary flat rate is charged until the situation can be fully resolved.

DOMLEC staff report that there are some problems with meter reading, meter accuracy and accounting. In each of these cases, DOMLEC's internal reporting systems might be including the energy produced for such customers as generation, without any direct designation for unaccounted for sales. Consequently, losses might be overstated. While DOMLEC's available reports do not provide a concrete estimate for the amount of energy that is unaccounted for, we can extrapolate some rough estimates.

In an attempt to quantify the effects of meter reading problems and possible impacts on losses, DOMLEC's records for the number of monthly bills that are read, exceptions and accounts not billed were utilized (Exception Report). The following table reflects DOMLEC's records for year-to-date 2005 and an extrapolation for the entire year. These data show that, in a given year, there are approximately 1,323 accounts that go unbilled, or 0.41 percent of the total number of bills issued. It must be noted that this approach is merely a high-level approximation since it inherently intermingles all of DOMLEC's customer classes (e.g. domestic, commercial, industrial, hotel, lighting and street lighting). None the less, applying these 1,323 annually unbilled accounts to DOMLEC's average energy usage per account (the 2004 Annual Report states that 28,980 customers used 66,419,000 kWh), results in a rough approximation that 3,032,172 kWh/Yr is unbilled due to meter reading problems. This figure reflects roughly 27 percent of DOMLEC's annual losses.

Once again, it must be noted that the above analysis is merely a rough approximation since the referenced reports were not designed to track losses and that gross approximations have been utilized. Despite this necessary caveat, it is R. W. Beck's opinion that between 25 to 50 percent of the unbilled 3,032,172 kWh/Yr may be accounted for in DOMLEC's records as losses, and, could be reduced by utilizing Pay-As-You-Go meters for repeat offenders and the replacement of bad meters.

Table 4-5: Metering Exceptions in 2005 (1)

2005 Monthly Cycle	Total Customers	Regular Reads	Exceptions Computed	Exceptions Reported	Accounts Not Billed	Not Billed (Percent)
January	27,027	23,901	3,126	2,991	135	0.50%
February	26,951	24,064	2,887	2,803	84	0.31%
March	26,892	24,377	2,515	2,393	122	0.45%
April	25,786	22,785	3,001	2,907	4	0.36%
Total YTD	106,656	95,127	11,529	11,094	435	0.41%
Total 2005 (2)	324,412	289,345	35,067	33,744	1,323	0.41%

1.) Source: DOMLEC monthly exception reports for 2005.
2.) Extrapolated by the number of days read.

Meters: Replacement Project

The importance of proper meter reading and its potential impact on losses is clearly demonstrated in the above analysis. DOMLEC staff is aware of this issue and previously launched a meter replacement program. In 2002, DOMLEC conducted a pilot program to gauge the overall accuracy of its meters. While written reports and statistics are not available, antidotal feedback from DOMLEC staff was that 25 percent of the meters tested under the pilot program failed to comply with DOMLEC's standard of +/-3 percent, and, that most of these meters were under recording. In response, DOMLEC launched a meter replacement program that can be summarized in the following table.

Table 4-6: Meter Replacement Program (1)

Year	Meters Replaced	Recorded Cost	Cost Per Meter
2003 (2)	2,180	EC $931,570	EC $427
2004	2,000	EC $803,734	EC $402
2005	5,000 (3)	NA	NA
2006	5,000 (3)	NA	NA
2007	2,500 (3)	NA	NA
Total	16,500	NA	NA

1.) Source: DOMLEC verbal reports.
2.) Project began in mid-year.
3.) Planned data. Meters replaced through 17 May 2005 totaled roughly 1,000.

DOMLEC's records for the cost of meter replacement appear to include all meter related activities (e.g. installation of Pay-as-U-Go pre-paid meters, new customer meter installations, etc.). DOMLEC's Pay-as-U-Go program replaced roughly 1,000 standard meters in 2004 and 528 in 2005 (year to date 17 May 2005). In contrast, DOMLEC verbally reported that the total cost of replacing a meter is roughly EC $160 per meter. It was also reported that staff can replace 16 to 24 meters per day in locations such as Roseau and Portsmouth, but only 12 per day in Dominica's rural areas.

Energy Theft

While energy theft does not directly affect losses, it has been R. W. Beck's experience in working with other utilities that the accounting treatment for theft could result in net generation without corresponding sales. This approach could indirectly result in an increase in computed (not technical) losses since there is no related adjustment in the amount of energy generated or sales.

In general, electric utilities commonly pursue two options in dealing with the sensitive issue of energy theft; it can embark upon a public information campaign to educate constituents about the consequences of theft, or, publicize legal actions taken against offenders. Verbal reports from DOMLEC staff indicate a belief that theft is not a significant issue on Dominica and that advertisements have been used to convey the message that stealing from DOMLEC actually steals from the entire public.

DOMLEC staff also reported that its number of disconnections due to unpaid bills is relatively high. DOMLEC verbally reported that, on the average, 600 meters are disconnected every month due to unpaid bills. This equates to approximately 2 percent of all meters per month. While many of these customers are probably repeat offenders, it could account for some of DOMLEC's reported losses.

DOMLEC staff attempt to tract theft by maintaining a report titled, "Possible Pilferage Monitored" which suggests that in February and March of 2005, total possible theft is 170,773 kWh. Extrapolating this sum for an entire year results in a figure of 1,024,638 kWh. Assuming that 2005 total energy losses are 11,329,000 (which is taken from DOMLEC's 2004 Annual Report), then this would account for roughly 9 percent of all losses.

Station Service

Errors in the accounting treatment of power plant station service could inadvertently result in an overstatement of computed (not technical) losses. R. W. Beck reviewed DOMLEC's metering one-line diagrams at each generating station to determine whether station service was being properly measured and found no reason for concern. R. W. Beck also observed that DOMLEC's loss reporting format specifically separates "Own Use" from sales. DOMLEC staff verbally reported that Own Use captures loads such as station service and DOMLEC's facilities.

Street Lights

Another non-technical source of losses could be found in the accounting treatment for street lights. Ownership of street lights on Dominica falls under private, public and government. Privately owned street lights are metered and billed in the same manner as any other customer load. Public and government owned street lights are handled differently. DOMLEC staff verbally reported that it has coupled an estimate of the total number of government and public street lights from its Graphical Interface System (GIS) with an estimate of the average bulb size and assumption that each light operates for 12 hours per day. This methodology has been agreed to between DOMLEC and the island government. Consequently, it appears that street lights are not affecting DOMLEC computation of electric losses.

Section 5
LOSS INTERVENTION MEASURES – ENGINEERING AND COST ANALYSIS

5.1 Capital Cost Estimating - Background

The previous section identified the nature and benefits associated with implementing various loss intervention measures. The following discussion takes that information one step further by conducting an overall financial evaluation (e.g. cost/benefit) of each measure. To supplement R. W. Beck's experience in assessing the cost of various capital projects, verbal reports were gathered from DOMLEC staff to better understand its hands-on experience in the cost of pertinent capital projects. The following costs are of special importance to this project and have been used extensively.

Table 5-1: Construction Costs (1)

Equipment	Installed Costs (EC$)
150 kVAR Capacitor (fixed)	$ 18,685
300 kVAR Capacitor (fixed)	19,137
450 kVAR Capacitor (fixed)	20,000
900 kVAR Capacitor (switched)	27,500
1.0 MVA transformer (< 66kV)	318,000
1.0 MVA transformer (66kV)	530,000
7.5/10/12 MVA transformer with breakers	1,325,000
12/16/20 MVA transformer with breakers	*1,590,000*
Conductors	**Installed Costs (EC $/km)**
New 150mm Ash (11kV)	$ 150,000
New 150mm Ash (20 kV)	200,000
New 150mm Ash (33 kV)	250,000
New 150mm Ash (66 kV)	300,000
New 75mm Willow (11kV)	120,000
New 75mm Willow (20kV)	160,000
New 75mm Willow (33kV)	200,000
New 75mm Willow (66kV)	240,000
Reconductor 150mm Ash (11kV)	39,000
Reconductor 175mm Elms (11kV)	46,800
Reconductor Wasp (400V)	29,000
Reconductor 70mm ABC (400V)	29,000
Reconductor 150mm ABC (400V)	46,561
Reconductor Wasp (230V)	25,062
Reconductor 70mm ABC (230V)	25,062

1.) Source: Discussions with DOMLEC and R.W. Beck estimates.

- Labor Costs for Phase Balancing: DOMLEC staff verbally reported that the total installed cost of conducting phase balancing would be EC $26,693 per feeder. This cost is entirely labor and overhead labor.
- Labor Costs for Feeder Load Balancing: DOMLEC staff verbally reported that the total installed cost of conducting feeder load balancing would be EC $6,160 per feeder. This cost is entirely labor and overhead labor.
- Overhead Cost of Labor: DOMLEC reports that its overhead cost of labor is 29 percent.
- The assumptions used to generate costs in the present worth analysis are included in the Appendix to this report.
- The cost of losses, which was developed based on DOMLEC's peak load data over the previous three years, averaged EC $0.293/kWh and was used in the present worth analysis. A copy of the cost of losses calculations is located in Appendix to this report.

5.2 Power Flow Base Case

At the outset of this project, DOMLEC provided R. W. Beck with a power flow input model in EDSA format. It was represented to R. W. Beck that the model contained 2004 peak loads and the entire existing 11 kV system. A model for the 400 V and 230 V distribution secondary systems were not included. While the mutually agreed upon Scope of Work assumed that this input data base would be sufficient, it is R. W. Beck's opinion that there are short comings in DOMLEC's input data base, including the absence of distribution transformers, modeling single phase loads as balanced three phase loads and the inclusion of non-operational capacitors. The power flow analyses, which are contained in this section, examined the technical feasibility of various loss intervention measures and fundamentally assumed that the DOMLEC input data base is accurate. The Scope of Work for this project did not include a review of the accuracy of DOMLEC's power flow input data base or any associated corrections or updates. Salient features of DOMLEC's input data base include:

- Total load (real power):11.2 MW
- Total load (reactive): 8.7 MVAR
- Total load: 14.2 MVA
- Total losses (real power): 463 kW
- Total losses (reactive): 1,243 kVAR
- Total effective shunt capacitance: 3,950 kVAR
- Total shunt capacitor locations: 20
- Total effective shunt inductance: 0 kVAR
- Total number of 11 kV feeders: 7
- Total number of nodes: 196

For the purposes of studying the economic feasibility of various loss intervention measures, the instantaneous losses normally simulated in power flow analyses are converted to annual figures by using DOMLEC's load factor statistics, which are defined as the ratio of average demand to peak demand, and are contained in DOMLEC's Annual Reports. The following table depicts the Annual Report data for the last 10 years and a computed average annual load factor of 0.67.

Table 5-2: DOMLEC's Historical Load Factors (1)

Year	Load Factor	Losses (2) (% of Generation)
1995	0.67	17.8%
1996	0.68	17.4%
1997	0.66	18.7%
1998	0.65	16.7%
1999	0.65	16.3%
2000	0.68	18.2%
2001	0.67	19.1%
2002	0.70	18.0%
2003	0.69	17.9%
2004	0.68	14.3%
Average	0.67	17.4%

1.) Source: DOMLEC's Annual Reports.
2.) Prior to 2000, DOMLEC reported losses as a percent of gross generation. In 2000 and afterwards, DOMLEC reported losses as a percent of net generation.

The 10-year average annual load factor was utilized throughout the analyses contained in this section to compute a benchmark estimation of the loss reduction associated with each intervention measure. Using DOMLEC's power flow peak load of 11.2 MW (in contrast, DOMLEC's Annual Report states that the 2004 peak was 13,190 kW), average load factor of 0.67 and 10-year average losses of 17.4 percent, results in annual energy losses of 11,517,000 kWh/Yr. It is recognized that this figure is not identical to DOMLEC's loss data found in the 2004 Annual Report (11,329,000 kWh/Yr). This discrepancy is less than 2 percent, which is not considered to be significant. Moreover, the primary source of this difference appears to be to the load profile that DOMLEC utilized in its power flow input model.

It must be noted that the value of any loss intervention measure is based on its associated reduction in losses and not the absolute value of losses. Consequently, it is R. W. Beck's opinion that such short comings do not significantly impede the loss intervention analyses contained in this report. The benchmark for losses used in this report is summarized in the following table.

Table 5-3: System Loss Summary: Base Case

System	Length (km)	Losses at Peak (1) (kWh)	Annual Losses (2) (kWh/Yr)
Total	1,078	1,916	11,633,985

1.) Based on the instantaneous simulation computed in the power flow. Includes secondary losses as well.
2.) Extrapolated by average load factor.

5.3 Modeling Typical Distribution Secondary Circuits

The Scope of Work for this project was amended to include data collection and modeling for one 400 V and one 230 V distribution secondary circuit. The objective for this effort was to incorporate the mathematical model for these two circuits into DOMLEC's power flow base case to quantify system losses. DOMLEC's total number of three-phase 400 V and single-phase 230 V circuits was 107 and 470, respectively. DOMLEC verbally reported that the conductors used in roughly 75 percent of its 400 V and 230 V circuits are Ant. Remaining circuits are aerial bundled conductor (ABC) of 150 mm (for 400 V) and 70 mm (for 230 V). The nominal area for Ant is 50 mm and Wasp is 100 mm.

DOMLEC identified two specific circuits for R. W. Beck to model, in the field, using a Trimble device for accurately measuring and recording distance data. The 400V circuit was Bath Road and the 230V circuit was Grand Bay. Data collected for these two circuits was used as the basis for estimating the reduction in losses associated with candidate secondary reconductoring projects.

DOMLEC provided most of the information required for the secondary wire (ANT and WASP). The remaining data required by the engineering model was derived based on comparable American standard conductors defined in Southwire literature. No characteristics were provided by DOMLEC for the 16mm and 25mm service wire, and research on the internet yielded nothing. Therefore, the following assumptions were made to define the service wire for the engineering model:

- The sizes denote the cross-sectional area of the wire.
- The cross-sectional area of the wire was compared to American standard conductors defined in Southwire literature.
- Wire characteristics defined based on the American standard conductors.

The only secondary conductor included in the GIS database was ANT. Based on the system configurations, ANT was assumed for the remaining secondary line sections. No service wire was identified in the GIS database; however, initial discussions with DOMLEC indicated that a 50/50 selection of the two sizes available (16mm and 25mm) would be adequate. Based on the available resources, the 25mm service wires and ANT secondary are relatively the same size which seemed to be an unlikely combination. Therefore, all of the service drops were assumed to be 16mm wire.

As for transformers, DOMLEC provided the size, configuration, and impedance. R. W. Beck assumed an X/R ratio of 15.

Billing history for the energy usage (kWh) was provided by DOMLEC for each consumer. The billing data was linked to the engineering model based on the meter number collected in the field. Only 111 out of the 266 meters collected in the field matched the consumer billing information, or approximately 42%. Averages were calculated for the Bath Road and Grand Bay circuits based on the consumer billing for the month of June 2004 of the 111 matches. The calculated averages were assigned to meters in the engineering model without consumer billing, on their respective circuits. The calculated averages for each circuit are given below.

- Bath Road - 184 kWh
- Grand Bay - 94 kWh

5.4 Loss Intervention Measures – Technical Options

The next step was to use power flow analyses to simulate the effects of various technical loss intervention measures. The candidate list of technical measures includes the following:

- Options1-2: Reconductor existing 11 kV primary feeders with Elm or Ash
- Options 3-5: Reconductor existing three-phase 400 V secondary circuits with Wasp, 70mm ABC, or 150mm ABC
- Options 6-7: Reconductor existing single-phase 230 V secondary circuits with Wasp or 70mm ABC
- Option 8-11: Install additional capacitors totaling 900 kVAR, 1,350 kVAR, 1,650 kVAR and 1,950 kVAR
- Options 12-13: Construct a new Fond Cole to Portsmouth 20 kV transmission line (includes a new substation at Midpoint) with Willow or Ash
- Options 14-15: Construct a new Fond Cole to Portsmouth 33 kV transmission line (includes a new substation at Midpoint) with Willow or Ash
- Options 16-17: Construct a new Fond Cole to Portsmouth 66 kV transmission line (includes a new substation at Midpoint) with Willow or Ash
- Options 18-20: Replace distribution transformers

Each of these candidate measures are summarized below, with additional details (e.g. capital costs, operational expense, cost/benefit analyses, etc.) contained in the Appendix to this report.

5.4.1 Reconductor Existing 11 kV Feeders (Options 1-2)

Varying feeder lengths, conductor sizes and loading conditions result in different losses for each feeder. The following table reflects the losses computed by the power

flow for base case conductors and two alternative conductors (Option 1: Conductor Elms 175mm and Option 2: Conductor Ash 150mm).

Replacing the existing 85mm Pigeon and 75mm Willow conductors in DOMLEC's 11 kV system results in a new set of power flow simulated losses. The 11kV system model provided by DOMLEC was utilized to simulate the power flow in these options. The following table simulates the total losses and compares each alternative conductor scenario with the base case.

Table 5-4: Feeder Reconductoring - Annual Losses (Options 1-2)

Alternatives	Annual Losses (kWh/Yr)	Peak Losses (kW)	Reduction from Base Case (kWh/Yr)	% of Base Case
Base Case	11,633,985	1,916	0	100%
Option 1	11,190,637	1,843	443,347	96%
Option 2	11,160,271	1,838	473,714	96%

DOMLEC staff reported that, based on its prior experience in reconductoring existing 11 kV feeders on Dominica, the average cost of reconductoring is EC $39,000/km for Ash 150 mm and EC $46,800/km for Elm 175mm.This assumption was used to estimate the cost of reconductoring each option, as summarized below.

The primary results for Options 1-2 are summarized in the following table.

Table 5-5: Options 1-2 Summary

	Option 1	Option 2
km of line reconductored	139 km	139 km
Total Capital Cost	EC $ 6,505,200	EC $ 5,421,000
Present Value of 20 Yr Cost	EC $17,401,286	EC $14,501,071
Annual Loss Intervention	443,347 kWh/Yr	473,714 kWh/Yr
Present value of 20 yr Savings	EC $880,830	EC $941,161
Cost/Benefit Ratio	19.76	15.41

5.4.2 Reconductor Existing 400 V Secondary (Options 3-5)

The next loss intervention measure was to assume the reconductoring of DOMLEC's existing 400 V secondary circuits to the following conductors:

- Option 3: Conductor Wasp
- Option 4: Conductor 70mm ABC
- Option 5: Conductor 150mm ABC

Using the data collected during R. W. Beck's on-site data collection, a model for a typical 400 V circuit, Bath Road, was developed and assumed to represent all of DOMLEC's 400 V circuits. The secondary circuit was modeled using Ant as the

entire backbone conductor. We recognize the potential for errors in making this extrapolation and, consequently, recommend that this analysis be treated as a rough approximation.

Using the power flow simulation, which was created using data from the field in Windmil, to estimate losses on 400 V circuits, the following table summarizes DOMLEC's total system-wide losses with the existing 400 V secondary conductors, the optional conductors, and the associated reduction in annual losses.

Table 5-6: Reconductoring 400 V Secondaries - Annual Losses

Alternatives	Annual Losses (kWh/Yr)	Peak Losses (kW)	Reduction from Base Case (kWh/Yr)	% of Base Case
Base Case	11,633,985	1,916	0	100%
Option 3	8,591,285	1,415	3,042,700	74%
Option 4	10,255,356	1,689	1,378,628	88%
Option 5	7,965,740	1,312	3,668,245	68%

DOMLEC staff reported that, based on its prior experience in reconductoring existing 400 V secondaries on Dominica, the average cost of such work is EC $29,000/km for Wasp and 70mm ABC and EC $46,560/km for 150mm ABC. This assumption was used to estimate the cost of this candidate loss intervention measure, as summarized below.

Table 5-7: Reconductoring 400 V Secondaries – Results (Options 3-5)

	Option 3	Option 4	Option 5
km of line reconductored	192.6 km	192.6 km	192.6 km
Total Capital Cost	EC $5,568,000	EC $5,568,000	EC $8,939,703
Present Value of 20 Yr Cost	EC $14,894,293	EC $14,894,293	EC $23,913,534
Annual Loss Intervention	3,042,700 kWh/Yr	1,378,628 kWh/Yr	3,668,245 kWh/Yr
Present value of 20 yr Savings	EC $6,045,157	EC $2,739,019	EC $7,287,962
Cost/Benefit Ratio	2.46	5.44	3.28

5.4.3 Reconductor Existing 230 V Secondary (Options 6-7)

The next loss intervention measure was to assume the reconductoring of DOMLEC's existing 230 V secondary circuits to the following conductors:

- Option 6: Conductor Wasp
- Option 7: Conductor 70mm ABC

Using the data collected during R. W. Beck's on-site data collection, a model for a typical 230 V circuit, Grand Bay, was developed and assumed to represent all of DOMLEC's 230 V circuits. The secondary circuit was modeled using Ant as the entire backbone conductor. We recognize the potential for errors in making this

extrapolation and, consequently, recommend that this analysis be treated as a rough approximation.

Using the power flow simulation, which was created using data from the field in Windmil, to estimate losses on 230 V circuits, the following table summarizes DOMLEC's total system-wide losses with the existing 230 V secondary conductors, the optional conductors, and the associated reduction in annual losses.

