CHAPLEAU PUBLIC UTILITIES CORPORATION

2016

Consolidated Distribution System Plan

Forecast Period: 2016 to 2020
Historical Period: 2010 to 2015

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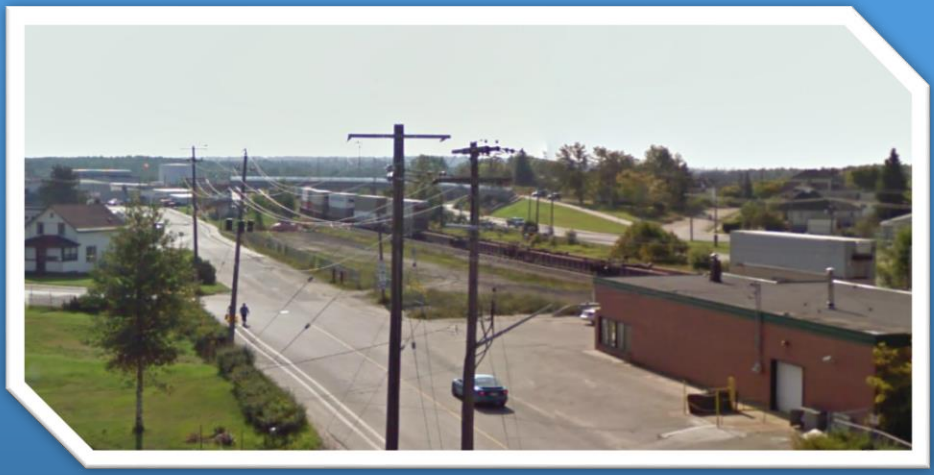

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5.0 INTRODUCTION

5.0.1 BACKGROUND

Chapleau Public Utility Corporation (CPUC) has retained Burman Energy Consultants Group Inc. (Burman Energy) to produce its distribution system (DS) Plan to meet the Ontario Energy Board's (OEB) Chapter 5 Consolidated Distribution System Plan Filing Requirements. The intent of this document is to provide the information required by the OEB under the Renewed Regulatory Framework for Electricity (RRFE) to facilitate assessment of CPUC's rate application. For the purposes of meeting the filing requirements, this DS Plan consolidates documentation of CPUC's asset management process and the capital expenditure plan.

This DS Plan describes how CPUC will develop, manage and maintain its distribution system equipment in order to provide a safe, reliable, efficient and cost effective service to its customers. The DS Plan identifies the major initiatives and projects to be undertaken over the planning period. Preparation of the DS Plan in this format is intended to supplement CPUC's rate application for 2016 distribution rates to the OEB. This is a 10-year plan, with a historical period spanning from 2011 to 2015 (2015 being the Bridge Year) and a forecast period of 2016 to 2020 (2016 being the Test Year).

The DS Plan is consistent with OEB expectations for distributors to optimize investments with present and future customers in mind. This Plan is focused on validating its direction with that of the most viable, value added, long term operating environment possible. Although full execution of all elements of the Plan may not be possible within the timeframe presented, these elements have all been addressed and prioritized within the context of an overall investment strategy for CPUC.

SECTION HEADINGS

Where relevant, this DS Plan is organized using the same section headings indicated in the OEB's Chapter 5 Filing Requirements, and addresses the information outlined in each section. Other relevant information is included in separately identified sections and is intended to complement the prescribed data.

5.0.2 ABOUT CHAPLEAU PUBLIC UTILITIES CORPORATION

Formed in 2002, CPUC is a licensed, rate-regulated local distribution company (LDC), operating in the Town of Chapleau, Ontario. The Township of Chapleau is the sole shareholder of both CPUC and the Chapleau Energy Services Corporation (CESC) – the service company affiliate. An operation and maintenance service agreement exists between the two companies.

Shown below is the corporate structure of CPUC:

Corporate Structure of CPUC

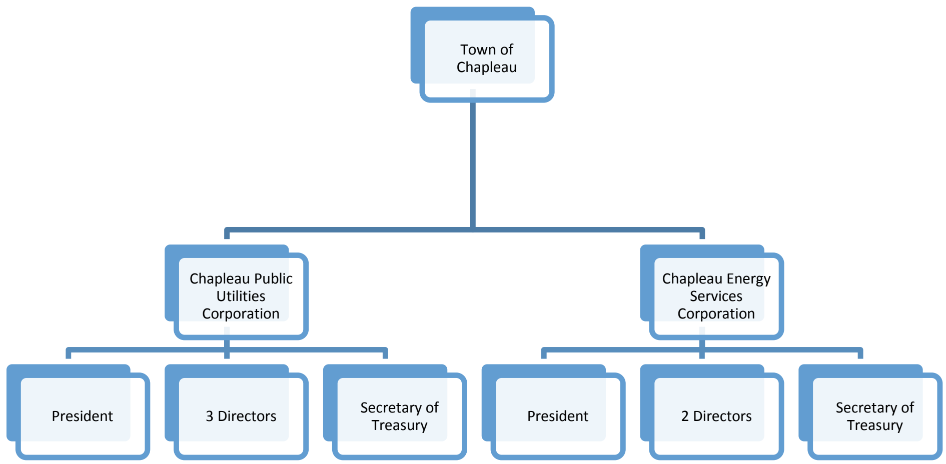


Figure 1.

CPUC serves approximately 1,300-metered rural, small commercial, forestry and Canadian Pacific Railway loads within the Township boundaries. Refer to Appendix A for a map of CPUC's Service Area.

Approximately 37% of the utility's electrical load is connected to Hydro One 25 kV supply and the remainder of the load is currently serviced at 4.16 kV through CPUC-owned transformation facilities (115 kV-4.16 kV). Several plant closures prior to 2006 in the forestry industry resulted in reductions to town population and corresponding reductions in electricity consumption. There have been no significant local economic developments since that time. There are no new significant economic developments in the Township of Chapleau forecast for the 2016-2020 planning period in this plan.

ABOUT THE TOWN OF CHAPLEAU

The Town of Chapleau is located in Northern Ontario, as shown on the map below, and has a population of approximately 2,100 residents.

Located in Sudbury District, Ontario, the Town size is approximately 14.3 square kilometers. Set against the backdrop of pristine lakes, rivers and abundant forests of northern Ontario, the Town is the gateway to the world's largest crown game preserve, and is a paradise for everyone who loves the outdoors.

For over 100 years, Chapleau has served the railroad and the forestry industry, a heritage that continues to this day. Chapleau is home to a vibrant Francophone community with First Nations as close neighbours. The Francophone presence dates back to the Town's beginnings, and contributes to Chapleau's strong bilingual foundation.

Location of the Town of Chapleau

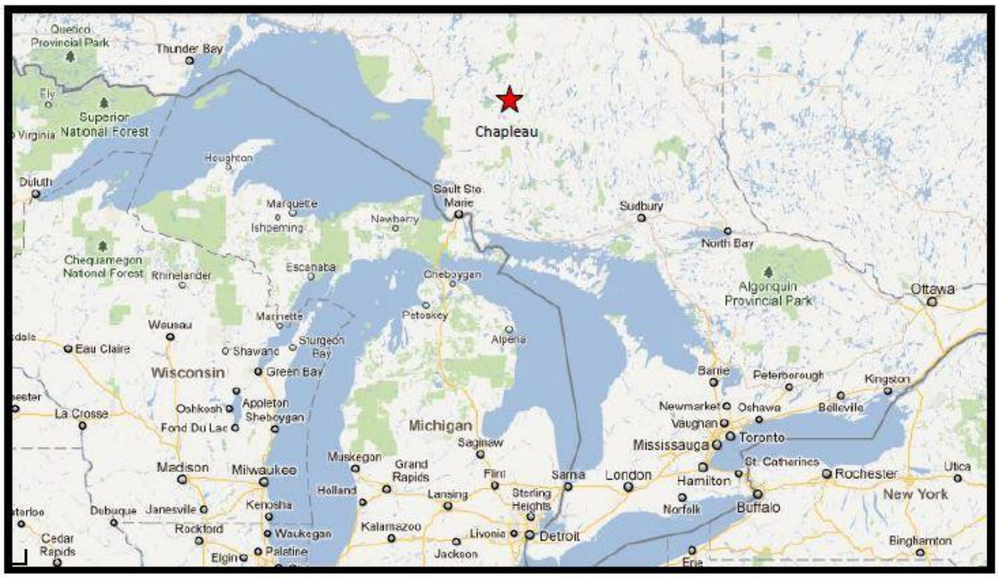


Figure 2.

MISSION & VALUES

CPUC builds and operates a distribution network that supports Ontario's energy future by delivering on obligations mandated by the Ontario Government and other regulatory agencies. CPUC will continue to operate as a stand-alone LDC servicing community needs at a good value for the money. CPUC works collaboratively with customers and business partners to deliver cost-effective and reliable service with minimal interruptions to supply. CPUC employees act with integrity, maintain a safe environment and take responsibility for the community.

CPUC takes pride in servicing its customers and embraces its business values.

CPUC Business Values

Figure 3.

Reliable - CPUC's System Reliability is a primary goal, designed to ensure appropriate management of its assets to provide a sustainable and reliable service to its customers.

Safe - CPUC ensures that the safety of its staff and the public remains its number one priority over the planning period.

Trustworthy - CPUC's employees are taking responsibility for their conduct and obligations to service their community.

Asset Stewardship - CPUC's asset stewardship ensures continual enhancement of its asset management processes as the basis for any increased investment.

Customer Focused - CPUC effectively meets the service expectations to its customers and delivers a good value for the money.

Collaborative - Decisions are made jointly, in cooperation with all stakeholders, as required, to optimize the planning process.

CPUC CUSTOMER BASE SUMMARY

The table below illustrates CPUC's historical and forecasted customer base which includes residential, general service < 50kW, general service >50kW and large users (>5000kW). No customer growth is currently forecast. Distribution system investments to date have focused on sustaining the existing DS infrastructure.

RATES AND ENERGY USAGE

Appendix B shows CPUC's current rates. The Utility currently has one of the lowest rates in the province.

The table below summarizes CPUC's historical total number of customers, residential energy usage (kWh) and commercial demand (kW).

	2005 Actual	2006 Actual	2007 Actual	2008 Actual	2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Actual
Customers	1,353	1,316	1,338	1,335	1,326	1,306	1,293	1,304	1,276	1,263
kWh (Residential, GS<50, GS>50, Streetlight, USL)	29,440,248	28,375,490	27,688,768	28,582,032	28,674,687	26,167,966	26,893,563	26,031,597	27,174,709	27,940,070
kW from applicable classes (GS>50 and Streetlight)	22,789	22,087	20,025	20,964	20,812	19,414	20,394	19,573	19,264	21,021

Figure 4.

5.0.3 DISTRIBUTION SYSTEM PLAN FRAMEWORK

5.0.3.1 INTEGRATED PLANNING

CPUC approaches distribution system planning within a continuous improvement framework that considers investment objectives for system renewal and expansion, renewable generation connections, smart grid development and regional planning forecasts using an integrated and iterative process.

CPUC's capital expenditure plan consolidates all categories of system investments and the DS Plan presents a current, best information approach to address the distribution system requirements. In addition, as developments in the electricity delivery market continue at a rapidly increasing pace, the DS Plan is intended to be a living document and will be amended to reflect changing priorities. The table below illustrates CPUC's distribution system planning process inputs, outputs and planning elements as CPUC seeks to align asset-management-driven business operations.

CPUC Distribution System Planning Process Inputs and Outputs

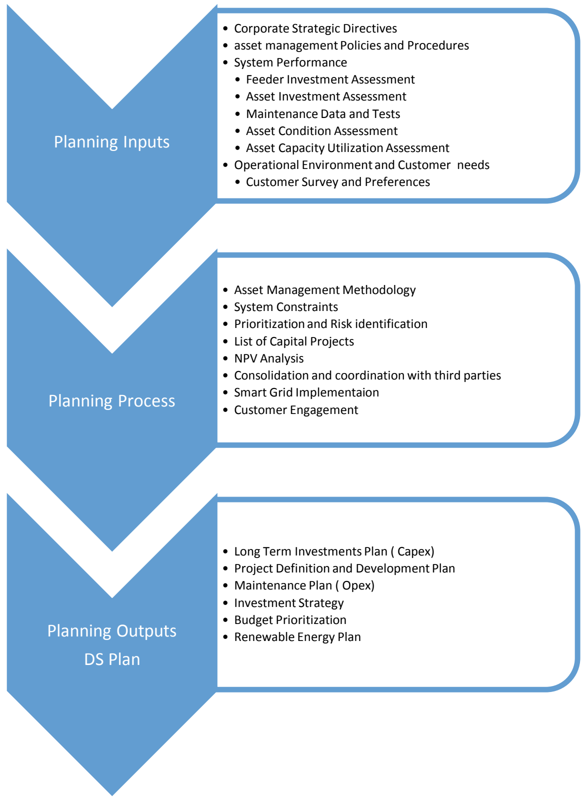


Figure 5.

The Plan Do Check Act (PDCA) continuous improvement cycle is becoming core to the CPUC asset management DS Planning methodology. The following diagram shows the elements being adopted through the planning process.

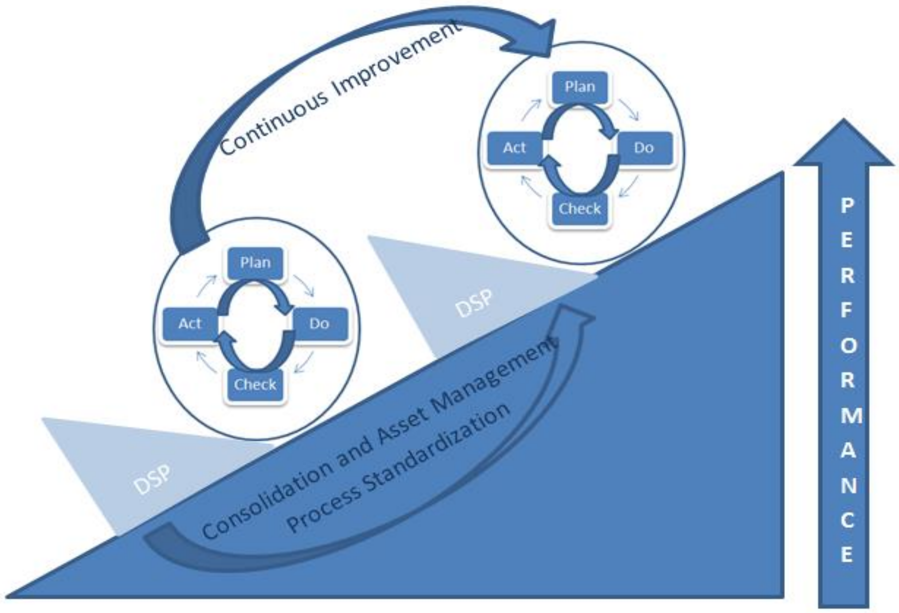


Figure 6.

Plan - Establish the objectives and processes necessary to deliver results in accordance with the expected outcomes. Start, on a small scale, to test possible effects and financial feasibility. Develop a DS Plan, prioritizing budgets, resources and timelines.

Do - Implement the Plan and collect data for analysis in the following "CHECK" and "ACT" steps. Develop projects' design and plan for execution, prepare status reports and implement planned activities.

Check - Study the actual results (measured and collected in "DO" above) and compare against the expected results (targets or goals from the "PLAN") to ascertain any differences. Evaluate any deviations in implementation from the Plan and evaluate the appropriateness and completeness of the Plan to enable the execution, i.e., "Do". This Plan elaborates on CPUC's Performance Outcomes in the later sections of the document. CPUC's Performance Monitoring Scorecard (Appendix C) represents an approach to managing utility performance through specific measurable key performance indicators.

Act - Recommend improvements and adjustments to the initial plan; determine the course of corrections and modifications to the plan.

ASSET MANAGEMENT TOOLS

Asset management at CPUC historically has involved the manual collection and largely anecdotal analysis of inspection, maintenance and reliability records. Going forward, CPUC will continue collecting asset attributes in its geographic information system (GIS – ESRI Platform) and will utilize third party consultants for studies with distribution engineering software (DESS Software). CPUC is also planning to consolidate data bases into a single source of information for use by each application in the future.

5.0.3.2 LONGER-TERM PLANNING HORIZON

The planning horizon for the CPUC DS Plan covers ten years with a five-year historical period of 2011 to 2015 and a five-year forecast period of 2016 to 2020. As defined in the Chapter 5 Requirements, 2015 is the Bridge year and 2016 the Test year. In order to support integrated planning and better align the distributor planning cycles with rate-setting cycles, the approach to longer-term planning has incorporated the following elements into the plan:

Longer Term Planning Element	**Approach**
Enhance the predictability necessary to facilitate planning – including regional planning – and decision-making by customers and distributors	▪ Heighten the emphasis on regionally planned infrastructure by identifying the supply challenges ▪ Complete system renewal and expansion – refresh assets in totality as per assets' lifecycle ▪ Encourage efforts to enable the connection of renewable energy generation ▪ Ensure the long-term viability and economic benefit of investment alternatives through the use of a capital investment model
Facilitate the cost-effective and efficient implementation of distributor DS Plans and, thereby, the achievement of customer service and cost performance outcomes	▪ CPUC's first efforts in moving towards a structured planning approach was to develop a system model and study to report on loss mitigation. The majority of the recommendations from that study were implemented within the following year.
Help distributors to manage consumer rate impacts	▪ Coordination between CPUC and Burman Energy in development of detailed 5-year implementation plans for CDM

Figure 7.

5.0.3.3 REGIONAL CONSIDERATIONS

CPUC participated in regional planning exercises as described in Section 5.2.2 of this document and undertook the process specified by the IESO. The result of the process was that an IESO-led plan was not required. Although the regional planning process has been initiated, the Regional Transmitter concluded in its Needs Assessment report that the identified needs do not require regional coordination and a Regional Infrastructure Plan will not be produced in this Region. The capacity constraints currently in place for the connection of REG projects could be addressed during future transmission planning. CPUC has engaged in a dialogue with Hydro One in regard to the needs of transmission upgrades.

5.0.3.4 SMART GRID DEVELOPMENT AND IMPLEMENTATION

CPUC is addressing smart grid development in a number of ways and the utility's activities in this regard are described throughout this document.

The following table provides further information about CPUC Plans for smart grid development and implementation.

LONG TERM PLANNING ELEMENT	APPROACH
The activities a distributor has undertaken in order to understand their customers' preferences (e.g., data access and visibility, participating in distributed generation and load management) and how they have addressed those preferences *The options a distributor has considered for facilitating customer access to consumption data in an electronic format* *The mechanisms that facilitate "real-time" data access and "behind the meter" services and applications that a distributor has considered for the purpose of providing customers with the ability to make decisions affecting their electricity costs*	▪ In its recent survey, CPUC explored smart grid options with its customer base. ▪ Based on responses received, customer expectations were clearly prioritized toward reliability at the lowest possible cost. ▪ Given the relative extremely high priority placed by customers on reliability and low cost, smart grid investments were not considered prudent at this time.
The consideration a distributor has given to the investments necessary to facilitate the integration of distributed generation and more complex loads (e.g., customers with self-generation and/or storage capability)	▪ CPUC performs CIAs to ensure the system has adequate distribution system capacity for distributed generation.
The technology-enabling opportunities a distributor has considered regarding operational efficiencies and improved asset management; and	▪ A GIS network model, initially developed by the Township for municipal purposes, has been employed to facilitate spatial referencing of assets, attributes and query enabled connectivity for asset management analyses.
The distributor's awareness and adoption of innovative processes, services, business models and technologies.[10]	▪ CPUC is investigating new technologies through a pilot project under the Smart Grid Fund. It is anticipated that

	the pilot will be implemented at no cost to the Utility and may provide reliability and further loss reduction benefits.

Figure 8.

5.0.4 DS PLAN PERFORMANCE OBJECTIVES

During all of CPUC's planning efforts, the results that affect customer focus, operational effectiveness, public policy responsiveness and financial performance were aligned with the OEB's performance outcomes.

5.0.5 FORM OF FILING REQUIREMENTS

It is CPUC's contention that this DS Plan conforms and also aligns with OEB's Filing Requirements for electricity distribution rate applications.

5.1 GENERAL & ADMISTRATIVE

CPUC has prepared this DS Plan in the standard approach prescribed by the OEB in the Chapter 5 Filing Requirements.

5.1.1 INVESTMENT CATEGORIES

CPUC has organized all distribution system spending detailed in this DS Plan with the investment categories outlined in the Filing Requirements. CPUC has grouped all capital spending into each of the four investment categories described below. The drivers for each investment category are also aligned with the Filing Requirements and are described in the relevant paragraphs of Section 5.4 Capital Expenditure Plan.

For reporting purposes, a project or activity involving two or more drivers associated with different categories are included in the category corresponding to the trigger driver. However, all drivers of a given project or activity were considered in the analysis of capital investment options and are described in the justification section of this Plan.

The table below provides a summary of the applicable drivers considered for CPUC's projects in each investment category.

Summary of CPUC's Major Drivers for Projects

	Drivers	Projects/ Activities
System Access	Mandated service obligations	Activities: -Customer connections -Metering
System Renewal	Assets at end of life: -Failure	System Renewal Programs: -Poles -Transformers -Other
System Service	System and operational objectives: -System performance and reliability	Capital Projects: -Voltage conversion project - Smart grid automation pilot
General Plant	System support	Activities: -Customer engagement and information

Figure 9.

5.1.2 INVESTMENTS RELATED TO RENEWABLE ENERGY GENERATION

CPUC understands its responsibility to ensure that renewable energy generation (REG) projects are accommodated and connected on its distribution system and addresses efforts in this regard in the appropriate section of this DS Plan. CPUC has no plans to make capital investments related to the connection of REG facilities due to the existing constraints.

