REVIEW OF BC HYDRO'S INDUSTRIAL POWER SMART EXPENDITURES

PREPARED FOR
BC OLD AGE PENSIONERS ORGANIZATION ET AL.

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Executive Summary

- BC Hydro's estimate of conservation potential indicates the amount of cost-effective load displacement or other electricity saving measures that consumers are not expected to undertake on their own. BC Hydro's estimate of industrial conservation potential in 2015/16 represents 32% of the reference case forecast industrial load. In other words, by BC Hydro's estimates, without any demand side subsidies or other measures, 32% of the industrial load will be economically inefficient—it wouldn't be required if industry implemented all cost-effective technologies.

- Competitive firms do not pass up cost-effective investments in conservation. The fundamental reason for the large amount of inefficient electricity consumption in the industrial sector is the failure of rates to signal users the incremental cost or value of the electricity they consume.

- BC Hydro sees the large amount of conservation potential as reason to spend hundreds of millions of dollars to 'acquire' the conservation resource. Its Power Smart plan, however, fails to consider or address the market failure underlying the industrial sector potential—something the BC Government's Energy Policy clearly wants done.

- There are major problems with conservation resource acquisition strategies like BC Hydro is planning. A recent econometric study found that because of selection bias (free rider problems), savings were on average one fifth (costs per Mwh saved five times) what utilities reported. Subsidized DSM encourages program participants to defer efficient conservation or assert the need for greater subsidy than actually required. Incorporating DSM expenditures into rate base creates perverse incentives for utilities to maximize subsidy and other costs regardless of their effectiveness. Economic theory and econometric studies both suggest that pricing electricity closer to its incremental cost is likely to be far more effective, efficient and equitable than subsidizing DSM.

- BC Hydro's Power Smart plan for the industrial sector is not very effective (a large percentage of the estimated cost-effective potential will not be realized) nor necessarily efficient. It certainly is not equitable. Two recent load displacement projects make clear that subsidized Power Smart projects can impose significant costs on ratepayers. Based on the market value of the electricity saved, the net loss to ratepayers will be at least $6.8 million for the Weyerhaeuser project and $11.1 million for the Canfor project. The net loss could be as much as $13.2 million for the Weyerhaeuser project and $25.0 million for the Canfor project given the possibility that some of the purchased savings might have been realized without any subsidy. Power Smart subsidies benefit recipients, but at the direct expense of all other ratepayers.

- The problem is that the Power Smart plan does not address the fundamental market failure that underlies the sub-optimal levels of load displacement and conservation in the industrial sector.

- If effective, efficient and equitable conservation is truly the goal, BC Hydro must develop rate proposals that signal users the incremental costs or value of the electricity they consume. A simple two tier rate structure will have some positive impact, but it will be limited by the percentage of its customers' loads subject to the tier 2 rate. Alternatives that signal the incremental cost or value of electricity for all of the customers' loads, consistent with the BC Government's energy policy objectives, would be more effective.

- What is required at this time is a rejection of the industrial Power Smart expenditures in BC Hydro's revenue requirements application, and direction to BC Hydro to develop rate proposals and complementary strategies (facilitating energy advisory service and conservation financing) that will achieve the industrial sector potential in an efficient and equitable manner.

1.0 Introduction

BC Hydro's Power Smart-related costs of service are estimated to total $62.5 million in fiscal year 2005 and $69.6 million in 2006. By 2006 they will have increased by almost 50% since 2003, an average increase of over 16% per year.[1]

BC Hydro's Power Smart plan calls for $690 million in new investment over the next ten years. The amortization of these expenditures and associated costs of capital (interest and allowed return on equity) will contribute to a continued increase in Power Smart costs of service in future years.

A large proportion of this Power Smart investment is to be directed to the industrial sector. BC Hydro's 10 year plan calls for $265 million to be spent on load displacement and other industrial sector initiatives. This plus a pro-rata share of the $140 million of indirect and other portfolio level costs accounts for 48% of the total planned investment.[2] Even if BC Hydro reduces industrial sector investments by $60 million, in accordance with its preliminary assessment of the implications of stepped rates,[3] the industrial sector initiatives, including a pro-rata share of indirect costs, will still account for over 40% of the total planned expenditures.

The purpose of this evidence is to assess the rationale, impacts, efficiency and equity of these expenditures, particularly in the context of the BC Government's energy policy which calls for new rate structures to provide incentive for industry to self generate and conserve.[4]

2.0 Conservation Potential

Underlying the targets and the level and allocation of expenditures in BC Hydro's Power Smart plan is its estimate of conservation potential. In its 2002 Conservation Potential Review,[5] BC Hydro reported a total economic potential of 12,462 Gwh by 2015/16. The 'most likely achievable' potential, recognizing barriers to implementation, was estimated at 5,835 Gwh.

The industrial sector accounts for a large percentage of the estimated conservation potential—by 2015/16 the industrial sector economic potential is estimated at 5,665 Gwh (some 45% of the total); the most likely achievable potential is estimated at 3,374 Gwh (almost 60% of the total).

