

ASSESSING BC ELECTRICITY POLICY

PEER REVIEW OF TWO CONTROVERSIAL 2007 DOCUMENTS

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Executive Summary

In spring 2008, I agreed to a request from the Independent Power Producers Association of BC (IPPBC) to conduct a peer review of two manuscripts that strongly criticize BC's current electricity policy: *Liquid Gold*, by John Calvert, and *Lost in Transmission*, by Marvin Shaffer. Peer review is a common activity for academics. Reviewers are expected to be leading researchers in their field and to be completely independent. Appendix 1 and 2 provide respectively my qualifications as a researcher and the contract provisions that ensure my independence in this relationship with the IPPBC.

Review of John Calvert's *Liquid Gold: Energy Privatization in British Columbia*

Dr. Calvert is a professor at Simon Fraser University. His book's principal thesis is that the BC Liberal government headed by Premier Gordon Campbell has, since its election in 2001, been executing a well-orchestrated plan to privatize the BC electricity system, by stealth if necessary. The motive for this plan is to maximize the profit-making opportunities for 'corporate friends' of the government, be they private independent power producers or large industrial firms that consume electricity. In support of his conspiracy theory, Calvert claims that BC's electricity policy:

1. relinquishes control of our electricity system to private interests in BC and to private interests and governments in the US;
2. subsidizes BC industrial customers unfairly;
3. results in unnecessarily high rate increases for BC residential customers; and
4. causes worse environmental impacts than would public ownership.

In this peer review, I provide extensive quotes from Calvert and then contrast these with real-world evidence and analysis to show that Calvert's book is best read as a political propaganda tract. The author does not present a balanced weighing of the evidence. Indeed, facts are wrong and evidence is distorted in a manner that consistently supports a sinister conspiracy theory. This is why I would not recommend publication if this were a peer review for an academic publisher.

There are undoubtedly many aspects of the government's electricity policy that reasonable people would disagree with. But it is unfair and unhelpful to the development of good electricity policy in BC to assume that the current policy's sole motivation is to enhance the profit making prospects of corporate friends of our provincial politicians.

As I show in this review, the government's current electricity policies appear to have sound 'public interest' rationales, and these policies are consistent with those of governments in other jurisdictions, even jurisdictions with left-of-centre governments of the type that Calvert would presumably prefer to see here in BC. The effort to expand electricity generation in BC makes sense in terms of security of supply for domestic consumers, even if the generation assets are not publicly owned. The different rates charged to industrial and residential customers are consistent with a century of regulatory rate designs that have emphasized economic efficiency and fairness in cost allocation. The increased role for IPP generation is a much-needed response to the high risk of electricity generation investment today as a way of reducing financial risk to ratepayers and taxpayers. And a growing role for smaller-scale renewable electricity generation in BC is consistent with the efforts made in virtually every jurisdiction in the world to reduce the environmental impacts and risks associated with complete reliance on conventional, large-scale facilities, especially those emitting greenhouse gases.

Review of Marvin Shaffer's Lost in Transmission: A Comprehensive Critique of the BC Energy Plan

Dr. Shaffer heads a Vancouver consulting company in his name and is also an adjunct professor in the Public Policy Program at Simon Fraser University. His report is comprised of three separate papers. Its principal thesis is that “the province’s Energy Plan is designed more than anything else to artificially increase the market for new IPP supply.” In particular, it:

1. exaggerates the need for new electricity supply from IPPs, resulting in higher than necessary rate increases,
2. discourages economically efficient conservation by sustaining BC Hydro’s average rates below the cost of new electricity supply, and
3. forces BC Hydro to acquire high cost IPP resources of low value, again resulting in higher than necessary rate increases.

Were I conducting this peer review for an academic publisher, my recommendation would be against publication until substantial revisions have been made. In other words, I believe there are inadequacies in the selection of evidence and problems with the analysis. The necessary revisions would, however, lead to conclusions that would be supportive instead of critical of the BC Energy Plan.

In the first paper, he claims that the Energy Plan requirement for electricity self-sufficiency in BC by 2016 and for the acquisition of additional ‘insurance power’ by 2025 (along with the requirement to favour ‘clean electricity sources’ for 90% of domestic supply) will lead to higher than necessary costs to BC Hydro, higher than necessary rates for BC Hydro’s customers, and an inflated demand for domestic IPP production. The evidence suggests, however, that one can only reach this conclusion by ignoring the clear and substantial risk of sustained high prices for electricity from fossil fuel combustion over the coming decades for reasons of scarcity and climate concern. When these risks are incorporated, along with provincial, national, North American and global requirements to reduce GHG emissions, then the self-sufficiency and perhaps even the insurance policy are likely to prove advantageous from a financial and environmental perspective. I agree with Shaffer that more risk analysis of this issue is desirable.

In the second paper, Shaffer claims that the failure to charge BC customers the high price of new power for all of their electricity consumption leads again to higher than necessary domestic electricity consumption and therefore higher than necessary demand for new IPP facilities in the province. However, Shaffer fails to assess the likely effect of the Energy Plan’s thrust toward non-linear pricing, a mechanism to get the right price signals to customers for the critical part of their consumption that is amenable to greater efforts at electricity efficiency. A long history of empirical studies of utility regulation suggests that this policy may achieve the outcome Shaffer says is desirable, which would render his critique moot.

In the third paper, Shaffer claims that the BC Energy Plan requires BC Hydro to acquire run-of-river and windpower electricity from IPPs, even though this power is of high cost and low value. One can only draw this conclusion, however, by taking a partial quote in the Energy Plan out of context. Returned to its original context, the full quote simply says that BC Hydro will endeavour to assess fairly its many options for clean power in terms of their full value. Moreover, in a full comparative, risk-based analysis of BC’s energy options, these IPP resources are likely to prove much more valuable than Shaffer suggests.

**Assessing BC Electricity Policy:
Peer Review of Two Controversial 2007 Documents**

Liquid Gold: Energy Privatization in British Columbia
(by John Calvert)

and

Lost in Transmission: A Comprehensive Critique of the BC Energy Plan
(by Marvin Shaffer)

by

Mark Jaccard

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September 1, 2008

Introduction

In spring 2008, I agreed to a request from the Independent Power Producers Association of BC (IPPBC) to conduct a peer review of two manuscripts that strongly criticize BC's current electricity policy: *Liquid Gold*, by John Calvert, and *Lost in Transmission*, by Marvin Shaffer.

Peer review is a common activity for academics. Before agreeing to publish a book, academic publishing houses require a positive review by two or more independent academics, usually provided anonymously. This demanding requirement to pass anonymous peer review is why leading academic publishing houses have a substantial rejection rate for submitted manuscripts. My two recent academic books, *The Cost of Climate Policy* (2002) and *Sustainable Fossil Fuels* (2005), underwent peer review. The latter book, published with Cambridge University Press, had five anonymous peer reviewers. Both books went on to win a national award as the top policy book in Canada, a success that the peer review process contributed to in my view.

In the same vein, the top academic journals in each discipline call upon three or more leading scholars to provide anonymous peer reviews of article submissions, again resulting in high rejection rates. The leading international journal in energy economics and policy – *The Energy Journal* – has a rejection rate of 80-85%. As a member of its editorial board, I am often asked to provide anonymous peer reviews. Unfortunately, these frequently result in rejection of submitted papers. But this is an essential quality control mechanism in the competitive academic process.

Peer reviewers are expected to be leading researchers in their field. To indicate my qualifications to review these two documents, I have included an abridged version of my CV as appendix 1. Peer reviewers are also expected to be completely independent. While my CV demonstrates my independence, I also include the main clauses from the contract I signed with the IPPBC, which guarantee public release of my review regardless of its conclusions.

My initial assumption was that I would review the book of Professor Calvert and the report of Dr. Shaffer as if they were a single document. After reading both, I came to see these documents as significantly different in various ways, including subject matter, treatment of the evidence, and argumentation. Therefore, I instead review each manuscript separately. Since some readers might only want to read one of these reviews, there is a small amount of overlap, where I explain the same concept in both reviews.

This is particularly the case with the rationale for natural monopoly regulation and the reason for greater competition in electricity generation.

Peer Review of John Calvert's *Liquid Gold: Energy Privatization in British Columbia*

The Book's Principal Thesis

Dr. Calvert is a professor at Simon Fraser University. His book's principal thesis is that the BC Liberal government headed by Premier Gordon Campbell has, since its election in 2001, been executing a well-orchestrated plan to privatize the BC electricity system, by stealth if necessary. The motive for this plan is to maximize the profit-making opportunities for 'corporate friends' of the government, be they private independent power producers or large industrial firms that consume electricity. In other words, the government's electricity policies are not motivated by 'public good' concerns such as reducing environmental risk, reducing financial risk to ratepayers and taxpayers, reducing security of supply risk to domestic consumers, and striving for a relatively equitable outcome in which each customer class pays rates that reflects the costs of providing them with service. To Calvert, electricity policy in BC has become little more than a conspiracy between individuals inside and outside of government to rob BC citizens of the value of their rich natural resources – the large hydropower facilities built in the past as well as the current development of small hydropower and other 'green' projects – and to extract extra revenues from BC Hydro's household ratepayers, all for the benefit of private electricity producers and major industrial customers. Evidence for this conspiracy is found in the government's 2007 Energy Plan and in the resulting policies and actions of government ministries, the crown-owned BC Hydro, and the government appointed BC Utilities Commission.

My General Assessment

Were I conducting this peer review for an academic publisher, my recommendation would be against publication until the book had been rewritten to such an extent that it would no longer be the same book. Moreover, I am confident that other leading academics with expertise in the economics of electricity system regulation and in sustainable energy policy would also recommend against publication. The reason is simple. To give his conspiracy theory plausibility, Calvert must be extremely biased in his selection and interpretation of the evidence, and he compounds this bias with in some cases a poor understanding of electricity systems, electricity economics and sustainable energy-environment policy.

In support of his conspiracy theory, Calvert claims that BC's electricity policy:

1. relinquishes control of our electricity system to private interests in BC and to private interests and governments in the US;
2. subsidizes BC industrial customers unfairly;
3. results in unnecessarily high rate increases for BC residential customers; and
4. causes worse environmental impacts than would public ownership.

Before addressing the evidence and logic of each of these claims, I focus first on a few basic factual misrepresentations in Calvert's book.

First, Calvert uses the terms energy and electricity synonymously throughout the book. Even the title of the book refers to 'energy privatization.' In fact, most of the BC energy system is privately owned and always has been. This includes the production, distribution and retail of refined petroleum products like gasoline, diesel, jet fuel, kerosene, home heating oil, propane and so on. It also includes the production, distribution and retail of natural gas (gas distribution in the Lower Mainland was privatized in 1988). It

includes the production, distribution and retail of biomass, whether for industrial use or domestic home heating. And, it includes the production of coal for a small amount of domestic consumption and a predominant use for export as an energy-carbon input to the steel production process in other countries. The electricity system, a subset of the energy system, has been primarily publicly owned since Premier WAC Bennett nationalized the BC Electric Company in 1962. But more than 10% of the province has long been served by private electricity providers, like the former West Kootenay Power (now Fortis), and there are private electricity generation projects owned by industrial firms like Alcan and some of BC's pulp and paper firms. This conflating of energy and electricity can get confusing at times. For example, on page 52 Calvert talks about a "major energy crisis" and on page 86 about "energy growth forecasting" when in both cases he apparently means electricity.