5.1.3 TIME OF FILING

The Chapleau PUC DS Plan is a stand-alone document and will be filed in support of CPUC's 2016 Cost of Service Rate Application.

5.1.4 PLANNING IN CONSULTATION WITH THIRD PARTIES

The forecasted loads at the points of interconnection are not expected to grow in the planning period. Although REG projects have been identified and preliminary work done on CIAs, the absence of a regional plan results in uncertainty with regards to CPUC plans to accommodate REG and smart grid investments. Until plans are developed to address the capacity limitations of Hydro One's transmission facilities, definitive plans surrounding required investments are not feasible. A more detailed description of CPUC's planning activities with third parties is included in Section 5.2.2.

This DS Plan was submitted to the IESO for review as prescribed in the Filing Requirements. The resulting letter from the IESO is attached in Appendix F.

5.1.5 PERFORMANCE REPORTING

CPUC uses the balanced scorecard approach to effectively translate the four performance outcomes into a coherent set of measures. This approach organizes the performance information in a manner that facilitates evaluations and meaningful comparisons. The scorecard (Appendix C) is designed to track and show CPUC's performance results over time and helps to clearly benchmark performance/improvement against other utilities and best practices.

Each measure included on the scorecard has an established minimum level of performance expected to be achieved (referenced as OEB Target). Each year CPUC reports on scorecard performance results to the OEB. Analysis of CPUC's historical performance is included in Section 5.2.3.

5.2 DISTRIBUTION SYSTEM PLAN

5.2.1 DISTRIBUTION SYSTEM PLAN OVERVIEW

KEY ELEMENTS OF THE PLAN

CPUC will convert its 4.16 kV electrical distribution infrastructure system to 25 kV by building a new substation and gradually changing the conductors, poles and associated equipment over the next ten years. The voltage conversion will result in a number of benefits, including:

- reduced line losses
- increased system reliability
- an offset of intrinsic investments required for replacement of end of life assets
- Increased shareholder value
- minimal rate impacts

This plan will consolidate CPUC's distribution assets at the 25 kV level eliminating the long-term load transfer currently in place at the municipal hospital and off- loading Hydro One's 25 kV system. Hydro One's remaining loads in the area will continue to be supplied by the Hydro One 25 kV assets. This project becomes the singular focus of CPUC in the planning period for the DS Plan. The significance of the project is such that it addresses numerous operational and business issues surrounding line loss mitigation, reliability improvements, asset age and renewal and standardization of system assets.

Investments in the categories of System Access, System Renewal and General Plant will be minimal and under the materiality threshold set out in the Chapter 5 Filing Requirements. In addition, it is expected that system O&M increases associated with an aging infrastructure will be avoided, in part due to the asset refresh from the voltage conversion.

The investments have been aligned through the asset management process and review of customer preferences. The customer preferences were derived from compiled data acquired through a targeted customer research survey. Throughout the planning process, CPUC has also considered field assessments, engineering judgement and system configuration to determine the needs of infrastructure investments.

EXPECTED SOURCES OF COST SAVINGS

The asset replacement resulting from the voltage conversion from 4.16 kV to 25 kV is expected to have a number of positive impacts on future O&M costs:

- Replacing the poles in the 4.16 kV system during the voltage conversion will reduce the frequency of pole failure and the costs associated with outage response and reactive replacement.
- Legacy units, such as transformers and switches, that can no longer be economically maintained will be replaced through the conversion and will result in a much less labour-intensive program of inspection and corrective maintenance as required, as opposed to the periodic preventive maintenance required for legacy assets.
- The voltage conversion that occurs in conjunction with line rebuilds on legacy lower voltage systems will reduce line losses.
- The inherent replacement of older assets will have a positive impact on overall system reliability, resulting in lower costs associated with outage response.
- This investment also mitigates increased staff resource costs that would be required to deal with an otherwise more frequent rate of system failure.

OTHER INFORMATION

The planning horizon for this DS Plan covers ten years with a five-year historical period of 2011 to 2015 and a five-year forecast period of 2016 to 2020. The information contained in this plan is current as of January 2016. This Plan is the first distribution system plan to be filed by CPUC. There are no ongoing activities or future events anticipated that will materially change this DS Plan.

5.2.2 COORDINATED PLANNING WITH THIRD PARTIES

Regional planning at CPUC is conducted through the Integrated Regional Resource Planning (IRRP) process, whereby local stakeholders collaborate in the development of integrated solutions for maintaining a reliable supply of electricity to Ontario communities. The regional planning process begins with a needs assessment performed by the transmitter which determines whether a regional plan is required. If a regional plan is required, the IESO then conducts a scoping assessment to determine whether a more comprehensive Integrated Regional Resource Plan is required (led by the IESO) or a more transmission (and distribution)-focused Regional Infrastructure Plan is required (led by the transmitter).

The objective of the IRRP process is to develop long-term electricity plans that thoughtfully integrate all relevant resource options, such as conservation and demand management, distributed generation, large-scale generation, transmission and distribution.

REGIONAL CONSIDERATIONS

Planning the distribution system infrastructure in a regional context will help promote the cost-effective development of electricity infrastructure in Ontario. Regional planning is conducted through the IRRP process where local stakeholders collaborate in the development of integrated solutions for maintaining a reliable supply of electricity to Ontario communities. The map below shows Ontario's 21 electricity regions.

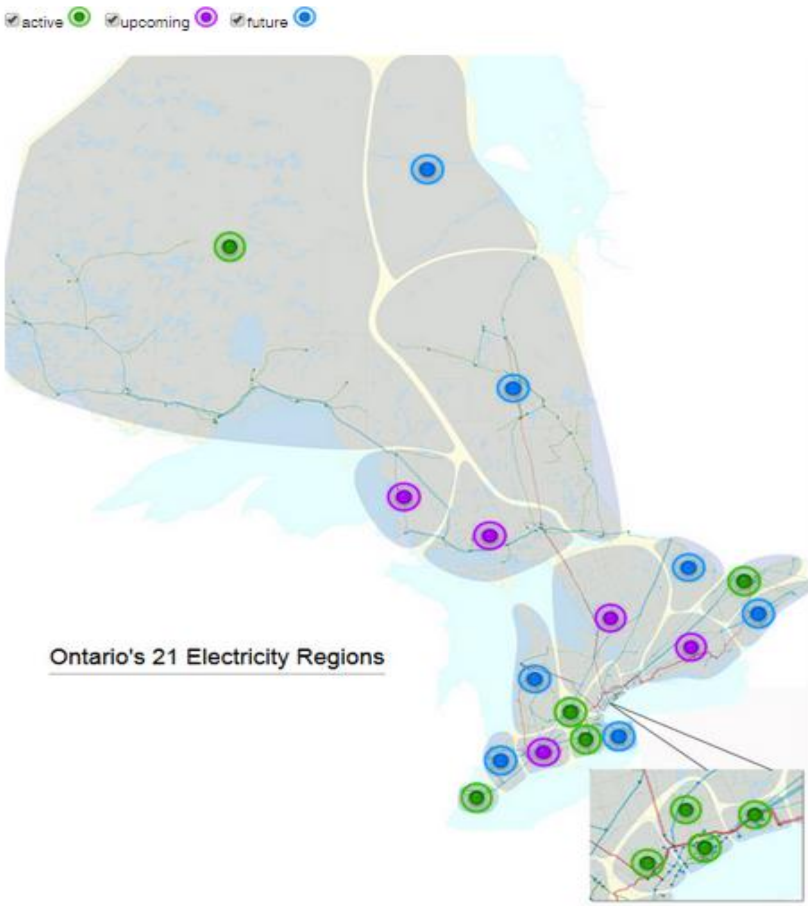


Figure 10.

Regions

Group 1	Group 2	Group 3
Burlington to Nanticoke	East Lake Superior	Chatham/Lambton/Sarnia
Greater Ottawa	London area	Greater Bruce/Huron
GTA North	Peterborough to Kingston	Niagara
GTA East	South Georgian Bay/Muskoka	North of Moosonee
GTA West	Sudbury/Algoma	North/East of Sudbury
Kitchener-Waterloo-Cambridge-Guelph		Renfrew
Toronto		St. Lawrence
Northwest Ontario		
Windsor-Essex		

Figure 11.

The objective of the IRRP process is to develop long-term electricity plans that thoughtfully integrate all relevant resource options, such as conservation and demand management, distributed generation, large-scale generation, transmission and distribution.

As per regional planning initiative, the province is divided into three planning groups:

- Group 1 & Group 2 – Active Plans
- Group 3 – Upcoming Plans

CPUC is part of regional planning Group 2 of East Lake Superior Region. The Great Lakes Power Transmission (GLPT) has been assigned the lead role in the East Lake Superior Region, which is prioritized in Group 2.

The East Lake Superior (ELS) Region includes all of GLPT's 560Km of transmission lines as well as ties to the provincial grid at Hydro One's Wawa TS in the North West and Mississagi TS in the North East plus the Hydro One's 115 kV line supplied from Wawa TS. East Lake Superior Distribution Companies include Algoma Power Inc., PUC Distribution Inc., Hydro One Distribution and Chapleau Public Utility Corporation.

GLPT along with all stakeholders in the region will evaluate the electrical infrastructure needs such as growth, reliability and end of life of major system components. If deemed necessary a Regional Infrastructure plan will be developed to identify alternatives and recommend solutions.

The stages of the process are described in the Working Group Report to the OEB (Appendix E). In order for the process to be sustainable it is expected that the process will have a minimum cycle review of 5 years; this may occur sooner if an unexpected planning concern triggers the regional planning process. Information from the municipal development department is also used to project the amount of customer-driven activity (such as community upgrades or new commercial construction). Most of these customer-driven projects are accommodated with minimal changes to the distribution system. These projects fit into the annual capital budget directly and are used to allocate the customer driven portion of the five-year capital budget.

As the lead Transmitter, Great Lakes Power Transmission (GLPT) completed the East Lake Superior (ELS) Region planning process on December 12, 2014 with the issuing of a final ELS Region - Needs Assessment Report to team members as well as posting the report on this GLPT web-site[1]. The ELS team was composed of participants representing GLPT, IESO, Hydro One, Algoma Power Inc., PUC Distribution Inc. and Chapleau Public Utilities Corporation.

The report did not recommend the need for any further regional planning so there will not be any need for an IESO Scoping Process for the ELS Region. The report did contain three recommendations on issues that do not require further regional coordination; the three issues are "localized" wire-only solutions and are to be developed by GLPT and the impacted distributor or customer.

[1] http://www.glp.ca/eng_content/_regional_planning_new/planning_status-40891.html

With the issuing of the "Needs Assessment Report" on December 12, 2014, the regional planning process was completed. GLPT plans to undertake the next regional planning process in five years (2019) as outlined by the Transmission System Code, unless there is sufficient load growth or a trigger event that requires the initiating of the regional planning process.

CONSULTATION WITH REGIONALLY INTERCONNECTED DISTRIBUTORS

CPUC has consulted with regionally interconnected distributors and transmitter(s) to which the distributor is connected through the regional planning process. Further consultations will be initiated as the need arises.

CPUC recently attended meetings with Hydro One to maintain perspective on the issue of supply and will continue to work towards a collaborative approach with Hydro One to seek common understanding of issues with respect to supply conditions and available capacity.

RENEWABLE ENERGY GENERATION INVESTMENTS

CPUC has experienced very little renewable generation activity in its service area. The utility has completed a small number of REG connection impact assessments (CIAs) that have been constrained by limitations to Hydro One's upstream transmission capacity. A solar installation project was initiated by the Town of Chapleau but the project was not completed due to this constraint. CPUC has discussed the option of upgrades with Hydro One in order to remove the system constraint but the cost of upgrades were deemed to be excessive by Hydro One and, as a result, there are no plans to enable the connection of renewable generation for CPUC customers.

Accordingly, CPUC has not identified the need for renewable generation enabling capital expansion expenditures in this DS Plan. Once improvements to Hydro One's system are made, the need for renewable energy initiatives will be reassessed.

A summary of the Chapter 5 REG requirements and outcome of CPUC's activities in each regard is described in the table below.

REG Requirements	**Summary**
The applications it has received from renewable generators through the FIT program for connection in the distributor's service area	▪ FIT applications have been rejected due to lack of upstream System Capacity on Hydro One System.
Whether the distributor has consulted with the IESO, or participated in planning meetings with the IESO	▪ CPUC has participated in planning meetings with the IESO.

The potential need for co-ordination with other distributors and/or transmitters or others on implementing elements of the REG investments	▪ Although Hydro One's system currently prohibits any further REG development, should plans be developed to enhance transmission capacity, the planned voltage conversion will enable more REG projects to be connected on CPUC's distribution system.

0Figure 12.

IESO COMMENT LETTER

CPUC has received a comment letter from the IESO with regards to long-term system limitations and/or plans for future development and it is included in Appendix F.

5.2.3 PERFORMANCE MEASUREMENT FOR CONTINUOUS IMPROVEMENT

CPUC relies on the OEB`s Electricity Distributor Scorecard tool to provide the metrics, feedback and trends needed to assess performance gaps. The scorecard is also used to continuously improve its asset management and capital planning process. CPUC's current performance state is represented by CPUC's scorecard results for 2013 as published by OEB. The scorecard helps CPUC operate effectively, while continually seeking ways to improve productivity and focus on improvements.

The scorecard includes traditional metrics for assessing services, such as frequency of power outages, financial performance and costs per customer. In addition, future performance results (for 2015 and onward) will include a number of new metrics that directly reflect the customer experience, such as how well CPUC resolves a customer's concern on the first contact, the accuracy of customers' bills, public safety and more.

The following section addresses performance metrics as published by the OEB in the performance scorecard and shown in Appendix C.

CUSTOMER FOCUS

CPUC has maintained an excellent performance exceeding the industry average. The combined average of the three Services Quality Measures is 100%. This includes New Residential/Small Business Services Connected on Time, Scheduled Appointments Met On Time and Telephone Calls Answered On Time. (See Appendix C.)

CPUC has collected customer satisfaction measures and has reported the results in compliance with OEB requirements. First Contact Resolution and Billing Accuracy was measured at 100 and CPUC exceeded the industry average in billing accuracy by 2%.

CPUC's unique "small town" environment affords CPUC staff the ability to readily communicate informally at various local social venues within the Town of Chapleau. This facilitates clear dissemination of information, and is significantly more effective and aligned with CPUC customers' preferred mode of communication. As a result, CPUC receives only a very small number of inquiries; of those, resolution is 100%.

Chapleau PUC retained Burman Energy Consultants Group Inc. and CGC Educational Communications Inc. to develop and execute tailored consumer research, concentrated in the following areas:

- Chapleau PUC's customers' experience in terms of the impacts of service interruptions.
- Chapleau PUC's customers' attitudes about the value of electricity to consumers as it relates to future investments.
- Identifying customer preferences with respect to service offerings and plans for distributing system upgrades.

CPUC has recognized the importance that stakeholder engagement plays in determining customer preferences and chose, as a more appropriate method, to conduct customer consultation via targeted surveys and direct phone interviews. The survey was conducted through telephone interviews, based on a customer list provided by CPUC. It was offered in both official languages (English and French - 20% of the respondents were French-speaking).

Customer responses to targeted questions were also used to determine customer preferences for investment decisions and asset management planning. The customer feedback produced a Customer Satisfaction (CSAT) Score of 95%, which includes responses on rating the "overall customer satisfaction." The CSAT Score is calculated as a combined rating of 7 and above, on a scale from 1 to 10. The sample size of 100 surveys was selected based on the sample size from the total number of customers required to achieve a confidence level of 90% with confidence interval of 5%. A detailed report with the Customer Survey Results is included in Appendix L.

OPERATIONAL EFFECTIVENESS

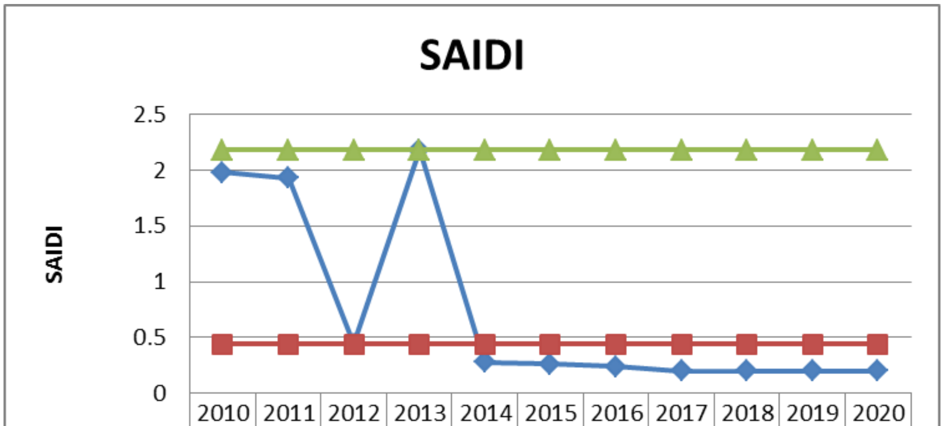
Safety

Safety is a new measure to be reported by utilities in the Province under the RRFE program; however, no measurement standard has been yet defined. CPUC is fully engaged in public safety awareness campaign delivered through its web site. CPUC is audited annually as part of Regulation 22/04 – Electrical Distribution Safety and its audit results indicate a full level of compliance.

System Reliability

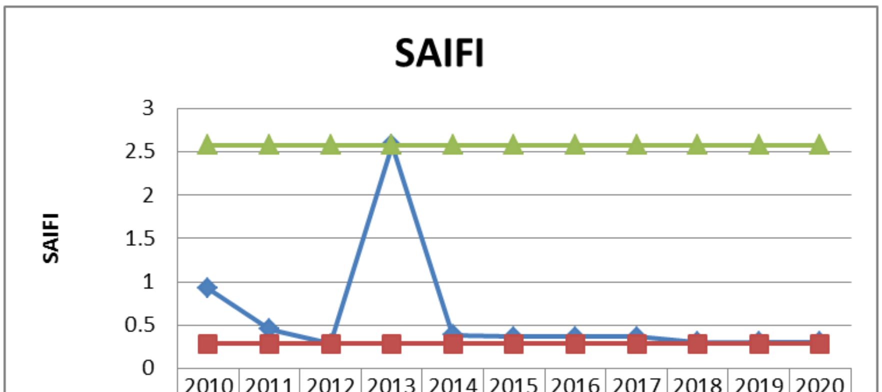
The reliability of supply is primarily measured by internationally accepted indices SAIDI and SAIFI. SAIDI, or the System Average Interruption Duration Index, is the length of outage customers experience in the year on average, expressed as hours per customer per year. SAIFI, or the System Average Interruption Frequency Index, is the average number of interruptions each customer experiences, expressed as the number of interruptions per year per customer.

CPUC's indices 2010-2014 history and forecast for 2015 to 2020 are shown in the tables below.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SAIDI	1.98	1.93	0.44	2.18	0.28	0.26	0.24	0.2	0.2	0.2	0.2
Lower	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Upper	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18	2.18

Figure 13.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SAiFI	0.92	0.45	0.28	2.58	0.38	0.36	0.36	0.36	0.3	0.3	0.3
Lower	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Upper	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58

Figure 14.

The anomaly in 2013 occurred when CPUC performed oil reclamation and re-inhibit treatment to its transformer station. This required three half-hour scheduled power outages to 1,001 customers. The planned construction of distribution circuits to convert the existing aging 4.16 kV circuits to the new standard of 25 kV level will improve the future reliability of supply be reducing the frequency of outages.

Asset Management

The ‘Distribution System Plan Implementation Progress’ measure is a new metric under the RRFE program. However, no measurement standard has yet been defined. CPUC began work preparing their DS Plan in 2014 to comply with Chapter 5 filing requirements as part of 2015 rate submission. Significant efforts were made in 2014 to collect and organize asset baseline data required in support of asset management and DS Plan preparation. However, weather related delays in acquiring field data impacted the DS Plan schedule. At the time this document was being prepared, a final version of the DS Plan had not been approved, and therefore no portion of the DS Plan has been deployed, and the DS Plan Implementation Progress Measure has not yet been assessed.

PUBLIC POLICY RESPONSIVENESS

Conservation & Demand Management

CPUC contracted Burman Energy Consultants Group to manage energy conservation and demand management activity in the local service area. Burman Energy was very active in the community and assisted residential and business customers to earn the incentives available to them. CPUC has an active customer engagement strategy for dissemination of various energy conservation activities though coupon savings events, small business lighting program and web energy conservation tips.

For the 2011–2014 period, the Ontario Energy Board established targets for energy conservation for each utility in the Province. CDM targets established for CPUC were 1.21 GWh of cumulative energy savings and 0.17 MW of demand savings for the 2011–2014 period. CPUC achieved 123.34 % of its energy savings target by the end of 2014.

CPUC also exceeded its four-year net cumulative energy savings target by the end of 2014. The successful achievement of 179.27 % of cumulative energy savings was made possible by the strong and early participation by local customers in retrofit and energy efficient lighting programs.

Connection of Renewable Generation

Ontario runs two renewable generation programs. FIT (“Feed-in Tariff”) applicants are those customers setting up solar or other renewable generation equipment to generate more than 10 kW of electricity at a time. MicroFIT applicants are those customers applying to generate electricity at a level less than or equal to 10 kW of electricity at a time.

The scorecard indicates that CPUC has not connected a renewable generation project due to upstream capacity constraints.

FINANCIAL PERFORMANCE

Cost Control

Keeping costs under control is a responsibility taken seriously at CPUC. The levels of spending are measured and prudently controlled so that customer rates are minimally affected.

