

REVIEW OF BC HYDRO

JUNE 2011







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Premier
Province of British Columbia
Parliament Buildings, Victoria BC, V8V 1X4

Honourable Rich Coleman
Minister of Energy and Mines
Province of British Columbia
Parliament Buildings, Victoria BC, V8V 1X4

Dear Madam/Sir:

We are honoured to present the 2011 review of BC Hydro.

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Deputy Minister, Ministry of Finance

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A/Deputy Minister, Ministry of Advanced Education

Victoria, BC
June 2011
Enclosure

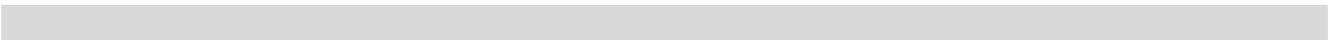


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Abbreviations

ABSBC	Accenture Business Services of BC
BC Hydro	British Columbia Hydro and Power Authority
BCTC	British Columbia Transmission Corporation
BCUC	British Columbia Utilities Commission
COPE	Canadian Office and Professional Employees
DSM	Demand Side Management
GWh	Gigawatt hour
IBEW	International Brotherhood of Electrical Workers
IFRS	International Financial Reporting Standards
IPP	Independent Power Producers
KWh	Kilowatt hour
LTAP	Long Term Acquisition Plan
MWh	Megawatt hour
ROE	Return on Equity
SMI	Smart Metering and Infrastructure
SUCH	Schools, Universities, Colleges and Hospitals
T&D	Transmission and Distribution
UCA	Utilities Commission Act
the province	The Province of British Columbia

Executive Summary

British Columbia Hydro and Power Authority (BC Hydro) is a regulated provincial Crown Corporation reporting to the Minister of Energy and Mines. It is the third largest electric utility in Canada, serving 95% of the population of the Province of British Columbia (the province), which represents approximately 1.8 million residential customers. In addition, BC Hydro supplies electricity to the province's commercial and industrial sector.

BC Hydro is a significant asset to the province, having provided relatively low cost power to the citizens of British Columbia for over 50 years. This has helped make BC an attractive place to live and a competitive place to do business. Residents and businesses of BC are truly fortunate to have BC Hydro providing them with such a critical service.

On March 1, 2011, BC Hydro filed its most recent application with the British Columbia Utilities Commission, seeking approval for rate increases of 9.73% for each of the next three years (a cumulative increase of 32%). Significant concerns were expressed regarding the impact the rate increase would have on BC families and other power consumers. As such, the Premier and the Minister of Energy and Mines on behalf of the Province of British Columbia, as the sole shareholder of BC Hydro, requested a review of BC Hydro in order to provide recommendations and options for minimizing the rate increase. This was to be accomplished by examining both the operating and capital requirements for the corporation.

This government review does not replace the normal, more detailed revenue requirements examination conducted by the British Columbia Utilities Commission to establish rates, which will resume after the conclusion of this review. On April 21, 2011, the British Columbia Utilities Commission approved an interim rate increase of 8% effective May 1, 2011 pending the results of this government panel review of BC Hydro.

A comprehensive financial and administrative review has been completed, which includes examining the governance structure of the corporation, the business planning process and a series of areas critical to BC Hydro's financial performance, including forecasting, procurement of goods and services, general operating costs, capital assets and the rate structures themselves. The review also examined a number of key initiatives underway within the Crown Corporation and the impact of government policy on the effective operation of BC Hydro.

Throughout the review it was apparent that BC Hydro has had a very strong customer service focus, with core objectives of safety and reliability. While the panel believes that BC Hydro has done a relatively

good job of providing reliable and safe electrical services to the residents of BC at low rates, BC Hydro's operating costs have been increasing over recent years. The panel would like to acknowledge the initiatives and efforts of BC Hydro on worker safety and feels these steps are appropriate. The panel's recommendations included in this report are not intended to detract from BC Hydro's safety initiatives.

During the review, the panel noted BC Hydro still has inefficient processes and practices and considered some expenditures generous at the expense of ratepayers. The extent to which BC Hydro's current initiatives address the short term cost pressures is not enough to impact the immediate rate increase; BC Hydro requires a more aggressive approach to achieve cost savings including a review of all significant costs within the organization. Cost savings are required to reduce the planned rates and proposed costs savings must be realized soon.

The panel has determined that BC Hydro can reduce costs by achieving efficiencies in a number of areas, including paying greater attention to operational processes, capital asset planning and management, utilizing stronger procurement approaches and project management. As well, the panel discussed with BC Hydro the setting of specific targets to reduce administrative costs.

The operational cost savings are the most immediate way to reduce short term rates for ratepayers and their families. Longer term rate reductions will be achieved through operating cost efficiencies, long term capital planning and policy decisions. Postponing capital projects and deferring costs in regulatory accounts may maintain or reduce short term rates but could put upward pressure on future rates.

It is the panel's opinion that, due to the regulatory environment and the corresponding corporate culture in BC Hydro, "being the best" and the resulting desire to have the gold standard is not necessarily for lowest cost or greatest value for money. The corporation is focussed on justifying incremental rate increases and associated costs rather than employing a zero-based operating budget development methodology to understand its underlying cost structure. Understanding the base costs will provide BC Hydro greater opportunity to challenge the current costs and improve overall cost effectiveness.

Also, the corporation has traditionally operated by silo, reducing efficiency and hampering the synergies from a more collaborative working environment.

As a result of the regulatory environment and corporate culture BC Hydro has become very risk adverse, increasing both operating and capital costs and limiting the potential effectiveness of the organization. We observed many examples of excessive planning, over engineering of

projects and the use of multiple layers of contingencies and reserves in order to satisfy various stakeholders and regulatory agencies.

BC Hydro's strong focus on service, safety and being the best are very good objectives, however, they need to be pursued in the context of balancing need and costs. The panel found that there is a general need to improve the communication between the province and BC Hydro, specifically, in regard to the examination of policy options to improve information available for decisions. BC Hydro also needs to more effectively manage its relationship and utilization of the vendor community with a view to optimizing efficiencies and cost effectiveness in service delivery.

With new executive leadership in place at BC Hydro, the panel acknowledges change has occurred and is confident that further positive steps will be made to transform the organization.

Rate Reduction

Government has viewed BC Hydro's application for a 9.73% rate increase as an insufficient attempt to decrease costs to an acceptable level for the ratepayers.

As the review progressed, the panel recognized the need to examine and differentiate between short term and long term rate increases. Strategies to reduce short term rates (1-3 years) will be primarily derived through operating cost efficiencies, while longer term rate declines will be achieved through continued operational efficiency, in addition to an examination of long term capital planning and policy decisions.

The panel recognizes that balance needs to be maintained when reviewing short term and long term rates.

To reduce the rates by 1% in the short term, BC Hydro must find operating cost savings of \$35M in the first year (Fiscal 2012), \$72M in year 2 (Fiscal 2013) and \$115M in year 3 (Fiscal 2014).

Eliminating capital projects will have the least impact in the short term, but will have significant potential for savings in the longer term. For example, eliminating capital projects totalling approximately \$450M would achieve a similar rate impact of 1% from amortization (assuming 40 yr. period), finance charges and dividend paid to government. Deferring capital projects will have some success in reducing current rates, but unless the need for a capital project is actually eliminated, this will only put pressure on long term rates and future ratepayers. Any decision to defer or eliminate capital projects must be done in a manner that does not unduly compromise reliability.

The panel and BC Hydro executive have worked together to find areas where costs can be reduced in the short term and believe, based on this collaborative effort, BC Hydro can, with careful management, reduce the

original rate increase for Fiscal 2012 – 2014 from the unacceptable 9.73% each year to increases which are approximately half that level. The Chair and Chief Executive Officer have agreed to these lower rate options below, however, this will take considerable work.

Rate Reduction Options

	F2012	F2013	F2014	3 Year Cumulative
(Existing) Rate increase as filed in Revenue Requirements Application (smoothed over 3 years)	9.73%	9.73%	9.73%	32.1%
Option 1 - Rate increase after panel and BC Hydro identified initiatives (smoothed over 3 years)	5.9%	5.9%	5.9%	18.9%
Option 2 - Rate increase after initiatives (assuming 8% in F2012 as per interim rate increase and smoothed over F2013 and 2014)	8.0%	3.9%	3.9%	16.6%

In addition to the management and cost containment strategies (both capital and operational) needed by BC Hydro, the panel also recommends that government review a number of current energy administrative policies that directly affect BC Hydro's cost effectiveness to support achievement of these reduced rates. British Columbia's current policies governing electricity, which focus on clean energy and self-sufficiency, were developed in an environment different from today's economic context. Greater flexibility may be required, and the panel has identified a number of policy options for government to consider that could affect longer term rates.

Achieving this reduction will require significant attention to risk management and enhanced reporting, by BC Hydro, as well as monitoring by government.

The panel has recommended that BC Hydro executive provide their Board of Directors with a detailed business plan that details the savings to be realized over these three years, as well as continued savings in the next Revenue Requirements Application. The Board Chair and Chief Executive Officer should make interim progress reports to the Minister of Energy and Mines and Treasury Board, given the impact on government's overall debt and fiscal plan if targets are not met.

Governance Structure

With respect to governance structure, the provincial government, through the Minister of Energy and Mines, provides clear direction to BC Hydro. The corporation's mandate is well-defined in provincial legislation and confirmed in the Shareholder's Letter of Expectations and BC Hydro's service plan. BC Hydro's Board of Directors performs satisfactory

oversight of BC Hydro's organizational performance and corporate governance information is transparent and publicly available.

Business
Planning and
Forecasting

BC Hydro's short and long-term business planning process is appropriate and supports the vision and mission of the corporation. However, risk planning does not always produce effective outcomes, for example, a BC Hydro commissioned vendor survey identified that BC Hydro is paying excessive risk premiums to contractors. Risk management needs to be improved to ensure risks are appropriately allocated and successfully transferred to vendors at the lowest costs.

The board has an appropriate level of involvement in the development of planning documentation and is provided with tools to monitor the plan's progress throughout the year, allowing BC Hydro to be responsive and change direction, should there be a requirement.

BC Hydro's energy forecasting process is well planned and provides accurate, reliable forecasts. Each forecast receives multiple levels of review to ensure accuracy and completeness as well as being monitored on a month-to-month and quarterly basis. Results are reviewed and discussed by the executive team and if required, forecasts are adjusted to reflect current information and to ensure that financial objectives are attained.

Operating Costs

BC Hydro's operating costs have been increasing over the past years largely due to the volume of work required for maintaining aging infrastructure and changes in legal, regulatory and environmental legislation/practices resulting in significant and uncontrolled increases in the number of employees and spending.

BC Hydro must find operating cost savings of \$35M, \$72M and \$115M in the fiscal years from 2012 to 2014 in order to reduce the electricity rates charged to customers by 1% for each year of the three year Revenue Requirements Application. However, the challenge to reduce costs can be complicated by a culture in BC Hydro where the company strives for "gold standard" (to be the best). BC Hydro needs to make immediate changes. Specific areas to address include staffing levels, labour costs and travel and contracting policies. Cost saving initiatives already underway need to be expedited.

Operating costs make up approximately 22% or \$0.8B of BC Hydro's estimated Fiscal 2012 revenue requirement of \$3.6B. Net operating costs (plus non-current post employment benefits) have increased approximately 27% between 2008 and 2010.

In particular, between 2006 and 2010, prior to British Columbia Transmission Corporation reintegration, BC Hydro experienced a 41% employee growth, rising from 3,976 to 5,615 employees resulting in a

significant impact to costs during these years. For example, BC Hydro currently employs approximately 650 engineers, which is about six times more than the Ministry of Transportation and Infrastructure, with a similar-sized capital program.

In addition to the direct labour associated with operations and capital projects, BC Hydro executive also acknowledged that back office and support functions experienced similar, uncontrolled expansion. The panel concurs that the level of employee growth was excessive and significant changes are needed. In comparison to other larger or similar size organizations the panel observed functions such as communications, finance, human resources and information management had extremely high staffing complements. For example, BC Hydro has 142 staff dedicated to external and internal communications for its 6,000 employees. This appears high compared to government's 187 communications staff for its 28,000 employees.

Recognizing this, the current executive team initiated a vacancy management and monitoring process, to limit or reduce staffing growth and recruitment activity, while maintaining a strong commitment to employee safety.

As a result of the review, the panel identified and discussed with BC Hydro additional staffing efficiencies. The panel believes that a more reasonable staffing level would be in the order of 4,800 employees. While this would be a challenging target, the panel believes that with strong oversight from the board and the executive management team, the goal is achievable through more effective utilization of internal and external resources, increased efficiencies in processes, as well as a direct reduction of work and utilization of technology.

The panel also found labour costs contribute significantly to operating cost pressures and that they need to be managed more effectively. Labour cost at \$500M makes up approximately 14% of the Fiscal 2012 revenue requirement. Management (non-union staff) wages are in line with a Crown Corporation comparison but appear to be higher compared to similar positions in government and an entity in the Schools, Universities, Colleges and Hospitals sector. The panel recommends that BC Hydro revisit the following costs related to labour in an effort to reduce the impact to ratepayers:

- Overtime costs (approximately \$52M in 2010) make up approximately 11% of base salary costs;
- Annual performance pay which on average is received by 99% of all BC Hydro staff (approximately \$42.3M in 2010);

- Banked flex time pay out to entitled staff who elect to be paid out in cash (approximately \$7.5M in 2010); and
- Other forms of compensation that Management and Professional staff may be entitled to including: honorariums, First Aid allowance and remote location incentive programs (approximately \$3.7M in 2010).

The panel also identified opportunities for BC Hydro to work with its two unions (the International Brotherhood of Electrical Workers and the Canadian Office and Professional Employees' Union), on matters such as shift scheduling to better manage overtime costs, to better facilitate changes required to allow BC Hydro to manage their resources and advance their strategic plans in a cost effective manner.

The panel further identified a need to tighten policy in areas such as travel and business expenses as well as consultant and contractor spending to ensure appropriate use of ratepayers' funds.

To mitigate further cost escalation, BC Hydro, under new executive management, is starting to implement some initiatives to streamline processes, eliminate low value work and leverage technology but these initiatives have not yet demonstrated significant reductions to operating costs that impact or reduce immediate rate increases to an acceptable level.

In order for BC Hydro's cost reduction initiatives to be successful, the panel found that BC Hydro requires an immediate and more aggressive approach to achieve savings. As well, the panel would like to see BC Hydro introduce specific operating cost reduction targets.

Procurement

Current procurement practices are labour intensive and inconsistent. BC Hydro must improve their vendor relationships through aggressive contracting practices and effective risk management.

BC Hydro needs to transition away from labour and administratively intensive paper-based, manual processes, to automated practices that are centralized and streamlined. The organization must develop an effective change management plan to expedite the full implementation of its technology projects. Simply adopting a process of redesign is not adequate to ensure benefits are effectively realized.

BC Hydro needs to further streamline and consolidate contract spending by reducing the number of small local direct awards, improve supplier relationships through increased transparency, develop a formalized vendor complaint process and embrace additional advanced technology solutions to streamline business processes.

Twenty eight percent of the \$2.2B in contract dollars signed in Fiscal 2011 was directly awarded to vendors rather than through the use of open solicitation processes. Given this figure, there are significant operational savings in pursuing strategic sourcing alternatives which would increase competition, reduce administrative costs, improve contractor oversight and simplify the planning process through consolidated long-term contracts with key vendors. Where appropriate, BC Hydro should include Shared Services BC in procurement strategies and solicitation processes for possible opportunities to onboard or leverage existing government wide contracts.

BC Hydro also needs to improve their risk management to ensure risks are successfully transferred to vendors at the lowest costs. The key to successfully managing risks with vendors is to ensure there is a clear understanding and agreement on risk transfer.

BC Hydro has recognized the need to improve vendor relationships. A Supplier Engagement Survey was commissioned in 2010. This survey identified a number of issues related to BC Hydro's approach to risk management in contracts, for example, it indicated BC Hydro was lagging behind their industry counterparts. Twenty-five percent of survey respondents said they include a premium in their bid to BC Hydro of between 10-30%, averaging 16%, due to the additional administration and risks they are forced to undertake. Suppliers also said that they needed to increase their bid prices to ensure that they cover all their risks (examples were given by suppliers bidding \$50M on a \$40M project). Alternatively, other suppliers indicated they were not bidding on BC Hydro's projects.

Capital Assets

BC Hydro has some well established practices for capital planning, utilization and spending strategies. However, it needs to manage its investment in capital assets more carefully to achieve better value for ratepayers.

BC Hydro needs to develop a better understanding of different procurement approaches and improve its procurement management over capital projects. This will enable BC Hydro to shift toward the use of more non-traditional procurement approaches such as Design-Build and Public-Private Partnerships. This will also foster innovation and result in greater cost effectiveness and value for money.

There is a tendency for BC Hydro to exert significant control over their projects which limits vendors' flexibility to deliver the project in a way that may be advantageous to both parties. BC Hydro acknowledges that they over manage their capital projects to ensure quality workmanship of contractors. BC Hydro's approach to procurement and risk allocation has resulted in multiple change orders for their projects of up to 114% of the original individual contract value and 13% of the total project value.

BC Hydro needs to better manage their projects to keep change orders within an acceptable benchmark of 3% of individual contract or total project budget excluding the costs of land acquisition. The panel believes that a better understanding of the procurement process would allow BC Hydro to more effectively transfer risk to the vendors while achieving project deliverables on time and on budget.

In order to control its costs and effectively budget for capital expenditures, BC Hydro employs a rigorous exercise to estimate capital project costs and estimates are refined as the project moves into more advanced stages, however, 73% of projects came in under budget. These results are an indicator that the estimates are generous and reflective of the risk adverse nature. Contingencies included in project estimates, ranging from 10 to 20% of direct construction costs, are high. The effect of these excessive contingencies is to inflate the amortization presented in the rate planning process. It also crowds out capital budget space that could have been utilized for other capital priorities.

Contingencies are also refined as projects progress and amounts that may be high at the beginning of a project may be reduced during the project life. Project reserves also accounted for an additional 13% of the expected budget for larger projects. Good practice suggests that contingencies should be in the 5 to 10% range.

The panel is recommending that BC Hydro reduce its contingencies and project reserves, set preliminary price expectations, better control soft project costs and use a more strategic approach to assigning internal staff resources to capital projects. The panel further recommends that BC Hydro postpone all office renovation work until new needs assessments are complete.

Rate Structures

BC Hydro rates are competitive with comparable jurisdictions, however, there may be a perception that general commercial customers are subsidizing residential customers. In particular, analysis of the cost-recovery ratios show that revenue generated from residential customers may not adequately cover the allocated costs of providing energy to these consumers.

The panel observed that the current cost-recovery approach used by BC Hydro and the resulting ratios indicate revenue generated from residential customers may not adequately cover the allocated costs of providing energy to these consumers. The panel explored a number of alternative approaches which could effect a different result.

The overall rate framework should take into consideration: how to allocate costs, the rate structure between classes, what the classes will be, and reflect the stated rate objectives. Further, a number of the objectives in the design of the rate structures (e.g., conservation,

Policy
Implications

competitiveness, simplicity, etc), identified in legislation and policy, are not clearly prioritized or synchronized, and a rate structure designed to achieve one objective often competes with the achievement of another objective. We have recommended the province clarify the objectives in the design of rate structures, and where the multiple objectives are potentially at odds with one another, clarify the priorities and require the British Columbia Utilities Commission to confirm that rate structure design will meet these objectives as part of their periodic review.

British Columbia's current policies governing electricity are set out in the 2007 BC Energy Plan: A Vision for Clean Energy Leadership, and the 2010 *Clean Energy Act*. The policies focusing on clean energy also support the 2008 Climate Action Plan, and related Greenhouse Gas emission reduction targets, which are set out in climate legislation and reproduced in the *Clean Energy Act*.

These policies were developed in an environment where economic growth was strong, natural gas prices were high, and BC and other jurisdictions were cooperating to put a price on carbon through a carbon tax and/or cap and trade. Also, in the early 2000's, BC was impacted by the California energy crisis with spot energy prices in excess of \$900 per MWh, low reservoir inflows, and a resulting need to buy extra power, at high prices, to meet domestic demand. In this environment, it was seen as desirable that BC develop its clean and renewable energy potential for both domestic and export markets.

However, the context that led to the current definition of energy self-sufficiency has since changed. In particular, slow recovery from the economic downturn has resulted in reduced demand for energy. Also, opportunities for purchasing inexpensive electricity on the open market have grown with the discovery of new unconventional natural gas supplies which have reduced the current and expected price of both natural gas and electricity. An overbuild of subsidized wind energy in the United States puts further downward pressure on electricity market prices.

The BC Hydro system has significant flexibility to import power at times of the day or year when market prices are low, as a result, BC requires additional flexibility in its energy policy.

The panel recognizes that the economic and energy situations have changed, and that the existing self sufficiency definition may be overly conservative and place an undue burden on ratepayers. The panel recommends that BC Hydro and the province evaluate alternative definitions and timelines for self-sufficiency that meet the needs of the province and ratepayers in a way that is sustainable for the long term.

The panel has also reviewed the *Clean Energy Act* requirement for 93% of electricity generated within British Columbia to be clean or renewable and concluded it is consistent with government's current climate change policy and objectives with respect to government's carbon reduction targets.

As well, the panel has reviewed the operation of Burrard Thermal generation station and found that it is not as efficient as other newer gas generating facilities, and has been the subject of some public controversy. Burrard Thermal is currently being used in a manner consistent with government policy for voltage stabilization and backup generation in urgent situations.

Water Rentals

The province charges a rental fee for using its water for hydroelectric production. The province received \$305M in water rental payments from BC Hydro during Fiscal 2011 and \$315M in Fiscal 2010. Unlike other provinces, where utilities pay a flat rate per Megawatt hour produced, BC based power producers pay water rental rates based on three criteria: capacity of construction in progress, capacity of generation assets and total energy produced. The water rental rates associated with energy produced is on a stepped basis, with increasing costs for larger power producers.

Compared with other utilities across Canada, BC Hydro appears to pay more for its water use. The panel has recommended that BC Hydro and the province work collaboratively, as the economy improves, to determine water rental rates which balance the needs of the province and the utility.

Capital Structure

The province, through Orders in Council, establishes the basis for determining BC Hydro's capital structure and annual dividend payment. BC Hydro is currently required to make an annual dividend payment to the province equal to 85% of BC Hydro's net income, assuming that the debt to equity ratio after deducting the payment will not exceed 80:20. If full payment results in a debt to equity ratio exceeding 80:20 (higher debt), then the dividend will be based on the greatest amount that can be paid without exceeding this ratio.

In each of the last 3 years BC Hydro has paid a reduced dividend in order to maintain their required debt to equity ratio. Historical dividend payments to the province, water rental payments and large capital expenditure requirements have contributed to a large increase in debt for BC Hydro and continued pressure on their maximum allowable leverage.

As with other BC based utilities, the British Columbia Utilities Commission defines the Return on Equity that BC Hydro is allowed to earn on its equity. BC Hydro is currently in a position where their actual equity (20%) is lower than their deemed equity (30%), and this

misalignment has resulted in BC Hydro earning a larger return on their assets than they actually have in place. BC Hydro also recovers financing costs, through rates, on their actual debt of 80%. This results in ratepayers being charged twice for the 10% portion of capital where deemed equity exceeds actual equity.

The panel has recommended that BC Hydro and the province work collaboratively, as the economy improves, to determine a dividend payout policy and capital structure that balances the needs of the province and the utility.

Acquiring Energy

Energy requirements for BC are predicted to grow significantly over the next 10 years by over 16,500 Gigawatt hours of electricity (before demand side measures). Given this need, BC Hydro must acquire additional power through internal generation, partnership with Independent Power Producers and acquiring energy through the open spot market. BC Hydro needs to be flexible in their acquisition strategies to ensure value for money is achieved for ratepayers over the long-term.

BC Hydro is planning to increase its capacity with the construction of the Site C dam. Site C is a proposed third dam and hydroelectric generating station on the Peace River in north-eastern BC and is part of BC Hydro's overall program to invest in and renew the province's electrical system. Site C will provide up to 1,100 megawatts of capacity, and produce about 5,100 Gigawatt hours of electricity annually – enough electricity to power more than 450,000 homes per year in BC.

The cost of Site C is estimated to be \$7.9B based on recent project cost estimates. There is justification for the Site C dam and hydroelectric generating station based on the projected demand and it appears to be a clean, affordable option.

To supplement the power from BC Hydro's current asset base, the corporation acquires clean or renewable electricity from Independent Power Producers, privately owned entities which generate electricity throughout the province. The government has encouraged the promotion and growth of the Independent Power Producers community. In fiscal 2010, Independent Power Producers produced 16% of domestic electricity requirements.

The *Clean Energy Act* further supports BC Hydro in implementing various programs to support the capacity and infrastructure growth of Independent Power Producers. The need to be self-sufficient by 2016 has also placed pressure on BC Hydro to increase their electricity supply through additional long-term agreements with Independent Power Producers to produce increasing levels of energy.

It should be noted, however, that in the current wholesale market place, clean energy is more expensive than other conventional forms of energy such as thermal electricity generated from coal, purchased under long term contracts. Clean energy is also generally more expensive than spot/short term market purchases.

The figure below identifies the range of energy costs.

Energy Allocation	Cost per Megawatt Hour
Latest power call for Independent Power Producer energy (long-term contract)	\$124
Wholesale market price (Mid C spot market price) (figures from the calendar year of 2010)	\$4.34 - \$52.43
Site C (expected for BC Hydro owned asset)	\$87 - \$95 (NPV)

The wholesale market is subject to highly volatile prices which increases risk to the ratepayer due to market price fluctuations. Independent Power Producers' contracts are fixed price contracts which provide certainty and can reduce this risk of market price fluctuations.

However, these fixed price contracts, while providing certainty also present a potentially significant financial risk, Ontario is currently experiencing an oversupply of power due to the long term, fixed price contracts with Independent Power Producers forcing the region to sell excess energy at a loss. Ontario's situation highlights the need for flexibility to acquire and/or produce power at a reasonable cost while serving public interests and meeting the future load growth.

Regulatory/
Deferral
Accounts

BC Hydro operates in a rate regulated environment where accounting policies allow the use of regulatory accounts to defer amounts for future recoveries or refunds, subject to the approval of the British Columbia Utilities Commission. In the absence of rate-regulation, these amounts would be included as revenues or expenditures when incurred.

BC Hydro is ordered in some cases by the British Columbia Utilities Commission or given special direction from the province, to defer certain amounts, in order to minimize rate fluctuations and provide a stable return to the shareholder.

Some regulatory account additions, such as the deferral of energy variances, will fluctuate between positive and negative amounts over the years, and can be offsetting over time, but deferred to allow smoothing of rates. Other regulatory accounts, established for the purpose of matching current costs to future benefits, such as expenditures related to Smart Metering and Infrastructure, will be recovered through the rates at a future time when the benefits to the ratepayers from the investment are being realized.

There has been significant growth recently in BC Hydro's net regulatory asset balance (from \$449M in 2007 to \$2.1B in 2011), and this growth will likely continue for several years (to \$4.9B by 2017), adding pressure and reduced flexibility to BC Hydro's efforts to keep rates competitive while addressing new cost pressures. The future annual impact is not clear, as amortization policies are not always known, but the impact will likely be significant, and there is concern for future ratepayers who are expected to cover these deferred costs. The panel recommends further review of the regulatory accounts to determine a more sustainable approach.

Energy
Conservation

Given that energy conservation program benefits are exceeding targets, the panel has recommended that BC Hydro re-evaluate the activity of the various conservation programs to reduce the overall cost to ratepayers, while achieving value for money.

Energy conservation encompasses the planning, implementation and evaluation of government and utility-sponsored initiatives to influence the amount or timing of customers' energy use. In BC, initiatives include actions (rates and regulations/standards) to conserve energy and promote energy efficiency. To date, the program has been exceeding expectations.

Smart Metering and Infrastructure is one of BC Hydro's future programs to support energy conservation. In the past ten years there have been substantial technology advancements in electric metering, and a BC Hydro review determined that Smart Meters can save energy, allow customers additional choice, reduce the need for expensive utility capacity additions and improve energy use efficiency.

BC Hydro indicated their commitment to the Smart Metering and Infrastructure project in their Fiscal 2006 Service Plan. The *Clean Energy Act* required the completion of the Smart Metering and Infrastructure project and re-iterated BC Hydro's earlier 2006 commitment to complete the project by 2012. The project cost is estimated at \$930M.

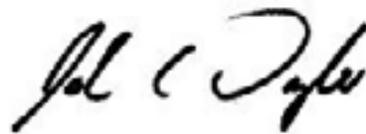
The useful life of the Smart Metering and Infrastructure project will be longer than the payback period of the investment; this means that ratepayers will continue to receive cost savings after the original investment has been recovered.

The amortization expenses for this capital project will not impact rates until 2015 and the business case rationale for the Smart Metering and Infrastructure project is reasonable. The assumptions used to support the cost savings identified in the business case are consistent and well supported. BC Hydro estimates that approximately 45% of the cost savings benefit to be derived from the project will be from theft detection.

This has been supported by independent research from the University of the Fraser Valley *Center for Public Safety and Criminal Justice Research*.

Although the identified savings from Smart Metering and Infrastructure business case appear reasonable, the budget for the project may be overstated. BC Hydro is encouraged to reassess their project costs including contingencies and rebate programs.

We would like to thank the management and staff of BC Hydro, the Ministry of Energy and Mines and other stakeholders who participated and contributed to this review for their cooperation and assistance.



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Introduction

British Columbia Hydro and Power Authority (BC Hydro) is a regulated provincial Crown Corporation reporting to the Minister of Energy and Mines. It is the third largest electric utility in Canada, serving 95% of the population of the Province of British Columbia (the province), or approximately 1.8 million residential customers. In addition, BC Hydro supplies electricity to the province's commercial and industrial users.

The corporation's primary business activities are the generation and distribution of electricity of which 90% is produced by the company's hydroelectric facilities. Pursuant to legislation, BC Hydro is responsible for providing an efficient and reliable supply of electricity and is required by government to generate and deliver energy in ways that are both environmentally and socially responsible.

BC Hydro is a significant asset to the province, having provided relatively low cost power to the residents of British Columbia, including industry and commercial consumers, for over 50 years. This has helped make BC an attractive place to live and a competitive place to do business. Residents and businesses of BC are fortunate to have BC Hydro providing them with such a critical service at a relatively low cost.

Throughout this report various measures are used to describe the measurement of energy. The following table describes the differences between Gigawatt hours, Megawatt hours and Kilowatt hour power measures.

<i>How Much Power?</i>	
Gigawatt hour (GWh)	One GWh will power 90 average BC homes for a year.
Megawatt hour (MWh)	One MWh will supply an average BC home for about a month.
Kilowatt hour (kWh)	One kWh will power one 100-watt bulb burning for ten hours.

Regulatory Environment

BC Hydro is regulated by the British Columbia Utilities Commission (BCUC), under the *Utilities Commission Act (UCA)*. BCUC is an independent, quasi-judicial regulatory agency of the Provincial Government whose mandate is "to ensure that ratepayers receive safe, reliable and non-discriminatory energy services at fair rates from the utilities it regulates, and that shareholders of those utilities are afforded a reasonable opportunity to earn a fair return on their invested capital."

On March 1, 2011, BC Hydro filed its most recent application with the BCUC, seeking approval for rate increases of 9.73% for each of the next three years (a cumulative total of 32%). Significant concerns were

expressed regarding the impact the rate increases will have on BC families and other power consumers. As such, the Premier and the Minister of Energy and Mines on behalf of the province, as shareholder of BC Hydro, requested a review of the corporation in order to provide recommendations and options for minimizing the rate increase by examining both the operating and capital requirements of the company.

This government review does not replace the normal, more-detailed revenue requirements examination conducted by the BCUC to establish rates, which will resume after the conclusion of this review. On April 21, 2011, the BCUC approved an interim rate increase of 8% effective May 1, 2011 pending the results of this government panel review of BC Hydro.

The province has previously taken steps to ease the rate increase by aligning water rental rates to inflation instead of to BC Hydro's rate increases, and changing the Return on Equity (ROE) calculation. BC Hydro must pay the province based on the total assets in service. These actions resulted in offsetting rate increases by approximately 2% per year over the Fiscal 2012 to 2014 period.

Even with these actions, BC Hydro, through its current Fiscal 2012 to 2014 Revenue Requirements Application, is still requesting a 9.73% per year increase from ratepayers to cover a revenue shortfall projected to reach approximately \$1 billion annually in Fiscal 2014.

This report represents a comprehensive financial and administrative review of the corporation, including examining the governance structure, the business planning process and a series of areas critical to BC Hydro's financial performance, including financial forecasting, procurement of goods and services, general operating costs, capital assets and the rate structures themselves. The review also examined a number of key initiatives underway within BC Hydro.

The purpose of this engagement was to review BC Hydro's current financial and administrative frameworks, to ensure British Columbians are receiving the maximum value for the funding expended by this provincially owned Crown Corporation.

Objectives and Scope

This review evaluated, and as appropriate, made recommendations with respect to the following:

1. Effectiveness of BC Hydro's Governance Framework, including:
 - organizational structure; and
 - effectiveness of short and long term business planning.

2. The examination of BC Hydro's Financial Performance, including:
 - reliability of forecasting and internal systems;
 - effectiveness of procurement approaches in achieving maximum value for money;
 - operating costs and the adequacy of cost containment strategies with a focus on identifying opportunity for savings, efficiencies and economies of scale, including a review of administrative expenses;
 - appropriate planning, utilization of capital and spending strategies in regard to capital; and
 - effectiveness of and opportunities in regards to revenue and rate structures.
3. Other matters that arose over the course of the engagement that the panel deemed important.