Calvert's inflation of the privatization concern by substituting energy for electricity is especially troubling when on page 11 he seems to recognize this potential for distortion in others. He concludes his technical description of the important distinction between the capacity to generate electricity (watts) and the electrical energy itself (watthours) by saying that his discussion "underlines how relatively easy it can be for the government to utilize arcane terminology to obscure the implications of its policy changes." But he provides no evidence of the government acting in this insidious manner.

Second, Calvert seems to believe that wood is a fossil fuel and that the term biomass is an industry fabrication. On page 12 he says, "the government left open the door to fossil fuel burning through its acceptance of the use of 'biomass' (a term coined by industry to make burning wood seem relatively benign) to generate electricity." And on page 62 he adds up electricity projects from coal (28%) and biomass (18%) in the 2006 IPP contract offers from BC Hydro and concludes, "In other words, power plants burning fossil fuels accounted for roughly 46 percent of the total." This displays a shocking ignorance of the energy system and the environment, an ignorance which is used to buttress Calvert's conspiracy theory. In fact, biomass is not a fossil fuel and the term was not invented by industry. (My ecology colleagues tell me that scientists have long used this term.) Because the carbon from biomass emissions is recaptured if land use remains in comparable biomass production, the Intergovernmental Panel on Climate Change considers biomass to be virtually greenhouse gas free. Calvert should know this, especially given that he makes such strong claims about the environmental implications of the government's policies.

Third, in keeping with his conspiracy theory, Calvert claims that IPPs use the term 'independent power producers' to make themselves sound more benign. On page 18 he says, "While these interests normally describe themselves, innocuously, as "independent power producers," a more accurate description is 'private energy interests.' " This statement by Calvert reveals an ignorance (perhaps wilful) of electricity sector reforms around the world that originated with President Carter's reform of the US Public Utilities and Regulatory Policy Act in 1978. From that time on, electricity industry analysts throughout the globe have used the term 'independent power producers' to indicate electricity providers who are not owned or controlled by a vertically integrated electricity monopoly. IPPs may be private companies, individuals, co-operatives, municipal governments or industrial firms (with cogeneration potential) that generate electricity for sale to the grid. Thus, IPPs in a given jurisdiction may not all be 'private energy interests' and it would be misleading to call them that.

I now turn to the four major components of Calvert's conspiracy theory. I critically assess his evidence for each of these in turn.

1 BC's Electricity Policy Relinquishes Control to Local and Foreign Private Interests

As the subtitle of his book suggests, Calvert's main concern is that British Columbians, through the deliberate policy of the Campbell government, are losing control of their electricity system to local and foreign private interests (the subtitle says energy, but he means electricity). On page vii he says, "my conclusion is that we are rapidly losing public control of our electricity system." On page 1 he claims that the goal of the government is to "eliminate the dominant role of the public sector as a supplier of energy to British Columbia." (Again, he mistakenly says energy instead of electricity.) And on page 3 he refers to the government's "policy that will effectively transfer control of the system from the public to local and foreign private interests." As evidence, Calvert points to (1) the industry and IPP bias of the BC Utilities Commission, (2) the government's separation of BC Hydro's transmission assets into the BC Transmission Company, with expanded right of access for third parties, and (3) the exclusion of BC Hydro's generation division from further development of electricity generation in BC, with the exception of large hydro projects if approved by cabinet.

1.1 BCUC as Agent of Local and Foreign Private Interests

With respect to the BCUC, Calvert points all the way back to the decision in 1980 by the Social Credit government, sustained by subsequent NDP and Liberal governments, to bring BC Hydro under regulation by the BC Utilities Commission. In a footnote on page 49 he says, "In placing BC Hydro within the scope of BCUC, successive governments have given private energy interests a very effective vehicle to scrutinize its activities and identify those areas where changes in BC Hydro policies and programs can result in significant benefits either to industrial / commercial customers or to private energy suppliers." He describes the conspiracy outcome of this step earlier on page 33, saying, "it is no exaggeration to say that the BCUC has become a kind of 'club' in which private interests have shaped the regulatory process in their favour."

Calvert offers little evidence to sustain this assertion of a conspiracy between the BCUC and private interests, and what he does offer is not true. He frequently argues that BCUC decisions are biased in favour of industrial customers; however, I will show in the next section that these decisions are not biased, but instead are consistent with economic efficiency and a fair allocation of costs to different ratepayer classes – a principle that is common to utility regulation throughout the world.

Calvert also says that rate design decisions of the BCUC are biased in favour of industrials. As an example, he cites the recently approved stepped rate structure (inverted block) that charges a lower rate for the first 90% of each industrial customer's electricity and a higher rate for the final 10%. He says in a footnote on page 51, "If nothing else, this arrangement underlines the effectiveness of lobbying by major industrial customers in protecting their access to cheap public power while ensuring that the public continues to subsidize their electricity rates." This quote suggests that Calvert does not understand or is deliberately ignoring the theory and practice of a century of utility regulation.

While I explain in a later section why the relative charges to industrial and other customers are generally fair in BC and elsewhere, I note briefly here that utility regulation (called natural monopoly regulation) has a dual objective. This is to set the marginal rates for each customer group equal to the incremental costs of new supply (or the incremental cost at a particular time of day or season in a capacity constrained system) while also ensuring that the utility neither loses money nor gains excess profits. Thus, this dual objective is (1) that marginal rates equal incremental supply costs and (2) that non-marginal rates are set so that average revenue equals average cost (including a return on investment) for the utility as a whole.

Achieving this dual objective usually requires what are called ‘non-linear rates’: charging different rates for marginal and non-marginal unit electricity consumption.¹ For much of the past century, incremental supply costs were cheaper than average costs. Utilities dealt with this by charging all customer classes a declining block rate. The idea in rate design was to encourage system expansion as economies-of-scale would lower average costs and thus everyone’s rates.

In recent decades, however, incremental supply costs have risen above average costs in most jurisdictions. (This is especially the case in jurisdictions like BC, whose past investments in hydropower are now low cost relative to new supply.) This new reality has been motivating utility regulators to push initially for flat rates (achieved when I chaired the BCUC in the 1990s) and now for inverted rates. This rate design would discourage extra consumption, an objective that conveniently coincides with environmental objectives to slow the development of new electricity supplies. This is not, of course, in the interests of IPPs, who hope to develop new supplies. This rate adjustment, however, is complicated and there are equity concerns – the bill impacts for some customers will be greater than for others. All jurisdictions find that it is best to start the new rate design with industrial customers, who have sophisticated metering and billing capabilities. This is happening in BC as it is elsewhere in the world. It is not happening in order to somehow benefit only industrial customers. In fact, industrial customers tend to resist these kinds of rate reforms because they complicate their operations, although those who think they might benefit are interested. The next step in BC and elsewhere is to try to implement inverted block rates at the small customer level. This will be a challenge, but new metering technologies for small customers should help. There is certainly no real motive or evidence for Calvert’s alleged conspiracy between the BCUC and industrial customers. This process of rate reform is the logical outcome of an effort to achieve efficiency and fairness in electric utility regulation.

As other evidence of BCUC bias, Calvert argues that industry is the major beneficiary of BCUC decisions with respect to funding interveners in its regulatory processes. On page 32 he refers to the “millions of dollars over the years” awarded to private power companies and industrial electricity consumers for regulatory interventions, concluding “in reality the major beneficiaries are not members of the public at all: they are corporate interests.” This is not true according to intervener award data, which can be obtained from the BCUC. Prior to 1998, when I chaired the BCUC (I introduced intervener funding as one of my first decisions in 1992), awards were definitely biased toward consumer associations, environmentalists and small regional entities. Almost no intervener funding went to industrial customers or IPPs. Data provided recently by the BCUC for the subsequent 10-year period, 1998 to July 2008, shows that of \$8.437 million of intervener funding awarded by the BCUC (for regulation of electricity, natural gas and automobile insurance), \$2.294 million were awarded to private industrial interests – industrial customers and IPPs. Small, non-profit organizations (unions, consumer groups, environmentalists, regional representatives) received the remaining 73% of intervener funding. Calvert is wildly incorrect when he claims that large private interests were the “major beneficiaries.”

If Calvert were as interested in history as he is in conspiracy, he would have at least mentioned some of the reasons why BCUC regulation of BC Hydro has such widespread support in BC, such that no political party has overturned the decision in 1980 to give it oversight of BC Hydro. He would also have mentioned why other jurisdictions, like Quebec, eventually copied the BC model. After studying the BC regulatory system, the Quebec government brought Hydro Quebec under the regulatory control of Quebec’s Regie de l’Energie in 2000, and jurisdictions throughout the world have followed this model, regardless of their political orientation. Personally, I have been asked to provide advice for such reforms in Quebec, Brazil, China, Hungary and several Francophone countries of western Africa.

¹ For a full exposition, see S. Berg and J. Tschirhart, *Natural Monopoly Regulation* (Cambridge: Cambridge University Press) 1988

The BC history is indicative of motivations elsewhere. Back in 1980, the Social Credit government was responding to concerns that BC Hydro had become an uncontrolled empire, with political influence and analytical resources far exceeding those of all other interests combined. (Calvert mentions these concerns on page 54 when he discusses the controversy over the Site C dam in the late 70s, but surprisingly never links them to the creation of the BCUC – which was the direct outcome of the controversy over that dam.) These other interests include household ratepayers, regional governments and other regional interests, industrial customers, first nations, poverty support organizations, municipal governments, unions, potential independent power producers, individuals with land conflicts with BC Hydro, and commercial customers. The challenge of a large publicly owned power monopoly acting without restraint and with no regard for other interests is a common concern wherever such entities exist. This is why many jurisdictions have developed ownership and regulatory models similar to that of BC, in which an electricity system that is largely state owned is nonetheless subject to quasi-judicial, arms-length regulation with respect to its resource decisions, rate setting and treatment of less powerful interests.

Not surprisingly, support for the BCUC is widespread among the various smaller interests throughout BC. These interests may not always like the BCUC's decisions, but they believe that it gives them a chance to counter the potential power that an unchecked BC Hydro can wield. This explains why the NDP never reformed this model during their decade in power (although under Glen Clark they temporarily reduced its powers over Hydro). To make his case that the BCUC is an agent of large private, profit-seeking interests, Calvert ignores both the history of electric utility regulation in BC and the current reality.

1.2 BC Transmission Company Created to Foster Local and Foreign Private Interests

According to Calvert, a key objective in the conspiracy between the BC government and private, profit-seeking interests is to break up BC Hydro so that its transmission division can better serve these interests. On page 232 he says, “The BC Transmission Corporation was not created to improve the performance of BC Hydro, but rather to appease the demands of American energy interests and Canadian private energy developers.” As evidence for this, Calvert points to the gradual adoption in BC of comparable common carrier rules for transmission as they developed in the US, which he claims undermine BC's ability to meet its own needs. On page 8 he says that the government's “policy of integrating the province's transmission grid with the United States, while lifting restrictions on private energy exports, undermines BC's ability to remain self-sufficient in electrical energy.” He is also unhappy that the generation arm of BC Hydro would now have to (page 7) “bid for access to the transmission system, just like any private energy supplier or marketer.”