It is remarkable how large the estimated conservation potential is in the industrial sector. By definition, conservation potential estimates the difference between the amount of

[1] BC Hydro Revenue Requirements Application, Volume 1, p. 4-5.
[2] BC Hydro Revenue Requirements Application, Volume 2, Appendix I, p.21.
[3] BC Hydro Revenue Requirements Application, Volume 1, p. 4-7.
[4] *Policy Action #21: New rate structures will provide better price signals to large electricity consumers for conservation and energy efficiency,* BC Ministry of Energy, Energy for our Future: A Plan for BC, p.33.
[5] BC Hydro Revenue Requirements Application, Volume 2, Appendix H.

electricity that industry would purchase without any demand side measures (the reference case forecast load), and the amount industry would purchase if it implemented all cost-effective load displacing or electricity saving measures. In effect, it is an estimate of the extent of inefficient electricity consumption. BC Hydro's estimate of industrial conservation potential in 2015/16 represents 32% of the reference case forecast industrial load. In other words, by BC Hydro's estimates, without any demand side subsidies or other measures, 32% of the industrial load will be inefficient—it wouldn't be required if industry implemented all cost effective technologies.

BC Hydro listed a number of reasons why industrial customers might not implement cost effective load displacing or electricity saving technologies. It suggested industry has to consider other factors, such as productivity, product quality, maintenance costs, legislation and perceived risks.[6] But the industrial sector is not like the commercial sector and certainly not like the residential sector. For the most part, it consists of firms operating in globally competitive industries that must minimize their energy and other costs to survive and grow. This is particularly the case in the energy intensive pulp and paper industry, which accounts for two-thirds of the industrial sector conservation potential estimated in BC Hydro's 2002 Review. If a load displacing or electricity saving measure is truly cost-effective, it means it would be beneficial to undertake when all factors including productivity, product quality, maintenance costs, capital costs and risks are taken into account. Successful, competitive firms do not pass up truly cost-effective technologies.

The most fundamental reason why competitive firms in B.C. don't implement cost-effective load displacing or electricity saving measures is the failure of BC Hydro's electricity rates to signal to users the incremental costs or value of the electricity they consume—they don't give firms the financial incentive to invest optimally in self-generation or other load reducing measures. The industrial rate currently averages $34/Mwh.[7] For its Power Smart planning, BC Hydro has indicated that the incremental cost or marginal value of electricity is $55/Mwh. There is a $21/Mwh difference between what firms pay and what BC Hydro estimates the electricity is worth.

To BC Hydro, the large estimate of conservation potential is reason to devote hundreds of person years of staff time and hundreds of millions of dollars to industrial Power Smart initiatives. But BC Hydro's Power Smart plan fails to address the fundamental reason why the conservation potential exists. The conservation potential that BC Hydro has estimated is not a measure of cost-effective conservation; it is a measure of the cost-effective conservation that industry will not undertake on its own.[8] It is a measure of the failure of the electricity market to promote efficient behaviour—a market failure due principally to rates not reflecting the incremental cost or value of electricity to BC Hydro.

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[6] Ibid., p.17.
[7] BC Hydro Revenue Requirements Application, Volume 1, p. 2-7.
[8] BC Hydro does not appear to recognize this very important difference in asserting that the "stepped rate does not impact the total economic conservation potential" (Response to BC Old Age Pensioners IR#1, 1.90c). Stepped rates will reduce the total economic conservation potential (the potential requiring subsidy) because it will increase the conservation that industry will undertake on its own.

In its Energy Plan, the BC Government clearly wants to address this market failure. The reason it recommends implementation of stepped rates in the industrial sector is to *"give consumers the incentive to undertake conservation and energy efficiency"* and *"to provide an incentive for large industrial or transmission rate customers to purchase from IPPs or to self generate when they can do so less expensively than the utility's cost of new supply"*.[9]

BC Hydro's 2002 Conservation Potential Review and its 10 year plan did not consider the impact of stepped rates or any pricing initiative that would better signal users the incremental cost or value of the electricity they consume.[10] Power Smart has not studied the effect that falling real electricity prices over the last decade have had on electricity consumption, and the extent to which inefficient pricing underlies the conservation problem it is trying to address. Power Smart has not developed any report or recommendations on how stepped rates could be implemented to maximize the incentive to conserve, and further reduce the need for staff and subsidy.[11] For these reasons alone, the Review and Plan do not provide a reasonable or justifiable basis to commit to the levels of expenditure in BC Hydro's Application.

3.0 Resource Acquisition versus Pricing Strategies

The provision of incentives and other support in BC Hydro's 10 year Power Smart plan is a classic planners' approach to conservation. Conservation potential is viewed as a resource to be acquired much like new sources of supply.

The purchase of conservation is not, however, the same as acquiring a new source of supply. Conservation reduces BC Hydro's obligation to serve the displaced or otherwise reduced load. But the benefit of that to the utility and its remaining customer load is not the cost it would otherwise incur for incremental supply—it is the difference between the cost of incremental supply and the amount BC Hydro would have charged for it.[12] That benefit only exists to the extent that rates do not reflect the incremental cost or value of electricity supply.

