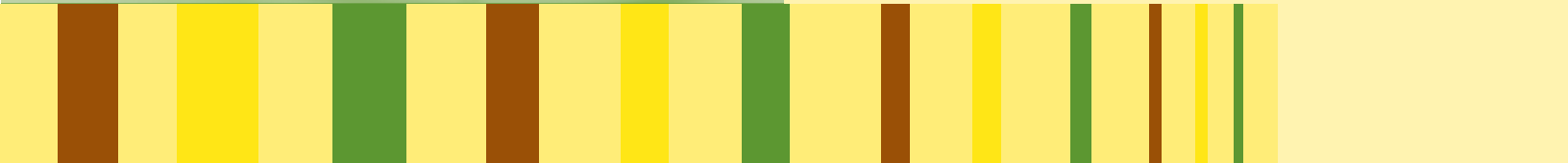


Self-Sufficiency and Insurance: Exaggerating the Need for New Sources of Electricity Supply



Prepared for:
Canadian Office and Professional Employees Union
Local 378
By:
Marvin Shaffer & Associates Ltd.

With the assistance of:
Jennifer Hove
and
Jason Yamashita

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Dr. Marvin Shaffer is an Adjunct Professor at the Public Policy Program for Simon Fraser University. He received his BA Honours in Economics at McGill and his PhD in Economics from the University of British Columbia. His consulting practice takes a progressive and socially responsible approach in energy, transportation and environmental economics and public policy work. Dr. Shaffer's research includes analysis of issues ranging from mining to the Olympics to child care. He was the BC provincial government's negotiator for the Columbia River Treaty settling agreements for the return of the power benefits owed to British Columbia under the Treaty. Dr. Shaffer also was the chief negotiator for the GVRD when the province created Translink.

Jennifer Hove holds a Masters of Public Policy from Simon Fraser University and is pursuing doctoral studies in Political Science at the University of Toronto.

Jason Yamashita holds a BA Honours in Economics from Simon Fraser University and is studying Law at the University of British Columbia.

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Designed by Talking Dog Communications (UFCW 120B) talkingdogcomm@gmail.com





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1.0 Introduction

The province's 2007 Energy Plan is fundamentally flawed. It will needlessly increase the cost of electricity supply in the province and greatly diminish the value of our unique, publicly-owned hydro reservoir assets.

- The Plan calls for self-sufficiency in electric energy supply even in critical low water years. It ignores the ability of BC Hydro to back up the risk of low water conditions with cost-effective market purchases of power. One industry expert estimated the cost of this policy to be in the order of \$160 million per year, equivalent to a rate increase of 5.5%.
- The Plan calls for so-called 'insurance'—the acquisition of 3000 Giga Watt hours (GWh) of electricity over and above its self-sufficiency target. There are no economic parameters or constraints for this policy. Nor is there any economic rationale. It will almost certainly add to the uneconomic acquisition of new sources of supply, and potentially double the cost impact that the self-sufficiency policy will in itself have.
- The combination of self-sufficiency in critical low water years plus insurance is effectively a policy of acquiring new Independent Power Producer (IPP) resources for export, with BC Hydro and its customers assuming all of the export price risk.
- The Plan calls for conservation and energy efficiency measures to meet half of forecast incremental requirements. At the same time, however, it extends in perpetuity, through the Heritage Contract, the policy of selling electricity at well below market prices. The Plan does not recognize the fundamental conflict between its rate and conservation policies. It does not offer a serious, coherent strategy to reduce inefficient or uneconomic requirements for electricity—electricity that customers would not want if they had to pay the economic and environmental costs of new supply.
- The Plan calls for the rapid development of IPP resources, like run-of-the-river hydro and wind, that are generally high in cost; rely on and diminish the value of BC Hydro's reservoir system; can have significant cumulative environmental impact; and do not offer any security of supply or price beyond specified contract periods. While there are specific circumstances where these resources may be beneficial, in excessive amounts they will have excessive cost. BC Hydro should be allowed to select the best resources available to it, taking into full account all of the economic, environmental and social consequences they have.

In short, the Plan is not well-considered and it is not in the general public interest. There is no constraint on demand by rates that reflect the cost of new supply, and no constraint on new IPP supply by what the market and BC Hydro's own projects would otherwise cost. The Energy Plan will result in the development and purchase of too much electricity supply at too high a price.

The purpose of this paper is to address the self-sufficiency and insurance policies in the Plan. It examines why imports and other market purchases are currently used to meet BC Hydro's requirements—why they have been a cost-effective supply strategy as opposed to evidence of a reliability concern. It considers what acquisition and supply strategies are needed going forward to ensure both reliability and cost-effectiveness in meeting growing electricity requirements. And it provides estimates of the cost of the self-sufficiency and insurance that the province is forcing BC Hydro to pursue.