Again, Calvert's eagerness to see a conspiracy between government and industry blinds him to the public interest reasons for electricity sector reforms that have occurred in jurisdictions around the world, regardless of whether the electric systems are predominantly publicly or privately owned. I describe these electricity system reforms more fully in the next section. But with respect to transmission, the owners, operators and regulators of electricity systems have increasingly recognized the economic efficiency and system reliability benefits of greater electricity interconnection and trade between regions. This trade is desirable even if the potential trading partners are all large, publicly-owned monopolies. To this end, the regulator of interstate electricity transmission in the US (the Federal Energy Regulatory Commission) and the European Commission have evolved toward similar rules in North America and Europe that facilitate third party access, at fair rates, to neighbouring transmission systems. Similar reforms have occurred in Australia, New Zealand, Japan and many developing countries.

British Columbians have benefitted significantly from these developments. Prior to these reforms, BC Hydro had only limited access to distant markets such as California because the Bonneville Power Authority, with control of the transmission system in Washington and Oregon, would either charge exorbitant wheeling fees or limit transmission access in order to maximize its returns from controlling access to the California market from the north. The reforms have enabled especially BC to get much higher returns from its existing facilities, in particular the enormous storage capabilities of BC Hydro's reservoirs.

For transmission access to be truly unfettered, jurisdictions in most OECD countries have separated transmission from the distribution and generation functions, thereby breaking up the vertically integrated monopolies that dominated the electricity industry for the first century of its existence. This removes the conflict of interest when the same company wishing to compete with other companies for use of a transmission system (both might be local monopolies) also happens to control the transmission system. As noted, the electricity trade that resulted from reforms like this has benefitted everyone, including small ratepayers and the taxpayers of jurisdictions with publicly-owned utilities like BC Hydro. Nowhere in the world has a jurisdiction, regardless of its ideological bent, tried to reverse this trend toward third party access and independent transmission entities. One has to completely ignore the evidence in order to describe this development as something that gives control to foreign and local private interests at the expense of taxpayers and small ratepayers.

1.3 Exclusive Reliance on IPPs for New Power Supply in BC

As part of its Energy Plan, the BC government has established a policy that BC Hydro investment in new electricity capacity should be limited to expansions of its existing facilities and to new large hydropower facilities, should the cabinet ever approve these. This means that BC Hydro must otherwise contract with IPPs to meet additional supply needs. At the same time, the Energy Plan calls for electricity self-sufficiency by 2016, which in itself will require significant expansion of electricity generation capacity in the province, given the minimal expansion of the past two decades (and even though the Energy Plan requires Hydro to meet at least 50% of new demand with electricity efficiency). Calvert claims that these two policies will result in de facto privatization of the BC electricity sector (I note again that he frequently says energy sector instead of electricity sector, making the claim sound all the more dramatic). Calvert claims that this 'privatization' of the electricity sector will be bad news for BC taxpayers (owners of BC Hydro) and BC Hydro residential ratepayers because it will mean the loss of value from public exploitation of our natural resources (such as small hydropower sites and favourable windpower sites) and higher rates for smaller customers than would exist if the electricity system were entirely in public hands.

First, it is important to note that while these policies from the Energy Plan are likely to increase the percentage of private ownership in the BC electricity system, they will not lead to a privatization of that system. The BC Transmission Corporation remains in public ownership. The BC Hydro distribution system remains in public ownership. All of BC Hydro's existing electricity generation facilities remain in public ownership. And all of its other assets, like buildings, properties and other infrastructure, remain in public ownership. Thus, the gradual increase in the share of private ownership in the province's generation mix during the course of say the next two decades – assuming that new IPP projects are almost all private – would still leave BC with an electricity system that is almost completely publicly owned and operated. In fact, even under a scenario of rapid system expansion over the next 20 years, the share of private ownership in all facets of the BC electricity system (all assets including distribution, transmission, generation and administration) might rise from its current level of 10% to about 15%, and certainly not more than 20% under the most extreme scenario. At these levels, the BC electricity system would still have one of the highest shares of public ownership among OECD jurisdictions. If, moreover, the

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provincial government decides to build the Site C dam (which looks more likely every day), then the addition of this capacity would offset in part the growing IPP capacity. (It is even possible that BC Hydro will build other large, publicly-owned hydro facilities over the next 15 years.) Calvert is aware that Site C is to be built as a public project (page 60), but he conveniently avoids doing any calculations to estimate what percentage of the entire BC electricity system (all aspects) will actually be privately owned 20 or 30 years from now under various growth scenarios. Any unbiased assessment would produce the numbers, and on this basis could not possibly conclude that the BC government's current policies will lead to 'privatization' of the BC electricity system.

Aside from Calvert's exaggerated claim, it is nonetheless likely that the government's policies will increase the role of private generation of electricity in BC. As the previous quotes show, Calvert claims that the rationale for this policy is to transfer wealth from taxpayers and ratepayers to private, profit-seeking friends of the government.

In the absence of documents confirming a secret agreement between politicians and their friends to rob British Columbians, Calvert cannot prove his conspiracy theory. But one cannot disprove it either. That is the problem with conspiracy theories; they cannot be disproved. Without proof one way or the other, what can we say about the plausibility of Calvert's conspiracy claim? The normal course in academia would be to review leading independent research into an industry like electricity – both globally and locally – to see what evidence and rationales have been provided to justify the levels of public and private ownership, and to explain their relative changes over time. Since the electricity sector has changed considerably over the past 20 years, especially with an increase in private ownership around the world, this literature is enormous. (I have surveyed this literature in some of my own refereed publications. I provide a few of these below in a footnote.²) However, if the references in Calvert's book are any guide, he seems uninterested in this literature. In his references, I spotted only a couple of publications that might purport to describe some aspects of the global reform trends in the electricity sector.³ This might explain why Calvert concludes that a local conspiracy is causing in BC greater private participation in the electricity sector, even though this trend happens to be a global phenomenon, with a very compelling rationale behind it. I'll briefly explain that rationale here; further elaboration is provided by the referenced articles.

For most of the past century the electricity sector was considered to be a 'natural monopoly' in that it was in society's interest, from a rate minimization perspective, to have a monopoly rather than several firms providing electricity service. To prevent price gouging by the monopoly, governments either created a publicly owned electric utility or they directed a utilities commission to regulate a privately owned utility. (As noted earlier, the more recent trend is to bring even publicly owned electric utilities under utilities commission regulation.) While natural monopoly conditions were assumed to exist in all of the generation, transmission and distribution facets of the electricity industry, a series of technological, economic and environmental developments in the 1980s and 1990s have improved significantly the prospects for smaller-scale electricity generation technologies. This in turn opened the door to allowing competitive markets in generation. This explains the trend toward a greater role for private (and some

² Jaccard, M., "Oscillating Currents: The Changing Rationale for Government Intervention in the Electricity Industry," *Energy Policy*, V.23, N.7, 1995, pp.579-592. Jaccard, M., "Deconstructing Hydro: The BC Electricity Sector in this Decade," *B.C. Studies*, No129, Spring 2001, 51-78. Jaccard, M., *California Shorts a Circuit: Should Canadians Trust the Wiring Diagram?* Toronto: C.D. Howe Institute, 2002, 28 pages.

³ There are many excellent studies by leading independent scholars surveying the lessons from the past two decades of electricity sector reforms. See F. Sioshansi and W. Pfaffenberger (eds.) *Electricity Market Reform: An International Perspective* (Oxford: Elsevier) 2006; especially the introductory chapter by P. Joskow, "Introduction to Electricity Sector Liberalization: Lessons Learned from Cross-Country Studies," pp.1-33. Another good survey is R. Gilbert and E. Kahn (eds.) *International Comparisons of Electricity Regulation* (Cambridge: Cambridge University Press) 2007.

public) IPPs in the generation of electricity throughout the world. This is not a development unique to BC and the Campbell government. It is a worldwide phenomenon.

This reality undermines Calvert's conspiracy theory. His theory is further undermined once one examines closely the costs and risks of private versus public electricity generation. Recent evidence from BC is consistent with experiences around the world.

In particular, electricity supply investments are highly uncertain, and have been for some time. Is coal the best option? If a new coal plant is not built with carbon capture and storage, will a frantic global community be demanding within 10 years that rapid climate change requires shutting down the coal plant or retrofitting at huge expense a carbon capture and storage unit? If the coal plant investment does include new carbon capture and storage technology, will the plant's costs run far over budget, rendering it uneconomic even in a world of high carbon taxes? Is natural gas the best option? Are natural gas prices about to follow oil prices to unprecedented levels? Will carbon taxes render even natural gas plants uneconomic within 10 years? Nuclear power looks good from a greenhouse gas perspective, but will construction costs spiral out of control – as has happened with some plants in the past – or will terrorist threats force excessively costly security measures and perhaps even plant closures? BC has the potential to build more hydropower facilities, starting with the Site C dam, but once initiated will this kind of project encounter public resistance that prevents completion or escalates costs, as happened with the first attempt to build Site C? Finally, what about all the different smaller-scale renewables like small hydropower, windpower, biomass, geothermal, tidal, solar and so on? These projects sound environmentally benign, but when you actually try to build them you may find out that this is not entirely the case. All of our electricity generation options have impacts and risks. Will the costs of these smaller-scale renewables options be far higher than anticipated, and again how many projects will actually run the gauntlet from conception to completed construction?

In a market economy like Canada's, most investments are made by private corporations that hope to earn profits for their shareholders by making the right investments in a risky world. Highly uncertain markets, like electricity generation today, have very high risks. This means that some firms may earn profits, but many firms will lose money and even fail. In high risk markets, it is usually most beneficial for taxpayers if the responsibility for risky investments is allocated to private investors as much as possible. If this were not the case, then one could argue that no investments should be private, that the economy should become a centrally planned, publicly-owned socialist economy. This type of economy may be attractive to some, but it is not to most British Columbians, if one can judge by their voting preferences (very few vote for a communist party or its equivalent).

The market for electricity generation is today seen, throughout the world, as one that is high risk. This is why virtually all jurisdictions are increasing the role in electricity generation of private independent generators. In Canada, the social-democratic NDP government in Manitoba is increasing the role of private investors in its electricity generation system in the same way as centre and right-of-centre governments in other provinces. (Only a communist government would, by definition, prohibit greater private involvement in electricity generation today. But there are few of these left in the world.) In the same vein, the BC NDP government in the 1990s increased the role of private electricity generation. But Calvert once again distorts the facts in order to support his conspiracy theory. Calvert presents Figure 1 on page 55 to make his case that private IPP capacity additions in BC are the result of the Liberal government's privatization strategy, which began with its election in 2001. The figure shows less than 100 MW of new capacity in BC in the 90s, but 1,000 MW since 2000. The figure demonstrates, according to Calvert, (page 55) "the growth of private energy investments since the Liberals were elected in 2001."