CPUC's controlled costs fall within a narrow range for the previous five years. Total cost per customer is calculated as the sum of CPUC's capital and operating costs and dividing this cost figure by the total number of customers the utility serves. CPUC's total cost per customer in 2014 was $729. This is approximately a 10% increase over 2013. Total costs per customer range between $606 and $729. There is a trend of gradual cost increases with the implementation of new initiatives such as smart meter installations.

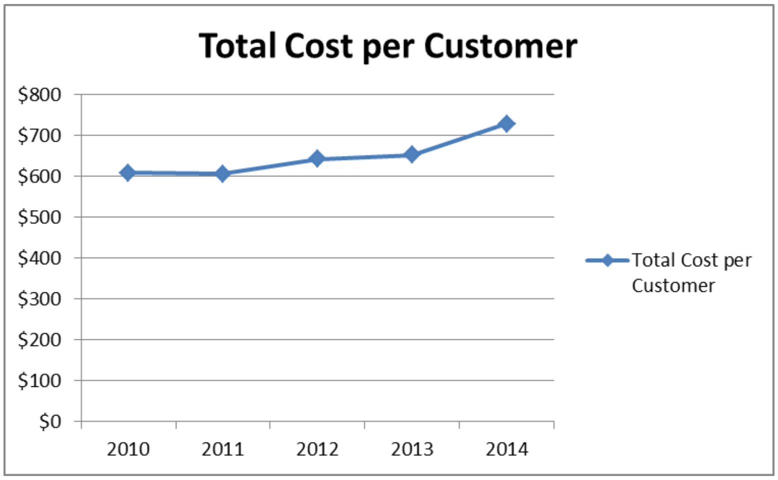


Figure 15.

The total costs per kilometre of line matched the trend of costs per customer for CPUC, since neither the customer numbers nor the kilometres of line changed significantly.

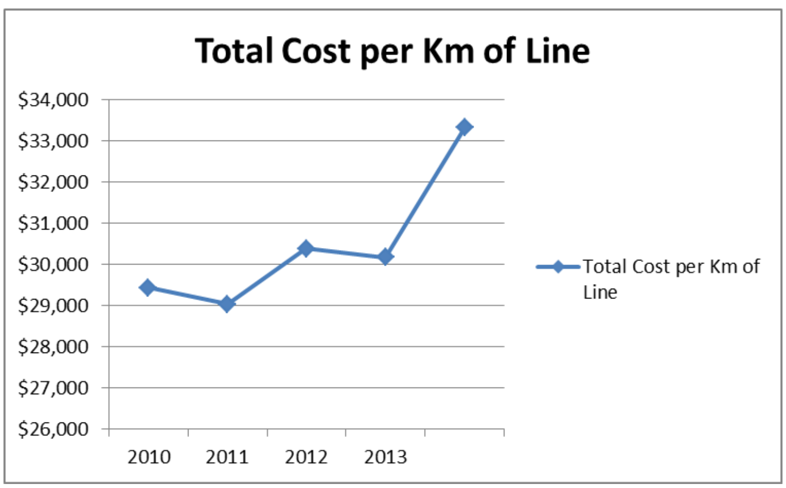


Figure 16.

	2010	2011	2012	2013	2014
Total Cost per Customer	$609	$606	$643	$653	$729
Total Cost per Km of Line	$29,441	$29,033	$30,385	$30,175	$33,329

Figure 17.

Financial Ratios

CPUC has maintained a healthy financial condition featuring a strong current ratio between 1.69 and 2. The Utility maintains a strong financial position and has no long-term debt at present. The current return on equity is 16.88% and profitability has remained steady during the last three years at 9.12%. There is considerable room to leverage CPUC's financial position in order to generate capital for the proposed investments identified in section 5.4.

PEER GROUP ANALYSIS AND BENCHMARKING

A peer group has been established for performance comparative analysis of customer service, reliability and financial measures. The charts[2] below provide benchmarking information from the 2014 OEB Performance Scorecards.

Customer Quality Benchmarking

The tables below show comparison of service quality measures of New Residential/Small Business Services Connected on Time, Scheduled Appointments Met on Time, Telephone Calls Answered on Time and First Contact Resolution. CPUC is performing well within benchmark levels.

[2] http://www.ontarioenergyboard.ca/html/performance

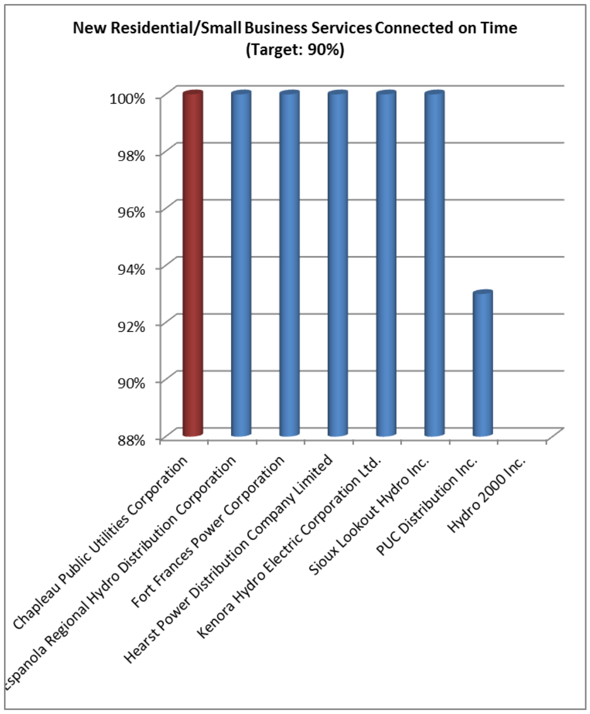


Figure 18.

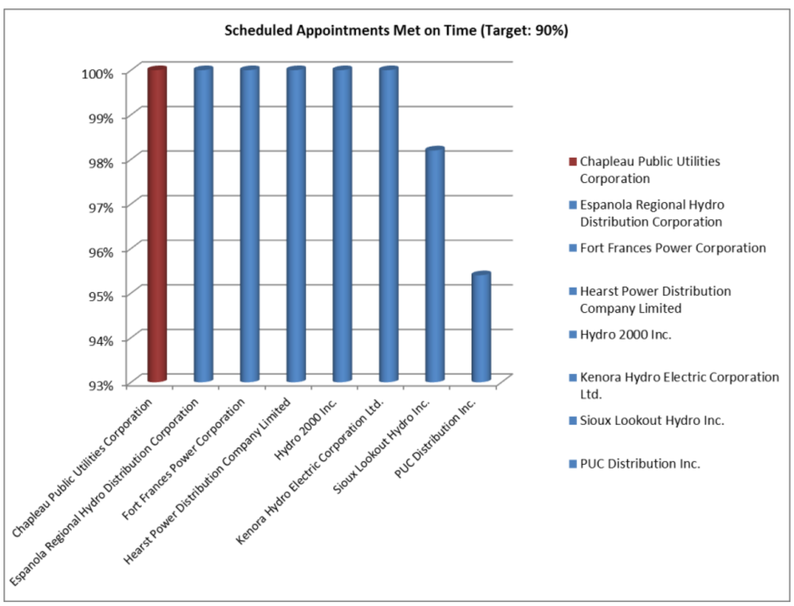


Figure 19.

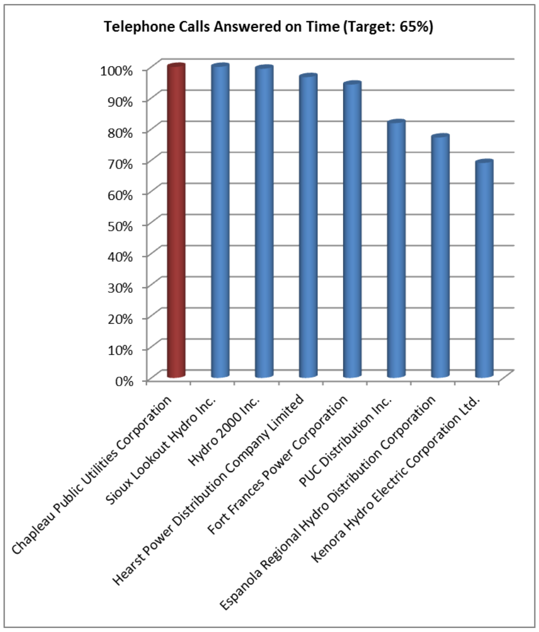


Figure 20.

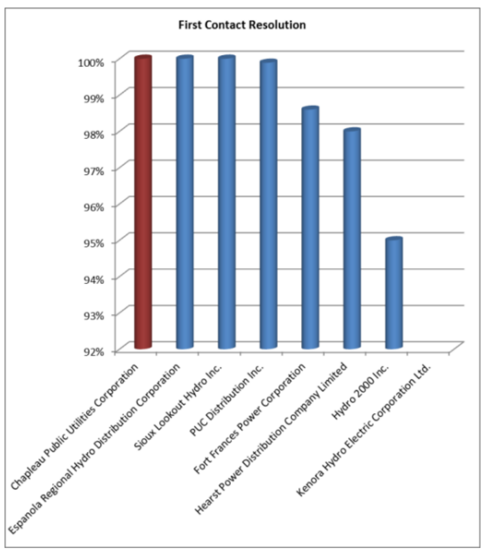


Figure 21.

System Reliability Benchmarking

The tables below show a comparison of system reliability measures, SAIDI and SAIFI. CPUC is performing well within benchmark levels.

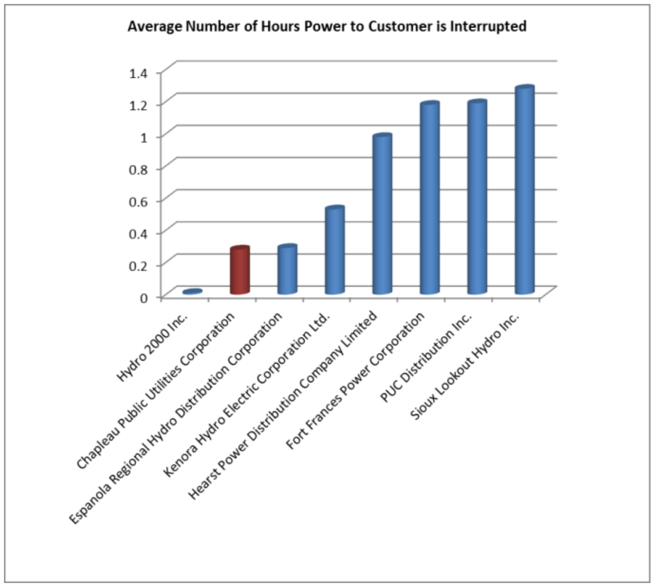


Figure 22.

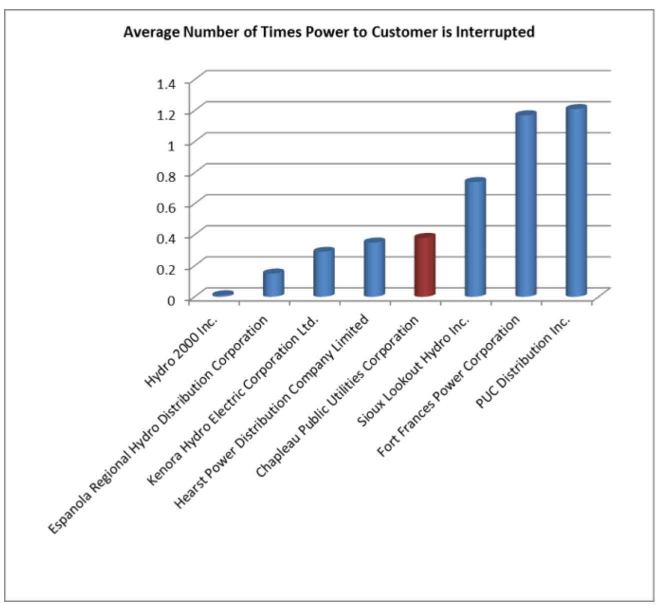


Figure 23.

Energy Conservation and Renewable Generation Benchmarking

Below is a comparison of energy conservation performance based on Net Annual Peak Demand Savings and Net Cumulative Energy Savings. CPUC has exceeded the Energy Conservation Program targets.

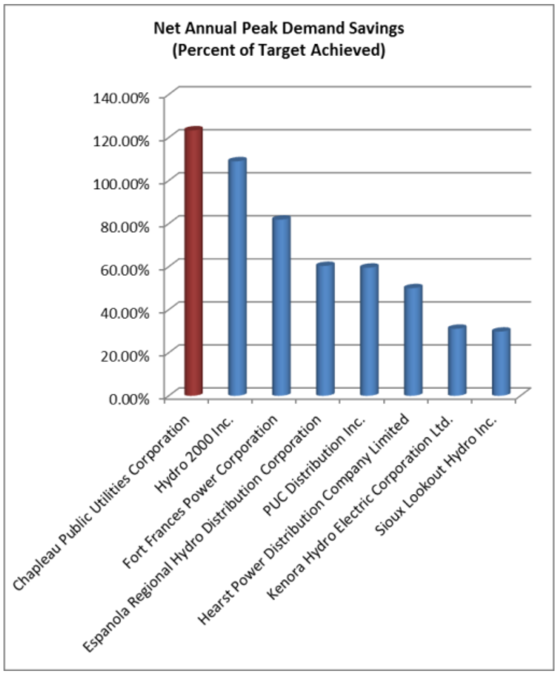


Figure 24.

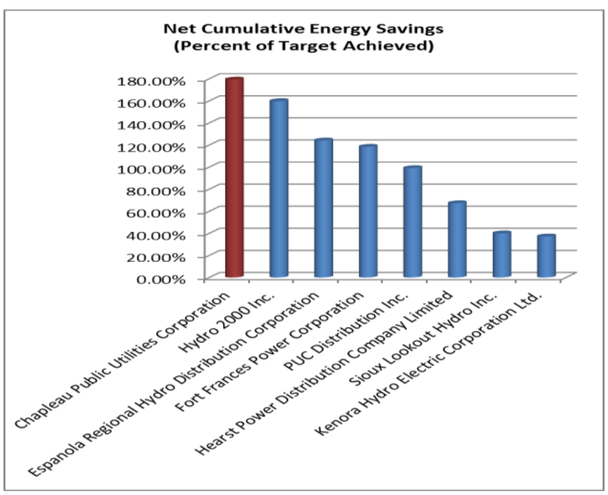


Figure 25.

Efficiency

LDCs manage costs by addressing opportunities for operational efficiencies in order to assure its customers they are receiving value for the cost of the service they receive. Actual costs are compared to predicted costs with better performing LSCs able to score higher by virtue of close alignment of actual to planned costs. Additionally, higher performance scores suggest operational efficiencies found during the implementation of planned work.

Performance for this metric is expected to improve for CPUC, simply by invoking a more structured approach toward asset management processes. As CPUC's database becomes more robust and reliable, predictive efforts are expected to improve, improving estimating accuracy for planned system programming/ investments. Utilities with actual costs that are higher than predicted will be assigned to Group 4 or Group 5. CPUC is in Group 4 for utilities with actual costs that are 10% to 25% above predicted costs.

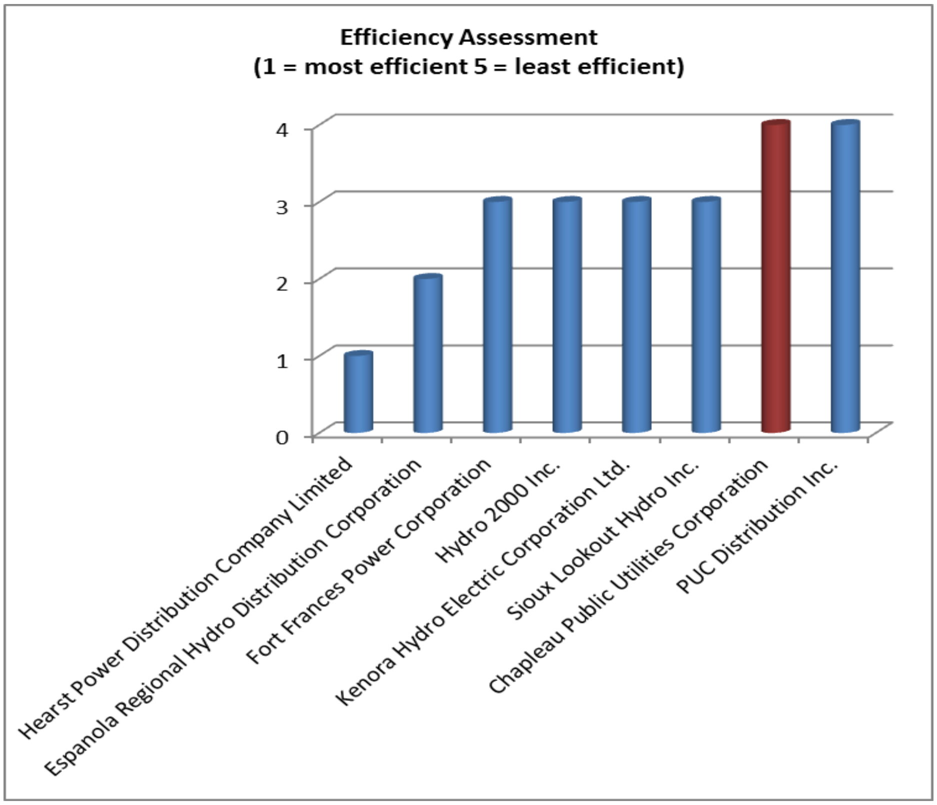


Figure 26.

DISTRIBUTION LINE LOSSES

Distribution line losses refer to the difference between the amount of energy delivered to the distribution system and the amount of energy customers are billed. Distribution line losses are comprised of two types: technical and non-technical. Technical losses are primarily due to heat dissipation resulting from the impedance of current carrying elements of the Distribution System. Technical losses can be estimated analytically. Non-technical losses occur because of theft, billing errors, metering inaccuracies and unmetered energy. Such losses cannot be quantified analytically, other than by subtracting technical losses from total losses.

According to data from 2013 OEB Yearbook of Ontario Electricity Distributors [3], the average annual loss factor in Ontario is 4.18%. CPUC's loss factor for 2013 was 8.66%. CPUC recognizes the importance of reducing the losses in its distribution system as the cost of energy lost is recovered from customers.

Distribution Loss Prevention Management Program

CPUC commissioned a study of both its 4.16 kV and 25 kV distribution systems to provide a platform for optimizing value for future investments and expenditures to mitigate losses.

CPUC has constructed an accurate system model of CPUC's electricity system suitable for analysis with Dromey Distribution Engineering Simulation Software (DESS). This included modeling all overhead and underground lines, distribution transformers, switches, station transformers and primary supply lines.

CPUC has built a loss prevention program to address both technical and non-technical losses. Mitigation of technical losses is based on the DESS system analyses of overall system losses, opportunities for mitigation investments and impacts of those investments on reducing losses. Mitigation of non-technical losses follows industry practices for preventing theft of power.

CPUC inspects meters for tampering or bypass by monitoring anomalies during bill preparation. Sudden significant increases and decreases in the historical consumption are flagged for further scrutiny.

Metering Inaccuracies Losses - Losses due to metering inaccuracies are defined as the difference between the amount of energy actually delivered through the meters and the amount registered by the meters.

CPUC does comply with the meter accuracy verification program related to both wholesale and retail meters, as set by Measurement Canada, which ensures the accuracy of the meter. Most over-billing or under-billing occurs in complex three-phase metering installations, involving current transformers, voltage transformers and meter multipliers. Incorrect entry into the billing system is often the source of losses.

[3] http://www.ontarioenergyboard.ca/

Unmetered Losses - Unmetered losses are experienced when loads without meters, such as street lights, have their energy use estimated instead of measured with an energy meter. CPUC is working on installing meters to mitigate the uncertainty regarding this contribution to non-technical losses.

Technical Loss Management - Technical losses on distribution systems are primarily due to heat dissipation resulting from the impedance of current carrying elements of the Distribution System. Losses are inherent to the distribution of electricity, and can be reduced through system redesign and voltage conversion.

Based on cost-effectiveness criteria, CPUC manages technical losses in the following ways.

a) ***Traditional system loss reduction projects*** - These include phase balancing, voltage improvement, power factor correction and voltage upgrades.

   Recent projects completed in this regard include:

   - Installation of 3 capacitors 225 kvar - bank in service May 6, 2009 Golf Course Road
   - Installation of 3 capacitors 225 kvar - bank in service April 23, 2009 Elgin Street

b) ***Installing larger conductors*** – When replacing conductors that reach their end-of-life, larger size conductors than the ones required for meeting thermal requirements are installed when feasible. This reduces losses, particularly on heavily loaded feeders. Recently, CPUC completed a re-conductoring of Demers St. in the fall of 2014.

c) ***Technical evaluation of projects*** - Presently, when CPUC evaluates projects, the incremental cost of mitigating losses is considered among the options. If two projects are close in cost, the option that will result in lower losses may be a deciding factor. Standard planning practices include the developing options, which would reduce system losses. This includes the consideration of installing low loss transformers, conductors and other equipment, where it is economic to do so.

d) ***Reducing load on heavily loaded feeders*** – Unloading heavily loaded feeders by transferring load to alternate feeders or new feeders can be effective in reducing losses where operationally feasible and economic.

e) ***Voltage conversion*** – CPUC has developed plans for the design of a new 25 kV substation and plans to replace the existing 4.16 kV transformers supply with a 25 kV supply from the new 115/25 kV station, reducing delivery current and resulting line losses.