In a number of U.S. jurisdictions where restructuring has caused electricity markets to become more competitive and rates more reflective of the incremental cost or market value of electricity, there has been a shift away from resource acquisition strategies. Utilities have neither the same ability nor incentive to subsidize or 'purchase'

[9] BC Ministry of Energy, Energy for our Future: A Plan for BC, p.24 and 30.
[10] Response to IPPBC IR#1, 1.33.1 and 133.2.
[11] Response to BC Old Age Pensioners IR#1, 1.90b.
[12] In a news release announcing an $18 million load displacement initiative in Kamloops, BC Hydro's Senior Vice President of Distribution was quoted as saying that its investment "provides a benefit-cost ratio of greater than 3:1". Similar and higher utility benefit-cost ratios are asserted in BC Hydro's Application based on its estimate of the cost per Mwh of load displaced in relation to its estimate of the cost of new supply. However, those benefit-cost ratios are grossly misleading. They misrepresent and greatly overstate the benefit that BC Hydro (and its remaining customer load) actually realize.

conservation.[13] It is not just that competition has undermined the viability of utility demand side expenditures, it has reduced the justification for them.[14] In restructured markets where there is a non-avoidable charge to support conservation, the emphasis has shifted to market transformation strategies—strategies aimed at eliminating barriers and encouraging the development of energy efficient products and viable energy service companies.[15] In marked contrast to BC Hydro's Power Smart plan, the goal is long term market and behavioural change as opposed to immediate purchases of savings.

There are major reservations about subsidy-based demand side resource acquisition strategies. A number of studies conclude they are not nearly as effective or efficient as BC Hydro's plan would suggest.

A recent econometric study used cross sectional and time series data for a large number of U.S. utilities to estimate the impact of DSM expenditures on energy intensity. The statistically observed impact was roughly one-fifth what the utilities' reported DSM savings would suggest. As compared to an average utility estimate of $29 for the cost per Mwh saved, the econometric results indicated costs of between $140 and $220 per Mwh saved.[16] The authors attributed this to the selection bias or free rider problem being much greater than assumed in most utility evaluations. Consistent with previous studies, they concluded that much of the DSM subsidies were going to firms and households that would have undertaken efficiency investments even without the program.[17]

In his critique of resource acquisition strategies, F. Wirl points out that the pool of DSM program participants is not a random sample, but rather is dominated by the households and firms closest to making efficiency investments. They are the group that will be most attracted to subsidy programs, yet the most likely to have made some investment without the programs. The comparison to non-participating control groups that utilities typically use to estimate savings doesn't recognize this fact. Wirl also points out that the provision of conservation subsidies in itself creates a 'moral hazard' problem. It encourages potential program participants to strategically defer efficient conservation investments or assert the need for subsidy beyond what is really required. Also, for utilities that can

[13] Similarly, in the BC natural gas sector, Terasen does not subsidize conservation. With gas commodity rates reflecting their market value, such subsidies would simply benefit the subsidy recipients at the expense of all other ratepayers.

[14] See T. Brennan, "Demand Side Management Programs Under Retail Competition", Resources for the Future Discussion paper 99-02, October, 1998.

[15] See C. Blumstein et. al., "Who Should Administer Energy-Efficiency Programs?", University of California Centre for the Study of Energy Markets, Aug., 2003.

[16] D. Loughren and J. Kulick, "Demand-Side Management and Energy Efficiency in the United States", Energy Journal, 2004, Volume 25, No.1, pp.19-43.

[17] Loughren and Kulick note that Train's analysis of industrial DSM offered by Southern California Edison in 1983 ("Incentives for Energy Conservation in the Commercial and Industrial Sectors", The Energy Journal Vol. 9, No 13, p.113-128) implies "about 70% of reported energy savings would have occurred in the absence of DSM participation". Ibid., p.23. They also note that Waldman and Ozog reached a similar conclusion in their study of DSM expenditures in midwest utilities (Southern Economic Journal 62(4), 1996. pp.1054-1071).

incorporate DSM spending in their rate base, it can create a perverse incentive to maximize spending for conservation regardless of its impact.[18]

In its response to a recent Ontario Energy Board report on DSM, Ontario's Energy Probe also questioned the effectiveness of DSM subsidies. It noted that subsidized DSM can be counter productive *"by slowing the rate at which consumers would of their own accord invest in conservation"* and by increasing purchases and use of energy-using appliances. Citing the results of a Gas Research Institute study on energy use by jurisdiction, Energy Probe stated that *"the available information suggests that gas DSM programs may have helped Ontario from keeping up with the conservation improvements in neighbouring jurisdictions".*[19]

Economic theory and econometric analysis both suggest that measures that correct fundamental market failures are likely to be more effective, efficient and equitable than resource acquisition subsidy programs. As one economist wrote, *"It is important to keep in mind that [subsidizing] DSM is an inferior 'second best' tool to policies that would bring electricity prices closer to marginal cost".*[20] Providing appropriate price signals avoids the selection bias, moral hazard and rebound effects of subsidized DSM. It eliminates the need for project applications, negotiations and other basically wasteful bureaucracy. And it allows industry to do what it can do best—to efficiently minimize its purchases and use of electricity.