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There are two problems. First, the figure is wrong. IPP projects completed in the 1990s exceed 100 MW. The McMahon facility at Taylor (105 MW) and the biomass project at William's Lake (65 MW) were completed in 1993, and there were several other, smaller projects during that decade. But, more importantly, Calvert conveniently fails to mention that almost half of the IPP generation that is operating today was built prior to the Liberals' election in 2001. This includes the Island Cogeneration project (240 MW), which began operation in 2001. Calvert's quote and discussion leaves the reader with the impression that the Liberal government introduced BC's thrust toward IPPs in 2001 when in fact it had already begun in earnest with the previous Social Credit and NDP governments. Indeed, Calvert's sentence on page 55 could actually be rewritten to refer to the 'growth of private energy investments since the NDP were elected in the 90s.' But that fact does not fit with his conspiracy theory, so it is replaced with an incorrect figure and a distorted description of its implications.

Indeed, the expansion of IPPs during the NDP government, for whom he served as an energy advisor, poses a real problem for Calvert's conspiracy theory. So on page 21 he says that the NDP encouragement of IPP power in the 1990s was "to deal with the specific problem of Vancouver Island's growing energy needs." and that the government "was driven not primarily by a desire to support private power developers. Rather, it was to find new energy supplies that would be near the load centre ..." This is strange logic. In fact, if the NDP government agreed with Calvert's obsession with 100% publicly owned electricity generation, it could have developed publicly owned power projects on Vancouver Island and have rejected the private IPP option. Indeed, it finally went this route, near the end of its reign, by launching a project to construct a natural gas pipeline to Vancouver Island in conjunction with one or more BC Hydro owned generation plants. But during most of the 1990s, the NDP instead issued several requests for IPP projects that resulted in 22 projects throughout BC being completed by the time the Liberals came to power in 2001.

In a later section, I use evidence from BC Hydro's aborted natural gas pipeline to Vancouver Island to show how transferring some generation investment risk to IPPs is likely to lead to lower rates in the long run for BC electricity consumers, big and small. I end this section by noting that this risk reduction strategy does not mean that BC ratepayers or taxpayers have relinquished control of their electricity system, in spite of Calvert's claim to the contrary. Signing long-term fixed-price contracts with IPPs for some portion of our electricity supply can be a good strategy in the face of high investment risk. If electricity prices are lower 20 years from now, these will be relatively high-cost facilities that the BC electricity ratepayers and taxpayers will not be saddled with, unlike publicly owned assets. BC Hydro's distribution entity will be free to negotiate lower prices for contract renewal on behalf of its customers. These high cost assets, which are substantial in many jurisdictions, are what are called 'stranded assets.' Some of Ontario Hydro's nuclear assets in the 1990s were in this category. If, on the other hand, electricity prices are higher in 20 years time, then BC ratepayers will have to pay higher rates. At the same time, the major publicly owned generation assets (perhaps including Site C by that time) will be able to earn a higher price for taxpayers, if the policy of setting market-based prices is politically acceptable, or will result in continued lower electricity rates for BC ratepayers, if not.

On page 64, Calvert demonstrates a one-sided approach to this risk. He sketches a distorted picture of the future in which there is no risk of stranded assets. All he looks at are the lost benefits if British Columbians do not invest in generation assets that end up being low cost. He wants 100% public ownership – of the risks and the rewards. He conveniently ignores the uncertain futures in which we make the wrong investment. Yet, energy analysts today agree that there is a high risk that a given electricity supply investment could turn out to be costly, whether made by a public or private investor.

Finally, Calvert does not define exactly what he means by losing “control of our electricity system.” And one is never sure what he means. In a market economy, even if you own generation assets, you should still set domestic rates based on market prices. Undercharging ourselves for something we could get a much better price for elsewhere only wastes resources, leading to economic inefficiency. If assets are built in BC, however, whether private or public, BC ratepayers will be well positioned to contract for this supply – transportation costs will be lower for them than for more distant consumers. But they will have to pay local market prices, which is as it should be.

2 BC Industrial Customers are Unfairly Subsidized

The second major pillar of Calvert’s theory of a conspiracy between government and private companies is his claim that BC’s industrial customers are being subsidized. But to make his case, Calvert must again distort reality. He does this by (1) focusing only on benefits to industrial customers from the Heritage Contract and (2) ignoring the sound economic efficiency and fairness reasons why industrial customers throughout the world pay less per unit of electricity than other customers.

The Heritage Contract was established by government to ensure that the benefits of BC Hydro’s existing low cost hydropower facilities were retained by all of its customers. Keeping domestic electricity rates low to reflect low domestic costs of electricity generation was the policy of the NDP government in the 90s and of the Liberal government in this decade. Although many economists and environmentalists, including myself, argue against this policy, it is not deemed politically acceptable today in BC for left-of-centre or right-of-centre politicians to raise average rates to reflect market prices. This is why non-linear rate options are needed to at least ensure that all BC Hydro customers (industrial, commercial, agricultural, residential) face the cost of new supply in their incremental rates. But no political party has argued that every unit of electricity sold to BC Hydro customers should be priced at the market price for new power.

Calvert admits on page 61 that the Heritage Contract benefits all BC Hydro customers. But frequently in the book he finds it more convenient to his conspiracy theory to pretend that the benefit flows only, or especially, to industrial customers. Early examples are on page 5, where he says that “the prime beneficiaries of the Heritage Contract have been major industrial customers,” and that “The Heritage Contract effectively shelters pulp-mill and mine owners ...”, on page 31 where he talks of the “Heritage Contract legislation which protected the major industrial customers from exposure to market prices ...” and on page 45 where he says of the Heritage Contract, “this legislation provided a huge subsidy – at least \$400 million annually – to B.C.’s mining and forest industries.”

On the same page, Calvert quietly notes that these industrial customers receive only one third of the Heritage Contract benefit, with the rest going to residential, commercial and other customer categories. Yet, for some reason, he suggests that the residential customers will not be protected in future by the Heritage Contract. He says on page 5, “Thus, far from protecting average residential customers, as the government claims, the Heritage Contract will result in them paying more for their future energy.”

How can Calvert simultaneously claim that industrial customers are the major beneficiaries of the Heritage Contract and that residential customers do not benefit from it, when both have guaranteed lower rates through this contract? Why does he not calculate the amount of benefit received by all other BC Hydro customers, not just industrial customers? Why is he so angry that industrial customers would be treated the same way as all other BC Hydro customers? The reason is obvious. Calvert focuses only on the Heritage Contract benefits to industrial customers because he needs to convince the reader that these

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customers are getting a special deal that reflects their conspiratorial relationship with the BC Liberal government.

This begs the question of what Calvert would propose as an alternative policy. If Calvert is arguing that BC taxpayers, as owners of the province's hydropower resource endowment should charge more for it, then the government can raise its water rental rates and all BC Hydro customers will pay more, including residential customers. If Calvert is arguing that BC taxpayers, as owners of BC Hydro, deserve market value for their low cost hydropower dams, then the government can arbitrarily amend the Heritage Contract to charge current market prices such that all BC Hydro customers will pay more, including residential customers. There is a sound economic argument for both of these policies. I would support either one, if phased in very gradually over the next two decades to give industry and small consumers time to adjust. There is even an equity argument, since I as a BC citizen who invests in efficient technologies and has changed my behaviour to use only 3,000 kWh per year in my home am subsidizing most of my fellow citizens who use an average of 13,000 kWh in a typical single family residence. But Calvert does not make these arguments. Nowhere does he say that residential customers should lose the benefits of the Heritage Contract.

It seems, as the above quotes suggest (and I could provide many more), that Calvert wants only industrial customers to pay more. But how would he justify this? Calvert mentions on page 17 (footnote 5) and elsewhere that industrials pay less for electricity than residential customers on a per unit basis. But he makes statements like this – to make his case for special treatment – without ever explaining why industrials might pay less. Because if he did explain what the reasons were, then it would be obvious to the reader that industrial customers are not getting special treatment. Everyone in the electricity industry knows that it costs much less per kWh delivered to serve industrial customers. It is recognized in rates throughout the world that industrial customers should not be charged for costs they do not cause, notably the substantial costs of low voltage distribution to smaller customers. Also, most industrial customers have a much more level and predictable load during the day, season and year, which reduce the need for capacity that is only used at times of peak load. There is a big difference in this regard between industrial and residential customers, and rates throughout the world reflect the much higher costs that residential load causes the electricity system. Calvert never mentions these sound reasons of economic efficiency and fairness. He wants the reader to assume that if industrials pay less per kWh, there must be a conspiracy behind it.

This leads Calvert to propose, on page 95, that government hammer industrial customers alone with rate increases, when he discusses the influence of electricity prices on electricity efficiency efforts. “Alternatively, the government could conserve energy by simply allowing BC Hydro to raise the price ... of Heritage Contract energy sold to industrial customers to market rates. This would send a clear signal to major pulp mills and mining companies that they need to conserve energy.” Of course, Calvert conveniently fails to mention that raising industrial rates to market value would cause massive economic disruption as BC's electricity intensive industries shut down, in turn throwing many BC taxpayers out of work in resource dependent communities.

He also fails to discuss why his logic for industrial customers would not equally apply to residential customers. Raising their rates would send a clear signal to them too about the need to conserve electricity. Indeed, most evidence shows that the greatest potential for electricity efficiency is in the residential sector. But Calvert is silent on this. Offering an economically efficient and fair alternative is not required when your objective is to promote a perception of conspiracy that favours private corporate interests.

3 BC Residential Customers Will Pay Higher than Necessary Rates

The third pillar of Calvert's conspiracy theory is that the BC Liberal government's electricity policy will lead to higher than necessary rates for BC residential customers. Here is the much-needed source of revenue to enrich the government's private industry IPP friends. Of course, Calvert conveniently forgets that these purportedly high rates will also extract money from the BC Hydro industrial customers who are also friends of the government and indeed co-conspirators. But to make conspiracy theories work, it is sometimes necessary to gloss over inconvenient facts, such as the diametrically opposed interests of BC Hydro's industrial customers and BC's emerging IPP industry. This is the rationale behind the earlier quotes in which Calvert describes the Heritage Contract as only benefitting BC Hydro industrial customers and conveniently overlooks its benefits to residential customers.

According to Calvert, the electricity policy will lead to higher rates because public electricity investments, through 100% BC Hydro ownership, are cheaper. On page 95 he says, "As a Crown corporation guaranteed by the government, BC Hydro has access to much cheaper financing ...". On page 2 he notes, "Because BC Hydro is required to purchase energy from private power developers located within the province, it is now paying as much as double current energy-market rates under the terms of inflation-indexed, long-run contracts." And on page 47 he says, "There are no studies that this author is aware of that show that it would be cheaper in the long-term for BC Hydro to source all its new energy from private power developers."

This final statement is particularly revealing. It is consistent with my earlier remark that the references at the back of Calvert's book are devoid of independent studies by leading scholars on the reasons behind the worldwide electricity reform movement – the trend to encourage competition in electricity generation as a way of allocating some of the substantial investment risk away from customers and taxpayers to IPPs of various sizes and ownership structures. I summarized these arguments in my 2001 BC Studies article referenced above. I noted then that BC Hydro's sudden, mysterious decision in 1999-2000 to reverse its original plan to upgrade the high-voltage transmission capacity to Vancouver Island and instead build a natural gas pipeline with generating plants was very risky. Yet, it was later revealed that neither the government nor BC Hydro had conducted a formal risk analysis before this decision was made and there had been no public involvement or external review of its planning process – in 2000 BC Hydro updated its 1995 Integrated Electricity Plan (and changed it completely) as a secretive, in-house activity.