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2.0 BC Hydro's Current Supply and Requirements for Electricity

In 2006, BC Hydro's gross requirements (domestic sales plus losses) totaled almost 58,000 GWh. As shown in Table 1, 46,850 GWh of that was met by BC Hydro's hydroelectric generation and 6,700 GWh

from Independent Power Production contracts. BC Hydro's thermal power production in 2006 was less than 400 GWh.

Table 1
BC Hydro Supply and Requirements - 2006¹ (GWh)

Requirements		Sources of Supply	Trade
Domestic sales	52400	BCH hydro	46850
Losses/own use	5300	Burrard thermal	40
		Other BCH thermal	340
		IPP contracts	6700
		Net imports	4400
		System Storage	(600)
Total	57700	Total	57700

Net imports² totaled 4,400 GWh in 2006. Some 3,800 GWh of that were needed to meet domestic requirements. The other 600 GWh that were imported served to increase BC Hydro's reservoir levels.

Under an internal transfer pricing agreement between BC Hydro and its trading subsidiary Powerex, net imports are now separately allocated to BC Hydro domestic and Powerex trading accounts.

In 2006, the amount of net imports allocated for BC Hydro domestic use was 5,900 GWh. Powerex's allocation was -1,500 GWh; in other words it was a net exporter in that year. These allocations don't change the physical power flows, or total system reliance on imports; rather they affect the internal corporate accounting of imports and charges for their current or future use.

¹ Sources: BC Hydro 2006 Annual Report (for requirements and BC Hydro production), BC Hydro 2006 Integrated Electricity Plan (for IPP contract volumes), and BC Hydro F07/08 Revenue Requirements Application, BC Hydro Response to IPPBC IR 1.11.2 (for net imports and changes in system storage). The total requirements and supply do not exactly equal due to rounding as well as the different sources that were needed for the Table.

² Net imports include market purchases from Alberta, the U.S and in-province IPPs. They are the overall net imports to the BC Hydro system for both domestic and trade purposes.



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As shown in Table 2, BC Hydro has been a net importer of electricity every year since 2001. In 2005

net imports totaled 7,400 GWh, of which 6,900 GWh were allocated for domestic use.

Table 2
BC Hydro Net Imports - 2001-2006³ (GWh)

	System Net Imports	Domestic	Trade
2001	1700	n.a. ⁴	n.a.
2002	5200	n.a.	n.a.
2003	1800	n.a.	n.a.
2004	5100	5300	(200)
2005	7400	6900	500
2006	4400	5900	(1500)

There has been a lot of concern expressed about BC Hydro's net imports of electricity. IPP lobbyists, the media and government officials have all decried what they describe as a deficit position. A Times Colonist editorial stated: "B.C. has been in an electrical deficit for five years... that's a shocking fact".⁵ The CEO of BC Hydro recently wrote in an op-ed article defending the government's self-sufficiency policy: "Hydro has had to import electricity from neighbouring jurisdictions in each of the past five years **just to meet our needs**" (emphasis added).⁶

However, suggestions that BC Hydro's net imports of electricity over the past five years are evidence of a shortage of power or supply concern are simply

incorrect. BC Hydro did not need to purchase 5,900 GWh to meet domestic requirements in 2006. It chose to import those volumes because it was economic to do so. As a technical spokesperson for BC Hydro pointed out in response to media, industry and political concerns about the so-called deficit: "there are good reasons for importing power... BC could lessen its reliance on outside sources by developing its own facilities, but that would mean higher electricity prices for consumers".⁷

A major reason why BC Hydro chose to import electricity in 2006 and previous years is because it could purchase electricity in wholesale markets at a lower cost than operating its Burrard thermal plant.⁸

³ Source: BC Hydro F07/08 Revenue Requirements Application, BC Hydro Response to IPPBC IR 1.11.2.

⁴ Domestic vs trade allocations were not defined prior to the 2003 Transfer Pricing Agreement.

⁵ Times Colonist, March 31, 2006.

⁶ Vancouver Sun, April 10, 2007.

⁷ Reported by Scott Simpson, Vancouver Sun, October 19, 2004.

⁸ Over the past three years, the cost of electricity from Burrard would have been \$10 to \$50/MWh more expensive than the cost of imports. Source: BC Hydro 2006 IEP and LTAP Application, BC Hydro Response to Cloudworks Energy IR 1.6.1.

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BC Hydro rates the annual energy capability of the Burrard plant at over 6,000 GWh.⁹ In 2006, production at Burrard was less than 40 GWh. In the language of BC Hydro's energy traders, Burrard was almost never 'in the money'. It was not economic nor was it necessary to buy natural gas and run Burrard for domestic (or export) purposes.