Table 5-8: Reconductoring 230 V Secondaries - Annual Losses (Options 6-7)

Alternatives	Annual Losses (kWh/Yr)	Peak Losses (kW)	Reduction from Base Case (kWh/Yr)	% of Base Case
Base Case	11,633,985	1,916	0	100%
Option 6	10,006,353	1,648	1,627,632	86%
Option 7	11,093,465	1,827	540,520	95%

DOMLEC staff reported that, based on its prior experience in reconductoring existing 230 V secondaries on Dominica, the average cost of such work is EC $25,060/km for Wasp and 70 mm ABC. This assumption was used to estimate the cost of this candidate loss intervention measure, as summarized below.

Table 5-9: Reconductoring 230 V Secondaries – Results (Options 6-7)

	Option 6	Option 7
km of line reconductored	752 km	752 km
Total Capital Cost	EC $18,721,111	EC $18,721,111
Present Value of 20 Yr Cost	EC $50,078,614	EC $50,078,614
Annual Loss Intervention	1,627,632 kWh/Yr	540,520 kWh/Yr
Present value of 20 yr Savings	EC $3,233,731	EC $1,073,888
Cost/Benefit Ratio	15.49	46.63

5.4.4 Install Additional Capacitors (Options 8-11)

The addition of capacitors can increase feeder voltages, improve power factors and reduce losses. Since the installed cost of capacitors is relatively low, this is an important candidate loss intervention measure and deserves careful scrutiny. The power flow base case provided by DOMLEC simulates a total of 6,000 kVAR at 25 locations. The preceding section contains a summary table for DOMLEC's operational (3,950 kVAR) and non-functional (1,850 kVAR) capacitors based on written and verbal reports obtained while on-site, which totals 5,800 kVAR. In light of these discrepancies and for the purposes of this project, R. W. Beck made the necessary adjustment to DOMLEC's power flow input data base to reflect 3,950 kVAR and treated this scenario as the base case. Additional options were also tested, as summarized below.

Table 5-10: Capacitor Additions (Options 8-11)

Base Case Total Capacitors (kVAR)	Option 8 Total Capacitors (kVAR)	Option 9 Total Capacitors (kVAR)	Option 10 Total Capacitors (kVAR)	Option 11 Total Capacitors (kVAR)
3,950	4,850	5,300	5,600	5,900
-	Add 900 kVAr at CS1 on LGF. (Switched Capacitor)	Replace 150 kVAR cap (off) with 450 kVAR at SA on PMF. (Fixed)	Replace cap at Cbeach on PMF (keep at 300 kVAr). (Fixed)	Replace cap at Staroma on NF (keep at 150 kVAr) & add 150 kVAr at SC on SF. (Fixed)

The optional levels of added capacitance noted above result in alternative annual total losses. The losses associated with each alternative are summarized in the following table.

Table 5-11: Capacitor Additions - Annual Losses (Option 8-11)

	Base Case (kWh/Yr)	Option 8 (kWh/Yr)	Option 9 (kWh/Yr)	Option 10 (kWh/Yr)	Option 11 (kWh/Yr)
Total	11,633,985	11,587,221	11,528,917	11,492,478	11,460,897

DOMLEC staff verbally informed R. W. Beck that, based on its reasonably recent experience in installing new capacitor banks, the cost of new installation is EC $18,685 EC for a single 150 kVAR bank and EC $19,137 for a single 300 kVAR bank. From R.W. Beck estimates based on recent purchases made by DOMLEC, the cost of new installation is EC $20,000 for a single 450 kVA bank and EC $27,500 for a single, switched 900 kVAR bank. These costs assume that no make ready or pole replacement is required. Utilizing these cost assumptions allows a cost estimate for each of the above options, as summarized in the following table.

The primary results for Options 8 through 11 are summarized below.

Table 5-12: Capacitor Additions - Results (Option 8-11)

	Option 8	Option 9	Option 10	Option 11
Total Capital Cost	EC $27,500	EC $47,500	EC $66,637	EC $104,007
Present Value of 20 Yr Cost	EC $108,753	EC $165,938	EC $220,655	EC $347,972
Annual Loss Intervention	46,764 kWh/Yr	105,067 kWh/Yr	141,507 kWh/Yr	173,088 kWh/Yr
Present value, 20 yr Savings	EC $92,909	EC $208,745	EC $281,142	EC $343,886
Cost/Benefit Ratio	1.17	0.79	0.78	1.01

5.4.5 Fond Cole to Sugar Loaf 20 kV Transmission Line (Options 12-13)

The next candidate loss intervention measures were to install a new 20 kV transmission line between the cities of Roseau (Fond Cole substation) and Portsmouth (Sugar Loaf substation) using the following conductors:

- Option 12: Conductor Willow 75mm
- Option 13: Conductor Ash 150mm

These options also require the addition of a new substation, to be located in the vicinity of Salisbury and St. Joseph, which for purposes of convenience, has been temporarily called Midpoint. The primary attributes, key assumptions, capital costs and findings for these options included the following:

- Option 12: Construct a new 20 kV transmission line between existing substations at Fond Cole and Sugar Loaf. Also, construct new 11kV lines to connect Midpoint to the 11 kV side. Total capital cost: EC $6,248,000.
- Option 12: Add one 7,500 kVA, 20 kV-11 kV transformer at Fond Cole, associated bus work and one 20 kV circuit breaker. Total capital cost: EC $1,325,000.
- Option 12: Add one 7,500 kVA, 20 kV-11 kV transformer at Sugar Loaf, associated bus work and one 20 kV circuit breaker. Total capital cost: EC $1,325,000.
- Options 12 & 13: Construct a new substation (Midpoint) assumed to be half way in-between Salisbury and St. Joseph that contains one 1,000 kVA, 20 kV-11 kV transformer, associated bus work, two 20 kV circuit breakers, and SCADA. Total capital cost: EC $318,000.
- Option 13: Construct a new 20 kV transmission line between existing substations at Fond Cole and Sugar Loaf. Also, construct new 11kV lines to connect Midpoint to the 11 kV side. Total capital cost: EC $7,810,000.
- Option 13: Add one 12,000 kVA, 20 kV-11 kV transformer at Fond Cole, associated bus work and one 20 kV circuit breaker. Total capital cost: EC $1,590,000.
- Option 13: Add one 12,000 kVA, 20 kV-11 kV transformer at Sugar Loaf, associated bus work and one 20 kV circuit breaker. Total capital cost: EC $1,590,000.
- Assumed line lengths for these circuits segments are:
  - Fond Cole to St. Joseph: 12.17 km
  - St. Joseph to Midpoint: 2.69 km
  - Midpoint to Salisbury: 2.69 km
  - Salisbury to Coulibisti: 1.78 km

- Coulibistri to Colihaut: 3.79 km
- Colihaut to Sugar Loaf: 11.59 km
- Total Fond Cole to Sugar Loaf: 34.71 km

Based on the above assumptions and analysis, the primary results for Options 12-13 are shown in the following table:

Table 5-13: Fond Cole to Sugar Loaf 20 kV Line Results (Options 12-13)

	Option 12	Option 13
Total Capital Cost	EC $9,216,000	EC $11,308,000
Present Value of 20 Yr Cost	EC $36,446,094	EC $ 44,719,230
Annual Loss Intervention	-92,313 kWh/Yr	308,521 kWh/Yr
Present value of 20 yr Savings	EC $-183,406	EC $612,961
Cost/Benefit Ratio	-198.72	72.96

A negative value in the table above represents an increase in annual losses and, therefore, an increase in the present value of the 20 year losses.

5.4.6 Fond Cole to Sugar Loaf 33 kV Transmission Line (Options 14-15)

The next candidate loss intervention measures were to install a new 33 kV transmission line between the cities of Roseau (Fond Cole substation) and Portsmouth (Sugar Loaf substation) using the following conductors:

- Option 14: Conductor Willow 75mm
- Option 15: Conductor Ash 150mm

These options also require the addition of a new substation, to be located in the vicinity of Salisbury and St. Joseph, which for purposes of convenience, has been temporarily called Midpoint. The primary attributes, key assumptions, capital costs and findings for these options included the following:

- Option 14: Construct a new 33 kV transmission line between existing substations at Fond Cole and Sugar Loaf. Also, construct new 11 kV lines to connect Midpoint to the 11 kV side. Total capital cost: EC $7,648,000.
- Options 14 & 15: Add one 12,000 kVA, 33 kV-11 kV transformer at Fond Cole, associated bus work and one 33 kV circuit breaker. Total capital cost: EC $1,590,000.
- Options 14 & 15: Add one 12,000 kVA, 33 kV-11 kV transformer at Sugar Loaf, associated bus work and one 33 kV circuit breaker. Total capital cost: EC $1,590,000.
- Options 14 & 15: Construct a new substation (Midpoint) assumed to be half way in-between Salisbury and St. Joseph that contains one 1,000 kVA, 33 kV-11 kV

transformer, associated bus work, two 33 kV circuit breakers, and SCADA. Total capital cost: EC $318,000.

- Option 15: Construct a new 33 kV transmission line between existing substations at Fond Cole and Sugar Loaf. Also, construct new 11 kV lines to connect Midpoint to the 11 kV side. Total capital cost: EC $9,560,000.

Based on the above assumptions and analysis, the primary results for Options 14-15 are shown in the following table:

Table 5-14: Fond Cole to Sugar Loaf 33 kV Line Results (Options 14-15)

	Option 14	Option 15
Total Capital Cost	EC $11,146,000	EC $13,058,000
Present Value of 20 Yr Cost	EC $44,078,576	EC $51,639,875
Annual Loss Intervention	-1,215 kWh/Yr	346,175 kWh/Yr
Present value of 20 yr Savings	EC $-2,413	EC $687,771
Cost/Benefit Ratio	-18,265.37	75.08

A negative value in the table above represents an increase in annual losses and, therefore, an increase in the present value of the 20 year losses.

5.4.7 Fond Cole to Sugar Loaf 66 kV Transmission Line (Options 16-17)

The next candidate loss intervention measures were to install a new 66 kV transmission line between the cities of Roseau (Fond Cole substation) and Portsmouth (Sugar Loaf substation) using the following conductors:

- Option 16: Conductor Willow 75mm
- Option 17: Conductor Ash 150mm

These options also require the addition of a new substation, to be located in the vicinity of Salisbury and St. Joseph, which for purposes of convenience, has been temporarily called Midpoint. The primary attributes, key assumptions, capital costs and findings for these options included the following:

- Option 16: Construct a new 66 kV transmission line between existing substations at Fond Cole and Sugar Loaf. Also, construct new 11kV lines to connect Midpoint to the 11 kV side. Total capital cost: EC $9,048,000.
- Options 16 & 17: Add one 12,000 kVA, 66 kV-11 kV transformer at Fond Cole, associated bus work and one 66 kV circuit breaker. Total capital cost: EC $1,590,000.
- Options 16 & 17: Add one 12,000 kVA, 66 kV-11 kV transformer at Portsmouth, associated bus work and one 66 kV circuit breaker. Total capital cost: EC $1,590,000.

- Options 16 & 17: Construct a new substation (Midpoint) assumed to be half way in-between Salisbury and St. Joseph that contains one 1,000 kVA, 66 kV-11 kV transformer, associated bus work, two 66 kV circuit breakers, and SCADA. Total capital cost: EC $530,000.
- Option 17: Construct a new 66 kV transmission line between existing substations at Fond Cole and Sugar Loaf. Also, construct new 11kV lines to connect Midpoint to the 11 kV side. Total capital cost: EC $11,310,000.

Based on the above assumptions and analyses, the primary results for Options 16-17 are shown in the following table:

Table 5-15: Fond Cole to Sugar Loaf Results (Options 16-17)

	Option 16	Option 17
Total Capital Cost	EC $12,758,000	EC $15,020,000
Present Value of 20 Yr Cost	EC $50,453,479	EC $59,398,907
Annual Loss Intervention	287,872 kWh/Yr	394,154 kWh/Yr
Present value of 20 yr Savings	EC $571,936	EC $783,094
Cost/Benefit Ratio	88.22	75.85

5.4.8 Transformer Replacement (Options 18-20)

DOMLEC verbally reported that UNIDO's prior technical evaluation indicated that it could reduce its current losses by 1 to 2 percent by replacing 256 11kV/400V transformers throughout the system. The UNIDO analysis focused on the reduction of losses based on the utilization of low-loss transformers and optimizing the transformer size to existing loads. The following three different options were analyzed for transformer replacement:

- Option 18: Replace Grand Bay and Bath Road transformers with a low-loss transformer (20% impedance savings from the Base Case transformer).
- Option 19: Replace Grand Bay and Bath Road transformers with a low-loss transformer (30% impedance savings from the Base Case transformer).
- Option 20: Replace existing three (3) single-phase 25 kVA transformers with three (3) single-phase 7.5 kVA transformers on Pierre Charles, Grand Bay and replace existing one (1) single-phase 50 kVA with one (1) single-phase 10 kVA transformer on Belfast North (due to loading).

Based on information from DOMLEC staff and an added premium for low-loss transformers, the total installed capital cost of replacing a single-phase 50 kVA transformer with 20% impedance savings is EC $3,650, and the cost of replacing a three-phase 500 kVA transformer with 20% impedance savings is EC $29,900. For transformers with 30% impedance savings, these costs are EC $3,800 and EC $31,300, respectively. Also, the cost of a single-phase 7.5 kVA transformer is EC $1,723, and the cost of a single-phase 10 kVA transformer is EC $1,988.

Based on the above assumptions and analyses, the results for Options 18-20 are summarized in the following table:

Table 5-16: Transformer Replacement Results (Options 18-20)

	Option 18	Option 19	Option 20
Total Capital Cost	EC $33,550	EC $35,100	EC $7,155
Present Value of 20 Yr Cost	EC $89,746	EC $93,892	EC $19,139
Annual Loss Intervention	729 kWH/yr	1,093 kWH/yr	2,429 kWH/yr
Present value of 20 yr Savings	EC $1,448	EC $2,172	EC $7,899
Cost/Benefit Ratio	61.98	43.23	2.42

5.5 Loss Intervention Measures – Non-Technical Options

The preceding loss intervention measures are fundamentally technical in nature. Their capital costs are relatively high and existing analytical tools are well suited to conducting required analyses. In contrast, there are also a number of non-technical options available to DOMLEC. Such options would generally require more labor, require relatively less capital, are not quantifiable and require estimations that are based on R. W. Beck's experience. The candidate non-technical loss intervention measures examined here include the following.

- Option 21: New Policy for Customer Power Factors
- Option 22: Phase Balancing
- Option 23: Replace existing customer meters
- Option 24: Modify existing loss accounting processes
- Option 25: Track possible cases of theft
- Option 26: Modify existing planning processes
- Option 27: Purchase and utilize an infrared camera

Despite the inherent obstacles in quantifying the loss intervention and cost/benefit of these candidate measures, their potential value to DOMLEC could be considerable and are discussed in greater detail below.

5.5.1 New Policy for Customer Power Factor (Option 21)

Another loss intervention measure is the application of customer based power factor criteria (Option 21). This option is considered to be technical in nature since potential corrective actions require capital additions (e.g. capacitor additions at the customer site). DOMLEC verbally reported that while it does not currently have the authority to apply a power factor standard, its Electricity Act is expected to be re-negotiated with Dominica government in the near future and that this constraint could be lifted. Future direct capital costs may be the responsibility of DOMLEC's customers. In closing, this

option is recommended even though its cost/benefit ratio can not be assessed since the analysis would need to be conducted on a case by case basis.

5.5.2 Phase Balancing (Option 22)

DOMLEC provides three-phase and single-phase service to its customers from its 400 V and 230 V circuits. In general, phase imbalances contributes to continual variations in phase loading, thereby making it practically impossible to perfectly balance the loading on any feeder throughout a significant period of time. Such imbalance causes an increase in conductor losses and it is recommended that DOMLEC annually study its phase balancing and reconnect customers as needed (Option 22).

It is R. W. Beck's opinion that sufficient distribution power flow input data bases contains a phase-by-phase model of loads. Such information is necessary in studying the effects of phase balancing and quantifying potential loss intervention. Unfortunately, phase balancing analyses could not be conducted here since DOLMEC's input data base does not contain such critical information.

It should be noted that phase balancing is actually a technical loss intervention measure. However, since DOMLEC's power flow input data base simulates transformer connections as being balanced, three-phase loads instead of single, two- and three-phase loads, preferred rigorous technical approach is not feasible. Consequently, this measure becomes a matter of policy, whereby DOMLEC would conduct a periodic review of all phases and feeders and make modifications as required.

5.5.3 Replace Existing Customer Meters (Option 23)

The next loss intervention measure assessed the continued replacement of customer meters (Option 23). Earlier in this report, a discussion was presented about DOMLEC's program to replace its existing customer meters. While this program is likely to be beneficial in providing customers with an accurate bill, no data is available to demonstrate that this program will cause a reduction in losses.

5.5.4 Modify Existing Loss Accounting Processes (Option 24)

R. W. Beck's review of DOMLEC's existing loss accounting processes found unresolved issues regarding how losses were being tracked and reported. Some specific examples of energy consumption that may be inadvertently accounted for as losses include the following:

- Cases where meter reading data is in error and unresolved
- Cases of possible proliferation of energy
- Cases where DOMLEC has made a donation to other firms in the form of energy
- Cases where the actual number of government owned street lights is greater than the computed number

R. W. Beck recommends that DOMLEC modify it current loss accounting practices to specifically track and report such items (Option 24). Due to the lack of data, it is not possible to complete the cost/benefit matrix for this option.

5.5.5 Track Possible Cases of Theft (Option 25)

Section 4 contains a discussion of the possible impact that theft could have on losses. To recap that discussion, R. W. Beck found that, in the sampled year, there are approximately 1,323 accounts that might go unbilled, or 0.41 percent of the total number of bills issued. Applying unbilled accounts to the average energy usage per account (the 2004 Annual Report states that 28,980 customers used 66,419,000 kWhr), results in a rough approximation that 3,032,172 kWh/Yr might be unbilled due to meter tampering issues. This figure reflects roughly 27 percent of DOMLEC's annual losses.

Despite the fact that this analysis is a high-level approximation, it is reasonable to assume that 5 percent of the potentially unbilled energy might not ever be paid for and subsequently accounted for as losses. These assumptions suggest that the potential overstatement of losses is 151,609 kWh/Yr. Resolving this issue could require a change in the way that DOMLEC accounts for losses, which requires no capital costs and minimal labor expense.

A second potential response to unpaid bills is to require repeat offenders to use Pay-As-You-Go meters. This approach is simple in nature, requiring suspected bad accounts to prepay for service and automatically curtails service when paid funds are exhausted. More importantly, Pay-as-U-Go meters could resolve the problem and actually reduce losses whereas the above accounting modification only affects loss recording and has no real impact on actual losses.

DOMLEC verbally reported that it uses outside contractors to install Pay-as-U-Go meters and that its total installed cost is EC $350 each. For 1,323 meters, the nonrecurring cost would be EC $463,050. Assuming a loss intervention of 151,609 kWh/Yr and an average cost of losses of EC $0.293/kWh, the annual benefit of loss intervention would be EC $44,421/Yr. Discounting this over the 20 year life of the meter results in a present worth of savings of EC $436,135. The following table summarizes the financial results of using Pay-as-U-Go meters.

Table 5-17: Track Possible Cases of Theft Results (Option 25)

	Option 25
Total Capital Cost	EC $463,050
Annual Operating Expense	EC $0
Annual Loss Intervention	151,609 kWh/Yr
Expected Annual Savings	EC $44,421/Yr
Cost/Benefit Ratio	1.06

The above Pay-as-U-Go meter analysis implicitly assumes that DOMLEC could achieve a 5 percent reduction in losses by reducing energy listed in its billing

exception report by a similar amount. Statistics regarding the amount of this energy that is correctly metered, eventually paid or associated with theft are, unfortunately, not available. Moreover, it was assumed that customers that tamper with their meters would no longer engage in such unlawful acts simply because a new type of meter is installed. The validity of each of these assumptions is an open question. Before pursuing this option, it is recommended that DOMLEC carefully collect statistics on the accounts and energy associated with its exception reports.

5.5.6 Modify Existing Planning Processes (Option 26)

Modifications to DOMLEC's existing planning processes could potentially result in reductions in electric losses (Option 26). The essence of this option is on *how* DOMLEC conducts various planning tasks and not on *which* tasks are conducted. For example, interviews with DOMLEC staff suggest that phase balancing, feeder balancing and protection studies are conducted on an ad hoc basis and that there are no formal planning criteria to guide the results of such analyses. This option recommends that DOMLEC formalize several planning processes. While it is not possible to quantify related costs or benefits, it is R. W. Beck's opinion that this option should be implemented in the immediate future.

5.5.7 Purchase and Utilize an Infrared Camera (Option 27)

Many electric utilities have been using infrared cameras to inspect the integrity of their distribution systems and identify "hot spots" such as loose connectors (Option 27). Such proactive programs are designed to identify and subsequently correct distribution system problems before they become disturbances and customer interruptions. It is R. W. Beck's opinion that this could be useful to DOMLEC, especially after the hurricane season when system equipment is commonly subjected to severe weather and significant vibration.