Approach

The panel was supported by a multi-disciplinary team who, with the support of expert consultants, conducted a broad scan of BC Hydro, and performed in depth work where they observed gaps, had possible concerns or identified opportunities for improvement.

The team included up to 20 professionals, mostly working on-site at BC Hydro for almost seven weeks. BC Hydro executive, management and staff provided utmost cooperation and support, which was essential in completing the review in the short timeframe. The approach included:

- the review of relevant legislation, contracts, agreements and other documentation;
- interviews and consultation senior company executives, BC Hydro staff, the province and other stakeholders;
- research for comparable information from other relevant organizations and other jurisdictions; and
- review of recent annual reports of the entity and comparators.

Overall Conclusion

The electrical utility industry as a whole is facing ever increasing cost pressures, with electricity rates increasing world-wide due to an environment of population growth and consumer demand. The citizens of British Columbia are truly fortunate to have BC Hydro. The corporation has provided the province with relatively low cost energy to the benefit of both residents and industry for the past half century.

Although the panel believes that BC Hydro has done a relatively good job of providing electrical services to the residents of BC at low rates, BC Hydro's operating costs have been increasing over recent years.

During the review, the panel noted BC Hydro still has inefficient processes and practices and considered some expenditures generous at the expense of ratepayers. The extent to which BC Hydro's current initiatives address the short term cost pressures is not enough to impact the immediate rate increase; BC Hydro requires a more aggressive approach to achieve cost savings including a review of all significant costs within the organization. Cost reductions must be accelerated.

The panel has determined that BC Hydro can reduce costs through making efficiencies in a number of areas, including greater attention to operational processes, capital asset planning and management, stronger procurement approaches and project management.

As well, the panel discussed with BC Hydro the setting of specific targets to reduce administrative costs as follows:

Description	Target Reduction
Travel	50%
Office and Business Expenses	25%
Advertising and Publications	25%
Donations	25%
Statutory Advertising and Publications	10%
Utilities, Materials and Supplies	10%
Operating Equipment and Vehicles	10%

This government review does not replace the normal, more-detailed rate increase examination conducted by the BCUC, which will resume after conclusion of this review.

Throughout the course of the review it was noted that, due to the regulatory environment and the corresponding corporate culture in BC Hydro, "being the best" and the resulting desire to have the gold standard is not necessarily for lowest cost or greatest value for money.

The corporation is focussed on justifying its costs through incremental rate increases rather than employing a zero-based operating budget development methodology to understand its underlying cost structure. Understanding the base costs will provide BC Hydro greater opportunity to challenge the current costs and improve overall cost effectiveness.

Also, the corporation has traditionally operated by silo, reducing efficiency and hampering the synergies from a more collaborative working environment.

As a result of the regulatory environment and corporate culture, BC Hydro has become very risk adverse, increasing both operating and capital costs and limiting the potential effectiveness of the organization. We observed many examples of excessive planning, over engineering of projects and the use of multiple layers of contingencies and reserves in order to satisfy various stakeholders and regulatory agencies.

BC Hydro's strong focus on service, safety and being the best are very good objectives, however, they need to be pursued in the context of balancing need and costs.

The panel found that there is a general need to improve the communication between the province and BC Hydro. More specifically, effective communication in regard to the examination of policy options could improve the information available for decisions.

BC Hydro also needs to more effectively manage its relationship and utilization of the vendor community with a view to optimizing efficiencies and cost effectiveness in service delivery.

As the review progressed, the panel recognized the need to examine and differentiate between short term and long term rate increases. Strategies to reduce short term rates (1-3 years) will be primarily derived through operating cost efficiencies, while longer term rate decline will be achieved through continued operational efficiency, in addition to an examination of long term capital planning and policy decisions.

Eliminating capital projects will have the least impact in the short term, but will have significant potential for savings in the longer term. For example, eliminating capital projects totalling approximately \$450M would achieve a similar rate impact of 1% from amortization (assuming 40 yr. period), finance charges and dividend paid to government. Deferring capital projects will have some success in reducing current rates, but unless the need for a capital project is actually eliminated, this will only put pressure on long term rates and future ratepayers. Any decision to defer or eliminate capital projects must be done in a manner that does not unduly compromise reliability.

The panel and BC Hydro executive have worked together to find areas where costs can be reduced in the short term and believe, based on this collaborative effort, BC Hydro can, with careful management, reduce the original rate increase for Fiscal 2012 – 2014 from the unacceptable 9.73% each year to a rate half that. The Chair and Chief Executive Officer have agreed to these lower rate options, however, this will take considerable work.

Rate Reduction Options

	F2012	F2013	F2014	3 Year Cumulative
(Existing) Rate increase as filed in Revenue Requirements Application (smoothed over 3 years)	9.73%	9.73%	9.73%	32.1%
Option 1 - Rate increase after panel and BC Hydro identified initiatives (smoothed over 3 years)	5.9%	5.9%	5.9%	18.9%
Option 2 - Rate increase after initiatives (assuming 8% in F2012 as per interim rate increase and smoothed over F2013 and 2014)	8.0%	3.9%	3.9%	16.6%

In addition to the management and cost containment strategies needed by BC Hydro, the panel also recommends that government review a number of current energy administrative policies that directly affect BC Hydro's cost effectiveness to support achievement of these reduced rates. British Columbia's current policies governing electricity, which focus on clean energy and self-sufficiency, were developed in an environment different from today's economic context. Greater flexibility may be required, and the panel has identified a number of policy options for government to consider that could affect longer term rates.

Achieving this reduction will require significant attention to risk management and enhanced reporting by BC Hydro, as well as monitoring by government.

Recommendation

We recommend that BC Hydro:

- (1) **Provide a business plan to their Board of Directors that details the savings to be realized over Fiscal 2012-2014, as well as continued savings in the next Revenue Requirements Application.**
- (2) **Chief Executive Officer and Board Chair provide interim progress reports to the Minister of Energy and Mines and Treasury Board, given the impact on government's overall debt and fiscal plan if targets are not met.**

Comments and Recommendations

1.0 BC Hydro's Governance Structure

BC Hydro is enabled by the *Hydro Power and Authority Act* which states that BC Hydro's mandate is "to generate, manufacture, conserve, supply, acquire and dispose of power and related products."

As a Crown Corporation and implementer of government policy, BC Hydro's strategic direction and objectives are shaped by provincial legislation, special directives from the government and regulatory requirements.

The province, as sole shareholder, is represented by the Ministry of Energy and Mines, who provides direction to BC Hydro through its Shareholder's Letter of Expectations. The Shareholder's Letter of Expectations represents the Ministry and BC Hydro's understanding of BC Hydro's mandate, strategic priorities and performance expectations.

Governance

The Board of Directors for BC Hydro performs oversight of the organization's performance. The corporate governance information is transparent and publicly available. The Governance structure is summarised in Figure 1.1.1 below.

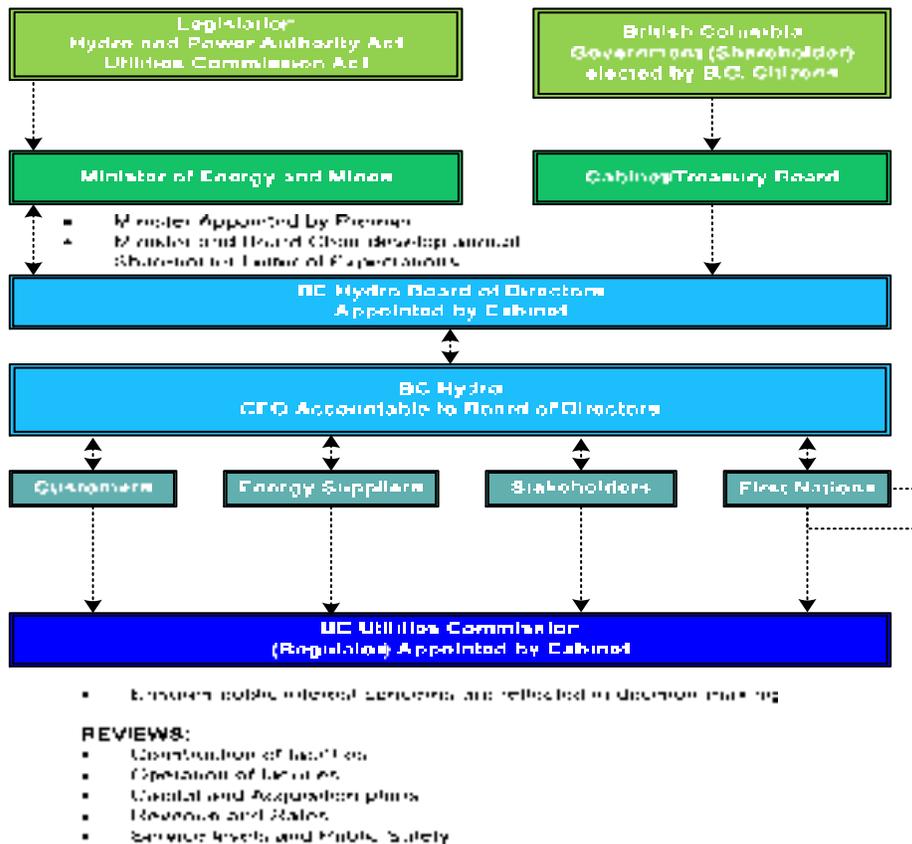


Figure 1.1.1

BC Hydro Subsidiaries

BC Hydro's two key operational subsidiaries are Powerex Corp. and Powertech Labs Inc. Powerex Corp. is a wholesale buyer and seller of electricity and natural gas in the marketplace and also purchases electricity and natural gas for BC Hydro's use. Powertech Labs Inc. provides clean energy consulting and testing services for BC Hydro as well as external clients in energy-related sectors. Based on our review of governance related documentation and interviews with management, it has been determined that BC Hydro exercises adequate oversight over its two key subsidiaries.

1.1 Organizational Structure

BC Hydro experienced excessive growth in its employee population between 2006 and 2010 which required the organization to undergo numerous organizational changes. BC Hydro recently revised its organizational structure, following the re-integration of British Columbia Transmission Corporation (BCTC) one year ago (discussed below). Prior to the integration, BCTC was a Crown Corporation which planned, operated and maintained the province's publicly-owned electrical transmission system.

Since November 2010, the corporation has been divided into seven core business groups, with each business group being responsible for defined activities (as well as Powerex and Powertech Labs) detailed in Figure 1.1.2 below.

To support these activities noted in the chart, as at March 31, 2011, BC Hydro employs 5,868 staff in its seven core business groups (i.e., excluding Powerex and Powertech). The corporation also holds an outsourcing agreement which provides all its "back office" functions with Accenture Business Services of British Columbia (ABSBC) who has approximately 1,400 employees providing these services (see section 3.3 for further detail). In addition, BC Hydro has an estimated 500 consultants to also support its operations.

BCTC Integration

In July 2010, as directed by the *Clean Energy Act*, BC Hydro and the BCTC were consolidated into one utility. It was anticipated at the time that the reconsolidation of BCTC and BC Hydro would create efficiencies by providing a single point of planning and by reducing duplication of activities.

For development of the Fiscal 2012 – 2014 Revenue Requirements Application, BC Hydro executive directed staff to identify \$95M in expenditure reductions, including cost savings from the integration of BCTC, to maintain the rate increase at 9.73%. BCTC savings were realized immediately after consolidation, however, the cost reductions were initially offset by the financial impact of integration, including

severance, IT systems, administration, pension and legal costs although future year savings are expected.

BCTC integration savings of \$25.8M are forecast to be realized in Fiscal 2012, from the previous reduction of 144 staff, 20 consultant positions and other associated reduction measures. These reductions are reflected in the current Fiscal 2012 – 2014 Revenue Requirements Application. The benefits of the consolidation of BCTC and BC Hydro are being realized.

Transmission
and Distribution
Transformation
Strategy

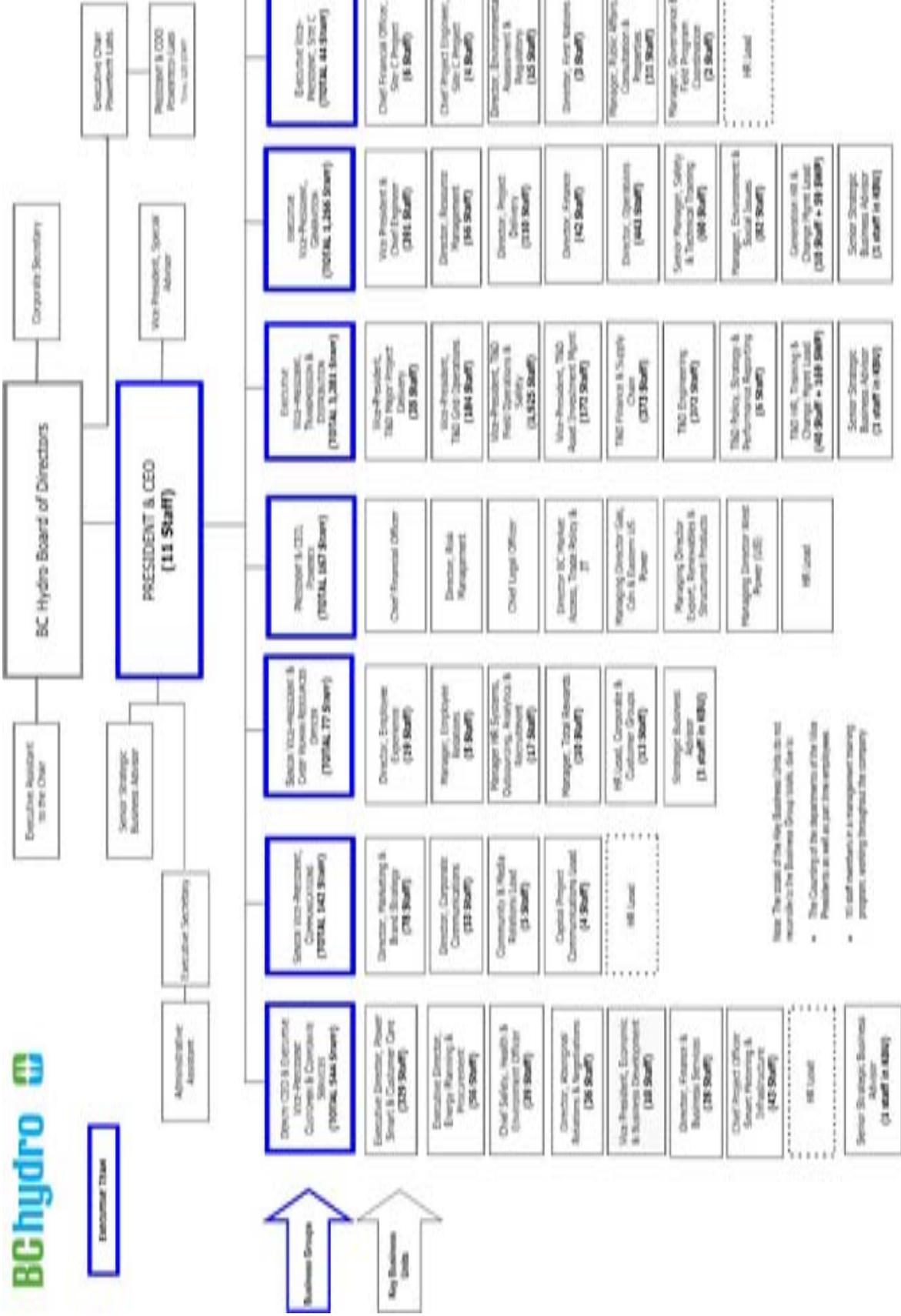
With the recent merger of BCTC, BC Hydro has also recognized substantial changes must take place. The Transmission and Distribution (T&D) group are currently working on a strategic plan to address operational issues including inefficiencies and organizational structure issues identified as a result of the integration, lack of cohesive long term integrated planning and resource utilization (including scheduling and allocation of internal and external resources). T&D anticipates savings of 5-10% over the long run from more integrated planning; however, these benefits are based on savings achieved by other organizations and they likely will not be realized until after Fiscal 2014 when capital projects come into service. The synergy between different groups across BC Hydro (asset management, engineering, procurement, system planning, First Nations, legal) is also increasing. This synergy should result in productivity increases and cost effectiveness through sharing of lessons learned and knowledge transfer.

While this initiative is expected to result in cost savings, they are still in the preliminary planning stages. The Transformation Strategy is to take place over approximately 18 months. Oversight and follow up will be critical to ensure success. The panel believes with a specific and tactical plan, this opportunity can be accelerated and will ensure the savings will happen.

Recommendation

We recommend that BC Hydro:

- (3) Accelerate the completion of the BCTC integration and collaboration between departments to achieve efficiencies and other benefits.**



Note: The staff of the Key Business Units is not available in the Business Group table. The Counting of the members of the Board of Directors is as well as per the employees. All staff members in management training program, working throughout the company.

Source: BC Hydro, May 2017

Figure 1.1.2

1.2 Business Planning

BC Hydro's short and long-term business planning process is appropriate and supports the vision and mission of the corporation. However, risk planning does not always produce effective outcomes. For example, a BC Hydro commissioned vendor survey identified that BC Hydro is paying excessive risk premiums to contractors. Risk management needs to be improved to ensure risks are successfully transferred to vendors at the lowest costs.

BC Hydro's Financial Performance is discussed further in section 2.0.

The board has an appropriate level of involvement in the development of planning documentation and both the short and long-term business plans undergo an iterative and consultative process before being signed off as approved. The board and management also receive regular and relevant reports, which allow them to conduct the appropriate level of monitoring of business plan progress.

For the basis of the review, we examined BC Hydro's internal planning processes, by considering the company's Service Plan as their short-term business plan and the Integrated Resource Plan (previously Long Term Acquisition Plan) as their long-term business plan. In addition, a review of other key elements of business planning, including risk management, stakeholder engagement and performance management processes were undertaken.

Short-Term Business Planning (Service Plan)

BC Hydro's service planning process includes an annual review of their vision, strategic objectives and performance measures. The exercise includes all levels of the organization, including the board, executives and employees. The board and executives refine objectives and performance measures on an annual basis, to develop the vision, while employee focus groups provide feedback. Employees also provide their input on a situational analysis strategic document which examines the internal and external economic, financial, environmental, social and regulatory trends that have significant implications for the company.

Long-Term Business Planning (Long-Term Acquisition Plan and Integrated Resource Plan)

BC Hydro regularly develops long-term electricity plans to capture how much electricity customers will demand in future years. In 2008, BC Hydro filed the Long-Term Acquisition Plan (LTAP), a 10-year plan for acquiring demand-side and supply-side resources to meet electricity demand in British Columbia. The BCUC approved the majority of the expenditures in LTAP, although the commission noted that the LTAP needed improvement in some areas such as reducing reliance on the Burrard Thermal Generating Station.

The next long-term electricity plan, tabled as the Integrated Resource Plan, is being prepared for submission to the Ministry of Energy and Mines before December 2012. It is a 20 year plan that documents BC Hydro customers' long term energy requirements and how to meet the growth in requirements through a number of measures including conservation and clean energy. It also explores market opportunities to export clean electricity to support economic development objectives and provides an assessment of transmission requirements for the future.

BC Hydro forecasts that total demand for electricity will increase by approximately 40% in the next 20 years. The demand forecast is developed by examining BC Hydro's three customer classes: residential, general commercial (small business, institutional and light industrial) and transmission (large industrial users). The primary indicators (drivers) for future electricity consumption among residential customers include population growth and housing starts. Drivers for the general commercial sector are economic activity which includes gross domestic product, retail sales and employment. The transmission class, which includes BC's largest industries and accounts for approximately 38% of the demand on the BC Hydro system, is the most volatile year over year and can be challenging to forecast as it is sensitive to the unpredictability of international commodity prices, economic cycles, natural disasters, regulatory approvals and labour disputes.

After identifying the gap between forecasted demand and current system capability, BC Hydro planners look at meeting the need by identifying possible new sources of electricity or resource options. Resource options include demand-side management initiatives (described in more detail in section 3.6) such as conservation and efficiency, supply-side options, new generating resources provided by BC Hydro through its capital planning process or Independent Power Producers (IPPs) (see section 3.4.2), as well as examining transmission options to ensure that electricity can be optimally moved through the system and delivered to customers.

Risk
Management

BC Hydro adopts a risk-based approach in its capital planning and decision-making processes and risk management activities are exercised at both the corporate and business group levels. At the corporate level, risk management activities are focused on facilitation and coordination while at the business group level, asset managers use various risk management techniques in conjunction with a Corporate Risk Matrix to drive capital planning programs of the business groups. BC Hydro's Executive Risk Management Committee regularly reviews risk issues and trends.

BC Hydro's Generation group, for example, uses a facility asset plan and Equipment Health Rating to assess and manage the risks of generation facilities and equipment. The Dam Safety Team's focus is extreme risk and the incorporation of international best practices and activities such as

surveillance and periodic comprehensive dam safety reviews. In the (T&D) business group, the Asset Investment Management risk framework is applied to manage T&D's assets.

Although the different business groups' risk management approaches vary in detail, each risk management process utilizes a bottom up methodology and risks are prioritized and consolidated based on the corporate risk matrix. It should be noted that BC Hydro is taking action to consolidate its business group risk summaries within an overall corporate risk register to further streamline its processes.

While BC Hydro has sufficient risk planning processes in place to identify risks, it has not been as effective in utilizing the risk information in managing costs and mitigating financial risks. For example, a vendor survey identified that BC Hydro is paying excessive risk premiums to their contractors. Risk management needs to be improved to ensure risks are appropriately allocated and successfully transferred to vendors at the lowest costs. The key to successfully managing risks with vendors is to ensure there is clear understanding and agreement on risk transfer.

BC Hydro must ensure their contract language and project management reflect the agreed responsibilities and that risks transferred to vendors remain within the vendor's control. BC Hydro also needs to improve their contingency budgeting for capital projects and to consider the reasonableness of their funding requests when identifying strategies to mitigate risks. An insufficient focus on costs creates an incentive to build excessive contingencies on project budgets which allows for poor cost containment in their risk oversight. For example, BC Hydro encountered a large number of change orders on some capital projects. Specifically, BC Hydro encountered several large design revisions during the construction period of the Aberfeldie Redevelopment Design Bid Build project at a cost of \$12M for additional general contractor, engineering and mechanical fees (26% of the original contract values). The high number of change orders noted on files is an indicator of ineffective risk allocation.

BC Hydro is implementing the recommendations from the Vendor Survey in an effort to improve their supplier relationships and optimize risk management to maximize value for money. BC Hydro executive is committed to recognizing risks and managing the risks to maximize productivity and reduce costs.

Recommendation

We recommend that BC Hydro:

- (4) Utilize risk management to focus on mitigating risks, not necessarily avoiding them entirely, in order to better manage costs of mitigation strategies.**

**Stakeholder
Engagement**

BC Hydro defines stakeholder engagement as “an umbrella term that covers the full range of an organization’s sincere effort to understand and involve stakeholders in its activities and decisions.” Some of BC Hydro’s stakeholders include landowners, different levels of government including First Nations, non-governmental organizations, IPPs, the BCUC and the general public.

When BC Hydro undertakes a generation, transmission or distribution project, it works closely with its stakeholders by informing them about the project plan and progress, gathering information from them and obtaining their feedback, which is integrated in the project plan when appropriate. BC Hydro works with stakeholders throughout the various phases of the project to build community support in order to avoid costly delays due to potential project opposition. BC Hydro also regularly engages technical experts to provide advice on specific issues.

**Performance
Measurement**

The development of performance measures involves the setting of targets at all levels of the organization with input from employee working groups, the executive members and the board itself.

BC Hydro’s public performance measures summarize the provision of services, safety and the reliability of the system. These performance measures are reasonable, appropriate, complete and include some industry standard measures. It is also important to point out that all performance measures are “SMART”, which translates to specific, measurable, actionable, repeatable and time bound, an industry best practice. Based on the 2010 Annual Report, BC Hydro met or exceeded 18 out of 24 of its performance measures.

2.0 BC Hydro’s Financial Performance

We reviewed BC Hydro’s overall financial performance, with attention primarily to finding opportunities to minimize costs and rate increases, and to ensuring impacts on ratepayers, taxpayers and government are favourable.

While BC Hydro’s financial and energy forecasting processes are robust, BC Hydro’s operating costs have been increasing over recent years.

Net operating costs plus non-current post employment benefits have increased approximately 27% between 2008 and 2010. Operating costs make up approximately 22% or \$0.8B of BC Hydro’s estimated Fiscal 2012 revenue requirement of \$3.6B.

During the review, the panel noted BC Hydro still has inefficient processes and practices and considered some expenditures generous at the expense of ratepayers. The extent to which BC Hydro’s current initiatives addresses the short term cost pressures is not enough to impact the immediate rate increase; BC Hydro requires a more aggressive approach to achieve cost savings.

It is the panel's opinion that, due to the regulatory environment in BC Hydro, the corporation is focussed on justifying its costs through incremental rate increases rather than employing a zero-based operating budget development methodology to understand its underlying cost structure.

The challenge to reduce costs can also be complicated by a culture in BC Hydro where the company strives for "gold standard" (to be the best), with a regulatory environment and historical management culture that supports the company to manage cost pressures through rate increases as opposed to cost containment.

In section 2.1, we discuss the reliability of forecasting, as this drives the identification of required spending (including procurement and operating costs) and capital investment. Section 2.2 covers operational costs, including cost containment strategies, efficiencies and additional possible areas for cost reduction. In section 2.3 we discuss where improvement can be made in BC Hydro's procurement processes. Aspects of capital asset management, including planning, utilization and spending are covered in section 2.4. Finally, section 2.5 looks at the effectiveness of the rate structures, and comparisons of rates and cost recovery by customer class.

2.1 Forecasting

BC Hydro's energy forecasting processes are well planned and produce accurate, reliable forecasts. The process begins with shareholder expectations (the provincial government) stating policy direction and performance expectations. Once this is obtained, economic outlook data assumptions as well as inputs from other professional external sources are utilized to ensure forecast integrity.

Electricity Load Forecasts from 2006 to 2010 reveal forecasts accurate to within 1% of actual results, based on the annual service plans. Between 2007 and 2010, actual load ranged from 50,233 GWh to 53,300 GWh.

Similar to the Domestic Load forecasts, we found that variances with Energy costs were relatively low. For example, in Fiscal 2010 Energy costs were within 1% for dollars and 7% in GWh based on actual versus Revenue Requirements Application forecasts.

Finally, our analysis of the net income forecasts depicted in the annual service plans prepared by BC Hydro over the past five years portrayed that overall forecasts resulted in a small net income variance of 7.8% or (\$32M), with revenue variances averaging 9% and expense variances averaging 5%.

Each forecast receives multiple levels of review to ensure accuracy and completeness. Once it is approved by management and the board, BC Hydro undertakes the monitoring of all forecasts on a month-to-month and quarterly basis through its regular reporting processes. Results are reviewed and discussed by the executive team and if required, forecasts are updated to reflect current information and to ensure that net income requirements are met.

There are three critical forecast areas. One area measures the demand for electricity (load), another focuses on the supply and cost of energy and the third involves financial projections.

Electricity Load Forecasting (Demand for Power)

Load forecasting is central to BC Hydro’s long-term planning, medium-term investment and short-term operational and forecasting activities. The load forecast is based on several end-use and econometric models that use billed sales data up to fiscal year end (March 31) as historical information, combined with a variety of economic forecasts and inputs from internal, government and third-party sources. The primary purpose of the electric load forecast is to inform decision-makers on the questions of “where, when and how much” electricity is expected to be required from the BC Hydro system.

This complex forecasting process includes multiple inputs from all of the BC Hydro business groups as well as examining various economic drivers by customer class as follows.

Economic Drivers	Residential	General (Small, Medium, Large)	Transmission
Demographics	*		
Domestic Economy	*	*	
Employment	*	*	
Weather	*	*	
Domestic Markets		*	
Customer Specific Information			*
International Markets			*
Production Expectations			*

Figure 2.1.1

Energy Cost
Forecast (Supply
of Power)

Another critical forecast for BC Hydro is the determination of energy costs. In order to generate the energy cost forecast, BC Hydro runs its Marginal Cost Model which is a suite of tools that considers water inflows, the monthly market price curve for gas and electricity, as well as current and anticipated future domestic demand. The model's main purpose is to produce data that will aid in the optimization and cost effectiveness of the corporation's various energy generation capabilities, including Heritage, Non-Heritage and IPPs.

Heritage Energy is defined in provincial legislation as energy developed from the province's older electrical generation assets, principally hydro dams and thermal generation facilities. The costs of these energy sources are composed principally of water rental costs, the cost of natural gas and gas transportation required for thermal generation, and certain electricity transmission costs, less any revenue from surplus sales.

Non-Heritage Energy costs are composed mainly of purchases from IPPs (see section 3.4), spot electricity market purchases, natural gas transportation costs, the cost of energy for the Non-Integrated Area (these are communities that are not connected to the BC Hydro grid) and water licence rental costs associated with BC Hydro's one-third interest in the Waneta facility located just south of Trail, BC. The Cost of Non-Heritage Energy is also adjusted for net purchases from Powerex.

BC Hydro is required to pay for energy delivered by the IPP regardless of whether it needs the energy or not. Each IPP contract fixes the price of energy and payment is made when the energy is delivered. This energy may be used when generated, or stored in BC Hydro's reservoirs for later domestic use or export sales. The only exception to this IPP arrangement is Island Co-generation, where BC Hydro is able to engage their services when the need for additional energy arises.

The cost of energy is forecasted in the annual service plan at \$2,310M in Fiscal 2012 and \$2,856M in Fiscal 2014. The increase in the cost of energy is because new sources of supply are at higher cost than existing heritage sources.

The most significant factors affecting the Cost of Energy are:

- demand;
- volume of market purchases;
- surplus sales;
- market prices for natural gas and electricity;
- volume of hydro electric generation (water inflow levels);

- government fees and taxes (e.g., water rentals, Carbon Tax); and
- the volume and price of IPP contract deliveries.

Financial Forecasts

One of the last steps in the BC Hydro forecasting process is the preparation of financial forecasts such as Operating Costs, Capital Expenditures, Amortization and Finance Charges. While we have concentrated our review on the significant forecasts already mentioned, BC Hydro also prepares forecasts for taxes, non-tariff income and trade-income.

BC Hydro takes both a top down and bottom up approach to forecasting. The process is initiated by the Finance department, providing direction and guidance through an internal memo, followed by formal planning guidelines. In more recent years, Business Groups have been advised to keep their operating budget at the same level as prior years yet are encouraged to find further efficiencies. Each Business Group contains Key Business Units who prepare their respective forecasts which are then reviewed and rolled up accordingly. Once all of the Key Business Units are consolidated into the Business Group forecast, recommendations with respect to forecast setting priorities for funding are submitted to executive for their review and approval.

Standard operating costs and high level capital forecasting steps are as follows:

- Each Business Unit is required to prepare individual budget worksheets.
- All Business Groups meet to discuss and negotiate for tradeoffs if over/under budget based on operating priorities – utilizing a corporate wide approach.
- Capital prioritization occurs within the business groups rather than the corporate wide approach taken with operating budgets.
- Executive team reviews Business Group forecasts and if required returns the forecast back to the Business Group to make changes - either through efficiencies or a re-ordering of priorities.
- Final Approved forecasts are consolidated by the Corporate Finance group for measurement purposes.

The Amortization Forecasting methodology takes a slightly different form, as follows:

- Determine forecasted capital expenditures based on planning process.

- Estimate in-service averages to be used for small project amounts, currently set at <\$6M based on historical averages.
- For larger projects the estimated in-service dates are entered manually.
- Establish the annual composite amortization rate for new capital expenditures based on depreciation rates approved by BCUC.
- Summarize depreciation/amortization by business function and year.

In order to forecast amortization on new capital expenditures, annual composite amortization rates are established each fiscal year by using historical data as at March 31 of the prior year. BC Hydro determines the rate by dividing the current month of depreciation by the original cost of the asset by business function. The rate is then compared to prior year's calculations to determine reasonableness.

In order to be consistent with other Crown Corporations in BC, and the government fiscal plan, the Finance Charge forecast uses inputs provided by Treasury Board Staff such as the short and long term interest and exchange rates in Canada and United States.

Finance charges include the cost of BC Hydro's debt portfolio and interest charges. Total finance charges are calculated net of sinking fund income, finance charges capitalized to unfinished projects under construction and interest allocated to regulatory accounts.

The panel found that BC Hydro is focused on justifying incremental rate increases and associated costs rather than employing a zero-based operating budget development methodology to understand its cost structure. From a cost management perspective, the board and management need to set stronger targets and objectives at the start of the budgeting and forecasting process to avoid incremental cost increases.

Recommendation

We recommend that BC Hydro:

- (5) **Improve its budgeting and forecasting processes by periodically undertaking a zero-based budgeting exercise to obtain a better understanding of their incremental costs and improve overall cost effectiveness.**
- (6) **Executive management team and the Board of Directors establish stronger targets and controls on all spending of a discretionary nature (e.g. business expenses, travel and contracting for professional services).**

2.2 Operating Costs

BC Hydro needs to reduce operating costs to lessen the impact of the cost of electricity to ratepayers. Reduction in operating costs may be achieved by accelerating the pace and magnitude of current initiatives that include streamlining processes, leveraging technology and consolidating functions across business groups. BC Hydro needs to work towards a more reasonable staffing level. Revisiting components of labour costs such as overtime, performance pay and banked flex time payout is required in order to achieve savings. As well, the panel would like to see BC Hydro introduce specific operating costs reduction targets (discussed in the Overall Conclusion).