With respect to effectiveness, it is instructive to note that the hundreds of millions of dollars of incentives and other expenditures in BC Hydro's Power Smart plan aren't expected to capture all of the economic potential or even all of the 'most likely achievable' potential. By BC Hydro's estimates, even if the industrial sector expenditures succeed in achieving their target savings, almost 25% of the estimated conservation potential in the industrial sector in 2015/16 won't be realized.[21]

4.0 Efficiency and Equity-- Impacts of Two Recent Load Displacement Projects

In 2003, BC Hydro announced two large Power Smart-subsidized load displacement projects: an $18 million contribution to Weyerhaeuser to support the installation of a 30 MW turbo-generator at its Kamloops pulp mill (displacing 155 GWh of load per year for ten years), and a $49 million contribution to Canfor to support the installation of a 48 MW turbo-generator at its Prince George pulp mill (displacing 390 GWh of load per year for fifteen years).

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[18] F. Wirl, "Lessons from Utility Conservation Programs", Energy Journal, 2000, Vol 21, pp.87-108.
[19] Energy Probe's Analysis of 'Demand Side Management and Demand Response in the Ontario Electricity Sector: Report of the Ontario Energy Board to the Minister of Energy', March 1, 2004.
[20] T. Brennan, "Demand Side Management Programs Under Retail Competition", Resources for the Future Discussion paper 99-02, October, 1998, p.15.
[21] By Hydro's estimates, the unrealized conservation potential in the industrial sector in 2015/16 will be 5665-1818 = 3847 Gwh. The forecast load, taking the estimated savings into account will be 17821-1818=16003 Gwh.

The Weyerhaeuser Kamloops project has been discussed for years. Weyerhaeuser purchased a refurbished 30 MW turbo-generator some time ago. The Power Smart incentive made the project sufficiently attractive to proceed and it is now nearing completion. The Canfor Prince George project has also been discussed for some time. Canfor submitted the project to the 2002 Customer-Based Generation Call,[22] but the project was not short-listed. Now with the Power Smart incentive, the project is under construction.

BC Hydro justified the large subsidies for these projects on the basis of its estimates of their total resource cost, utility cost and ratepayer impact. BC Hydro stated that these projects are efficient (their total resource costs are less than the $55/Mwh it assumes for the cost of alternative sources of electricity), their utility cost (ignoring lost revenues) are approximately $15/Mwh, and the impact on the ratepayers (the remaining load) is positive, with a ratepayer impact (RIM) benefit-cost ratio for Canfor of 1.4.[23]

BC Hydro did not provide detailed evaluations in support of these statements. However, the utility cost and ratepayer impacts can be roughly replicated based on an avoided cost of $55/Mwh, an industrial rate averaging $36/Mwh and an assumed timing of the payments and load displacement as shown in Appendix A. The total and levelized cost and ratepayer impacts under those assumptions are shown in Table 1 below. They indicate levelized utility costs of $17/Mwh and a ratepayer benefit cost-ratio of 1.1 for Weyerhaeuser, and utility costs of $14/Mwh and a ratepayer benefit-cost ratio of 1.35 for Canfor.

Table 1
Benefits and Costs -- BCH Case
(2003 NPV at 6% real, levelized value per Mwh in italics)

	Weyerhaeuser	**Canfor**
Utility Cost (including provision for overhead)	$18,960,000 *$17.10*	$51,610,000 *$14.02*
Avoided Cost	$60,970,000 *$55.00*	$202,430,000 *$55.00*
Lost Revenue	$39,910,000 *$36.00*	$132,500,000 *$36.00*
Ratepayer Net Benefit	**$2,100,000** ***$1.90***	**$18,320,000** ***$4.98***
RIM Benefit-Cost Ratio	**1.11**	**1.35**

[22] See www.bchydro.com/rx_files/info/info3286.pdf.
[23] The utility cost and cost of alternative supply estimates are provided in the press releases announcing the projects. The ratepayer benefit cost ratio is provided in Response to BC Old Age Pensioners IR#1, 1.89.0(b).

The problem with the assumptions required to replicate BC Hydro's results, however, is that they overstate the benefit of the power that is displaced and ignore the possibility that Weyerhaeuser and Canfor would have instituted some conservation measures or installed the turbo-generators without subsidies at some point in the future.

An objective measure of the avoided cost or value of incremental supply is the Mid-Columbia market price. This is the measure which BC Hydro has contractually agreed to use to calculate liquidated damages should Weyerhaeuser or Canfor use their projects to obtain market sales instead of supplying the savings to BC Hydro[24]. It indicates the amount BC Hydro could expect to pay to acquire additional supply or realize from the marketing of any additional surplus. As shown in Appendix B, BC Hydro's forecast of these prices, assuming a 2% inflation rate, suggests a real (2003$) levelized value of $47/Mwh for the flat profile of savings offered by these projects.[25]

The Mid-Columbia price overstates the value of electricity supply in Prince George and Kamloops. There are greater transmission costs and losses to deliver power from these locations to BC Hydro's domestic load or market centres than from the Mid-Columbia region. As well, contractual provisions in the load displacement agreements allowing for a 'load balancing account' diminish the certainty of its supply at any time and its value compared to a firm purchase at Mid-Columbia. Nevertheless the Mid-Columbia price forecast does provide a more accurate and objective estimate of the benefit of the load displacement projects than the $55/Mwh that BC Hydro used.[26]

In Table 2 below, the effect of basing avoided costs on the Mid-Columbia price forecast is shown. The results indicate significant net losses to ratepayers for both projects. The net loss for the Weyerhaeuser project is $6.8 million; for Canfor the net loss is over $11 million. The reason for the net loss is clear. Based on the cost or value of power available in the market, the benefit of the load displacement to BC Hydro and its remaining customer load is only $11/Mwh, but BC Hydro is contributing $14 to $17 per Mwh to achieve it.