BC Hydro has also chosen to import electricity in order to add to its hydro storage when its reservoirs were relatively low and not expected to be refilled with annual water run-offs. The imports have

enabled BC Hydro to reduce its own generation, leaving more water behind the dams. In 2006, imports effectively added 600 GWh to BC Hydro's system storage; in 2005 they added 3,600 GWh.

In Table 3, BC Hydro's system net imports over the past six years are shown along with Burrard thermal production, its hydro generation and changes in reservoir storage. The table clearly shows the role imports have played in displacing production from Burrard and backing up the hydro system.

Table 3
Net Imports in Relation to BC Hydro Production and Reservoir Levels - 2001-2006¹⁰ (GWh)

	System Net Imports	Burrard Thermal Prod.	BCH Hydro Generation	Change in Reservoir Storage
2001	1700	4000	45500	(1900)
2002	5200	2700	40500	800
2003	1800	100	47600	0
2004	5100	100	44800	100
2005	7400	500	41800	3600
2006	4400	40	47200	600

Burrard production has been less than its firm capability every year over this period, most notably since 2003. Burrard is an old and relatively inefficient power plant, and not economic to run when gas prices are high relative to the market price of electricity, which they have been in recent years. Nevertheless Burrard has a unique value. It is strategically located where BC Hydro needs

power, and helps ensure peak and annual electricity requirements can be met. It doesn't have to be operated, but can be when required. The Burrard plant has let BC Hydro take advantage of wholesale electricity markets without being dependent on them. Over the past six years it has been increasingly advantageous for BC Hydro to do so.

⁹ BC Hydro 2006 Integrated Electricity Plan.

¹⁰ Source: BC Hydro F07/08 Revenue Requirements Application, BC Hydro Response to IPPBC IR 1.11.2.



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With respect to BC Hydro's hydroelectric generation, production levels have been relatively low over the past six years. BC Hydro estimates that under average water conditions, its annual hydro production would be approximately 47,000 GWh. In four out of the last six years, hydro production was significantly less than that. In 2002 and 2005, hydro production was particularly low, and imports correspondingly high.

It is important to recognize that BC Hydro's hydroelectric generation can vary over 10,000 GWh depending on water conditions¹¹; more with changes in reservoir levels.¹² In an isolated electric system, fluctuating water conditions have to be backed up with domestic firm resources. However, BC Hydro is interconnected with Alberta and the western United States. It has the opportunity to buy electricity from the market in years when water conditions are low. And because of its large, multi-year hydro storage capability, it can buy from the market when electricity is readily available and relatively low in cost. Well over half of BC Hydro's imports for domestic purposes are purchased during light load hours, when surplus thermal capacity keeps prices relatively low. And a significant amount of its imports have been in the spring when surplus freshet hydro

production in Pacific Northwest system typically causes market prices to fall.¹³

IPP industry lobbyists have argued that BC Hydro should not be importing electricity under any circumstances. They even suggest that BC Hydro should pursue a policy of oversupply.¹⁴ However, what this ignores is that importing electricity has been a very cost-effective strategy for BC Hydro.

The alternative that the IPPs have demanded and that government will now force BC Hydro to pursue is to acquire more IPP resources instead of importing to back up the hydro system and displace Burrard. As shown in Table 4, a conservative estimate of the extra cost that this would have caused in 2006, based on BC Hydro import and IPP cost data, is some \$60 million. This estimate is conservative because it ignores incremental transmission costs with the IPP supply (the average cost of imports is for electricity delivered to the Lower Mainland). And it reflects the cost of existing sources of IPP supply, not the cost of incremental sources of supply. The extra cost of replacing all imports with long term IPP contracts would have been \$160 to \$180 million¹⁵ based on the prices in the contract awards from BC Hydro's F2006 Call.

¹¹ In the Heritage Contract hearing, BC Hydro estimated that its historical hydro production averaged 46,600 GWh and ranged within +/- 5000 GWh (BC Hydro Proposal for Heritage Contract, Stepped Rates and Access Principles, BC Hydro Response to CBTE IR 2.3.0). More recent estimates of the range around hydro production in average water years is from -4,000 GWh in low water years to +6,000 to 8,000 GWh in high water years.

¹² In 1995, BC Hydro's hydroelectric production was 39,900 GWh. In 1997 it was 53,300.

¹³ Source: BC Hydro F07/08 Revenue Requirements Application, Response to IPPBC IR 1.24.3.

¹⁴ Harvie Campbell of the IPPBC Association stated in a Board of Trade panel that oversupply is actually a good policy because it prevents this kind of flow of funds [for imports] out of British Columbia. Reported by Scott Simpson, Vancouver Sun March 24, 2004.