5.3 ASSET MANAGEMENT PROCESS

CPUC's intent is to comply fully with Chapter 5 of the OEB's Filing Requirements for Electricity Transmission and Distribution Applications. However, CPUC has only recently begun embarking upon the application of asset management principles. From a practical perspective, the first place to start was to inventory assets and capture spatial, attribute and other relevant distribution system information. This data forms the foundational elements for preparing an initial, broad-based assessment of alternatives to enable optimal long-term asset management. It also provides the opportunity to identify gaps where essential data is currently unavailable or incomplete. It is within the scope of this document to incorporate and develop plans to identify and capture data required to bridge these gaps.

An example of this is the absence of unique customer transformer identifiers within CPUC's distribution system. The absence of this data represented a substantial gap in CPUC's asset information inventory. Without this data, effective economic groupings of tasks and work packages can only be made with the use of broad-based assumptions. To address this, the process of numbering and recording all field equipment installed and inventorying customer transformers was initiated. Concurrent with this, customer accounts connected to each transformer were identified, rendering a more comprehensive relational data set for future analyses. Overall, it is estimated that the ensuing process of continuous improvement to the asset management process itself will incur similar efforts annually and will essentially form the basis for ongoing annual investment to support both the analytical framework and data collection and refreshment.

INVESTMENT DRIVERS

This DS Plan was developed through an asset management approach that reflects CPUC's strategic commitment to customer service excellence, net investment in distribution infrastructure and investment optimization consistent with its expected future financial performance. Some of the factors taken into consideration during the planning process include service reliability, safety, obsolescence, operational environment considerations and risk tolerance. The table below summarizes the drivers used by CPUC to analyze investment options.

CPUC's DS Planning Drivers

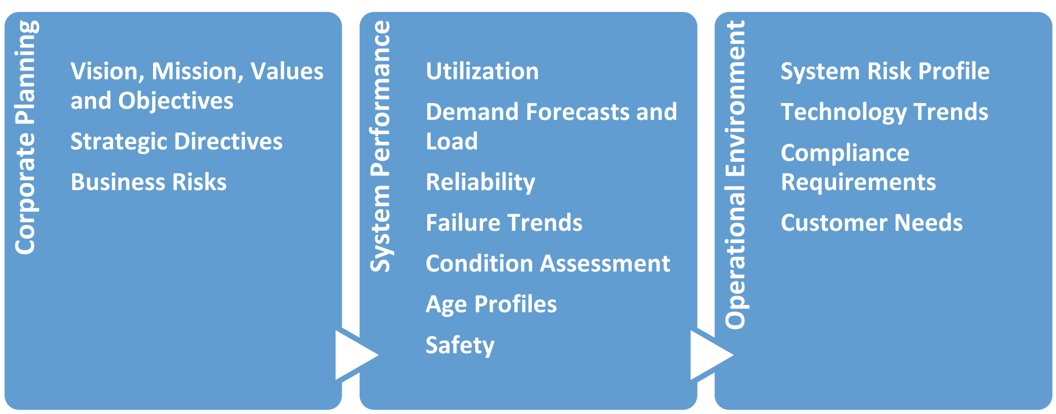


Figure 27.

Other key drivers in CPUC's asset management planning process include:

- **Customer Needs** - This includes ongoing monitoring and plan adjustments as required to address service expectations of the end-consumer. Customer requirements are also reflected in the setting of internal performance targets such as response times for outages or system upgrades. Customer requirements are validated and, if necessary, updated via customer satisfaction surveys, routine customer contact and through feedback received via various CDM programs.

- **Load Growth** - General load growth brings about a need to invest in additional network capacity. CPUC does not expect any significant load growth that would warrant system upgrades.
- **Regulatory Context** - Obligations are imposed by government agencies and CPUC's stakeholders expect CPUC to act ethically and with integrity. These considerations influence the commercial and administrative arrangements CPUC makes as a business entity and its overall approach to asset management.
- **Technology Trends** - Continuous improvement is a key part of asset management. New technologies, tools or methods that have a potential benefit to the company continually become available. Given that some of CPUC's assets have an expected life in excess of 40 years, it is important that investment undertaken now takes into account potential future technology trends. CPUC intends to actively seek and evaluate new technology opportunities.
- **Asset Condition** - The current age and condition profile of the assets has a major influence on CPUC's future asset management plans. Where possible, asset investment decisions will take into account the current condition and performance of assets and the expected condition and performance profile under different investment scenarios. Such an idealized approach, based on modelling remaining life and associated asset performance, is not always possible due to a lack of available data. Where this is the case, CPUC seeks to apply sound engineering judgment, coupled with analyses of observed asset performance and the age of the asset, as a proxy for asset condition. A core component of CPUC's asset management improvement initiative is the improvement of data capture and information provision.

MANAGING STAKEHOLDER INTERESTS

Stakeholder interests can be viewed from a number of perspectives including customer focus, operational effectiveness, public policy responsiveness and financial performance. CPUC accommodates stakeholder interests as follows.

Interest	How CPUC accommodates stakeholder interests
Customer Focus *(Service Quality and Customer Satisfaction)*	CPUC conducted a customer survey to determine customer preferences and customers indicated that they expect their utility to provide consistent and reliable service. Customers also want improvement in communications. To address customer preferences, CPUC will continue to effectively maintain its infrastructure and invest in reducing line losses and sustaining system reliability.
Financial Performance	CPUC's strategy must be cost-effective and, at the same time, be sufficient to continue to balance distribution system reliability, efficiency and return on investment.

Operational Effectiveness	CPUC intends to maintain a reliable system and will implement this DS Plan in an effective manner to benefit the interests of all key stakeholders. CPUC intends to keep the public and its staff safe by ensuring all assets are structurally sound and by continuously improving its safety management program.
Public Policy Responsiveness	CPUC will continue to deliver on obligations mandated by the government. CPUC intends to continue its smart grid development.

Figure 28.

KEY ASSUMPTIONS

A series of key assumptions form the basis of the development of this DS Plan. These key assumptions guide CPUC's forecast of future activities and help CPUC decide whether to maintain, replace or develop new assets

The key assumptions for this DS Plan are as follows:

- The economic development of the Town of Chapleau depends on a secure, affordable and reliable supply of electricity.
- Regulatory activities by the Ontario Energy Board will continue at the current pace over the next five years.
- The Green Energy Act requires investments in the distribution infrastructure in order to meet smart grid objectives.
- Smart meters installed in 2009 produce significant amounts of operational and energy consumption data that can be used to help CPUC assess smart grid opportunities. CPUC will evaluate feasible smart grid technologies over the DS Planning period.
- CPUC's DS Plan is a strategic document to convey future distribution system development and maintenance plans to stakeholders.
- CPUC's asset management systems will undergo continuous improvement to ensure that CPUC can meet its supply condition obligations without measureable degradation to performance.
- Compliance with relevant regulatory requirements, as they pertain to electricity rates, filing requirements, health & safety and environmental protection, will be maintained.
- The DS planning process will continually improve, balancing stakeholder requirements. Further data will be collected to refine future plans for capital projects and programs.

CPUC's analysis to date indicates an approaching need to increase system renewal expenditures due to the advanced age of much of CPUC's asset base.

5.3.1 ASSET MANAGEMENT PROCESS OVERVIEW

CPUC has implemented the process, as indicated in the flow chart below, to determine the programs and projects needed to manage its distribution asset base.

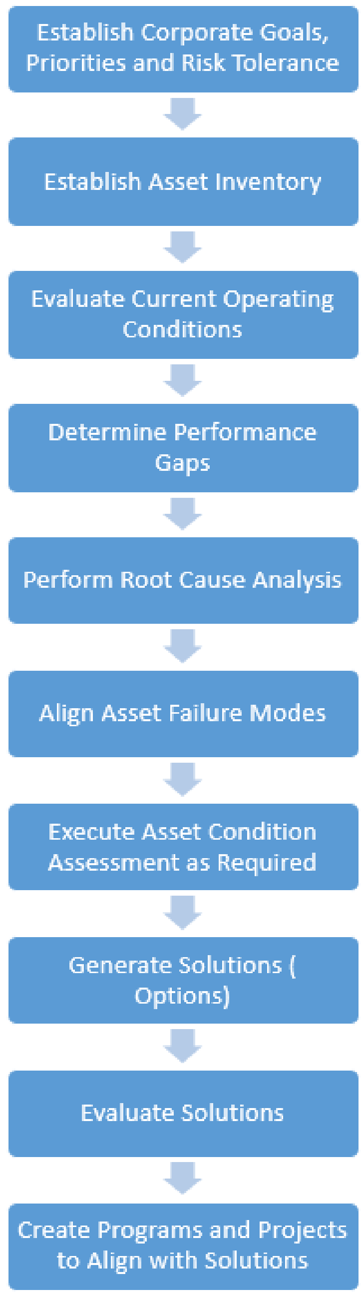


Figure 29.

ESTABLISH CORPORATE PRIORITIES, GOALS AND RISK TOLERANCE

The asset planning process began with a validation of CPUC's mission, vision & values statements with the Utility's Board of Directors. These statements became guideposts and inputs for various steps in the asset management process.

CPUC developed the corporate priorities regarding the management of its assets by reviewing the available data sets providing key performance criteria and results. The data sets included corporate scorecard results, customer survey results and other historical engagement exercises. The consistent theme of the feedback received was that reliability is the top concern for most customers. Rate impacts are also a high priority with customers, while most users responded that they were not interested in increasing control over their energy use if this ability came at the cost of increasing rates.

Central to CPUC's asset management process is the management of risk as this has a significant influence on the quantum and focus of future investment. CPUC's formal approach to the assessment of risk is one of the areas identified as being in need of strengthening. A formal approach to the assessment of risk was the focus of this step in the process at CPUC.

The CPUC risk assessment was performed from a holistic perspective which enveloped consideration of key factors including:

- current operations and related scorecard metrics
- feedback from recent customer survey
- nature and extent of current and future asset resilience
- forecasts of operating conditions and overall system performance
- CPUC risk tolerance
- potential for variability in outcomes and resulting scenarios

ESTABLISH ASSET INVENTORY

For this initial planning process cycle, CPUC has developed an asset registry in its GIS system and started collecting asset data. This system is in its infancy and currently has limited attributes captured for each asset class. It is CPUC's intention to continue to expand the attributes measured and collected to more comprehensively bridge information gaps that were identified in this initial assessment.

The following represents components of the current asset registry.

Poles

- Spatial representation
- Size and class
- Age
- Unique numerical identifier

Customer Supply Transformers

- Spatial representation
- Electrical characteristics (e.g. Impedance)
- Size
- Unique numerical identifier (new)
- Age

Distribution Station Transformer

- Age
- Year of last refurbishment
- Size
- Load profile

Switches

- Spatial representation

Protective Equipment

Fuses

- Spatial representation

Other

Capacitor Banks

- Spatial representation

Overall system configuration (model)

- System loss calculations

CPUC recognizes the need to enhance the current asset registry and supporting data population to provide a more comprehensive picture of the assets' capabilities and conditions.

EVALUATE CURRENT OPERATING CONDITIONS

In this step, CPUC reviewed the current operating environment to determine the effectiveness of previous asset management decisions. Because this is CPUC's first DSP submission, scorecard analyses were performed, comparing past performance, industry benchmarks and year-over-year trends. CPUC also undertakes an assessment of the general state of the distribution network and its ability to efficiently deliver reliable supply to its customers. Through this evaluation and by forecasting future trends, CPUC determines the performance gaps that need to be addressed through projects and programs. In the current case, CPUC identified the significant energy losses occurring on the distribution system as a prime gap that needed to be addressed.

PERFORM ROOT CAUSE ANALYSIS

CPUC analyses the events and conditions on the distribution system that lead to the identified gaps.

ALIGN ASSET DEFICIENCY MODES

Information about CPUC's asset attributes and condition data are held within the GIS database, various paper records and files. This information is reviewed to determine alignment of asset deficiencies with the root causes of the performance gaps. CPUC recognizes that the data attributes and collection methods for each asset will require revision to better reflect evolving condition assessment information priorities.

EXECUTE ASSET CONDITION ASSESSMENT

CPUC uses best available information to assess the condition of its assets. Initial information is limited to asset age. Long-term plans are to add additional asset information attributes cataloguing reports such as inspection and maintenance activities. This detailed information will be continually improved and with time, the confidence level of this information will be enhanced. Eventually, CPUC intends to move to using an asset health index as the basis for project/program prioritization.

GENERATE SOLUTIONS (OPTIONS)

The ultimate goal of the asset management process is to determine the best solutions for addressing the performance gaps. This requires the generation of various options that can be analyzed against business and technical drivers using the asset management tools available to CPUC.

EVALUATE SOLUTIONS

CPUC deploys several tools to help evaluate the various solutions available to address the performance gaps. These tools include modelling the financial impacts of investment decisions, and prioritizing and assessing the solutions using investment drivers.

CREATE PROGRAMS AND PROJECTS TO ALIGN WITH SOLUTIONS

In this step, CPUC generates programs and projects that support the various operating objectives. One of the main guiding objectives in this step of the process is establishing the level of service (LOS) that CPUC will deliver for the planning period. Various operating scenarios are developed and analyzed using an investment strategy tool. The targeted LOS is used to prioritize projects and programs.

CPUC has defined four levels of service used for developing investment scenarios:

LEVEL 1 (Minimum) – represents the elimination of only high severity defects that pose safety, environmental or imminent failure risk. This forms the minimum level of investment for each type of asset and may result in minor performance deterioration over time.

LEVEL 2 (Sustain) – addresses Level 1 needs and looks forward five years to view the assets that have ages exceeding the typical useful life. The result is an annual level of investment to replace end of life units maintaining the condition of the portfolio and sustaining performance near current levels.

LEVEL 3 (Improve) – is a higher level of investment that provides a “catch-up” opportunity to replace assets that already exceed end of life in addition to addressing Level 2 requirements. It provides for a catch-up over a five-year period, and expects to improve the performance of the portfolio, albeit at an increased cost, relative to other levels.

LEVEL 4 (Optimize) – is a longer-term smoothing approach comparable to Level 2 but looks forward 10 years to provide a further opportunity for smoothing. The overall performance of the portfolio would be maintained over the longer-term; however, there may be variation year over year that may necessitate reprioritization during the plan. Ultimately, this should be accommodated within the overall system renewal capital levels.

In the end, the selected LOS is implemented through new or existing programs covered by a combination of the Operating and Maintenance budget and the development of programs and projects that fall within one of the OEB’s assigned investment categories.

INVESTMENT STRATEGY ANALYSIS

CPUC applies an investment strategy analysis tool developed by Burman Energy to help evaluate the investment options and determine the impact on key financial metrics such as customer rates, shareholder returns and the financial viability of the utility. This holistic approach provides the necessary information to effectively balance the various competing needs. The investment strategy methodology integrates the “bottom-up” asset needs with “top-down” strategic criteria and review.

The bottom-up approach ties investment strategy to asset by asset, project to project consolidation as an initial work program portfolio. The top-down analysis is performed by developing a long-term planning framework to model multiple planning scenarios that include variations to bottom up projects, impacts on capital investments and resultant impacts on customer rates, shareholder returns and financial viability.

This approach provides CPUC with context to make decisions by understanding projected outcomes it also provides information for customers, shareholders and stakeholders to provide more effective input into the CPUC planning process. The graphic below shows the various considerations included in the CPUC investment planning process.

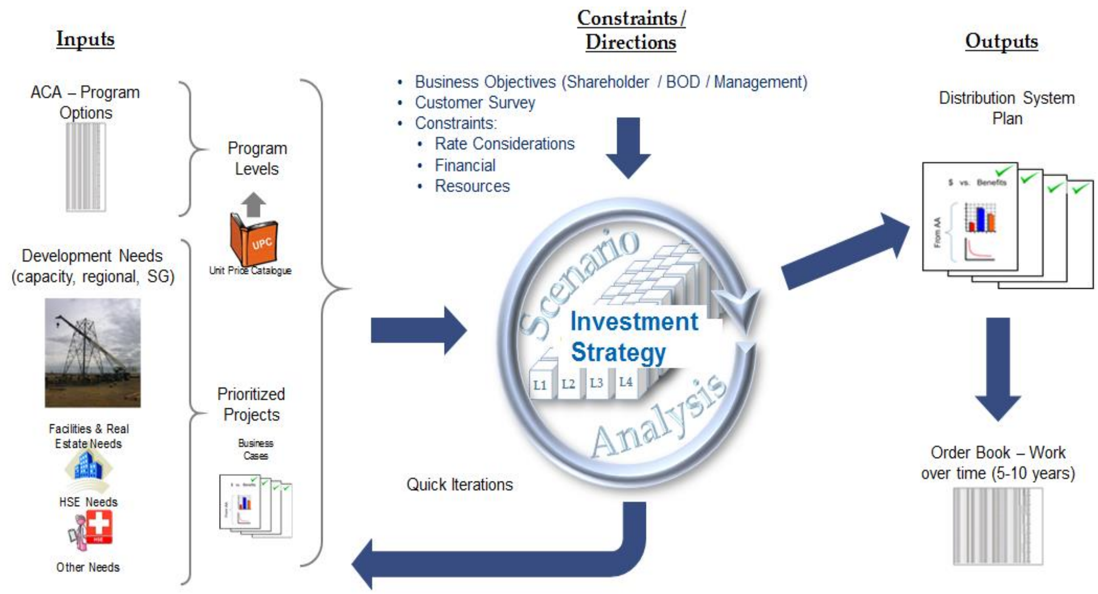


Figure 30.

In the current planning cycle, CPUC used a long-term (14 year) forecasting model to test a number of investment scenarios and evaluated the resulting outcomes. The model evaluated the effects of different investment approaches on such outcomes as customer rates and the financial health of CPUC. The investment planning model allowed CPUC to vary parameters such as debt to equity ratio, dividends, equity injections, customer growth and/or energy growth, depreciation, productivity and regulatory changes such as rebasing dates, choice of IRM model, rates, etc. The results of the investment strategy analysis are described in Section 5.4.5.1.

5.3.2 OVERVIEW OF ASSETS MANAGED

FEATURES OF DISTRIBUTION SERVICE AREA

CPUC's service area includes all geography within the borders of The Town of Chapleau. The service territory is shown in Appendix A. Through this network configuration, CPUC receives power in bulk from Hydro One's 115 kV transmission system and pays a transformation uplift charge for the 25 kV supply it receives directly from the adjacent Hydro One distribution system. Distribution voltages are 4.16 kV through CPUC's 115 – 4.16 kV distributing station and 25 kV delivered through Hydro One's adjacent service territory.

SUMMARY DESCRIPTION OF SYSTEM CONFIGURATION

CPUC assets include poles, conductors, transformers, switches and meters. The office building, transportation equipment and storage areas are owned by Chapleau Energy Services Corporation and are leased to CPUC. Delivery is achieved via overhead conductors but both underground and submarine conductors exist in the CPUC system. CPUC's distribution system consists of a single transformer station with 3 transformers:

- two transformers 4.16 kV (3750 kVA and 2500 kVA), owned and operated by CPUC;
- one transformer 25 kV owned by Hydro One (listed at 3750 kVA).

The CPUC 25 kV load is supplied by a distribution network which is approximately 5.4 kilometers in length. The CPUC 4.16 kV distribution network is 20.2 kilometers in length (overhead only). The combined networks of CPUC's distribution system deliver a total of 29,940,176 kWh per year as of 2014 (including losses).

ENERGY & DEMAND CHARACTERISTICS

The graphic below shows the annual peak kW demand for the CPUC's distribution system.

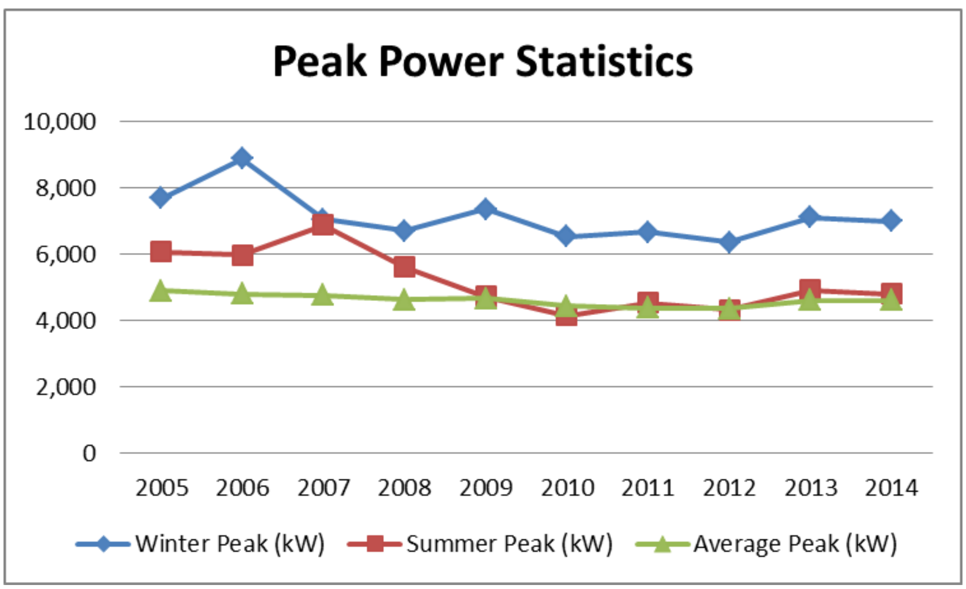


Figure 31.

	Winter Peak (kW)	Summer Peak (kW)	Average Peak (kW)
2005	7,691	6,080	4,902
2006	8,879	5,971	4,810
2007	7,058	6,873	4,761
2008	6,703	5,618	4,629
2009	7,365	4,724	4,678
2010	6,531	4,156	4,430
2011	6,676	4,532	4,374
2012	6,359	4,316	4,362
2013	7,119	4,923	4,603
2014	6,991	4,805	4,620

Figure 32.