DOMLEC verbally reported that it has not conducted an inspection of its distribution system with an infrared camera for several years, but intends to purchase one in the future. R. W. Beck contacted FLIR Systems, a manufacturer of infrared cameras, and found that prices for such cameras range from EC $26,500 (E Series) to EC $132,500 (P Series). The labor component of total cost also needs to be taken into account since, for proper application, a DOMLEC employee would need to walk or slowly drive the length of its feeder system once per year (totaling roughly 178 km). It is roughly estimated that this would take between 10 to 20 percent of one person-year, or EC $8,000 per year plus depreciation. Unfortunately, the annual loss intervention of this option is uncertain and can not be forecasted.

5.5.8 Summary – Technical Loss Intervention Measures

The preceding discussion presents a total of 27 candidate loss intervention measures, 20 of which are technical in nature and 7 have been treated as being non-technical. The 20 technical options were rigorously tested over a 20 year life that simulated capital costs and operating expense under a variety of financial assumptions. Details

of each analysis are contained in the Appendix to this report. Most importantly, a cost/benefit ratio was also computed for each technical option.

A cost/benefit ratio of unity (1.00) for a given loss intervention measure is interpreted as having its present value of 20 years of benefits exactly match its present value of 20 years of costs (capital and operating). Assuming that DOMLEC's financial hurdle is a 20 year payback, it is R. W. Beck's opinion that loss intervention measures having a cost/benefit ratio of less than or equal to 1.00 should be pursued.

The next step was to create a summary of the salient features of each candidate loss intervention measure. The following table takes these data and ranks all measures by the cost/benefit ratio. This analysis finds that there are three loss intervention measures that meet the assumed cost/benefit test.

- Install 1,650kVAR of additional capacitance (0.78)
- Install 1,350kVAR of additional capacitance (0.79)
- Install 1,950kVAR of additional capacitance (1.01)

The recommendation is to install 1,650kVAR of capacitance.

It should be noted that there are several options that should be considered which slightly exceed the optimal cost/benefit ratio. These are

- Track Possible Cases of Theft (Option 25, cost/benefit equals 1.06)
- Replace Distribution Transformers due to loading (Option 20, cost/benefit equals 2.42)
- Reconductor 400V Secondary with Wasp (Option 3, cost/benefit equals 2.46)

Table 5-18: Cost/Benefit Summary

		COST ANALYSIS		BENEFIT ANALYSIS		
OPTION	CASE	TOTAL CAPITAL COST (EC$) [1]	PRESENT VALUE OF 20 YR COST (EC$) [2]	REDUCTION FROM BASE LOSSES (kWh/YR) [3]	PRESENT VALUE OF 20YR LOSS REDUCTION (EC$) [4]	COST/BENEFIT RATIO
0	Base Case	$ -	-	-	$ -	-
1	Reconductor 11kV feeders with 175mm Elms	6,505,200	17,401,286	443,347	880,830	19.76
2	Reconductor 11kV feeders with 150mm Ash	5,421,000	14,501,071	473,714	941,161	15.41
3	Reconductor 400 V Secondary with Wasp	5,568,000	14,894,293	3,042,700	6,045,147	2.46
4	Reconductor 400 V Secondary with 70mm ABC	5,568,000	14,894,293	1,378,628	2,739,019	5.44
5	Reconductor 400 V Secondary with 150mm ABC	8,939,703	23,913,534	3,668,245	7,287,962	3.28
6	Reconductor 230 V Secondary with Wasp	18,721,111	50,078,614	1,627,632	3,233,731	15.49
7	Reconductor 230 V Secondary with 70mm ABC	18,721,111	50,078,614	540,520	1,073,888	46.63
8	Install Additional Capacitors - 900 kVAR	27,500	108,753	46,764	92,909	1.17
9	Install Additional Capacitors - 1,350 kVAR	47,500	165,938	105,067	208,745	0.79
10	Install Additional Capacitors - 1,650 kVAR	66,637	220,655	141,507	281,142	0.78
11	Install Additional Capacitors - 1,950 kVAR	104,007	347,972	173,088	343,886	1.01
12	FC-SL 20 kV Line at 75mm Willow with Midpoint Sub	9,216,000	36,446,094	(92,313)	(183,406)	(198.72)
13	FC-SL 20 kV Line at 150mm Ash with Midpoint Sub	11,308,000	44,719,230	308,521	612,961	72.96
14	FC-SL 33 kV Line at 75mm Willow with Midpoint Sub	11,146,000	44,078,576	(1,215)	(2,413)	(18,265.37)
15	FC-SL 33 kV Line at 150mm Ash with Midpoint Sub	13,058,000	51,639,875	346,175	687,771	75.08
16	FC-SL 66 kV Line at 75mm Willow with Midpoint Sub	12,758,000	50,453,479	287,872	571,936	88.22
17	FC-SL 66 kV Line at 150mm Ash with Midpoint Sub	15,020,000	59,398,907	394,154	783,094	75.85
18	Replace Distribution Transformers (20%)	33,550	89,746	729	1,448	61.98
19	Replace Distribution Transformers (30%)	35,100	93,892	1,093	2,172	43.23

(1) Total Capital Costs assume that each Option is operational at the beginning of year 1.
(2) The Present Value of 20 Year Cost includes all costs with the exception of the cost of losses and is discounted at a rate of 9%.
(3) Assumes that losses are constant over 20 years. Annual kWh = (Load Factor)*(Peak kW Losses)*(8760 Hours)
(4) Assumes cost of losses is EC $1,321.81/kW

5.5.9 Summary – Non-Technical Loss Intervention Measures

In addition to the above technical loss intervention measures, this report also assessed 7 non-technical options. Unfortunately, the absence of data precludes a quantitative assessment of such measures. Consequently, the following list prioritizes the 7 non-technical loss intervention measures solely on the basis of R. W. Beck's opinions, which are founded on prior experience, and potential impacts on electric losses.

- Option 21: New Policy for Customer Power Factors (High Priority)
- Option 22: Phase Balancing (High Priority)
- Option 23: Replace existing customer meters (Medium Priority)
- Option 24: Modify existing loss accounting processes (Medium Priority)
- Option 25: Track possible cases of theft (High Priority)
- Option 26: Modify existing planning processes (Medium Priority)
- Option 27: Purchase and utilize an infrared camera (Low Priority)

Section 6
SENSITIVITY ANALYSIS

Each of the previously presented loss intervention measures is affected by DOMLEC's cost of electric production. This cost is important here since it directly places a financial value on energy losses. The following table and figures provide an historical perspective of DOMLEC's production costs, as taken from its Annual Reports. As shown below, the initial five-year period (1995-1999) depicts a time of relative price stability and DOMLEC's annual increase in its average cost of generation increased was a mere 0.35 percent. In contrast, the next five-years (2000-2004) reflect a period of significant price increases and instability in the world-wide price of diesel fuel, which have clearly taken its toll on DOMLEC. The price of diesel fuel is the primary driving force behind the jump in the average cost of production between 2002 (EC $0.183/kWh) and 2004 (EC $0.293/kWh). This two-year jump in price translates into an average annual increase of roughly 26 percent. During this same period, fuels costs rose by roughly 15 percent per year and non-fuel costs (e.g. maintenance, repair, etc.) fell by roughly 2.4 percent per year.

In review of these data, it is R. W. Beck's opinion that DOMLEC's production costs are significantly sensitive to the price of diesel fuel and are comparatively high when compared to other island utility systems.

Table 6-1: Production Costs (1)

	Non-Fuel Costs (EC $/Year)	Fuel Costs (EC $/Year)	Total Cost (EC $/Year)	Gross Generation (kWh)	Avg. Cost of Generation (EC $/kWh)
1995	4,255,000	3,862,000	8,117,000	56,209,000	$0.144
1996	3,593,000	4,311,000	7,904,000	60,093,000	$0.132
1997	3,857,000	5,218,000	9,075,000	65,742,000	$0.138
1998	4,723,000	5,042,000	9,765,000	70,300,000	$0.139
1999	4,901,000	5,987,000	10,888,000	73,977,000	$0.147
2000	6,570,000	9,893,000	16,463,000	77,515,000	$0.212
2001	8,893,000	10,678,000	19,571,000	80,965,000	$0.242
2002	6,802,000	7,875,000	14,677,000	80,132,000	$0.183
2003	5,955,000	13,471,000	19,426,000	78,434,000	$0.248
2004	5,530,000	17,698,000	23,228,000	79,229,000	$0.293

(1) Source: DOMLEC's Annual Reports

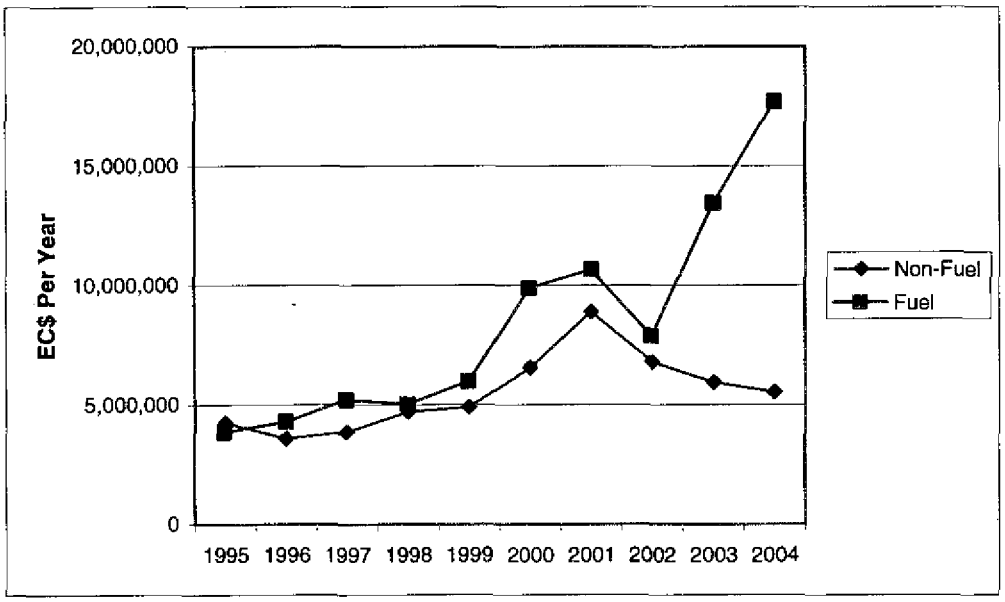

Figure 6-1: Production Costs

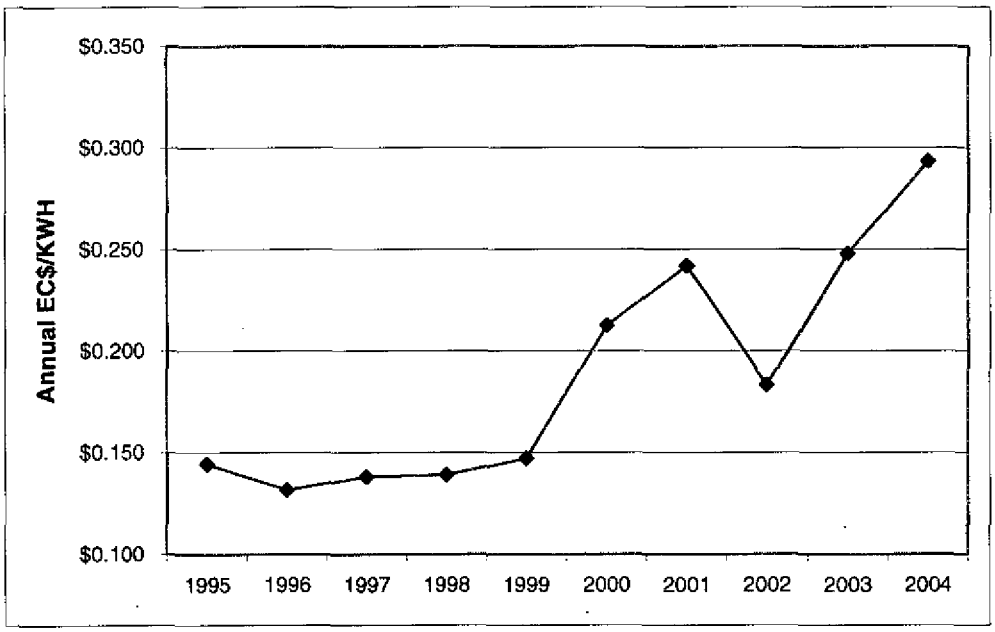

Figure 6-2: Average Production Costs

While forecasting DOMLEC's future price of diesel fuel is outside the Scope of Work for this project, this report responds to such price volatility by re-visiting the economic analyses previously presented for each loss intervention measure under a different set of price assumptions. The alternative prices assumed here are as follows:

- Decrease of 5 percent (average cost of generation is assumed to be EC $0.278/kWh)
- No change (average cost of generation is assumed to be EC $0.293/kWh)

- Increase of 5 percent (average cost of generation is assumed to be EC $0.308/kWh)
- Increase of 10 percent (average cost of generation is assumed to be EC $0.322/kWh)
- Increase of 20 percent (average cost of generation is assumed to be EC $0.352/kWh)

Based on these price assumptions, the following table lists a corresponding set of cost/benefit indices for each loss intervention measure.

Table 6-2: Impact of Alternative Production Costs on Cost/Benefit Ratios

Option	Description	5 Percent Decrease	No Change	5 Percent Increase	10 Percent Increase	20 Percent Increase
0	Base Case	N/A	N/A	N/A	N/A	N/A
1	Reconductor 11kV feeders with 175mm Elms	20.80	19.76	18.81	17.96	16.46
2	Reconductor 11kV feeders with 150mm Ash	16.22	15.41	14.67	14.01	12.84
3	Reconductor 400 V Secondary with Wasp	2.59	2.46	2.35	2.24	2.05
4	Reconductor 400 V Secondary 70mm ABC	5.72	5.44	5.18	4.94	4.53
5	Reconductor 400 V Secondary150mm ABC	3.45	3.28	3.12	2.98	2.73
6	Reconductor 230 V Secondary with Wasp	16.30	15.49	14.75	14.08	12.91
7	Reconductor 230 V Secondary 70mm ABC	49.09	46.63	44.41	42.39	38.86
8	Install Additional Capacitors - 900 kVAR	1.23	1.17	1.11	1.06	0.98
9	Install Additional Caps - 1,350 kVAR	0.84	0.79	0.76	0.72	0.66
10	Install Additional Caps - 1,650 kVAR	0.83	0.78	0.75	0.71	0.65
11	Install Additional Caps - 1,950 kVAR	1.07	1.01	0.96	0.92	0.84
12	FC-SL 20 kV Line at 75mm Willow with Midpoint Sub	(209.18)	(198.72)	(189.26)	(180.65)	(165.60)
13	FC-SL 20 kV Line at 150mm Ash with Midpoint Sub	76.80	72.96	69.48	66.32	60.80
14	FC-SL 33 kV Line at 75mm Willow with Midpoint Sub	(19,226.70)	(18,265.37)	(17,395.59)	(16,604.88)	(15,221.14)
15	FC-SL 33 kV Line at 150mm Ash with Midpoint Sub	79.03	75.08	71.51	68.26	62.57
16	FC-SL 66 kV Line at 75mm Willow with Midpoint Sub	92.86	88.22	84.01	80.20	73.51
17	FC-SL 66 kV Line at 150mm Ash with Midpoint Sub	79.84	75.85	72.24	68.96	63.21
18	Transformer (20%) Replacement	65.24	61.98	59.03	56.35	51.65
19	Transformer (30%) Replacement	45.51	43.23	41.17	39.30	36.03
20	Transformer Loading Replacement	2.55	2.42	2.31	2.20	2.02

The above sensitivity analysis focused on testing several alternative scenarios for DOMLEC's average cost of energy and losses. This report recognizes that there are additional attributes that could affect estimated cost/benefit ratios, such as the cost of labor, inflationary impact on equipment, or capital carrying charges (e.g. the interest rate that DOMLEC pays for capital equipment purchases). However, it is R. W. Beck's opinion that under current circumstances, the potential impacts caused by changes in the cost of diesel fuel probably far outweigh other attributes.

The above table demonstrates that as the cost of the energy and losses increases, the cost/benefit ratio of candidate loss intervention options improves. This effect is especially important in evaluating options that are slightly above unity, potentially causing them to become cost effective. For example, Options 8 through 11 examine the economic feasibility of adding capacitors to the system. Given the existing cost of energy and losses, the base case analysis finds that adding 1,650 kVAR of capacitance (Option 10) is the most cost effective approach, having a cost/benefit ratio of 0.78, and that adding additional capacitance (Option 11) would result in a less desirable cost/benefit ratio. However, if the cost of energy and losses increases by 5 percent, then the addition of 1,950 kVAR would also be cost effective, having a cost/benefit ratio of 0.96.

It should be noted that for no other options are affected in this manner (subject to an increase in energy and losses of up to 20 percent).

Furthermore, all options that were found to be cost effective in the base case (e.g. having a cost/benefit ratio of 1.0 or less), would still be economically prudent should the cost of energy and losses decrease by 5 percent.

Section 7
AREAS FOR FUTURE STUDY

Analyzing DOMLEC's electric losses and intervention options required R. W. Beck to investigate numerous functional areas and speak with a considerable number of DOMLEC staff. During the course of this effort, a number of areas for future studies were discovered, though, are outside of the Scope of Work for this project. Some of the more important ones are listed below, in order of priority.

7.1 New Roseau – Portsmouth Transmission Line

The analyses contained in this report support the recommendation that a new higher voltage line between Roseau and Portsmouth should be constructed. However, there are numerous important side questions, which are outside the Scope of Work for this project, that need to be addressed, including:

- The line route needs to be finalized
- Environment impact issues need to be addressed
- The location of the new 66 kV / 11 kV substation needs to be finalized
- Costs associated with the transmission line, easement and new substation need to be confirmed

It is R. W. Beck's opinion that DOMLEC's staff can address the above issues without the assistance of an outside consultant.

7.2 Resource Planning

One of the most important issues confronting DOMLEC today is its high cost of electric generation and resulting retail tariffs. The production cost information presented in Section 6 indicates that the fuel component of production costs has risen dramatically during the past two years, being driven in part by the price of diesel fuel. DOMLEC's tariffs (domestic, commercial, industrial, hotel, lighting and street lighting) have also increased and it base rate is currently the second highest among all CARILEC members.

Another consideration that affects DOMLEC's cost of generation and tariffs is the importance of environmentally friendly resource options and its relationship with economic development. R. W. Beck recommends that DOMLEC undertake a resource planning study aimed at reducing its total production costs and the implementation of renewable resources, such as hydro-electric, wind, geothermal and ocean-thermal (OTC).

Some of the efforts that are currently in progress on Dominica include the following:

- Wind power data collection
- Micro-hydro power evaluation of alternative streams
- Study modifications to the existing Padu hydro-electric plant to increase its capacity
- Study the revitalization of the existing Old Trafalgar hydro-electric plant
- A natural gas pipeline has been tentatively proposed to connect various islands and, potentially, pass relatively close to Dominica. Bringing this source of fuel to Dominica could significantly affect DOMLEC energy portfolio.

Lastly, it must be noted that the location of any future resources are expected to affect losses. The Fond Cole and Sugar Loaf generating stations are located near Dominica's two largest cities (Roseau and Portsmouth). However, since there are also numerous, smaller, communities that are relatively far from these stations, the application of distributed generation could reduce total losses.

7.3 Fuel Procurement

During the course of this project, it came to R. W. Beck's attention that DOMLEC has been purchasing all of its diesel fuel requirements from a single provider and that open bidding processes have not been fully utilized. R W. Beck recommends that DOMLEC review its fuel contract to determine the time-frame of the obligation and engage in an open Request for Proposal (RFP) bidding process for future resources.

7.4 EDSA Power Flow Software

There is some uncertainty about the capability of DOMLEC's existing EDSA® power flow package's adequately model unbalanced distribution systems. Given the nature of the local distribution system, it is essential for DOMLEC to have the capability to accurately simulate single phase loads. DOMLEC needs to confirm the capabilities of its package and update its EDSA® software as needed.

7.5 Transmission and Distribution Planning Criteria

DOMLEC currently does not have a formal transmission or distribution planning criteria. The development and adherence to such documents and philosophies could assist DOMLEC in providing uniformly reliable service to its constituents and, simultaneously, address the importance of losses in its overall design of the system.

7.6 Generating Station Meter Replacement

There is antidotal evidence that the meters at all of DOMLEC's generating stations (gross generation, net generation and own use) require testing, calibration and possible

replacement. Since test data for such meters is currently unavailable, it is not possible to comment on the accuracy of such meters. However, since verbal reports indicate that testing such meters has not occurred since their original installation, it is recommended that testing such meters be treated as a high priority.

7.7 Replace Old Conductors

DOMLEC currently appears to be at a point of transition between its old conductors and standardizing on a new set of standards. It is also appears that there is some #4 and #6 copper conductors being utilized in its distribution secondary. DOMLEC should investigate the economic feasibility of replacing such conductors.

7.8 Transient Stability Analysis

Assuming that DOMLEC implements a new Roseau-Portsmouth transmission line and resource additions, it is recommended that a transient stability analysis be conducted to reveal any problems in maximizing system integrity and reliability during system disturbances.

7.9 Transformer Purchasing

Current transformer purchasing methodologies do not fully take into account the cost of losses. Consequently, it is recommended that DOMLEC replace its existing transformer purchasing practices.

7.10 Undersea Interconnections

It may be economically feasible to interconnect Dominic with the electrical systems on Guadalupe or Martinique. This could result in a market for electricity, the sharing of resources, opportunities to capture economies of scale and cost savings.