¹⁵ Brian Wallace estimated the extra cost of adding 4,000 GWh of firm IPP purchases at \$160 million (Presentation to the 4th Annual BC Power Summit). The \$180 million estimate reflects the assumed replacement of all 2006 BC Hydro imports by new IPP purchases, based on an average IPP cost of \$88/MWh for electricity delivered to the Lower Mainland.

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Table 4
*Import vs IPP Cost - 2006*¹⁶

Quarter	Avg cost of imports (\$/Mega Watt Hour (MWh))	Avg cost of existing IPPs (\$/MWh)	Volume of Imports (Giga Watt Hour (GWh))	Import cost saving (\$million)
1	53	66	2882	37.5
2	48	62	948	13.3
3	72	73	896	0.9
4	63	70	1274	8.9
Total			6000	60.6

3.0 Planning and Acquisition Criteria

The Energy Plan states that BC Hydro must acquire sufficient B.C. based resources to be able to meet its requirements with domestic resources at all times, even in critical water years—the lowest sequence of water run-offs experienced over the last 60 years. This policy directive, while cast in the context of ensuring reliability, is not in fact needed to ensure the security of our electricity supply.

Security of electricity supply requires that BC Hydro have sufficient dependable generating and transmission capacity to be able to meet peak loads. Market liquidity or transmission constraints could limit imports or other market purchases to meet peak demands in the specific hours they occur. But the focus of the province's Energy Plan is not on peak capacity. It is on annual energy capability—the ability to meet electricity requirements over the course of the year.

Security of electricity supply does not require that BC Hydro have sufficient domestic annual energy capability to meet the total amount of electricity

required over the course of the year. It certainly doesn't require, as prescribed in the Energy Plan, that BC Hydro have sufficient domestic annual energy capability in all years regardless of water conditions. Unlike peak capacity, annual energy capability can be supplemented by the purchase and storage of seasonal and off-peak imports or other market sources of supply.

To ensure security of annual energy supply, BC Hydro need only have sufficient domestic supply that together with its annual import or other market purchase and storage capability, it can always meet its annual requirements.

BC Hydro previously recognized its ability to rely on 2,500 GWh of imports or other market purchases to meet annual requirements. This market allowance was part of its energy planning criteria until BC Hydro's latest Integrated Electricity Plan. The 2,500 GWh allowance for imports was conservative; it was first developed in 1995 before open access and the expansion of markets in the Pacific Northwest,

¹⁶ Sources: BC Hydro 2006 IEP and LTAP Application, BC Hydro Response to Cloudworks Energy IR 1.6.1 (for average import and existing IPP costs); BC Hydro F07/08 Revenue Requirements Application, Response to IPPBC IR 1.24.3 (for import volumes by quarter allocated for domestic use).

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California and Alberta greatly increased BC Hydro's ability to import electricity. Actual net imports and other market purchases over the past five years demonstrate that BC Hydro could, if it chose, rely on considerably more. In 2005, net imports totaled some 7,400 GWh. With the existing intertie capacity between B.C. and the U.S. and Alberta, BC Hydro could import over 10,000 GWh of electricity, even if the intertie capacity were only available and used 50% of the time.

That isn't to say BC Hydro should depend on imports of up to 10,000 GWh per year. It might not be cost-effective to buy that much electricity on the market. Rather, the point is that to assume no imports or other market purchases can be made, even in low water years, is unnecessary. Nor is it economic.

BC Hydro could, for example, plan on the basis of average water conditions¹⁷, still ensure security of supply and do so in a more cost-effective manner than what the Energy Plan will require. Planning on the basis of average water conditions would mean that BC Hydro would only have to acquire new resources such that its firm purchase contracts together with its hydro capability in average water years and its reliable, firm thermal capability¹⁸ would be sufficient to meet annual requirements. In low water years BC Hydro would have to import up to 4,000 GWh to meet its requirements, in addition to any imports or other market purchases it chose to make to displace its thermal capability.

BC Hydro would have to pay the market price for the imports or other market purchases required

to back up low water conditions. However, under this planning criterion BC Hydro would avoid the need to enter into additional long term contracts for 4,000 GWh of supply and the economic cost and environmental impact they entail. Even run-of-the-river hydro and wind farms have environmental impact; 4,000 GWh of electricity would displace the need for 100 to 200 small (5-10 MW) hydro sites or some 500 (3 MW) windmills and their associated transmission requirements.