Peak demand has been gradually decreasing over the historical timeframe. Consistent with northern climate supply areas, CPUC experiences its overall system peak during winter. With no significant changes to CPUC's customer base, recent (2009-2012) peak declines are consistent with the success of CDM program execution. Offsetting increases in 2013/14 are attributable to varying winter conditions and loading impacts associated with the number of degree days and recent increases to connection upgrades (see below).

The table below indicates the efficiency of the kWh purchased by CPUC. Recent reported (2013-2014) line loss reductions are a result of billing system adjustments to realign with IESO billing cycles.

Annual kWh Purchased	2010	2011	2012	2013	2014
Total kWh Delivered (excluding losses)	26,167,966	26,893,563	26,031,597	27,174,709	27,940,070
Total Distribution Losses (kWh)	1,741,734	1,581,064	1,979,556	2,575,215	2,000,106
Total kWh Purchased	27,909,701	28,474,627	28,011,153	29,749,924	29,940,176
Losses as % of Delivered	6.24	5.55	7.07	8.66	6.68

Figure 33.

NETWORK CONFIGURATION

CPUC's distribution system is connected to the 115 kV transmission system through Chapleau DS. The distribution system is comprised of two voltage systems: one at 4.16 kV and the other at 25 kV. CPUC owns two 115-4.16 kV transformers at the DS totalling 6.2 MVA which supply 3 feeders. In addition, CPUC Has one 25 kV feeder supplied by Hydro One Networks Inc. which is limited to supplying approximately 3.5 MVA of capacity. Approximately 60% of the distribution assets are rated at 4.16 kV and 40% are rated at 25 kV.

CPUC delivered a total of 29,940,170 kWh in 2014 (including losses). The distribution station configuration is shown below.

Distribution Station Configuration

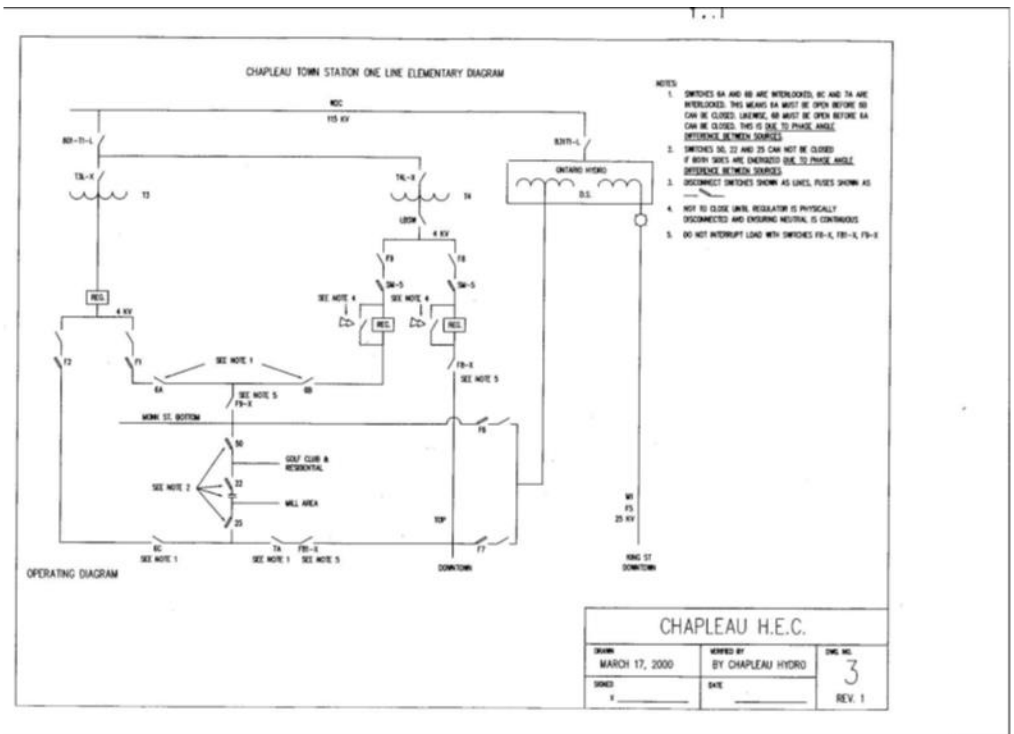


Figure 34.

Detailed design of the Distribution System is provided in Appendix K.

- F2 - Feeds to switch #22 across the river; approx. 210 customers
- F8 - Feeds downtown and most of the south side of Birch St.; approx. 330 customers
- F9 - Feeds west of tracks and all other customers across the river and south heading out of town past switch # 15; approx. 465 customers
- F5- 25 kV circuit feeds King St., Broomhead Rd. and east along Pine St.; approx. 340 customers

ASSET INFORMATION

The following table provides information regarding CPUC's assets:

Description of Asset	# of Assets
Wood Poles	586
Three Phase Transformers	33
Single Phase Transformers	234
Switches	52
Meters	1276
Station Transformers	2
Conductor	27.33 km

Figure 35.

The current asset inventory can be sorted spatially based on asset age and has helped to analyse planning options for replacing assets. The future intent is to enhance attributes beyond age demographics to reflect asset condition, asset failure modes and risk tolerances.

The following considerations were taken into account to determine CPUC's distribution system plans and allocation of investments:

- Although CPUC does have a high level of confidence in its asset data information, there is an opportunity to better organize the data into a consistent format and source system (single system of record), as well as define condition standards that can be consistently translated to probability and outcome. This will continue to be a subject of the continuous improvement process as inspections are conducted and source systems are integrated over time (e.g. GIS with DESS, etc.).
- Reliability statistics and line losses need to be addressed; as a result CPUC has identified voltage conversion as a high priority for capital investments. This project will also lead to renewal of the asset base.
- Plant inspections over the last few years have identified very few assets with high severity defects; those identified are typically addressed in a timely manner.

Detailed information about the assessment results and system renewal service levels is given in the Asset Assessment section in 5.4.5.2.

KEY SYSTEMS AND PROCESSES

CPUC's key tool to manage asset knowledge is the municipal ESRI Geographical Information System (GIS). This system, in conjunction with a number of spreadsheets and paper records contain maintenance/inspection information for some of the distribution assets. Collecting and consolidating the information in the GIS will be a focus area of continuous improvement, given the need for data integrity in this area and the new reliance on analytics to drive asset replacement programs.

CAPACITY ASSESSMENT

The current and predicted economic outlook for Chapleau suggests an assumption of 0% load growth over the forecast period is reasonable. This position is consistent with the load forecast included in the CPUC cost of service rate application. Renewable generation connections are constrained by the Hydro One transmission system, but recent Customer Impact Assessments indicate no particular problems with potential CPUC REG connections on CPUC's distribution system at this time, should Hydro One's transmission constraints be addressed.

NUMBER OF NEW CONNECTIONS

Recently, CPUC has had no new customer connections. During 2014, CPUC provided 14 connection upgrades. The following charts provide the specifics of historical trends for low voltage (LV) connection upgrades.

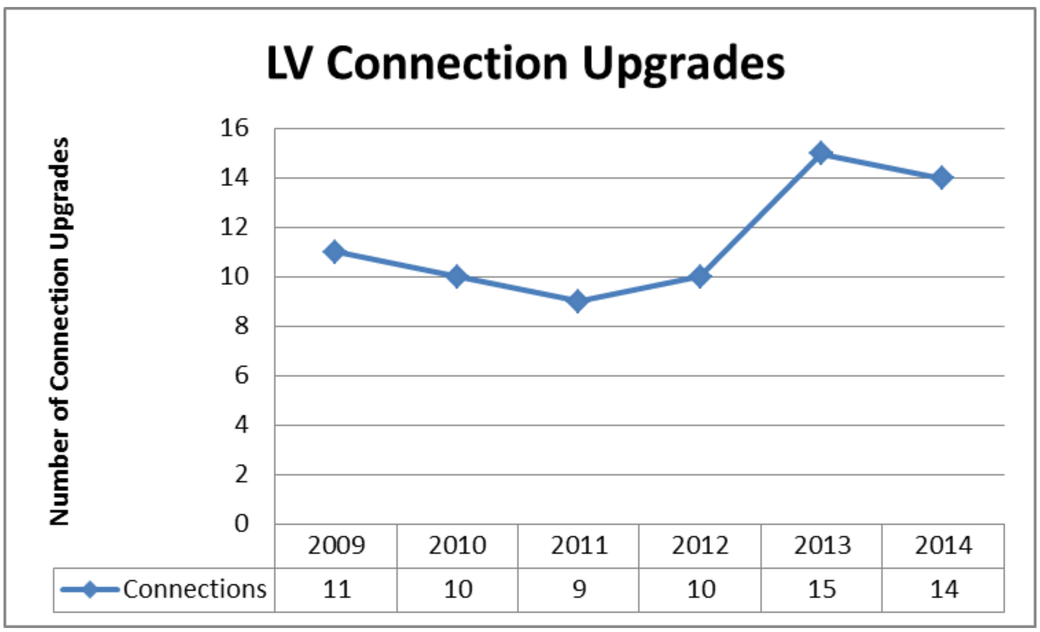


Figure 36.

CPUC is actively participating in the municipal planning activities although there is no expected load growth in the area during the next five-year period.

5.3.3 ASSET LIFECYCLE OPTIMIZATION POLICIES AND PRACTICES

Electricity assets, like any other type of physical assets, have a lifecycle. This section describes how CPUC assets are managed over their entire lifecycle, from conception to retirement. CPUC will be working towards a lifecycle asset management program as the basis for longer-term planning and predictable investment levels that optimize operational and financial risks.

CPUC's approach in Asset Lifecycle Management and Planning is holistic in nature and takes into consideration the combined implications of managing all types of assets, including physical assets, financial and human capital. CPUC focuses on a system and process approach of asset management and planning, considering assets in their operating context and optimizing the value of the overall assets system rather than the individual asset.

ASSET LIFECYCLE MANAGEMENT

Definition of Key Lifecycle Activities:

Activity	Detailed Definition
Operations	Involves changing the design parameters of an asset, such as changes in circuit configuration or setting taps on a transformer. Does not involve a physical change to the asset. Line clearing of trees is an example of an operations activity.
Maintenance	Involves replacing consumable components on asset assemblies, but not the whole assembly. Generally, these sub-components wear out before the whole assembly fails, for example, an insulator on a pole assembly or an arc snuffer/muffler on a gang operated load break switch.
Sustainment	Involves replacing assets within asset categories, for example, replacing a pole or poles (pole asset category).
Retirement	Removes an asset from the distribution system, for example, removing a redundant circuit from service.

Figure 37.

OPERATING THE ASSETS

CPUC bases its operational activities on delivering satisfactory service levels to its customers. Services include a broad range of services, including capacity, quality of electrical supply, continuity, restoration, grounding of equipment (public safety) and the absence of (radiant) interference. The measure of CPUC service levels is related to the performance of its distribution assets.

CPUC assesses customers' preferences by obtaining informal feedback from customers during regular daily interactions with the utility and by formal surveys. Based on the recent customer interactions and surveys, CPUC has concluded that customer preferences fall into four categories, in order of priority (highest to lowest), as follows:

- Reliability – continuity of electrical supply.
- Cost – lowest possible cost, accepting modest rate increases as required to refresh assets.
- Quality – the absence of momentary interruptions and non-standard voltage levels.

- Process – answering the phone, as accuracy of customer bills, timely construction of new service connections and upgrades to electrical services and outage notices that are given far enough ahead of the outage to allow action or reaction by the customer.

Operational activities generally arise in dealing with distribution system issues when assets are not operating steady state and as designed. As an example, a number of triggers would initiate activities to restore normal operations, as follows:

- Voltage levels too high or too low – outside of Canadian Standards Association Voltage Variation Limits.
- Fault current exceeds thresholds on protective devices such as breakers and fuses.
- Demand exceeds thresholds on protective devices and or the assets current carrying capacity.
- Customer concerns about the quality or reliability of electricity being supplied to them.

MAINTAINING THE ASSETS

Basic maintenance deals primarily with replacing consumable components of assets. Components wear out in a number of ways, including oxidation, pitting or erosion of contact surfaces, material rot, gasket degradation, pitting of insulators, etc. Continued operations of devices which clearly exhibit component degradation, will eventually lead to a failure in the distribution system. Failure of assets is influenced by a complex interaction of parameters, such as quality of manufacture, quality of installation, age, operating hours, number of operations, loading cycles, stress due to fault events, ambient temperature, contaminants and the maintenance performed during the life of the asset.

For some assets, run to fail is the only feasible option due to limitations of maintenance that can be performed. For example, distribution transformers are manufactured and deployed with no corresponding regular maintenance for the duration of their lifecycle.

Conversely, a small percentage of the distribution assets, such as distribution station transformers do require regular maintenance. These transformers generally supply large number of customers and a failure would likely result in a lengthy outage and a significant number of resources to replace a failed unit. This maintenance involves regular condition testing (e.g. gas-in-oil analysis) which highlights or identifies possible problems.

Asset maintenance and inspection is based on manufacturers' recommendations, industry regulatory requirements, industry best practices and CPUC's own experience with performing the maintenance or inspection. Currently CPUC intends to build a knowledge base to provide enough information to make informed decisions on future maintenance activities. Initial intervals for maintenance may be changed, based on actual experience with field data collected. The data collected from the maintenance will provide valuable information upon which to base repair work, refurbishment activities and asset replacement schedules.

CPUC maintains a record of maintenance activity on all major assets as follows:

1. ***Distribution System Assets*** - Annual Infra-Red Scanning, monthly patrols of distribution system to identify immediate problems.

2. ***Transformers and Substation*** - Monthly visual inspections, temperature and pressure readings taken, oil samples taken for testing, oil replacement or top-up, regulators checked for oil levels and tap changer wear and tear, performance readings and monitoring.
3. ***Inspection Patrols*** – Based on the requirements of the Distribution System Code, Appendix C. Corrective action plans are carried out as required.

Prioritization of capital programs and projects is based, in part, on the impacts of the above.

OTHER MAINTENANCE AND SUSTAINMENT ACTIVITIES

With a developing asset knowledge base CPUC intends to continually improve programs for assets repairs, replacements or enhancements based on the following criteria (as appropriate):

- Age (relative to expected life)
- Physical condition
- Performance history and service reliability
- Maintenance records (repair frequency and cost)
- Maintainability (availability of parts, comparison to new technology)
- Safety impacts (worker and public)
- Future use (local and regional planning)
- External demands (customer driven, road relocations)
- Efficiency opportunities (voltage conversions, new technology, cost reduction)

The physical condition of the DS is assessed by scheduled inspections, planned maintenance and unplanned inspections and repairs. When an area of the DS is identified for upgrade or replacement, further analysis is conducted to review available options.

To aid CPUC in planning for future maintenance work all outages are recorded by location allowing CPUC to track distribution system problem areas. Service Reliability as measured by the SAIDI, CAIDI & SAIFI Indices provide a significant input to the DS Planning - CPUC tracks the following information related to power outages:

- time and date of occurrence
- customers affected
- duration
- cause
- customer complaints

Loss of supply outages from Hydro One are currently having the greatest impact on CPUC customers.

Infra-red Scanning - The purpose of infra-red scanning is to identify any hot spot issues on distribution system, indicative of potential for system failure. Detected hot spots are verified and further assessed through visual inspections and verification by line crews. Critical items identified are corrected immediately and non-critical items are scheduled for repair in conjunction with other planned work.

Line Clearing and Tree Trimming – The Town of Chapleau has heavily treed areas. If not for the CPUC regular line clearing and tree trimming maintenance program, tree contacts would become a major cause of distribution system outages and momentary interruptions for CPUC customers. This program cycles through the service territory on an annual basis and annual tree trimming and tree removal quantities vary based on conditions found.

RISK MANAGEMENT

CPUC's Distribution System Maintenance and Inspections are aimed, in part, at protecting the public from physical, electrical and environmental hazards, by maintaining a schedule of regular asset inspections and maintenance activities.

Ontario Regulation 22/04 - Electrical Distribution Safety is a key regulation addressing electrical safety. CPUC maintains the Distribution System compliance to the Distribution System Code, material standards and construction verification programs to safeguard the public from hazards. The Electrical Safety Authority (ESA) is responsible for enforcing the regulation and monitors CPUC compliance through the annual third party safety audits and regular field inspections.

CPUC promotes excellence in health and safety management in order to prevent losses to people, assets, environment and reputation. Keys elements to Health & Safety management are the evaluation of risk for all workplace hazards, regular Health & Safety meetings with staff and feedback about safety related incidents.

CPUC follows all regulatory requirements and guidelines to ensure the distribution system has a low risk impact on the environment.

CPUC employs assessment of reliability metrics in asset management decision making and focuses on remedial work for specific system components that have a high risk of failure and a correspondingly high consequence. Broader strategies, which CPUC recently began evaluating, include:

- Initiating a voltage conversion to improve system reliability, reduce line losses and partially offset costs associated with increases in age-related maintenance and/or replacement.
- Maintaining poles and basic infrastructure reaching end of life.
- Sustaining inspection and maintenance programs to reduce risk of failure.
- Sustaining vegetation management frequencies to prevent tree-related failure events.

A priority will be placed on addressing concerns from maintenance reports provided from crew walk-through inspection activities in the services area. CPUC will continue to use the customer satisfaction survey and customer complaints to inform prioritization of maintenance work, and ultimately determine whether the reliability and efficiency levels are optimal.

5.4 CAPITAL EXPENDITURE PLAN

5.4.1 SUMMARY OF CAPITAL EXPENDITURE PLAN

CPUC has developed the capital expenditure plan by analyzing multiple investment scenarios and measuring the ability of each alternative to meet corporate goals and objectives. The investment analysis was an iterative process and the resulting plan is summarized below.

	2016	2017	2018	2019	2020
System Access					
System Renewal					
System Service					
New 25 kV Substation	$750,000	$750,000			
New 25 kV Supply to Hospital	$35,000	$50,000			
4.16kV to 25kV Voltage Conversion			$200,000	$200,000	$200,000
Total System Service	$785,000	$800,000	$200,000	$200,000	$200,000
General Plant					
TOTAL EXPENDITURE	$785,000	$800,000	$200,000	$200,000	$200,000
System O& M	$328,029	$321,206	$327,630	$334,182	$340,866

Figure 38.

In summary, based on the analysis in Sections to follow, CPUC will make minimal investments for maintaining the distribution infrastructure in the short term, and instead will invest on a voltage conversion. This approach will improve system efficiency by reducing line losses, improve reliability by renewing assets and enable additional REG capacity when Hydro One capacity constraints are addressed. The following describes the planned investments in each of the OEB prescribed categories.

System Access investments are planned based on historical actual load levels required to meet regulatory obligations for connections, upgrades and plant relocation driven by customers and third parties. CPUC expects that its system will continue to accommodate the requests for new load connections and for service upgrades during the forecast period. CPUC does not project any significant load growth in the next five years.

System Renewal investments are typically based on the requirements of asset replacement programs. As previously indicated, asset replacement programs are being driven by a developing asset management process that uses the age of assets as the main indicator of asset health. The added level of precision inherent within the acquisition of additional asset attribute data sets is anticipated to further refine the analyses. Based on the similarities in asset age profile, the analysis of current information has concluded that asset renewal for other asset categories will follow essentially the same schedule as pole replacement. Specifically, assets such as customer transformers, system switches, conductors, etc. were assumed to be subject to the same vintage replacement criteria as the poles to which they were attached.

The voltage conversion project will result in a replacement of all of the existing 4.16 kV assets, reducing the need for significant expenditures in the System Renewal category. Accordingly, projects planned in this category over the forecast period will be offset by investments identified in System Service.

Improvements to the asset management process made over the DS Plan forecast period will be used to justify System Renewal category projects proposed in the next DS Plan.

System Service spending focusses on the planned voltage conversion work that addresses the primary driver of increasing system efficiency. Secondary drivers addressed by the planned investments include increasing system reliability (supported by results from the customer survey) and renewing the aging asset base. Study estimates for this work including design and construction of a new 115 to 25 kV distribution station and annual costs of converting 4.4 kV customer supply to 25 kV.

The **General Plant** category focusses on ensuring that adequate tools and equipment are in place to support the day-to-day operations. The short-term plans are to address the customer-identified priorities, such as improved communications, are met by enhancing ad hoc customer communications though the web site and bill inserts. This will not require capital investments and therefore, there are no projects planned in this category over the forecast period.

INVESTMENT DRIVERS

The CPUC DS Plan was developed considering the assessment of:

- Future load projections
- The customer survey completed in 2014
- The current state of the assets
- The ability of the system to accept distributed energy resources
- The results of the regional planning process
- The performance outcomes mandated by the OEB
- The financial health of CPUC and the rate impacts of the DS Plan

The following sections describe the roles of these drivers in CPUC's investment decisions.

Load Growth

The Town of Chapleau is a remote, isolated, community that has experienced difficult economic times with the downturn in the softwood lumber market. As indicated in Figure 41 and Figure 36, load loss and not load growth has been the norm for the historical period of the DS Plan. As there is no immediate relief to the economic conditions in the foreseeable future, load is expected to continue to decline in the short term. A load forecast from CPUC's pending cost of service rate proposal is attached in Appendix D.

The CPUC capital plan is primarily focused on sustaining infrastructure to serve existing customers at an acceptable level of reliability and efficient cost.