Operating costs make up approximately 22% or \$0.8B of BC Hydro's estimated Fiscal 2012 revenue requirement of \$3.6B. These costs have been increasing over the past years largely due to the volume of work required for maintaining aging infrastructure and changes in legal, regulatory and environmental legislation/practices resulting in significant increases in the number of employees.

The challenge to reduce costs can be complicated by a culture in BC Hydro where the company strives for "gold standard" (to be the best). The regulatory environment and historical management culture supports managing cost pressures through rate increases. The focus is on justifying costs through incremental rate increases rather than employing a zero-based operating budget development methodology to understand its underlying cost structure to reduce impacts to rates. Costs that cannot be recovered from the ratepayers are passed on to the shareholder. This type of culture makes it easier for the company to do all it can to be the best at many levels, including as an employer and community partner. For example, BC Hydro is a competitive employer, with generous compensation packages and training programs, and qualifying as one of Canada's top 100 employers according to one Toronto-based job search agency. This culture, however, does make it challenging to contain costs.

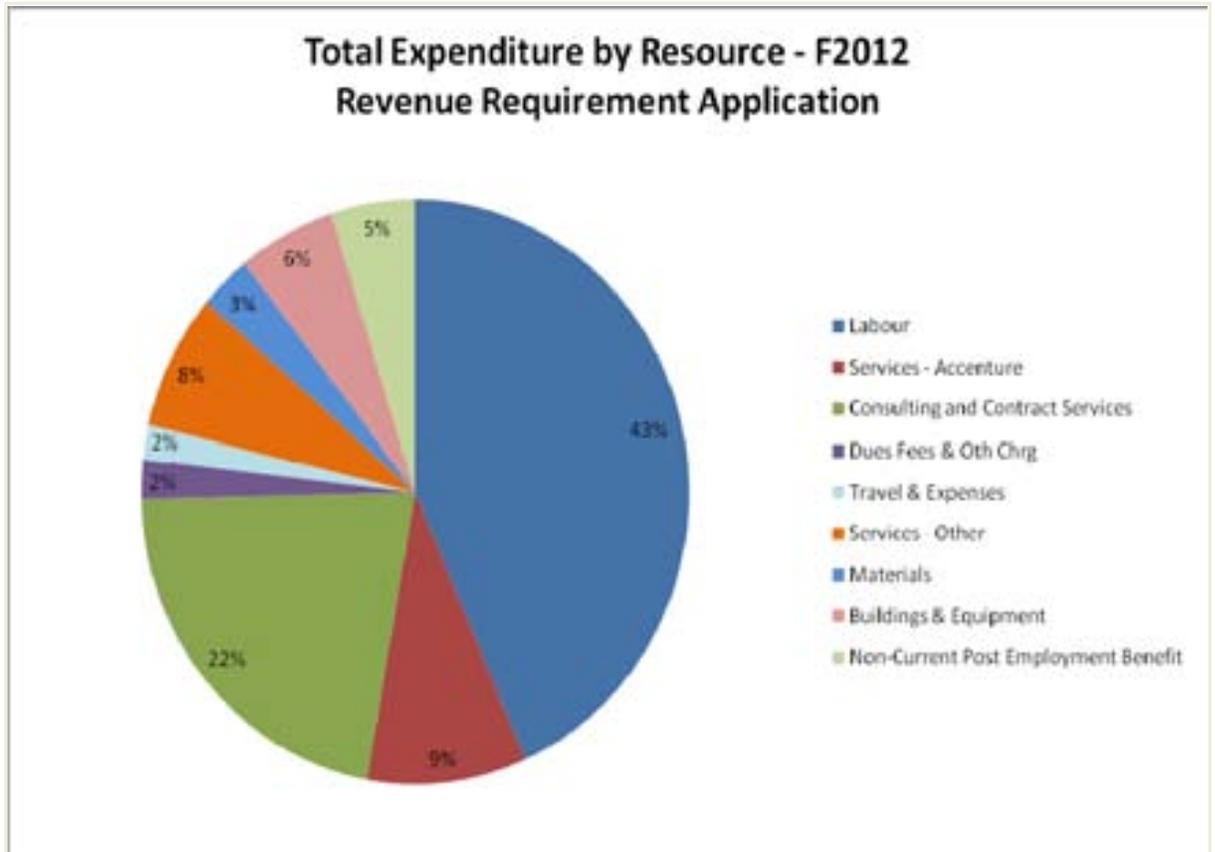


Figure 2.2.1

Operating costs include costs related to day-to-day operations and maintenance of the electrical system such as labour, consultant fees, materials, travel and building and equipment (see Figure 2.2.1). The presentation of the operating cost information provided to the panel did not allow analysis of administrative versus direct operating expenditures. We feel this information would be useful in managing operations and controlling costs.

BC Hydro contends that they are facing cost pressures due to inflation, customer growth, maintenance activities and improving public, employee and contractor safety. However, during the review, the panel noted BC Hydro still has inefficient processes and practices and considered some expenditures significant at the expense of the ratepayers.

In order to reduce the rates by 1% for each year of the three year application, BC Hydro must find operating cost savings of \$35M in the first year (Fiscal 2012), \$72M in year 2 (Fiscal 2013) and \$115M in year 3 (Fiscal 2014).

2.2.1 External Oversight and Internal Processes to Control Costs

BC Hydro is subject to extensive external oversight and has internal processes to provide monitoring of costs. Despite the oversight provided by the BCUC, interveners and others, BC Hydro's own internal operating costs have continued to rise.

External Oversight

The BCUC reviews BC Hydro's Revenue Requirements Application through a public process before making a decision on any changes to electricity rates.

Interest groups known as interveners and the BCUC provide scrutiny of BC Hydro's final operating budget and actual operating expenditures. Intervenors include residential ratepayer groups, commercial and industrial ratepayer groups, environmental groups and IPPs. Local governments and community groups also intervene to address issues affecting their community. To support these groups, BC Hydro engages in regular meetings and actively conducts stakeholder engagement meetings and workshops.

Although this process may be time consuming and expensive, the regulatory process is to ensure sufficient review of the filings by all stakeholders.

The Shareholder's Letter of Expectation, *Budget Transparency and Accountability Act*, *Financial Administration Act* and *Financial Information Act* also directs and ensures proper oversight is in place over BC Hydro operations.

Internal Controls and Oversight

As discussed in section 2.1, BC Hydro has a mature forecasting process. As part of their cost monitoring, BC Hydro also has extensive monthly monitoring and reporting processes including clear assignment of accountabilities from the Business Groups up to executives and to the Board of Directors who receive quarterly updates. Processes and accountabilities have been established to ensure individual Business Groups manage within their budget and escalation to the corporate level only occurring if the Business Group is unable to take corrective action within their own budget. BC Hydro staff works to achieve their corporate results as performance incentives are tied to the achievement of operating budget and other business unit objectives.

BC Hydro's Audit Services also plays a role by providing assurance that appropriate controls are in place to support management in achieving their business objectives within an acceptable risk framework through their annual audit plan. Their responsibilities include assessing whether potential risks are appropriately identified and managed, reviewing the adequacy of controls and compliance with policies and procedures, and assessing whether financial and managerial reporting is accurate, reliable and timely.

2.2.2 Operating Costs (Current State and Trends)

BC Hydro presents operating costs on a Gross View (the upper line on Figure 2.2.2). The Gross View includes operating costs plus regulatory accounts and deferred provisions incurred during the year. The shaded area demonstrates the impact of the regulatory accounts on operating costs. These regulatory and deferred provisions are delayed for future recovery/refund (discussed in section 3.5). Examples of regulatory accounts include Site C and Demand Side Management (DSM). Provisions are non-cash flow related (e.g., environmental and First Nation liabilities) that will be realized when actual payments are made.

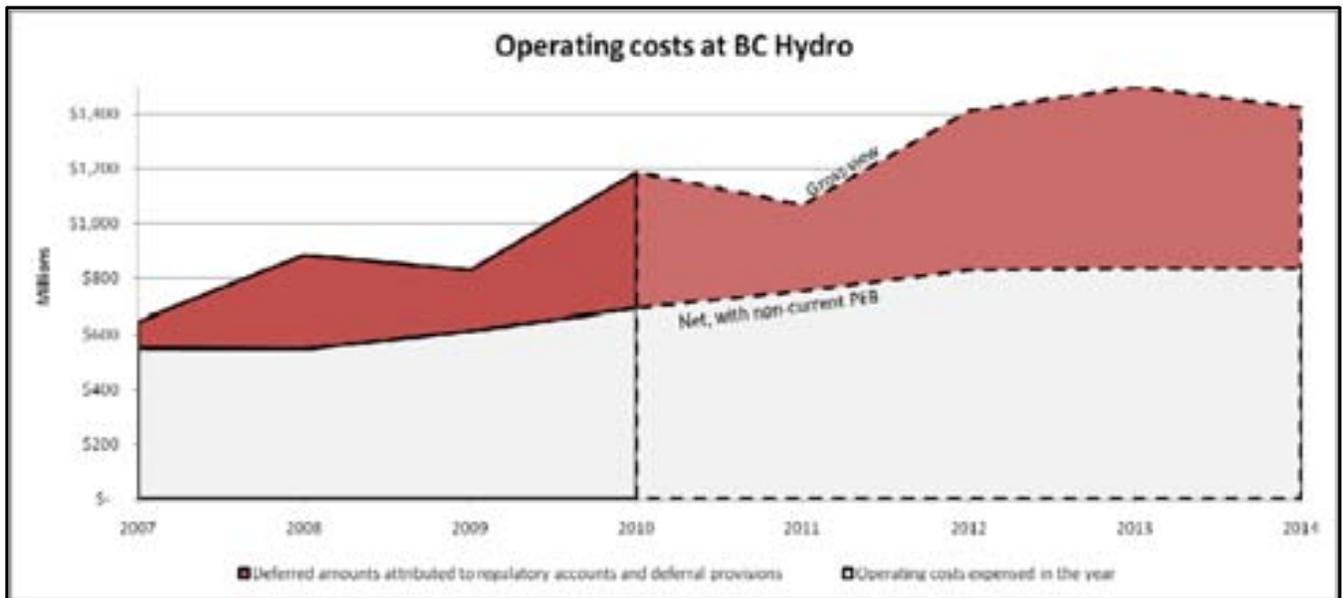


Figure 2.2.2 – Source: BC Hydro Revenue Requirements Application

Figure 2.2.3. depicts how operating costs, particularly between 2008 and 2010 have been increasing. Primary cost drivers for the increases relate to increased maintenance on aging infrastructure and increased volume of work resulting in what BC Hydro identified as a need for additional staffing levels. Costs are also due to an increase in the non-current employee benefit costs (i.e., pension benefits and other post employment benefits). Net operating costs have increased approximately 12% from 2008 to 2010, (27% with non current post employment benefits).

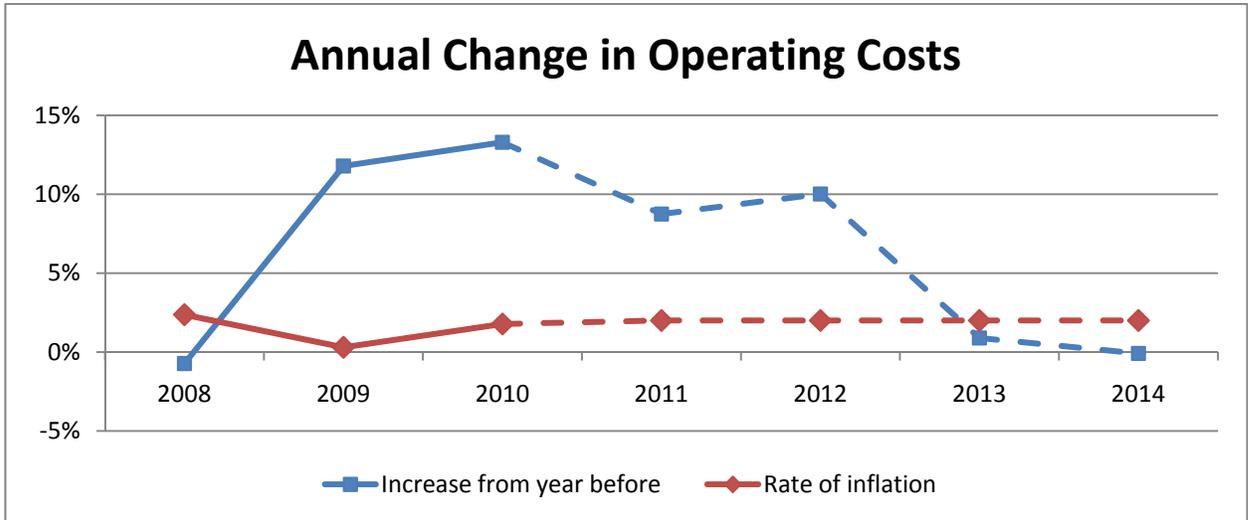


Figure 2.2.3 – Source: BC Hydro Revenue Requirements Application

While BC Hydro is working towards reducing operating costs for the 2012 – 2014 period, operating cost increases between 2011 and 2012 are generally due to accounting reclassifications such as the change in accounting treatment for certain electricity purchase agreements with IPPs which reclassify costs from energy costs to operating costs, finance charges, taxes and amortization.

As a result of the Fiscal 2011 Revenue Requirements Application proceedings (which concluded with a 6.11% rate increase), BC Hydro agreed to a one-time operating cost reduction of \$35M for Fiscal 2011 as part of the Negotiated Settlement Agreement reached with its Interveners and agreed to by the BCUC. As the agreed to reduction was only for Fiscal 2011, net operating costs for Fiscal 2012 have been adjusted back to their “base” levels.

Figure 2.2.3. also shows the projected rate of percentage change increases in operating costs are declining between 2012 and 2014 compared to prior years. BC Hydro executive informed staff that their Fiscal 2012 budget could not exceed Fiscal 2011 staffing levels and operating costs (excluding non-current post employment costs) budget inclusive of the impacts of BCTC integration. As such, BC Hydro was required to find productivity improvements in order to offset any cost pressures they identified.

Despite BC Hydro’s attempts to decrease costs to lower the impact of rate increases to the ratepayers to 9.73% per year in the current Revenue Requirements Application, government viewed these reductions as insufficient.

2.2.3 Operational Efficiencies and Cost Containment/Reduction Strategies

BC Hydro, recognizing that it has not been operating to optimum efficiency, has initiatives to streamline processes, eliminating low value work and leveraging technology, but there is some question as to the effectiveness of these initiatives as they have not demonstrated significant reductions to operating costs.

In order for these initiatives to be successful, a change in culture and a commitment to revisit current operational norms is required. The panel has recommended BC Hydro take a more aggressive approach in executing these initiatives to achieve additional savings, including improving their organizational effectiveness through optimizing staffing levels and enhancing resource management.

Improving Organizational Effectiveness

Between 2006 and 2010 (prior to BCTC integration), BC Hydro experienced excessive growth, rising from 3,976 to 5,615 employees, representing an increase of 1,639 employees over a four year period. Many of the new staff were allocated to (directly or in support of) capital projects to meet the need for self-sufficiency by 2016.

As a comparison, BC Hydro currently employs approximately 650 engineers, which is about six times more than the Ministry of Transportation and Infrastructure, with a similar-sized capital program.

In addition to the direct labour associated with operations and capital projects, BC Hydro executive also acknowledged that back office and support functions experienced similar uncontrolled expansion. The panel concurs that the significant level of employee growth was excessive and significant changes are needed. In comparison to other larger or similar size organizations the panel observed functions such as communications, finance, human resources and information management had extremely high staffing complements.

These growth figures and the commensurate employee growth figures of other comparable utilities during this same timeframe are illustrated in Figure 2.2.4 below. The organizational structure of BC Hydro is similar to Manitoba Hydro and Quebec Hydro as they also heavily rely on hydro electric generation as a major source of energy.

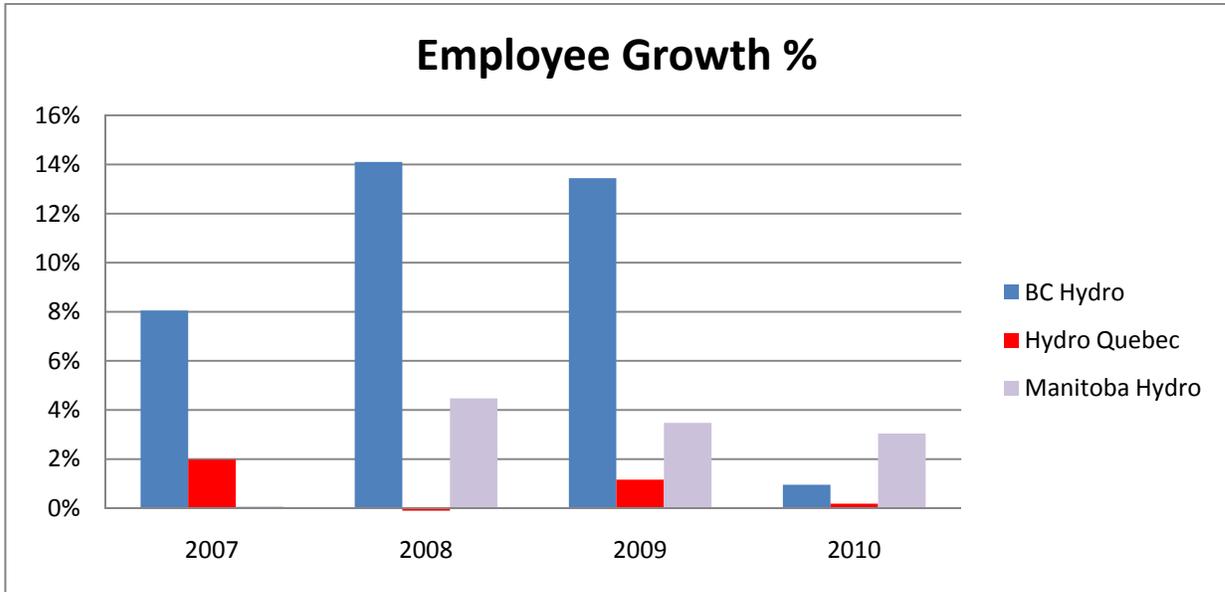


Figure 2.2.4

Following the increase in staffing, the GWh production per Full Time Equivalent employee decreased. This fact is portrayed in Figure 2.2.5 below. The graph compares BC Hydro (with and without Accenture employees) against other Hydro companies.

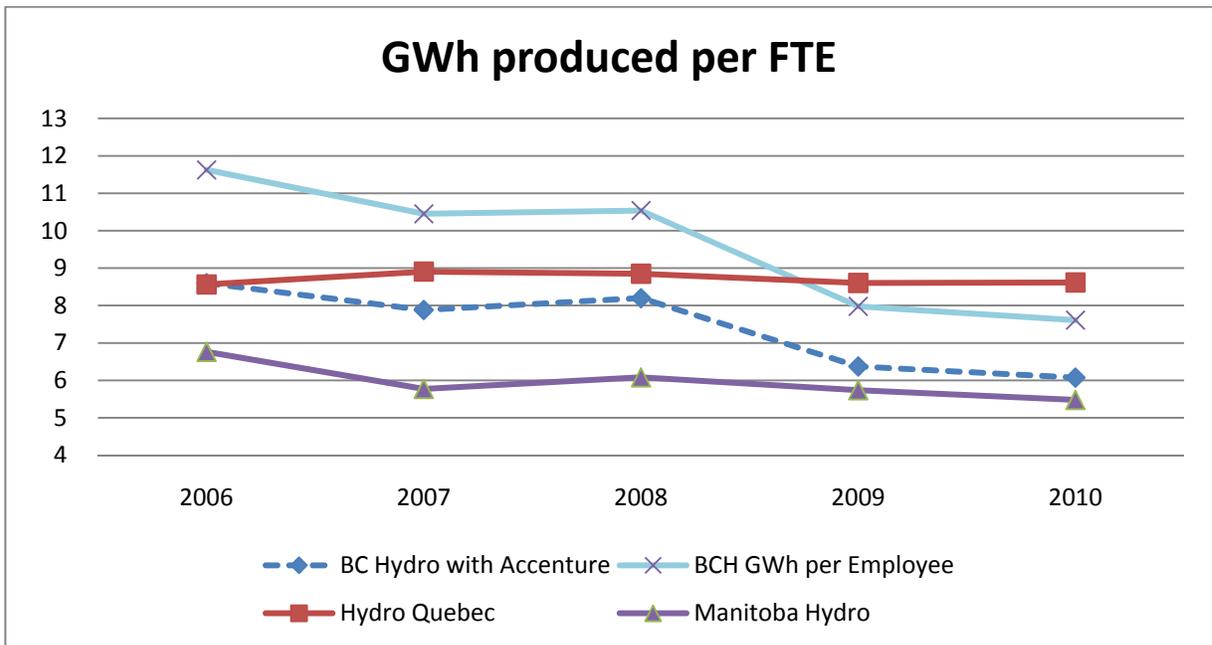


Figure 2.2.5

Recognizing this, the current executive team initiated a vacancy management and monitoring process, to limit or reduce staffing growth and recruitment activity, while maintaining a strong commitment to employee safety.

The purpose of the Vacancy Management initiative is to ensure BC Hydro manages and prioritizes the filling of vacancies in a way that meets their business objectives. The process for achieving this has been to match external hiring to attrition levels and to prioritize and re-purpose work while ensuring that roles essential to meet BC Hydro's objectives continue to be filled.

When a position comes vacant, recruitment options are reviewed to determine if the role will be replaced and how they will fill the position to obtain the best resource allocation. BC Hydro has begun to make an effort to manage and prioritize staffing levels to meet current and future workforce needs and business objectives. As a result, total equivalent staff numbers (including BCTC) reduced by 151, from 6019 in 2009 to 5868 in 2011.

In addition to vacancy management, BC Hydro is has committed to (but has yet to have fully realized) further improving organizational effectiveness and efficiency through the following actions:

- building on BCTC integration efficiencies;
- streamlining processes;
- eliminating low value work;
- leveraging technology;
- increasing staff skills;
- consolidating functions across business groups;
- outsourcing; and
- maintaining or reducing staffing levels as appropriate.

The panel identified several areas where BC Hydro needs to focus their efforts and commit to making changes. BC Hydro is reviewing the span of control (the ratio of staff to managers) in their organization to facilitate efficiencies. Currently there is a ratio of approximately one manager to every seven point five employees. Its plan is to move the non-operational support areas of the organization to an average 1:10 ratio by Fiscal 2013, and an overall increase to the manager-to-employee ratio to the 1:10 average level in Fiscal 2013 and 2014.

At the high end, certain teams reflect ratios of 1:30, for example, where there are foremen and sub-foremen or Canadian Office and Professional Employees (COPE) work leaders involved in ensuring the safety, quality and integrity of the work results. At the low end, some managers have fewer than three direct reports, for example, where the work is highly

specialized and involves oversight of contracted or outsourced services, high levels of cross-company coordination or active engagement with external stakeholders.

The panel has identified the need for finding staffing efficiencies within their organizational structure. As a result of the review and discussions with BC Hydro, the panel believes that a more reasonable staffing level would be in the order of 4,800 employees. While this would be a challenging target, the panel believes that with strong oversight from the board and executive it is achievable through utilizing internal and external resources, the various efficiencies initiatives BC Hydro are undertaking, as well as direct reductions of work.

Substantial gains can be generated quickly to deliver an organizational structure that minimizes rate increases and reduces costs passed to ratepayers.

Recommendation

We recommend that BC Hydro:

- (7) Accelerate the pace and magnitude of change to develop an organizational structure that reflects the reasonable level of internal and external staffing that reduces costs passed on to ratepayers.**

Overtime Management

Overtime is to be expected in the electric utility industry. Unscheduled overtime to restore power and planned overtime for jobs that extend past normal working hours or into weekends are commonplace for BC Hydro but not for others in the industry. A study conducted by the Electricity Sector Council reported that overtime has been averaging around 9% over base wages for the industry for the 2000 – 2006 period. BC Hydro's overtime results are somewhat higher at 11% (for example Fiscal 2010 overtime costs were \$52M of total salary \$489.4M). While the percentage of total overtime to base salary cost has been stable at approximately 11% between 2007 – 2010, BC Hydro consistently exceeds budgeted overtime hours.

Distribution of overtime hours by staff type (i.e., union and excluded) in 2010 were approximately 11% for COPE, 5% for Management and Professional and 84% for the International Brotherhood of Electrical Workers (IBEW). The majority of overtime compensation (paid according to negotiated collective agreements at two times the hourly rate) is incurred by the Field Operations (part of T&D) which includes power line technicians.

BC Hydro recognizes that overtime costs, while necessary to keep the electrical system operating safely, efficiently and effectively, has been increasing in recent years. There are other negative effects of excessive

overtime than just increased costs. In their submission to the panel, the Line Contractor Association of BC expressed concerns “that high levels of overtime in the construction trades are correlated to significant reductions in productivity and safety”. Fatigue, illness and compromised safety of employees are potential effects of high overtime hours worked by employees. The highest five overtime hours and related overtime amounts paid to IBEW BC Hydro staff in Fiscal 2011 are as follows:

Hours of Overtime Incurred in Fiscal 2011	Overtime Cost Paid to Employee, excludes base salary (\$)
1,420	130,397
1,324	122,893
1,239	114,331
1,241	113,521
1,330	113,139

Figure 2.2.6

These overtime hours are almost equivalent to an (additional) entire year’s work and are paid on top of base salary.

The current collective agreements need to be improved for BC Hydro to manage their resources to work effectively and efficiently as 95% of overtime is incurred by union staff.

In 2010, BC Hydro implemented an Overtime Management Strategy to achieve and fulfill work plans, while remaining cost effective. The Overtime Management Strategy includes the enforcement of corporate policies such as justification and pre-approval of overtime, timely and regular reporting and monitoring of overtime needs and determining the appropriate and effective mix of both internal and external resources (in-house versus external).

BC Hydro realized a 2% decrease in overtime hours between 2009 and 2010 and documents supporting the 2012-2014 Revenue Requirements Application indicated that they are planning on reducing overtime costs to approximately 8% of base salary in 2014. This will reduce budgeted overtime costs by approximately 25%.

At this time, given BC Hydro’s history of exceeding budgeted overtime it is unclear whether they can reduce overtime to the level they need to be more cost effective. However, it is the panel’s opinion that BC Hydro should take steps to reduce or remove scheduled overtime. Immediate attention should be focussed on the area of Field Operations, which incurs the highest amount of overtime hours.

Recommendations

We recommend that BC Hydro:

- (8) **Work with Unions, through a collaborative process, to identify and implement cost effective solutions to reduce overtime, including scheduled overtime and improve overall productivity of the organization.**
- (9) **Evaluate whether overtime may be more effectively managed through the use of private sector contractors.**

Maintenance
Improvement
Initiative

A review of maintenance and reliability cost performance undertaken by BC Hydro in 2008 resulted in their “Back to Basics” Maintenance Improvement Initiative. This initiative established maintenance and reliability best practices, and identified a need for improving work planning and consistent scheduling practices. BC Hydro has taken positive steps, however, they acknowledge that there are areas to improve such as the management of material supplies.

Recommendation

We recommend that BC Hydro:

- (10) **Continue to focus on areas requiring improvement under the Maintenance Improvement Initiative such as material supplies management to increase efficiencies.**

Information
Technology and
Telecommunications
Plan

Fiscal 2010 was BC Hydro’s first year of a five year Information Technology and Telecommunications plan to increase efficiency and productivity, and improve decision making and service by removing administrative burden through automation, and increasing the accuracy of data. The plan includes business transformation in such areas as finance, human resources, asset management and resource management. Technology upgrades will simplify and standardize work and business processes to help BC Hydro meet their strategic objectives.

Recommendation

We recommend that BC Hydro:

- (11) **Implement stronger commitment and oversight to the Information Technology and Telecommunications Plan to change business processes necessary to ensure benefits and efficiencies are fully achieved during this rate period.**

2.2.4 Further Opportunities for Cost Savings

While BC Hydro has focused on reducing administrative and support services, managing staffing resources and seeking efficiencies to offset cost pressures, there are other opportunities for further cost savings by examining cost drivers related to compensation.

Labour costs (regular salaries, overtime costs and other pay), at \$500M, makes up approximately 14% of Fiscal 2012's revenue requirement. BC Hydro's staff compensation package is considered very generous. BC Hydro's compensation plans were reviewed for potential cost pressures including the collective agreements, Management and Professional Other pay, performance plan programs, banked flex time payouts and post retirement benefits. Overtime costs were discussed in section 2.2.3.

Collective Agreements

The majority of BC Hydro's workforce is under one of two collective agreements – COPE and IBEW. These collective agreements set the framework for labour costs in which BC Hydro must operate. Both the IBEW and COPE collective agreements expire March 31, 2012. Some provisions in these contracts provide their members with generous benefits compared to other public sector unions. For example, BC Hydro's sick leave provisions at 100% of basic pay up to 26 weeks are higher than government's sick leave for union staff at 75% of base pay. As well, overtime is paid at two times the hourly rate for all overtime hours versus public sector unions at one and one half times for the first two hours of overtime and two times thereafter. While BC Hydro has made progress on negotiating shift schedules that improve operational requirements, there may still be opportunities for the unions and BC Hydro to work together to manage operational requirements more effectively and efficiently and to improve the overall productivity of the organization.

While it is not a union contract requirement, BC Hydro's generous and extensive apprenticeship training program (discussed in section 2.2.5) is a significant benefit to the employees and the union but at the cost of the ratepayers.

Recommendation

We recommend that BC Hydro:

- (12) Work with the COPE and IBEW unions to make the collective agreements more aligned with other public sector agreements and to better facilitate the shift schedule changes required to allow BC Hydro to manage their resources and advance their strategic plans in a cost effective manner.**

Executives

The Chief Executive Officer's total compensation is in compliance with the 2007 Cabinet compensation framework and executive team salaries are generally comparable to other Crown Corporations.

The Chief Executive Officer maximum allowable total compensation plan which includes base salary, incentive pay, employee benefits, perquisites, expenses and professional fees, is established through a letter from the Minister.

BC Hydro is a Crown Corporation subject to the *Public Sector Employers Act* and is required to submit its executive compensation plans, including those of its subsidiaries, to the Public Sector Employer's Council. As part of disclosure, the board of directors are asked to certify that compensation paid is within the approved compensation plan. In addition, Crown Corporations' disclosures may be subject to audit by the Public Sector Employer's Council to confirm whether disclosure was within the approved plan.

BC Hydro conducts annual benchmarking analysis of compensation statistics obtained through third party data surveys including Towers Watson, Mercers and Hay. Government owned and publically traded electrical utilities across Canada and government owned and publically traded organizations that are similar size to BC Hydro are used as the comparator groups. We reviewed the total compensation paid for the Chief Executive Officer position in Hydro One, Toronto Hydro and Hydro Quebec and found that total remuneration ranged from approximately \$513,000 to \$950,000 (2010 figures). The Chief Financial Officers remuneration ranged from \$393,000 to \$564,000 (no figures for Hydro Quebec were available).

We also compared the total compensation for these positions' salaries to ones in Crown Corporations such as the Insurance Corporation of British Columbia, Work Safe BC and BC Lottery. The Chief Executive Officers' remuneration ranged from \$383,000 to \$507,000 (2010 figures) while the Chief Financial Officers remuneration ranged from \$262,000 to \$515,000.

BC Hydro's Chief Executive Officer was appointed May 2010. The compensation paid for the 10 months in 2010 was approximately \$467,000. This partial year payment is on the higher end of the provincial Crown Corporations but on the low end of the other utility corporations (discussed above). The Chief Financial Officer's compensation of \$458,000 is comparable to the organizations reviewed.

Management and Professional Staff

BC Hydro's work force includes approximately 700 Management and 1,200 Professional staff who are excluded (non-union) employees approximating 32% of the total staff complement in BC Hydro (using a 2010 base of approximately 6,000 employees). These positions are generally middle to upper level management positions whose average

salaries range from approximately \$76,000 to \$160,000 (based on Fiscal 2010 figures and excluding management trainees and excluded administration staff).

We compared a Management position reporting to an executive team member with other positions with similar reporting relationships in government, another Crown Corporation and a Schools, Universities, Colleges and Hospitals (SUCH) sector entity.

Overall, wages in this type of position appear to be higher at BC Hydro when compared to similar positions in government and the SUCH sector entity; however, they are in line with the Crown Corporation. It is important to note that a full analysis was not completed; the comparison does not assess the level of responsibility and authority between these comparators and does not include any incentive pay employees may receive on top of their base salary.