There is no question that BC Hydro is physically able to import (or make other market purchases) and store 4,000 GWh of electricity if required because of low water conditions. Indeed, the lower our water run-offs and reservoir levels, the more electricity can BC Hydro import and store. Relying on imports and other market purchases to back up fluctuating water conditions would in no way risk BC Hydro's physical ability to meet its requirements.¹⁹

The issue, as the BC Utilities Commission (BCUC) stated in its recent BC Hydro IEP/LTAP Decision, is not one of physical supply, but rather one of price. And the price issue is not simply that market prices may be high. Rather, the price issue is whether relying on market prices to back up low water conditions will be more or less economic than entering into long term, fixed price contracts. BC Hydro's own submissions in the recent IEP/LTAP hearing favoured market purchases: "the portfolios [that BC Hydro analyzed] with 3,000 and 6,000 GWh of market purchases are both cheaper and less sensitive to gas price forecasts than other scenarios".²⁰

¹⁷ This is in fact the definition of hydro supply that the provincial government required BC Hydro to use in the development of the Heritage Contract—the supply that is priced on the basis of historic average cost.

¹⁸ Whether that would be 6100 GWh for Burrard or some fraction of that would depend on the maintenance program or other plans BC Hydro instituted for Burrard, an important issue in its own right.

¹⁹ BC Hydro acknowledged in the recent IEP/LTAP hearing that there are well established spot markets and there will always be the opportunity to buy electricity. BCUC, In the Matter of BC Hydro Integrated Electricity Plan and Long Term Acquisition Plan, Decision, May 11, 2007, p. 120. In addition to the out-of-province market sources there are in-province as well. For example, BC Hydro could purchase energy at market prices from Teck Cominco. Teck Cominco has surplus energy capability; in 2006 its net exports totaled 830 GWh. It could also purchase energy from the province, which receives over 4,000 GWh per year from Bonneville Power as a result of its entitlement to downstream benefit (DSB) power under the Columbia River Treaty. More economic sources of energy than the DSBs will most likely be available because the DSBs are delivered to the province on-peak and consequently are higher in value than the off-peak energy BC Hydro can buy. In terms of security of supply, however, they are physically available if required.

²⁰ BCUC, In the Matter of BC Hydro Integrated Electricity Plan and Long Term Acquisition Plan, Decision, May 11, 2007, p. 124.

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The province's self-sufficiency policy confuses three quite distinct aspects of supply: physical reliability; price certainty; and source of supply. Self-sufficiency is not needed to ensure physical reliability of supply. Self-sufficiency can provide greater price certainty if secured with long term fixed price contracts, but that in itself won't reduce price risk, it will just change the nature of the risk. The only certain thing self-sufficiency will do is ensure that B.C. resources are used to meet B.C. requirements regardless of the cost.

If there are benefits from self-sufficiency they will come from the price certainty and the requirement for domestic supply. But the province's policy does not address what the magnitude of these benefits is likely to be and how that compares to the costs. The fundamental problem with the province's self-sufficiency policy is that it is not backed up with any data or analysis that suggests that the benefits can be expected to exceed the costs. Nor is the policy qualified in any way—it does not say, for example, that price certainty and domestic supply should be pursued but only to the extent the benefits are expected to outweigh the costs.

There is, in fact, little reason to expect there will be net benefits from the price certainty that the province's self-sufficiency policy will provide.

- The proportion of BC Hydro's total supply subject to short term market price uncertainty is relatively low, and would remain so on average even if it were to rely on imports or market sources of supply to back up low water conditions.²¹
- Entering into fixed high price contracts raises the risk of paying too high a price, which is in fact what recent IPP contract awards suggest would happen. The fixed long term prices in the F2006 contract awards are well above all

but the highest forecasts of future market prices.²² And with the constraints imposed on BC Hydro by the province's Energy Plan, domestic IPP supply prices could increase. The more BC Hydro is required to rely on domestic IPPs, the more expensive they are likely to be.

- The province's self-sufficiency policy will only reduce BC Hydro's exposure to market prices in low water years. In all other years it will increase it. Buying enough electricity to meet BC Hydro requirements in critical water years will result in surpluses in all other years. The province's requirement for 3,000 GWh of 'insurance' will add to the surplus. The value of those surpluses and therefore net cost of the long term fixed price contracts to BC Hydro and its customers will depend on market prices.
- The price risk associated with up to 4,000 GWh of imports or other market purchases if required to offset low water conditions is already fully hedged by the Downstream Benefits (the DSBs) returned to the province under the Columbia River Treaty—electricity that is sold for the province by Powerex at U.S. market prices. Even if the DSBs are not directly used to meet BC Hydro requirements, from a provincial perspective they provide a perfect financial hedge. Any spike in import costs would be more than offset by the higher revenues the province would receive for the DSBs. The price risk associated with low water year purchases is also offset by Powerex profits, to the extent that higher market prices increase the value of the storage and arbitrage that Powerex can effect. From a provincial perspective, high electricity market prices would also be offset by the higher natural gas royalties that the province would receive, given the typically strong correlation between electricity and natural gas prices.²³