7.11 Training

During R. W. Beck's three-week on-site work with DOMLEC staff, it became apparent that there are several areas where training could augment DOMLEC's existing skill set. Specific examples include the following:

- Data collection on the 400 V and 230 V systems
- Power flow modeling
- Power flow analysis
- Feeder load balancing
- Phase balancing
- Applying planning criteria
- Protective coordination

7.12 Asset Management Systems

DOMLEC currently does not have a formal asset management system (e.g. software) to track its equipment or depreciation. It is strongly recommended that the implementation of an asset management system could assist DOMLEC tracking its capital investments, depreciation calculations, and developing a new perspective of achieving a return on investments.

7.13 Quantifying Environmental Effects

The implementation of loss intervention measures are expected to reduce DOMLEC's gross energy generated and, subsequently, reduce the amount of associated airborne particulates. The positive environmental effects associated with implementing various loss intervention measures should be assessed.

7.14 Phase Balancing Studies

Section 5 noted that phase balancing studies could result in a cost effective means to loss intervention. It was also noted that the primary obstacle to conducting this analysis is the status of DOMLEC's power flow input data base. Consequently, it is recommended that DOMLEC update its data base to better simulate single phase loads and, subsequently, conduct a formal phase balancing study.

7.15 Feeder Balancing Studies

As noted above for phase balancing studies, Section 5 also pointed out that feeder balancing studies could result in a cost effective means to loss intervention. Again, it is unfortunate that the state of DOMLEC's power flow input data base precludes such analysis. Consequently, it is recommended that DOMLEC update its data base to better simulate the exact locations of single and three-phase loads and, subsequently, conduct a formal feeder balancing study.

7.16 High-Voltage Construction and Maintenance Practices

DOMLEC's crews are well accustomed to working on 230 V, 400 V and 11 kV systems. However, if a higher-voltage line is constructed between Fond Cole and Sugar Loaf, then additional construction and maintenance training will be necessary.

7.17 Power Flow Database

Throughout this analysis, there have been comments and discussions regarding the limitations of DOMLEC's power flow input database. It is recommended that the

database be revised and updated to better simulate single phase loads, capacitor status, and low voltage transformers.

7.18 Summary

The above recommendations for future study have been collaboratively reviewed with DOMLEC staff in order to establish a priority for future actions. The following table summarizes such projects and ranks them by relative priority.

Table 7-1: Summary of Future Studies, by Priority

Priority	Project
High	Transformer Purchasing
High	Fuel Procurement
High	Asset Management
High	Transmission and Distribution Planning Criteria
High	Transmission and Distribution Planning Training
High	Transient Stability Analysis (Existing System)
High	Generation Station Meter Replacement
High	Power Flow Database
Medium	New Roseau – Portsmouth Transmission Line
Medium	Resource Planning
Medium	Replace Old Conductors
Medium	High-Voltage Construction and Maintenance Practices
Medium	Feeder Balancing Studies
Medium	Phase Balancing Studies
Medium	Transient Stability Analysis (Post System Additions)
Low	Quantifying Environmental Effects
Low	EDSA Power Flow Software
Low	Undersea Interconnections

Appendix A
DATA REQUEST

APPENDIX A

Table A-1: Data Request Status

	Data Request	Status of Request
1.	Identify key points of contact at UNIDO (phone numbers, fax number, cell phone, e-mail address, and mailing address).	Complete
2.	Identify key points of contact at DOMLEC (phone numbers, fax number, cell phone, e-mail address, and mailing address), including the individual that is responsible for the overall Loss Reduction Project and the managers of the following departments. ■ Transmission Planning ■ Distribution Planning ■ Substation Engineering ■ Generation ■ Purchasing ■ Operations ■ Accounting ■ Billing ■ Finance ■ Meter Shop ■ Meter Readers	Complete
3.	DOMLEC's organizational chart that includes the above departments.	Complete
4.	Location of DOMLEC's offices for the above departments (e.g. which staff are located in Roseau, Portsmouth, or other locations).	Complete
5.	Do any DOMLEC staff belong to a union, and if so, which one(s)?	Complete
6.	DOMLEC field crew assistance during on-site investigation.	Complete
7.	Copy of existing transmission and distribution planning standards and criteria.	Not available
8.	Copy of existing transmission and distribution design standards and criteria.	Complete
9.	Copy of any existing policies and procedures relating to meter sealing, meter testing and investigation and prosecution of incidents suspected theft of power.	Not available
10.	List of all existing generators (including bus locations, MW and MVAR capacity, and marginal production cost data).	Complete
11.	List of all proposed generation projects (including bus locations, MW and MVAR capacity, general substation requirements, and marginal production cost data).	Not available
12.	Name of DOMLEC's power flow (or load flow) software, if available.	Complete
13.	Hardcopy output from power flow analyses (base case, peak load, light load and any other loading conditions.	Complete, Alternate loading conditions are not available
14.	Electronic copy of the input data base for DOMLEC's power flow program.	Provided, data is incomplete
15.	Hard copy of the input data base for DOMLEC's power flow program.	Complete
16.	List of existing system capacitors (including size in kVAR and location). Please also include a description of how they are switched (e.g. seasonally on/off, automatically switched by voltage, manually controlled as needed, controlled by SCADA as needed, time of day, etc.).	Complete

Data Request	Status of Request
17. Table of distribution feeders (noting overhead/underground segments, conductor sizes, length, nodes/buses, connected loads and typical conductor spacing data).	Complete
18. Copy of any reports that pertain to phase balancing on distribution feeders.	Not available
19. Copy of any reports that pertain to the transposition of transmission circuits.	Not available
20. Any available loading data for each distribution feeder and transmission line (e.g. peak loads, load factor, power factor, seasonality, etc.).	Complete
21. List of all existing overhead conductors, underground cables and underwater cables in use (including impedances, surge impedance loading and ratings).	Complete
22. List of transformers in-service (including capacity in kVA, location, low and high-side voltages, windings, impedances, age).	Not available
23. Copy of any transformer test and maintenance reports.	Testing is not conducted
24. Copy of any procedures, practices, policies or reports that pertain to tree trimming.	Not available
25. Copy of any procedures, practices, policies or reports that pertain to line and insulator inspections.	Not available
26. Copy of any recent, existing studies that pertain to losses on DOMLEC's electric system.	Existing reports are old and out of date
27. Maps and one-line diagrams of DOMLEC's electric system.	Complete
28. One-line diagrams showing the locations of generator station metering.	Complete
29. Any reports that show the real (MW), imaginary (MVAR) or total complex (MVAR) output at each generating unit.	Complete
30. Does DOMLEC have existing GPS or Trimble units that we can use?	Complete
31. What weather station data is available?	Complete
32. Power factor data (does DOMLEC have power factor data for loads, feeders, special loads, etc.)	Complete
33. .Locations and nature of any special or very large loads (e.g. demand, energy, power factor).	Complete
34. Copy of any recent capital construction plans.	Complete
35. DOMLEC financial data	Complete
36. Cost of actual DOMLEC projects, including capacitors additions, conductor costs, transformers replacement and cost of meter lock-rings	Complete
37. Please provide an office and telephone for our staff to use while on Dominica (we probably also need to be able to enter and exit outside of normal working hours).	Complete

Appendix B
COST BENEFIT ANALYSIS

DOMLEC 10/21/2005

Present Worth Analysis

		COST ANALYSIS				BENEFIT ANALYSIS			
OPTION	CASE	TOTAL CAPITAL COST ($EC) [1]	PRESENT VALUE OF 20 YR COST ($EC) [2]	Load Factor	Peak KW Losses	TOTAL LOSSES (KWH/YR) [3]	REDUCTION FROM BASE LOSSES (KWH/YR) [3]	PRESENT VALUE OF 20YR LOSS REDUCTION ($EC)	COST/BENEFIT RATIO
0	Base Case	$ -	$ -	69%	1,916	11,633,985	-	$ -	-
1	Reconductor 11kV feeders with 175mm Elms	6,505,200	17,401,286	69%	1,843	11,190,637	443,347	880,830	19.76
2	Reconductor 11kV feeders with 150mm Ash	5,421,000	14,501,071	69%	1,838	11,160,271	473,714	941,161	15.41
3	Reconductor 400 V Secondary with Wasp	5,568,000	14,894,293	69%	1,415	8,591,285	3,042,700	6,045,147	2.46
4	Reconductor 400 V Secondary with 70mm ABC	5,568,000	14,894,293	69%	1,689	10,255,356	1,378,628	2,739,019	5.44
5	Reconductor 400 V Secondary with 150mm ABC	8,939,703	23,913,534	69%	1,312	7,965,740	3,668,245	7,287,962	3.28
6	Reconductor 230 V Secondary with Wasp	18,721,111	50,078,614	69%	1,648	10,006,353	1,627,632	3,233,731	15.49
7	Reconductor 230 V Secondary with 70mm ABC	18,721,111	50,078,614	69%	1,827	11,093,465	540,520	1,073,888	46.63
8	Install Additional Capacitors - 900 kVAR	27,500	108,753	69%	1,908	11,587,221	46,764	92,909	1.17
9	Install Additional Capacitors - 1,350 kVAR	47,500	165,938	69%	1,898	11,528,917	105,067	208,745	0.79
10	Install Additional Capacitors - 1,650 kVAR	66,637	220,655	69%	1,892	11,492,478	141,507	281,142	0.78
11	Install Additional Capacitors - 1,950 kVAR	104,007	347,972	69%	1,887	11,460,897	173,088	343,886	1.01
12	FC-SL 20 kV Line at 75mm Willow with Midpoint Sub	9,216,000	36,446,094	69%	1,931	11,726,298	(92,313)	(183,406)	(198.72)
13	FC-SL 20 kV Line at 150mm Ash with Midpoint Sub	11,308,000	44,719,230	69%	1,865	11,325,463	308,521	612,961	72.96
14	FC-SL 33 kV Line at 75mm Willow with Midpoint Sub	11,146,000	44,078,576	69%	1,916	11,635,199	(1,215)	(2,413)	(18,265.37)
15	FC-SL 33 kV Line at 150mm Ash with Midpoint Sub	13,058,000	51,639,875	69%	1,859	11,287,809	346,175	687,771	75.08
16	FC-SL 66 kV Line at 75mm Willow with Midpoint Sub	12,758,000	50,453,479	69%	1,868	11,346,113	287,872	571,936	88.22
17	FC-SL 66 kV Line at 150mm Ash with Midpoint Sub	15,020,000	59,398,907	69%	1,851	11,239,831	394,154	783,094	75.85
	Low-Loss Transformer Base Case	-	-	69%	2.97	18,038	-	-	-
18	Upgrade to low-loss transformer (20% imp. savings)	33,550	89,746	69%	2.85	17,309	729	1,448	61.98
19	Upgrade to low-loss transformer (30% imp. savings)	35,100	93,892	69%	2.79	16,944	1,093	2,172	43.23
	Transformer Loading Base Case	-	-	69%	0.82	4,980	-	-	-
20	Upgrade transformers due to loading	7155	19,139	69%	0.42	2,551	2,429	7,899	2.42

Notes:
(1) Total Capital Costs assume that each Option is operational at the beginning of year 1.
(2) The Present Value of 20 Yr Cost includes all costs with the exception of the cost of losses and is discounted at a rate of 9%.
(3) Assumes that losses are constant over 20 years. Annual KWH = (Load Factor)*(Peak KW Losses)*(8760 Hours)

Exhibit 3-1
Present Worth Cost Assumptions

Interest for Present Worth Analysis	9.00%

	TRANSMISSION	SUBSTATION	DISTRIBUTION
Annual Inflation on Investment	2.50%	2.50%	2.50%
Depreciation Life of Investment (Years)	20.0	20.0	20.0
Annual Depreciation (3-yr. Avg.)	5.00%	5.00%	5.00%
Nominal Interest Rate	9.00%	9.00%	9.00%
Capital Recovery Factor (Calculated)	10.95%	10.95%	10.95%
Percent O&M Expense of Installed Plant	12.00%	12.00%	0.00%
Annual Inflation of O&M Expenses	0.00%	0.00%	0.00%
Tax on Investment Book Value	30.00%	30.00%	30.00%
Annual Inflation of Tax Rate	0.00%	0.00%	0.00%
Percent Insurance Expense of Installed Plant	3.30%	3.30%	0.00%
Annual Inflation of Insurance Expense	0.00%	0.00%	0.00%

COST OF LOSSES

Cost for 1kW of Peak Loss (Cu) ($EC)	$1,321.81
Cost for 1kW of Peak Loss (Fe) ($EC)	$2,568.22
Annual Inflation of Cost of Losses	0.00%

Notes:

- Depreciation based on Transmission & Distribution value from DOMLEC
- O&M expenses agreed upon with DOMLEC; O&M applied to new equipment only
- Insurance expenses based on Total Plant; Insurance applied to new equipment only

Present Worth Analysis

Equipment	Installed Costs ($EC)	Source
150 kVAR Capacitor (fixed)	$ 18,685	DOMLEC Staff
300 kVAR Capacitor (fixed)	19,137	DOMLEC Staff
450 kVAR Capacitor (fixed)	20,000	R.W. Beck estimates
900 kVAR Capacitor (switched)	27,500	R.W. Beck estimates based on DOMLEC cost for 3000kVAR switched bank
1.0 MVA transformer (< 66kV)	318,000	R.W. Beck estimates based on U.S. $120,000
1.0 MVA transformer (66kV)	530,000	R.W. Beck estimates based on U.S. $200,000
7.5/10/12 MVA transformer with breakers	1,325,000	R.W. Beck estimates
12/16/20 MVA transformer with breakers	1,590,000	R.W. Beck estimates

Conductors	Installed Costs ($EC/km)	Source
New 150mm Ash (11kV)	$ 150,000	DOMLEC Staff
New 150mm Ash (20 kV)	200,000	Based on R.W. Beck estimates prepared for Granada.
New 150mm Ash (33 kV)	250,000	Based on R.W. Beck estimates prepared for Granada.
New 150mm Ash (66 kV)	300,000	Based on R.W. Beck estimates prepared for Granada.
New 75mm Willow (11kV)	120,000	Assumed 20% less than reconductoring 150mm Ash
New 75mm Willow (20kV)	160,000	Assumed 20% less than reconductoring 150mm Ash
New 75mm Willow (33kV)	200,000	Assumed 20% less than reconductoring 150mm Ash
New 75mm Willow (66kV)	240,000	Assumed 20% less than reconductoring 150mm Ash
Reconductor 150mm Ash (11kV)	39,000	DOMLEC Staff
Reconductor 175mm Elms (11kV)	46,800	Assumed 20% more than reconductoring 150mm Ash
Reconductor Wasp (400V)	29,000	Assumed the same as 70mm ABC reconductoring based on conductor size
Reconductor 70mm ABC (400V)	29,000	DOMLEC Staff
Reconductor 150mm ABC (400V)	46,561	Based on estimates provided by DOMLEC (In U.S. currency: $10,090 to reconductor 70mm ABC and $16,200 to reconductor 150mm ABC)
Reconductor Wasp (230V)	25,062	Assumed the same as 70mm ABC reconductoring based on conductor size
Reconductor 70mm ABC (230V)	25,062	Based on estimates provided by DOMLEC (In U.S. currency: $14,000 to reconductor 150mm ABC (230V). Ratio used based on costs to reconductor (400V) 150mm ABC)

Base Case
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$0**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,916
20	Calculated Distribution Losses @ Peak (kW)	1,916
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$23,114,060**

Base Case - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064
TOTAL ANNUAL COST	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064	$2,532,064
Annual Present Worth Cost	**$2,322,994**	**$2,131,187**	**$1,955,218**	**$1,793,778**	**$1,645,668**	**$1,509,787**	**$1,385,126**	**$1,270,757**	**$1,165,833**	**$1,069,571**	**$981,258**	**$900,237**	**$825,905**	**$757,711**	**$695,148**	**$637,750**	**$585,092**	**$536,782**	**$492,460**	**$451,798**
Cumulative Annual Present Worth Cost	**$2,322,994**	**$4,454,182**	**$6,409,400**	**$8,203,177**	**$9,848,845**	**$11,358,632**	**$12,743,758**	**$14,014,515**	**$15,180,348**	**$16,249,919**	**$17,231,177**	**$18,131,413**	**$18,957,319**	**$19,715,030**	**$20,410,178**	**$21,047,928**	**$21,633,020**	**$22,169,802**	**$22,662,262**	**$23,114,060**

Option 1
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	Reconductor Existing 11kV Feeders with 175mm Elms (139 km)	$6,505,200
	SUBTOTAL TRANSMISSION	**$6,505,200**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$6,505,200**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,843
20	Calculated Distribution Losses @ Peak (kW)	1,843
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$39,634,516**

Option 1 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$6,505,200	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$6,505,200	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200	$6,505,200
Annual Depreciation	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260	$325,260
Cumulative Depreciation	$325,260	$650,520	$975,780	$1,301,040	$1,626,300	$1,951,560	$2,276,820	$2,602,080	$2,927,340	$3,252,600	$3,577,860	$3,903,120	$4,228,380	$4,553,640	$4,878,900	$5,204,160	$5,529,420	$5,854,680	$6,179,940	$6,505,200
Investment Book Value	$6,179,940	$5,854,680	$5,529,420	$5,204,160	$4,878,900	$4,553,640	$4,228,380	$3,903,120	$3,577,860	$3,252,600	$2,927,340	$2,602,080	$2,276,820	$1,951,560	$1,626,300	$1,301,040	$975,780	$650,520	$325,260	$0
Capital Recovery	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$1,853,982	$1,756,404	$1,658,826	$1,561,248	$1,463,670	$1,366,092	$1,268,514	$1,170,936	$1,073,358	$975,780	$878,202	$780,624	$683,046	$585,468	$487,890	$390,312	$292,734	$195,156	$97,578	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$1,853,982	$1,756,404	$1,658,826	$1,561,248	$1,463,670	$1,366,092	$1,268,514	$1,170,936	$1,073,358	$975,780	$878,202	$780,624	$683,046	$585,468	$487,890	$390,312	$292,734	$195,156	$97,578	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622	$712,622
Operating Expenses	$1,853,982	$1,756,404	$1,658,826	$1,561,248	$1,463,670	$1,366,092	$1,268,514	$1,170,936	$1,073,358	$975,780	$878,202	$780,624	$683,046	$585,468	$487,890	$390,312	$292,734	$195,156	$97,578	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572	$2,435,572
TOTAL ANNUAL COST	$5,002,176	$4,904,598	$4,807,020	$4,709,442	$4,611,864	$4,514,286	$4,416,708	$4,319,130	$4,221,552	$4,123,974	$4,026,396	$3,928,818	$3,831,240	$3,733,662	$3,636,084	$3,538,506	$3,440,928	$3,343,350	$3,245,772	$3,148,194
Annual Present Worth Cost	**$4,589,152**	**$4,128,102**	**$3,711,901**	**$3,336,287**	**$2,997,395**	**$2,691,721**	**$2,416,090**	**$2,167,626**	**$1,943,720**	**$1,742,011**	**$1,560,361**	**$1,396,831**	**$1,249,669**	**$1,117,285**	**$998,243**	**$891,243**	**$795,106**	**$708,769**	**$631,269**	**$561,735**
Cumulative Annual Present Worth Cost	**$4,589,152**	**$8,717,254**	**$12,429,155**	**$15,765,442**	**$18,762,837**	**$21,454,558**	**$23,870,649**	**$26,038,274**	**$27,981,994**	**$29,724,005**	**$31,284,366**	**$32,681,197**	**$33,930,866**	**$35,048,151**	**$36,046,394**	**$36,937,637**	**$37,732,743**	**$38,441,512**	**$39,072,781**	**$39,634,516**

Option 2
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	Reconductor Existing 11kV Feeders with 150mm Ash (139 km)	$5,421,000
	SUBTOTAL TRANSMISSION	**$5,421,000**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$5,421,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,838
20	Calculated Distribution Losses @ Peak (kW)	1,838
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$36,673,971**