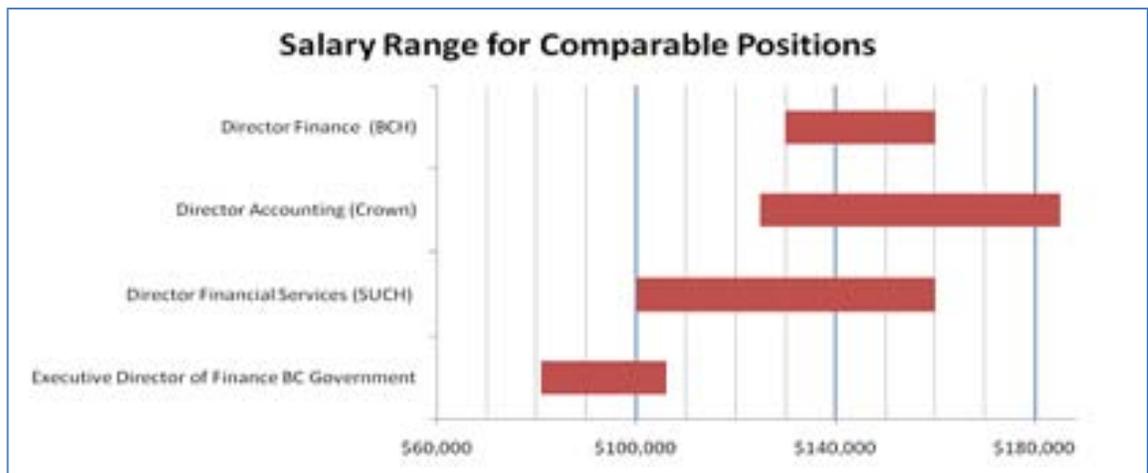


Figure 2.2.7

Since 2007, total base salary costs of the Management and Professional staff have increased by approximately 62% or \$72.4M. Part of the increase is due to the total number of employees in these positions expanding by approximately 46% during the same period, as well as base salary increases. This does not include other pay such as BC Hydro's Variable Pay Program which is discussed later.

Other Management and Professional Benefits

Management and Professional staff may be entitled to other compensation in the form of:

- honorariums for achievement of exceptional unplanned results and duty honorariums to compensate for the inconvenience experienced when acting in the Duty Coordinator role (\$500-\$10,000);

- floor rates of 10%-15% of base pay to maintain pay relations between managerial job and unionized position;
- First Aid allowance; and
- remote location incentive program which pays 6, 12 or 15% of pay, travel costs to provide an opportunity for the employee and their family to travel to a major shopping center (such as Vancouver or Edmonton), to have access to amenities that are not available in their remote work location (from \$950 for family of one to approximately \$9,000 for a family of six) and extended health care benefits for travel to medical appointments.

The total amount reimbursed to staff under these categories in Fiscal 2010 totalled \$3.7M. Honorariums being provided to staff for exceptional results appear to overlap with the performance incentives excluded staff also receive based on corporate and personal achievement.

The travel allowances provided to employees in remote locations is significantly higher than the amount provided by Government (\$500).

Recommendation

We recommend that BC Hydro:

- (13) Revisit compensation policies and compare with public sector allowances to determine if other Management and Professional benefit costs are in the best interest of the ratepayer.**

Performance Pay

All BC Hydro employees have the opportunity to engage in performance incentive plans. These reward programs have been a part of BC Hydro's culture since the 1990s and are used to recognize employees' efforts in successful achievement of corporate and individual performance measures. Performance pay programs are common amongst public sector employers (for example, SUCH sector, ICBC, BC Lottery Corporation, WorkSafe BC etc). BC Hydro's percentages are an average of 10% for Management, 25% for Executives and excluded Powerex Managers and Directors and 20% for the Chief Executive Officer.

BC Hydro uses these programs to remain competitive with other utilities and the private sector. However, when these amounts are added to base salaries along with any overtime hours incurred, the total compensation package of employees may significantly increase. The Line Contractors' Association expressed concerns that "when public sector improves its wage offer, the private sector must respond in kind to retain its force". In essence, the generous compensation BC Hydro employees receive, particularly in the trades, can drive private sector labour costs up as they are competing for the same labour pool.

BC Hydro’s Variable Pay Program for Management and Professional staff (non- union employees) reflects both personal and corporate results in different areas that if considered together provides a good performance view. The proposed metrics are developed through the strategic planning process and recommended by the executive team. The board reviews and provides input into the final corporate targets based on past performance and forecasted future performance before they approve the final metrics. However, we noted a number of issues in both design and administration of the program.

Variable Pay Program for Management and Professional staff is affected by several factors:

- targets that are a percentage of base salary and normally in the range from 7.5% to 20% but can reach maximum up to 40%;
- BC Hydro corporate multiplier, which is a blended result achieved in Financial, Customer Satisfaction and Safety areas; and
- Personal Achievement Factor, which is a multiplier in the range from 0 to 2 depending on the level of performance achieved by an employee in the year.

Figure 2.2.8 shows the distribution of performance rating of Management and Professional staff. An eligible employee whose performance exceeds “needs improvement” would be entitled to some amount of incentive pay. Only 1% of Management and Professional staff have not qualified for some amount of incentive pay in the last four years.

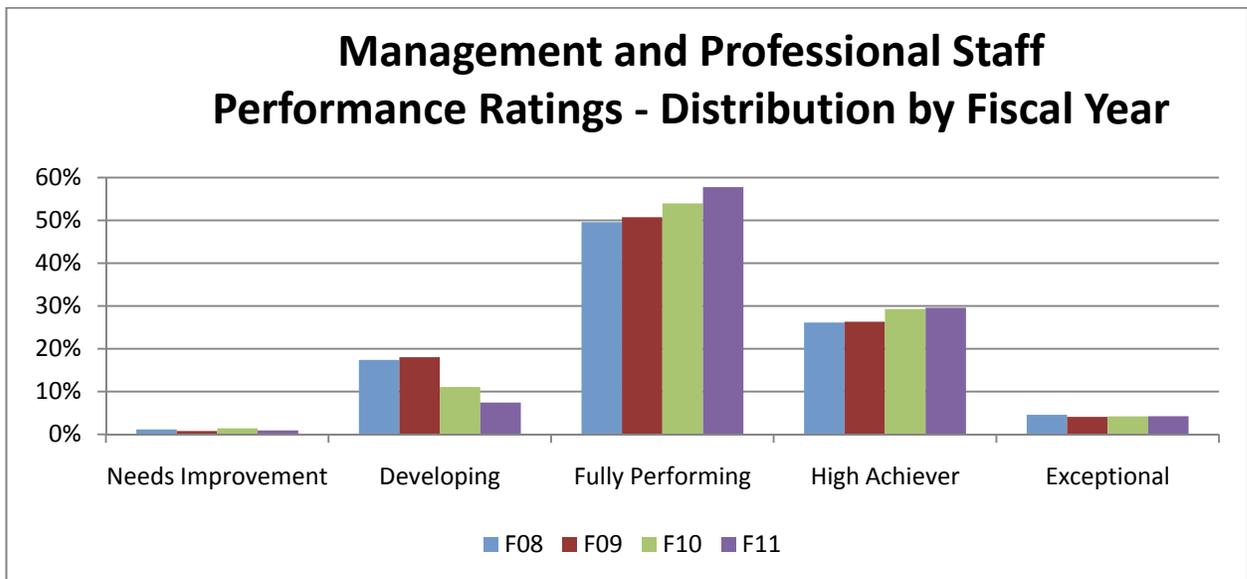


Figure 2.2.8

As noted, one of the components used to determine Variable Pay for an employee is his/her Personal Achievement Factor. This multiplier is designed to provide for variable pay for higher achievement and fully performing employees and for developing employees and those requiring additional training or coaching. However, in order to be effective, the Variable Pay Program should be awarded only to the employees who achieve superior performance; otherwise the program qualifies virtually every employee for the benefit.

Another area of concern is achievement of personal and corporate targets which contributes towards variable pay. While many objectives were based on quantifiable business improvements, some personal targets could be considered normal requirements and not set at a level that motivates performance excellence. For example, a personal target like “create a work environment that allows people to bring their best to work” appears to be a routine accomplishment for an employee whose job accountabilities include providing regular and significant coaching and acting as a role model.

In addition, some corporate targets have been set too low to be challenging. For example, targets in the Customer Satisfaction area for Fiscal 2011 were set at 80% to 89%, while actual results in this area have been 90% for the three previous years according to the 2010 BC Hydro Annual Report.

Finally, despite the fact that the Fiscal 2011 corporate target on the “All Injury Frequency” measure was not achieved, the result still contributed in a small way towards executive variable pay. As well, any incentive pay received to 15% of base salary is considered in staff’s pensionable earnings resulting in additional related costs for BC Hydro.

In light of the panel’s observations, BC Hydro will continue to implement new manager training around effective objective setting as well as perform periodic spot audits to ensure objectives are being appropriate set.

Union staff may receive up to 5% under Gainsharing which is based on the performance of the entire corporation and individual business unit(s) in which the employee is assigned. This program is incorporated into the two collective agreements (COPE and IBEW).

In Fiscal 2010, BC Hydro paid \$31M to Management and Professional staff, \$10.5M to Union staff and \$840K to the Executive team. These amounts do not include payments to Powerex (Fiscal 2010 totalled \$7.7M) or Powertech (Fiscal 2010 totalled \$1M). The Fiscal 2011 payment to Management staff was \$24M and is more representative of prior years.

Given the current economic conditions and the current focus on reducing costs, performance evaluations should be made more challenging and could be tied to improvements to financial targets such as reducing operational costs rather than achieving the budgeted amounts.

Recommendation

We recommend that BC Hydro:

- (14) **Adjust incentive plans under the Variable Pay program for Management and Professional staff to ensure targets for performance measures are set at a level that is not easily attained to prevent the incentive pay becoming part of base compensation.**

Banked Flex Time

Flex time is an earned time off program that grants additional time off for hours worked beyond a 35 hour work week. By working 37.5 hours during the majority of the work weeks, 17 days are granted to compensate for the extra time worked. BC Hydro offers flex time to entitled staff (some staff under the collective agreement may not receive flex time but are paid in lieu). All full time Management and Professional staff receive 20 Flex Days in each calendar year (17 days for collective bargaining staff).

At the beginning of the year, employees can elect to bank all days to take as flex time during the year or trade the days for cash and flex credits to fund other benefits. Flex time entitlements are also earned by an employee on maternity leave for 17 weeks and during paid leave due to illness or injury.

One-time incentives of up to 2% are offered for choosing cash and/or flex credits. The value of the incentive may be up to 10% of salary. There is a time bank cap of 50% of an employee's base annual salary which equals 130 working days.

For Management and Professional staff, the value of cashed out flex days ranged from \$5M to \$8.6M between Fiscal 2007 and 2010. COPE employees are also entitled to banked flex day payouts and COPE total cash payouts ranged from \$280k to \$400k between Fiscal 2007 and 2010. In the BC government, union employees approved for flex time do not have the option to be paid out.

The option of a payout of banked flex day constitutes a cost to BC Hydro that is passed on to ratepayers.

Recommendation

We recommend that BC Hydro:

- (15) Reduce or eliminate the flex time sign up incentive and pay out options for hours worked beyond the 35 hour work week while maintaining the flex schedule option.**

Post Retirement Benefits

BC Hydro manages its own employee pension plan. A pension management committee made up of members of the Executive team reports any pension matters to the Audit and Risk Committee, who oversees decisions. The Audit and Risk Committee then reports to the BC Hydro Board of Directors who is responsible for approving and signing off any significant changes. A range of different decision types can be made at different levels. A terms of reference outlines the respective decision making powers of each group.

BC Hydro's current post retirement group benefit provides for full premium payments of Medical Service Plan, life insurance and extended health care (\$25,000 lifetime maximum) and up to \$250 for dental per annum. The BC government's Public Service Pension Board of Trustees has, over the years, made changes to the post-retirement group benefits provided through the Public Services Pension Plan. Effective April 1, 2012, changes to the plan include eliminating any extended health or life insurance benefits subsidies (dental premium has already been removed).

The cost associated with these benefits comes from BC Hydro's operating budget. BC Hydro's 2012 non-current post employment benefit cost is estimated at approximately \$56M.

Recommendation

We recommend that BC Hydro:

- (16) Revisit the current post-retirement benefit coverage for extended health and life insurance benefits provided to reduce the impact to ratepayers.**

2.2.5 Policy and Processes

By tightening policy and processes in the following areas, cost savings should materialize.

Travel

Travel expenses are a legitimate expense required by BC Hydro to conduct their business. The T&D and Generation groups have the largest travel budget related to supervisor visit and fieldwork.

The controls over travel expenses could be strengthened. For example, pre-approvals for travel might not be consistently obtained. We were advised that the Generation group requires pre-approval of each business

trip; however, the inspectors responsible for Transmission project site visits do not require pre-approval for each trip due to allowances pre-set in job assignments. This inconsistency might cause inefficiency in capital project management and unnecessary travel expenses.

In our sample review, we noted travel costs of up to \$800,000 on projects (see Figure 2.2.9 below). Expectations and budgets for travel and living expenses of personnel overseeing construction are set out at the start of a project, consistent with BC Hydro policy and practice. All travel expenses are subject to review and approval by supervisors through the expense report process. In Generation, staff also required pre-approval for each trip whereas in T&D no further approval was needed if the travel was within the approved budget. BC Hydro also needs to take a more strategic view to travel planning and consider whether alternatives are available such as assigning staff to certain regions on a temporary basis. Doing so may negate the use of scarce resources used on weekly or bi-weekly travel from the Lower Mainland to other regions of the province.

Project	Budget	Travel
System Control Modernization Project	\$132,560,000	\$353,474
Greenfield Substations	\$51,088,454	\$770,909
Aberfeldie Redevelopment	\$90,000,000	\$806,300
Vancouver Island Transmission Reinforcement	\$140,000,000	\$243,470
Fort Nelson Resource Smart Upgrade	\$149,200,000	\$428,000
Bridge River Townsite Redevelopment	\$24,100,000	\$15,500

Figure 2.2.9

Furthermore, the organization could take a more strategic view on travel planning. For example, capital planning staff could work out travelling requirements for each period by looking at the capital projects in the next few years, then consider alternatives to travelling such as temporary accommodations in certain regions and assign capital staff accordingly. This approach could facilitate optimal resource allocations on capital management. Actual travel expense incurred in Fiscal 2010 has decreased 13% since Fiscal 2008 and is being budgeted to decrease by another 10% over the next three years. In recent years there has been a higher use of technology such as video conferencing and “Live Meeting”, where appropriate for operational requirements, which has helped to reduce actual travel.

In addition to implementing stronger controls, BC Hydro can manage costs more effectively by aligning their travel policy to the spirit and intent of government’s Core Policy, eliminating entertainment expenses (for example, business lunches and dinners, customer recognition gifts, employee lunches, etc.), establishing limits on receipted meals while

travelling on business or setting a per diem rate and revisiting the different mileage rates for the different categories of vehicles and distances incurred.

Recommendation

We recommend that BC Hydro:

- (17) Strengthen its controls over travel planning and align its travel policies and allowable business expenses with provincial government's Core Policy.**

Consultant and Contract Services

Both Consultant and Contracting costs increased approximately 40% between Fiscal 2007 and Fiscal 2010. Consultant costs are scheduled to increase by approximately 70% and contract services costs are to increase by 10% between Fiscal 2010 and Fiscal 2014. However, it should be noted that some of these costs may be capitalized or externally recovered, reducing the overall increase.

Increases in consultant expenses include reclassifying some expenses originally considered a cost of energy to operating costs to meet the new requirements of International Financial Reporting Standards (IFRS). As well, in Fiscal 2011, consultant fees related to transmission lines, resulting from the BCTC integration, are now included.

BC Hydro does not have immediate information on active consultants as their current system cannot verify the number of consultants or contractors without someone manually going through the contractor list and consulting with the various business groups.

Based on the panel's discussion with BC Hydro, they acknowledged the importance of having this kind of information and are fixing the reporting problem through their new human resource information system that will track consultants. In the absence of this system change, BC Hydro has put a control procedure into effect requiring that each Executive Team member personally authorize any management consulting expenditure in their area valued at \$5,000 or higher (contractor/consultant contracts over \$100,000 must be authorized by entire Executive Team) to ensure the work is required and that an employee cannot perform the function or task as part of their base job to manage costs more prudently.

Recommendation

We recommend that BC Hydro:

- (18) Continue with the new implementation of their human resource information system to ensure sufficient monitoring and reporting of active consultant and contractors.**
- (19) Implement stronger policy to ensure appropriate use of contract services.**

Apprenticeship and Trainee Programs

BC Hydro offers programs for trade qualification apprenticeships and other specialized training. Qualified individuals are enrolled in these programs as future employees and are provided extensive support while they undergo classroom and practical “on the job” training. The programs offered include trades such as electricians, power line technicians, cable splicers, as well as Engineers, Graduate Technologists and Management in training programs.

In Fiscal 2011, there were approximately 275 people in these programs and BC Hydro spent approximately \$11.9M on materials, courses, travel and labour (course, training time and trainer staff).

FY 2011 Actual (\$M)				
	Labour	Materials	Courses and Travel	Total
Apprentices	5,793,673	145,556	2,171,955	8,111,184
Other Trainees	3,436,948	43,849	334,188	3,814,985
Total Cost	9,230,621	189,405	2,506,143	11,926,169

Figure 2.2.10

This cost does not include the value of training employees received on the job learning to work with BC Hydro’s system and equipment. BC Hydro also receives value from the productive work provided by these trainees, for example, apprentice power line technicians spend approximately 10% of their time in formal training and 90% in the field as part of a crew.

Apprentices are required to personally pay for their climbing gear, basic hand tools, costing \$2,000 while vehicle truck and transport mechanics may spend up to \$15,000 to \$20,000 on their own comprehensive hand tools and tool box.

Apprentices attend both private and public training institutions such as BC Institute of Technology, Vancouver Community College and the Electrical Industry Training Institute operated by the IBEW. BC Hydro does not partner with any trade schools or any trade associations for cost sharing training purposes. Through the Electrical Industry Training Institute, BC Hydro also offers free safety training sessions to trade workers, paramedics, police and fire fighters. The union acknowledges the valuable asset the training provides to BC Hydro employees, private industry and other jurisdictions. BC Hydro’s apprenticeship program is recognized as one of the best.

Currently, BC Hydro funds training courses and some materials used by the employee and there is no requirement for them to remain as an employee once they have completed their training, trades qualification, certification etc. BC Hydro does not keep statistics on the number of employees who leave the company after completing their programs as there have been very few employees who have done so in the past.

Recommendation

We recommend that BC Hydro:

- (20) **Revisit their policy on funding all of the apprenticeship training costs and look into cost sharing opportunities by partnering with trade schools and trade associations.**
- (21) **Consider a payback policy requiring a commitment from staff to remain as a BC Hydro employee for a certain number of years after receiving apprenticeship training so that BC Hydro and ratepayers may benefit from the investment in the employee. BC Hydro should work collaboratively with the IBEW to establish a suitable arrangement for the apprentices under this collective bargaining unit.**

Donations and Sponsorship

The donations and sponsorship program (\$1.4M) provides donations, scholarships and sponsorships as an investment in building BC Hydro's positive reputation in communities. BC Hydro acknowledged that there may be some funding that may not be completely aligned with their community investment objectives and have identified approximately \$200,000 that may be reduced from that budget allocation. While this budget is fairly insignificant to the overall revenue requirement, there is a need for BC Hydro to revisit this program to ensure that these expenditures are aligned with core operational requirements.

Nothing significant was discovered with respect to other expenses such as other provisions, dues and fees and advertising (BC Hydro has already decreased their proposed budget by \$1M), material, supplies and tools. These budgets are relatively consistent throughout the three year Revenue Requirements Application period.

However, the panel believes BC Hydro should revisit these expenses to achieve the targeted percentage savings as discussed in the Overall Conclusion.

2.3 Procurement

Procurement

Current procurement practices are labour intensive and inconsistent. BC Hydro must improve their vendor relationships through enhanced contracting practices and effective risk management.

BC Hydro needs to transition away from labour and administratively intensive paper-based, manual processes, to automated practices that are centralized and streamlined. The organization must develop an effective change management plan to expedite the full implementation of its technology projects. Simply adopting a process of redesign is not adequate to ensure benefits are effectively realized.

In 2007, BC Hydro undertook a Procurement Enhancement Initiative to transition from an administratively intensive, manual process, to automated practices that are centralized and streamlined. The concept is that front line workers focus on project outcomes rather than processes. Over the past four years, BC Hydro has made improvements in this area which has led to better procurement practices. BC Hydro has increased the amount of competitive bids, resourced key procurement management positions, introduced automated and integrated IT solutions and developed a methodology to support strategic sourcing decisions to achieve better value for each dollar spent.

Although all of the above are positive steps, many initiatives remain only partially implemented. BC Hydro Executive should accelerate the transition. Currently, it will take years to fully implement. The longer the Procurement Enhancement Initiative takes the more money it costs. The key to accelerating the transition is organizational change in administrative processes and the culture of doing business in a more robust way to maximize efficiencies and lower costs. This practice will in turn lower the rates that are charged to the citizens of BC.

2.3.1 Consolidate Contract Spending

BC Hydro has an administratively expensive procurement practice of issuing small dollar, short term contracts directly to local vendors.

BC Hydro has made improvements to their procurement practices by increasing competitive bids and consolidating some contract spending. However, BC Hydro needs to further streamline and consolidate contract spending by reducing the number of small local direct awards, improve supplier relationships through increased transparency, develop a formalized vendor complaint process and embrace additional technology solutions to streamline business processes.

Maximizing Economies of Scale

Procurement best practices for a large organization emphasizes consolidating contract spending to maximize economies of scale. In large organizations, such as BC Hydro, there are opportunities to roll-up individual regional contracts which have similar deliverables into larger dollar value contracts which apply across the entire organization. Consolidating contract spending has two significant cost savings; first, it takes advantage of bulk purchase discounts and, second, it reduces administrative resource requirements within BC Hydro.

Through the Procurement Enhancement Initiative BC Hydro has adopted a strategic sourcing methodology based on the principle of maximizing economies of scale. However, there are still opportunities in the organization to reduce costs.

Opportunities for Savings

Twenty eight percent of the \$2.2B in contract dollars signed in Fiscal 2011 were directly awarded to vendors rather than through open solicitation processes. Given this figure, there are significant operational savings in pursuing strategic sourcing alternatives which would increase competition, reduce administrative costs, improve contractor oversight and simplify the planning process through consolidated long-term contracts with key vendors.

A viable option to increase economies of scale is to take advantage of the Shared Service BC program within the provincial government to see if there are opportunities to onboard or leverage existing government wide contracts. The BC government has had significant success with consolidating services in the information technology and facility management business areas.

BC Hydro will continue to investigate strategic sourcing opportunities like leveraging existing government corporate supply arrangements to maximize discounts through government wide purchases.

Accenture

BC Hydro identified savings of \$250M over the 10 year life of the Accenture outsourcing arrangement, and based on our review, these savings appear reasonable. Currently, BC Hydro is in negotiations with Accenture to possibly extend the existing agreement which expires in 2013.

In 2003, BC Hydro's contract with Accenture was the largest outsourcing relationship in Western Canada and one of the largest in Canada. ABSBC's current scope of services includes: technology services, customer care services, meter reading, credit and collections, human resources, accounts payable, building management/maintenance and office services.

BC Hydro's total actual savings, plus remaining projected savings as of today, will exceed the \$250M savings target. The commitment to a 10-year contract length was deemed fundamental to achieving the objectives envisioned at the beginning of the agreement.

Recommendations

We recommend that BC Hydro:

- (22) Where appropriate, include Shared Services BC in procurement strategies and solicitation processes for possible opportunities to onboard or leverage existing government wide contracts. As well, BC Hydro should utilize corporate supply arrangements to maximize discounts through government wide purchases.**
- (23) Continue to investigate opportunities to streamline and consolidate the procurement of common goods or services to achieve significant long-term savings.**

2.3.2 Improving Supplier Relationships

Improving vendor relationships is a necessary component in transforming the procurement culture within BC Hydro.

In winter 2010, the Executive of BC Hydro engaged an independent consultant to complete a Supplier Engagement Survey. BC Hydro received feedback that the organization was lagging behind their industry counterparts. BC Hydro suppliers were dissatisfied with their relationship, mainly due to a lack of transparency and not having an effective way to escalate their concerns through an official Vendor Complaint Review Process. BC Hydro realizes that they need to improve these relationships to increase competition, innovation and to ensure best value for ratepayers.

The Supplier Engagement Survey also identified a number of issues related to BC Hydro's approach to risk management in contracts. Twenty five percent of survey respondents said they include a premium in their bid to BC Hydro of between 10-30%, averaging 16%, due to the additional administration and risks they are forced to undertake. Suppliers also said that they needed to increase their bid prices to ensure that they cover all risks and unforeseen circumstances (examples were given by suppliers bidding \$50M on a \$40M project). Alternatively, other suppliers were not bidding on BC Hydro's projects. However, it was unknown whether the respondents were, in fact, winning bidders. Further, the survey found that a high level of specificity and rigid enforcement of the contract hindered the contractor's ability to identify the best solution at the lowest cost. BC Hydro can improve its risk allocation on capital projects through innovative procurement management, better communication of risks and enhanced project management.

Due to these findings, BC Hydro is currently implementing an action plan to address the issues raised in the Survey. BC Hydro will establish a joint BC Hydro/Supplier working group to identify contractual (both commercial and technical) and operational behaviour issues. Efforts will be made to ensure that the risk review occurs earlier in the planning process and is incorporated into the procurement options analysis. Improved collaboration between suppliers and BC Hydro will be required to ensure that the risk transfer has been made to the party best able to manage the risk at the lowest cost, while serving the public interest. These efforts will require a considerable amount of change management and will need to be scalable based on the size and complexity of the project/procurement opportunity.

Increasing
Transparency
and Consistency

BC Hydro operates within business group silos. This business model increases the risk of inconsistent practices which would, if realized, impact negatively on transparency and vendor relationships.

BC Hydro's standard procurement templates and policy guidance documents have recently been updated to support improved alignment with government procurement principles; however, these policy changes have not been adopted consistently across the organization. For example, within the different business groups, there are inconsistent competitive bid disclosures. Some business groups disclose weighted evaluation criteria while others only disclose the ranking of the evaluation criterion. The result of these variable practices is inconsistent transparency within the organization which has negative impacts on BC Hydro's supplier relationships.

Adopting the best practice of disclosing the weight of each evaluation criteria outlined within competitive bid documents will increase transparency to both the supplier community and the general public. If this standard is consistently adopted, it will result in improved quality of bid submissions and a reduction in administrative costs to both vendors and BC Hydro.

Vendor
Complaint
Review Process

The provincial government has a formalized Vendor Complaint Review Process which provides a mechanism to enhance vendor relationships by providing a fair and transparent way of addressing their concerns.

The Vendor Complaint Review Process does not overturn contract awards nor does it assess punitive damages. Instead, it provides a mechanism to allow the vendor community to raise issues of real or perceived lapses in the application of fair and open competitive procurement policies. It also provides a means to identify gaps in policy or procedures, and acts as a process improvement tool.

Adopting the Government Vendor Complaint Review Process will address the recommendations in the Supplier Engagement Survey, and streamline business processes resulting in administrative cost savings.

Recommendations

We recommend that BC Hydro:

- (24) **Ensure that weighted and defined evaluation criteria are mandatory within competitive bid documents to improve transparency, promote consistency and enhance vendor relationships.**
- (25) **Adopt the Government's formalized Vendor Complaint Review Process to provide vendors with a fair and transparent way of addressing their concerns. This process will also provide a means to identify gaps in policy, or procedures, thereby acting as a process improvement tool.**

- (26) **Continue to work with vendors through the Joint BC Hydro/Supplier Working Group to improve contractual (both commercial and technical) language and involve vendors in risk transfer strategies to ensure risks are allocated appropriately between BC Hydro and vendors.**

2.3.3 Leveraging Technology

BC Hydro has been making progress towards leveraging technology to support streamlined business solutions. Before 2007, the procurement process was extremely manual; for example, purchase orders were manually matched to invoices and receipts. This manual process was inefficient and costly. The Procurement Enhancement Initiative in 2007 introduced Procure-to-Pay, an automated and integrated solution that manages the entire procurement cycle from requisition to payment.

Technological advancements will require dramatic changes to BC Hydro's culture. Before a procurement process is automated, the process must be streamlined. Streamlining historical practices to create efficiencies in an organization is heavily dependent on change management and to date, this cultural transformation has been slow at BC Hydro. BC Hydro's tendering process remains manual and an e-commerce module to support electronic ordering, receipt and payment of goods and services is in the pilot stage.

Electronic Tendering

Adopting the government's BC Bid technology as outlined below represents a path to be considered to support BC Hydro's advancement towards automation.

Since 1995, the BC Bid application has been the single point of access to BC public sector economic opportunities for citizens, business owners, manufacturers and contractors. The system accepts electronic bids from self-registered suppliers, enables suppliers to receive customized electronic notification of tender opportunities, and manages all BC Government goods requisitions in a fully electronic end-to-end procurement process integrated with government systems.

Having a more streamlined process, which involves electronic bid submissions (where it makes good business sense), will allow automatic time stamping, improved efficiencies in tracking documents and more timely delivery of bid submissions to evaluation committee members.

BC Bid also has functionality which supports contract award information. If BC Hydro adopted this functionality and completed this information for all contracts posted, it would increase transparency and have a positive impact on supplier relationships. The BC Bid service is available to BC Hydro for free and does not require any investment of capital.

Electronic Plans and Drawings

BC Hydro is also able to take advantage of the BC Bid application to access electronic documents, which would allow interested vendors to download electronic copies of documents. Interested vendors from across the province would have real time access to the bid drawings and plans.

BC Hydro currently absorbs the cost of supplying interested vendors with professional detailed drawings and plans in hard copy. These documents are provided free of charge to the interested vendors at their request by Queen's Printer. BC Hydro covers these capital costs, which totalled approximately \$600,000 in Fiscal 2011.

Given that vendors can access these documents electronically, BC Hydro should consider revising their policy and requesting that interested vendors pay directly to Queen's Printer for shipping and copying of hard copy documents.

E-Commerce

BC Hydro has already invested in e-commerce technology to support electronic ordering, receipt and payment of goods and services, however it has not been fully implemented.

Analysis of the vendors' payments revealed that on average a vendor receives payment in about 45 days (the payment per vendor ranged from 21 days to 85 days). This is below industry average, which is approximately 30 days.

The Average Days Payable calculation suggests that once the e-commerce module is fully implemented there is an opportunity to take advantage of early payment discounts in order to realize cost savings, improve relations with vendors and leverage existing IT technology.

Recommendations

We recommend that BC Hydro:

- (27) Work with the province to fully adopt the functionalities of Government's BC Bid technology to maximize efficiencies by leveraging existing government technology and through strategic sourcing and consolidation of new bid opportunities and purchases.**
- (28) Cease absorbing the cost of supplying interested vendors with professional detailed drawings and plans in hard copy. The current policy of covering costs is not consistent with other government entities and would result in direct savings.**
- (29) Expedite the full implementation of its technology projects to support electronic ordering, receipt and payment of goods and services. Simply adopting a process of redesign is not adequate to ensure benefits are effectively realized. Technology projects' implementation need to be supported by a strong executive change management strategy.**

2.3.4 Capital Procurement Management

BC Hydro needs to develop a better understanding of different procurement approaches and improve its procurement management over capital projects. This will enable BC Hydro to shift toward the use of more non-traditional procurement approaches such as Design-Build and Public-Private Partnerships. This will foster innovation and result in greater cost effectiveness and value for money. A better understanding of the procurement process would allow for BC Hydro to more effectively transfer risk to the vendors while achieving project deliverables on time and on budget.

Procurement Option Analysis

While BC Hydro is working toward more innovative capital projects such as Design Build projects, bundled projects and even the proposed Design Build Finance Rehabilitation project to rehabilitate and/or upgrade the John Hart Generating Station on Vancouver Island, these innovations have occurred mostly over the last three years. There is a tendency for BC Hydro to exert significant control over their projects which limits vendors' flexibility to deliver the project in a way that may be advantageous to both parties.

Different procurement options exist and fit different situations. The approach selected is dependent on a range of considerations including owner expertise, project size and complexity, prevailing market conditions as well as scheduling and funding constraints and risk tolerance. Procurement approaches used by BC Hydro are summarized in Figure 2.3.1 below.