The outcome was predictable. Once BC Hydro's plans became public, there was a strong negative reaction from environmentalists, industry, consumer groups and individual citizens. After several years of public debate and BCUC processes, BC Hydro finally withdrew the controversial strategy, but only after it had wasted over \$120 million.

With his focus on conspiracy, Calvert fails to acknowledge the important lesson from this huge financial loss in terms of the risks inherent in new electricity investments, and especially the risks in allowing a large monopoly free reign to initiate projects without public involvement or proper risk analysis. Indeed, part of the problem was that by order in council the NDP government in its last years had exempted Hydro from BCUC oversight as long as it did not request a rate increase. It was not long afterward that Hydro changed its resource plan to promote a major natural gas pipeline and natural gas generation projects. Hydro's unsupportable decision confirmed the wisdom of the policy that all governments in BC had otherwise supported since 1980 – BCUC oversight of BC Hydro in open processes. After their election in 2001 the Liberals made the popular decision to return BC Hydro to full BCUC regulation.

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Calvert mentions the BC Hydro loss of \$120 million on page 45, but, amazingly, he blames the loss on the Liberal government's decision in 2002 to submit the project to the BCUC for review, "a review process that lasted three years and resulted in delays that eventually resulted in cancellation of the project at a cost to BC Hydro of approximately \$120 million." This is a major distortion of the facts. First, strong public outrage gave the newly elected government little option but to put the project back under BCUC review where it should have been from the start. This opposition, not the BCUC, is also what delayed the project, as interest groups resisted first the pipeline, which was eventually approved by the National Energy Board, and then the generation project, which was eventually approved by the BCUC. Only after that, did the Hydro Board start to acknowledge the issues of financial risk (possible escalation in natural gas prices, possible escalation in greenhouse gas emission charges) and then decide on its own to cancel the project.

The Vancouver Island natural gas experience provides evidence for the argument that a large, vertically integrated natural monopoly can be very costly for ratepayers, and perhaps taxpayers depending on who pays for its mistakes. This helps to explain why, around the world, policy makers have recognized the merits of a greater role for IPPs in electricity generation. At the same time, the Vancouver Island experience illustrates the extreme financial investment risks in the electricity sector today.

If a monopoly generator misinvests, ratepayers pay the costs of this mistake. If the monopoly ratepayer is also publicly owned, then taxpayers may end up sharing these costs through lower dividends to government. If, on the other hand, a private IPP misinvests, it must swallow the losses, not ratepayers and taxpayers. Ratepayers are not completely off the hook in that they may be dependent by contract for some time on the sub-optimal investment for electricity supply, perhaps at a price that is higher than new market developments. But eventually they will be able to shift toward better investments as these appear in a competitive marketplace, so their exposure is generally much less than in the case where they are intimately tied to the monopoly generator, as ratepayers and perhaps as taxpayers of a publicly owned utility.

On page 199, Calvert notes that many IPP projects that are originally short-listed by BC Hydro never actually get built. He seems to interpret this as an indication of the weakness of these projects. He misses the point, again because of his focus on conspiracy. Electricity investment is risky. As in any competitive market, there must be the potential for profits or investment will dry up. But there will also be major losses. In the long run, it is much better for BC ratepayers if those losses are incurred by IPPs rather than a monopoly utility which can pass on all its losses. If there were no risk, the monopoly utility might very well lead to the lowest rates for ratepayers. But if there is risk and the potential for competition in generation, then the competitive model is likely to lead to lower rates in the long run. Calvert will not acknowledge this. But that is understandable given that he never talks about investment risk in electricity and how jurisdictions are dealing with it around the world – invariably by a significant increase in the role of IPP investment.

Without any proper evidence to make his case that increased IPP investment will increase BC Hydro rates, Calvert must resort to comparing apples and oranges. On pages 76 – 79 he compares the high cost of new power (which happens to be IPP) with the low cost of existing generation (which happens to be BC Hydro) and concludes that the IPP supply policy will lead to higher rates. Economists call this a confusion, deliberate in this case, of historic costs with marginal costs. Comparing the cost of power from BC Hydro generation – most of it constructed in the 1960s – with the price BC Hydro paid for IPP power in the 1990s, Calvert concludes on page 77 that the comparison "underlines how much more expensive it has been in the past for BC Hydro to buy energy from private power developers rather than building its own generation facilities." He conveniently forgets to account for the effects of amortization and

inflation. I and two co-authors adjusted BC Hydro's historical investments since the early 1960s for inflation and amortization in a refereed paper published back in 1990 and found that these two factors accounted for almost all of the difference between historic costs and projected new costs of electricity production in BC heading into the 1990s.⁴ This factor clearly cannot be ignored when making comparisons across time periods, but Calvert does and it conveniently serves his conspiracy theory.

The proper comparison would be of BC's new renewables IPP projects with those emerging through competitive bidding processes in other jurisdictions, such as Washington or Oregon. Thus far, the cost of BC's IPP power is in line with these other jurisdictions. Of course, Calvert can always reply that the conspiracy is global.

In reality, one could use Calvert's approach of comparing apples and oranges to draw the opposite conclusions. In Ontario one could compare the historic cost of nuclear power built by Ontario Hydro (a public monopoly at the time) with new IPP supply in Ontario and conclude that IPP power is cheaper. But this would be equally foolhardy. Confusing historical and current production costs tells us nothing about the relative costs of IPP power versus public monopoly power.

With the same logic, Calvert claims on page 94 that Site C, if built soon by BC Hydro, will be much cheaper than the IPP contracts BC Hydro has recently signed. This might turn out to be true. It might also turn out to be false, especially if interest group and public resistance to Site C turn out to be as aggressive as they were back in the early 1980s, and if Site C construction cost estimates are doubled to reflect the near doubling of construction costs of the past three years in neighbouring Alberta. Moreover, the government might well initiate Site C only to delay or halt the project after spending millions, as occurred with the Vancouver Island natural gas initiative and with Site C three decades ago. In fact, one could argue that the full cost of a public project like Site C should include all of the aborted BC Hydro projects along the way, in particular the \$120 million lost on Vancouver Island. This would provide a fairer comparison with private IPP projects because investors in these projects must worry about the risk of losses. Hydro can ignore this risk, as it has done in the past, because ratepayers and taxpayers will pick up the tab, as they have done in the past.

The current project proposals put forward by IPPs are predominantly small hydropower, windpower, and biomass. There is no doubt that these are more expensive than the current per kWh costs of servicing the remaining debt on BC Hydro's major hydropower investments of the 1960s plus the small operating costs. This means that rates will rise over time. They would also rise if BC Hydro were to develop all these projects. But Calvert downplays this and focuses on his argument that rates will rise even more with IPPs because of the lucrative profits they will earn from locking up BC's best sites, especially for small hydropower. On page 16 he says, "The government has already sold the most valuable and suitable sites for small hydro and wind projects across the province for a tiny fraction of their asset value." He goes on to say, "the amounts paid by private interests for permanent entitlements to water resources and land occupancy are a pittance compared to the future revenues these sites will generate ..." And on page 220, without providing any evidence, he refers to an IPP project's "hugely profitable revenue stream."

Before even getting into the economic question, Calvert has the facts wrong yet again, and once again in a way that favours his conspiracy theory. In fact, the government has not 'sold' these sites. And except in a few exceptional circumstances that predate this government, IPP entitlements to the water resources and land are not 'permanent.' Today IPP investors can acquire water licences and land tenures for a maximum

⁴ Jaccard, M., J. Nyboer, and T. Makinen, "Managing Instead of Building: B.C. Hydro's Role in the 1990s," *B.C. Studies*, Winter/Spring 1991/1992.

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of 40 years. The process and regulations that the BC government uses to establish these non-permanent access rights to land and water are comparable to those of provinces like Manitoba (with its NDP government) and Quebec (with its strong support for an electricity system that is mostly in public ownership). Is there a conspiracy in each of these provinces as well?

There actually is a very simple and obvious explanation for why these IPP projects appear to be relatively expensive. BC Hydro resource assessments for over three decades have shown that most small-scale renewable projects are likely to be more expensive than generating electricity by burning coal or natural gas, building a large dam or even building a nuclear plant. This is consistent with the assessment of electricity generation projects around the world, as the World Energy Assessment of 2000 shows.⁵ So why might governments and electricity distributors nonetheless contract for power from such projects? Because there is an expectation that many of these will be less environmentally damaging or risky than fossil fuel plants that emit greenhouse gas emissions, large hydro dams that flood valleys, and nuclear plants that pose risks from radioactive waste disposal, operational accidents, terrorist attacks and nuclear weapons proliferation.

It is hard to reconcile the universal evidence of the high costs of these smaller-scale ‘renewables’ projects with Calvert’s claims for how profitable they are. If they are so lucrative, one has to wonder why so many projects never get completed, as Calvert himself notes on page 199.

To summarize, Calvert claims that IPP projects, especially the current crop of small hydropower and windpower projects being contracted for by BC Hydro, will lead to higher rates than necessary. The evidence he provides involves three comparisons that no objective analyst would make. First, he compares the residual cost of generation (after inflation and partial amortization) from BC Hydro’s large existing hydropower facilities with new IPP projects. But even new projects by BC Hydro would be more expensive because the cost of generating electricity in new projects today is much higher everywhere. Second, he compares the small renewables IPP projects with the possible cost of BC Hydro’s Site C dam. The Site C dam might turn out to be cheaper than small renewables IPP projects. And it might turn out to be more expensive, once the rapid increase in construction costs is incorporated. But IPPs are excluded from bidding to construct the Site C dam, just as BC Hydro’s generation division is excluded from bidding to construct small renewables. Again, comparing two very different types of projects (large hydro at the most favourable site in BC with small renewables throughout the province) tells us nothing about relative costs of IPPs versus BC Hydro. Third, Calvert ignores the importance of how risk is treated when comparing BC Hydro generation with IPP projects. Large monopolies like BC Hydro have a tendency to overlook financial risks in their rate of return calculations because that risk is 100% the responsibility of taxpayers and ratepayers. IPPs cannot ignore risk because, as private entities, their shareholders will have to absorb much of the risk-related losses from misinvestment. A proper comparison of IPP and BC Hydro costs should correct BC Hydro cost estimates for the risk of losses. The aborted Vancouver Island natural gas project cost taxpayers and ratepayers \$120 million. The aborted Site C dam in the 1980s apparently cost them even more. If the Site C dam is again initiated and again aborted, what will it cost taxpayers and ratepayers? In contrast, the losses attributable to the many aborted IPP projects in BC have all been incurred by IPP investors.

⁵ See J. Goldemberg (chair), *World Energy Assessment: Energy and the Challenge of Sustainability* (New York: United Nations Development Programme) 2000.