²¹ BCUC, *In the Matter of BC Hydro Integrated Electricity Plan and Long Term Acquisition Plan, Decision, May 11, 2007, pp. 119-120.*

²² BC Hydro, *Report on the F2006 Call for Tender Process Conducted by BC Hydro, August 31, 2006, p. 49.*

²³ *Given the province's entitlement to the DSBs and its large natural gas resources, from a provincial perspective B.C. is currently exposed to electricity and natural gas market prices being lower than expected. The province's self-sufficiency policy will increase that exposure.*

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With respect to the benefits of local supply, there is the protectionist notion that we are better off paying our own workers and businesses for all of the goods and services we need. However, as economists have long argued, there are benefits to trade. We should produce those goods and services for which we have a comparative advantage, and backing up fluctuating water conditions with high cost domestic sources of supply may not be one of them.

Even if B.C. did have a comparative advantage in this, the benefits to BC Hydro and its customers will be quickly lost with mandated domestic supply, as required by the Energy Plan. There is no surer way to raise costs than to increase demand for domestic supply and at the same time eliminate all import competition. It is a policy that is designed to benefit the IPP industry, not customers.

4.0 Impact and Cost of Energy Plan Self-Sufficiency and Insurance

In its February 2006 load forecast, BC Hydro is projecting its total domestic load (including losses) to grow from 57,100 GWh in 2006 to 59,400 GWh in 2007; 68,300 GWh by 2016; and 78,100 GWh by 2024. The amount of new supply needed to meet

the forecast load, given the policies in the Energy Plan, are shown in Table 5. By 2016, almost 10,000 GWh of new domestic supply will be required. By 2025, over 18,000 GWh of new domestic supply will be required.

Table 5
New Supply Requirements Under the Energy Plan - (GWh) ²⁴

	2007	2016	2025
Forecast Load (incl. losses)	59400	68300	78100
Forecast Load after DSM	59400	63850	68750
Insurance Requirement	-----	-----	3000
Available Supply (as per Energy Plan)	58100	54000	53400
New Supply Requirements	1300	9850	18350

²⁴ Source: BC Hydro, Report on the F2006 Call for Tender Process Conducted by BC Hydro, August 31, 2006, p. 38. In accordance with the Energy Plan, the new supply requirements assume that 50% of load growth is met by DSM, hydro capability is limited to the energy available under critical water conditions, and 3000 GWh of insurance is required by 2025. The available supply includes the expected firm supply from the F2006 contract awards and assumes the Burrard thermal plant is retired by 2016.

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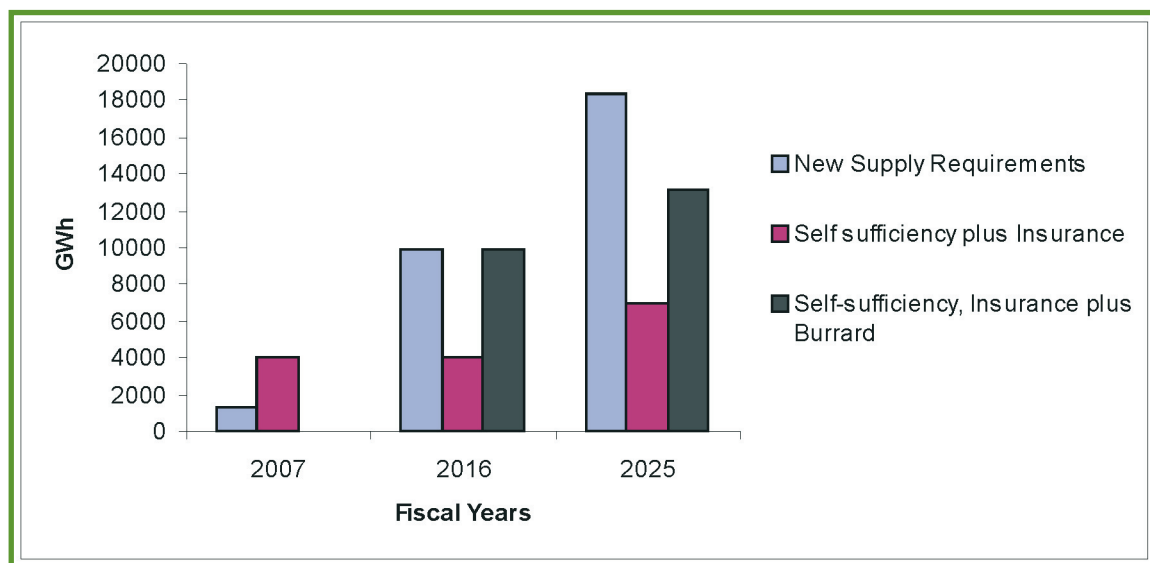
These new supply requirements are significant. Given the attrition rate in recent IPP contract awards, there might have to be five Calls for 5,000 GWh of energy or more over the next 20 years²⁵. It certainly suggests there is an urgent and major requirement for the acquisition of new sources of supply.