Procurement Type	Characteristics
Design Bid Build, also known as the Traditional Model	<ul style="list-style-type: none"> • Owner acts as Project Manager or contracts with a professional Project Manager to act on its behalf • Owner retains an architect and/or engineer to prepare drawings and specifications under the direction of the Project Manager • A fully designed project is tendered with working drawings and a set of contract terms • Owner recruits a General Contractor to construct the project under the oversight of the Owner/Project Manager • May be appropriate if the project risks are too costly for contractors to take on • Project scope is well known providing relative certainty regarding project costs • Construction performance risks are effectively transferred to the General Contractor • There is some sharing of risks, but because the owner is accountable for the project design, the owner takes on the risk related to project design • The owner needs stronger project management since they are taking on most of the project risk • Can lead to costly change orders if the project design is not right

Procurement Type	Characteristics
Construction Management	<ul style="list-style-type: none"> • Owner acts as Project Manager or contracts with a professional Project Manager to act on its behalf • Owner retains an architect and/or engineer to prepare drawings and specifications under the direction of the Project Manager for use in a series of trade tenders • Owner contracts a Construction Manager on a fee for service basis to work with the design team, to conduct value analysis and to arrange trade tender processes • Owner may contract directly with trades, suppliers and others or may require contracts between the Construction Manager and trades, thus effectively transferring this risk • Useful if there is insufficient industry capacity to ensure competitive bids from general contractors • Can help manage potentially critical service disruptions by tendering in sequence • Can accelerate the project's delivery schedule to meet critical service or operational requirements through fast tracking or overlapping • Costs are not fully known during early stages • Owner relies heavily on the Construction Manager • Owner is responsible for funding any costs above the approved budget • Less competitive if the general contractor does not openly procure the subcontracts that lie underneath • Owner takes on many contracts (with construction manager and sub trades) adding to complexity • Owner is responsible for cost overruns and delays
Design Build	<ul style="list-style-type: none"> • Owner acts as Project Manager or contracts with a professional Project Manager to act on its behalf • Owner retains an architect and/or engineer to prepare high level concept and functional requirements and deliverables • Owner selects a Design-Builder to prepare detailed designs and a budget based on the Owners requirements • Design-Builder completes designs and detailed specifications using its own architect, engineer and other specialists and constructs the project • Owner/Project Manager administers the Design-Builder contract • Single point of responsibility for design and construction • Design-Builder takes on design and construction risk • Should result in fewer change orders • Promotes innovative and cost effective approaches • Integrating design and construction has the potential to deliver faster completion • Ability to evaluate contractors on factors other than cost • Owner can control cost at early stage • Owner loses some control • Owner's requirements must be well-defined early on • Risk that the contractor meets criteria through cheaper material and minimum design • Costly for proponents to develop proposals • Requires more owner skill on front end work (e.g. to prepare RFP) • Lack of project definition prior to contract award

Procurement Type	Characteristics
Public Private Partnership models (includes Design Build Finance Rehab and other variations)	<ul style="list-style-type: none"> • Long-term, performance- based contract where a range of risks are transferred to a private sector partner • Owner contracts with a private partner to undertake some combination of design, financing, construction, long term maintenance and rehab and/or operations • Some level of financing is provided by partner • Payment is based on service performance and availability of asset • Contracts usually last a very long time (e.g., 30 years or more) • By integrating design, financing, construction and longer term operations and maintenance this option can facilitate: <ul style="list-style-type: none"> ➢ Effective risk transfer across a broader range of activities including design, construction financing and operations ➢ Schedule and cost certainty ➢ Improvements to a project's constructability ➢ Greater freedom for private sector innovation in design through construction ➢ Long term asset maintenance and service performance • Private partner has a vested interest in the long term performance of the asset increased level of risk transfer due financing transfer • Reduced risk to owner when payment linked to performance • Long term agreements are inherently more complex and resource intensive • Requires expertise to manage the procurement and the negotiation of life cycle costs • Owner exercises control over the project somewhat indirectly through mechanisms such as performance measures • The model is limited to larger scale projects, e.g., exceeding \$50M

Figure 2.3.1

BC Hydro stated that, despite the move towards more innovative Design Bid models recently, they have a tendency to rely on traditional procurement approaches such as Construction Management and Design Bid Build models. Also, few Design Bid models were noted in the project files. One file reviewed showed a Design Build model however, BC Hydro controlled the project and utilized extensive in-house design to do so. This approach undermines the effectiveness of a Design Build model and mitigates the ability to effectively transfer risks to their vendors.

Procurement staff need to be involved early in the planning process to provide expertise in risk analysis, market sounding and contract development to achieve the greatest value from innovative procurement options and to provide assurances that the most appropriate model is chosen given the circumstances.

Managing the Cost of Risks

In order to provide assurances that the risks are effectively allocated and managed as planned, BC Hydro needs to identify the detailed risks in a project risk register, including who the risk was assigned to, who is monitoring it and the costs associated with the particular risks. This risk register should be started in the early phases of the project and be

continually updated and monitored by the Project Manager as risks evolve. In the project files, the risks and general mitigation strategies were identified in a risk register; however, the register did not adequately identify which party was assuming the risk or the associated costs. Therefore, BC Hydro could not demonstrate whether they were receiving good value for money and they could not demonstrate an informed understanding of risk or effective risk management.

This risk register can inform the procurement analysis and, if included as part of the tender documents, it can allow for informed negotiations on risk transfer. For example, vendors may want to assume certain risks included in the register and can identify terms, conditions and costs to accepting these risks for BC Hydro’s consideration. In addition, the risk register can allow for a more precise estimation of contingency amounts that may be required to mitigate those risks. Further, a review of the risk register at project completion, in consultation with the contractors, can provide for knowledge transfer in relation to risk management and allocation.

Change Orders

BC Hydro’s approach to procurement and risk allocation has resulted in multiple change orders for their projects. Also, excessive contingencies on projects did not provide the incentive to manage the change orders at a reasonable level, which is defined as 3% of individual contract or total project budget excluding the costs of land acquisition. Change orders were prevalent in our sample, irrespective of the type of procurement approach and in spite of the degree of internal engineering services done to limit incomplete designs or inappropriate project specifications. In the small contracts we sampled, some change orders resulted in a 100% increase to the contract value. In our review of contract files for six large capital projects, we noted the following:

Change Orders		
Project	Procurement Type	Change Orders Noted
System Control Centre Energy Management Systems	Design Bid Build	\$6.5m or 5% of project value
“Greenfield” Distribution Substations	Design Build	\$2.6M or 5% of project value
Vancouver Island Transmission Reinforcement	Design Build and Design Bid Build	\$7.3M or 3% of project value
Aberfeldie Redevelopment	Design Bid Build	\$12m or 13.3% of project value
Fort Nelson Resource Smart Upgrade*	Design Bid Build for civil and Design-Supply for equipment	\$1.2M or 6% of General Contractor contract pending executive approval \$3.4M or 45% of original contract value on design and CM services
Bridge River Townsite Houses & Infrastructure Redevelopment *	Design Bid Build	\$1.4M or 114% of original contract value on design and CM services

*Project is still in progress

Figure 2.3.2

Capital construction is inherently risky and some changes are unavoidable (e.g., revised building codes or advancements in technology). However, BC Hydro's change orders are high compared to a reasonable, commonly accepted benchmark of 3% of the project or contract budget (excluding land costs). Further, there is a risk that the vendor community may view the excessive use of change orders as a means of avoiding fair procurement practices. For example, some vendors may perceive others as using the change order process to compensate for their low bid.

It was noted, however, that change order protocols were included in contracts, requests were well-documented, approval procedures and descriptions were satisfactory, and negotiation on the changes was evidenced. To improve change management, BC Hydro needs to limit the change orders to no more than 3% of individual contract or total project budget. Further, BC Hydro should consider adding change order origin (e.g., owner, architect, engineer, site conditions) to the change order log and consistently documenting the submitted amount and settled amount. This information can be then assessed at project completion to inform the effectiveness of planning and risk management.

Recommendation

We recommend that BC Hydro:

- (30) Capital staff work more closely with procurement staff to achieve the greatest value from innovative procurement approaches for example, Design-Build and Public-Private Partnerships.**
- (31) Ensure procurement staff are sufficiently trained and continuously update their knowledge around procurement.**
- (32) Fully identify project risks in a risk register and communicate the assignment of capital project risks with vendors, for all large capital projects.**
- (33) Ensure the cost of change orders is within 3% of initial project and contract budgets.**
- (34) Document change order origin, submitted amount and settled amount in the change order log to allow for a comprehensive assessment at project completion.**

2.4 Capital Assets

BC Hydro has well-established practices for planning, utilization and spending strategies for capital assets. However, BC Hydro needs to manage its capital investment more carefully to allow for reasonable rates over the long term. BC Hydro should improve procurement choices and spending strategies including more effective risk transfer, cost controls and continued integration of departments. In particular, BC Hydro must pay attention to its risk management practices, focusing on effective risk transfer and communication with private sector partners. Also, BC Hydro

could consider reducing soft costs and deferring some capital projects to obtain further savings.

BC Hydro recorded \$21,677M (\$14,104M net of accumulated depreciation) of property, plant and equipment and intangible assets on its Financial Statements for Fiscal 2010. Each year, BC Hydro takes on numerous capital projects. The expenditures identified in the Fiscal 2012 to 2014 Revenue Requirements Application totals \$7,235M and can be categorized by lines of business as in the Figure 2.4.1 below. These expenditures are not depreciated until they go into service at which point the accumulated expenditures become capital additions. As such, the capital expenditures do not impact short term electricity rates charged to customers until they go into service.

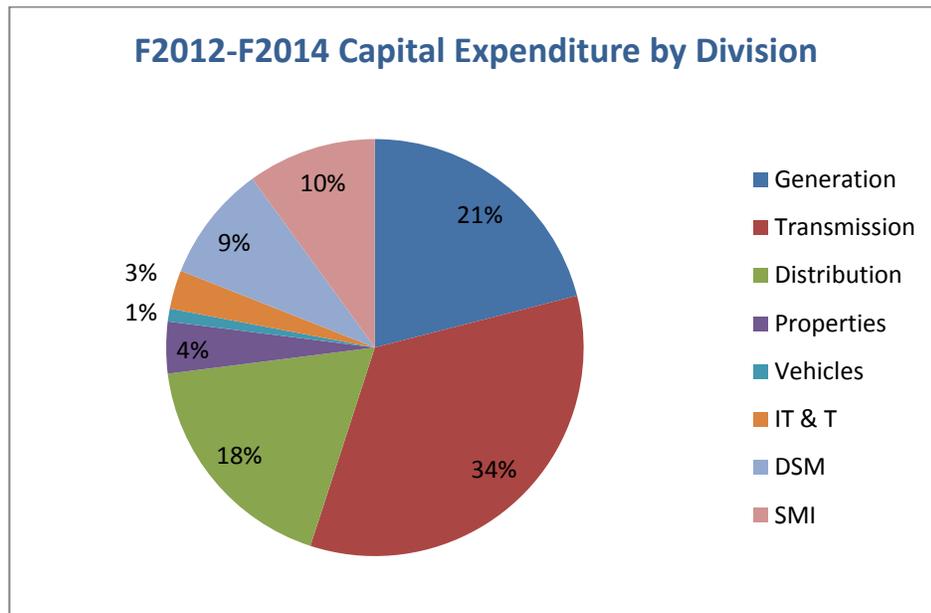


Figure 2.4.1

The capital programs include the following:

- **Generation** – This business group includes dams and generating facilities used to produce energy. BC Hydro owns and maintains 75 dams at 42 sites throughout the province. The generation facilities include 31 hydro electric stations, 3 thermal generation stations and some diesel generators. The thermal stations are in remote locations with the exception of the Burrard Thermal Generation Station in Port Moody. A regulation under the *Clean Energy Act*, however, stipulates that the Burrard facility can no longer be relied upon for energy and that it can be used for emergency purposes only, such as in a situation where the transmission line supplying energy to the Lower Mainland goes down (Section 3.1.3 has further discussion of Burrard). Capital expenditures in this department total \$1.5B or 21% of total capital spending from Fiscal 2012 – 2014.

- Transmission and Distribution – This business group is comprised of over 18,000 kilometres of transmission lines and related substations that transmit high voltage power from the generating facilities to the distribution system or directly to industrial customers. The power from the transmission system is stepped down to lower voltages and delivered to residential and commercial customers through the distribution system. The distribution system is comprised of over 57,000 kilometres of lines, 900,000 poles, and related equipment such as transformers, circuit breakers, etc. The transmission system was managed by BCTC prior to its amalgamation with BC Hydro in July 2010. Capital expenditures in this department total \$3.7B or 52% (34% in transmission and 18% in distribution) of total capital spending.
- Properties – This area is responsible for over 115 buildings including headquarters or office buildings and field offices. Capital expenditures in this area relate to field office rebuilding, headquarters improvements and building improvements. The Home Purchase Offer Plan, whereby BC Hydro acquired and resold homes along the Tsawwassen right of way, is also operated by the properties department. Four percent of capital expenditures relate to this department.
- Vehicles – This area manages a fleet of over 3,000 heavy duty, light and medium duty working vehicles, transportation vehicles, equipment, trailers and other vehicles. Vehicles account for 1% of Capital expenditures.
- Information Technology and Telecommunications – This area, accounting for 3% of capital expenditures takes on a variety of information technology and telecommunications projects to support BC Hydro's business.
- Demand Side Management – These expenditures relate to PowerSmart and other similar programs designed to encourage energy conservation amongst customers. Although it does not consist of tangible capital property, it is allocated to Capital since the costs are deferred and amortized over ten years to better match the costs with the expected benefits which are expected to last for ten years. See Section 3.6 for further information.
- Smart Metering Infrastructure – This program involves replacing existing customer meters with smart meters and upgrading the technology and telecommunications infrastructure. This significant initiative is discussed further in Section 3.6.

Some projects are specifically required by legislation including Smart Meters and DSM. These expenditures total 19% of projects. Further, the *Clean Energy Act* exempts some projects (9% of total expenditures for Fiscal 2012 – 2014) from the regulatory process under the UCA whereby BC Hydro must obtain a certificate of public convenience and necessity before they begin the construction or operation of a public utility plant or system. BCUC may, however, review the prudence of expenditures for these programs later when BC Hydro applies to recover costs through rates. These projects are all considered growth projects and comprise 23% of total growth projects. They include the Northwest Transmission Line, Mica 5 & 6 Generating Facilities, Revelstoke 6 Generating Facility and Site C Dam and Generating Facility. Note that the Site C project is not included in the Capital Expenditures over the next 3 years since it is currently at the environmental assessment stage.

2.4.1 Overall Capital Planning

BC Hydro takes a lifecycle approach to managing its assets with the goal of minimizing total costs of assets, including capital and maintenance, over the long run. Capital needs are identified through long term business planning, load forecasts, asset condition assessments and various studies. Risk based Capital Plans are developed by each business group.

Generation benchmarks the performance, maintenance and operating costs of a sample of assets each year to understand how the assets are performing. It also inspects its facilities on a cyclical basis and is moving towards condition based inspections, recognizing that some assets are in more need of inspection. Maintenance is focused on key and strategic assets.

The Equipment Health Rating (developed for major equipment) is used along with information on reliability statistics, equipment availability, plant performance, load growth and changing legislation to develop their risk based Capital Plan. The Facility Asset Plan, which sets out the strategy for the use of the facility, and planned outages are also factored into the maintenance and capital needs. Dam Safety is managed and reported separately due to the extreme risks of a dam failure and the need to satisfy regulations.

T&D prioritizes its capital projects using a risk based methodology. T&D also utilizes a Sustainment Investment Model to validate age and condition of assets, and a risk-based approach to target spending to assets identified as highest need. System key drivers include load growth based on forecasts up to 30 years, age and condition of assets, reliability and electric tariffs and regulatory requirements including the *Clean Energy Act*.

All capital projects are based on one or more capital drivers which include:

- Growth projects totalling 59% of capital expenditures are driven by load growths, requirements to connect customers and power producers, the *Clean Energy Act*, and under investments in prior years which have led to the system being at or near capacity in some areas.
- Sustaining projects, totalling 36% of capital expenditures, are driven by aging assets, under investment in prior years which have led to assets in poor condition or need of rehabilitation, reliability needs and requirements, dam safety or other risks such as safety, environmental and risk mitigation. IT projects are also sustaining projects.
- Corporate projects, including properties and vehicles, are driven by the aging assets, increasing FTE counts and other corporate needs.

2.4.2 Project Planning Processes

BC Hydro needs to improve their risk management, procurement management and project budgeting to provide better value on their capital projects. This conclusion is based on a review of 20 Generation and Transmission capital files (see attached Appendix A for list) and some corporate capital project files and contracts on small projects. However, BC Hydro does have some good capital planning practices, for example:

- BC Hydro uses a lifecycle approach for managing assets to monitor the health and maintenance needs of assets;
- capital projects are all justified based on key drivers, such as the *Clean Energy Act*, the requirement to connect customers or power producers, load growths, aging assets, reliability needs, dam safety and other risk factors;
- alternatives analysis are comprehensive and include an analysis of DSM, purchasing power on the market or from IPPs and various alternate approaches;
- projects are compared to alternatives using qualitative and quantitative factors including net present value; and
- business cases are supplemented by third party technical studies and condition assessments such as seismic studies and reliability reports.

Project Management

BC Hydro tends to exert significant control over their capital projects which limits vendors' flexibility to deliver the project in a way that may be advantageous to both parties. BC Hydro historically developed rigorous project specifications or set out prescriptive rules before they went to market to find a vendor to deliver a project. While this approach makes sense for a traditional project, it does not provide the vendor with the flexibility they need to deliver a good project within a reasonable cost. BC Hydro acknowledges that they over manage their capital projects to ensure quality workmanship of contractors. This tendency was confirmed through the vendor survey. As such, BC Hydro needs to move towards more performance based project management and allow vendors to more effectively deliver on their contracts. This shift should lead to better relationships with vendors, lessen project budgets and produce more effective outcomes.

BC Hydro requires management information to assist in the implementation of projects. The existing system has limited capability to monitor milestones and deliverables on long term, multi-year projects. In June 2011, BC Hydro is implementing a new Project Management system and tools across the company to improve consistency and standardization in planning, procurement and contracting. This new system should provide better information for strategic decision making and project management.

Recommendation

We recommend that BC Hydro:

- (35) Move towards more performance based project management in order to enable contractors to more effectively achieve deliverables.**
- (36) Implement and use their new project management system to provide better information for strategic decision making and project management.**

2.4.3 Utilization of Capital

BC Hydro's assets in all departments are well utilized. However, the corporation has invested very little in their infrastructure in the last 20 years as noted in Figure 2.4.2 below. This under investment has led to aging assets, assets run at capacity and assets in deteriorating condition.

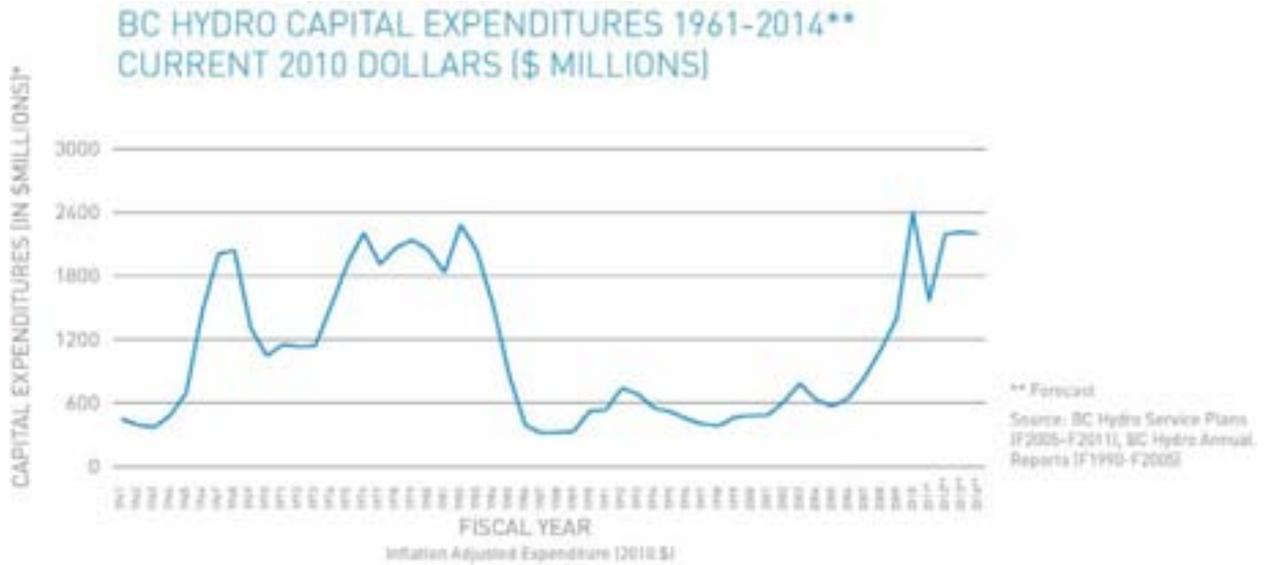


Figure 2.4.2

As a result, BC Hydro needs to invest in assets or acquire alternative energy sources to meet future capacity requirements, at a significant cost to ratepayers. Figure 2.4.3 below shows that BC Hydro has aggressively increased its capital spending over the last 5 years, particularly in comparison to other utilities, to address the aging assets and to meet the expected load growth from regional and economic development.

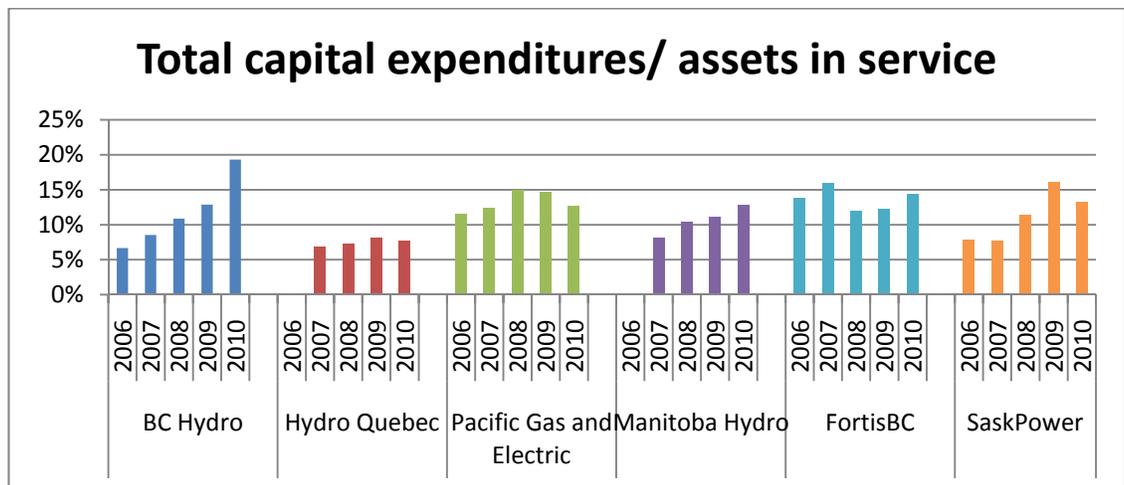


Figure 2.4.3

Generation Facilities – Utilization

Generating Facilities are highly utilized and operate at close to expected capacity. However, the availability of BC Hydro’s generation facilities is declining and is not comparing favourably to Canadian Electrical Association counterparts. Specifically, BC Hydro has noted that the Forced Outage Factor, a measure of unforeseen outages which could be caused by various factors such as equipment breakdown, accidents, or weather conditions, started to increase in Fiscal 2008. The Forced

Outage Factor is now considerably higher than other counterparts measured by the Canadian Electrical Association as noted in Figure 2.4.4.

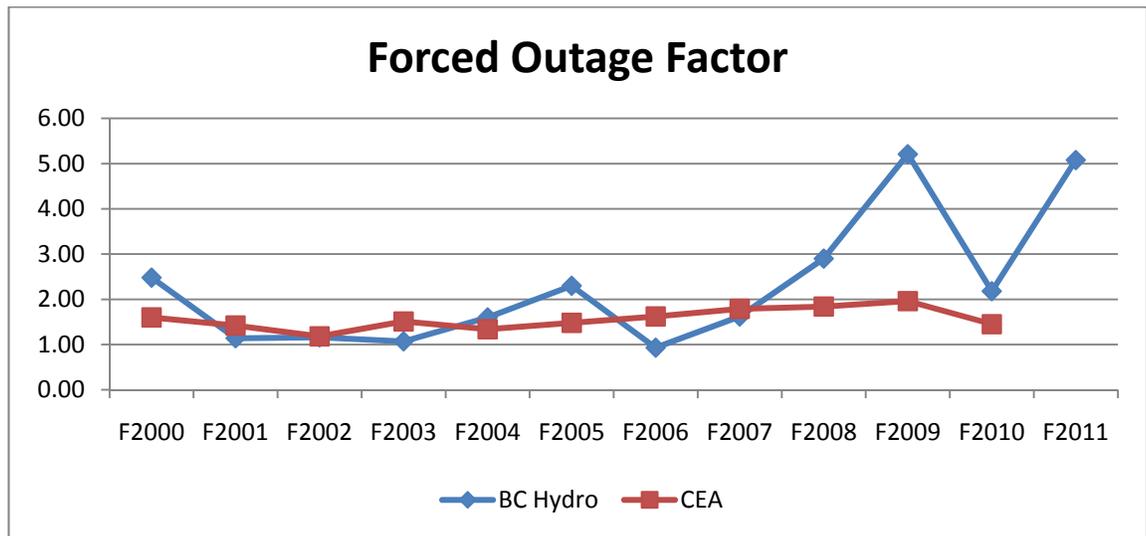


Figure 2.4.4

This decreasing reliability can be attributed to aging assets. Specifically, the very high outages in the fiscal years 2009 and 2011 are a result of equipment failure and rock falls including the following:

- GM Shrum Unit 3 turbine failed catastrophically in 2009 forcing the unit out of service for the entire fiscal year (the unit was out of service for a total of 14 months);
- Bridge River Unit 4 was forced out of service for about 6 months in F2009 due to explosive failure of the unit circuit breaker;
- Whatshan Unit 1 was forced out of service for about 4 months in F2009 due to a rock fall in the penstock tunnel which also resulted in damage to the turbine;
- Alouette generating station has been forced out of service since February 2010 due to a rock fall at the intakes (and remains out of service);
- Shuswap Unit 2 was forced out of service for about 9 months in F2011 due to severe vibration in the turbine bearing and damage to the exciter; and
- Ruskin Unit 2 turbine bearing failed, forcing the unit out of service for about 4 months in Fiscal 2011.

BC Hydro's generating facilities have an average age of 49.5 years. While significant investments were made to generating facilities in the 1950's and up to 1984 when the Revelstoke Dam was built, there has been little

new investment since. In comparison, Hydro Quebec built 20 generating facilities between 1971 and 2010 with a capability of over 21,000 MWs. Also, wear and tear on the equipment from high utilization and under investment in maintenance have contributed to the decreasing reliability.

BC Hydro engages in an industry benchmarking exercise annually to understand how the performance and costs of its facilities compare to other facilities. The February 2011 report identified, amongst other items, that BC Hydro's spending, overall, has increased dramatically for all stations when compared to earlier benchmarks and that plant performance problems identified in the maintenance section may be indicative of historically low levels of investment over many years. It has also led to the need to invest to maintain and grow the system.

Transmission and Distribution Assets – Utilization

BC Hydro has also maximized the capability of its T&D assets. Although it provides reliable service to its customers, the reliability is trending downwards. Figure 2.4.5 shows that BC Hydro has missed its target for Average Interruption in Hours per Interrupted Customer, or CAIDI, for the last 3 years. Although BC Hydro's targets and actuals compare to SaskPower, Manitoba Hydro is consistently more reliable than BC Hydro.

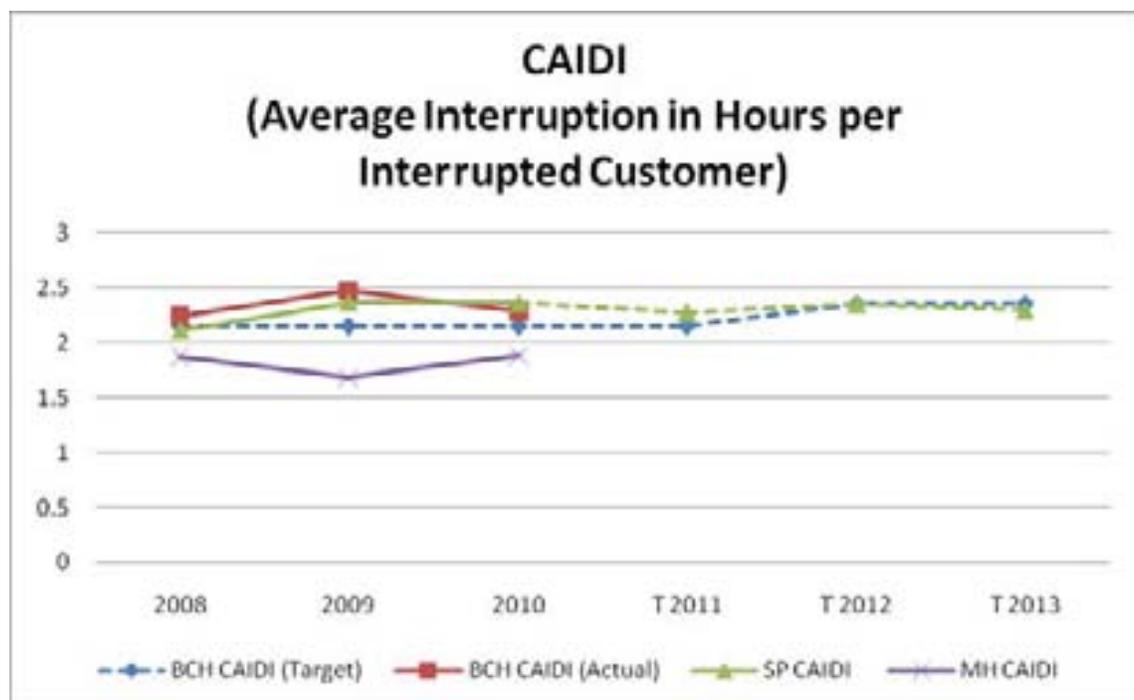


Figure 2.4.5

Also, BC Hydro has missed their System Average Interruption Frequency Index target (a key indicator that measures the number of interruptions per customer per year) for the past 3 years and this forecast is increasing over time, implying a reduction in reliability. BC Hydro systems are operating at or near capacity in many areas. These trends have once again led to the need for BC Hydro to invest in the system to sustain and grow assets so

that they can continue providing reliable service to customers. Recently completed projects are showing high utilization and improved reliability: an indication that the projects were justified.

Other –
Utilization

BC Hydro is increasing its utilization of its headquarters properties with renovations planned to increase the utilization of staff by per square foot. BC Hydro's criteria for determining vehicle replacement are age, mileage (dependant on vehicle type) and condition assessment of each vehicle. BC Hydro uses its vehicles for 20% longer than other companies.

2.4.4 Spending Strategies

BC Hydro has a significant sized capital portfolio which represents a large component of the price increase to ratepayers, now and in the future. Capital additions represent a rate increase of approximately 3.0, 5.6 and 5.6% over the next 3 years. BC Hydro needs to tightly control their project costs in order to maintain reliability while minimizing the rate impact to customers. Additionally, BC Hydro needs to ensure lower levels of spending will not impact system reliability. While there are several good cost containment controls in place, BC Hydro must do more to reduce costs, including reducing budgets and implementing better cost controls or deferring projects.

Cost Controls in
Place

In order to control its costs and effectively budget for capital expenditures, BC Hydro employs a rigorous exercise to estimate capital project costs. Estimates are based on the expected amount of work needed to complete the capital project and use a Monte Carlo statistical analysis to factor in uncertainty. Independent cost appraisers are consulted to verify the budgets and assumptions and as the projects move into more advanced stages, the estimates are revisited and accuracy improves.

Funding approvals are needed at various checkpoints and financial approval limits are governed by policy. Contracts are competitively tendered to provide assurances that value is achieved and actual costs are monitored monthly by the Project Manager, Project Sponsor and Finance Department and quarterly by the Capital Committee of the Board.

Budget Concerns

BC Hydro has, for the most part, successfully completed their projects within approved funding, documenting that 73% of the projects were completed under budget in Fiscal 2011 (64% in 2010). This result was achieved despite that, as a result of their statistical estimate modelling, they expect 50% of the projects to be over the approved funding. These results are an indicator that the estimates are generous and reflective of the risk adverse nature.

If BC Hydro is willing to take on more risks, these estimates, and ultimately costs, could be reduced. We note that variable pay incentives for Project Managers, ranging from 10 to 15% of salaries, are tied to the

ability to bring projects in on budget, schedule and scope. While this can be good motivator to manage costs, if budgets are not well controlled it can also be an incentive to keep budgets high (pad budgets). This incentive could explain why BC Hydro's capital projects are usually under budget. Reduced contingencies and project reserves, price caps, better control over travel and soft costs and a more strategic approach to choosing internal versus external professional services should help reduce budgets. These approaches, together with better procurement management and risk transfer, as discussed above, should reduce capital costs and the resulting cost to ratepayers.

Cost
Expectations

Project planning at BC Hydro follows several steps. An issue is identified and a project is designed to address the need. Various alternatives are considered to address the requirements of the project and alternatives are analysed to select a project design that will meet BC Hydro's and customers' needs. A comparison of costs is always considered when selecting the best alternative.

Once the project is identified, the cost estimate is built and refined based on a work plan that identifies the required engineering, project management, construction, or other internal or external resources, equipment and soft costs. Currently, the planners and project managers are not constrained by a price cap. If a concept plan and cost estimate were provided to the board or executive before the detailed estimating work is undertaken, a preliminary cost expectations could be established serving as a price cap. With cost expectations in place, the planners and project manager would more diligently look for trade-offs between functional elements, building materials, design elements and aesthetics when completing the value analysis to obtain cost savings in designing the project and drafting the work plan.

Recommendation

We recommend that BC Hydro Board and/or Executive:

(37) Review concept plans and cost estimates as a basis for setting preliminary cost expectations on capital projects before detailed estimating is undertaken.

Contingencies

BC Hydro capital projects include large contingencies and often project and/or management reserves to account for uncertainty and risks associated with the project. In our sample, we noted one contingency of 4% and the remainder ranged from 10 to 20% of direct construction costs. Project reserves also accounted for an additional 13% of the expected budget. Good practice suggests that contingencies should be in the 5-10% range, and up to double that amount for a very difficult project. As such, BC Hydro's contingencies are at the high range of good practice, and if Project Reserves are considered, the overall contingencies are very high.

Projects are estimated using a Monte Carlo statistical simulation model, considered a good budgeting practice. A range of costs are estimated for various components of the project such as the cost to build and install a piece of equipment like a turbine. Using these estimates, a project estimate called the Expected Amount is calculated and it includes a contingency. These estimates are refined as the project advances and the uncertainties become known. Contingencies are reduced as a result. BC Hydro expects to come in over or under the Expected Amount 50% of the time depending upon whether the risks materialize.