[24] Response to BC Old Age Pensioners IR#1, 1.89.0e.

[25] Response to BCUC IR 1.2.23.

[26] It should also be noted that BC Hydro's $55 avoided cost estimate is a nominal value (Response to Sierra Club IR#2.24.0). It is therefore not the appropriate figure to compare to a $36/Mwh industrial rate to calculate the benefit of load displacement. The $36 rate is expressed in real (2003$) terms. In nominal terms the industrial rate will be $37/Mwh by 2005 if the rate application is approved, and can be expected to increase at least with the rate of inflation as BC Hydro rolls in high cost sources of supply. As shown in Appendix B, adjusting BC Hydro's forecast of the costs of new supply for inflation yields an equivalent 2003$ levelized value of approximately $49.60/Mwh, far less than the $55 required to replicate BC Hydro's results.

Table 2
Benefits and Costs Based on Mid Columbia Market Value of Electricity
(2003 NPV at 6% real, levelized value per Mwh in italics)

	Weyerhaeuser	**Canfor**
Utility Cost (including provision for overhead)	$18,960,000 *$17.10*	$51,610,000 *$14.02*
Avoided Cost	$52,100,000 *$47.00*	$172,990,000 *$47.00*
Lost Revenue	$39,910,000 *$36.00*	$132,500,000 *$36.00*
Ratepayer Net Benefit	**($6,770,000)** ***($6.10)***	**($11,130,000)** ***($3.02)***
RIM Benefit-Cost Ratio	**.64**	**.78**

BC Hydro's evaluation assumes that without the subsidy, Weyerhaeuser and Canfor would not have implemented conservation measures on their own, even though under stepped rates they would have had to pay the tier 2 market price for at least some portion of their purchases. That is not a reasonable assumption.

The pulp and paper sector has been identified by Power Smart as fertile ground for energy conservation. As well, in the National Climate Change context the pulp and paper industry has undertaken to reduce its greenhouse gas (GHG) emissions intensity by an average of 15 percent by 2008 to 2012, the first Kyoto commitment period.[27]

In Table 3 below, it is assumed that without the load displacement subsidies Weyerhaeuser and Canfor would have implemented some conservation measures and reduced its electricity purchases by 10%. The net loss to ratepayers in this case increases to almost $8 million for Weyerhaeuser and over $15 million for the Canfor project. The reason for the increase in the net loss is that the cost per unit of savings increases. BC Hydro is essentially paying for savings that would have occurred to some extent without the subsidy.

[27] *Government of Canada and Canadian Pulp and Paper Industry Agree on Blueprint for Climate Change Action*, Government of Canada, Press release, November 6, 2003.

Table 3
Benefits and Costs with 10% Conservation
(2003 NPV at 6% real, levelized value per Mwh in italics)

	Weyerhaeuser	**Canfor**
Utility Cost (including provision for overhead)	$18,960,000 *$19.73*	$51,610,000 *$15.58*
Avoided Cost	$46,890,000 *$47.00*	$155,690,000 *$47.00*
Lost Revenue	$35,920,000 *$36.00*	$119,250,000 *$36.00*
Ratepayer Net Benefit	**($7,990,000)** ***($8.73)***	**($15,170,000)** ***($4.58)***
RIM Benefit-Cost Ratio	**.58**	**.71**

Not only could Weyerhaeuser and Canfor have implemented some conservation without the subsidy, particularly for that portion of their load subject to tier 2 rates, it is possible they would have installed turbo-generators on their own at some later date. With rising BC Hydro rates, greater access to domestic markets, and some already sunk costs, the projects might have proven economic in the foreseeable future.

In Table 4 below, the implications of Weyerhaeuser otherwise installing a turbo-generator in 2009 and Canfor otherwise installing a turbo-generator in 2013 are shown. This net loss to ratepayers increases to over $13 million for the Weyerhaeuser project and over $25 million for Canfor. As in the previous case the reason for the losses is that BC Hydro is paying for savings that would otherwise have occurred. There are, of course, major benefits to Weyerhaeuser and Canfor from the Power Smart subsidies, but they come at the direct expense of all other ratepayers.

Table 4
Benefits and Costs with Future Unsubsidized Load Displacement
(2003 NPV at 6% real, levelized value per Mwh in italics)

	Weyerhaeuser	**Canfor**
Utility Cost (including provision for overhead)	$18,960,000 *$36.33*	$51,610,000 *$21.35*
Avoided Cost	$24,530,000 *$47.00*	$113,640,000 *$47.00*
Lost Revenue	$18,790,000 *$36.00*	$87,040,000 *$36.00*
Ratepayer Net Benefit	**($13,220,000)** ***(25.33)***	**($25,020,000)** ***(10.35)***
RIM Benefit-Cost Ratio	**.30**	**.52**

It is possible that the Weyerhaeuser and Canfor projects are efficient—that they are less costly than alternative sources of supply. The test, however, is whether Weyerhaeuser and Canfor would have undertaken those projects without subsidy if they had to pay the incremental cost or value of the electricity they purchased from BC Hydro. Under the current pricing regime, one simply cannot be certain what Weyerhaeuser and Canfor, taking all factors including non-electricity benefits and costs into account, would have in fact done.