Option 2 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$5,421,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$5,421,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000	$5,421,000
Annual Depreciation	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050	$271,050
Cumulative Depreciation	$271,050	$542,100	$813,150	$1,084,200	$1,355,250	$1,626,300	$1,897,350	$2,168,400	$2,439,450	$2,710,500	$2,981,550	$3,252,600	$3,523,650	$3,794,700	$4,065,750	$4,336,800	$4,607,850	$4,878,900	$5,149,950	$5,421,000
Investment Book Value	$5,149,950	$4,878,900	$4,607,850	$4,336,800	$4,065,750	$3,794,700	$3,523,650	$3,252,600	$2,981,550	$2,710,500	$2,439,450	$2,168,400	$1,897,350	$1,626,300	$1,355,250	$1,084,200	$813,150	$542,100	$271,050	$0
Capital Recovery	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$1,544,985	$1,463,670	$1,382,355	$1,301,040	$1,219,725	$1,138,410	$1,057,095	$975,780	$894,465	$813,150	$731,835	$650,520	$569,205	$487,890	$406,575	$325,260	$243,945	$162,630	$81,315	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$1,544,985	$1,463,670	$1,382,355	$1,301,040	$1,219,725	$1,138,410	$1,057,095	$975,780	$894,465	$813,150	$731,835	$650,520	$569,205	$487,890	$406,575	$325,260	$243,945	$162,630	$81,315	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851	$593,851
Operating Expenses	$1,544,985	$1,463,670	$1,382,355	$1,301,040	$1,219,725	$1,138,410	$1,057,095	$975,780	$894,465	$813,150	$731,835	$650,520	$569,205	$487,890	$406,575	$325,260	$243,945	$162,630	$81,315	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963	$2,428,963
TOTAL ANNUAL COST	$4,567,799	$4,486,484	$4,405,169	$4,323,854	$4,242,539	$4,161,224	$4,079,909	$3,998,594	$3,917,279	$3,835,964	$3,754,649	$3,673,334	$3,592,019	$3,510,704	$3,429,389	$3,348,074	$3,266,759	$3,185,444	$3,104,129	$3,022,814
Annual Present Worth Cost	**$4,190,642**	**$3,776,184**	**$3,401,599**	**$3,063,127**	**$2,757,360**	**$2,481,202**	**$2,231,850**	**$2,006,760**	**$1,803,624**	**$1,620,353**	**$1,455,050**	**$1,305,998**	**$1,171,640**	**$1,050,566**	**$941,498**	**$843,279**	**$754,860**	**$675,294**	**$603,721**	**$539,363**
Cumulative Annual Present Worth Cost	**$4,190,642**	**$7,966,826**	**$11,368,425**	**$14,431,552**	**$17,188,912**	**$19,670,114**	**$21,901,964**	**$23,908,724**	**$25,712,348**	**$27,332,701**	**$28,787,751**	**$30,093,749**	**$31,265,389**	**$32,315,955**	**$33,257,453**	**$34,100,732**	**$34,855,592**	**$35,530,886**	**$36,134,607**	**$36,673,971**

Option 3
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Reconductor Existing 400 V Secondary from Ant to Wasp (192 km of line)	$5,568,000
	SUBTOTAL DISTRIBUTION	**$5,568,000**
TOTAL CAPITAL COST		**$5,568,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,415
20	Calculated Distribution Losses @ Peak (kW)	1,415
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$31,963,207**

Option 3 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$5,568,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$5,568,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000
Annual Depreciation	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400
Cumulative Depreciation	$278,400	$556,800	$835,200	$1,113,600	$1,392,000	$1,670,400	$1,948,800	$2,227,200	$2,505,600	$2,784,000	$3,062,400	$3,340,800	$3,619,200	$3,897,600	$4,176,000	$4,454,400	$4,732,800	$5,011,200	$5,289,600	$5,568,000
Investment Book Value	$5,289,600	$5,011,200	$4,732,800	$4,454,400	$4,176,000	$3,897,600	$3,619,200	$3,340,800	$3,062,400	$2,784,000	$2,505,600	$2,227,200	$1,948,800	$1,670,400	$1,392,000	$1,113,600	$835,200	$556,800	$278,400	$0
Capital Recovery	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$1,586,880	$1,503,360	$1,419,840	$1,336,320	$1,252,800	$1,169,280	$1,085,760	$1,002,240	$918,720	$835,200	$751,680	$668,160	$584,640	$501,120	$417,600	$334,080	$250,560	$167,040	$83,520	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$1,586,880	$1,503,360	$1,419,840	$1,336,320	$1,252,800	$1,169,280	$1,085,760	$1,002,240	$918,720	$835,200	$751,680	$668,160	$584,640	$501,120	$417,600	$334,080	$250,560	$167,040	$83,520	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955
Operating Expenses	$1,586,880	$1,503,360	$1,419,840	$1,336,320	$1,252,800	$1,169,280	$1,085,760	$1,002,240	$918,720	$835,200	$751,680	$668,160	$584,640	$501,120	$417,600	$334,080	$250,560	$167,040	$83,520	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839	$1,869,839
TOTAL ANNUAL COST	$4,066,674	$3,983,154	$3,899,634	$3,816,114	$3,732,594	$3,649,074	$3,565,554	$3,482,034	$3,398,514	$3,314,994	$3,231,474	$3,147,954	$3,064,434	$2,980,914	$2,897,394	$2,813,874	$2,730,354	$2,646,834	$2,563,314	$2,479,794
Annual Present Worth Cost	**$3,730,894**	**$3,352,541**	**$3,011,233**	**$2,703,431**	**$2,425,930**	**$2,175,824**	**$1,950,480**	**$1,747,515**	**$1,564,770**	**$1,400,289**	**$1,252,302**	**$1,119,207**	**$999,553**	**$892,028**	**$795,445**	**$708,730**	**$630,912**	**$561,112**	**$498,538**	**$442,472**
Cumulative Annual Present Worth Cost	**$3,730,894**	**$7,083,435**	**$10,094,668**	**$12,798,099**	**$15,224,029**	**$17,399,853**	**$19,350,333**	**$21,097,848**	**$22,662,619**	**$24,062,908**	**$25,315,210**	**$26,434,417**	**$27,433,970**	**$28,325,998**	**$29,121,443**	**$29,830,173**	**$30,461,084**	**$31,022,197**	**$31,520,735**	**$31,963,207**

Option 4
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Reconductor Existing 400 V Secondary from Ant to 70mm ABC (192 km of line)	$5,568,000
	SUBTOTAL DISTRIBUTION	**$5,568,000**
TOTAL CAPITAL COST		**$5,568,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,689
20	Calculated Distribution Losses @ Peak (kW)	1,689
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$35,269,335**

Option 4 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$5,568,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$5,568,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000	$5,568,000
Annual Depreciation	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400	$278,400
Cumulative Depreciation	$278,400	$556,800	$835,200	$1,113,600	$1,392,000	$1,670,400	$1,948,800	$2,227,200	$2,505,600	$2,784,000	$3,062,400	$3,340,800	$3,619,200	$3,897,600	$4,176,000	$4,454,400	$4,732,800	$5,011,200	$5,289,600	$5,568,000
Investment Book Value	$5,289,600	$5,011,200	$4,732,800	$4,454,400	$4,176,000	$3,897,600	$3,619,200	$3,340,800	$3,062,400	$2,784,000	$2,505,600	$2,227,200	$1,948,800	$1,670,400	$1,392,000	$1,113,600	$835,200	$556,800	$278,400	$0
Capital Recovery	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$1,586,880	$1,503,360	$1,419,840	$1,336,320	$1,252,800	$1,169,280	$1,085,760	$1,002,240	$918,720	$835,200	$751,680	$668,160	$584,640	$501,120	$417,600	$334,080	$250,560	$167,040	$83,520	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$1,586,880	$1,503,360	$1,419,840	$1,336,320	$1,252,800	$1,169,280	$1,085,760	$1,002,240	$918,720	$835,200	$751,680	$668,160	$584,640	$501,120	$417,600	$334,080	$250,560	$167,040	$83,520	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955	$609,955
Operating Expenses	$1,586,880	$1,503,360	$1,419,840	$1,336,320	$1,252,800	$1,169,280	$1,085,760	$1,002,240	$918,720	$835,200	$751,680	$668,160	$584,640	$501,120	$417,600	$334,080	$250,560	$167,040	$83,520	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014	$2,232,014
TOTAL ANNUAL COST	$4,428,849	$4,345,329	$4,261,809	$4,178,289	$4,094,769	$4,011,249	$3,927,729	$3,844,209	$3,760,689	$3,677,169	$3,593,649	$3,510,129	$3,426,609	$3,343,089	$3,259,569	$3,176,049	$3,092,529	$3,009,009	$2,925,489	$2,841,969
Annual Present Worth Cost	**$4,063,164**	**$3,657,376**	**$3,290,898**	**$2,960,005**	**$2,661,319**	**$2,391,777**	**$2,148,602**	**$1,929,279**	**$1,731,526**	**$1,553,276**	**$1,392,657**	**$1,247,973**	**$1,117,687**	**$1,000,407**	**$894,876**	**$799,951**	**$714,600**	**$637,891**	**$568,977**	**$507,095**
Cumulative Annual Present Worth Cost	**$4,063,164**	**$7,720,540**	**$11,011,439**	**$13,971,444**	**$16,632,762**	**$19,024,539**	**$21,173,141**	**$23,102,420**	**$24,833,945**	**$26,387,221**	**$27,779,878**	**$29,027,851**	**$30,145,537**	**$31,145,945**	**$32,040,820**	**$32,840,771**	**$33,555,372**	**$34,193,263**	**$34,762,240**	**$35,269,335**

Option 5
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Reconductor Existing 400 V Secondary from Ant to 150mm ABC (192 km of line)	$8,939,703
	SUBTOTAL DISTRIBUTION	**$8,939,703**
TOTAL CAPITAL COST		**$8,939,703**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,312
20	Calculated Distribution Losses @ Peak (kW)	1,312
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$39,739,632**

Option 5 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$8,939,703	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$8,939,703	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703	$8,939,703
Annual Depreciation	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985	$446,985
Cumulative Depreciation	$446,985	$893,970	$1,340,955	$1,787,941	$2,234,926	$2,681,911	$3,128,896	$3,575,881	$4,022,866	$4,469,851	$4,916,836	$5,363,822	$5,810,807	$6,257,792	$6,704,777	$7,151,762	$7,598,747	$8,045,732	$8,492,718	$8,939,703
Investment Book Value	$8,492,718	$8,045,732	$7,598,747	$7,151,762	$6,704,777	$6,257,792	$5,810,807	$5,363,822	$4,916,836	$4,469,851	$4,022,866	$3,575,881	$3,128,896	$2,681,911	$2,234,926	$1,787,941	$1,340,955	$893,970	$446,985	$0
Capital Recovery	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$2,547,815	$2,413,720	$2,279,624	$2,145,529	$2,011,433	$1,877,338	$1,743,242	$1,609,146	$1,475,051	$1,340,955	$1,206,860	$1,072,764	$938,669	$804,573	$670,478	$536,382	$402,287	$268,191	$134,096	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$2,547,815	$2,413,720	$2,279,624	$2,145,529	$2,011,433	$1,877,338	$1,743,242	$1,609,146	$1,475,051	$1,340,955	$1,206,860	$1,072,764	$938,669	$804,573	$670,478	$536,382	$402,287	$268,191	$134,096	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313	$979,313
Operating Expenses	$2,547,815	$2,413,720	$2,279,624	$2,145,529	$2,011,433	$1,877,338	$1,743,242	$1,609,146	$1,475,051	$1,340,955	$1,206,860	$1,072,764	$938,669	$804,573	$670,478	$536,382	$402,287	$268,191	$134,096	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693	$1,733,693
TOTAL ANNUAL COST	$5,260,821	$5,126,726	$4,992,630	$4,858,535	$4,724,439	$4,590,344	$4,456,248	$4,322,153	$4,188,057	$4,053,962	$3,919,866	$3,785,771	$3,651,675	$3,517,579	$3,383,484	$3,249,388	$3,115,293	$2,981,197	$2,847,102	$2,713,006
Annual Present Worth Cost	**$4,826,442**	**$4,315,063**	**$3,855,227**	**$3,441,909**	**$3,070,561**	**$2,737,072**	**$2,437,720**	**$2,169,143**	**$1,928,298**	**$1,712,437**	**$1,519,077**	**$1,345,973**	**$1,191,098**	**$1,052,623**	**$928,895**	**$818,423**	**$719,861**	**$631,995**	**$553,732**	**$484,084**
Cumulative Annual Present Worth Cost	**$4,826,442**	**$9,141,504**	**$12,996,731**	**$16,438,640**	**$19,509,201**	**$22,246,273**	**$24,683,993**	**$26,853,136**	**$28,781,434**	**$30,493,871**	**$32,012,948**	**$33,358,921**	**$34,550,019**	**$35,602,643**	**$36,531,538**	**$37,349,960**	**$38,069,821**	**$38,701,816**	**$39,255,548**	**$39,739,632**

Option 6
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Reconductor Existing 230 V Secondary from Ant to Wasp (747 km of line)	$18,721,111
	SUBTOTAL DISTRIBUTION	**$18,721,111**
TOTAL CAPITAL COST		**$18,721,111**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,648
20	Calculated Distribution Losses @ Peak (kW)	1,648
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$69,958,943**

Option 6 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$18,721,111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$18,721,111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111
Annual Depreciation	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056
Cumulative Depreciation	$936,056	$1,872,111	$2,808,167	$3,744,222	$4,680,278	$5,616,333	$6,552,389	$7,488,444	$8,424,500	$9,360,556	$10,296,611	$11,232,667	$12,168,722	$13,104,778	$14,040,833	$14,976,889	$15,912,944	$16,849,000	$17,785,056	$18,721,111
Investment Book Value	$17,785,056	$16,849,000	$15,912,944	$14,976,889	$14,040,833	$13,104,778	$12,168,722	$11,232,667	$10,296,611	$9,360,556	$8,424,500	$7,488,444	$6,552,389	$5,616,333	$4,680,278	$3,744,222	$2,808,167	$1,872,111	$936,056	$0
Capital Recovery	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$5,335,517	$5,054,700	$4,773,883	$4,493,067	$4,212,250	$3,931,433	$3,650,617	$3,369,800	$3,088,983	$2,808,167	$2,527,350	$2,246,533	$1,965,717	$1,684,900	$1,404,083	$1,123,267	$842,450	$561,633	$280,817	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$5,335,517	$5,054,700	$4,773,883	$4,493,067	$4,212,250	$3,931,433	$3,650,617	$3,369,800	$3,088,983	$2,808,167	$2,527,350	$2,246,533	$1,965,717	$1,684,900	$1,404,083	$1,123,267	$842,450	$561,633	$280,817	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832
Operating Expenses	$5,335,517	$5,054,700	$4,773,883	$4,493,067	$4,212,250	$3,931,433	$3,650,617	$3,369,800	$3,088,983	$2,808,167	$2,527,350	$2,246,533	$1,965,717	$1,684,900	$1,404,083	$1,123,267	$842,450	$561,633	$280,817	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820	$2,177,820
TOTAL ANNUAL COST	$9,564,168	$9,283,352	$9,002,535	$8,721,718	$8,440,902	$8,160,085	$7,879,268	$7,598,452	$7,317,635	$7,036,818	$6,756,002	$6,475,185	$6,194,368	$5,913,552	$5,632,735	$5,351,918	$5,071,102	$4,790,285	$4,509,468	$4,228,652
Annual Present Worth Cost	**$8,774,466**	**$7,813,611**	**$6,951,609**	**$6,178,685**	**$5,486,007**	**$4,865,592**	**$4,310,230**	**$3,813,407**	**$3,369,242**	**$2,972,428**	**$2,618,173**	**$2,302,153**	**$2,020,471**	**$1,769,609**	**$1,546,400**	**$1,347,986**	**$1,171,796**	**$1,015,510**	**$877,045**	**$754,522**
Cumulative Annual Present Worth Cost	**$8,774,466**	**$16,588,078**	**$23,539,687**	**$29,718,372**	**$35,204,379**	**$40,069,971**	**$44,380,200**	**$48,193,607**	**$51,562,849**	**$54,535,278**	**$57,153,450**	**$59,455,603**	**$61,476,074**	**$63,245,683**	**$64,792,083**	**$66,140,070**	**$67,311,865**	**$68,327,376**	**$69,204,421**	**$69,958,943**

Option 7
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Reconductor Existing 230 V Secondary from Ant to 70mm ABC (747 km of line)	$18,721,111
	SUBTOTAL DISTRIBUTION	**$18,721,111**
TOTAL CAPITAL COST		**$18,721,111**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,827
20	Calculated Distribution Losses @ Peak (kW)	1,827
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$72,118,786**

Option 7 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$18,721,111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$18,721,111	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111	$18,721,111
Annual Depreciation	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056	$936,056
Cumulative Depreciation	$936,056	$1,872,111	$2,808,167	$3,744,222	$4,680,278	$5,616,333	$6,552,389	$7,488,444	$8,424,500	$9,360,556	$10,296,611	$11,232,667	$12,168,722	$13,104,778	$14,040,833	$14,976,889	$15,912,944	$16,849,000	$17,785,056	$18,721,111
Investment Book Value	$17,785,056	$16,849,000	$15,912,944	$14,976,889	$14,040,833	$13,104,778	$12,168,722	$11,232,667	$10,296,611	$9,360,556	$8,424,500	$7,488,444	$6,552,389	$5,616,333	$4,680,278	$3,744,222	$2,808,167	$1,872,111	$936,056	$0
Capital Recovery	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$5,335,517	$5,054,700	$4,773,883	$4,493,067	$4,212,250	$3,931,433	$3,650,617	$3,369,800	$3,088,983	$2,808,167	$2,527,350	$2,246,533	$1,965,717	$1,684,900	$1,404,083	$1,123,267	$842,450	$561,633	$280,817	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$5,335,517	$5,054,700	$4,773,883	$4,493,067	$4,212,250	$3,931,433	$3,650,617	$3,369,800	$3,088,983	$2,808,167	$2,527,350	$2,246,533	$1,965,717	$1,684,900	$1,404,083	$1,123,267	$842,450	$561,633	$280,817	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832	$2,050,832
Operating Expenses	$5,335,517	$5,054,700	$4,773,883	$4,493,067	$4,212,250	$3,931,433	$3,650,617	$3,369,800	$3,088,983	$2,808,167	$2,527,350	$2,246,533	$1,965,717	$1,684,900	$1,404,083	$1,123,267	$842,450	$561,633	$280,817	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423	$2,414,423
TOTAL ANNUAL COST	$9,800,772	$9,519,955	$9,239,138	$8,958,322	$8,677,505	$8,396,688	$8,115,872	$7,835,055	$7,554,238	$7,273,422	$6,992,605	$6,711,788	$6,430,972	$6,150,155	$5,869,338	$5,588,522	$5,307,705	$5,026,888	$4,746,072	$4,465,255
Annual Present Worth Cost	**$8,991,534**	**$8,012,756**	**$7,134,310**	**$6,346,301**	**$5,639,783**	**$5,006,671**	**$4,439,660**	**$3,932,150**	**$3,478,181**	**$3,072,372**	**$2,709,864**	**$2,386,274**	**$2,097,646**	**$1,840,412**	**$1,611,357**	**$1,407,580**	**$1,226,468**	**$1,065,669**	**$923,062**	**$796,739**
Cumulative Annual Present Worth Cost	**$8,991,534**	**$17,004,289**	**$24,138,599**	**$30,484,900**	**$36,124,683**	**$41,131,353**	**$45,571,013**	**$49,503,163**	**$52,981,344**	**$56,053,716**	**$58,763,580**	**$61,149,854**	**$63,247,499**	**$65,087,911**	**$66,699,268**	**$68,106,848**	**$69,333,316**	**$70,398,985**	**$71,322,046**	**$72,118,786**

Option 8
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	Install Additional Capacitors (1 - 900 kVAR)	$27,500
	SUBTOTAL TRANSMISSION	**$27,500**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$27,500**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,908
20	Calculated Distribution Losses @ Peak (kW)	1,908
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$23,129,904**

Option 8 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$27,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$27,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500	$27,500
Annual Depreciation	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375	$1,375
Cumulative Depreciation	$1,375	$2,750	$4,125	$5,500	$6,875	$8,250	$9,625	$11,000	$12,375	$13,750	$15,125	$16,500	$17,875	$19,250	$20,625	$22,000	$23,375	$24,750	$26,125	$27,500
Investment Book Value	$26,125	$24,750	$23,375	$22,000	$20,625	$19,250	$17,875	$16,500	$15,125	$13,750	$12,375	$11,000	$9,625	$8,250	$6,875	$5,500	$4,125	$2,750	$1,375	$0
Capital Recovery	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013
Operations and Maintenance	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300
Taxes	$7,838	$7,425	$7,013	$6,600	$6,188	$5,775	$5,363	$4,950	$4,538	$4,125	$3,713	$3,300	$2,888	$2,475	$2,063	$1,650	$1,238	$825	$413	$0
Other Operating Expenses	$862	$817	$771	$726	$681	$635	$590	$545	$499	$454	$408	$363	$318	$272	$227	$182	$136	$91	$45	$0
Total Operating Expense	$12,000	$11,542	$11,084	$10,626	$10,168	$9,710	$9,252	$8,795	$8,337	$7,879	$7,421	$6,963	$6,505	$6,047	$5,589	$5,132	$4,674	$4,216	$3,758	$3,300
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013
Operating Expenses	$12,000	$11,542	$11,084	$10,626	$10,168	$9,710	$9,252	$8,795	$8,337	$7,879	$7,421	$6,963	$6,505	$6,047	$5,589	$5,132	$4,674	$4,216	$3,758	$3,300
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886	$2,521,886
TOTAL ANNUAL COST	$2,536,898	$2,536,440	$2,535,982	$2,535,524	$2,535,067	$2,534,609	$2,534,151	$2,533,693	$2,533,235	$2,532,777	$2,532,319	$2,531,861	$2,531,404	$2,530,946	$2,530,488	$2,530,030	$2,529,572	$2,529,114	$2,528,656	$2,528,198
Annual Present Worth Cost	**$2,327,429**	**$2,134,871**	**$1,958,244**	**$1,796,229**	**$1,647,619**	**$1,511,304**	**$1,386,267**	**$1,271,575**	**$1,166,372**	**$1,069,872**	**$981,357**	**$900,165**	**$825,690**	**$757,377**	**$694,715**	**$637,238**	**$584,516**	**$536,156**	**$491,798**	**$451,109**
Cumulative Annual Present Worth Cost	**$2,327,429**	**$4,462,300**	**$6,420,544**	**$8,216,773**	**$9,864,393**	**$11,375,697**	**$12,761,964**	**$14,033,539**	**$15,199,911**	**$16,269,784**	**$17,251,141**	**$18,151,305**	**$18,976,995**	**$19,734,372**	**$20,429,087**	**$21,066,325**	**$21,650,841**	**$22,186,998**	**$22,678,795**	**$23,129,904**