What is important to note, however, is that the scale and urgency of the new supply requirement is a creation of the province's Energy Plan. It is not dictated by the need for a secure electric energy supply.

The chart below shows the amount of the new supply requirements that is due to the self-

sufficiency and insurance policies in the Energy Plan, and the amount due to those policies plus the assumed retirement of the Burrard thermal plant.²⁶ As shown in the chart, the amount of new supply required in 2016 under the Energy Plan is almost 10,000 GWh. However, 4,000 GWh or 40% of that requirement is due simply to the self-sufficiency policy in the Energy Plan—the policy that would prevent BC Hydro from backing up low water conditions with imports if required. And 10,000 GWh, which is equal to the entire new supply requirement in 2016, is due to the self-sufficiency policy combined with the assumed retirement of the Burrard Thermal Plant.

Amount of New Supply Requirements Due to Provisions in the Energy Plan



²⁵ BC Hydro estimated that the attrition and outage factor that should be applied to its F2006 Call awards is 30% (BC Hydro, Report on the F2006 Call for Tender Process Conducted by BC Hydro, August 31, 2006, pp. 34-35). At that rate, Calls for over 25,000 GWh would be necessary to secure 18,000 GWh of firm supply.

²⁶ The province supports the retirement of Burrard in the Energy Plan, even though the Utilities Commission has concluded that the retirement of Burrard requires further consideration, noting that BC Hydro has not made an application or case that better sources are available. (BCUC, In the Matter of BC Hydro Integrated Electricity Plan and Long Term Acquisition Plan, Decision, May 11, 2007, p. 73).

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In other words, if imports were allowed to back up critical water conditions and Burrard is not retired, no new supply would be required for 2016. That is not to say that no new supply should be acquired. New sources should be acquired if they are economic or otherwise advantageous in relation to their economic and environmental costs. The point is that, except for the dictates of the Energy Plan, there is no urgent need to acquire new sources of supply. The Energy Plan says to BC Hydro: 'buy more IPP supply whatever the impact and cost'. What it could and should say is: 'buy, but only to the extent it makes good economic and environmental sense'.

Even for 2025, the requirement is much less dramatic than the Energy Plan suggests. Almost 40% of the new supply requirement in that year (7,000 GWh of the 18,350 GWh requirement) is due to the self-sufficiency and insurance policies in the Energy Plan—policies for which there are no economic criteria or justification. And over 70% of the new supply requirement in 2025 is due to those policies combined with the assumed retirement of Burrard. Exactly what should be done with Burrard is not yet clear. However, there are environmentally responsible options for Burrard that may be preferable both economically and environmentally to the generation and transmission projects that would be required to replace it. If that proves to be

the case, the new supply requirement in 2025 would be some 5,000 GWh, not much more than what the Site C project would provide if it could be developed in an environmentally and socially acceptable way. With or without Site C, that is a much different outlook than what the Energy Plan would require.

There is no doubt that the urgent, large scale demand for new sources of supply created by the Energy Plan is beneficial to the IPP industry. There will be greater opportunity and higher prices for their projects. However, the portfolio analyses that BC Hydro undertook for its 2006 Integrated Electricity Plan report suggest that BC Hydro expansion plans under the Energy Plan will not benefit customers or the environment. The expansion plans with self-sufficiency and insurance are higher in cost and have greater land, water and local air emission impacts than alternative scenarios.

Table 6 presents a summary of the financial and environmental consequences of five different expansion plans that BC Hydro analyzed for its most recent Integrated Electricity Plan. The alternative plans were specifically designed by BC Hydro to assess the impacts of maintaining versus retiring Burrard, and of self-sufficiency or self-sufficiency plus insurance versus relying on different amounts of imports in critical water years.