Customer Preferences

The 2014 Customer Survey, referenced in section 5.1.5 and Appendix L, provided insight for the CPUC Board of Directors and staff about customer preferences regarding the capital expenditure scenarios under consideration. In spite of enduring economic hard times, 87% of the survey respondents delivered a message that supported a modest increase in the distribution portion of rates to revitalize the existing electricity distribution system controlled by CPUC. The survey results also revealed that 100% of respondents considered CPUC as a partner and trust that their interests are aligned with the interests of the community.

Asset Condition

Since its last rate filing, CPUC has initiated efforts to develop a credible asset management process (see section 5.3 for details). Foundational data organization work, such as spatially identifying assets and their attributes, have been used to populate a shared GIS system, access to which is sponsored by the municipality. Additional work was required to assign unique identification numbers to specific assets in the field. Work is currently underway to migrate field collected data into the GIS asset registry.

Asset attribute data gathered thus far has centred on asset age as the primary precursor to preventative maintenance or replacement programming. The age profile for poles is shown in Figure 51 below.

REG Connections

CPUC is not expecting to make any major changes to its distribution system to accommodate load growth or renewable energy generation projects. There is no foreseeable load growth and the upstream transmission system is constrained limiting the connection of REG projects. CPUC will monitor developments in smart grid technologies that can provide customer control capabilities and enhance the reliability of the local network and will consider implementing those technologies if economically and technically feasible.

Regional Planning

CPUC participated in the East Lake Superior (ELS) integrated regional resource planning process led by Great Lakes Power Transmission. The regional planning process had no material impact on the CPUC DS Plan.

Prior to proceeding with a singular option upon which the DS Plan would be based, three other financial and technical options were considered. Burman Energy's scenario analysis model was used to examine the long-term customer, rate and financial health impacts of various investment strategies.

5.4.2 CAPITAL EXPENDITURE PLANNING PROCESS OVERVIEW

CAPITAL EXPENDITURE PLANNING OBJECTIVES, PLANNING CRITERIA AND ASSUMPTIONS

CPUC's capital expenditure planning objective is to put forward capital investment expenditures that align with optimal value determined from the investment strategy analysis in the previous section. The funding sources for these expenditures include:

- Returns from operations (over and above working capital requirement).
- Leveraging CPUC's favourable financial position through debt acquisition.
- Distribution rate increases.

The planning process traditionally follows a bottom-up project-by-project portfolio development by identifying issues and their solutions. A cost-opportunity analysis or feasibility study is used to analyse possible solutions and alternatives, as well as potential costs and consequences. Cost-opportunity options are analyzed and cost estimations are compared so that the selected solutions move to the next planning stage.

CPUC considers all viable alternatives for resolving system or operational issues. For major capital projects, a "do-nothing" alternative is considered in order to determine whether the risks associated with the issue/constraint merit any significant investment.

The table below describes how CPUC has aligned strategic objectives with long term strategic planning. The overall objective is to review the full value chain in order to provide the optimum long term value.

Objectives (from Mission & Values)	Tactics
CPUC will remain a viable business entity / going concern.	• Develop a long term strategy / business plan • Build a business that creates value for the future while balancing the needs of ratepayers
CPUC will be operated efficiently to provide maximum value: • Effective and efficient use of capital • Effective and efficient operating and capital plans • Build value into the business for now and the future	• Institute a commercial capital structure more closely aligned to deemed regulatory D/E and cost of capital • Use tools such as asset condition, risk optimization, lowest lifecycle cost to balance operations and capital spending • Look at the full value chain (energy generation to end point delivery) to provide lowest cost to ratepayers • Include business valuation into the business planning process – consider longer term business value
Develop a robust energy delivery system optimized to meet current and future needs: • Community • Provincial energy policy • Renewed regulatory framework	• Study delivery system operating and capital scenarios that provide future flexibility • Ensure customers needs are understood and incorporated (reliability versus investment and rates) • Investment scenarios "must" include plans for smart grid, the ability to incorporate green power, and meet current and future load growth

Figure 39.

CPUC CAPITAL PLANNING PROCESS

Five-Year Plan

CPUC uses results from its long-term planning efforts and other reports, such as asset condition reports, to perform 'tactical' planning which covers a five-year period.

Annual updates to the long term-term plan incorporate new information that may arise, such as new regulations, longer-term individual customer needs or updated information arising from the activities described in the long-term planning process. Typical inputs to medium-term planning include:

- Customer-driven needs
- Municipal-driven needs
- Health, Safety and Environmental issues
- Regulatory requirements
- Reliability and System analysis
- Asset Condition Reviews
- Asset replacement requirements (based on the outcome of long-term planning)
- Expansion requirements (if any are identified through long-term planning)
- Innovative initiatives, such as smart grid and smart meters

The results of the medium-term planning process provide the basis by which to select and prioritize projects for inclusion in the five-year CPUC Capital plan. Results of medium-term planning are also considered to review the effectiveness of maintenance programs and to make adjustments as required.

One-Year Capital Plan

Short-term planning involves developing specific plans to implement the projects defined in the budget for the current year, as well as to operate and maintain the distribution system(s) in a safe and reliable manner. It also addresses short-term needs such as connection of new customers or reaction to external events including severe weather conditions and storms. The one year capital plan covers:

- Current budget year project design
- Customer-driven asset development (if and when they develop)
- Municipal and developer-driven asset development (if and when they develop)
- Other short-term projects

CUSTOMER ENGAGEMENT MECHANISMS

CPUC's town site is over 450 kms from Greater Sudbury, 250 kms from Sault Ste. Marie, and almost 200 kms from Timmins, the three closest major centers. CPUC staff are members of the small community, and thus are very much aware of any major issues experienced by the customers.

CPUC actively communicates with its customers regarding ongoing business, accomplishments and changes in regulatory matters. Customers' feedback and experiences were collected via targeted customer research and were incorporated into this DS Plan throughout the planning process. The voice of the customer has shaped CPUC's business direction, with regard to its long-term strategy of improving reliability, service quality and communications.

CPUC regularly undertakes activities to reach out to customers, stakeholders and third parties as part of its business relations. The engagement activities support the primary business goal aimed at customer focus in shaping utility features and implementing environmentally friendly solutions, while improving distribution system reliability. The activities are part of a continuous engagement improvement process which is designed to transform customer service channels into powerful relationship and branding tools. CPUC has entered a new phase of customer engagement after redefining the strategic plan, positioning customer engagement points and offering educational components to help customers to modify their behavior and allow them to take control over their energy usage choices.

In the past, the relationship with the customer has been largely transactional. However, CPUC has now taken the lead in the community to empower customers through customer education to help them to modify their consumption behaviors. The graphic below outlines the stages of customer engagement at CPUC.

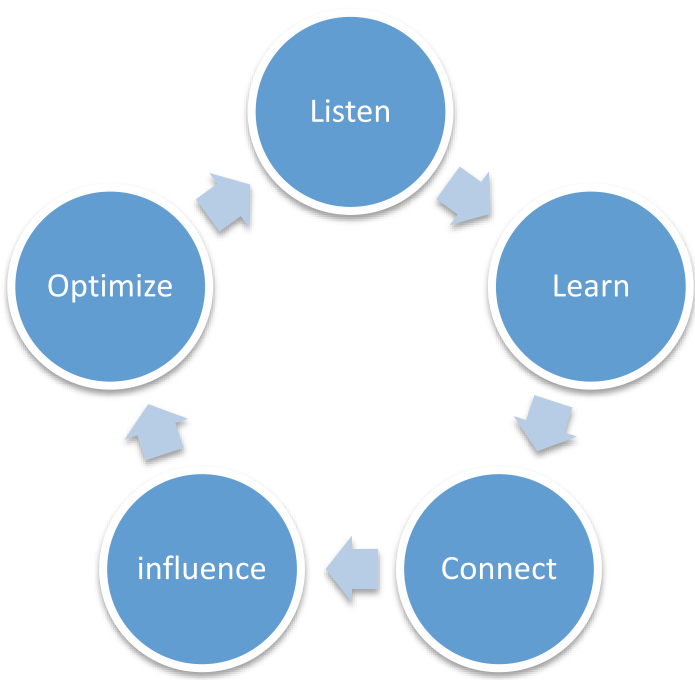


Figure 40.

Some recent customer communication activities and results include:

Customer Survey - CPUC conducted a customer satisfaction survey and targeted research of customer preferences to support the DS Plan investment planning process. To ensure impartiality and objectivity of the results, CPUC has contracted a third party to design and conduct the surveys. The results of the customer survey are included in Appendix L.

Meetings with Commercial and Industrial Customers – Large general service customers are invited to meet with CPUC, to explore conservation initiatives and opportunities, as well as to learn more about changes in the industry and the company's efforts to address the changes. Customers are encouraged to ask questions and provide feedback in support of CPUC distribution activities.

Corporate Website – The website provides information about energy conservation and safety. CPUC's website also provides customers a mechanism by which they can reach out for services and provides contact information.

Bill Inserts – CPUC sends bill inserts regularly to its customers with monthly invoices. These inserts include information on specific customer initiatives, energy savings coupons, safety messages, community involvement, twelve-month energy consumption data, cost of power rate information and information regarding current CDM initiatives.

Conservation and Demand Management Programs – CPUC performed its formal customer survey in 2014 identifying the concerns and preferences of the members of this small community in Northern Ontario. To ensure impartiality and objectivity of the results, CPUC contracted a third party to design and conduct the surveys. The results of the customer survey are included in Appendix L. The results of the survey served as guiding inputs for the preparation of this DS Plan. An excerpt from the ensuing results analyses is described below.

In the 2014 customer survey, customers were given four distribution system plan investment options and asked to choose their preferred option:

- 0% of the respondents chose -- "Do not make any investments. Keep our distribution costs as they are."
- 2% of the respondents chose – "Finance the investment in a new modern system under CPUC control by holding the distribution rates at their current level and not returning any money to the town."
- 11% of the respondents chose – "Borrow the funds necessary to maintain our system."
- 87% of the respondents chose – "Finance the investment in a new modern system under CPUC control through a slight increase in our distribution rates."

The survey also found that:

- 97% of respondents ranked the statement "How important is it for Chapleau to take action to improve the delivery of continuous, reliable power?" as a 9 or a 10.
- 53% ranked the statement "How important is it that CPUC support efforts to "green" the community by investing in such things as facilitating renewable energy for home and business, etc." as a 9 or a 10.
- 44% of all respondents indicated they intend to invest in renewable energy in the next 5 years.

Day-to-Day Operations - Although not formally part of the 2014 customer survey, the day-to-day interactions between CPUC staff and customers affirm the fact that CPUC customers are concerned about the rising cost of electricity. Taking all of the above into account, the planning objectives of CPUC are well aligned with customer preferences.

PLANNING ANALYSIS, TOOLS AND METHODS

According to data from 2013 OEB Yearbook of Ontario Electricity Distributors [4], the average annual loss factor in Ontario was 4.18% in that year. Figure 23 represents a comparison of the line loss factors of Distributors in Ontario and the red line represents the CPUC's loss factor of 8.66%. CPUC recognized the importance of reducing the losses in its Distribution System, given its position relative of other Ontario LDCs. Over the historical period of this DS Plan, CPUC engaged Burman Energy to perform various power system analyses on the CPUC distribution system using state of the art engineering analysis software. The results of the analyses showed that a significant portion of the system losses on the CPUC distribution system resided on the 4.16 kV system.

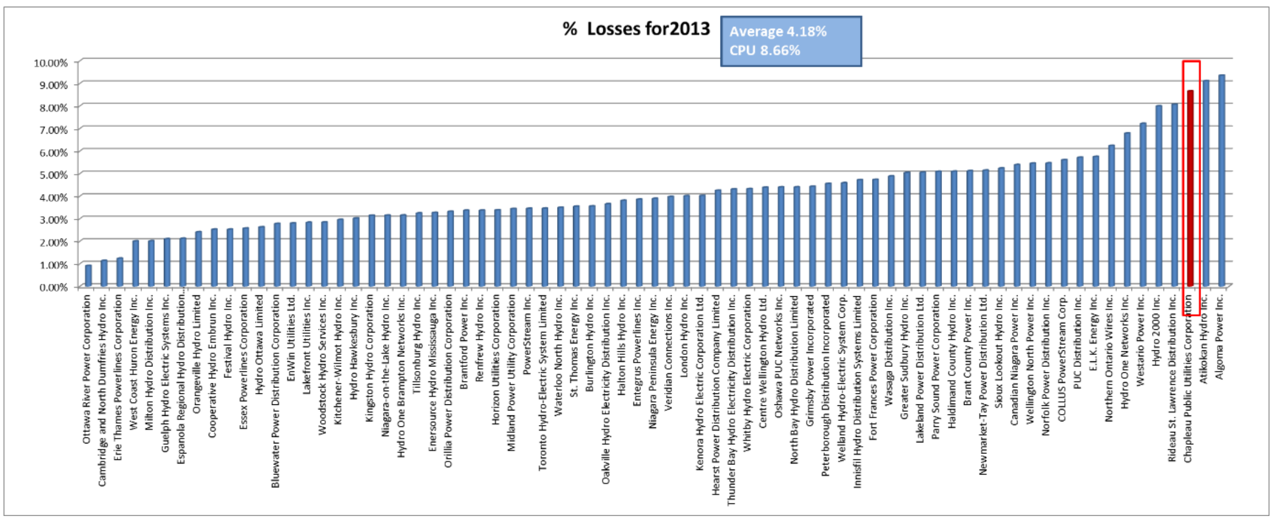


Figure 41.

As Burman Energy Consultants Group worked with CPUC to perform the required power system analyses, it became apparent that the required geospatial and equipment attribute characteristics were not available in a sustainable format. To solve this problem, CPUC agreed to further engage Burman Energy to create a geospatial referenced database of the CPUC distribution system using the ESRI Geographic Information System (GIS). The numerous benefits of having a geospatially correct distribution system model with accurate equipment attributes have become apparent as the OEB mandated need to embrace asset management principles were given to Ontario LDCs in the Chapter 5 Filing Guidelines.

[4] http://www.ontarioenergyboard.ca/

Creating and maintaining a geospatially correct distribution system model was not a trivial exercise. During the historic period of this DS Plan, the initial effort required significant data acquisition efforts by both CPUC and supporting Burman Energy staff including:

- Capture of as-is system components
- Determining and confirming feeder characteristics (voltage, phasing, conductor size)
- Establishing basis for integrating feeder loading

At present Burman Energy has constructed and is maintaining a separate model of CPUC's distribution system suitable for analysis with Dromey Distribution Engineering Simulation Software (DESS). The development of this model precedes the ESRI based GIS model and includes modeling all overhead and underground lines, distribution transformers, switches, station transformers, primary supply lines, similar to the GIS system model. However the distinct difference is that DESS model is used to analyse the modeled system electrically based on existing assets, their electrical characteristics and overall system electric connectivity. Although currently the ESRI (GIS) and DESS models remain separate, the long term goal is to integrate data management for both systems.

System losses or technical losses on distribution systems are primarily due to heat dissipation resulting from the impedance of current-carrying elements of the distribution system. Losses are inherent to the distribution of electricity and can be reduced by either lowering the impedance of current-carrying element(s) or decreasing the current through current-carrying elements. The effects of current reduction are greater than the effects of impedance reduction due to the underlying physics relating losses to the current squared. In 2006, Burman Energy undertook an analysis of system losses using DESS, and recommended several capital and O&M projects designed to reduce system losses. The projects specified by Burman Energy were tried and true conventional solutions to the system loss problem. The projects included:

- *Installing larger conductors* – When replacing conductors that reached their end-of-life, larger size conductors were installed when feasible. This reduced the line impedance and therefore the losses, particularly on heavily loaded feeders.
- *Reducing load on heavily loaded feeders* – Heavily loaded feeders had load transferred to alternate feeders or new feeders, where feasible, which resulted in reduced losses.
- *Balancing phases* – Moving transformer connections or single-phase feeder taps from one phase to another helped balance phase currents.
- *Power Factor Improvement* – Specific line sections were targeted for the installation of capacitor banks.

The following projects were completed prior to and during the historic period of the current DS Plan;

- Installation of 3 capacitors 225 kvar - bank in service May 6, 2009 Golf Course Road.
- Installation of 3 capacitors 225 kvar - bank in service April 23, 2009 Elgin Street.
- Re-conductoring of Demers St - re-conductored Fall 2014.
- Load balancing performed throughout Town with direction from Burman Energy. This included transferring loads from feeder to feeder where feasible.

The recent power system analyses update performed by Burman Energy indicated that CPUC had exhausted opportunities to reduce system loss reductions using the above methods.

Next, CPUC and Burman Energy considered the results of the customer survey and the OEB mandated performance outcomes. In consideration of all factors, scenario outcomes were developed. These scenarios formed the basis upon which Investment Strategies analyses could be performed. The evaluative criteria developed are as follows:

- Funding for the project work should not be constrained by the CPUC's current debt/equity structure.
- The project should sustain the delivery of safe, reliable power.
- The project should not restrict the connection of renewable energy generation on CPUC's distribution network.
- The project should have minimal impact on customers' overall electricity bill.
- The project should reduce system losses.

CPUC and Burman Energy decided that the need to meet the industry standard for system losses was one of the top priorities of the DS Plan. To do so, CPUC would invest in a voltage conversion project to convert the old 4.16 kV system to 25 kV. After the project estimates were received, it was apparent that the cost of this project would exceed the capability of CPUCs existing capital investment structure. The ability of CPUC to complete the voltage conversion project and meet the customer's preference for a modest increase in distribution rates would be tested using a proprietary capital investment tool and project prioritization tools. Throughout the planning process, CPUC deployed these tools for prioritizing and managing risks (benefits) and optimizing and pacing the timing of capital expenditures (costs).

CAPITAL PROJECT(S) AND/OR ALTERNATIVES PRIORITIZATION TOOLS

CPUC uses a long-term forecasting model, developed by Burman Energy, to evaluate the effects of different investment approaches on such outcomes as customer rates and the financial health of PUC. CPUC uses this tool to compare the financial effects and inherent risks of the Intrinsic approach and to help define the pace of execution of projects.

The investment planning model allows CPUC to vary parameters such as:

- Debt to equity ratio
- Dividends
- Special dividends
- Equity injection
- Customer growth and/or energy growth
- Depreciation
- Productivity
- Regulatory options such as rebasing dates, choice of IRM model, rates, etc.

The capital costs of the voltage conversion project were estimated and the "Do Nothing" alternative capital costs were calculated based on the average historic capital spend at CPUC over the historic period. These costs were then input into four scenarios in the investment planning model. The investment scenarios, the results of the analysis and the resulting impacts are described in Section 5.4.5.2.

As can be expected, the value of the business is further enhanced in the DS Plan scenarios where additional capital is expended, resulting in an increase in rate base and the associated reduction in the cost of capital over the plan horizon by introducing debt financing. The rate impacts, financial health information, customer preferences, planning objectives and strategic objectives are then used in the capital project prioritization tool to evaluate four investment alternatives. Each of the investment alternatives is evaluated as a singular project at this point in the process. The capital project prioritization tool (Appendix I), used at CPUC to evaluate the relative benefits of proposed capital projects is based on a model that ranks the project's strategic fit, system needs and feasibility based on the following criteria:

- Alignment with Goals and Objectives – Evaluates the alignment of project or action to corporate strategic and planning goals and objectives.
- Customer Focus - Evaluates how well the project or action meets customer preferences (customer survey).
- Public Policy Responsiveness - Evaluates if the project or action aligns with REG, CDM, Green Energy Act (GEA) requirements.
- Criticality - Evaluates if the project or action mitigates an identified business risk.
- Asset Health (Age/Condition) - Evaluates the expected useful life (or remaining life) of the assets.
- Health & Safety, Environmental - Evaluates if there are health, safety and/or environmental risks.
- Cost Benefit – Evaluates the cost benefit of project or action.
- Operational and Technology Risk - Rates if the project or action will address operational or technology risks and issues.
- Resources - Evaluates the potential of job creation in the local community.

The selection criteria and weighting scale are found on the Selection Criteria page of Appendix I. Each ranking criteria receives a score between 1 and 5, in accordance with the scoring criteria found on the Project Ranking page of Appendix I. The score is then multiplied by a weighting factor assigned to each ranking criteria to produce a weighted score the sum of the weighted scores produces the overall project score. The relative overall project scores are used to rank the alternatives. The results of the ranking process are discussed in Section 5.4.5.2.

5.4.3 SYSTEM CAPABILITY ASSESSMENT FOR RENEWABLE ENERGY GENERATION

CPUC distribution electrical system has two voltage levels; a 25 kV system fed from a Hydro One Distribution Station and a 4.16 kV system fed from a municipal substation owned and operated by CPUC. CPUC has performed a system analysis, and is aware of the capacity of its feeders to accept generation. The results are attached in Appendix N. CPUC has not identified the need for renewable generation enabling capital expansion expenditures, although the voltage conversion project proposed in the DS Plan has inherent enabling characteristics. In addition, CPUC is planning expenditures for evaluation studies of various smart grid-related technological components as a part of the voltage conversion project.

Both the 25 kV and 4.16 kV systems currently have upstream capacity constraints on Hydro One transmission side that are inhibiting renewable generation connections. For example, a solar installation project initiated by the Town of Chapleau was not completed due to inadequate upstream capacity on the Hydro One transmission network.

CPUC has asked Hydro One to consider upgrades in order to remove the upstream capacity constraint, given that the OEB direction is to have an integrated approach to distribution network planning. Hydro One's current position is that there are no plans to enable the connection of renewable generation for CPUC customers due to the high cost of upgrades. Further details about the regional planning outcomes are provided in Appendix E.

Although its distribution system has the capacity to connect renewable generation, CPUC does not anticipate any renewable generation connections over the forecast period, as Hydro One has no plan to remove the upstream constraints.