One thing is certain. The BC Hydro contributions in support of those projects are inequitable to ratepayers. There are very significant net losses to BC Hydro and its remaining customer load, recognizing the market value of the displaced load plus the possibility that some of the savings might have been realized without any subsidy.

The contributions are also inequitable to alternative potential suppliers of electricity. The projects were not subject to the same competitive bidding process or the same contractual terms as alternative suppliers. The amount of electricity they in fact provide is much less certain and relative ranking very unclear.

4.0 Alternative Conservation Strategies

There is a clear environmental and economic interest in promoting conservation. The issue isn't whether to be 'power smart'—the issue is how that can be done in the most effective, efficient and equitable manner.

BC Hydro's Power Smart plan for the industrial sector is not very effective (a large percentage of the estimated cost-effective potential will not be realized) nor necessarily efficient. It certainly is not equitable. The problem is that the plan does not address the fundamental market failure that underlies the sub-optimal levels of load displacement and conservation investment in the industrial sector.

If effective, efficient and equitable conservation is truly the goal, BC Hydro must develop rate proposals that signal users the incremental costs or value of the electricity they consume. A simple two tier rate structure will have some positive impact, but it will be limited by the percentage of customers' loads subject to the tier 2 rate. A full commitment to conservation requires the right price signal for all of the customers' loads.

There are different ways that industrial rates can be structured to fully promote conservation, yet still be sensitive to the government's policy objective of distributing benefits of low cost heritage supply to electricity consumers. For example, a basic fixed charge reflecting each industry or customer's base year energy intensity could be established, with the final bill adjusted for differences between actual and base consumption priced at the incremental cost or value of electricity. Base year energy use patterns could be used to define variations by time of day and season in order to incorporate real time pricing of electricity consumed or saved. Negative customer charges could be another option to consider. In any case the key is to distribute the share of the heritage benefit (the difference between incremental cost or value of electricity consumed and revenue requirements) independently of the load displacement or conservation decisions customers make.

A separate hearing will be held to address BC Hydro's rate structure. However, BC Hydro's expenditure plans for Power Smart, a rapidly growing component of its revenue requirements, cannot be properly reviewed without considering the way in which BC Hydro plans to implement more efficient rates in keeping with the intent of the BC Government's Energy Policy.

What is required at this time is a rejection of the industrial Power Smart expenditures in BC Hydro's current revenue requirements application, and direction to BC Hydro to develop rate proposals and complementary strategies (facilitating energy service and conservation financing) that will achieve the industrial sector potential in an efficient and equitable manner.

Appendix A

Impact Assumptions and Calculations for Weyerhaeuser and Canfor Load Displacement Projects

Weyerhaeuser's Kamloops Project

BC Hydro announced on January 15, 2003 that it was making a Power Smart incentive payment to Weyerhaeuser to support a load displacement project at Weyerhaeuser's Kamloops pulp mill. BC Hydro agreed to contribute $18.0 million dollars toward the $34.8 million 30 MW turbo-generator project. The turbo-generator will produce 155 GWh per year, making the mill self-sufficient with respect to electricity use. Weyerhaeuser is committed to using the power to displace domestic load for a period of ten years under the load displacement agreement.

Table A-1 is an analysis of the cost and ratepayer impacts of the Kamloops project based on information in the BC Hydro press release and BC Hydro responses to Information Requests for the Revenue Requirements Hearing.

Table A-1 assumptions:

Base Case (BC Hydro)

- Discount rate – 6% real.
- BC Hydro contribution: $18,000,000, paid 25% in 2003, remainder in 2004.
- 10% added to BC Hydro contribution to estimate total 2003$ cost, including provision for overheads and adjustment for inflation.
- Project assumed to be in service July 1, 2004 – 77.5 GWh of load displaced in 2004, 155.0 GWh in 2005 through 2013, and 77.5 GWh in 2014.
- Avoided Cost based on levelized cost of new generation of $55/MWh.
- Lost Revenues based on 2003$ levelized average industrial rate estimated at $36.00/MWh.
- RIM test: Avoided Cost minus Lost Revenue divided by BC Hydro Utility Cost.

Case 1 – Avoided Cost based on Mid-Columbia price forecast (a 2003$ levelized value of $47/MWh)

Case 2 – 10 percent conservation would have occurred without subsidy

- Load displaced reduced by 10%, commencing in 2004.

Case 3 – Load displacement would have occurred in 5 years without subsidy

- Load displacement due to the subsidy reduced to zero in 2009 and following years.