BC Hydro planners also calculate the Authorized Amount, which includes a higher contingency to allow for more budget certainty since projects should come in under the Authorized Amount 90% of the time. The Authorized Amount may also include other amounts set aside for additional project risks such as cost escalation, foreign exchange risk or scope changes. This larger contingency and the other risk amounts are known as the Project Reserve.

BC Hydro expects to use a portion of the Project Reserve for 50% of their projects. However, they do not set aside specific funds in their overall portfolio budget to allow for this spending. Instead the Business Groups are expected to cover any money spent on projects going over the Expected Amount with savings from other projects.

When the board approves a project to go into implementation it reviews two amounts, the Expected Amount without a Project Reserve and the Authorized Amount with a Project Reserve, and delegates the authority to release the Project Reserve. Under this scenario, the Project Manager can only spend up to the lower budget amount (including contingencies) and should the higher amount be required, the additional spending needs to be reviewed and approved by the delegated authority (e.g., Project Initiator or Planner). For large projects, a higher level approval, such as the Capital Committee of the Board, may be required to spend the Project Reserve.

The separate approval is needed to spend the Project Reserve. This separation provides some rigour to control unnecessary spending, however, the Project Sponsor often has control over the entire budget. If the Business Unit is producing solid financial results and is coming in under budget overall, there is a risk that the savings from other projects could be used for scope changes or other nice to have but not necessary items.

Also, the fact that projects are often coming in under budget is an indicator that budgets are too high and BC Hydro is being very risk adverse. The large contingencies are needed to allow for the high degree of project risks that BC Hydro takes on and to accommodate change orders. There appears to be a tendency to reduce contingencies by performing more

work to remove uncertainty associated with the risks. We do not advocate this approach. Instead, BC Hydro needs to more effectively allocate risk with their vendors to reduce contingencies and reserves.

Recommendation

We recommend that BC Hydro:

- (38) Reduce project contingencies and reserves to realistically reflect risks.**
- (39) Ensure project reserve expenditures continue to be scrutinized and approved by the Capital Committee of the Board before they are spent.**

Soft Costs

Consultation and Environmental Assessment costs on 22 projects totalled over \$148.5M out of the \$5.4B expected project costs. These costs ranged from 0.02% to 9.78% of Expected Costs and included stakeholder relations, First Nations consultation and environmental assessment. These costs are dependent upon the degree of work undertaken, not the actual cost of procuring an item. The legal requirements for First Nations consultation have been defined in court cases. For projects with Federal and Provincial permitting requirements, environmental assessments have fairly well defined scope and schedule. Both have reduced the level of discretion for these activities.

These processes are all important aspects of delivering a successful project and it is reasonable to assume that project risks can be reduced through consultation with Stakeholders and First Nations. However, there may be an opportunity to reduce these costs. In some instances such as for First Nations costs, we have heard others express concern that BC Hydro is doing more work than necessary and raising expectations for others to do the same.

These costs are incurred, in part, to reduce projects risk, consistent with their risk adverse culture. BC Hydro should perform a risk based cost benefit analysis to identify more cost effective means of completing projects and ways to collaborate more closely with agencies to provide assurances that they are not doing more than necessary.

Recommendation

We recommend that BC Hydro:

- (40) Review its soft costs related to stakeholder and First Nations consultations and environmental assessment with a view to reducing them.**

Internal versus
External
Resources

Engineering, design, construction management and oversight resources are assigned to projects from either internal or external resources on a project by project basis, depending on the level of expertise needed, the availability of staff and project suitability for internal resources. Although there is a trend towards greater outsourcing of engineering, project management and CM services, BC Hydro needs to take a more strategic approach to assigning resources to provide assurances that ratepayers are obtaining value for money.

Figure 2.4.6 below compares BC Hydro’s charge out rates to typical industry rates.

	BC Hydro Rates	Industry Rates
Junior Engineer	From \$70	\$100 – 110
Senior Engineer (Note 1)	Up to \$169	\$140 – 150
Project Manager/Construction Manager (Note 1)	\$88 – 169	\$100 – 150
Quality Assurance	\$106	\$85-95

Figure 2.4.6

Note 1 BC Hydro’s Senior Engineer and Construction Manager rates include rates for highly qualified Principal Engineers.

On an hourly basis, BC Hydro’s junior engineering rates are comparable to private sector rates. The senior engineers and managers, and Quality Assurance functions have considerably higher ranges than the private sector.

Further, external engineering firms will typically closely monitor the time they spend on a project, particularly if the contract has a predefined maximum amount or is set at a stipulated sum. With the use of internal resources, there is a greater risk that more hours could be charged to a project unless detailed budgets are designed with clear expectations to keep costs at a minimum, actual costs are closely monitored, and the right mix of labour is used. We were unable to compare the time spent by internal resources versus external resources on all projects because the information was not readily available. However, on the two projects where the information was available, we found that the internal engineering costs were considerably higher than what we would have expected. As such, while the rates are comparable to the private sector, BC Hydro may incur greater overall costs from using internal resources due to the risk of over engineering or managing a project.

Recommendation

We recommend that BC Hydro:

- (41) Take a more strategic approach to assigning engineering design and oversight resources to ensure that it is providing ratepayers with good value.**

Capital Cost Savings

On a project by project basis, the capital projects that BC Hydro undertakes are well justified based on the capital drivers defined in individual project business cases. Regardless, some projects, while justified, are not critical to meeting the load growths and reliability expected from a utility company. As such, these projects could potentially be deferred, scaled back or cancelled to ease the rate increases. After working with the panel, BC Hydro has identified a total of \$175M of capital additions that can be deferred and will identify further reductions to project budgets to reduce capital additions by an additional \$625M, to provide for a lower rate increase. However, doing so will result in increased risk including the risk of not being able to serve load growth when needed and further deterioration of reliability.

The Properties capital plan includes Headquarters improvements at both the Dunsmuir and Edmonds office buildings totalling \$26.9M over the next three years. While BC Hydro justified these projects based on the fact that the floor spaces are dated and not conducive to collaborative work, and because the renovations will improve floor density, they are not critical. BC Hydro has already renovated or partly renovated 19 floors and 4 floors are currently under renovations. Their plan includes starting 13 additional floor renovations over the next three years. With the staff reductions, BC Hydro may not need this space and the renovations should be on hold until these reductions are resolved.

Also, the Properties Capital Plan includes major renovations or rebuilds of five field offices because the buildings are in poor condition or do not adequately meet the business needs. One Business Case reviewed showed the preliminary budget to be high, based on inflated costs per square foot and high overall contingencies and reserves totalling 40%.

Recommendation

We recommend that BC Hydro:

- (42) Postpone the office renovation work at both headquarters and field offices currently underway or scheduled until new needs assessments are completed following this review.**

2.5 Rate Structures

BC Hydro rates are competitive with other comparable jurisdictions. However, there may be the perception of unfairness in the revenue/cost ratios between customer classes. In addition, a number of the objectives for the rate structures, although identified in relevant legislation (*Clean Energy Act*, UCA) and policy (Energy Plan), are not given clear priority or ranking. This can lead to competing objectives, because a rate structure designed to achieve one objective may compete with the achievement of another objective. As well, rate structures are not always proficient at supporting the achievement of the objectives. For example, some rate structures do not inherently support conservation, simplicity of billings or low rates to large families.

BC Hydro designs and BCUC approves the rate structures for each customer class. Although each rate structure is different, they all include Basic and Energy charges. The Basic charge, a flat daily rate, is aimed to cover customer care costs and does not depend on electricity consumption levels. The Energy charge, based on consumption levels is intended to cover all other costs within the customer class. Some rate structures (for classes with demand metering in place) also include a demand charge, which recovers the costs of building the transmission systems based on peak load requirements, using a tiered rate for kW demand. In addition, there is a Rate Rider charge applied to all customer classes, used to pay down BC Hydro's deferral accounts.

The Residential rate structure is set on an inclining block (or stepped) basis whereby the customer pays a higher cost per unit for energy consumed above a certain threshold. The Small General service rate structure (for small businesses) is flat which results in the consumer paying the same rate, regardless of consumption levels. Neither of these rate classes has demand meters in place, so their rates do not include a demand charge element.

The Medium General and Large General Service rate structures are more complex. They include declining block structures, where the rate drops above a certain consumption level, and the introduction of an additional energy charge or credit that aims to encourage energy conservation. This model allows for an energy charge (at a higher rate) if consumption exceeds pre-determined levels, or an energy credit (reduction) may be applied if the energy consumption is lower than the customer's normal level. This additional charge/credit mechanism is being phased in over three years for the Medium General Service class, so not all customers in that class are currently impacted.

The Transmission Service rate structure, for large industrial customers, is set on an inclining block structure. If energy consumption in a given period exceeds 90% of the customer's historical consumption level, a higher rate is charged above this level. The historical consumption level is determined separately for each customer.

2.5.1 Objectives and Principles of the Rate Structures

BC Hydro works within a framework established by legislation and government policy directions, such as the *Clean Energy Act*, UCA and the Provincial Energy Plan. The provisions set within the framework have a significant impact on the rate structures. The following represents the parameters BC Hydro must work within for rate structure design:

1. to explore new rate structures that encourage energy efficiency and conservation (2007 Energy Plan Policy Action No 4);
2. to collect revenue that is sufficient to recover the utility's costs (the *Clean Energy Act*);
3. to ensure that the rates remain among the most competitive of rates charged by public utilities in North America (the *Clean Energy Act*);
4. to avoid unjust, unreasonable, unduly discriminatory or unduly preferential rates (the UCA); and
5. to provide for simplicity of the rate structure to ensure customer understanding and acceptance (2008 Residential Inclining Block Application).

As well, government may review these parameters as other priorities emerge to find the right balance between investing in the hydro system, while keeping the electricity rates as low as possible for BC families.

BC Hydro generally takes all the objectives mentioned above into consideration when designing rate structures. However, when there are a number of objectives to be met, there is a possibility that a rate structure designed to achieve one objective can impact attaining another objective. For example, moving from a flat rate structure to a stepped rate improves "conservation" yet reduces "simplicity". With such competing objectives and conflicting interests, there needs to be some direction given on what the priorities should be.

The *Clean Energy Act* sets an expectation that BC Hydro's rates remain among the most competitive in North America. BC Hydro does not consider "competitiveness" as one of the objectives in the design of the rate structures, although when they make changes to the rate structures, they do consider average cost and customer bill impacts.

Competitiveness should be considered since a potential new business to BC might consider rate structures for power consumption as one evaluation criteria prior to relocation of operations. (i.e., a declining block structure for a growing business, rather than an inclining block structure).

Time of Use
Rate Structure

In line with the 2007 Energy Plan's direction to explore new rate structures to encourage conservation, BC Hydro had been moving toward making an application for residential Time of Use rates in conjunction with its Smart Metering and Infrastructure (SMI) program. Time of Use rates are valuable in smoothing out the peaks in demand that drive the need for new generating and transmitting capacity and therefore could be an effective way of reducing the need for large expensive capital investments.

However, there are broader policy considerations that need to be weighed, and as a result, the government has directed that mandatory differential pricing will not be implemented.

Recommendation

We recommend the province:

- (43) Clarify the objectives, priorities and/or relative ranking among competing objectives of the rate structure design. If necessary, legislation or the Shareholder's Letter of Expectations can be used for this clarification.**

2.5.2 Effectiveness of Rate Structures

Overall, the rate structures for the various customer classes support achieving some identified objectives.

However, the flat rate structure, which is used for the Small General Service customer class, does not provide an efficient price signal to customers and will not encourage conservation. Similarly, the stepped rate structure for the Transmission Service customer class is a flat rate up to 90% of customers' normal consumption level before the higher tier takes effect, which might be more effective using a lower threshold. As well, the Medium General Service rate structure, which is gradually transitioning towards a more conservation inducing structure, has some customers still on a declining block structure which does not incent customers to conserve.

The Residential Inclining Block rate structure may put larger families that live in bigger homes with electric space and water heating in an unfavourable position compared to other customers as their average electricity costs will likely be higher given the size of the house and number of family members consuming power, which will ultimately result in families paying a higher average price. However, BC Hydro's analysis shows that 70% of residential customers pay less under the Residential

Inclining Block than a flat rate; and of the 30% that pay more, approximately half do not use electricity to heat their homes.

The rate structures for the Large General Service and the newer structure for Medium General Service are complex and may not be understood by customers. Both structures use a complicated additional charge or credit mechanism that can either increase or reduce the customer's bill depending on whether current usage is higher or lower than the customer's historical usage levels. This mechanism was initiated to encourage energy conservation without transferring the customers from a declining block structure. While encouraging conservation, these rate structures might not be well understood by customers due to their complexity, and if they can't be understood, then they are less likely to change consumer's behaviour.

BC Hydro performs periodic evaluations of the rate structures and reports the results to BCUC. In particular, BC Hydro conducted a study to evaluate the customer awareness of energy and peak savings attributed to the Residential Inclining Block structure. Also, BC Hydro engaged an independent research team to conduct interviews with Transmission Service Rate customers to obtain their perspective on the implemented stepped rate and its effect on the conservation of energy.

Both studies provided information on estimated reduction of energy consumption facilitated by the conservation rate structures. In the case of the study conducted on the Residential Inclining Block structure, the results show an estimated 231.9 GWh reduction in customer consumption for the second-tier customers for 2010. In the case of the Transmission Service rate customers, customers reported energy savings averaging 550 GWh per year from 2007 – 2009.

Recommendation

We recommend the province:

- (44) Ensure rate structures are designed to achieve the priority objectives, including requiring the BCUC to confirm this as part of their review of the new rate structures.**

2.5.3 Rate Comparison with other Jurisdictions

BC Hydro rates are set through the development of a financial framework, whereby the corporation submits an application to the BCUC, proposing rate levels which will generate revenue necessary to recover forecasted costs. The application includes a forecast of the revenues and expenses that are expected over the period covered in the application, including a pre-determined ROE. The BCUC review process includes public proceedings before the BCUC makes a final determination on the application.

BC Hydro classifies its customers into three key categories. The following is the percentage of domestic revenue provided by these customer classes:

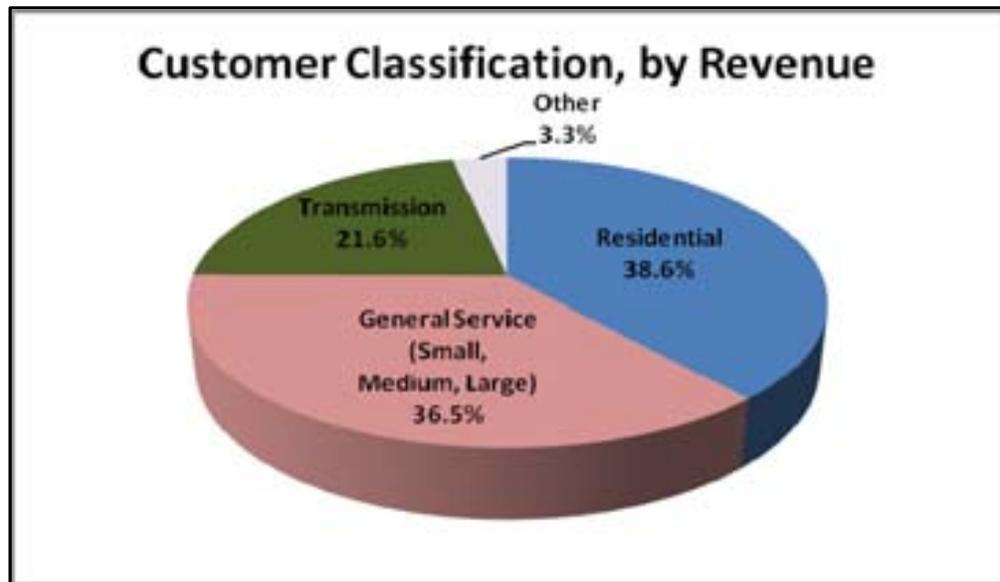


Figure 2.5.1

The 3.3% of other revenue is generated from irrigation, street lighting and sales to other smaller utilities like FortisBC.

An annual study conducted by Hydro Quebec, and participated in by BC Hydro, shows that in general, BC Hydro's rates are among the most competitive across 22 North American jurisdictions. For example, rates for residential customers in Vancouver were the fourth lowest. BC Hydro also files an annual report to the Government that provides a comparison of monthly bills and average prices for all of its customer classes across 21 major Canadian and United States utilities. The latest report filed in December 2010 shows that BC Hydro remains in the top quartile for all reported segments. BC Hydro rates are only marginally higher than in Manitoba and Quebec. Figure 2.5.2 below shows that Saskatchewan charges higher rates than the other Canadian comparators across all customer classes shown, mainly due to the fact that SaskPower does not have the same inexpensive hydro electric generation that BC, Manitoba and Quebec possess. Pacific Gas and Electric Company represents a comparison with a large U.S. utility (rates are converted at the average exchange rate for the applicable year). Rates are lower for large power customers as they receive energy directly from the transmission lines, without separate distribution lines. Please note, for the comparison against other jurisdictions, alternative customer class names are used.

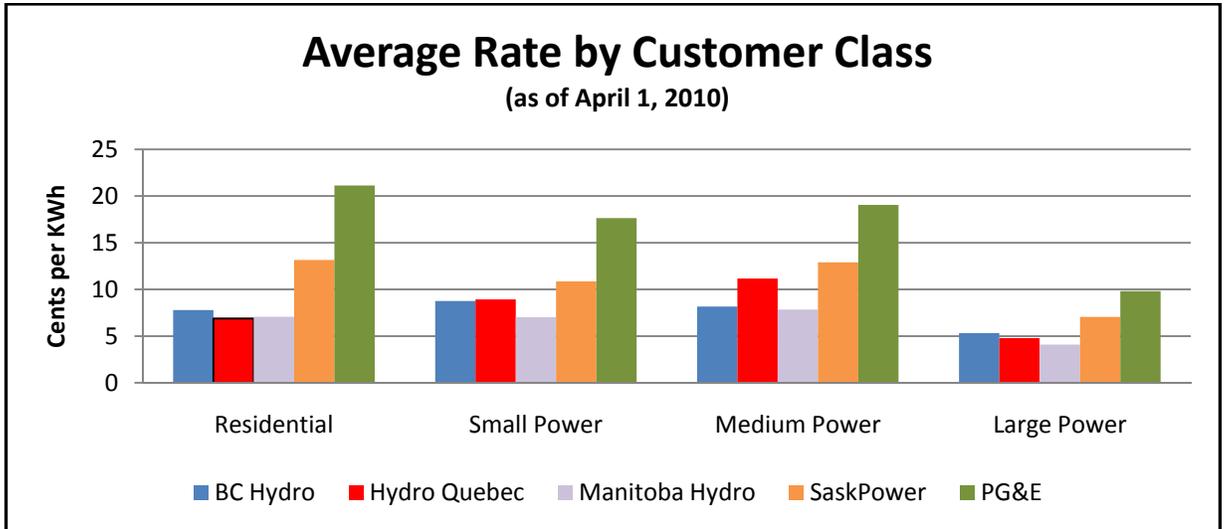


Figure 2.5.2

Figure 2.5.3 below shows the trend of BC Hydro’s average electricity rates over the last five years. For the residential customer class, there has been a rise from 6.41 cents/KWh to 7.79 cents/KWh over the five years. The increase in the rates is reasonably smooth from 2006 through 2009, but rises more quickly from 2009 to 2010, in all four customer classes shown. Some general causes of the higher rates are: increased capital spending to renew and expand BC Hydro’s system, increased allowed rate of ROE, reduced forecast in trade revenue and lower valuation of BC Hydro’s pension assets due to market conditions, and general increase in operating costs.

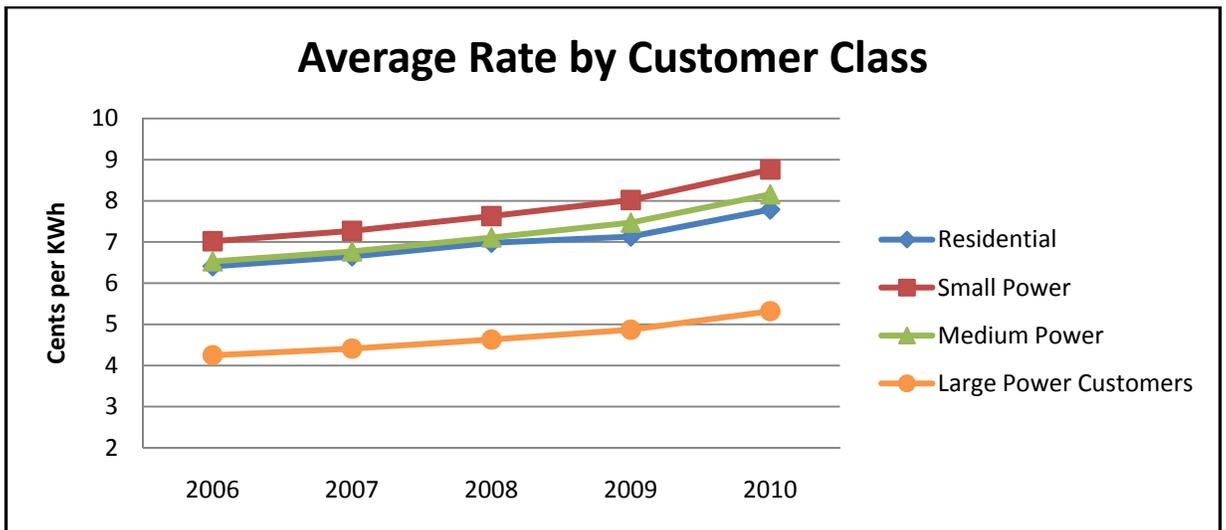


Figure 2.5.3

Cost Recovery Ratio

The cost recovery ratio (revenue/cost) is an indicator of the degree to which revenue from each customer class recovers estimated costs allocated to the particular customer class.

The process of classifying and allocating the costs is done through a Cost of Service study, which is complex, and involves expert judgement and estimates. As a result, allocation methodologies provide only an approximation of the actual costs of serving a particular customer class. The BCUC reviews the Cost of Service study and may direct that the costs be allocated in a manner different than that proposed by BC Hydro.

Figure 2.5.4 shows the cost recovery ratios for BC Hydro's major customer classes in the last three years. The lines show the percentage of costs allocated to the customer classes that are recovered through revenues of each class. Generally speaking, utilities will often aim to have all customer classes fall within a range such as from 95% to 105%, a range within which the utility will consider the rates to be balanced.

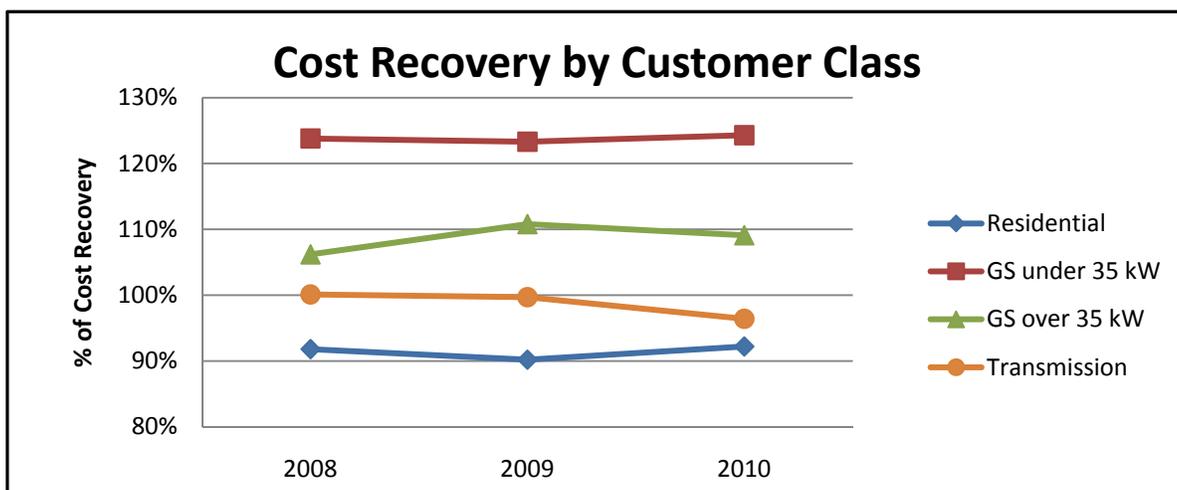


Figure 2.5.4

Figure 2.5.4 also shows that the Residential customer class, and recently the Transmission service class, are being charged less than the allocated cost of providing the service to the class. This suggests these classes are “subsidized” to some extent by other customer classes (Small, Medium and Large General Service), which recover more than their share of the costs. This situation for residential customers is not unique among public utilities.

Figure 2.5.5, using data from a 2009 Manitoba Hydro study, shows the residential customer classes in North America generally have lower cost recovery and are subsidized by commercial, and to a lesser extent, industrial customer classes. Also illustrated below is Alberta-based ATCO Electric, which has a cost recovery ratio of 100% for all three customer classes. The lighter shades near the top of some bars indicate a range for the ratio in that particular class and utility.

In 2007, the BCUC required BC Hydro to rebalance rates among customer classes, so that cost recovery was closer to 100% for each class. The province then intervened with amendments to the UCA, temporarily halting any rebalancing of rates, and placing a limit on rebalancing to a maximum of 2% change in cost recovery ratio any given year.

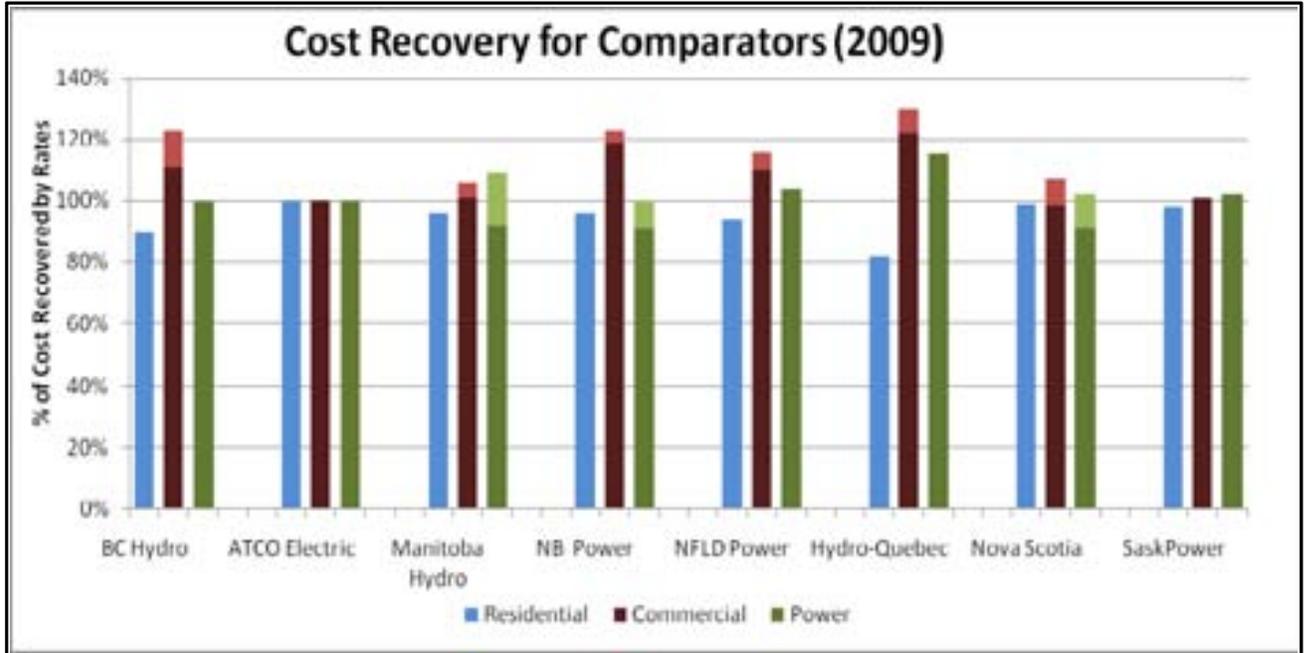


Figure 2.5.5

Cost Allocation Methodology

The methodology of allocating costs to the customer classes for purposes of determining the Cost Recovery ratios is reasonable overall. While consumption of energy among BC Hydro's three main customer classes is relatively similar (about one-third each), a higher proportion of certain costs are allocated to the residential class. All customer classes have generation demand and transmission demand, and allocation of generation-demand and transmission-demand related costs to all customer classes takes into account monthly peak loads during November-February. The coincidental peaks within this four month period, known as Four Coincidental Peaks, is when residential customers' demand for energy is higher, relative to the other classes, and results in the higher cost allocation to these customers.

Alternative peak load measures that consider demand costs across the entire year (e.g., Twelve Coincidental Peaks) would reduce the allocation of generation-demand and transmission-demand costs to the residential customers by approximately \$52M and thus increase the revenue/cost ratio for residential customers. This would reduce the pressure to rebalance rates upwards but would transfer these costs to other customer classes.

BCUC directed BC Hydro to use the Four Coincidental Peaks allocation model as the most reasonable demand allocator. This allocation approach is considered an appropriate basis by some industry experts since residential demand in the winter is the driver for determining the required transmission and generation capacity and therefore drives capital investments. However, other cost allocation methodologies might be appropriate, if there are other factors driving capital investments. For example, in situations where costly transmission lines are built to service primarily industry, the cost allocation methodology could take this into consideration.

Income from
Powerex

As another alternative to help keep residential rates in check, one could consider that costs currently allocated under the Four Coincidental Peaks model are in support of the need for system capacity during peak winter months. Therefore, during non-winter months, any surplus capacity in the system contributes to Powerex ability to buy and sell energy to earn greater income. Any Powerex income resulting from this extra capacity to be recaptured by BC Hydro could be factored into the calculation of a higher cost-recovery ratio for residential customers. This would ensure the residential customers receive the full value of upside benefits given they are currently allocated a proportionately larger share of certain costs.

This more favourable cost recovery ratio could help to reduce pressure to increase residential class rates but would reduce the allocation of trade income to other customer classes.

Recommendation

We recommend the province work with BC Hydro to:

- (45) **Review the methodology to allocate costs among customer classes to ensure it supports government priorities and objectives for rates.**

3.0 Policy Implications and Other Matters

The review examined the impact of government policy on the effective operation of BC Hydro as well as a number of key initiatives underway within the Crown Corporation. These areas are explained and evaluated in the following sections.

3.1 Policy Implications

Policy
Background

British Columbia's current policies governing electricity are set out in the 2007 BC Energy Plan: A Vision for Clean Energy Leadership, and the 2010 *Clean Energy Act*. The policies focusing on clean energy also support the 2008 Climate Action Plan, and related Greenhouse Gas emission reduction targets, which are set out in climate legislation and reproduced in the *Clean Energy Act*.

These policies were developed in an environment where economic growth was strong, natural gas prices were high and BC and other jurisdictions were cooperating to put a price on carbon through a carbon tax and/or cap and trade. Also, in the early 2000's, BC was impacted by the California energy crisis with spot energy prices in excess of \$900 per MWh, low reservoir inflows and a resulting need to buy extra power, at high prices, to meet domestic demand. In this environment, it was seen as desirable that BC develop its clean and renewable energy potential for both domestic and export markets.

However, the circumstances that led to the current definition of energy self-sufficiency have since changed. In particular, slow recovery from the economic downturn has resulted in reduced demand for energy. Also, opportunities for purchasing inexpensive electricity on the open market have grown with the discovery of new unconventional natural gas supplies which have reduced the current and expected price of both natural gas and electricity, and with an overbuild of subsidized wind energy in the United States which puts further downward pressure on electricity market prices.

The BC Hydro system has significant flexibility to import power at times of the day or year when market prices are low. As a result, BC requires additional flexibility in its energy policy. Additional flexibility for BC Hydro, including increased access to low cost energy from the market, could reduce costs significantly for ratepayers.

3.1.1 Self-sufficiency

The *Clean Energy Act* and the 2007 BC Energy Plan require that BC Hydro be energy self-sufficient by 2016 at critical water levels (the lowest historical inflow into B.C. Hydro's reservoirs occurring in the early 1940's) and further require that BC Hydro acquire a surplus of 3,000 GWh of insurance energy, at critical water levels, by 2020.

This surplus energy, which would range from 3,000 GWh in critical water years, 7,000-8,000 GWh in average water years, to 14,000 GWh in favourable water years, must then be sold on the export market. This could result in losses should the export market return less than the cost of generating or purchasing that energy. The policy of self-sufficiency, as presently defined, amounts to a significant planning constraint affecting BC Hydro's ability to offer cost effective energy solutions. The financial burden of meeting this government direction will be passed on to current and future ratepayers, in the form of rate increases.

Due to the operational implications of the self-sufficiency requirement in the 2007 Energy Plan and the *Clean Energy Act*, BC Hydro must make adjustments to their operations that may be considered inefficient, and less than cost effective. With the phasing-out of Burrard Thermal as a

source of generation (discussed in section 3.1.3), BC Hydro must purchase local renewable generation in place of less expensive imported energy. In order to illustrate the impact of this policy on rates, BC Hydro performed a number of cost calculation scenarios. The costs of self-sufficiency using critical water levels with insurance was compared with the costs of self-sufficiency should the definition be changed to average water levels with no insurance. Changing the definition of self-sufficiency could have the effect of mitigating rate increases by up to 8% in 2016 and 20% in 2020 under current low market prices. Under high market prices the change would be minimal.