Option 9
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	Install Additional Capacitors (1,350 kVAR) 1 - 900 kVAR & 1 - 450 kVAR	$47,500
	SUBTOTAL TRANSMISSION	**$47,500**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$47,500**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,898
20	Calculated Distribution Losses @ Peak (kW)	1,898
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$23,071,253**

Option 9 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$47,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$47,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500	$47,500
Annual Depreciation	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375	$2,375
Cumulative Depreciation	$2,375	$4,750	$7,125	$9,500	$11,875	$14,250	$16,625	$19,000	$21,375	$23,750	$26,125	$28,500	$30,875	$33,250	$35,625	$38,000	$40,375	$42,750	$45,125	$47,500
Investment Book Value	$45,125	$42,750	$40,375	$38,000	$35,625	$33,250	$30,875	$28,500	$26,125	$23,750	$21,375	$19,000	$16,625	$14,250	$11,875	$9,500	$7,125	$4,750	$2,375	$0
Capital Recovery	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203
Operations and Maintenance	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300
Taxes	$13,538	$12,825	$12,113	$11,400	$10,688	$9,975	$9,263	$8,550	$7,838	$7,125	$6,413	$5,700	$4,988	$4,275	$3,563	$2,850	$2,138	$1,425	$713	$0
Other Operating Expenses	$1,489	$1,411	$1,332	$1,254	$1,176	$1,097	$1,019	$941	$862	$784	$705	$627	$549	$470	$392	$314	$235	$157	$78	$0
Total Operating Expense	$18,327	$17,536	$16,745	$15,954	$15,163	$14,372	$13,581	$12,791	$12,000	$11,209	$10,418	$9,627	$8,836	$8,045	$7,254	$6,464	$5,673	$4,882	$4,091	$3,300
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203	$5,203
Operating Expenses	$18,327	$17,536	$16,745	$15,954	$15,163	$14,372	$13,581	$12,791	$12,000	$11,209	$10,418	$9,627	$8,836	$8,045	$7,254	$6,464	$5,673	$4,882	$4,091	$3,300
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197	$2,509,197
TOTAL ANNUAL COST	$2,532,727	$2,531,936	$2,531,145	$2,530,354	$2,529,563	$2,528,772	$2,527,981	$2,527,191	$2,526,400	$2,525,609	$2,524,818	$2,524,027	$2,523,236	$2,522,445	$2,521,654	$2,520,864	$2,520,073	$2,519,282	$2,518,491	$2,517,700
Annual Present Worth Cost	**$2,323,602**	**$2,131,080**	**$1,954,508**	**$1,792,567**	**$1,644,042**	**$1,507,824**	**$1,382,892**	**$1,268,312**	**$1,163,225**	**$1,066,844**	**$978,450**	**$897,379**	**$823,026**	**$754,833**	**$692,290**	**$634,929**	**$582,321**	**$534,072**	**$489,820**	**$449,235**
Cumulative Annual Present Worth Cost	**$2,323,602**	**$4,454,682**	**$6,409,190**	**$8,201,757**	**$9,845,800**	**$11,353,624**	**$12,736,516**	**$14,004,828**	**$15,168,053**	**$16,234,897**	**$17,213,347**	**$18,110,726**	**$18,933,752**	**$19,688,585**	**$20,380,875**	**$21,015,804**	**$21,598,125**	**$22,132,197**	**$22,622,018**	**$23,071,253**

Option 10
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	Install Additional Capacitors (1,650 kVAR) 1 - 900 kVAR, 1 - 450 kVAR, & 1 - 300 kVAR	$66,637
	SUBTOTAL TRANSMISSION	**$66,637**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$66,637**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,892
20	Calculated Distribution Losses @ Peak (kW)	1,892
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$23,053,573**

Option 10 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$66,637	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$66,637	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637	$66,637
Annual Depreciation	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332	$3,332
Cumulative Depreciation	$3,332	$6,664	$9,996	$13,327	$16,659	$19,991	$23,323	$26,655	$29,987	$33,319	$36,650	$39,982	$43,314	$46,646	$49,978	$53,310	$56,641	$59,973	$63,305	$66,637
Investment Book Value	$63,305	$59,973	$56,641	$53,310	$49,978	$46,646	$43,314	$39,982	$36,650	$33,319	$29,987	$26,655	$23,323	$19,991	$16,659	$13,327	$9,996	$6,664	$3,332	$0
Capital Recovery	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300
Operations and Maintenance	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300	$3,300
Taxes	$18,992	$17,992	$16,992	$15,993	$14,993	$13,994	$12,994	$11,995	$10,995	$9,996	$8,996	$7,996	$6,997	$5,997	$4,998	$3,998	$2,999	$1,999	$1,000	$0
Other Operating Expenses	$2,089	$1,979	$1,869	$1,759	$1,649	$1,539	$1,429	$1,319	$1,209	$1,100	$990	$880	$770	$660	$550	$440	$330	$220	$110	$0
Total Operating Expense	$24,381	$23,271	$22,162	$21,052	$19,943	$18,833	$17,724	$16,614	$15,505	$14,395	$13,286	$12,176	$11,067	$9,957	$8,848	$7,738	$6,629	$5,519	$4,410	$3,300
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300	$7,300
Operating Expenses	$24,381	$23,271	$22,162	$21,052	$19,943	$18,833	$17,724	$16,614	$15,505	$14,395	$13,286	$12,176	$11,067	$9,957	$8,848	$7,738	$6,629	$5,519	$4,410	$3,300
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266	$2,501,266
TOTAL ANNUAL COST	$2,532,946	$2,531,837	$2,530,727	$2,529,618	$2,528,508	$2,527,399	$2,526,289	$2,525,180	$2,524,070	$2,522,961	$2,521,851	$2,520,742	$2,519,632	$2,518,523	$2,517,413	$2,516,304	$2,515,194	$2,514,085	$2,512,975	$2,511,866
Annual Present Worth Cost	**$2,323,804**	**$2,130,996**	**$1,954,186**	**$1,792,045**	**$1,643,357**	**$1,507,005**	**$1,381,967**	**$1,267,303**	**$1,162,152**	**$1,065,726**	**$977,300**	**$896,211**	**$821,850**	**$753,659**	**$691,126**	**$633,781**	**$581,194**	**$532,970**	**$488,748**	**$448,194**
Cumulative Annual Present Worth Cost	**$2,323,804**	**$4,454,800**	**$6,408,986**	**$8,201,031**	**$9,844,388**	**$11,351,393**	**$12,733,360**	**$14,000,662**	**$15,162,814**	**$16,228,540**	**$17,205,840**	**$18,102,051**	**$18,923,902**	**$19,677,561**	**$20,368,686**	**$21,002,467**	**$21,583,661**	**$22,116,631**	**$22,605,379**	**$23,053,573**

Option 11
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	Install Additional Capacitors (1,950kVAR) 1-900kVAR, 1-450kVAR, 1-300kVAR, & 2-150kVAR	$104,007
	SUBTOTAL TRANSMISSION	**$104,007**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$104,007**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,887
20	Calculated Distribution Losses @ Peak (kW)	1,887
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$23,118,147**

Option 11 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$104,007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$104,007	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007	$104,007
Annual Depreciation	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200	$5,200
Cumulative Depreciation	$5,200	$10,401	$15,601	$20,801	$26,002	$31,202	$36,402	$41,603	$46,803	$52,004	$57,204	$62,404	$67,605	$72,805	$78,005	$83,206	$88,406	$93,606	$98,807	$104,007
Investment Book Value	$98,807	$93,606	$88,406	$83,206	$78,005	$72,805	$67,605	$62,404	$57,204	$52,004	$46,803	$41,603	$36,402	$31,202	$26,002	$20,801	$15,601	$10,401	$5,200	$0
Capital Recovery	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394
Operations and Maintenance	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542	$5,542
Taxes	$29,642	$28,082	$26,522	$24,962	$23,402	$21,841	$20,281	$18,721	$17,161	$15,601	$14,041	$12,481	$10,921	$9,361	$7,801	$6,240	$4,680	$3,120	$1,560	$0
Other Operating Expenses	$3,261	$3,089	$2,917	$2,746	$2,574	$2,403	$2,231	$2,059	$1,888	$1,716	$1,545	$1,373	$1,201	$1,030	$858	$686	$515	$343	$172	$0
Total Operating Expense	$38,445	$36,713	$34,981	$33,250	$31,518	$29,786	$28,055	$26,323	$24,591	$22,859	$21,128	$19,396	$17,664	$15,932	$14,201	$12,469	$10,737	$9,006	$7,274	$5,542
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394	$11,394
Operating Expenses	$38,445	$36,713	$34,981	$33,250	$31,518	$29,786	$28,055	$26,323	$24,591	$22,859	$21,128	$19,396	$17,664	$15,932	$14,201	$12,469	$10,737	$9,006	$7,274	$5,542
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392	$2,494,392
TOTAL ANNUAL COST	$2,544,231	$2,542,499	$2,540,767	$2,539,036	$2,537,304	$2,535,572	$2,533,840	$2,532,109	$2,530,377	$2,528,645	$2,526,914	$2,525,182	$2,523,450	$2,521,718	$2,519,987	$2,518,255	$2,516,523	$2,514,792	$2,513,060	$2,511,328
Annual Present Worth Cost	**$2,334,157**	**$2,139,971**	**$1,961,939**	**$1,798,717**	**$1,649,073**	**$1,511,879**	**$1,386,098**	**$1,270,780**	**$1,165,056**	**$1,068,127**	**$979,262**	**$897,790**	**$823,096**	**$754,615**	**$691,832**	**$634,272**	**$581,501**	**$533,120**	**$488,764**	**$448,099**
Cumulative Annual Present Worth Cost	**$2,334,157**	**$4,474,127**	**$6,436,066**	**$8,234,783**	**$9,883,856**	**$11,395,735**	**$12,781,832**	**$14,052,612**	**$15,217,668**	**$16,285,795**	**$17,265,058**	**$18,162,847**	**$18,985,943**	**$19,740,558**	**$20,432,391**	**$21,066,663**	**$21,648,164**	**$22,181,284**	**$22,670,048**	**$23,118,147**

Option 12
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	5.4km of (11kV) 75mm Wiflow	$648,000
	35km of (20kV) 75mm Willow	$5,600,000
	SUBTOTAL TRANSMISSION	**$6,248,000**
Substation Improvements		
	1 - 1.0 MVA & 2 - 7.5 MVA transformers w/ 3 - 11 kV & 3 - 20 kV circuit breakers	$2,968,000
	SUBTOTAL SUBSTATION	**$2,968,000**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$9,216,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,931
20	Calculated Distribution Losses @ Peak (kW)	1,931
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$59,743,559**

Option 12 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$6,248,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$6,248,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000	$6,248,000
Annual Depreciation	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400	$312,400
Cumulative Depreciation	$312,400	$624,800	$937,200	$1,249,600	$1,562,000	$1,874,400	$2,186,800	$2,499,200	$2,811,600	$3,124,000	$3,436,400	$3,748,800	$4,061,200	$4,373,600	$4,686,000	$4,998,400	$5,310,800	$5,623,200	$5,935,600	$6,248,000
Investment Book Value	$5,935,600	$5,623,200	$5,310,800	$4,998,400	$4,686,000	$4,373,600	$4,061,200	$3,748,800	$3,436,400	$3,124,000	$2,811,600	$2,499,200	$2,186,800	$1,874,400	$1,562,000	$1,249,600	$937,200	$624,800	$312,400	$0
Capital Recovery	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446	$684,446
Operations and Maintenance	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760	$749,760
Taxes	$1,780,680	$1,686,960	$1,593,240	$1,499,520	$1,405,800	$1,312,080	$1,218,360	$1,124,640	$1,030,920	$937,200	$843,480	$749,760	$656,040	$562,320	$468,600	$374,880	$281,160	$187,440	$93,720	$0
Other Operating Expenses	$195,875	$185,566	$175,256	$164,947	$154,638	$144,329	$134,020	$123,710	$113,401	$103,092	$92,783	$82,474	$72,164	$61,855	$51,546	$41,237	$30,928	$20,618	$10,309	$0
Total Operating Expense	$2,726,315	$2,622,286	$2,518,256	$2,414,227	$2,310,198	$2,206,169	$2,102,140	$1,998,110	$1,894,081	$1,790,052	$1,686,023	$1,581,994	$1,477,964	$1,373,935	$1,269,906	$1,165,877	$1,061,848	$957,818	$853,789	$749,760
SUBSTATION																				
New Investment	$2,968,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$2,968,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000	$2,968,000
Annual Depreciation	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400	$148,400
Cumulative Depreciation	$148,400	$296,800	$445,200	$593,600	$742,000	$890,400	$1,038,800	$1,187,200	$1,335,600	$1,484,000	$1,632,400	$1,780,800	$1,929,200	$2,077,600	$2,226,000	$2,374,400	$2,522,800	$2,671,200	$2,819,600	$2,968,000
Investment Book Value	$2,819,600	$2,671,200	$2,522,800	$2,374,400	$2,226,000	$2,077,600	$1,929,200	$1,780,800	$1,632,400	$1,484,000	$1,335,600	$1,187,200	$1,038,800	$890,400	$742,000	$593,600	$445,200	$296,800	$148,400	$0
Capital Recovery	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134	$325,134
Operations and Maintenance	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*	*$356,160*
Taxes	$845,880	$801,360	$756,840	$712,320	$667,800	$623,280	$578,760	$534,240	$489,720	$445,200	$400,680	$356,160	$311,640	$267,120	$222,600	$178,080	$133,560	$89,040	$44,520	$0
Other Operating Expenses	$93,047	$88,150	$83,252	$78,355	$73,458	$68,561	$63,664	$58,766	$53,869	$48,972	$44,075	$39,178	$34,280	$29,383	$24,486	$19,589	$14,692	$9,794	$4,897	$0
Total Operating Expense	$1,295,087	$1,245,670	$1,196,252	$1,146,835	$1,097,418	$1,048,001	$998,584	$949,166	$899,749	$850,332	$800,915	$751,498	$702,080	$652,663	$603,246	$553,829	$504,412	$454,994	$405,577	$356,160
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580	$1,009,580
Operating Expenses	$4,021,402	$3,867,955	$3,714,509	$3,561,062	$3,407,616	$3,254,170	$3,100,723	$2,947,277	$2,793,830	$2,640,384	$2,486,938	$2,333,491	$2,180,045	$2,026,598	$1,873,152	$1,719,706	$1,566,259	$1,412,813	$1,259,366	$1,105,920
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155	$2,552,155
TOTAL ANNUAL COST	$7,583,137	$7,429,691	$7,276,244	$7,122,798	$6,969,352	$6,815,905	$6,662,459	$6,509,012	$6,355,566	$6,202,120	$6,048,673	$5,895,227	$5,741,780	$5,588,334	$5,434,888	$5,281,441	$5,127,995	$4,974,548	$4,821,102	$4,667,656
Annual Present Worth Cost	**$6,957,007**	**$6,253,422**	**$5,618,596**	**$5,045,970**	**$4,529,600**	**$4,064,102**	**$3,644,593**	**$3,266,654**	**$2,926,279**	**$2,619,842**	**$2,344,060**	**$2,095,958**	**$1,872,846**	**$1,672,289**	**$1,492,083**	**$1,330,235**	**$1,184,942**	**$1,054,573**	**$937,655**	**$832,854**
Cumulative Annual Present Worth Cost	**$6,957,007**	**$13,210,429**	**$18,829,024**	**$23,874,994**	**$28,404,594**	**$32,468,696**	**$36,113,289**	**$39,379,943**	**$42,306,222**	**$44,926,064**	**$47,270,124**	**$49,366,082**	**$51,238,928**	**$52,911,217**	**$54,403,300**	**$55,733,536**	**$56,918,478**	**$57,973,051**	**$58,910,705**	**$59,743,559**

Option 13
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	5.4km of (11kV) 150mm Ash	$810,000
	35km of (20kV) 150mm Ash	$7,000,000
	SUBTOTAL TRANSMISSION	**$7,810,000**
Substation Improvements		
	1 - 1.0 MVA & 2 - 12.0 MVA transformers w/ 3 - 11 kV & 3 - 20 kV circuit breakers	$3,498,000
	SUBTOTAL SUBSTATION	**$3,498,000**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$11,308,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,865
20	Calculated Distribution Losses @ Peak (kW)	1,865
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$67,220,329**

Option 13 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$7,810,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$7,810,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000	$7,810,000
Annual Depreciation	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500	$390,500
Cumulative Depreciation	$390,500	$781,000	$1,171,500	$1,562,000	$1,952,500	$2,343,000	$2,733,500	$3,124,000	$3,514,500	$3,905,000	$4,295,500	$4,686,000	$5,076,500	$5,467,000	$5,857,500	$6,248,000	$6,638,500	$7,029,000	$7,419,500	$7,810,000
Investment Book Value	$7,419,500	$7,029,000	$6,638,500	$6,248,000	$5,857,500	$5,467,000	$5,076,500	$4,686,000	$4,295,500	$3,905,000	$3,514,500	$3,124,000	$2,733,500	$2,343,000	$1,952,500	$1,562,000	$1,171,500	$781,000	$390,500	$0
Capital Recovery	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558	$855,558
Operations and Maintenance	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200	$937,200
Taxes	$2,225,850	$2,108,700	$1,991,550	$1,874,400	$1,757,250	$1,640,100	$1,522,950	$1,405,800	$1,288,650	$1,171,500	$1,054,350	$937,200	$820,050	$702,900	$585,750	$468,600	$351,450	$234,300	$117,150	$0
Other Operating Expenses	$244,844	$231,957	$219,071	$206,184	$193,298	$180,411	$167,525	$154,638	$141,752	$128,865	$115,979	$103,092	$90,206	$77,319	$64,433	$51,546	$38,660	$25,773	$12,887	$0
Total Operating Expense	$3,407,894	$3,277,857	$3,147,821	$3,017,784	$2,887,748	$2,757,711	$2,627,675	$2,497,638	$2,367,602	$2,237,565	$2,107,529	$1,977,492	$1,847,456	$1,717,419	$1,587,383	$1,457,346	$1,327,310	$1,197,273	$1,067,237	$937,200
SUBSTATION																				
New Investment	$3,498,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$3,498,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000
Annual Depreciation	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900
Cumulative Depreciation	$174,900	$349,800	$524,700	$699,600	$874,500	$1,049,400	$1,224,300	$1,399,200	$1,574,100	$1,749,000	$1,923,900	$2,098,800	$2,273,700	$2,448,600	$2,623,500	$2,798,400	$2,973,300	$3,148,200	$3,323,100	$3,498,000
Investment Book Value	$3,323,100	$3,148,200	$2,973,300	$2,798,400	$2,623,500	$2,448,600	$2,273,700	$2,098,800	$1,923,900	$1,749,000	$1,574,100	$1,399,200	$1,224,300	$1,049,400	$874,500	$699,600	$524,700	$349,800	$174,900	$0
Capital Recovery	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194
Operations and Maintenance	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760
Taxes	$996,930	$944,460	$891,990	$839,520	$787,050	$734,580	$682,110	$629,640	$577,170	$524,700	$472,230	$419,760	$367,290	$314,820	$262,350	$209,880	$157,410	$104,940	$52,470	$0
Other Operating Expenses	$109,662	$103,891	$98,119	$92,347	$86,576	$80,804	$75,032	$69,260	$63,489	$57,717	$51,945	$46,174	$40,402	$34,630	$28,859	$23,087	$17,315	$11,543	$5,772	$0
Total Operating Expense	$1,526,352	$1,468,111	$1,409,869	$1,351,627	$1,293,386	$1,235,144	$1,176,902	$1,118,660	$1,060,419	$1,002,177	$943,935	$885,694	$827,452	$769,210	$710,969	$652,727	$594,485	$536,243	$478,002	$419,760
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752	$1,238,752
Operating Expenses	$4,934,246	$4,745,968	$4,557,689	$4,369,411	$4,181,133	$3,992,855	$3,804,577	$3,616,298	$3,428,020	$3,239,742	$3,051,464	$2,863,186	$2,674,907	$2,486,629	$2,298,351	$2,110,073	$1,921,795	$1,733,516	$1,545,238	$1,356,960
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916	$2,464,916
TOTAL ANNUAL COST	$8,637,913	$8,449,635	$8,261,357	$8,073,079	$7,884,801	$7,696,522	$7,508,244	$7,319,966	$7,131,688	$6,943,410	$6,755,131	$6,566,853	$6,378,575	$6,190,297	$6,002,019	$5,813,740	$5,625,462	$5,437,184	$5,248,906	$5,060,628
Annual Present Worth Cost	**$7,924,691**	**$7,111,889**	**$6,379,283**	**$5,719,173**	**$5,124,579**	**$4,589,185**	**$4,107,267**	**$3,673,644**	**$3,283,627**	**$2,932,971**	**$2,617,835**	**$2,334,744**	**$2,080,555**	**$1,852,424**	**$1,647,782**	**$1,464,305**	**$1,299,893**	**$1,152,649**	**$1,020,858**	**$902,972**
Cumulative Annual Present Worth Cost	**$7,924,691**	**$15,036,580**	**$21,415,864**	**$27,135,036**	**$32,259,616**	**$36,848,800**	**$40,956,067**	**$44,629,711**	**$47,913,338**	**$50,846,310**	**$53,464,145**	**$55,798,889**	**$57,879,444**	**$59,731,869**	**$61,379,651**	**$62,843,957**	**$64,143,850**	**$65,296,499**	**$66,317,357**	**$67,220,329**