5.4.4 CAPITAL EXPENDITURE SUMMARY

Appendix H provides a 10-year overview of CPUC's capital expenditures including a 5-year historical summary and a 5-year forecast. The majority of the planned capital expenditures will occur in the System Service category through a conversion of the 4.16 kV system to 25 kV. Many of the CPUC assets will be replaced in the conversion. To expedite the conversion, CPUC will limit investment in the System Renewal category. The break-fix liability risk of this approach is expected to be minimal and below the materiality threshold.

Similarly, General Plant investments are also not expected to be material.

System Access projects generally fall under the "obligation to serve" and "mandatory connection" requirements of the Electricity Act and as such must be completed by CPUC when the customer meets all the requirements of the Distribution System Code. CPUC is expecting a negligible load growth and has not included a forecast of System Access costs as the costs will not be material.

The remaining categories of System Access and General Plant are not forecasted to have any material investments.

5.4.5 JUSTIFYING CAPITAL EXPENDITURES

As described in the previous sections, CPUC has completed a comprehensive asset planning exercise to develop this DS Plan. The identified projects were developed with the planning and corporate objectives in mind. The projects that aligned with the objectives and have strategic value for CPUC were vetted through CPUC's Board using a proprietary investment model which predicts rate, financial health and shareholder value outcomes. These alternative projects were also vetted by the capital project prioritization tool (Appendix I). The resulting plan represents a balanced approach to delivering best-in-class customer service with minimal rate impacts and maximum shareholder value.

5.4.5.1 OVERALL PLAN

The following provides a summary of the rationale for expenditures planned in each of the investment categories.

SYSTEM ACCESS

System Access investments include costs related to connection of new customers. This category also includes capitalization of costs related to smart metering. Costs for the forecast period are in line with historical costs in this category. The major drivers of projects in this category is the regulatory requirement under the Distribution System Code (DSC) to provide electricity for customers as requested. CPUC is forecasting negligible load growth and the total planned expenditure in the category, for the 2016 to 2020 period, is less than the material threshold.

SYSTEM RENEWAL

Activity in this category is limited to emergent replacement of assets "like-for-like." Past expenditures in this category have ranged from $10,000 to $48,000 over the past five years addressing required asset replacements identified in the annual System Renewal project plan. The proposed System Renewal activity is now based on reactive replacement or system service Level 1. As such, there is no forecasted material expenditure of System Renewal costs for the period 2016 to 2020. The replacements of assets are planned based on an equipment age analysis, and it is expected that much of the asset base that requiring reinvestment will be replaced within the proposed voltage conversion project.

CPUC recognizes that the existing smart meters, installed in 2009, will need to be re-verified during the next five years. CPUC will initiate a meter re-verification program that includes batch testing prior to 2019. Should the testing result in required replacements, the System Renewal investment will need to be increased to include the cost of new smart meters.

SYSTEM SERVICE

The total planned System Service expenditure for 2016 to 2020 period is $2,185,000. This is a marked change from the past five years in which no investments were made in this category. The major driver for the voltage conversion capital project proposed in this category is to improve system efficiency by reducing the distribution system line losses. Secondary drivers include improving reliability, enhancing the ability of the CPUC distribution system to connect renewable generation and integrating smart grid elements. The proposed voltage conversion project will consume the majority of available capital and human resources over the forecast period and will meet the planning objectives described in Figure 33.

The proposed voltage conversion project includes a new 25 kV substation and the replacement of all existing 4.16 kV transformers, power lines and associated equipment with new 25 kV transformers and power lines. This investment is expected to reduce line losses by a minimum of 10%, and will standardize the distribution system at the 25 kV level. The distribution system upgrades and voltage conversion will deliver reliable and adequate distribution service at reduced cost, as a result of improved line losses.

GENERAL PLANT

There are no planned capital investments in the General Plant category. In the past five years, CPUC has invested in the development of a GIS database for the asset registry as well as the purchase computers for administrative support. The expectation is that no additional investments will be required in this category.

O&M

CPUC is forecasting O&M spending to remain near historical levels with some productivity synergies to be realized from the voltage conversion. The expectation is that the voltage conversion will result in lower spending than would otherwise have been the case in System Renewal Programs (e.g. pole replacements) during the next planning periods.

The total forecasted expenditures in system O&M costs for the next five years is $1,651,912.

JUSTIFICATION OF SELECTED APPROACH

CPUC generated a number of asset expenditure scenarios that delivered various levels of service, addressed various corporate and customer priorities and delivered varying shareholder returns. The scenarios were filtered by aligning with corporate goals and objectives such that four alternative investment scenarios were selected for further analysis using a ranking and selection criteria and process described in Appendix I.

Four scenarios were developed and evaluated through the investment planning model.

1. Intrinsic Approach – This scenario is based on operating the distribution system status quo. Under this scenario, CPUC operates the assets along a predetermined budget that includes like-for-like replacement of equipment at end of life and operating the local grid in much the same way it has been in the past.

2. Recapitalization Approach – Under this scenario, CPUC changes its financial structure and recapitalizes to a 60/40 debt equity ratio. This scenario would bring the Utility's capital structure in line with the OEB's deemed value (currently CPUC has no long term debt) while keeping the investment approach the same as the Intrinsic Model.

3. Investment Optimization Approach – This scenario describes an investment approach that optimizes the operation of the distribution system and recapitalizes the Utility to finance the investments

4. "Not for Profit" Approach – Under this scenario, the Utility recapitalizes to the deemed 60/40 value but operates without a return on equity. All the would-be profits are returned to the ratepayer by lowering customer rate. This not-for-profit variation was run to test the viability of a low rate impact test case.

A selection methodology was used that ranked the investment alternatives based on the strategic fit, system needs and feasibility using the following criteria.

Strategic Fit

- Alignment with Goals and Objectives – Evaluates the alignment of the scenario with corporate strategic and planning goals and objectives.
- Customer Focus - Evaluates how well the scenario meets customer preferences (customer survey).
- Public Policy Responsiveness - Evaluates the scenario alignment with REG, CDM, Green Energy Act (GEA) requirements.

System Needs

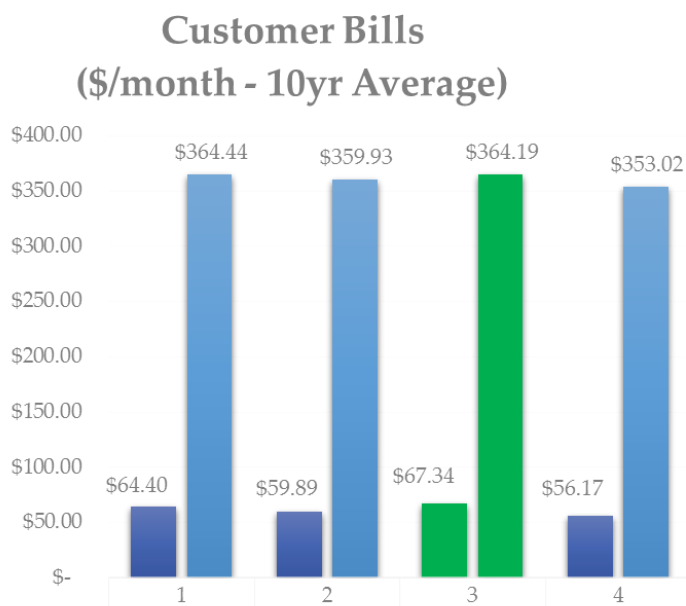
- Criticality - Evaluates if scenario mitigates an identified business risk
- Asset Health (age/condition) - Evaluates the effect of the scenario on the expected useful life (or remaining life) of the assets.
- Health & Safety, Environmental - Evaluates the health, safety and/or environmental risks.

Feasibility

- Cost Benefit – Evaluates the costs and benefits of the scenario.
- Operational and Technology Risk – Evaluates the degree that the scenario will address operational or technology risks and issues.
- Resources: People - Evaluates the potential of job creation in the local community.

The results of the evaluations using a weighting scale are found in Appendix I. Each ranking criteria received a score between 1 and 5, in accordance with the scoring criteria found on the scenario ranking page of Appendix I. The score was then multiplied by a weighting factor assigned to each ranking criteria to produce a weighted score. The sum of the weighted scores produced the overall project score. The relative overall project scores were used to rank the investment alternatives.

One of the ranking criteria with the highest weighting was the cost/benefit of the scenario, which includes the rate impact. The figure below shows the impact on average rates for each scenario over the long-term, calculated as average revenue per customer with no customer class differentiation (this would normally be done as part of an extensive cost of service and cost allocation study). The information is presented to show the average impact on the distribution component of customers' bills as well as the impact on the total bill.



	1	2	3	4
Distribution Only	$64.40	$59.89	$67.34	$56.17
Total Bill	$364.44	$359.93	$364.19	$353.02

Figure 42.

In addition to rates, the cost/benefit evaluation looked at the value of the utility, as defined in this case by the cash flow generated and available to the shareholder as well as the market value of the utility.

CPUC's investment strategy analysis showed that operating the system as it has been in the past resulted in the lowest overall customer energy bills, but did not address the line losses or refresh the asset base. CPUC investigated the option to recapitalize (the utility currently has no long-term debt) and invest in a system renewal plan, but this did not improve system losses, and left customers with higher rates than if the losses were addressed. Finally, operating the model as a not-for-profit entity presented an increased risk to the Township by reducing revenues and cash reserves such that the CPUC would not be financially viable in the event of unforeseen changes in business and operating assumptions.

The investment scenario that delivered both a direct customer benefit and the best value for the shareholder was Scenario 3 – the Investment Optimization approach. This scenario included recapitalizing the PUC to meet the deemed 60/40 ratio and investing in converting the 4.16 kV system to 25 kV. As can be expected, the value of the business is further enhanced in the DS Plan scenarios where additional capital is expended, resulting in an increase in the rate base over the plan horizon. However, the voltage conversion will also result in an asset refresh of the aging 4.16 kV system with improved reliability and will increase system efficiency by reducing line losses to the benefit of ratepayers. In addition, maintaining a single voltage infrastructure will provide operating efficiencies, which will again benefit CPUC ratepayers.

THIRD PARTY REVIEW OF CAPITAL INVESTMENT PLAN

CPUC engaged KPMG LLP, an accounting and professional services company, to perform a third-party review of the Burman Energy's capital investment model and the analysis used to determine the capital plan. The third party review validated the model and the results of the analysis. A report on the review is included in Appendix O.

SMART GRID PILOT

In addition, CPUC will continue to investigate new smart grid technologies to add capabilities to the Chapleau distribution system including increased visibility through remote telemetry, automatic control, self-healing and increased efficiencies. As an example of its efforts in this regard, Chapleau has applied to the Smart Grid Fund for a project that has the potential to reduce system losses, add remote disconnect and monitoring capability and improve voltage and power quality to customers. The project uses newly developed equipment and has a high degree of uncertainty and risk associated with validating the equipment functionality and reliability. The results of an initial testing may impact significantly the voltage conversation capital project. The implementation of new technology will result in creation of an adaptive infrastructure by extending the capabilities and life span of the 4.16 kV network.

The project is proposes to provide control and automation capabilities enabling a self-healing and self-correcting grid. Network visibility will be greatly increased through remote metering and telemetry allowing CPUC to monitor network conditions in real time, locate faults and identify energy losses.

5.4.5.2 MATERIAL INVESTMENTS

The following sections describe CPUC's planned material investments in each category.

SYSTEM ACCESS

The primary driver of this category is customer service requests and mandated obligations under the Distribution System Code (DSC). There have not been any significant investments in this category over the past five years and none are expected in the forecast period, due to a flat load forecast.

SYSTEM RENEWAL

This capital expenditure includes all "like-for-like" replacement costs related to renewal of major assets (poles, switches, etc.) because of failure, serious damage or end of useful life. Major drivers in this category are risk of failure, substandard performance and functional obsolescence. CPUC is not planning any major investments in this category, as asset replacements will be part of a larger voltage conversion project.

Rational

This DS Plan is a significant advancement in the application of asset management principles by CPUC. The intent is to use the developing asset management process to draw a roadmap for future developments and improvements. The asset management process will be continually improved over the forecast period by adding additional asset data and analytics to CPUC's future asset and program planning.

In this DS Plan, CPUC is applying sound planning methodology, asset management principles and a proprietary capital investment model that ties predictable performance outcomes to input from customers. At this point in the asset management process development, CPUC has only asset age data upon which to base the asset health. As the asset management process improves over the forecast period, CPUC will collect further asset condition data including information about the severity of identified defects for the various asset types. It is anticipated that with these improvements, CPUC will be able to refine its plans and develop assessments based on adjusted ages that can be objectively compared to typical useful lives (CPUC utilizes the typical useful life of assets noted in the Kinectrics study[5]).

Asset Assessment

Wood Poles

Wood Poles, by far, are the largest quantum of assets within the distribution system. CPUC has 586 poles in its system with 68% of them being 4.16 kV poles and the rest 25 kV poles. The age and condition of the poles cover the full range of possibilities, from newly installed to over forty years of age. A large number of the population of older wood poles will be replaced when CPUC proceeds with voltage conversion. CPUC has used a typical useful life (TUL) of 45 years for poles.

The table and graphic below provide information about the total wood pole count of 586 and their age distribution.

Bin	# Poles
0 - 5	6
6 - 10	32
11 - 15	25
16 - 20	64
21 - 25	56
26 - 30	61
31 - 35	163
36 - 40	81
41 +	98
Total Poles	**586**

Figure 43.

[5] Kinectrics report is published as a part of OEB Revised Chapter 2 Appendices - version 2.1 from Aug 1-14 at Appendix 2-BB Service Life

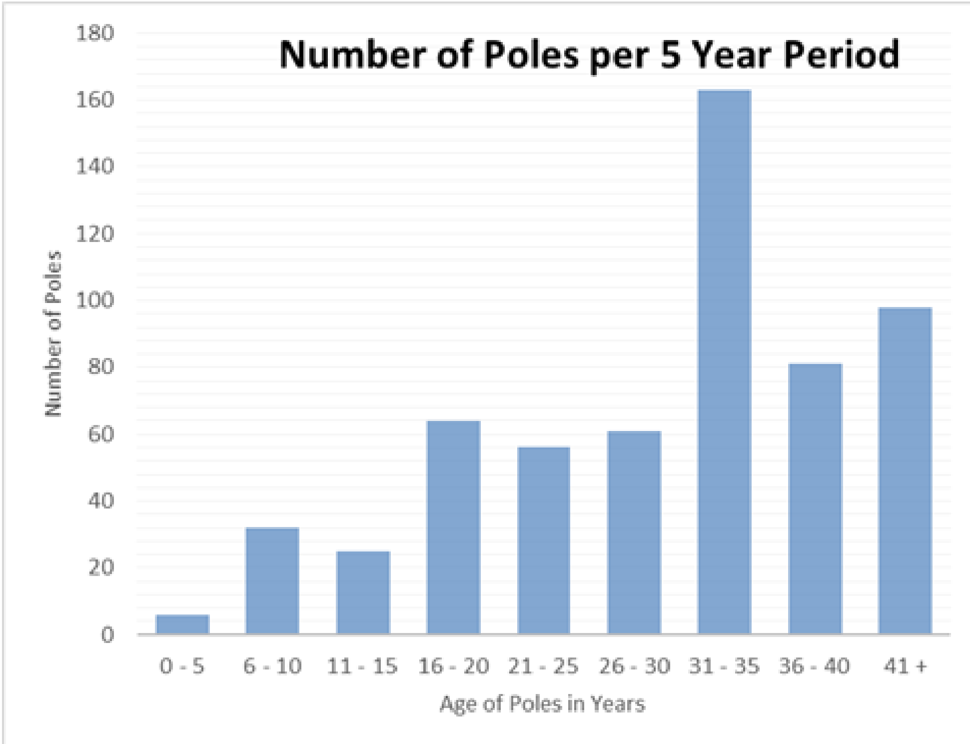


Figure 44.

The vintage distribution of wood poles indicates that a significant number of the poles need to be replaced in the next 15 years. Under the Intrinsic model, approximately 20 poles per year, or a total of 100 poles for this planning period, would have to be replaced under a System Renewal program to maintain the expected service level. Of the 100 poles replaced, about 68 of them would be 4.16 kV poles and the rest 25 kV.

Under the Investment Optimization approach, the voltage conversion will gradually replace all the 4.16 kV poles over the next ten years thus eliminating the need to replace some of the poles reaching end of life. A total of 150 poles are expected to be converted in this planning period and there is a 17% chance that the pole replaced has reached the end of life. This means that the conversion project will have replaced approximately 25 end of life poles thus avoiding this cost that would have been incurred in the Intrinsic approach. At a cost of $1,700 per pole, the total benefit is $42,500.

Pole-Mounted Transformers

CPUC has 267 pole-mounted transformers constituting large dollar value portion of the asset base. CPUC has used a TUL of 40 years for pole-mounted transformers and a total of five units are expected to reach end of life in this planning period. The Intrinsic approach plans for the replacement of all five transformers at a cost of $3,500 each or a total of $17,500. The Investment Optimization approach will replace all the 4.16 kV transformers in the next ten years with 68 being replaced in this planning period. It is expected that at least one of the transformers reaching end of life will be replaced by the voltage conversion, thus providing a benefit of $3,500 over the Intrinsic approach.

CPUC is currently installing unique transformer location numbers and collecting more information about its transformers. CPUC is planning for pole-mounted transformer replacements based on transformer age criteria in the future.

Smart Meters

Presently, there are 1,276 meters within the distribution system. Some meters are pending removal. The meter age range is from newly installed to below ten (10) years of age. As a result, of the Ministry of Energy's directive[6] to the OEB in 2004 to provide smart meters to all residential and GS<50kW customers, CPUC upgraded all of its meters. The bulk replacement of these meters took place in 2009. Fully 100 % of the meters are within their typical useful life. For the period of 2009 to 2014, a total of 29 malfunctioning meters were replaced for the amount of $2,400. Replacements under a reactive approach are part of the Operations and Maintenance budget.

CPUC is planning meter re-verification in 2018 and an investment may be required to purchase replacements if a significant number of meters fail testing. In order to mitigate the impact of meter failures during re-verification, CPUC will perform pre-sampling to help determine the best approach and meet the Measurement Canada sampling plan requirements[7].

Transformers

CPUC manages the operation of two 4.16 kV station transformers on which are performed weekly patrol inspections and annual oil tests (Appendix G).

CPUC's sustainment strategy is predicated on the following factors:

- TUL for power transformers is 45 years.
- Continue inspections designed to identify any emergent issues.
- Maintain stations over the short-term and consider replacement through the voltage conversion plan.
- Inspection and testing of station transformers oil is a very good predictor of when a transformer is reaching the end of its life. Regular inspection and testing allows time to make decisions about capital investment based on a proactive approach.

As a result of this strategy, CPUC is planning transformer replacements as a part of the voltage conversion project.

SYSTEM SERVICE

These projects will improve system reliability, automation and/or contingency performance. CPUC is planning a large voltage conversion and is currently considering adding smart grid elements to the distribution system. The voltage

[6] OEB Smart Metering Initiative
[7] S-S-06—Sampling Plans for the Inspection of Isolated Lots of Meters in Service

conversion project had been included in the DS Plan as it addresses customer issues by lowering system losses and the price of electricity to consumers, it increases the reliability of the distribution system and it decreases costs by eliminating the need for the replacing the end-of-life 4.16 kV assets.

Rationale

CPUC has decided that the single System Service project proposed for the forecast period will be a voltage conversion project. No other project could meet all the strategic and planning objectives which include:

- The project results in an optimal financial structure for the utility as deemed by the OEB. The capital spend for the conversion will require CPUC to borrow funds to the 60/40 debt/equity structure endorsed by the OEB.
- The project will improve the delivery of safe, reliable power. The project will replace the old 4.16 kV substation and wood pole lines with a state-of-the-art, smart grid ready 25 kV system. The new infrastructure will exceed the capital investments normally ascribed to System Renewal, avoiding the need for these investments over future planning periods.
- The project will enable the connection of renewable energy generation. One measure of the ability of a distribution system to connect renewable generation without mitigation is the available fault current on the system[8]. Replacing the 4.16 kV system with a 25 kV system will increase the available fault current within the CPUC system and therefore increase the amount of renewable generation that can be connected without mitigation. The exact quantum of the increase cannot be accurately calculated until the impedance of the new 115/25 kV substation transformers is known.
- As a conservative estimate, the project will reduce system losses by at least 10% from current levels.
- The project will enhance shareholder value. The voltage conversion will result in a greater shareholder value than any of the other investment options considered.

The proposed voltage conversion project included a new 25 kV substation and the replacement of all existing 4.16 kV transformers, switches, fuses, power lines and ancillary equipment with new 25 kV assets. This investment expects to reduce line losses by a minimum of 10%, and will standardize the distribution system at the 25 kV level. The distribution system upgrades and voltage conversion will deliver reliable and adequate distribution service at a reduced cost.

A 'Do Nothing' alternative has been considered whereby CPUC operates the assets along a predetermined budget that includes like-for-like replace of equipment at end of life and operating the local grid in much the same way it has in the past. Two other alternatives were also considered, which included refinancing the utility and operating as a not-for-profit entity. The four resulting options were prioritized using a scoring process described in Appendix I. The final scoring, as well as a visual representation of the prioritization of the four alternatives, is included in the bubble chart in Appendix I.

[8] Phil Barker

The table below provides a material investment summary based on the Voltage Conversion Capital Project System Service Category for the period from 2015 to 2020.