If the definition of self-sufficiency was modified to use average water without insurance, BC Hydro is close to being self-sufficient now. If a critical water event occurred, BC Hydro's domestic supply of energy would be short by 4,000-5,000 GWh. This shortfall could then be offset with market purchases from the United States and Alberta. BC Hydro has imported as much as 8,400 GWh in a single year. If for some reason market purchases were unavailable, BC Hydro could rely over the medium term on keeping the Columbia River Treaty Canadian Entitlement in BC rather than re-marketing it in the US (4,000-5,000 GWh annually, but not assured after 2024). BC Hydro would need to pay the market value for this power.

Changing the definition of self-sufficiency to use average water without additional surplus energy would substantially reduce the need for new clean energy supply and BC Hydro would not need to begin sourcing of additional clean energy until 2016 or beyond depending on increased demand. If the definition of self-sufficiency is not changed, BC Hydro will need to begin sourcing new clean energy as early as January 2012.

The panel has considered all these factors. Overall, it recognizes the government's energy policies need to take into account that the economic and energy situations have changed, BC Hydro's flexibility to import power when advantageous to do so, and that some legislated energy requirements place an undue burden on ratepayers.

Recommendations

We recommend that BC Hydro and the province:

- (46) Evaluate alternative definitions and timelines for government's self-sufficiency policy that meet the needs of the province and ratepayers in a way that is sustainable for the long term.**

3.1.2 Clean Energy

The *Clean Energy Act* has a requirement for 93% of the electricity generated within British Columbia to be clean or renewable (93% carbon free).

Natural gas is currently not considered clean under the *Clean Energy Act*. Therefore, BC Hydro is limited in its ability to leverage this resource beyond 7% of total generation. However, market analysis indicates that natural gas prices will continue to be low over at least the medium term, making natural gas potentially a desirable and inexpensive electricity generation choice.

The panel has reviewed the *Clean Energy Act's* 93% renewable energy requirement and found that it is consistent with government's current climate change policy and its objectives with respect to government's carbon reduction targets.

3.1.3 Burrard Thermal

The *Clean Energy Act* included provisions to implement government's policy to phase-out the Burrard Thermal generation station. A regulation under the *Clean Energy Act* allows Burrard to be used for peak capacity planning until such time as new units at Mica and transmission upgrades are completed. As a result, BC Hydro must acquire new capacity and energy from other BC based sources to replace the amounts previously available through the Burrard station. Although not used for planning, the Burrard station will continue to be maintained as a source of back-up energy and to support the transmission system, including voltage stabilization.

The phase-out of Burrard Thermal was originally directed in the 2007 Energy Plan, and was implemented in 2009 through direction to the BCUC which has been replaced with the regulation under the *Clean Energy Act* described above. These directions remove 900 MW of capacity, and between 3,000 – 6,000 GWh of annual energy from the resource planning stack. Rarely, however, was this amount of energy actually produced at Burrard Thermal. Over the past 8 years, the average amount of power produced annually at Burrard Thermal was closer to 250 GWh. The reason for this variance is that Burrard's age and relative inefficiency make market purchases more cost effective for ratepayers.

The panel supports the continued use of Burrard Thermal as a source of back-up energy. The cost of maintaining this emergency back-up capability is approximately \$25M per year (\$19M for operations and maintenance and \$6M per year planned over the next few years for sustaining capital).

The voltage stabilization function that Burrard provides allows the transmission system to deliver more power from the interior to the Lower Mainland, and from BC into the United States. Natural gas is not burned to provide voltage stabilization services. If Burrard were decommissioned, this voltage stabilization would need to be replaced with new assets in Lower Mainland substations at a cost of about \$90M.

Recommendation

We recommend that:

- (47) **Burrard Thermal Generation Station continue to be used as a source of back-up energy as well as for voltage stabilization.**

3.2 Water Rental Rates

Water rental rates are the costs incurred by BC Hydro for the use of the various water sources across the province to power the corporation's hydro electric generating stations. The province received \$305M in water rental payments during Fiscal 2011 and \$315M in Fiscal 2010 which is significantly more per MWh than other jurisdictions such as Quebec and Manitoba (Figure 3.2.1).

It could be argued that the rates BC Hydro pays for water usage are nearly twice that of other jurisdictions across Canada that levy these charges. If rates were reduced to be comparable to those found in Quebec and Manitoba, BC Hydro would instantly see their costs reduced by approximately \$150M (~50% of \$312M paid in 2010) which would flow directly to ratepayers.

Unlike Manitoba and Quebec, where the utilities pay a flat rate based on energy produced, BC based power producers pay water rates based on three criteria: capacity of construction in progress, capacity of generation assets and total energy produced. The total energy produced criteria is charged on a stepped-basis, with increased costs for larger power producers. In this way, smaller power producers pay significantly less than larger power producers. This tiered system could be considered unfair, as it requires significantly higher rates for the larger power producers.

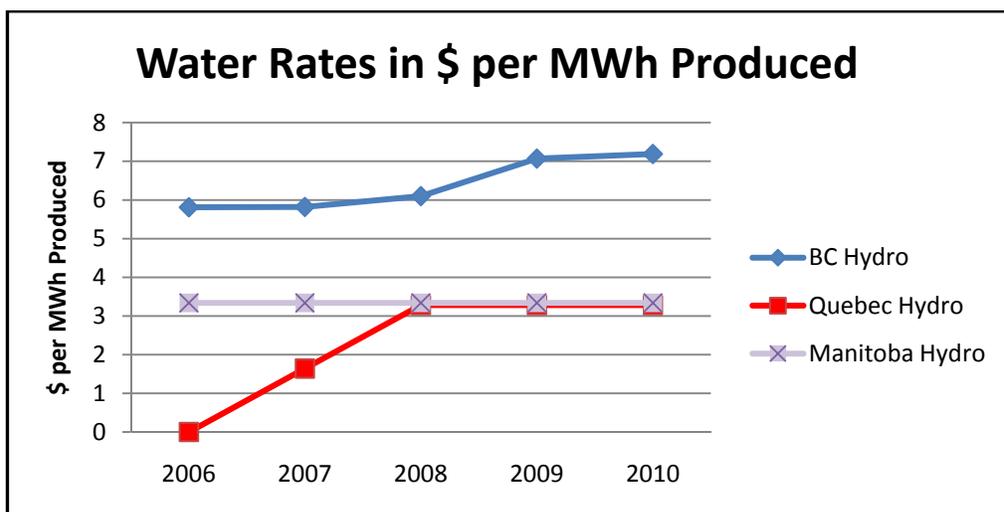


Figure 3.2.1

Figure 3.2.2 illustrates the break-down of how Water Rates are charged to BC Hydro.

Break down of Water Rates, per regulation:

Rate Criteria	Cost (\$)	Description
Construction capacity, per kilowatt	0.409	Rate for Construction in progress capacity
Authorized capacity, per kilowatt	4.095	Rate for capacity of entire generating fleet
Output capacity per MWh, where output is less than 160,000	1.229	Generation rate for small power producers
Output capacity per MWh, where output is between 160,000 – 3,000,000	5.734	Generation rate for medium power producers
Output capacity per MWh, where output is over 3,000,000	6.896	Generation rate for large power producers (BC Hydro)

Figure 3.2.2

Up to 2010, water rentals were indexed based on the average percentage increase in BC Hydro’s rates during the prior calendar year. Effective in 2011, water rentals for power generation are indexed to the BC consumer price index.

While this change has been made recently, given the water rental rate comparisons above, a further review may be appropriate.

However, this review should consider the needs of the province (including a balanced budget as the economy improves), as well as the needs of the utility and ratepayers.

Recommendation

We recommend that BC Hydro and the province:

- (48) **Determine collaboratively, as the economy improves, government’s water rental rates charged to BC Hydro, which balance the needs of the province and the utility.**

3.3 Capital Structure

Capital Structure

BC Hydro is currently required to make an annual dividend payment to the province equal to 85% of net income for each fiscal year assuming that the desired debt (80%) to equity (20%) ratio, (after deducting the dividend payment), is not exceeded. If the full payment would result in debt moving beyond 80%, the largest dividend possible (without exceeding this limit) is paid. In each of the last three years BC Hydro has paid a reduced dividend in order to maintain their capital ratio, as required. The structure for dividend payments has been established by the province, through Orders in Council.

Historical dividend payments and large capital expenditures have contributed to large increases in debt and continued pressure on the desired debt-equity ratio.

The province should work collaboratively with BC Hydro, as the economy improves, to determine a capital structure and dividend payout policy that balances the needs of the province and the utility.

BC Hydro's
Current Capital
Situation

The BCUC sets the rate BC Hydro can earn on its equity, as it does with other utility market players. This predefined ROE¹ allows BC Hydro to earn an appropriate return on their assets, and contributes to determining electricity rates.

As of April 1, 2011, BC Hydro received approval to base ROE on 30% of assets in-service rather than 30% of debt plus equity. This change was made to help mitigate rate increases and to better align BC Hydro's capital structure with common Canadian utility practices.

BC Hydro is currently in a position where their actual equity (20%) is lower than their deemed equity (30%). This misalignment results in BC Hydro earning a larger return on their assets than they actually have in place. This variance is passed on to ratepayers. BC Hydro also recovers financing costs through rates on their actual debt of 80%. This results in the ratepayer being charged twice for the 10% portion of capital where deemed equity exceeds actual equity.

Changing the capital structure and/or dividend policy will have a marginal effect on hydro rates (one scenario is a 0.6% decrease).

Debt levels impact customers' rates more significantly and directly through finance charges and indirectly through amortization of capital projects. With higher levels of debt comes greater sensitivity to changes in interest rates, and greater potential volatility in future years.

BC Hydro's capital structure could eventually be changed (debt to equity ratio reduced, favouring additional equity) through further rate increases and/or through reduced dividends to the province. Should the capital structure be de-levered to address actual vs deemed equity, BC Hydro's² interest costs would be reduced, and those savings would eventually be passed on to the ratepayer. If a model of increasing rates is used to fund the de-levering, this could result in ratepayer fatigue and backlash. If a model of reduced dividends is used, the province would be required to supplement the dividend shortfall in some other way, either by reducing its own operating or capital requirements, or by taking on its own debt.

¹ Currently the BC Hydro rate of return on Deemed Equity is set at 14.37%

² BC Hydro borrows in the Province's name at interest rates that reflect the province's strong credit rating

Capital Assets

BC Hydro has cited an increase in capital costs and higher levels of investment in assets as the primary drivers for the rate increases³. BC Hydro takes on numerous capital projects. The expenditures involved in these projects are not depreciated until they go into service, at which point the accumulated expenditures become capital additions. The current capital plan calls for in excess of \$7B of investments over the next three years. These investments will increase debt significantly.

BC Hydro has expressed concern about its current debt load as well as access to future debt to fund the capital plan. BC Hydro is only able to add new debt proportionately to its retained equity, otherwise the debt to equity ratio will increase beyond 80:20. For every \$1B of debt borrowed, BC Hydro must retain \$250M in equity. In an environment of significant leverage, there is little to no cushion to ensure the amount of debt needed can be borrowed if the debt to equity ratio is to be maintained. Due to the variability of BC Hydro's earnings caused by varying water levels, rising interest costs and the possibility of not being able to defer all unanticipated costs under IFRS, it is possible that the situation could arise where BC Hydro cannot balance the ratio given the high borrowing requirements of the capital plan. To keep within an 80:20 ratio, borrowing would need to be scaled back and portions of the capital plan postponed. If interest costs or other significant costs can't be deferred and are recovered from ratepayers, a portion of BC Hydro's debt may be deemed to be taxpayer supported by credit agencies. The province's credit rating may be negatively impacted as a result (discussed in Section 3.3.2 Credit Agency Rating Perspective).

Cost of Borrowing

Market forecasters suggest we are in an environment of increasing interest rates. Recent economic news of a slowing economy and greater Eurozone risk factors would suggest that the pace of the increasing interest rate environment as previously forecasted may not materialize as quickly as thought. BC Hydro has assumed an interest rate forecast that neatly falls between the 3 month T-bill and the forecasted 10 year rate in the recent Revenue Requirements Application.

BC Hydro is currently forecasting a borrowing requirement of approximately \$2.3B in 2011/12, and \$1B of 30-year bonds have recently been issued.

³ March 11, 2011 BC Hydro Rating Agency Presentation

Market Outlook for Interest Rates

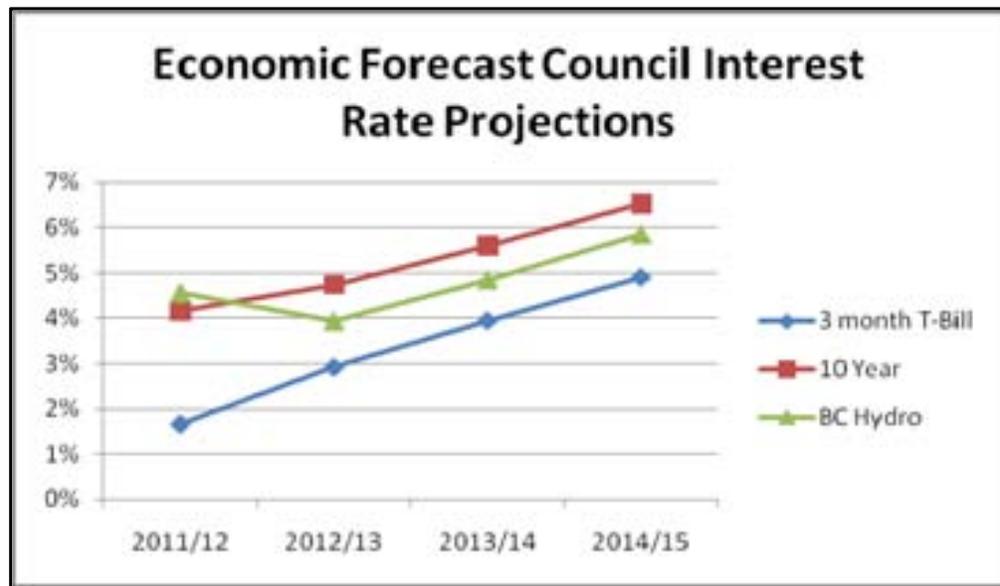


Figure 3.3.2

- 3 month T-Bill and 10 year forecast sent to Crown Corporations in Jan 2011 to be used in their planning submissions.
- Forecast based on the average of six private sector forecasters

Public and Private Sector Capital Structures / Dividend Policies

If BC Hydro acted similarly to the private sector and rates were not regulated, many of the expenses currently deferred would be expensed in the period incurred, or would be amortized more aggressively. Expenses incurred would be recovered (not deferred) more immediately through rate increases.

Under this structure where BC Hydro does not expense these costs in the year they were incurred, they are forced to take on additional debt. While expensing these items immediately or amortizing quickly would likely result in lower debt levels and improve the capital structure, it would come at the cost of additional rate increases in the near term.

During periods of large increases in capital expenditures, BC Hydro debt will grow faster than it is being repaid. In an effort to smooth rate impacts, higher regulatory accounts and debt balances are being utilized. These increased balances will put continued pressure on rates for many years to come. Capital structures among other public sector utilities currently range between 60:40 and 73:27 debt to equity and have stated targets in place to maintain levels between 65:35 and 75:25. Private sector utilities maintain debt to equity ratios closer to 60:40. Fortis BC, for example, recently made an announcement that, subject to BCUC approval, they would issue an additional \$10M of Common Share Equity in order to maintain its approved capital structure of 60:40⁴. BC Hydro's current ratio is debt (80%) to equity (20%).

⁴ <http://www.fortisbc.com/About/RegulatoryAffairs/ElecUtility/Documents/Tab%202020-%20Executive%20Summary%20Oct%201-10.pdf>

Private sector entities are exposed to the consequences of adding too much leverage to their capital structure. Tax advantages of financing with additional debt are weighed against the rising costs of debt. However, public sector utilities borrow at much lower rates as they borrow as agents of their respective provinces. Using the private sector ratio as a comparison, we would expect a public sector utility debt to equity ratio to be between 75:25 and 70:30, but this capital structure is ultimately mandated by provincial regulation.

3.3.1 Dividend Policy

FortisBC and PG&E recently paid out 60% and 68% of earnings, respectively. Dividend policies among other public sector utilities currently range between 0% and 75% payout. Quebec is the only other province the panel is aware of that has a stated payout target in place (75%).

Currently, BC Hydro's annual dividend payment to the province is equal to 85% of net income, providing the debt (80%) to equity (20%) ratio is maintained.

In light of the desire to satisfy shareholders and prevent dividend cuts, publically traded utilities will typically pay out at a level at which they deem sustainable over the long term. In comparison, Government owned utilities are free to readjust their payout policy as necessary to meet joint objectives (government and utility). Delivering reliable, low cost power is generally seen as more important than maximizing the return to the shareholder.

3.3.2 Credit Rating Agency Perspective

If electricity rates are not allowed to rise to cover capital expenditures, or if significant unanticipated costs arise that cannot be deferred, credit rating agencies may deem a portion of BC Hydro debt as taxpayer supported, impacting the province's cost of funds. In general, rating agencies have recognized BC's regulatory environment as supportive and friendly. Recently, however, they have noted the risk of ratepayer fatigue, and have cited cash flow deficits as a challenge in the medium-long term due to the capital plan and high dividends to the province⁵. It is suggested that in the future, cash flow from operations may be insufficient to fund capital expenditures and the dividend to the province.

⁵ DBRS June 2011 Report – British Columbia Hydro and Power Authority

As a result, higher debt levels and weaker coverage ratios should be expected as cash flow deficits continue to be funded with debt. Credit rating agencies, in general, support the notion that BC Hydro is overly leveraged and its interest coverage ratios are weak relative to its peers. However, over the next five years BC Hydro is not expected to encounter any challenges regarding refinancing of upcoming maturities given the province's credit rating and its access to provincially raised debt.

3.3.3 Actual Equity vs. Deemed Equity

As discussed in section 3.3, because BC Hydro is currently in a position where their actual equity (20%) is lower than their deemed equity for rate setting purposes (30%), the province should consider allowing BC Hydro's capital structure to move towards a model where actual equity is equal to deemed equity.

Utilities are typically expected to balance their actual and deemed equity, otherwise the utility may earn a ROE that does not exist. Harmonizing equity and avoiding double dipping to ratepayers will improve the credibility of the regulatory environment in BC with ratepayers and private sector utilities.

The speed at which harmonization is achieved inversely impacts the ratepayers and the province. The quicker BC Hydro is de-levered, the less the immediate impact there is on ratepayers. However, this comes at a cost, resulting in increased taxpayer supported debt for the province. De-levering to a point where actual equity and deemed equity are the same has modest impacts on hydro rates.

Moving forward, the annual dividend to the province should be revisited. This should be done as the economy improves and once the provincial budget is balanced, after BC Hydro has completed its intensive capital plan and obtained its desired debt to equity ratio.

At that time, BC Hydro's capital requirements should also be reassessed to ensure an efficient sustainable capital structure is maintained which is in the fiscal interest of the province (including a balanced budget), the utility and ratepayers.

Recommendations

We recommend that BC Hydro and the province:

- (49) Determine collaboratively, as the economy improves, a capital structure to support the desired debt to equity ratio and dividend payout policy that balances the needs of the province and the utility.**

3.4 Acquiring Energy

Energy requirements for BC are predicted to grow by over 16,500 GWhs of electricity, before demand side measures, over the next 10 years. Given this demand BC Hydro must acquire additional power through internal generation, partnership with IPPs and acquiring energy through the open spot market. BC Hydro needs to be flexible in their acquisition strategies to ensure value for money is achieved for ratepayers over the long-term.

The cost of Site C is estimated to be \$7.9B (net present value) based on recent project cost estimates. The Site C dam and hydroelectric generating station is justified based on the need to comply with the *Clean Energy Act* including its self sufficiency requirements.

To supplement the power from BC Hydro's current asset base, the corporation acquires clean or renewable electricity from IPPs that are privately owned entities which generate electricity throughout the province. The BC Government has encouraged the promotion and growth of the IPP community.

The *Clean Energy Act* further supports BC Hydro in implementing various programs to support the capacity and infrastructure growth of IPPs. The need to be self-sufficient by 2016 has also placed pressure on BC Hydro to increase their electricity supply through increased long-term agreements with IPPs to produce increasing levels of energy.

It should be noted, however, that in the current wholesale market place, clean energy is more expensive than other conventional forms of energy generated from thermal sources, such as coal or natural gas purchased under long term contracts, and generally more expensive than spot/short term market purchases.

The figure below identifies the range of energy costs.

Energy Allocation	Cost per MWh
Latest power call for IPP energy (long-term contract)	\$124
Wholesale market price (Mid C spot market price) (figures from the calendar year of 2010)	\$4.34 to \$52.43
Site C (expected for BC Hydro owned asset)	\$87 - \$95 (NPV)

Figure 3.4.1

IPPs are fixed price contracts which provide certainty and can reduce the risk of market price fluctuations. The wholesale market is subject to highly volatile prices which increases risk to the ratepayer due to market price fluctuations.

However, these fixed price contracts, while providing certainty also present a potentially significant financial risk. Ontario is currently experiencing an oversupply of power due to the long term fixed price contracts with IPPs forcing the region to sell excess energy at a loss. Ontario's situation highlights the need for flexibility to acquire and/or produce power at a reasonable cost while serving public interests and meeting the future load growth.

3.4.1 Site C

Site C is a reasonable cost alternative to meet load growth. A balanced portfolio of internally produced, independently produced, open market purchases and demand side measures is needed to help balance risks from market fluctuations, water rental rates and other associated costs.

Site C is a proposed third dam and hydroelectric generating station on the Peace River in North-eastern BC and is part of BC Hydro's overall program to invest in and renew the province's electricity system. Site C would provide up to 1,100 megawatts of capacity, and produce about 5,100 GWh of clean and renewable electricity annually.

The Site C project requires environmental certification and other regulatory permits and approvals before it can proceed to construction. In addition, the province has a duty to consult and, where appropriate, accommodate Aboriginal groups. BC Hydro has employed a multi-stage approach for Site C to allow for review and approvals at various checkpoints, and to facilitate more detailed planning and budgeting as the project progresses.

The current updated cost of Site C is \$7.9B net present value including an 18% contingency on direct construction costs. This preliminary budget is based on the Design-Bid-Build procurement model. However, alternative procurement or outsourcing methods need to be considered, so BC Hydro could possibly reduce the budget. The current status of the project is Stage 3 – planning and development and an Environmental and Regulatory Review.

Procurement Approach

The procurement approach has not yet been determined, and will not be finalized until completion of the environmental assessment in September 2013. Project construction is likely to be outsourced as it is considered a non-routine and complex project. As the project is so large, it will also probably be broken up into several procurement pieces, including highway re-alignment, reservoir clearing, dam construction, powerhouse construction and the development of the transmission line. At this time, BC Hydro is working with both Partnerships BC and KPMG on a value for money analysis of procurement options.

Project Planning

Significant planning has taken place to date resulting in expenditures of \$104M as of March 31, 2011. At this time, there are 62 committed contracts in place totalling \$36.3M. These contracts are primarily related to environmental assessment, stakeholder consultation, estimation and design. The projected planning expenditures to March 31, 2014 are forecast to be \$425M as shown in the table below. As the planning costs of Site C are so large, BCUC has allowed BC Hydro to defer them in a regulatory account. The costs will be amortized and brought into rates in the future, at a rate approved by BC Hydro.

	FY 2012	FY 2013	FY 2014	Grand Total
Expenditures	\$123 M	\$157 M	\$96 M	\$376 M
Interest Accrued	\$8.2 M	\$16.1 M	\$24.5 M	\$48.8 M
Total	\$131.2 M	\$173.1 M	\$120.5 M	\$424.8 M

Figure 3.4.2

A key component of planning is the service delivery options analysis which considered DSM, natural gas, coal, biomass, geothermal, solar/tidal, small hydro and large hydro. The portfolio of available options included wind, small hydro and some biomass types.

Site C Rationale

The resulting rationale for moving forward with Site C is cost, ongoing supply with dependable capacity and compliance with the *Clean Energy Act*. The new energy supply would be unaffected by market fluctuations that impact the cost of natural gas and carbon generated power so Site C unit costs should not result in spikes in price as noted above. Site C is seen as cost effective, as the cost of energy, at \$87-95 per MWh, compares favourably with other benchmarks for clean energy. Also, as the third project on the Peace River, Site C would take advantage of water already stored in the Williston Reservoir to deliver firm energy⁶ thereby allowing for a reliable source of power. Further, the project meets BC's Energy Objectives defined in the *Clean Energy Act* as Site C provides a source of clean renewable energy.

Cost of Energy Breakdown

The cost of producing electricity at Site C is projected to be between \$87 and \$95 net present value per MWh based on the following updated Project Description Report of May 2011.

⁶ Firm energy is the amount of energy available for production or transmission which can be guaranteed to be available at a given time. Firm energy refers to the actual energy guaranteed to be available.

Site C Unit Energy Cost		
Dependable Capacity	1,100 MWh	
Average Annual Energy	5,100 GWh	
Project Capital Cost (nominal)	\$7,900M	
Earliest First Unit In-Service Date	2020 (calendar)	
Discount Rate	5.50%	6.00%
	Planning	IRP
	(\$/MWh)	(\$/MWh)
Capital Cost	75.34	83.15
Sustaining Capital	1.91	1.82
Water Rental	7.89	7.89
Operating Costs	1.47	1.47
Grants-in-Lieu & Taxes	0.49	0.49
Unit Energy Cost (net present value)	87.09	94.81
Rounded	87	95

Figure 3.4.3

Rate Increases (Site C)

The Site C Regulatory Account was established to provide a better matching of costs and benefits for different generations of customers. If the Site C planning costs were expensed as required under the accounting standards applicable to BC Hydro, it could cause an unfair rate impact on current customers, considering the long development period before Site C could be placed into service. As a result, all planning costs are deferred and recorded in the Site C Regulatory Account thus having no impact on existing rates. A regulatory account was initially approved in respect of Site C expenditures incurred in Fiscal 2007 and 2008 and was later extended to the end of Fiscal 2011. BC Hydro is currently requesting BCUC approval to include in the Site C Regulatory Account all operating costs incurred related to Site C in the Fiscal 2012 to 2014 period.

While the impact on rates is yet to be fully determined, the capital costs of this project should not impact rates until the project is in-service or discontinued. The in-service date is anticipated to be 2020. At this time, BC Hydro would amortize the capital costs over the expected life of the asset. Although various components of the dam and generating facility have differing expected life terms, dams generally last for several decades. As such, the long life span will minimize or smooth those rate increases. Based on known capital and operating expenses, BC Hydro expects that the impact on rates from adding this large asset would be smoothed over at least a 10 year period.

3.4.2 Independent Power Producers

British Columbia is similar to other jurisdictions in regards to their promotion and support of IPPs and compares favourably with other jurisdictions with respect to demonstrating value for money through an open and fair competitive process in purchasing energy from IPPs. Cost-effectiveness and efficiency are the driving principles behind the IPP project procurement process.

To supplement the power from BC Hydro's current asset base, the corporation acquires clean or renewable electricity from IPPs (private entities which generate electricity throughout the province). In the current wholesale marketplace, clean energy is generally more expensive than other conventional forms of energy purchased. The BC Government has encouraged the promotion and growth of the IPP community to create jobs and increase government revenues (such as property taxes and water rentals etc).

The *Clean Energy Act*, further supported BC Hydro in implementing various programs to support the capacity and infrastructure growth of the IPP community. The need to be self-sufficient by 2016 has placed pressure on BC Hydro to increase procurement through long-term agreements with IPPs to produce increasing levels of energy.

Energy recently purchased from IPPs meets BC's definition of "clean or renewable energy"⁷, and the electricity purchased by BC Hydro from IPPs has grown by 64% from \$364M in 2007 to \$568M in 2010.

Figure 3.4.4 below identifies the range of energy costs. IPPs are fixed price contracts which provide certainty and can reduce the risk of market price fluctuations. The wholesale market, subject to highly volatile prices, increases risk to the ratepayer due to market price fluctuations.

Energy Allocation	Cost per MWh
Latest power call for IPP energy	\$124
Wholesale market price (Mid C price) (figures from the calendar year of 2010)	\$4.34 to \$52.43
Site C (expected)	\$87 - \$95

Figure 3.4.4

Additional flexibility in regards to different types of energy purchasing strategies in BC would have significant downward pressure on rates.

⁷ Section 1(1) of the Clean Energy Act and other prescribed resources set out in the Clean or Renewable Resource Regulation

IPP Community

BC Hydro has been purchasing energy from IPPs since the late 1980s', however, in the past ten years, IPP projects in operation have doubled. In BC, the IPP community extends across all regions of the province.

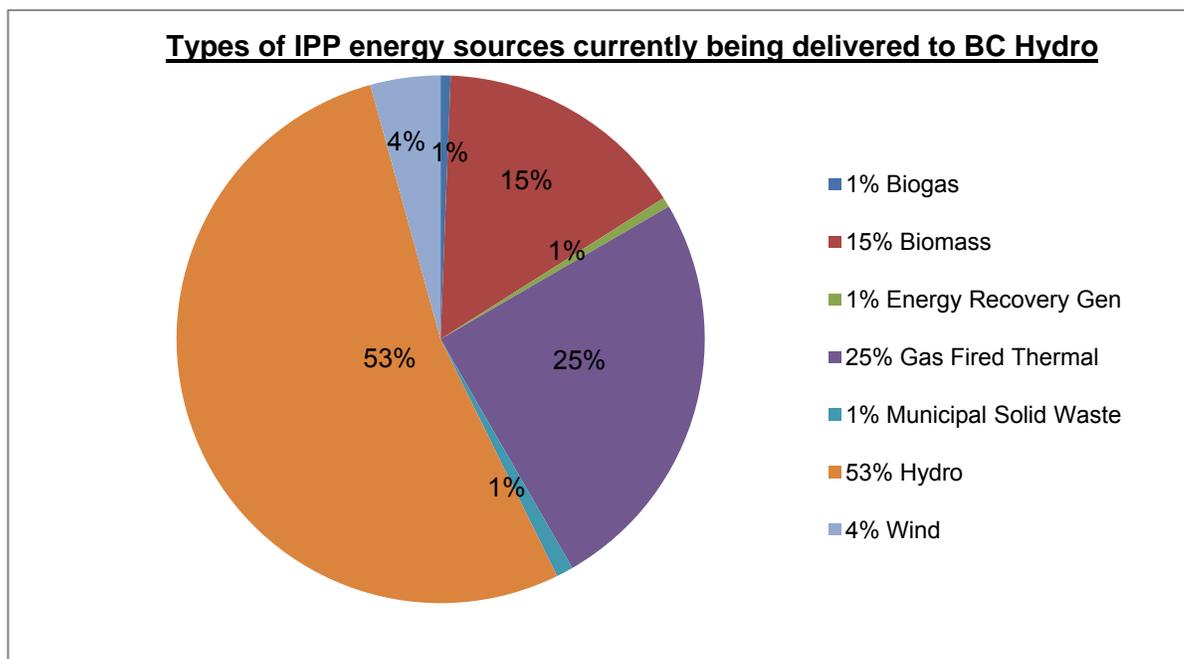


Figure 3.4.5

In Fiscal 2010, IPPs produced 16% of total domestic electricity requirements; however IPP electricity costs represented 49% of the overall domestic energy cost. It should be noted however, energy cost associated with BC Hydro's hydroelectric system are from depreciated assets mostly constructed in the 1960s and 1970s, and does not include fixed costs such as allocated capital, operating and maintenance costs.

Demonstrating Value through a Fair and Competitive Process

There is a reasonable degree of competition amongst IPP's in BC. BC Hydro compares favourably with other jurisdictions with respect to demonstrating value for money through an open and fair competitive process. Cost and efficiency are the driving principles behind the IPP project approval process.

BC Hydro enters into Electricity Purchase Agreements to ensure a commitment of long-term energy at a fixed price with a portion of costs indexed for inflation. There are no additional grants, tax incentives or other types of subsidies for IPPs, and the BCUC reviews the contracts awarded to the IPPs for reasonableness on behalf of the ratepayer.

When BC Hydro wants to enter into additional Electricity Purchase Agreements to increase the IPP purchases, they typically issue a power call. The purpose of the power call is to attract bid submissions for new clean energy projects in BC. Although the latest power call price for IPP energy was \$124 per MWh, this does not represent the purchase price paid to IPPs for their energy. The \$124 per MWh calculation is an

estimation on the future cost of energy from IPPs. The cost also includes an estimate of internal costs BC Hydro needs to absorb to build the connecting grid to the IPP projects so BC Hydro is able to transport the energy to their customers. The average purchase price of IPP energy as per the BC Hydro 2010 Annual Report was \$63.85 per MWh.

IPP energy costs vary depending on several factors such as region, type of energy and the year the Electricity Purchase Agreement was originally negotiated (Electricity Purchase Agreements can range from 5 to 40 years).

Attrition (Failure)
Rates of IPPs

The overall average attrition rate in BC is 37%, which is consistent with other jurisdictions. Attrition is the measure of the success rate of the Electricity Purchase Agreements and is determined by when the IPP project reaches operation and begins to deliver power to BC Hydro. In other jurisdictions, such as California, the attrition rate ranges from 30-50%.

The primary reasons for an IPP to terminate their Electricity Purchase Agreement are financial viability, construction complexity and obtaining project permits. In an external consultant report, completed by Merrimack Energy Group in February 2011, it was noted that BC Hydro does not utilize financial stability of the proponent to a large extent to determine project viability. Furthermore, BC Hydro indicates that risk or non-price assessment is part of the evaluation process but it appears that price is the primary determinant for selecting successful bidders. Not setting adequate levels of financial viability as a mandatory requirement may have contributed to the attrition rate in BC.