Option 14
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	5.4km of (11kV) 75mm Willow	$648,000
	35km of (33kV) 75mm Willow	$7,000,000
	SUBTOTAL TRANSMISSION	**$7,648,000**
Substation Improvements		
	1 - 1.0 MVA & 2 - 12.0 MVA transformers w/ 3 - 11 kV & 3 - 33 kV circuit breakers	$3,498,000
	SUBTOTAL SUBSTATION	**$3,498,000**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$11,146,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,916
20	*Calculated Distribution Losses @ Peak (kW)*	*1,916*
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$67,195,050**

Option 14 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$7,648,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$7,648,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000	$7,648,000
Annual Depreciation	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400	$382,400
Cumulative Depreciation	$382,400	$764,800	$1,147,200	$1,529,600	$1,912,000	$2,294,400	$2,676,800	$3,059,200	$3,441,600	$3,824,000	$4,206,400	$4,588,800	$4,971,200	$5,353,600	$5,736,000	$6,118,400	$6,500,800	$6,883,200	$7,265,600	$7,648,000
Investment Book Value	$7,265,600	$6,883,200	$6,500,800	$6,118,400	$5,736,000	$5,353,600	$4,971,200	$4,588,800	$4,206,400	$3,824,000	$3,441,600	$3,059,200	$2,676,800	$2,294,400	$1,912,000	$1,529,600	$1,147,200	$764,800	$382,400	$0
Capital Recovery	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811	$837,811
Operations and Maintenance	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760	$917,760
Taxes	$2,179,680	$2,064,960	$1,950,240	$1,835,520	$1,720,800	$1,606,080	$1,491,360	$1,376,640	$1,261,920	$1,147,200	$1,032,480	$917,760	$803,040	$688,320	$573,600	$458,880	$344,160	$229,440	$114,720	$0
Other Operating Expenses	$239,765	$227,146	$214,526	$201,907	$189,288	$176,669	$164,050	$151,430	$138,811	$126,192	$113,573	$100,954	$88,334	$75,715	$63,096	$50,477	$37,858	$25,238	$12,619	$0
Total Operating Expense	$3,337,205	$3,209,866	$3,082,526	$2,955,187	$2,827,848	$2,700,509	$2,573,170	$2,445,830	$2,318,491	$2,191,152	$2,063,813	$1,936,474	$1,809,134	$1,681,795	$1,554,456	$1,427,117	$1,299,778	$1,172,438	$1,045,099	$917,760
SUBSTATION																				
New Investment	$3,498,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$3,498,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000
Annual Depreciation	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900
Cumulative Depreciation	$174,900	$349,800	$524,700	$699,600	$874,500	$1,049,400	$1,224,300	$1,399,200	$1,574,100	$1,749,000	$1,923,900	$2,098,800	$2,273,700	$2,448,600	$2,623,500	$2,798,400	$2,973,300	$3,148,200	$3,323,100	$3,498,000
Investment Book Value	$3,323,100	$3,148,200	$2,973,300	$2,798,400	$2,623,500	$2,448,600	$2,273,700	$2,098,800	$1,923,900	$1,749,000	$1,574,100	$1,399,200	$1,224,300	$1,049,400	$874,500	$699,600	$524,700	$349,800	$174,900	$0
Capital Recovery	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194
Operations and Maintenance	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760
Taxes	$996,930	$944,460	$891,990	$839,520	$787,050	$734,580	$682,110	$629,640	$577,170	$524,700	$472,230	$419,760	$367,290	$314,820	$262,350	$209,880	$157,410	$104,940	$52,470	$0
Other Operating Expenses	$109,662	$103,891	$98,119	$92,347	$86,576	$80,804	$75,032	$69,260	$63,489	$57,717	$51,945	$46,174	$40,402	$34,630	$28,859	$23,087	$17,315	$11,543	$5,772	$0
Total Operating Expense	$1,526,352	$1,468,111	$1,409,869	$1,351,627	$1,293,386	$1,235,144	$1,176,902	$1,118,660	$1,060,419	$1,002,177	$943,935	$885,694	$827,452	$769,210	$710,969	$652,727	$594,485	$536,243	$478,002	$419,760
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005	$1,221,005
Operating Expenses	$4,863,557	$4,677,976	$4,492,395	$4,306,814	$4,121,234	$3,935,653	$3,750,072	$3,564,491	$3,378,910	$3,193,329	$3,007,748	$2,822,167	$2,636,586	$2,451,005	$2,265,425	$2,079,844	$1,894,263	$1,708,682	$1,523,101	$1,337,520
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328	$2,532,328
TOTAL ANNUAL COST	$8,616,890	$8,431,309	$8,245,728	$8,060,148	$7,874,567	$7,688,986	$7,503,405	$7,317,824	$7,132,243	$6,946,662	$6,761,081	$6,575,500	$6,389,919	$6,204,339	$6,018,758	$5,833,177	$5,647,596	$5,462,015	$5,276,434	$5,090,853
Annual Present Worth Cost	**$7,905,404**	**$7,096,464**	**$6,367,215**	**$5,710,012**	**$5,117,928**	**$4,584,691**	**$4,104,619**	**$3,672,569**	**$3,283,883**	**$2,934,345**	**$2,620,141**	**$2,337,819**	**$2,084,255**	**$1,856,626**	**$1,652,378**	**$1,469,201**	**$1,305,008**	**$1,157,913**	**$1,026,212**	**$908,365**
Cumulative Annual Present Worth Cost	**$7,905,404**	**$15,001,868**	**$21,369,084**	**$27,079,095**	**$32,197,023**	**$36,781,714**	**$40,886,334**	**$44,558,903**	**$47,842,786**	**$50,777,131**	**$53,397,272**	**$55,735,091**	**$57,819,346**	**$59,675,973**	**$61,328,351**	**$62,797,551**	**$64,102,559**	**$65,260,472**	**$66,286,684**	**$67,195,050**

Option 15
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	5.4km of (11kV) 150mm Ash	$810,000
	35km of (33kV) 150mm Ash	$8,750,000
	SUBTOTAL TRANSMISSION	**$9,560,000**
Substation Improvements		
	1 - 1.0 MVA & 2 - 12.0 MVA transformers w/ 3 - 11 kV & 3 - 33 kV circuit breakers	$3,498,000
	SUBTOTAL SUBSTATION	**$3,498,000**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$13,058,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,859
20	Calculated Distribution Losses @ Peak (kW)	1,859
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$74,066,164**

Option 15 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$9,560,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$9,560,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000	$9,560,000
Annual Depreciation	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000	$478,000
Cumulative Depreciation	$478,000	$956,000	$1,434,000	$1,912,000	$2,390,000	$2,868,000	$3,346,000	$3,824,000	$4,302,000	$4,780,000	$5,258,000	$5,736,000	$6,214,000	$6,692,000	$7,170,000	$7,648,000	$8,126,000	$8,604,000	$9,082,000	$9,560,000
Investment Book Value	$9,082,000	$8,604,000	$8,126,000	$7,648,000	$7,170,000	$6,692,000	$6,214,000	$5,736,000	$5,258,000	$4,780,000	$4,302,000	$3,824,000	$3,346,000	$2,868,000	$2,390,000	$1,912,000	$1,434,000	$956,000	$478,000	$0
Capital Recovery	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264	$1,047,264
Operations and Maintenance	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200	$1,147,200
Taxes	$2,724,600	$2,581,200	$2,437,800	$2,294,400	$2,151,000	$2,007,600	$1,864,200	$1,720,800	$1,577,400	$1,434,000	$1,290,600	$1,147,200	$1,003,800	$860,400	$717,000	$573,600	$430,200	$286,800	$143,400	$0
Other Operating Expenses	$299,706	$283,932	$268,158	$252,384	$236,610	$220,836	$205,062	$189,288	$173,514	$157,740	$141,966	$126,192	$110,418	$94,644	$78,870	$63,096	$47,322	$31,548	$15,774	$0
Total Operating Expense	$4,171,506	$4,012,332	$3,853,158	$3,693,984	$3,534,810	$3,375,636	$3,216,462	$3,057,288	$2,898,114	$2,738,940	$2,579,766	$2,420,592	$2,261,418	$2,102,244	$1,943,070	$1,783,896	$1,624,722	$1,465,548	$1,306,374	$1,147,200
SUBSTATION																				
New Investment	$3,498,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$3,498,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000	$3,498,000
Annual Depreciation	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900	$174,900
Cumulative Depreciation	$174,900	$349,800	$524,700	$699,600	$874,500	$1,049,400	$1,224,300	$1,399,200	$1,574,100	$1,749,000	$1,923,900	$2,098,800	$2,273,700	$2,448,600	$2,623,500	$2,798,400	$2,973,300	$3,148,200	$3,323,100	$3,498,000
Investment Book Value	$3,323,100	$3,148,200	$2,973,300	$2,798,400	$2,623,500	$2,448,600	$2,273,700	$2,098,800	$1,923,900	$1,749,000	$1,574,100	$1,399,200	$1,224,300	$1,049,400	$874,500	$699,600	$524,700	$349,800	$174,900	$0
Capital Recovery	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194	$383,194
Operations and Maintenance	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760	$419,760
Taxes	$996,930	$944,460	$891,990	$839,520	$787,050	$734,580	$682,110	$629,640	$577,170	$524,700	$472,230	$419,760	$367,290	$314,820	$262,350	$209,880	$157,410	$104,940	$52,470	$0
Other Operating Expenses	$109,662	$103,891	$98,119	$92,347	$86,576	$80,804	$75,032	$69,260	$63,489	$57,717	$51,945	$46,174	$40,402	$34,630	$28,859	$23,087	$17,315	$11,543	$5,772	$0
Total Operating Expense	$1,526,352	$1,468,111	$1,409,869	$1,351,627	$1,293,386	$1,235,144	$1,176,902	$1,118,660	$1,060,419	$1,002,177	$943,935	$885,694	$827,452	$769,210	$710,969	$652,727	$594,485	$536,243	$478,002	$419,760
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458	$1,430,458
Operating Expenses	$5,697,858	$5,480,443	$5,263,027	$5,045,611	$4,828,196	$4,610,780	$4,393,364	$4,175,948	$3,958,533	$3,741,117	$3,523,701	$3,306,286	$3,088,870	$2,871,454	$2,654,039	$2,436,623	$2,219,207	$2,001,791	$1,784,376	$1,566,960
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721	$2,456,721
TOTAL ANNUAL COST	$9,585,037	$9,367,621	$9,150,206	$8,932,790	$8,715,374	$8,497,959	$8,280,543	$8,063,127	$7,845,711	$7,628,296	$7,410,880	$7,193,464	$6,976,049	$6,758,633	$6,541,217	$6,323,802	$6,106,386	$5,888,970	$5,671,554	$5,454,139
Annual Present Worth Cost	**$8,793,612**	**$7,884,539**	**$7,065,638**	**$6,328,214**	**$5,664,395**	**$5,067,055**	**$4,529,741**	**$4,046,612**	**$3,612,384**	**$3,222,275**	**$2,871,959**	**$2,557,526**	**$2,275,438**	**$2,022,497**	**$1,795,813**	**$1,592,774**	**$1,411,022**	**$1,248,425**	**$1,103,059**	**$973,187**
Cumulative Annual Present Worth Cost	**$8,793,612**	**$16,678,151**	**$23,743,789**	**$30,072,003**	**$35,736,398**	**$40,803,453**	**$45,333,194**	**$49,379,805**	**$52,992,189**	**$56,214,463**	**$59,086,423**	**$61,643,949**	**$63,919,387**	**$65,941,884**	**$67,737,697**	**$69,330,472**	**$70,741,494**	**$71,989,919**	**$73,092,977**	**$74,066,164**

Option 16
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	5.4km of (11kV) 75mm Willow	$648,000
	35km of (66kV) 75mm Willow	$8,400,000
	SUBTOTAL TRANSMISSION	**$9,048,000**
Substation Improvements		
	1 - 1.0 MVA & 2 - 12.0 MVA transformers w/ 3 - 11 kV & 3 - 66 kV circuit breakers	$3,710,000
	SUBTOTAL SUBSTATION	**$3,710,000**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$12,758,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,868
20	Calculated Distribution Losses @ Peak (kW)	1,868
Present Worth Cost		
20	*20-Year Cumulative Present Worth Cost*	**$72,995,603**

Option 16 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$9,048,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$9,048,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000	$9,048,000
Annual Depreciation	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400	$452,400
Cumulative Depreciation	$452,400	$904,800	$1,357,200	$1,809,600	$2,262,000	$2,714,400	$3,166,800	$3,619,200	$4,071,600	$4,524,000	$4,976,400	$5,428,800	$5,881,200	$6,333,600	$6,786,000	$7,238,400	$7,690,800	$8,143,200	$8,595,600	$9,048,000
Investment Book Value	$8,595,600	$8,143,200	$7,690,800	$7,238,400	$6,786,000	$6,333,600	$5,881,200	$5,428,800	$4,976,400	$4,524,000	$4,071,600	$3,619,200	$3,166,800	$2,714,400	$2,262,000	$1,809,600	$1,357,200	$904,800	$452,400	$0
Capital Recovery	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177	$991,177
Operations and Maintenance	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760	$1,085,760
Taxes	$2,578,680	$2,442,960	$2,307,240	$2,171,520	$2,035,800	$1,900,080	$1,764,360	$1,628,640	$1,492,920	$1,357,200	$1,221,480	$1,085,760	$950,040	$814,320	$678,600	$542,880	$407,160	$271,440	$135,720	$0
Other Operating Expenses	$283,655	$268,726	$253,796	$238,867	$223,938	$209,009	$194,080	$179,150	$164,221	$149,292	$134,363	$119,434	$104,504	$89,575	$74,646	$59,717	$44,788	$29,858	$14,929	$0
Total Operating Expense	$3,948,095	$3,797,446	$3,646,796	$3,496,147	$3,345,498	$3,194,849	$3,044,200	$2,893,550	$2,742,901	$2,592,252	$2,441,603	$2,290,954	$2,140,304	$1,989,655	$1,839,006	$1,688,357	$1,537,708	$1,387,058	$1,236,409	$1,085,760
SUBSTATION																				
New Investment	$3,710,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$3,710,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000
Annual Depreciation	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500
Cumulative Depreciation	$185,500	$371,000	$556,500	$742,000	$927,500	$1,113,000	$1,298,500	$1,484,000	$1,669,500	$1,855,000	$2,040,500	$2,226,000	$2,411,500	$2,597,000	$2,782,500	$2,968,000	$3,153,500	$3,339,000	$3,524,500	$3,710,000
Investment Book Value	$3,524,500	$3,339,000	$3,153,500	$2,968,000	$2,782,500	$2,597,000	$2,411,500	$2,226,000	$2,040,500	$1,855,000	$1,669,500	$1,484,000	$1,298,500	$1,113,000	$927,500	$742,000	$556,500	$371,000	$185,500	$0
Capital Recovery	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417
Operations and Maintenance	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200
Taxes	$1,057,350	$1,001,700	$946,050	$890,400	$834,750	$779,100	$723,450	$667,800	$612,150	$556,500	$500,850	$445,200	$389,550	$333,900	$278,250	$222,600	$166,950	$111,300	$55,650	$0
Other Operating Expenses	$116,309	$110,187	$104,066	$97,944	$91,823	$85,701	$79,580	$73,458	$67,337	$61,215	$55,094	$48,972	$42,851	$36,729	$30,608	$24,486	$18,365	$12,243	$6,122	$0
Total Operating Expense	$1,618,859	$1,557,087	$1,495,316	$1,433,544	$1,371,773	$1,310,001	$1,248,230	$1,186,458	$1,124,687	$1,062,915	$1,001,144	$939,372	$877,601	$815,829	$754,058	$692,286	$630,515	$568,743	$506,972	$445,200
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594	$1,397,594
Operating Expenses	$5,566,953	$5,354,533	$5,142,112	$4,929,691	$4,717,271	$4,504,850	$4,292,429	$4,080,008	$3,867,588	$3,655,167	$3,442,746	$3,230,326	$3,017,905	$2,805,484	$2,593,064	$2,380,643	$2,168,222	$1,955,801	$1,743,381	$1,530,960
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410	$2,469,410
TOTAL ANNUAL COST	$9,433,957	$9,221,537	$9,009,116	$8,796,695	$8,584,275	$8,371,854	$8,159,433	$7,947,013	$7,734,592	$7,522,171	$7,309,750	$7,097,330	$6,884,909	$6,672,488	$6,460,068	$6,247,647	$6,035,226	$5,822,806	$5,610,385	$5,397,964
Annual Present Worth Cost	**$8,655,007**	**$7,761,583**	**$6,956,691**	**$6,231,801**	**$5,579,190**	**$4,991,863**	**$4,463,489**	**$3,988,338**	**$3,561,221**	**$3,177,446**	**$2,832,768**	**$2,523,347**	**$2,245,710**	**$1,996,719**	**$1,773,534**	**$1,573,593**	**$1,394,579**	**$1,234,398**	**$1,091,162**	**$963,164**
Cumulative Annual Present Worth Cost	**$8,655,007**	**$16,416,590**	**$23,373,280**	**$29,605,081**	**$35,184,271**	**$40,176,134**	**$44,639,623**	**$48,627,961**	**$52,189,182**	**$55,366,628**	**$58,199,397**	**$60,722,744**	**$62,968,454**	**$64,965,173**	**$66,738,707**	**$68,312,300**	**$69,706,879**	**$70,941,278**	**$72,032,439**	**$72,995,603**

Option 17
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	5.4km of (11kV) 150mm Ash	$810,000
	35km of (66kV) 150mm Ash	$10,500,000
	SUBTOTAL TRANSMISSION	**$11,310,000**
Substation Improvements		
	1 - 1.0 MVA & 2 - 12.0 MVA transformers w/ 3 - 11 kV & 3 - 66 kV circuit breakers	$3,710,000
	SUBTOTAL SUBSTATION	**$3,710,000**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$15,020,000**
Losses Summary		
0	Calculated Distribution Losses @ Peak (kW)	1,851
20	Calculated Distribution Losses @ Peak (kW)	1,851
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$81,729,873**

Option 17 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$11,310,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$11,310,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000	$11,310,000
Annual Depreciation	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500	$565,500
Cumulative Depreciation	$565,500	$1,131,000	$1,696,500	$2,262,000	$2,827,500	$3,393,000	$3,958,500	$4,524,000	$5,089,500	$5,655,000	$6,220,500	$6,786,000	$7,351,500	$7,917,000	$8,482,500	$9,048,000	$9,613,500	$10,179,000	$10,744,500	$11,310,000
Investment Book Value	$10,744,500	$10,179,000	$9,613,500	$9,048,000	$8,482,500	$7,917,000	$7,351,500	$6,786,000	$6,220,500	$5,655,000	$5,089,500	$4,524,000	$3,958,500	$3,393,000	$2,827,500	$2,262,000	$1,696,500	$1,131,000	$565,500	$0
Capital Recovery	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971	$1,238,971
Operations and Maintenance	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200	$1,357,200
Taxes	$3,223,350	$3,053,700	$2,884,050	$2,714,400	$2,544,750	$2,375,100	$2,205,450	$2,035,800	$1,866,150	$1,696,500	$1,526,850	$1,357,200	$1,187,550	$1,017,900	$848,250	$678,600	$508,950	$339,300	$169,650	$0
Other Operating Expenses	$354,569	$335,907	$317,246	$298,584	$279,923	$261,261	$242,600	$223,938	$205,277	$186,615	$167,954	$149,292	$130,631	$111,969	$93,308	$74,646	$55,985	$37,323	$18,662	$0
Total Operating Expense	$4,935,119	$4,746,807	$4,558,496	$4,370,184	$4,181,873	$3,993,561	$3,805,250	$3,616,938	$3,428,627	$3,240,315	$3,052,004	$2,863,692	$2,675,381	$2,487,069	$2,298,758	$2,110,446	$1,922,135	$1,733,823	$1,545,512	$1,357,200
SUBSTATION																				
New Investment	$3,710,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$3,710,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000	$3,710,000
Annual Depreciation	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500	$185,500
Cumulative Depreciation	$185,500	$371,000	$556,500	$742,000	$927,500	$1,113,000	$1,298,500	$1,484,000	$1,669,500	$1,855,000	$2,040,500	$2,226,000	$2,411,500	$2,597,000	$2,782,500	$2,968,000	$3,153,500	$3,339,000	$3,524,500	$3,710,000
Investment Book Value	$3,524,500	$3,339,000	$3,153,500	$2,968,000	$2,782,500	$2,597,000	$2,411,500	$2,226,000	$2,040,500	$1,855,000	$1,669,500	$1,484,000	$1,298,500	$1,113,000	$927,500	$742,000	$556,500	$371,000	$185,500	$0
Capital Recovery	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417	$406,417
Operations and Maintenance	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200	$445,200
Taxes	$1,057,350	$1,001,700	$946,050	$890,400	$834,750	$779,100	$723,450	$667,800	$612,150	$556,500	$500,850	$445,200	$389,550	$333,900	$278,250	$222,600	$166,950	$111,300	$55,650	$0
Other Operating Expenses	$116,309	$110,187	$104,066	$97,944	$91,823	$85,701	$79,580	$73,458	$67,337	$61,215	$55,094	$48,972	$42,851	$36,729	$30,608	$24,486	$18,365	$12,243	$6,122	$0
Total Operating Expense	$1,618,859	$1,557,087	$1,495,316	$1,433,544	$1,371,773	$1,310,001	$1,248,230	$1,186,458	$1,124,687	$1,062,915	$1,001,144	$939,372	$877,601	$815,829	$754,058	$692,286	$630,515	$568,743	$506,972	$445,200
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279
Substation Fe	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTALS																				
Capital Recovery	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388	$1,645,388
Operating Expenses	$6,553,977	$6,303,894	$6,053,811	$5,803,728	$5,553,645	$5,303,562	$5,053,479	$4,803,396	$4,553,313	$4,303,230	$4,053,147	$3,803,064	$3,552,981	$3,302,898	$3,052,815	$2,802,732	$2,552,649	$2,302,566	$2,052,483	$1,802,400
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279	$2,446,279
TOTAL ANNUAL COST	$10,645,644	$10,395,561	$10,145,478	$9,895,395	$9,645,312	$9,395,229	$9,145,146	$8,895,063	$8,644,980	$8,394,897	$8,144,814	$7,894,731	$7,644,648	$7,394,565	$7,144,482	$6,894,399	$6,644,316	$6,394,233	$6,144,150	$5,894,067
Annual Present Worth Cost	**$9,766,646**	**$8,749,735**	**$7,834,170**	**$7,010,147**	**$6,268,791**	**$5,602,068**	**$5,002,708**	**$4,464,132**	**$3,980,389**	**$3,546,095**	**$3,156,383**	**$2,806,851**	**$2,493,521**	**$2,212,797**	**$1,961,432**	**$1,736,491**	**$1,535,323**	**$1,355,537**	**$1,194,974**	**$1,051,684**
Cumulative Annual Present Worth Cost	**$9,766,646**	**$18,516,381**	**$26,350,551**	**$33,360,698**	**$39,629,489**	**$45,231,557**	**$50,234,265**	**$54,698,397**	**$58,678,786**	**$62,224,881**	**$65,381,264**	**$68,188,115**	**$70,681,635**	**$72,894,433**	**$74,855,865**	**$76,592,355**	**$78,127,679**	**$79,483,216**	**$80,678,190**	**$81,729,873**