4 IPP Power is More Environmentally Harmful

The fourth pillar of Calvert's conspiracy theory is that the BC government is so intent on rewarding its private industry friends that it is even willing to destroy the BC environment to do so, by fostering environmentally harmful small IPP renewables projects at the expense of environmentally 'superior' options like the Site C dam, repowering the Burrard Thermal natural gas plant in the Lower Mainland, and purchasing coal-fired electricity from Alberta and other jurisdictions. On page 11 he says, "One of the other major consequences of the government's new energy policy is its negative impact on the provincial environment." And on page 198 Calvert says, "the government is wrecking havoc on pristine rivers and streams across the province to enable its friends in the private power industry to profit from lucrative BC Hydro EPAs."

Before addressing the plausibility of Calvert's sinister portrayal of a government that is willing to destroy the BC environment to profit its friends, it is once again necessary to correct the facts. Calvert claims that environmental objectives and requirements for electricity generation have declined since the Liberals took office in 2001. On page 47, he says that the Liberals Energy Plan in 2002, with its 50% requirement that energy be from clean sources, "opened the door to the purchase of new energy from pulp mills that use wood waste and coal ..." This is wrong. Before the government established the 50% requirement, BC Hydro's policy under the NDP was that 10% of its electricity must come from clean sources. In other words, 90% could have come from burning coal. The Energy Plan could not open a door that was already wide open under the NDP. Instead, it half shut a door that under the NDP was wide open.

In the same vein, Calvert claimed that since two firms brought forward coal-fired generation proposals under the 50% clean policy (which they could have done earlier under the NDP's 10% clean policy), this demonstrated that (page 12) "The government sanctioned the use of this controversial fuel source in B.C. for the first time in generations." Again, it is simply not true that there was a 'government sanction.' The government had tightened the loose environmental restriction of the NDP, but even so, two coal projects were proposed, as they could have been under the NDP. In response, the government eventually (subsequent to the publication of Calvert's book) disallowed the projects unless they were to include carbon capture and storage. But even Calvert's statement about 'first time in generations' is not true. In the 1980s, BC Hydro vigorously promoted a massive coal-fired plant at Hat Creek (a proposal initiated under the NDP in the 1970s), which was only prevented by lack of electricity demand and public resistance, not by the environmental concerns of Hydro's management at the time. Again, a lot of taxpayer and ratepayer money was wasted preparing and promoting a mega-project that never materialized.

Another issue is Calvert's claim that the BC government's environmental assessment process is a rubber stamp for IPPs because it (page 13) "has always resulted in approval, regardless of the location and impact of the project." This is not true. Many IPP projects have been cancelled or shelved as they receive feedback through the stages of the assessment process. This explains some of the many aborted IPP projects Calvert refers to on page 199. And this is how it should be. It would be a pretty inefficient regulatory system if many (or even any) projects actually got to the stage where a formal rejection was required to stop them. As an academic, Calvert should understand this. In most university departments, all students (or almost all) pass their final PhD thesis defence. But many students who start a PhD do not complete. This is because they are culled in the course of the PhD process, which includes obligations at various stages along the way. It would be ludicrous to suggest that because the Harvard economics department passes virtually all students taking the PhD thesis defence, that the department is a rubber stamp. And, it is equally ludicrous to suggest, using a similar evidentiary logic, that the BC environmental

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assessment process is a rubber stamp because it has not formally rejected a project at the final decision stage.

Turning to Calvert's main argument about the environmental impact of the government's policy, the logic is difficult to follow and at times contradictory. He seems to believe that small renewables, like small hydropower, are more environmentally damaging than large hydropower. On page 47 he says, "Arguably, BC's established hydro facilities would meet the much more stringent 'test' of green but for the fact that such facilities are not what private energy developers are planning to build." Here the logic is certainly twisted. First, he is comparing existing facilities with potential new facilities. A fair comparison would be if we were looking at building the massive dams of the 1960s today versus building small hydropower and other renewables. Also, Calvert seems to suggest that the government defines small renewables as green because this is what the IPPs are planning to build. The reality is the converse. The IPPs are promoting small renewables because these are the only projects the government will let them develop. Some IPPs would undoubtedly love to promote large hydropower projects, but the government – a government that is supposedly so intent on private development – has allocated such projects exclusively to the publicly owned BC Hydro.

As I noted earlier when discussing investment risk, the environmental impact of various electricity options is not obvious because each option entails different impacts and risks. Only through some kind of trade-off analysis can society make a choice about which option it might favour at a given time.⁶ When climate change was not on the horizon in the 1980s, new coal plants were preferred to new nuclear plants in many jurisdictions. With the current focus on climate change, nuclear is back in vogue in these same jurisdictions. When British Columbians were increasingly concerned in the 1970s with BC Hydro's plans to dam every major river system in the province, small hydro and other smaller-scale renewables looked advantageous. But these projects have their own impacts and risks, as British Columbians are now coming to realize. Indeed, I warned of this in my 1990 co-authored article on the BC electricity system, which is why I agree with Calvert's statement on page 13 that "It is not self-evident that the total cumulative environmental impact of building a hundred run-of-river projects ... is significantly less damaging than building one major hydro dam ..."

But because he is so focused on his conspiracy theory, Calvert fails to provide a fair assessment of how society might address these difficult comparative assessments of its electricity options. BC may eventually decide to build the Site C dam, which will presumably be developed by BC Hydro. But there are likely to be many small renewables projects that will also be acceptable, so we should be pursuing these too, given that even aggressive efficiency efforts will not prevent some increased use of electricity over the coming decades. All of our electricity options are financially very risky, which is why all jurisdictions – even Manitoba with an NDP government – are also promoting some smaller-scale renewables projects developed by IPPs. One of the big risks is that many prospective sites will eventually be deemed unacceptable for development. And that is the messy, but necessary, process that BC is currently involved in.

When it comes to the environmental impacts of our energy options, climate change has become a dominant issue. This makes sense when we consider the potentially massive environmental and social

⁶ I explain this in detail in *Sustainable Fossil Fuels: The Unusual Suspect in the Quest for Clean and Enduring Energy* (Cambridge: Cambridge University Press), 2006. Incidentally, although he refers to the book on page 212, Calvert incorrectly describes me as a "Proponent of clean coal." The book is about sustainable energy trade-offs and focuses on how we should understand that all options involve impacts and risks, and that it is unwise to rule out one particular option *a priori*, be that fossil fuels, nuclear power or renewables (large- and small-scale). For this reason, I am definitely not a proponent of any particular option.

impacts that scientists say are likely. It is surprising that Calvert says so little about this when discussing the government's conspiracy to destroy the BC environment to profit its friends. He conveniently overlooks the fact that all over the world governments are promoting small-scale renewables electricity generation by IPPs as a key component in the strategy to reduce greenhouse gas emissions and prevent major disruption of the earth's climate. These options certainly involve significant environmental impacts on a local scale. But this is deemed to be preferable to the massive disruption that climate change would cause both locally and globally. To cite just one piece of evidence, most scientific experts say there is a high probability that the pine beetle devastation in BC's forests is attributable to human-induced climate change.

It is therefore troubling that Calvert never mentions the greenhouse gas implications when he talks of repowering the Burrard Thermal natural gas plant. Yet emissions from natural gas combustion were one of the concerns in the reversal of BC Hydro's Vancouver Island natural gas strategy. And he conveniently overlooks the greenhouse gas implications of purchasing electricity from coal fired sources in neighbouring jurisdictions when on page 69 he laments "Instead of buying energy cheaply when it is available in the United States or Alberta and re-selling it at higher prices, BC Hydro is increasingly committed to using its storage to fulfill its contractual obligations to private run-of-river projects." For those of us who have pushed hard over the decades for a greater development of small-scale renewables in BC, because of our concern for the local and global environment, it is incredible to see Calvert portray such a development as simply the result of the BC government's strategy of destroying the BC environment in order to profit its business friends.

5 Concluding Comment

As the quotes make clear, Calvert's book is best read as a political propaganda tract rather than as an independent, unbiased analysis. The author is uninterested in presenting a balanced weighing of the evidence. Indeed, facts are wrong and evidence is distorted in a manner that consistently supports a sinister conspiracy theory. This is why I would not recommend publication if this were a peer review for an academic publisher.

There are undoubtedly many aspects of the government's electricity policy that one can disagree with, as I have many times in the distant and recent past. But it is unfair and unhelpful to the development of good electricity policy in BC to assume that the current policy's sole motivation is to enhance the profit making prospects of corporate friends of our provincial politicians.

As I have shown in this review, the government's current electricity policies appear to have sound 'public interest' rationales, and these policies are consistent with those of governments in other jurisdictions, even jurisdictions with left-of-centre governments of the type that Calvert would presumably prefer to see here in BC. The effort to expand electricity generation in BC makes sense in terms of security of supply for domestic consumers, even if the generation assets are not publicly owned. The different rates charged to industrial and residential customers are consistent with a century of regulatory rate designs that have emphasized economic efficiency and fairness in cost allocation. The increased role for IPP generation is a much-needed response to the high risk of electricity generation investment today as a way of reducing financial risk to ratepayers and taxpayers. And a growing role for smaller-scale renewables electricity generation in BC is consistent with the efforts made in virtually every jurisdiction in the world to reduce the environmental impacts and risks associated with complete reliance on conventional, large-scale facilities.

Peer Review of Marvin Shaffer's *Lost in Transmission: A Comprehensive Critique of the BC Energy Plan*

The Book's Principal Thesis

Dr. Shaffer heads a Vancouver consulting company in his name and is also an adjunct professor in the Public Policy Program at Simon Fraser University. His report's principal thesis is that "the BC Energy Plan is fundamentally flawed" because it:

1. exaggerates the need for new electricity supply, resulting in higher than necessary rate increases,
2. discourages economically efficient conservation by sustaining BC Hydro's average rates below the cost of new electricity supply, and
3. forces BC Hydro to acquire high cost resources of low value, again resulting in higher than necessary rate increases.

Shaffer presents each of these three components of his thesis as separate papers within his report, in which he provides evidence and argument. He also explains what alternative policies would be superior to the current approach of the BC government.

My General Assessment

Were I conducting this peer review for an academic publisher, my recommendation would be against publication until revisions have been made. This response is what editors of academic publishing houses and academic journals refer to as a requirement for "revisions and resubmission." In other words, I believe there are inadequacies in the selection of evidence and problems with the analysis. The revisions would, however, lead to significantly different conclusions for all three papers, conclusions that would be much more supportive of the BC Energy Plan. Of course, a reviewer might still support publication even if, after revisions to the evidence and arguments, the author still arrived at conclusions that the reviewer disagreed with, as long as these were well supported.

Since Shaffer presents his thesis as three separate papers, this review deals with each separately. However, before addressing the evidence and arguments, I note that some of Shaffer's comments throughout the report give the impression that this is, as his sub-title says, "A comprehensive critique of the BC Energy Plan." It is not. The BC Energy Plan has sections on electricity, but it also has sections on oil and gas, alternative energy, energy efficiency, and energy-related employment training. A 'comprehensive' critique would also address these components. But Shaffer is focused completely on electricity, which means that while he of course discusses alternative electricity supply technologies and electricity efficiency, he gives no coverage to alternative energy and energy efficiency outside of electricity and moreover ignores oil and gas along with other key aspects of the Energy Plan. A more appropriate sub-title would be something like "A critique of the electricity pricing and supply acquisition elements of the BC Energy Plan."⁷

As the common theme for all three papers, Shaffer states in his introductory page that "the province's Energy Plan is designed more than anything else to artificially increase the market for new IPP supply." In the first paper, Shaffer claims that the electricity self-sufficiency policy (including the provision for

⁷ One should not generalize from a sample of two, but it is interesting that this confusion of energy and electricity is common to both critics of the BC government's Energy Plan – John Calvert makes the same mistake in his book *Liquid Gold*. It is true that the BC Energy Plan has a considerable focus on electricity, but that is no excuse for muddled use of such basic terminology. Energy and electricity are not synonyms.