When an IPP fails there are administrative costs to BC Hydro. For example, if BC Hydro no longer has an agreement to receive energy from that operation, they will bear the cost of running additional Power Calls to increase electricity supply. BC Hydro assumed a 30% attrition rate in its procurement processes to increase the probability that the desired volume will ultimately be delivered. BC Hydro is also exposed to market fluctuations in price; the replacement costs for the same level of energy may be higher. Therefore, BC Hydro should revise their evaluation criteria and implement where possible additional criteria which reflects project and financial viability.

Another area of improvement mentioned in the external consultant report was the allocation of risk. Improvements can be made to ensure that risks transferred are those which are able to be managed by IPPs at a lower cost than BC Hydro.

BC Hydro is continuously improving their procurement process for IPP energy and is currently reviewing their risk allocation, evaluation criteria and transparency of information to ensure that value for money is being achieved for ratepayers.

Recommendations

We recommend that BC Hydro:

- (50) Ensure that weighted and defined evaluation criteria for bids on electricity purchase agreements are disclosed within competitive bid documents, to improve transparency, promote consistency and enhance vendor relationships.**
- (51) Consider revising and implementing evaluation criteria, which reflect financial and project viability, within its solicitation documentation for Power Calls.**
- (52) Review the process for risk allocation to ensure that risks are being transferred to those IPPs which are best able to manage risks at the least cost, while serving the public interest.**

3.5 Regulatory/Deferral Accounts

There has been recent significant growth in BC Hydro's net regulatory asset balance, and this growth will continue for several years, adding additional pressure and reduced flexibility to BC Hydro's efforts to keep rates competitive while addressing new cost pressures. The future annual impact is not clear, as amortization policies are not always known, but the impact will likely be significant, and there is concern for future ratepayers who are expected to cover these deferred costs, even in cases where the benefits were realized by current ratepayers.

BC Hydro operates in a rate regulated environment where, with BCUC's approval, accounting policies allow the use of regulatory accounts to defer amounts for future recovery/refund. In the absence of rate-regulation, these amounts would be included in the net income when incurred and could result in volatile rate swings.

Deferred amounts are often large and/or unexpected income or expense due to factors beyond BC Hydro's control (e.g., annual inflows into BC Hydro's reservoirs), would cause BC Hydro's rates and ROE to be unstable. The industry, in general, and regulators want stable rates for customers and returns to investors. To reduce rate fluctuations, BC Hydro is sometimes ordered by the BCUC, or given special direction from the province, to defer certain amounts. The deferred costs are recorded as regulatory assets, to be recovered from future ratepayers; deferred income is recorded as regulatory liability, to be refunded to future ratepayers. The deferrals most often serve one of the following purposes:

- defer variances between forecast and actual costs or revenues;
- match costs and benefits for different generations of customers; and
- smooth out the rate impact of large non-recurring revenues or costs.

BC Hydro currently has 29 deferral/regulatory accounts as of 2010 (listed in the Fiscal 2012-Fiscal 2014 Revenue Requirements Application), with a total net asset balance of approximately \$2.1B at the end of Fiscal 2011 (\$1.7B in Fiscal 2010). Additions in 2011 to the regulatory accounts were \$456 M (\$775M in 2010), and amortization in 2011 was \$32M (\$79M in 2010). BC Hydro applies interest to most of the deferral/regulatory account balances using their weighted average cost of debt (\$42M was accrued in Fiscal 2010).

BC Hydro has also identified planned and potential future regulatory accounts in its current Revenue Requirements Application, yet to be formally proposed to the BCUC. BC Hydro will commence using the IFRS for its fiscal year ending March 31, 2013. IFRS does not have an accounting standard that recognizes rate regulated accounting, in which case, the balances referred to above would be charged to BC Hydro's operating statement in the year incurred. Conversion to IFRS would also result in an immediate charge to BC Hydro's retained earnings of approximately \$2B and annual income would become very volatile. It is anticipated that Treasury Board will direct BC Hydro to adopt IFRS plus apply rate regulated accounting in accordance with the United States Financial Accounting Standards Board Accounting Standards Codification 980 (ASC 980).

If BC Hydro is directed to follow ASC 980, most of the above impacts of IFRS will be deferred. However, BC Hydro has indicated that the adoption of IFRS plus ASC 980 will still result in reductions in operating income ranging from \$35M to \$145M per annum. The BC Office of the Auditor General is currently reviewing BC Hydro's deferral/regulatory accounts to determine whether the recovery or refund periods are effective.

Growth of Regulatory Accounts

BC Hydro's net regulatory assets have increased 467% from \$449M in 2007 to \$2.1B in 2011, as seen in the diagram below⁸. In the Fiscal 2012-2014 Revenue Requirements Application, net regulatory assets are projected to increase another 225% to \$4.7B over the application period.

Long range projections of net regulatory assets increase to a high of \$4.9B in 2017, levelling off beyond 2017 and slowly declining. However, in these projections, the energy deferral and variance deferral accounts, which totalled approximately \$800M in Fiscal 2011, are fully amortized through this period as no additions to these accounts are forecasted. Historically, variances are added to these normally volatile accounts (2009 additions \$240M, 2010 additions \$249M).

⁸ The Long range forecasts were prepared by BC Hydro for scenario analysis only, based on simple assumptions and subject to significant uncertainty, and may differ from future Revenue Requirements Applications.

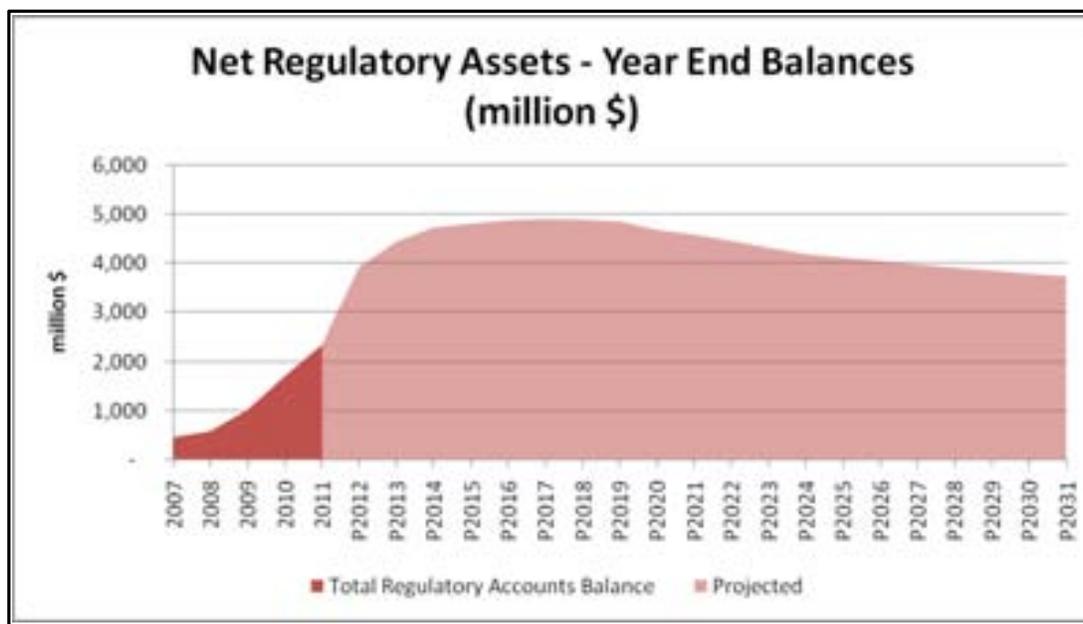


Figure 3.5.1

Some of the individual regulatory accounts with the steepest growth to 2017 and accounting for much of the overall increase, include:

- DSM, which from 2007 to 2011 increased from \$270M to \$506M, and could increase another three-fold by 2020 to \$1.5B.
- Site C regulatory account increased from \$3.7M in 2007 to \$140M by 2011, and expected to hit approximately \$750M by 2020.
- Regulatory accounts for First Nations negotiation, litigation and settlement provisions totalled \$119M in 2007 and increased to \$399M by 2011. By 2031, BC Hydro forecasts these accounts to be about \$700M.
- Two new regulatory accounts established to defer impacts of conversion to IFRS are expected to increase dramatically. The IFRS Plant, Property and Equipment account, that defers overhead costs no longer capitalized under IFRS, is projected to reach about \$845M by 2020. The IFRS Pension account, that defers unamortized experienced gains and losses on pensions and other post-employment benefits, is projected to reach \$900M by Fiscal 2013 on transition to IFRS.

The establishment of a regulatory account does not in itself predetermine over what period any balance in that account may be recovered. BC Hydro can propose a recovery period, which must be approved by the BCUC. The rate impacts when the account balances are amortized are taken into consideration in determining the period over which the accumulated balances are recovered.

The sharp increase in net regulatory assets is a concern for ratepayers and other stakeholders. While deferral of these costs reduces the rate increases in the short run, there is increasing pressure and reduced flexibility in setting future rates to meet the Revenue Requirement and ROE obligations, since the recovery of regulatory accounts takes up a larger proportion of the Revenue Requirements.

The regulatory recoveries are expected to increase for 2012 to 2014 to reach about \$450M for fiscal 2014. If the net regulatory asset balance continues to around \$4.5B, and assuming a 10-year straight-line amortization, a rough estimate of the annual recovery from ratepayers could be approximately \$450M per year.

There are also concerns that the extensive use of the regulatory accounts reduces transparency of the financial information, and that the transfer of these costs from present ratepayers to future ratepayers could be considered inequitable and unfair to future ratepayers in cases where the costs are not matched to future benefits to the ratepayers.

The company and its external auditor have not made any allowance with respect to the ability of BC Hydro to recover the regulatory assets through future rates, but this could be a potential future concern given the projected size of these accounts and the desire to keep rates competitive. If BC Hydro is unable to recover any of the deferred amounts, the costs would be passed on to the province (as sole shareholder) and covered by taxpayers.

Comparisons
with other
Jurisdictions

In Fiscal 2010, BC Hydro's net regulatory assets were \$1.7B, compared with \$1.1B at Hydro-Quebec and \$299M at Manitoba Hydro. Pacific Gas and Electric's net regulatory assets are \$2.7B for Fiscal 2010.

As a percentage of total assets, figure 3.5.2 demonstrates that BC Hydro's net regulatory assets are three to four times that of Quebec and Manitoba. BC Hydro's annual net additions to regulatory accounts have been noticeably higher in proportion to total assets. Contributing to this spike in regulatory account additions are, among other factors, two years of very low water levels in BC, two years of Powerex' trade income being significantly below the forecast included in the revenue requirements, and the increasing levels of investment in BC Hydro's capital-like programs such as DSM and Site C project investigation costs.

BC Hydro's net deferral (additions less recoveries) in 2010 was \$696M, compared with Hydro Quebec's \$188M, and Manitoba's \$12M. SaskPower, another comparator looked at, has no regulatory account balances.

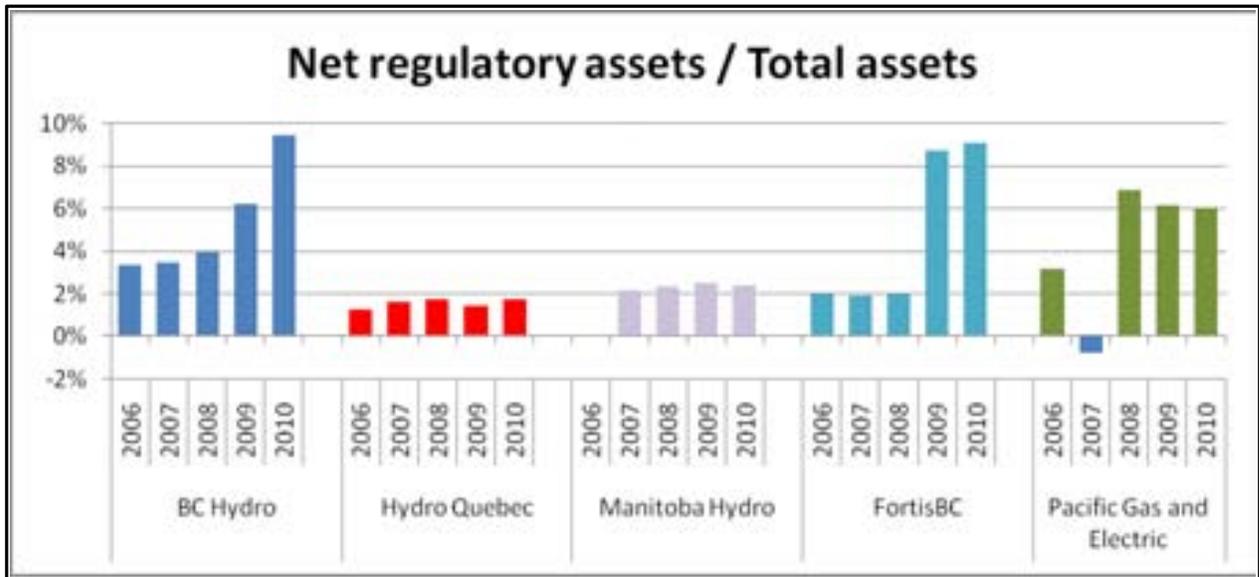


Figure 3.5.2

Other Amortization Issues

Some further concerns associated with the recovery or amortization of regulatory accounts were identified.

The period of amortization for each of the regulatory accounts is not always known. There are at least six regulatory accounts where the amortization period will be determined in a future rate application, when the BCUC can look at all the factors and the impacts on rates. Examples include the regulatory accounts for Site C, SMI and the Home Purchase Offer Program. Seven other regulatory accounts have no set amortization period, but rather will be drawn down by other means, such as the rate rider mechanism for three energy and variance deferral accounts, and the Environmental Compliance Provisions account that will be drawn down as spending occurs.

Due to this uncertainty in the amortization periods, it is challenging for stakeholders to clearly understand the impact of the net regulatory balances on future rates and ROE.

In some cases, the timing of recognition of amortization of the regulatory accounts may be questionable. In the case of the SMI regulatory account, capital assets purchased are capitalized and amortized in accordance with Generally Accepted Accounting Principles. However, the amortization of those assets is being deferred in a regulatory account until 2015 (subject to BCUC approvals), after which recovery through rates will begin. BC Hydro advise that this was to better match the costs with the benefits of the SMI program, as the full benefits of the SMI program will not begin until the entire smart meter and infrastructure system is installed and operational.

We also have concerns that the recovery of deferred SMI costs, as proposed in the Fiscal 2012-Fiscal 2014 Revenue Requirements Application, will not take place until 2015. The scheduled completion date for the installation of the smart meters component of SMI is in 2012, yet no costs are to be recovered until 3 years later, according to the current Revenue Requirements Application.

This deferment of costs is understandable from the perspective that BC Hydro does not wish to increase rates or pass on costs to the ratepayer pre-maturely. However, it is important to find the right balance between smoothing out the significant and unexpected amounts, while preventing excessive or unwarranted deferral of costs to future generations of ratepayers.

Recommendation

We recommend that BC Hydro:

- (53) Work with the province to perform a more in-depth review of the growth of regulatory accounts and determine a more sustainable approach to utilizing them over the long term.**

3.6 Energy Conservation

Performance measures indicate that between 2008 and 2010, 1,778 GWh of energy conservation (DSM) benefits have been realized against a target of 1,700. The *Clean Energy Act* directed BC Hydro to meet 66% of the province's incremental electricity needs through efficiency and conservation by 2020. This is an increase on the 50% target set in the 2007 Energy Plan.

DSM is the planning, implementation and evaluation of government and utility-sponsored programs to influence the amount or timing of customers' energy use. In BC, programs also include actions (including rates and regulations/standards) to conserve energy and promote energy efficiency.

BC Hydro's approach involves government, manufacturers and retailers accelerating adoption of energy efficient technologies and products, through DSM initiatives such as:

- Power Smart;
- Smart Meters;
- LiveSmartBC;
- Lighting Rebates, Fridge Buy-Backs, Appliance Rebates;
- conservation rates;

- BC Building Code amendments and regulations/standards for products and equipment (e.g., furnaces, water heaters, general service lighting); and
- public awareness, involvement and education.

Recent DSM (2008-2010) expenditures were as follows:

	Total (\$ 000)
Rate Structure	\$ 14,366
Programs	209,436
Supporting Initiatives	83,350
Total	\$307,152

Figure 3.6.1

Costs and
Benefits
Comparison

DSM efficiency and conservation energy savings are the difference between the amount of actual energy consumed and the amount that would have been consumed without DSM initiatives (the baseline). While the amount of energy consumed can be measured, the baseline amount of energy is estimated using evaluation, measurement and verification protocols.

The method of calculation of the cost effectiveness of BC Hydro's DSM plan was debated frequently during past regulatory processes and most recently in the last LTAP deliberations. The cost effectiveness of DSM will be addressed by BC Hydro in the next Integrated Resource Planning application, due to be submitted to the Minister of Energy and Mines by early December 2012.

Figure 3.6.2 details our calculation of the estimated benefits and costs of DSM.

Estimated Costs and Benefits of DSM	Measure	Notes
Costs by 2028 (A)	\$3,174M	
Long-term energy savings benefit by 2028 (B)	77,781 GWh	
Unit cost of energy savings benefit (C)	\$41 MWh	(A/B x 1000)
Value of energy savings benefit (D)	\$120/MWh	Estimated in 2008 LTAP
Net benefit or savings from DSM by 2028	\$6,160M	(B x 1000) x (D-C)

Figure 3.6.2

Verification of Demand Side Management Costs and Benefits

The measurement of benefits and costs of DSM is subject to considerable verification and scrutiny.

BC Hydro’s DSM evaluation resources include recognized experts in the field. Evaluation reports are reviewed by independent, third party experts and then further reviewed and approved by a cross-BC Hydro committee. Also, BC Hydro files milestone evaluation reports with the BCUC separate from the Revenue Requirements Application process.

The evaluation activities are guided by the California Evaluation Framework, which is generally regarded as the leading protocol in North America for DSM evaluation.

Recommendation

We recommend that BC Hydro:

- (54) Re-evaluate its various energy conservation programs to reduce the overall costs to ratepayers while still achieving value for money.**

Smart Metering and Infrastructure

The business case rationale for the SMI project appears reasonable, and the assumptions used to support the cost savings are generally consistent and supported. The useful life of the SMI structure project will be longer than the payback period of the SMI investment; this means that ratepayers will continue to receive cost savings from the investment after the original investment has been recovered.

Over the next four years, BC Hydro will be replacing all 1.8M residential and commercial customers' existing meters with new Smart Meters. The meters used by BC Hydro for electricity reading are based on 1950’s technology, so in October, 2005, BC Hydro began their Smart Meters or Advanced Metering Infrastructure review to determine how current technology could better serve ratepayers and the province.

In their Fiscal 2006 Service Plan, BC Hydro committed to the SMI project with completion scheduled for 2012, and the *Clean Energy Act* reiterated the completion of the project by 2012. The SMI budget is estimated at approximately \$930M:

Smart Metering Program Budget	Millions
Initiation Phase (2007)	\$1.4
Identification Phase (2008)	\$8.9
Definition Phase (2011)	\$38.8
Implementation Phase (2011-2014)	\$716.5
Interest During Construction	\$14.4
Contingencies	\$150
Total	\$930

Figure 3.6.3

The BC Hydro Board of Directors approved the total project budget of \$930M on September 16, 2010. The amortization expenses for this capital project will not impact rates until 2015.

Major program benefits of SMI include:

- improved energy efficiency, safety and reliability;
- enhanced customer choices and service;
- reduced theft of electricity;
- improved operational efficiency including shifting consumption from peak hours;
- reduction in Greenhouse Gases and other pollutant emissions; and
- reduction of the need for expensive utility capacity additions.

While reviewing the business case and supporting documentation, the following observations and potential opportunities for long term cost savings for future generation ratepayers were made.

Project
Contingency

The total project contingency is \$174.6M (Board Reserve \$90M, Project Contingency \$60M and additional contingencies with major vendors \$24.6M) which is approximately 19% of the total project budget. Contingencies generally range from 5% - 20% for the most complex projects. Consideration must be given to the fact that the SMI project team consists of experienced subject matter experts, SMI consultants, that BC Hydro is not considered to be an early adopter of SMI, and that technology costs are rapidly decreasing. Given these factors, the contingency of 19% appears to be high.

Recommendation

We recommend that BC Hydro:

- (55) Re-evaluate the cost estimates of the SMI project to determine if there are opportunities to reduce the overall costs of the project, decreasing costs to ratepayers over the longer term, including reassessment of high project contingencies.**

Time of Use
Rates

The benefits of having differential pricing (Time of Use rates) for peak and non-peak times is to encourage conservation. BC Hydro states on their website that this differential pricing may be considered after the completion of the current Integrated Resource Planning process. The planning process will determine if there is any need for Time of Use rates to meet BC Hydro's future capacity needs. If voluntary time of use rates are not implemented, a small amount of the savings estimated in the business case may not be realized, however even without time of use there would be positive payback, as theft detection and operational efficiencies makes up 93% of savings while time of use is only 7% of savings according to the business case. As noted in section 2.5.1,

government has directed that mandatory differential pricing will not be implemented.

Rebate Program

BC Hydro is creating an incentive for individuals to obtain In-Home Display units. The purpose of these In-Home Display units is to encourage people to actively track their real time use of electricity and, thereby, reduce their consumption. The rebate program will cover the full cost of a basic residential unit which has a commercial value of approximately \$50. The budget value for this rebate program is estimated at \$42M. Given that consumption tracking can be done with a computer or hand-held device, and the current economic constraints BC Hydro is facing and the impact of the cost of the rebate to ratepayers, BC Hydro may wish to re-examine the incentive.

Recommendation

We recommend that BC Hydro:

- (56) Re-evaluate the SMI in home display rebate program to actively track real time use of electricity and to assess the benefits of the program versus the impact of the program costs on ratepayers. Consider whether this element of the program should require prior BC Utilities Commission approval.**

Benefits

The total quantified benefits, Figure 3.6.4 below, (identified in the business case for the SMI project) was \$1.6B from Fiscal 2006 to 2033. Net present value, discounted for time value of money, are estimated at \$520M.

Type of Benefit	Expected Benefits in Millions	%
Operational Efficiencies and Avoided Capital	\$359	22%
Energy Savings	\$208	13%
Theft Detection	\$732	45%
Voluntary Time-of-use-Rates	\$110	7%
Conservation Tools (in-home feedback tools)	\$220	14%
Total Quantified Benefits	\$1,629	100%
Net Present Value Quantified Benefits	\$520	

Figure 3.6.4

BC Hydro estimates that approximately 45% of the cost savings benefit to be derived from the SMI project will be from theft detection. This has been supported by independent research from the University of the Fraser Valley *Center for Public Safety and Criminal Justice Research*.

If these estimated benefits are realized over the long term, ratepayers will receive a return on their investment in SMI through lowered energy costs.

Appendix A – List of Generation and Transmission Projects Reviewed

Department	Project Name	Project Type	Status	Capital Budget
Generation	John Hart Replacement	Sustaining	Planning	\$1,053,000,000
Generation	Ruskin Dam and Powerhouse Upgrade	Sustaining	Implementation	\$718,036,000
Generation	Bridge River Townsite Redevelopment	Sustaining	Implementation	\$24,100,000
Generation	GM Shrum 09 G1-5 Turbine Rehabilitation	Sustaining	Implementation	\$262,000,000
Generation	Mica Switchgear Replacement	Sustaining	Implementation	\$180,625,000
Generation	Site C Clean Energy	Growth	Planning	\$7,900,000,000
Generation	Fort Nelson Resource Smart Upgrade	Growth	Implementation	\$149,200,000
Generation	Mica Units 5 & 6	Growth	Implementation	\$710,000,000
Generation	Revelstoke Unit 5	Growth	Implementation	\$300,000,000
Generation	Aberfeldie Redevelopment	Growth	Completed	\$90,000,000
Generation	Waneta Dam Interest Purchase	Growth	Completed	\$841,000,000
Transmission	Dawson Creek/Chetwynd Area Transmission	Growth	Planning	\$232,767,738
Transmission	Seymour Arm Capacitor Station	Growth	Planning	\$71,495,100
Transmission	Vancouver City Central Transmission	Growth	Implementation	\$200,936,000
Transmission	Northwest Transmission Line	Growth	Implementation	\$404,000,000
Transmission	Interior to Lower Mainland	Growth	Implementation	\$602,143,000
Transmission	Columbia Valley Transmission	Growth	Implementation	\$154,145,000
Transmission	Vancouver Island Transmission Reinforcement	Growth	Completed	\$248,817,090
Transmission	Greenfield Substations	Growth	Completed	\$51,088,454
Transmission	System Control Modernization	Growth	Completed	\$132,560,000
Total				\$14,325,913,382

Appendix B – Summary of Recommendations

The report recommendations have been organized by topic area. For further details, refer to the corresponding recommendation number in the report.

Recommendations
<p>Reporting</p> <p>We recommend that BC Hydro:</p> <ul style="list-style-type: none">(1) Provide a business plan to their Board of Directors that details the savings to be realized over Fiscal 2012-2014, as well as continued savings in the next Revenue Requirements Application.(2) Chief Executive Officer and Board Chair provide interim progress reports to the Minister of Energy and Mines and Treasury Board, given the impact on government's overall debt and fiscal plan if targets are not met.(18) Continue with the new implementation of their human resource information system to ensure sufficient monitoring and reporting of active consultant and contractors.
<p>Operational Efficiencies</p> <p>We recommend that BC Hydro:</p> <ul style="list-style-type: none">(3) Accelerate the completion of the BCTC integration and collaboration between departments to achieve efficiencies and other benefits.(4) Utilize risk management to focus on mitigating risks, not necessarily avoiding them entirely, in order to better manage costs of mitigation strategies.(7) Accelerate the pace and magnitude of change to develop an organizational structure that reflects the reasonable level of internal and external staffing that reduces costs passed on to ratepayers.(10) Continue to focus on areas requiring improvement under the Maintenance Improvement Initiative such as material supplies management to increase efficiencies.(11) Implement stronger commitment and oversight to the Information Technology and Telecommunications Plan to change business processes necessary to ensure benefits and efficiencies are fully achieved during this rate period.(29) Expedite the full implementation of its technology projects to support electronic ordering, receipt and payment of goods and services. Simply adopting a process of redesign is not adequate to ensure benefits are effectively realized. Technology projects' implementation need to be supported by a strong executive change management strategy.
<p>Labour Costs</p> <p>We recommend that BC Hydro:</p> <ul style="list-style-type: none">(8) Work with Unions, through a collaborative process, to identify and implement cost effective solutions to reduce overtime, including scheduled overtime and improve overall productivity of the organization.(9) Evaluate whether overtime may be more effectively managed through the use of private sector contractors.

Recommendations

- (12) Work with the COPE and IBEW unions to make the collective agreements more aligned with other public sector agreements and to better facilitate the shift schedule changes required to allow BC Hydro to manage their resources and advance their strategic plans in a cost effective manner.
- (13) Revisit compensation policies and compare with public sector allowances to determine if other Management and Professional benefit costs are in the best interest of the ratepayer.
- (14) Adjust incentive plans under the Variable Pay program for Management and Professional staff to ensure targets for performance measures are set at a level that is not easily attained to prevent the incentive pay becoming part of base compensation.
- (15) Reduce or eliminate the flex time sign up incentive and pay out options for hours worked beyond the 35 hour work week while maintaining the flex schedule option.
- (16) Revisit the current post-retirement benefit coverage for extended health and life insurance benefits provided to reduce the impact to ratepayers.

Operating Costs Policy and Processes

We recommend that BC Hydro:

- (5) Improve its budgeting and forecasting processes by periodically undertaking a zero-based budgeting exercise to obtain a better understanding of their incremental costs and improve overall cost effectiveness.
- (6) Executive management team and the Board of Directors establish stronger targets and controls on all spending of a discretionary nature (e.g. business expenses, travel and contracting for professional services).
- (17) Strengthen its controls over travel planning and align its travel policies and allowable business expenses with provincial government's Core Policy.
- (19) Implement stronger policy to ensure appropriate use of contract services.
- (20) Revisit their policy on funding all of the apprenticeship training costs and look into cost sharing opportunities by partnering with trade schools and trade associations.
- (21) Consider a payback policy requiring a commitment from staff to remain as a BC Hydro employee for a certain number of years after receiving apprenticeship training so that BC Hydro and ratepayers may benefit from the investment in the employee. BC Hydro should work collaboratively with the IBEW to establish a suitable arrangement for the apprentices under this collective bargaining unit.

Operational and Capital Procurement Practices

We recommend that BC Hydro:

- (22) Where appropriate, include Shared Services BC in procurement strategies and solicitation processes for possible opportunities to onboard or leverage existing government wide contracts. As well, BC Hydro should utilize corporate supply arrangements to maximize discounts through government wide purchases.
- (23) Continue to investigate opportunities to streamline and consolidate the procurement of common goods or services to achieve significant long-term savings.

Recommendations

- (24) Ensure that weighted and defined evaluation criteria are mandatory within competitive bid documents to improve transparency, promote consistency and enhance vendor relationships.
- (25) Adopt the Government's formalized Vendor Complaint Review Process to provide vendors with a fair and transparent way of addressing their concerns. This process will also provide a means to identify gaps in policy, or procedures, thereby acting as a process improvement tool.
- (26) Continue to work with vendors through the Joint BC Hydro/Supplier Working Group to improve contractual (both commercial and technical) language and involve vendors in risk transfer strategies to ensure risks are allocated appropriately between BC Hydro and vendors.
- (27) Work with the province to fully adopt the functionalities of Government's BC Bid technology to maximize efficiencies by leveraging existing government technology and through strategic sourcing and consolidation of new bid opportunities and purchases.
- (28) Cease absorbing the cost of supplying interested vendors with professional detailed drawings and plans in hard copy. The current policy of covering costs is not consistent with other government entities and would result in direct savings.
- (30) Capital staff work more closely with procurement staff to achieve the greatest value from innovative procurement approaches for example, Design-Build and Public-Private Partnerships.
- (31) Ensure procurement staff are sufficiently trained and continuously update their knowledge around procurement.
- (32) Fully identify project risks in a risk register and communicate the assignment of capital project risks with vendors, for all large capital projects.
- (33) Ensure the cost of change orders is within 3% of initial project and contract budgets.
- (34) Document change order origin, submitted amount and settled amount in the change order log to allow for a comprehensive assessment at project completion.
- (50) Ensure that weighted and defined evaluation criteria for bids on electricity purchase agreements are disclosed within competitive bid documents, to improve transparency, promote consistency and enhance vendor relationships.
- (51) Consider revising and implementing evaluation criteria, which reflect financial and project viability, within its solicitation documentation for Power Calls.
- (52) Review the process for risk allocation to ensure that risks are being transferred to those IPPs which are best able to manage risks at the least cost, while serving the public interest.

Capital Project Planning and Spending

We recommend that BC Hydro:

- (35) Move towards more performance based project management in order to enable contractors to more effectively achieve deliverables.
- (36) Implement and use their new project management system to provide better information for strategic decision making and project management.
- (38) Reduce project contingencies and reserves to realistically reflect risks.

Recommendations

- (39) Ensure project reserve expenditures continue to be scrutinized and approved by the Capital Committee of the Board before they are spent.
- (40) Review its soft costs related to stakeholder and First Nations consultations and environmental assessment with a view to reducing them.
- (41) Take a more strategic approach to assigning engineering design and oversight resources to ensure that it is providing ratepayers with good value.
- (42) Postpone the office renovation work at both headquarters and field offices currently underway or scheduled until new needs assessments are completed following this review.

We recommend that BC Hydro Board and/or Executive:

- (37) Review concept plans and cost estimates as a basis for setting preliminary cost expectations on capital projects before detailed estimating is undertaken.

Rate Structures

We recommend that the province:

- (43) Clarify the objectives, priorities and/or relative ranking among competing objectives of the rate structure design. If necessary, legislation or the Shareholder's Letter of Expectations can be used for this clarification.
- (44) Ensure rate structures are designed to achieve the priority objectives, including requiring the BCUC to confirm this as part of their review of the new rate structures.

We recommend that the province work with BC Hydro to:

- (45) Review the methodology to allocate costs among customer classes to ensure it supports government priorities and objectives for rates.

Government Policy

We recommend that BC Hydro and the province:

- (46) Evaluate alternative definitions and timelines for government's self-sufficiency policy that meet the needs of the province and ratepayers in a way that is sustainable for the long term.

We recommend that:

- (47) Burrard Thermal Generation Station continue to be used as a source of back-up energy as well as for voltage stabilization.

We recommend that BC Hydro and the province:

- (48) Determine collaboratively, as the economy improves, government's water rental rates charged to BC Hydro, which balance the needs of the province and the utility.
- (49) Determine collaboratively, as the economy improves, a capital structure to support the desired debt to equity ratio and dividend payout policy that balances the needs of the province and the utility.

Recommendations

Regulatory / Deferral Accounts

We recommend that BC Hydro:

- (53) Work with the province to perform a more in-depth review of the growth of regulatory accounts and determine a more sustainable approach to utilizing them over the long term.

Energy Conservation

We recommend that BC Hydro:

- (54) Re-evaluate its various energy conservation programs to reduce the overall costs to ratepayers while still achieving value for money.
- (55) Re-evaluate the cost estimates of the SMI project to determine if there are opportunities to reduce the overall costs of the project, decreasing costs to ratepayers over the longer term, including reassessment of high project contingencies.
- (56) Re-evaluate the SMI in home display rebate program to actively track real time use of electricity and to assess the benefits of the program versus the impact of the program costs on ratepayers. Consider whether this element of the program should require prior BC Utilities Commission approval.