System Service	2016	2017	2018	2019	2020
New 25 kV Substation	$750,000	$750,000			
New 25 kV Supply to Hospital		$35,000			
4.16kV to 25kV Voltage Conversion			$200,000	$200,000	$200,000
Total System Service	$750,000	$785,000	$200,000	$200,000	$200,000

Figure 45.

General Information on the Project

The project scope includes replacement and renewal of the current assets on the 4.16 kV system. The existing 4.16 kV substation will be rebuilt at 25 kV, with provision for smart grid capabilities that can be added later. The older 4.16 wood pole lines will be replaced with new 25 kV wood pole lines over an 8-year period that exceeds the forecast period. Conversion of the entire CPUC distribution system to 25 kV will reduce distribution line loses and standardize the system design. This project has affected the System Renewal planning, as the assets on the 4.16 kV line will be replaced during the conversion.

CPUC will also investigate smart grid technologies to enhance the distribution system with automation during the voltage conversion in order to respond quickly to outages. CPUC is evaluating the potential use of automatic reclosers, smart transformers and other equipment in order to upgrade and add system adaptability and self-healing features CPUC is considering a new system design that will provide downstream-automated reclosing sequences and self-healing where CPUC would be able to control its operation remotely.

Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability - This voltage conversion project will result in reduced lines losses, increased reliability, reduced number of unscheduled outages, , lower overall customer bills, increased shareholder value (the customers are the shareholders) and enhanced renewable generation connection capability.

Safety - The voltage conversion project will result in safety improvements, as a large amount of the asset base will be renewed.

Economic Development - Project work for the conversion will be completed using CPUC employees and contractors, which may result in job creation in the local community.

Environmental Benefits - The voltage conversion project will enhance the ability of the CPUC system to connect renewable generation, which will have positive environmental benefits.

GENERAL PLANT

Investments in this category relate to IT enhancements to meet customer preferences. CPUC is not planning any capital investments in this category.

APPENDIX A

CPUC'S SERVICE TERRITORY

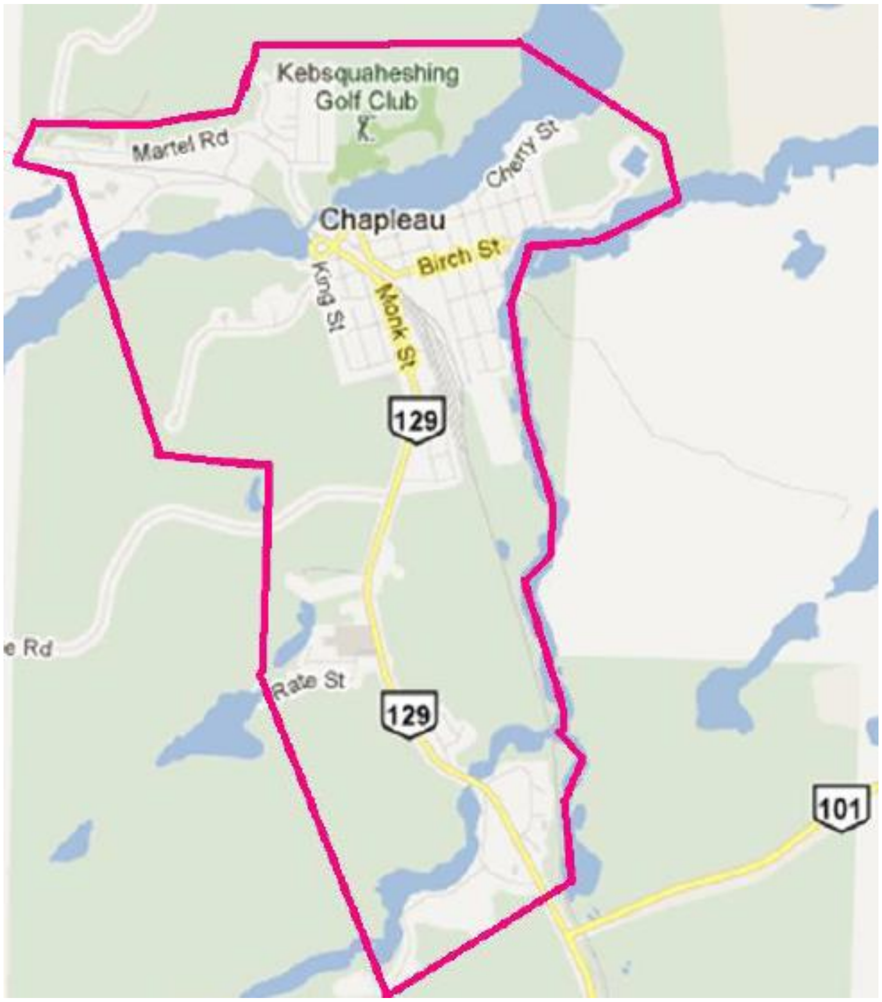


Figure 46.

APPENDIX B

DETAILED BREAKDOWN OF THE MONTHLY RATES & CHARGES

APPENDIX C

SCORECARD

APPENDIX D

LOAD FORECAST

APPENDIX E

REGIONAL PLANNING REPORT[9]

[9] http://www.glp.ca/content/regional_planning_new/history-40236.html

APPENDIX F

IESO LETTER

APPENDIX G

TRANSFORMER OIL INSPECTION RECORD

APPENDIX H

SUMMARY OF FIVE-YEAR PLAN FOR CAPITAL-RELATED EXPENDITURES (2015 – 2020)

APPENDIX I

PROJECT PRIORITIZATION MODEL

SELECTION CRITERIA

Selection Criteria

BURMAN ENERGY

	Strategic Fit			System Needs			Feasibility			Total
Selection Criteria	Alignment with Goals and Objectives	Customer Focus	Public Policy Responsiveness	Criticality	Asset Health (Age/Condition)	H&S , Environmental	Cost Benefit	Operational and Technology Risk	Resources - People	Weight
Weighting Scale	5%	15%	5%	5%	25%	5%	25%	10%	5%	100%

equal to 100%

Ranking Criteria:	**Definitions:**
Alignment with Goals and Objectives	Rate how aligned this project or action, is to corporate goals & objectives (mission and values)
Customer Focus	Rate how this project or action positions CPUC better in relation to customer preferences (customer survey)
Public Policy Responsiveness	Rate if this project or action aligns with REG, CDM, GEA requirements
Criticality	Rate if this project or action addresses assets critical to the business and critical to satisfaction
Asset Health (Age/Condition)	Rate the asset expected useful life for this project or action
H&S , Environmental	Rate if there are health, safety and environmental risks
Cost Benefit	Rate project or action cost benefits
Operational and Technology Risk	Rate if the project or action will address operational or technology risks and issues
Resources - People	Rate job creation in the local community

Performance Outcome	**Selection Criteria**
Customer Focus	Customer Focus
Financial Performance and Economic Efficiency Performance	Cost Benefit
Public Policy Responsiveness, Health & Safety and Environmental Performance	Public Policy Responsiveness , H&S , Environmental
Operational Effectiveness, Reliability, Consistency and Improvement	Asset Health, Criticality, Operational Risk

PROJECT RANKING

BURMAN ENERGY

Ranking Criteria

Definitions						
Ranking Criteria	1	2	3	4	5	Critical Projects List
Fast Track	Low Business Impact	Below Average Business Impact	Average Business Impact	Above Average Business Impact	High Business Impact	Extremely Critical
Alignment with Goals and Objectives	Poor project or action alignment with corporate goals & objectives (mission and values)	Below average project or action alignment with corporate goals & objectives (mission and values)	Average project or action, action alignment with corporate goals & objectives (mission and values)	Above average project or action alignment with corporate goals & objectives (mission and values)	Good project or action alignment with corporate goals & objectives (mission and values)	
Customer Focus	Poor project or action positioning in relation to customer preferences (customer survey)	Below average project or action positioning in relation to customer preferences (customer survey)	Average project or action positioning in relation to customer preferences (customer survey)	Above average project or action positioning in relation to customer preferences (customer survey)	Good project or action, positioning in relation to customer preferences (customer survey)	
Public Policy Responsiveness	Poor project or action alignment with GEA and RRFE (REG, CDM, GEA) requirements	Below average project or action alignment with GEA and RRFE (REG, CDM, GEA) requirements	Average project or action alignment with GEA and RRFE (REG, CDM, GEA) requirements	Above average project or action alignment with GEA and RRFE (REG, CDM, GEA) requirements	Good project or action alignment with GEA and RRFE (REG, CDM, GEA) requirements	The project or action is addressing regulatory requirement or legal compliance obligation
Criticality	The project or action is not critical to the business or to the customer	The project or action has below average business or customer impact	The project or action has average business or customer impact	The project or action has above average business impact	The project or action is critical to the business or to the customer	
Asset Health (Age/Condition)	Good asset condition or below minimum useful life range (below MIN UL)	Above average asset condition or below medium useful life range below TUL)	Average asset condition or medium useful life range (TUL)	Below average asset condition or above medium useful life range (above TUL)	Poor asset condition or beyond maximum useful life range (above MAX UL)	
H&S , Environmental	There are no health, safety or environmental risks	There are below average health, safety or environmental risks	There are average health, safety or environmental risks	There are above average health, safety or environmental risks	There are high health, safety or environmental risks	There are imminent health, safety or environmental risks
Cost Benefit	Low project or action cost benefits	Below average project or action cost benefits	Average project or action cost benefits	Above average project or action cost benefits	Very high project or action cost benefits	
Operational and Technology Risk	The project or action is not addressing operational or technology issues	The project or action is addressing below average operational or technology risks	The project or action is addressing average operational or technology risks	The project or action is addressing above average operational or technology risks	The project or action is addressing insurmountable operational or technology issues	
Resources - People	The project or action does not create jpbs in the local community	The project or actionis expected to result in below average job creation in the community	The project or actionis expected to result in average job creation in the community	The project or actionis expected to result in above average job creation in the community	The project or actionis expected to result in high job creation in the community	

PROJECT SCORING

BURMAN ENERGY

Project Scoring

Rank each Project on a scale of 1-5 for each criteria. There is a drop-down box for each cell.

ID	Project Description	Strategic Fit			System Needs			Feasibility		
		Alignment with Goals and Objectives	Customer Focus	Public Policy Responsiveness	Criticality	Asset Health (Age/Condition)	H&S, Environmental	Cost Benefit	Operational and Technology Risk	Resources - People
	Weighting	5%	15%	5%	5%	25%	5%	25%	10%	5%
#1	Intrinsic Model	3	2	2	2	2	3	3	2	2
#2	Recapitalization Model	5	4	5	5	5	4	3	3	5
#3	DSP Investment Optimization Model	5	5	5	5	5	4	5	5	5
#4	DSP " Not for profit" Model	4	3	5	5	5	4	4	4	5

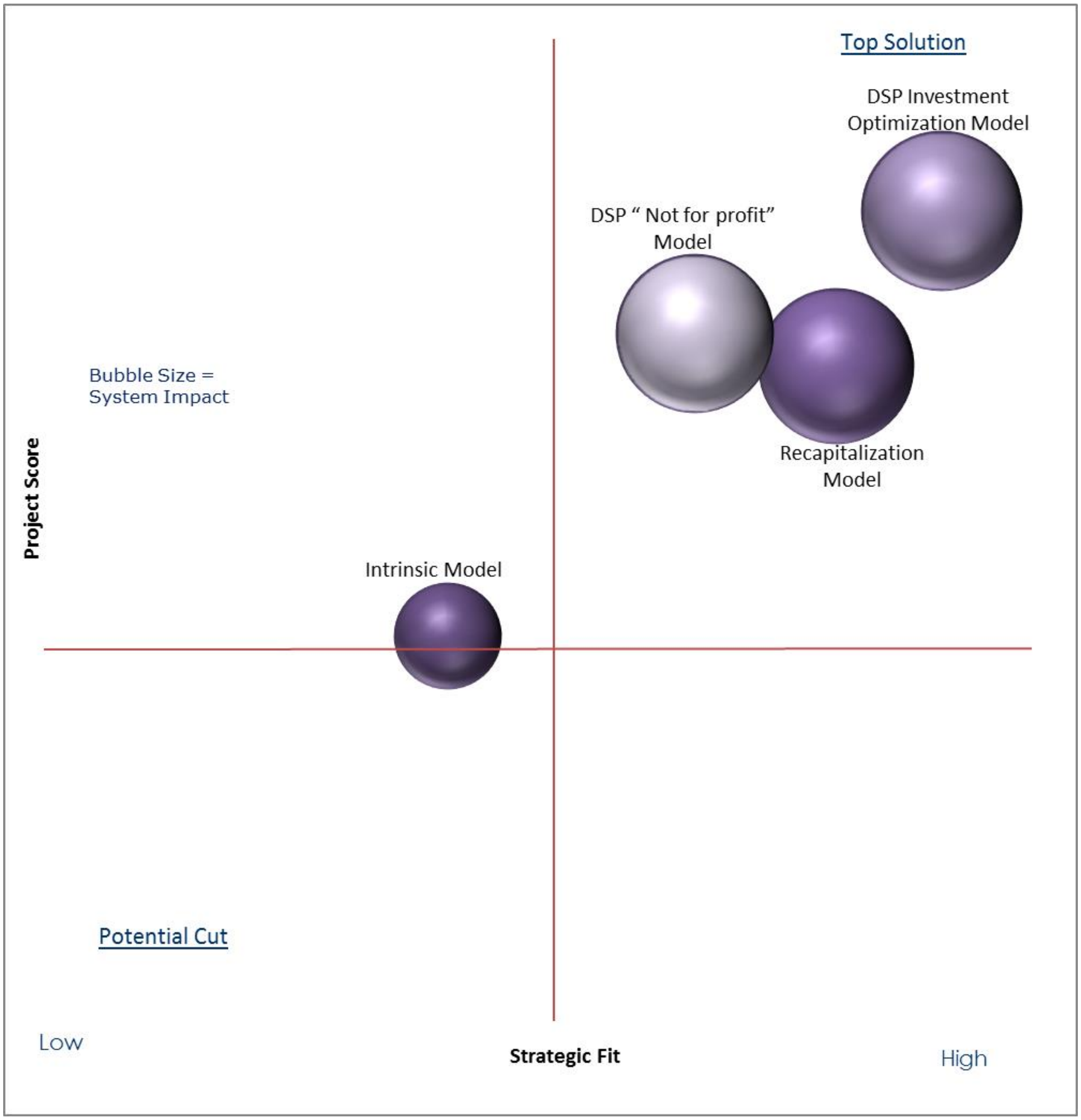
ID	Project Description	Strategic Fit			System Needs			Feasibility		
		Alignment with Goals and Objectives	Customer Focus	Public Policy Responsiveness	Criticality	Asset Health (Age/Condition)	H&S , Environmental	Cost Benefit	Operational and Technology Risk	Resources - People
	Weighting	5%	15%	5%	5%	25%	5%	25%	10%	5%
#1	Intrinsic Model	3	2	2	2	2	3	3	2	2
	Ranking details	•Does not align with long tem strategic goals •Doesn't address regulations	•Customer Survey results "No system investments. Keep our distribution costs as they are – 0%	• Low efficiency •Reactive operations •Does not have the future in mind •Doesn't address regulations	• The project has below average business impact as it does not address line losses , system standardization and customer preferences • Eventual non-compliance due to aging infrastructure	•Maintain status quo •Aging infrastructure •High line losses •"Bow wave" of longer term issues	•Aging infrastructure could cause various safety issues related to split and wakened pole tops •Loose insulators and floating conductors can lead to outages and increased safety risks for the public and	•Minimize current costs in a short term •The utility has to deal with problems on an unplanned basis, there are valuable man-hours invested in repairs and, in many cases, revenue is lost.	•High Risks in a long term •Aging asset base •Reactive (uncertain) operations •"Bow wave" of longer term issues	• Potential problems related to replacing assets on an unplanned basis, there are valuable man-hours invested in repairs and, in many cases, revenue is lost.
#2	Recapitalization Model	5	4	5	5	5	4	3	3	5
	Ranking details	•The project aligns with long term vision and goals	•Customer Survey results: Borrow the necessary funds to maintain our system – 11%	•25 kV voltage conversion to reduce line losses •Standardization on a single electricity supply voltage in the service territory •Smart Grid enhancements •Address Green Energy Plan requirements	•Aging assets with high line losses in the system that are business critical to address	•Asset renewal •System standardization •Line losses reduction	•Renewed asset infrastructure •Less safety hazards	Benchmarks utility business •Offsets rate pressure providing a cushion against future rate increases and aligns the utility to the OEB's preferred capitalization structure •Reduction in financing costs •Leverages LDC's risk profile •Source of cash as debt cheaper than equity	•Offsets rate pressure •Reduction in financing costs •Punitive if not aligned with OEB capitalization structure	•Large capital project will result in job creation in the local community
#3	DSP Investment Optimization Model	5	5	5	5	5	4	5	5	5
	Ranking details	•The project aligns with long term vision and goals	•Customer Survey results: Finance the investment in a new modern system that we control through a slight increase in our distribution rates – 87%	•25 kV voltage conversion to reduce line losses •Standardization on a single electricity supply voltage in the service territory •Smart Grid enhancements •Address Green Energy	•Aging assets with high line losses in the system that are business critical to address	•Asset renewal •System standardization •Line loss reduction	•Renewed asset infrastructure •Less safety hazards	•Long term value creation •Stable Operations •Optimize investment •Will reduce the losses and improve the reliability of the system	•The project or action is addressing insurmountable operational or technology issues related to line losses and aging infrastructure with minimised financial risk to the utility	•Large capital project will result in job creation in the local community
#4	DSP " Not for profit" Model	4	3	5	5	5	4	4	4	5
	Ranking details	•The project aligns with long term vision and goals , however there is no contribution to operational reserve	•Customer Survey results: Finance the investment in a new modern system that we control by holding the distribution rates at their current level and by not returning any money to the town – 2%	•25 kV voltage conversion to reduce line losses •Standardization on a single electricity supply voltage in the service territory •Smart Grid enhancements •Address Green Energy Plan requirements	•Aging assets with high line losses in the system that are business critical to address	•Asset renewal •System standardization •Line losses reduction	•Renewed asset infrastructure •Less safety hazards	•Investment optimization base •Minimizes rates •All the would-be profits are returned to the rate payer by lowering rates resulting in reduced revenues for the PUC	•Increased financial risk •Contingency susceptible •No contribution to operating reserve •"Bare bones" cash management •Minimal Long Term protection from insolvency	•Large capital project will result in job creation in the local community

PROJECT PRIORITIZATION

Rankings

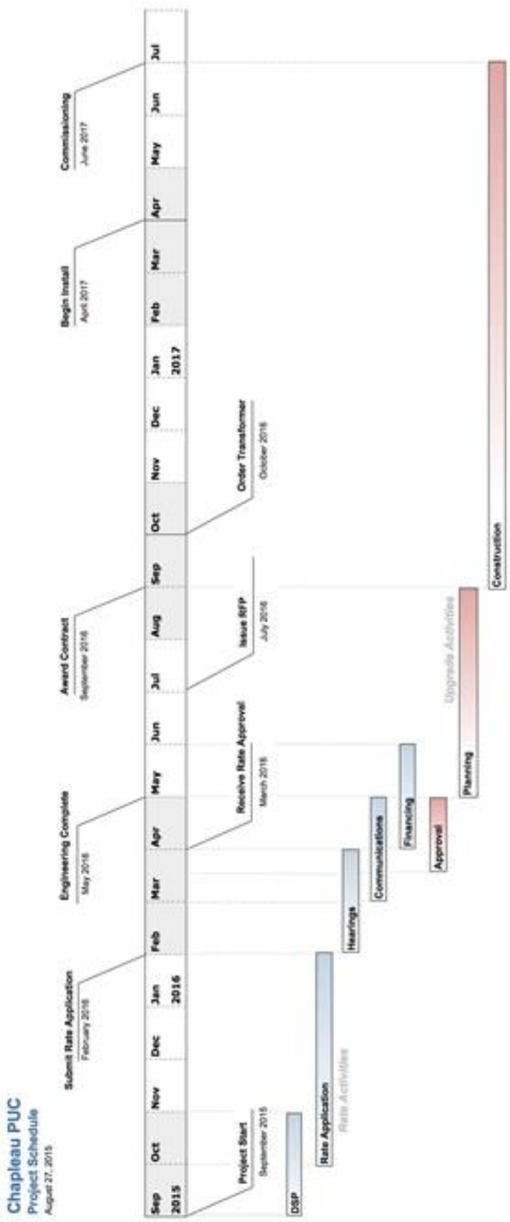
Sort by selecting all Projects & Initiatives, Project Score, Strategic Fit, Economic Impact and Feasibility cells. Click "Data" and "Sort", and sort by Project Score (Largest to Smallest).

ID	Project Description	Project Score	Strategic Fit	System Needs	Feasibility
#3	DSP Investment Optimization Mo	4.95	1.3	1.7	2.0
#4	DSP " Not for profit" Model	4.20	0.9	1.7	1.7
#2	Recapitalization Model	4.00	1.1	1.6	1.3
#1	Intrinsic Model	2.35	0.6	0.8	1.1


Top Solution
DSP Investment Optimization Model
DSP " Not for profit" Model
Recapitalization Model
Bubble Size = System Impact
Project Score
Intrinsic Model
Potential Cut
Low
Strategic Fit
High

APPENDIX J

VOLTAGE CONVERSION CAPITAL PROJECT SCHEDULE



APPENDIX K

CPUC DISTRIBUTION SYSTEM DESIGN

APPENDIX L

DISTRIBUTION SYSTEM PLANNING CUSTOMER SURVEY

APPENDIX M

CDM STATUS REPORT

APPENDIX N

SYSTEM ANALYSIS

APPENDIX O

KPMG REPORT