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Table 6
*Financial and Environmental Consequences of Alternative BC Hydro Plans*²⁷

	Maintain Burrard	Imports up to 6000 GWh	Imports up to 3000 GWh	Self - sufficiency	Self-sufficiency plus insurance
System costs (\$m, PV@6%)	4261	4178	4271	4458	4824
Impacted Land (ha)	8387	8822	8950	9199	9260
Impacted Aquatic (ha)	4069	4167	4169	4240	4295
GHG Emissions (kilotonnes)	19778	13926	12935	11340	11167
Local Air Emissions (tonnes)					
-NOx	206	99	87	1065	5915
-SOx	2259	1454	1312	5866	21418
-CO	382	260	88	8060	39072
-VOC	64	43	15	4	3539
-PM10	0	0	0	4019	14431
-PM2.5	567	588	501	485	480

The table indicates the lowest system cost (BC Hydro incremental expenditures including all purchases net of any surplus export revenue) would be realized when imports are allowed. There would be savings of some \$180 to \$280 million as compared to the self-sufficiency case and \$550 to \$650 million compared to self-sufficiency plus insurance. Maintaining Burrard is also a low cost option—with savings of \$200 million relative to the self-sufficiency case and \$560 million relative to the self sufficiency plus insurance case.

With respect to impacts on land and aquatic areas, maintaining Burrard is the best case, followed by the

import cases. The self-sufficiency and self-sufficiency plus insurance cases require the most amount of new development, and consequently impact the greatest amount of land and aquatic areas. With respect to local air emissions, the import cases are best. The highest local air emission impacts for all contaminants but PM2.5 would occur under the self-sufficiency plus insurance cases. They are significantly higher than not only the import cases, but also the case with Burrard. The large amount of local air emissions, most notable in the self-sufficiency plus insurance case, is due to the amount of biomass development that was assumed in this case.

²⁷ Source: BC Hydro, 2006 Integrated Electricity Plan, Table 6-4, p. 6-19.

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The one advantage of the self-sufficiency and self-sufficiency plus insurance cases is for Green House Gas (GHG) emissions. The cumulative difference in GHG emissions over the planning period would be almost 2 to 3 million tonnes relative to the import cases and 8.6 million tonnes relative to the Burrard case. However, this benefit to some extent is already factored into the financial cost. The system cost analysis assumed a charge of \$15/tonne for GHG emissions, rising to \$25/tonne by 2015— a charge that is intended to reflect the cost of offset measures.

There are, of course, many assumptions underlying BC Hydro's analysis of these alternative plans. Spot market prices may be different from the forecast that BC Hydro used. The charge required to offset GHG emissions may be different from the charge in BC Hydro's analysis. The cost of the new resources required in the different cases will almost certainly

be different. BC Hydro's analysis assumed unit energy costs of \$49-\$64/MWh for wind, and \$50-\$60/MWh for run of the river. The bids in the F2006 Call were much higher than that.

Nevertheless, the analysis that BC Hydro did is what is currently available and does not support the self-sufficiency, insurance or Burrard policies in the Energy Plan. To the contrary, BC Hydro's analysis suggests that whatever superficial appeal the Energy Plan self-sufficiency and insurance policies may have, they could be costly in financial and environmental terms. At a minimum, BC Hydro's analysis suggests exercising caution in the policy direction to BC Hydro—not urgency in the pursuit of what appear to be the highest cost, highest impact plans.

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5.0 Conclusion

As stated at the outset, the province's 2007 Energy Plan is fundamentally flawed. The problems with the self-sufficiency and insurance policies in the Plan are addressed in this paper.

The self-sufficiency and insurance that the Energy Plan would force BC Hydro to pursue reflect a misunderstanding of the BC Hydro system, and the role that imports have played to displace Burrard and back up low water conditions—a role they could continue to cost-effectively play if not for the dictates of the Plan.

Self-sufficiency and insurance are not needed to ensure the physical security of our electric energy supply. They may provide price certainty in fixed price IPP contracts, but that will not eliminate price risk. They will raise the risk that BC Hydro will be paying too high a price for its electricity supply. Self-sufficiency and insurance will ensure that BC Hydro acquires all of its energy from B.C. sources, but like all protectionist measures, that will serve only to benefit the IPP industry, not BC Hydro customers.

With respect to the environment, the self-sufficiency and insurance policies will cause more land and aquatic impacts and more local air emissions

than would otherwise occur. They may result in a reduction in GHG emissions, but GHG emissions can be offset, and there is no evidence to suggest that expansion plans with self-sufficiency and insurance would be preferred at any reasonable offset charge. Indeed, BC Hydro's analyses suggest otherwise. Put somewhat differently, BC Hydro's analysis suggests there are more cost effective ways to reduce GHGs than by developing new power projects BC Hydro does not in fact need.

The Energy Plan provides a solution to a problem that does not exist. It creates an urgency for new supply and it imposes artificial limitations on how that supply can be met. It will almost certainly prevent BC Hydro from meeting B.C.'s energy requirements in the most cost-effective, environmentally and socially responsible way.