‘insurance power’) exaggerates the need for electricity, resulting in higher than necessary demand for new power from IPPs. Shaffer claims that a cheaper alternative would be to purchase power from external producers at times when BC Hydro’s water flows are below average. Likewise, insurance power can be acquired via short-term power purchases from external sources as needed.

The second paper notes that by sustaining the Heritage Contract, which guarantees low cost power to BC Hydro customers from BC’s long-standing hydropower facilities, the Energy Plan leads to higher electricity consumption than would occur if all kWhs sold were priced at the cost of new supply. The Heritage Contract thus works in opposition to the policy goal of electricity efficiency and results in a higher demand for IPP power as well as perhaps additional large-scale hydropower investments by BC Hydro.

The third paper argues that the Energy Plan forces BC Hydro to meet most of its growing power requirements from specific domestic resources that are high cost and of low value to the BC Hydro system, namely small-scale hydropower and wind projects developed by IPPs. This also means higher rates for BC Hydro consumers than otherwise necessary.

While I found all of the papers to be clear and well argued, I am troubled by elements that are not considered. If these were considered, I believe the conclusions would be significantly different for all three papers. In particular, I believe that a proper consideration of key uncertainties – notably the risk of very high prices for fossil fuel derived electricity within a decade because of climate concerns and the risk of wholesale price spikes associated with short-run periods of tight regional electricity markets – would suggest a different strategy than that which Shaffer espouses. Indeed, a proper consideration of these risks would, in my view, favour a resource acquisition strategy for BC Hydro that is very close to that currently being followed through the policy directives of the BC Energy Plan. I also believe that while it is preferable that all electricity in BC be priced at the cost of new supply, there is strong evidence, from decades of regulatory experience, that new rate design required by the Energy Plan will lead to a satisfactory outcome in terms of consumption levels.

1. Exaggerating the Need for New Sources of Electricity Supply

Shaffer’s first paper criticizes the BC Energy Plan for its requirement that BC achieve electricity self-sufficiency by 2016 and even a 3,000 GWh surplus of ‘insurance power’ by 2025. Shaffer argues against the plan’s implicit definition of self-sufficiency as ‘electricity contracted for, or generated by, BC Hydro that is sufficient to meet all domestic demand even in low water years.’ He argues that this definition, in combination with a requirement for a minimum level of insurance power will cause unnecessarily high supply costs for BC Hydro in future. This is because the policy will require BC Hydro to sign long-term fixed price contracts to buy power from BC IPPs, some of which it will be required to export at lower prices as short-term surplus sales in years of average and high water flows.

Shaffer argues that a more economically beneficial strategy is likely to be one in which BC Hydro plans to meet its customers’ electricity demand (through IPP purchases and its own generation) in average water years, and then purchases additional power from external markets as needed during lower than average water years, while also abandoning the requirement for insurance power. As empirical support for this strategy, Shaffer uses data available from BC Hydro to estimate the financial losses associated with the self-sufficiency and insurance approach of the Energy Plan in comparison to alternative approaches.

In table 6 on page 16 he shows the estimated present value of system costs to BC Hydro, plus the land, water, local air pollution and greenhouse gas (GHG) impacts, of five alternative strategies that are called (1) continue to run Burrard natural gas plant, (2) allow imports up to 6000 GWh, (3) allow imports up to

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3000 GWh, (4) self-sufficiency in low water years, (5) self-sufficiency in low water years plus insurance.⁸ In terms of system costs, the high import strategies are estimated to be lower cost compared to self-sufficiency. The most extreme contrast is the present value saving of almost \$650 million (13% of total system cost) that the 6000 GWh import strategy offers relative to the self-sufficiency plus insurance policy. In terms of GHGs (which I intend to focus on) the outcomes are similar at between 11 and 14 megatonnes of emissions of carbon dioxide equivalent per year, except for the maintain Burrard strategy, which produces almost 20 megatonnes.

The evidence in the table appears to support Shaffer's claim that BC Hydro, and thus its ratepayers, are better off with more imports and/or more thermal generation from the Burrard natural gas plant than from more domestic production by IPPs that are generating electricity from small-scale renewables like hydropower, biomass and wind, as required by the BC Energy Plan. While the GHG emissions are not greatly different between the two strategies, the financial savings appear to be substantial.

Shaffer is well aware, however, that the assumptions generating these numbers have considerable uncertainty. As he notes on page 17 "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 new resources required in different cases will almost certainly be different."

In regard to the latter, Shaffer notes that experience with recent bids already shows that BC Hydro will be paying more for small-scale renewables IPP power than the estimates used to calculate the results in his Table 6. He points out, however, that while one can differ with the assumptions, the ones being used by BC Hydro at the time certainly support his argument that the self-sufficiency plus insurance strategy is high cost relative to alternatives, even with environmental impacts considered. Shaffer notes, moreover, that the present value system costs include an estimated charge for GHG emissions (which he refers to as the cost of 'GHG offsets'). In particular, the results in Table 6 are based on the assumption by BC Hydro that GHG emissions would cost \$15 / tonne initially, rise to \$25 / tonne by 2015 and remain at that level thereafter.

As I noted at the outset, Shaffer's analysis is interesting and presents a legitimate challenge to either the provincial government or BC Hydro. Either Hydro's numbers provide a good representation of the future prices and risks, and thus put into question the electricity self-sufficiency and insurance elements of the government's Energy Plan. Or the Energy Plan is sound, but appears not to be because Hydro's estimates fail to reflect the full risks of strategies that rely on greater use of natural gas-fired Burrard and imported electricity, most of which is likely to be generated in coal-fired power plants in Alberta and the US. I think the real-world evidence strongly suggests the latter – namely that BC Hydro's values in its 2006 IEP do not reflect the most likely magnitudes and costs of the GHG emissions associated with an electricity import strategy.

In my view, there is a substantial problem with BC Hydro's 2006 analysis in that it ignores or grossly underestimates the probability of a relatively rapid rise in the cost of electricity generated by fossil fuels resulting from a combination of resource depletion and rising charges for GHG emissions. In this regard, I note that Shaffer too overlooks a lot of readily available information when he says in his conclusion on page 18 that "there is no evidence to suggest that expansion plans with self-sufficiency and insurance would be preferred at any reasonable offset charge." In other words, Shaffer is saying that only in extremely unlikely circumstances could charges for GHG emissions rise to a level at which it would be

⁸ According to Shaffer, this table is constructed from the *2006 BC Hydro Integrated Electricity Plan*, Table 6-4, pages 6-19.

cheaper for BC Hydro to pursue self-sufficiency via long-term contracts with non-emitting, renewables-based, domestic IPPs rather than to import a substantial amount of power from coal-fired power plants in low water years.

In fairness to BC Hydro, it is important to point out that the analysis for its 2006 IEP was probably conducted in 2004 and 2005. Much has changed in the last four years in terms of domestic and international policy efforts to reduce GHG emissions, and the estimated GHG charges that will result from these policies, in both Canada and the US. Nonetheless, even five and 10 years ago these developments and the resulting costs had a significant probability and should have been considered in any reasonable analysis of risks. In a letter to the BC Hydro board of directors in 2000, I lamented their lack of price risk analysis in launching the Vancouver Island natural gas strategy. I said, “Natural gas prices are unpredictable and may average much higher levels in future. We now have some sense of that risk. Greenhouse gas liabilities may be significant. You don’t need to be an expert to know that the world must go far beyond the Kyoto Protocol if it is to stabilize greenhouse gases in the atmosphere.” Likewise, in testimony before the BCUC in 2005 I provided international and domestic evidence to show that the charges on GHG emissions would need to be very high – over \$100 within the next 5 to 10 years – to make substantial emission reduction progress in the Kyoto timeframe (by 2010) or even if this deadline for reductions was extended a decade or two into the future.

Prior to Shaffer’s 2007 report, the newly elected Conservative government of Canada had already set GHG emission reduction targets that required a 20% reduction from 2006 levels by 2020 and a 65% reduction by 2050. Independent estimates by the National Roundtable on the Environment and the Economy indicated that the GHG emission charges required to achieve these targets would need to reach \$200 / tonne by 2025 and \$300 by 2035. Most recently, the Lieberman-Warner bill that was almost passed by the US Congress had similar percentage reduction targets for the US by mid-century and the US Energy Information Administration estimated in 2008 that this would require GHG charges in the US comparable to those listed above for Canada in about the same timeframe. Unlike President Bush, both presidential candidates in 2008 say they will not veto a similar bill once passed by Congress.

At the same time, the price of oil has climbed considerably. While it may fall from its current levels, few independent experts expect the price to resettle down below the \$30 / barrel range of a decade ago. Many analysts currently assume that the average price for the next decade will be above \$60 and perhaps above \$100. Research consistently shows that natural gas prices will ultimately follow oil prices because of the partial substitutability of these two products.⁹ Most studies also show that high natural gas and oil prices exhibit upward pressure on coal prices, thus increasing the cost of coal-fired electricity. The price of coal is already well above its 2004-2005 levels, when BC Hydro did the analysis in Shaffer’s Table 6.

In concert, these two price risks – higher fossil fuel prices due to depletion of high quality oil and gas, and rapidly rising charges for GHG emissions – present a future in which electricity generated from coal and natural gas will be significantly more expensive within 10 years and even more so within 20. With new assumptions associated with such a future, the BC Hydro analysis summarized by Shaffer’s Table 6 would produce dramatically different results. In the following discussion, I focus on GHG policy (and ignore fossil fuel scarcity) to make a couple of adjustments that illustrate the kind of back-of-the-envelope analysis Shaffer could have conducted with the information at hand, to reflect the increasingly high probability that fossil fuel-generated electricity will rise in cost relative to renewables-generated electricity.

⁹ See, for example, P. Hartley, K. Medlock III, and J. Rosenthal, “The relationship of natural gas prices to oil prices,” *The Energy Journal*, V.29, N.3, 2008, pp.47-66.

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As GHG pricing policies intensify in the next few years, in order to achieve emission targets for 2020 and 2050, jurisdictions everywhere will be looking to acquire electricity from zero emission sources (this is already occurring in a significant way in all OECD countries). As a consequence, coal-fired plants will be looking for a market, especially for their surplus power in off-peak periods. If BC Hydro uses its storage to import electricity during off peak hours, this electricity is likely to be generated almost entirely by coal plants in Alberta and the US northwest. This means that Table 6 probably understates the GHG emission differences between the self-sufficiency and the import power scenarios. The table shows an increase of only 1.6 megatonnes of annual GHG emissions when switching from the BC self-sufficiency scenario to the 3000 GWh of imports scenario. But if the 3000 GWh of electricity are produced by coal-fired plants, the increase should be 2.9 megatonnes of GHGs. Moreover, for the 6000 GWh strategy, the increase in GHGs should be 5.8 megatonnes per year, not the 2.6 megatonnes shown in Table 6. This is a very big difference.¹⁰ British Columbians cannot ignore GHGs emissions just because they are not emitted in BC. Climate change is a global risk and a policy in BC to reduce GHG emissions domestically is a failure if it only serves to increase emissions elsewhere. The BC government and BC citizens appear to be increasingly aware of this, as evidenced by the BC Climate Plan of 2008 and all the supporting legislation and investments. Likewise, the Western Climate Initiative, which now includes most western US states and most of Canada's population with the inclusion of Ontario and Quebec, is poised to establish a similar level of effort in neighbouring jurisdictions.