DOMLEC 10/21/2005

Present Worth Analysis

		COST ANALYSIS				BENEFIT ANALYSIS			
OPTION	CASE	TOTAL CAPITAL COST ($EC) [1]	PRESENT VALUE OF 20 YR COST ($EC) [2]	Load Factor	Peak KW Losses	TOTAL LOSSES (KWH/YR) [3]	REDUCTION FROM BASE LOSSES (KWH/YR) [3]	PRESENT VALUE OF 20YR LOSS REDUCTION ($EC)	COST/BENEFIT RATIO
0	Base Case	$ -	$ -	69%	2.97	18,038	-	$ -	-
18	Upgrade to low-loss transformer (20% imp. savings)	33,550	89,746	69%	2.85	17,309	729	1,448	61.98
19	Upgrade to low-loss transformer (30% imp. savings)	35,100	93,892	69%	2.79	16,944	1,093	2,172	43.23

Notes:
(1) Total Capital Costs assume that each Option is operational at the beginning of year 1.
(2) The Present Value of 20 Yr Cost includes all costs with the exception of the cost of losses and is discounted at a rate of 9%.
(3) Assumes that losses are constant over 20 years. Annual KWH = (Load Factor)*(Peak KW Losses)*(8760 Hours)

Exhibit 3-1
Present Worth Cost Assumptions

Interest for Present Worth Analysis	9.00%

	TRANSMISSION	SUBSTATION	DISTRIBUTION
Annual Inflation on Investment	2.50%	2.50%	2.50%
Depreciation Life of Investment (Years)	20.0	20.0	20.0
Annual Depreciation (3-yr. Avg.)	5.00%	5.00%	5.00%
Nominal Interest Rate	9.00%	9.00%	9.00%
Capital Recovery Factor (Calculated)	10.95%	10.95%	10.95%
Percent O&M Expense of Installed Plant	12.00%	12.00%	0.00%
Annual Inflation of O&M Expenses	0.00%	0.00%	0.00%
Tax on Investment Book Value	30.00%	30.00%	30.00%
Annual Inflation of Tax Rate	0.00%	0.00%	0.00%
Percent Insurance Expense of Installed Plant	3.30%	3.30%	0.00%
Annual Inflation of Insurance Expense	0.00%	0.00%	0.00%

COST OF LOSSES

Cost for 1kW of Peak Loss (Cu) ($EC)	$1,321.81
Cost for 1kW of Peak Loss (Fe) ($EC)	$2,568.22
Annual Inflation of Cost of Losses	0.00%

Notes:

- Depreciation based on Transmission & Distribution value from DOMLEC
- O&M expenses agreed upon with DOMLEC; O&M applied to new equipment only
- Insurance expenses based on Total Plant; Insurance applied to new equipment only

Present Worth Analysis

Equipment	Installed Costs ($EC)	Source
1ph 50 kVA (20% low loss)	3,650	DOMLEC Staff (US $1,251.90 for 1ph 50 kVA: added 10% for premium)
3ph 500 kVA (20% low loss)	29,900	DOMLEC Staff (US $10,260.59 for 3 ph 500 kVA: added 10% for premium)
1ph 50 kVA (30% low loss)	3,800	DOMLEC Staff (US $1,251.90 for 1ph 50 kVA: added 15% for premium)
3ph 500 kVA (30% low loss)	31,300	DOMLEC Staff (US $10,260.59 for 3 ph 500 kVA: added 15% for premium)

Base Case
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$0**
Losses Summary		
0	Calculated Load Losses @ Peak (kW)	1.67
0	Calculated No-Load Losses @ Peak (kW)	1.30
20	Calculated Load Losses @ Peak (kW)	1.67
20	Calculated No-Load Losses @ Peak (kW)	1.30
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$50,628**

Base Case - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207	$2,207
Substation Fe	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339
TOTALS																				
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546
TOTAL ANNUAL COST	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546	$5,546
Annual Present Worth Cost	**$5,088**	**$4,668**	**$4,283**	**$3,929**	**$3,605**	**$3,307**	**$3,034**	**$2,783**	**$2,554**	**$2,343**	**$2,149**	**$1,972**	**$1,809**	**$1,660**	**$1,523**	**$1,397**	**$1,282**	**$1,176**	**$1,079**	**$990**
Cumulative Annual Present Worth Cost	***$5,088***	***$9,756***	***$14,039***	***$17,968***	***$21,572***	***$24,879***	***$27,913***	***$30,697***	***$33,250***	***$35,593***	***$37,742***	***$39,714***	***$41,523***	***$43,183***	***$44,705***	***$46,102***	***$47,384***	***$48,560***	***$49,638***	***$50,628***

Option 18
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Upgrade to low loss transformers, 1 - 1ph 50 kVA and 1 - 3ph 500 kVA, on Grand Bay and Bath Road (20% savings from base impedance)	$33,550
	SUBTOTAL DISTRIBUTION	**$33,550**
TOTAL CAPITAL COST		**$33,550**
Losses Summary		
0	Calculated Load Losses @ Peak (kW)	1.55
0	Calculated No-Load Losses @ Peak (kW)	1.30
20	Calculated Load Losses @ Peak (kW)	1.55
20	Calculated No-Load Losses @ Peak (kW)	1.30
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$138,925**

Option 18 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$33,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$33,550	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550	$33,550
Annual Depreciation	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678	$1,678
Cumulative Depreciation	$1,678	$3,355	$5,033	$6,710	$8,388	$10,065	$11,743	$13,420	$15,098	$16,775	$18,453	$20,130	$21,808	$23,485	$25,163	$26,840	$28,518	$30,195	$31,873	$33,550
Investment Book Value	$31,873	$30,195	$28,518	$26,840	$25,163	$23,485	$21,808	$20,130	$18,453	$16,775	$15,098	$13,420	$11,743	$10,065	$8,388	$6,710	$5,033	$3,355	$1,678	$0
Capital Recovery	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$9,562	$9,059	$8,555	$8,052	$7,549	$7,046	$6,542	$6,039	$5,536	$5,033	$4,529	$4,026	$3,523	$3,020	$2,516	$2,013	$1,510	$1,007	$503	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$9,562	$9,059	$8,555	$8,052	$7,549	$7,046	$6,542	$6,039	$5,536	$5,033	$4,529	$4,026	$3,523	$3,020	$2,516	$2,013	$1,510	$1,007	$503	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049	$2,049
Substation Fe	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339
TOTALS																				
Capital Recovery	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675	$3,675
Operating Expenses	$9,562	$9,059	$8,555	$8,052	$7,549	$7,046	$6,542	$6,039	$5,536	$5,033	$4,529	$4,026	$3,523	$3,020	$2,516	$2,013	$1,510	$1,007	$503	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387	$5,387
TOTAL ANNUAL COST	$18,625	$18,121	$17,618	$17,115	$16,612	$16,108	$15,605	$15,102	$14,599	$14,095	$13,592	$13,089	$12,586	$12,082	$11,579	$11,076	$10,573	$10,069	$9,566	$9,063
Annual Present Worth Cost	**$17,087**	**$15,252**	**$13,604**	**$12,125**	**$10,796**	**$9,605**	**$8,536**	**$7,579**	**$6,722**	**$5,954**	**$5,267**	**$4,654**	**$4,105**	**$3,616**	**$3,179**	**$2,790**	**$2,443**	**$2,135**	**$1,860**	**$1,617**
Cumulative Annual Present Worth Cost	**$17,087**	**$32,339**	**$45,943**	**$58,068**	**$68,864**	**$78,469**	**$87,006**	**$94,585**	**$101,306**	**$107,260**	**$112,528**	**$117,181**	**$121,286**	**$124,902**	**$128,081**	**$130,870**	**$133,313**	**$135,448**	**$137,308**	**$138,925**

Option 19
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Upgrade to low loss transformers, 1 - 1ph 50 kVA and 1 - 3ph 500 kVA, on Grand Bay and Bath Road (30% savings from base impedance)	$35,100
	SUBTOTAL DISTRIBUTION	**$35,100**
TOTAL CAPITAL COST		**$35,100**
Losses Summary		
0	Calculated Load Losses @ Peak (kW)	1.49
0	Calculated No-Load Losses @ Peak (kW)	1.30
20	Calculated Load Losses @ Peak (kW)	1.49
20	Calculated No-Load Losses @ Peak (kW)	1.30
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$142,348**

Option 19 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$35,100	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$35,100	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100	$35,100
Annual Depreciation	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755	$1,755
Cumulative Depreciation	$1,755	$3,510	$5,265	$7,020	$8,775	$10,530	$12,285	$14,040	$15,795	$17,550	$19,305	$21,060	$22,815	$24,570	$26,325	$28,080	$29,835	$31,590	$33,345	$35,100
Investment Book Value	$33,345	$31,590	$29,835	$28,080	$26,325	$24,570	$22,815	$21,060	$19,305	$17,550	$15,795	$14,040	$12,285	$10,530	$8,775	$7,020	$5,265	$3,510	$1,755	$0
Capital Recovery	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$10,004	$9,477	$8,951	$8,424	$7,898	$7,371	$6,845	$6,318	$5,792	$5,265	$4,739	$4,212	$3,686	$3,159	$2,633	$2,106	$1,580	$1,053	$527	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$10,004	$9,477	$8,951	$8,424	$7,898	$7,371	$6,845	$6,318	$5,792	$5,265	$4,739	$4,212	$3,686	$3,159	$2,633	$2,106	$1,580	$1,053	$527	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969	$1,969
Substation Fe	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339	$3,339
TOTALS																				
Capital Recovery	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845	$3,845
Operating Expenses	$10,004	$9,477	$8,951	$8,424	$7,898	$7,371	$6,845	$6,318	$5,792	$5,265	$4,739	$4,212	$3,686	$3,159	$2,633	$2,106	$1,580	$1,053	$527	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308	$5,308
TOTAL ANNUAL COST	$19,157	$18,630	$18,104	$17,577	$17,051	$16,524	$15,998	$15,471	$14,945	$14,418	$13,892	$13,365	$12,839	$12,312	$11,786	$11,259	$10,733	$10,206	$9,680	$9,153
Annual Present Worth Cost	**$17,575**	**$15,681**	**$13,979**	**$12,452**	**$11,082**	**$9,853**	**$8,751**	**$7,765**	**$6,881**	**$6,090**	**$5,384**	**$4,752**	**$4,188**	**$3,684**	**$3,236**	**$2,836**	**$2,480**	**$2,164**	**$1,883**	**$1,633**
Cumulative Annual Present Worth Cost	**$17,575**	**$33,256**	**$47,235**	**$59,687**	**$70,769**	**$80,622**	**$89,373**	**$97,138**	**$104,019**	**$110,109**	**$115,493**	**$120,245**	**$124,432**	**$128,117**	**$131,352**	**$134,188**	**$136,668**	**$138,832**	**$140,715**	**$142,348**

DOMLEC 10/21/2005

Present Worth Analysis

		COST ANALYSIS				BENEFIT ANALYSIS			
OPTION	CASE	TOTAL CAPITAL COST ($EC) [1]	PRESENT VALUE OF 20 YR COST ($EC) [2]	Load Factor	Peak KW Losses	TOTAL LOSSES (KWH/YR) [3]	REDUCTION FROM BASE LOSSES (KWH/YR) [3]	PRESENT VALUE OF 20YR LOSS REDUCTION ($EC)	COST/BENEFIT RATIO
0	Base Case	$ -	$ -	69%	0.82	4,980	-	$ -	-
20	Upgrade transformers due to loading	7,155	19,139	69%	0.42	2,551	2,429	7,899	2.42

Notes:
(1) Total Capital Costs assume that each Option is operational at the beginning of year 1.
(2) The Present Value of 20 Yr Cost includes all costs with the exception of the cost of losses and is discounted at a rate of 9%.
(3) Assumes that losses are constant over 20 years. Annual KWH = (Load Factor)*(Peak KW Losses)*(8760 Hours)

Exhibit 3-1
Present Worth Cost Assumptions

Interest for Present Worth Analysis	9.00%

	TRANSMISSION	SUBSTATION	DISTRIBUTION
Annual Inflation on Investment	2.50%	2.50%	2.50%
Depreciation Life of Investment (Years)	20.0	20.0	20.0
Annual Depreciation (3-yr. Avg.)	5.00%	5.00%	5.00%
Nominal Interest Rate	9.00%	9.00%	9.00%
Capital Recovery Factor (Calculated)	10.95%	10.95%	10.95%
Percent O&M Expense of Installed Plant	12.00%	12.00%	0.00%
Annual Inflation of O&M Expenses	0.00%	0.00%	0.00%
Tax on Investment Book Value	30.00%	30.00%	30.00%
Annual Inflation of Tax Rate	0.00%	0.00%	0.00%
Percent Insurance Expense of Installed Plant	3.30%	3.30%	0.00%
Annual Inflation of Insurance Expense	0.00%	0.00%	0.00%

COST OF LOSSES

Cost for 1kW of Peak Loss (Cu) ($EC)	$1,321.81
Cost for 1kW of Peak Loss (Fe) ($EC)	$2,568.22
Annual Inflation of Cost of Losses	0.00%

Notes:

- Depreciation based on Transmission & Distribution value from DOMLEC
- O&M expenses agreed upon with DOMLEC; O&M applied to new equipment only
- Insurance expenses based on Total Plant; Insurance applied to new equipment only

Present Worth Analysis

Equipment	Installed Costs ($EC)	Source
1 ph 7.5 kVA	1,723	DOMLEC Staff (For 1ph 3 kVA, US $543; 1 ph 5 kVA, US $521; 1 ph 37.5 kVA, US $1037.64)
1 ph 10 kVA	1,986	DOMLEC Staff (For 1ph 3 kVA, US $543; 1 ph 5 kVA, US $521; 1 ph 37.5 kVA, US $1037.64)

Base Case
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	SUBTOTAL DISTRIBUTION	**$0**
TOTAL CAPITAL COST		**$0**
Losses Summary		
0	Calculated Load Losses @ Peak (kW)	0.31
0	Calculated No-Load Losses @ Peak (kW)	0.51
20	Calculated Load Losses @ Peak (kW)	0.31
20	Calculated No-Load Losses @ Peak (kW)	0.51
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$15,697**

Base Case - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410	$410
Substation Fe	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310	$1,310
TOTALS																				
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720
TOTAL ANNUAL COST	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720	$1,720
Annual Present Worth Cost	**$1,578**	**$1,447**	**$1,328**	**$1,218**	**$1,118**	**$1,025**	**$941**	**$863**	**$792**	**$726**	**$666**	**$611**	**$561**	**$515**	**$472**	**$433**	**$397**	**$365**	**$334**	**$307**
Cumulative Annual Present Worth Cost	**$1,578**	**$3,025**	**$4,353**	**$5,571**	**$6,688**	**$7,714**	**$8,654**	**$9,517**	**$10,309**	**$11,035**	**$11,702**	**$12,313**	**$12,874**	**$13,389**	**$13,861**	**$14,294**	**$14,691**	**$15,056**	**$15,390**	**$15,697**

Option 20
Capital Improvements Summary

Load Level	Description	2005 Estimated Cost ($EC)
Transmission Improvements		
	SUBTOTAL TRANSMISSION	**$0**
Substation Improvements		
	SUBTOTAL SUBSTATION	**$0**
Distribution Improvements		
	Replace existing 3 - 1ph 25 kVA with 3 - 1ph 7.5 kVA transformers on Pierre Charles GrandBay and replace existing 1 ph 50 kVA with 1 ph 10 kVA transformer on Belfast North	$7,155
	SUBTOTAL DISTRIBUTION	**$7,155**
TOTAL CAPITAL COST		**$7,155**
Losses Summary		
0	Calculated Load Losses @ Peak (kW)	0.18
0	Calculated No-Load Losses @ Peak (kW)	0.24
20	Calculated Load Losses @ Peak (kW)	0.18
20	Calculated No-Load Losses @ Peak (kW)	0.24
Present Worth Cost		
20	20-Year Cumulative Present Worth Cost	**$26,938**

Option 20 - P.W. Cost
Present Worth Calculations

	Load Level																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRANSMISSION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SUBSTATION																				
New Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Depreciation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investment Book Value	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital Recovery	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
DISTRIBUTION																				
New Investment	$7,155	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inflated Investment	$7,155	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cumulative Cost	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155	$7,155
Annual Depreciation	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358	$358
Cumulative Depreciation	$358	$716	$1,073	$1,431	$1,789	$2,147	$2,504	$2,862	$3,220	$3,578	$3,935	$4,293	$4,651	$5,009	$5,366	$5,724	$6,082	$6,440	$6,797	$7,155
Investment Book Value	$6,797	$6,440	$6,082	$5,724	$5,366	$5,009	$4,651	$4,293	$3,935	$3,578	$3,220	$2,862	$2,504	$2,147	$1,789	$1,431	$1,073	$716	$358	$0
Capital Recovery	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784
Operations and Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Taxes	$2,039	$1,932	$1,825	$1,717	$1,610	$1,503	$1,395	$1,288	$1,181	$1,073	$966	$859	$751	$644	$537	$429	$322	$215	$107	$0
Other Operating Expenses	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Operating Expense	$2,039	$1,932	$1,825	$1,717	$1,610	$1,503	$1,395	$1,288	$1,181	$1,073	$966	$859	$751	$644	$537	$429	$322	$215	$107	$0
DELIVERY CHARGES																				
Delivery Point Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Facilities Rental Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Breaker Rental Charges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LOSSES ($)																				
Transmission Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Substation Cu	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution Cu	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238	$238
Substation Fe	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616	$616
TOTALS																				
Capital Recovery	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784	$784
Operating Expenses	$2,039	$1,932	$1,825	$1,717	$1,610	$1,503	$1,395	$1,288	$1,181	$1,073	$966	$859	$751	$644	$537	$429	$322	$215	$107	$0
Delivery Charges	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Losses	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854	$854
TOTAL ANNUAL COST	$3,677	$3,570	$3,463	$3,355	$3,248	$3,141	$3,033	$2,926	$2,819	$2,711	$2,604	$2,497	$2,389	$2,282	$2,175	$2,067	$1,960	$1,853	$1,745	$1,638
Annual Present Worth Cost	**$3,374**	**$3,005**	**$2,674**	**$2,377**	**$2,111**	**$1,873**	**$1,659**	**$1,468**	**$1,298**	**$1,145**	**$1,009**	**$888**	**$779**	**$683**	**$597**	**$521**	**$453**	**$393**	**$339**	**$292**
Cumulative Annual Present Worth Cost	**$3,374**	**$6,378**	**$9,052**	**$11,429**	**$13,540**	**$15,413**	**$17,072**	**$18,541**	**$19,838**	**$20,984**	**$21,993**	**$22,881**	**$23,660**	**$24,343**	**$24,940**	**$25,461**	**$25,913**	**$26,306**	**$26,646**	**$26,938**