Table A-1												
Rate Impact Measure												
Weyerhaeuser's Kamloops Project												
BC Hydro Contribution/Cost	18.00	$ million		Avoided Cost		55.00	$/MWh					
Electricity Displaced	155.00	GWh/yr		Lost Revenue (1821 Rate		36.00	$/MWh					
Turbogenerator	30.00	MW										
Discount Rate	6%											
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Baseline Calculation												
BC Hydro Contribution/Cost ($)	4,500,000	13,500,000	0									
Net Present Value - BCH Cost ($)	18,959,433.96											
Electric Load Displaced (GWh)	-	77.50	155.00	155.00	155.00	155.00	155.00	155.00	155.00	155.00	155.00	77.50
Levelized Utility Cost ($/MWh)	17.10											
Avoided Cost ($)	0	4,262,500	8,525,000	8,525,000	8,525,000	8,525,000	8,525,000	8,525,000	8,525,000	8,525,000	8,525,000	4,262,500
NPV Avoided Cost ($)	60,968,948											
Levelized Avoided Cost ($/MWh)	55.00											
Lost Revenue ($/MWh)	0	2,790,000	5,580,000	5,580,000	5,580,000	5,580,000	5,580,000	5,580,000	5,580,000	5,580,000	5,580,000	2,790,000
Net Present Value - Lost Revenue ($)	39,906,947											
Levelized Lost Revenue ($/MWh)	36.00											
RIM test [(Avoided-Lost Revenue)/Utility]	1.11											
Net Present Value - Benefit ($)	21,062,000											
Net Present Value - Cost ($)	18,959,434											
Net Benefit	2,102,566											
Case 1 - Avoided cost = $47/MWh												
Avoided Cost ($)	0	3,642,500	7,285,000	7,285,000	7,285,000	7,285,000	7,285,000	7,285,000	7,285,000	7,285,000	7,285,000	3,642,500
NPV Avoided Cost ($)	52,100,737											
Levelized Avoided Cost ($/MWh)	47.00											
RIM test [(Avoided-Lost Revenue)/Utility]	0.64											
Net Present Value - Benefit ($)	12,193,790											
Net Present Value - Cost ($)	18,959,434											
Net Benefit	(6,765,644)											

Table A-1 (con'd)
Rate Impact Measure
Weyerhaeuser's Kamloops Project

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Case 2 - 10 Percent Conservation												
Electric Load Displaced (GWh)		69.75	139.50	139.50	139.50	139.50	139.50	139.50	139.50	139.50	139.50	69.75
Levelized Utility Cost ($/MWh)	19.00											
Avoided Cost ($)	0	3,278,250	6,556,500	6,556,500	6,556,500	6,556,500	6,556,500	6,556,500	6,556,500	6,556,500	6,556,500	3,278,250
NPV Avoided Cost ($)	46,890,663											
Levelized Avoided Cost ($/MWh)	47.00											
Lost Revenue ($/MWh)	0	2,511,000	5,022,000	5,022,000	5,022,000	5,022,000	5,022,000	5,022,000	5,022,000	5,022,000	5,022,000	2,511,000
Net Present Value - Lost Revenue ($)	35,916,253											
Levelized Lost Revenue ($/MWh)	36.00											
RIM test [(Avoided-Lost Revenue)/Utility]	0.58											
Net Present Value - Benefit ($)	10,974,411											
Net Present Value - Cost ($)	18,959,434											
Net Benefit	(7,985,023)											
Case 3 - Load Displacement Otherwise Occurs in 5 Years												
Electric Load Displaced (GWh)		69.75	139.50	139.50	139.50	139.50	-	-	-	-	-	-
Levelized Utility Cost ($/MWh)	36.33											
Avoided Cost ($)	0	3,278,250	6,556,500	6,556,500	6,556,500	6,556,500	0	0	0	0	0	0
NPV Avoided Cost ($)	24,525,674											
Levelized Avoided Cost ($/MWh)	47.00											
Lost Revenue ($/MWh)	0	2,511,000	5,022,000	5,022,000	5,022,000	5,022,000	0	0	0	0	0	0
Net Present Value - Lost Revenue ($)	18,785,623											
Levelized Lost Revenue ($/MWh)	36.00											
RIM test [(Avoided-Lost Revenue)/Utility]	0.30											
Net Present Value - Benefit ($)	5,740,051											
Net Present Value - Cost ($)	18,959,434											
Net Benefit	(13,219,382)											

Canfor's Prince George Project

BC Hydro announced on October 31, 2003 that it was making a Power Smart incentive payment to Canadian Forest Products Ltd. (Canfor) to support an upgrade to its Prince George Pulp and Paper mill to provide all the electricity needs of that mill plus its Intercontinental Pulp mill. BC Hydro agreed to contribute $49.0 million dollars toward the $81.0 million project. The project will entail the installation of a 49 MW turbo-generator that will produce 390 GWh per year, making the two Prince George-area pulp mills self-sufficient with respect to electricity use. Canfor is committed to using the power to displace domestic load for a period of fifteen years under the load displacement agreement.

Table A-2 is an analysis of the cost and ratepayer impacts of the Prince George project based on information in the BC Hydro press release and Information Requests to BC Hydro for the Revenue Requirements Hearing.

Table A-2 assumptions:

Base Case (BC Hydro)

- Discount rate – 6% real.
- BC Hydro contribution: $49,000,000, paid 25% in 2004, remainder in 2005.
- 10% added to BC Hydro contribution to estimate total 2003$ cost, including provision for overheads and adjustment for inflation.
- Project assumed to be in service July 1, 2005 – 195 GWh of load displaced in 2005, 390 GWh in 2006 through 2018, and 195 GWh in 2019.
- Avoided Cost based on levelized cost of new generation of $55/MWh.
- Lost Revenues based on 2003$ levelized average industrial rate estimated at $36.00/MWh.
- RIM test is: Avoided Cost minus Lost Revenue divided by BC Hydro Utility Cost.

Case 1 – Avoided Cost based on Mid-Columbia price forecast (a 2003$ levelized value of $47/MWh)

Case 2 – 10 percent conservation would have occurred without subsidy

- Load Displaced reduced by 10%, commencing in 2005.

Case 3 – Load Displacement would have occurred in 10 years without subsidy

- Load displacement due to the subsidy reduced to zero in 2014 and following years.

Table A-2
Rate Impact Measure
Canfor's Prince George Project

BC Hydro Contribution/Cost	49.00	$ million		Avoided Cost		55.00	$/MWh										
Electricity Displaced	390.00	GWh/yr		Lost Revenue (1821 Rate)		36.00	$/MWh										
Turbogenerator	48.00	MW															
Discount Rate	6%																
Year	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2015**	**2016**	**2017**	**2018**	**2019**
Baseline Calculation																	
BC Hydro Contribution/Cost ($)	12,250,000	36,750,000															
Net Present Value - BCH Cost ($)	51,611,792																
Electric Load Displaced (GWh)	-	195.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	390.00	195.00
Levelized Utility Cost ($/MWh)	14.02																
Avoided Cost ($)	0	10,725,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	21,450,000	10,725,000
NPV Avoided Cost ($)	202,431,673																
Levelized Avoided Cost ($/MWh)	55.00																
Lost Revenue ($/MWh)	0	7,020,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	14,040,000	7,020,000
Net Present Value - Lost Revenue ($)	132,500,731																
Levelized Lost Revenue ($/MWh)	36.00																
RIM test [(Avoided-Lost Revenue)/Utility]	1.35																
Net Present Value - Benefit ($)	69,930,941																
Net Present Value - Cost ($)	51,611,792																
Net Benefit	18,319,149																
Case 1 - Avoided cost = $47/MWh																	
Avoided Cost ($)	0	9,165,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	18,330,000	9,165,000
NPV Avoided Cost ($)	172,987,066																
Levelized Avoided Cost ($/MWh)	47.00																
RIM test [(Avoided-Lost Revenue)/Utility]	0.78																
Net Present Value - Benefit ($)	40,486,335																
Net Present Value - Cost ($)	51,611,792																
Net Benefit	(11,125,458)																

Table A-2 (cont'd)
Rate Impact Measure
Canfor's Prince George Project

Year	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2015**	**2016**	**2017**	**2018**	**2019**
Case 2 - 10 Percent Conservation																	
Electric Load Displaced (GWh)	-	175.50	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	175.50
Levelized Utility Cost ($/MWh)	15.58																
Avoided Cost ($)	0	8,248,500	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	8,248,500
NPV Avoided Cost ($)	155,688,359																
Levelized Avoided Cost ($/MWh)	47.00																
Lost Revenue ($/MWh)	0	6,318,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	6,318,000
Net Present Value - Lost Revenue ($)	119,250,658																
Levelized Lost Revenue ($/MWh)	36.00																
RIM test [(Avoided-Lost Revenue)/Utility]	0.71																
Net Present Value - Benefit ($)	36,437,701																
Net Present Value - Cost ($)	51,611,792																
Net Benefit	(15,174,091)																
Case 3 - Load Displacement Otherwise Occurs in 10 Years																	
Electric Load Displaced (GWh)		175.50	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	351.00	-	-	-	-	-	-
Levelized Utility Cost ($/MWh)	21.35																
Avoided Cost ($)	0	8,248,500	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	16,497,000	0	0	0	0	0	0
NPV Avoided Cost ($)	113,637,752																
Levelized Avoided Cost ($/MWh)	47.00																
Lost Revenue ($/MWh)	0	6,318,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	12,636,000	0	0	0	0	0	0
Net Present Value - Lost Revenue ($)	87,041,683																
Levelized Lost Revenue ($/MWh)	36.00																
RIM test [(Avoided-Lost Revenue)/Utility]	0.52																
Net Present Value - Benefit ($)	26,596,070																
Net Present Value - Cost ($)	51,611,792																
Net Benefit	(25,015,723)																

Appendix B

BC Hydro Forecasts of Mid Columbia Price[28] and Cost of New Supply[29] (Cdn$/Mwh)

Year	Mid-C Nominal	Mid-C (2003$)	Cost of New Supply (Nom.)	Cost of New Supply (2003$)
2004	50.8	49.8	55.0	53.9
2005	50.8	48.8	54.9	52.8
2006	50.8	47.9	55.7	52.5
2007	48.6	44.9	53.9	50.0
2008	45.5	41.2	53.2	48.2
2009	48.5	43.1	53.8	47.8
2010	51.8	45.1	54.3	47.3
2011	55.4	47.3	54.9	46.8
2012	58.8	49.2	55.4	46.4
2013	62.6	51.4	56.0	45.9
Equivalent 2003$ levelized value[30]		**46.9**		**49.6**

[28] Response to BCUC IR #1.2.23. Average price assumes 57%-43% HLH-LLH split. Inflation assumed to average 2% per year.
[29] Response to Sierra Club IR #2.24.0.
[30] Calculated over the 2004-2013 period at a 6% real discount rate.