This policy thrust in BC and adjacent jurisdictions means that the financial implications in Table 6 are also unlikely because they are based on the assumption that the charge for GHG emissions will remain at \$25 / tonne from 2015 onward.¹¹ In concert with the above-noted under-estimate of coal-fired imports of electricity, this explains why the 'maintain Burrard' and the two 'import power' scenarios outperform the 'self-sufficiency' scenario on a financial basis.

In Table 6, the GHG charge of \$25 / tonne is associated with a self-sufficiency scenario that is \$280 million more expensive in present value than the 6000 GWh import scenario. If we assume instead that the average GHG charge is \$125 / tonne (using 5% discount to balance lower values in the near term with values above \$200 and climbing by 2025), then this \$100 / tonne increase in the estimated charge (\$125 instead of \$25) leads to an increased cost of the 6000 GWh import strategy of \$580 million per year. If this annual value continues for 25 years (a typical utility planning horizon) and is then discounted at 5% into a present value, this results in about an \$8 billion increase in costs in the 6000 GWh import scenario. Instead of being \$280 million cheaper, this import scenario could well be almost \$8 billion more expensive than the self-sufficiency scenario.¹²

To be fair, the numbers on the other side of the ledger might also be adjusted to reflect new information. Small-scale IPP renewables are proving to be more expensive than the BC Hydro assumptions in Table 6. But a crude estimate suggests that the cost of power from this source would have to be double, and perhaps triple, the costs BC Hydro estimates in its 2006 IEP before the importation of coal-generated electricity might be financially preferable – in a world that is serious about GHG emissions reduction. In

¹⁰ To calculate. Step 1: 6,000 GWh of electricity requires 18,000 GWh of coal (at 33% efficiency). Step 2: 18,000 GWh of coal equals 64,800,000 GJ of coal (at 3,600 GJ per GWh). Step 3: 64,800,000 GJ of coal produces 5.83 Mt of carbon dioxide (at 0.09 tonnes of CO₂ per GJ of coal).

¹¹ BC has already implemented a carbon tax which is scheduled to reach \$30 / tonne by 2012 and its climate target of reducing emissions 33% below 2005 levels by 2020 will probably require a tax of at least \$100 well before that date – either directly through the tax or implicitly through alternative regulations that include a cap and trade system.

¹² If more of the imported electricity is produced by natural gas plants, the GHG charge would be lower, but the price of natural gas would also be higher, so it is difficult to know if a greater reliance on this source of imported electricity would change the financial picture.

such a case, a more likely outcome would be for BC Hydro to build the zero-emission Site C dam rather than import coal-generated electricity from external sources. As a large investment, this facility alone may result in surplus power for some years that will need to be exported under short term, lower-priced contracts. Under the high probability future of increasingly stringent climate policy in Canada and the US, reliance on GHG-emitting imports is likely to be a bad strategy for the environment and for BC Hydro ratepayers.

Of course, the future is uncertain. My numbers illustrate one possible future, one that in my view is much closer to what is likely when we see today's evidence of policy developments and resource scarcity. What is really needed is a full scale risk analysis (which I am confident Shaffer would agree with). But this should be one in which the risk preferences of the decision maker (the BC government acting as agent for BC citizens) are incorporated. Depending on these risk preferences, it may indeed make sense for the BC Energy Plan to call also for additional 'insurance power' to be developed within BC to decrease the risk of extremely high electricity prices during periods of regionally tight electricity markets – and perhaps to avoid unplanned curtailments as California experienced less than a decade ago.

But Shaffer is also critical of the Energy Plan's requirement for 'insurance power.' I agree with Shaffer that the cost of this 'insurance' is the difference between the price BC Hydro pays for IPP contracts that ensure its right to this power and the value Hydro gets from reselling the contracted power in short-term contracts when it is not needed – which should be most of the time. (The power will not be consumed in BC except under fairly extreme circumstances of low water combined with unavailability of established BC Hydro or IPP generation capacity.)

Where we differ, however, is in how to determine the 'value' of the insurance – the benefit to weigh against its cost. To Shaffer, its value is very small, because the alternative to holding this domestic surplus capacity is for BC Hydro to instead import low-cost electricity as needed – and the assumption is that this will be readily available at a low price. Thus, the value is determined by the cost of the next best alternative, that being to purchase import power. But Shaffer seems to ignore the significant risk that at the very time this alternative source of insurance is needed, it will not be available, or at least not at a reasonable cost.

I have already shown that the likely source of electricity for import – coal-fired power – may be very high cost because of rapidly tightening climate policy. There is also some probability that the need for this power in BC will coincide with times of very tight markets throughout the region. Low water in BC can be correlated with low water in the US Pacific Northwest. When this happens, spot market prices and short-term contract prices in the region are also likely to rise significantly. And if BC Hydro is mandated, under provincial government climate policy, to not cause rising GHG emissions, whether domestically or in neighbouring jurisdictions, BC Hydro will be bidding for extremely scarce small-scale renewables power at extremely high prices.¹³ Thus, while Shaffer emphasizes the risks that BC Hydro will be stuck selling contracted power at low rates in the short-term market some of the time, a proper risk analysis would include the likelihood of an upside, namely the probability that BC Hydro might reap huge rewards if it has some surplus 'clean' power to sell during times when prices for such power are extremely high,

¹³ A foreshadowing of this outcome occurred in California during its electricity crisis in 2001 when a regional and local shortage of electricity led to increased use of natural gas for local electricity generation. This drove up the regional price of natural gas. It also drove up the cost of permits for the NOx emissions from natural gas combustion in Southern California, which further drove up the price of electricity – including electricity purchased from zero-emission alternatives like the hydropower from BC. These tight market conditions were exacerbated at the time by market manipulation, but that continues to be a risk with electricity markets. Since the traumatic experience of its 2001 electricity crisis, surveys have shown that most Californians now express a willingness to pay substantial insurance to avoid such an experience in future.

and is not in a deficit position where it must import extremely high priced coal-fired power. Shaffer ignores this other side of the ledger.

A full risk analysis of this and other possible outcomes is required before one can agree with Shaffer's argument that a strategy of 'insurance power' in BC is not a good one. Independent research consistently shows that modern societies place a very high value on ensuring a secure supply of electricity at a roughly predictable price. And the value of zero-emission electricity is likely to climb significantly over the coming years. With a proper assessment of the uncertainties and risks – and of the risk preferences of British Columbians with respect to electricity supply and prices – the electricity self-sufficiency requirement of the BC Energy Plan, and indeed even the insurance power requirement, may well be the optimal approach from an economic, environmental and risk preference perspective. Shaffer has not provided enough evidence to reject this policy strategy. My guess is that a proper risk assessment would validate it.

2. Discouraging Economically Efficient Electricity Conservation

Shaffer's second paper criticizes the BC Energy Plan because the Heritage Contract sustains BC Hydro's average rates below the cost of new supply, and therefore discourages economically efficient electricity conservation investments and behaviour. The Heritage Contract provides the benefits of BC Hydro's low-cost hydropower assets in perpetuity for its customers, be they existing or new customers. Because BC Hydro is acquiring new supplies (whether from IPPs or eventually from the Site C dam) at a much higher cost, its customers are not facing the true cost of using electricity and are thus undertaking less conservation effort than they otherwise would. This means that BC Hydro must acquire more power than is economically efficient from a societal perspective. Shaffer notes that there is also a distributional issue in that the 'subsidy' is greatest for those who consume the most. In the residential sector, high income customers, who on average consume more electricity than low income customers, receive more of the subsidy. One study cited by Shaffer also shows that industrial customers may get more subsidy than other classes of customers.¹⁴

As an economist, I support the principle behind Shaffer's argument in this paper. From an economic efficiency perspective, and even from an equity point of view, average electricity rates for BC Hydro customers should reflect the cost of new electricity supply. Thus, the best policy might be Shaffer's proposal on page 15 that "the Heritage contract and the low, historic cost-based pricing it entails should be phased out."

But as Shaffer would know better than most, an ideal policy like this can be very difficult to implement for political reasons. For several years under the NDP government in the 1990s, Shaffer led the Crown Corporations Secretariat, an agency whose mandate was to assist the provincial cabinet in maximizing the value to the province from its publicly owned corporations, BC Hydro being the most important of these. No bureaucrat in the province was better positioned to convince politicians to implement the policy that Shaffer is today critical of the current BC government for not implementing. There are obvious lessons to be learned from the fact that he was not able to get this policy implemented when he was in a key advisory role.

¹⁴ The evidence Shaffer takes from this study does not accord with my experience as a utility regulator in BC for five years. After expert analysis and testimony at rate design hearings, we adjusted rates to each customer class to reflect the relative costs that each caused the system. Of course, rates could get somewhat out of line between rate design hearings and remain that way while adjustments were gradually phased in after a subsequent hearing. The misalignment shown by Shaffer may be due to the long period between rate design hearings that resulted from the NDP decision to restrict BCUC pricing oversight of Hydro until it applied for a rate increase.

In particular, it is very difficult for politicians to convince large segments of the public that raising electricity rates will be in their long-term interest and indeed will be compensated by tax decreases or improved government services. The political costs far exceed the political benefits. Also, as Shaffer points out, the BC industrial sector has evolved to take advantage of low average electricity prices. Raising these prices will probably force some electricity-intensive industries to contract production or even shut down, with devastating impacts for industry-dependent communities. Again, politicians are faced with the difficult job of trying to convince those who are most directly harmed by the policy that the overall benefits exceed their costs, however concentrated these costs might be for some.

If Shaffer and I both agree in principle with a policy of raising BC Hydro average rates to reflect the cost of new supply, where we seem to disagree is on the extent of the harm from not implementing this policy. This is a critical question because if there is some alternative regulatory policy that might achieve an approximately equal level of consumption and conservation, without the politically impossible ‘raising of average rates,’ and if government is implementing that policy, then Shaffer’s criticism becomes moot.

And there is such a regulatory policy, indeed one that has been around for a very long time. It is called ‘non-linear rates.’ This a standard utility rate design in which marginal rates are set to reflect the utility’s marginal cost of power (new generation investments or new IPP supply contracts) while so-called ‘infra-marginal rates’ (fixed demand charges, rates for off-peak consumption, rates for initial blocks of consumption) are set so that in total the utility earns only enough money to cover its average costs, including a return on equity commensurate with its risk profile.

Non-linear rates were initiated early in the 20th century and refined over time by public utility regulators with guidance from economists. They were developed in the case of ‘strong natural monopolies,’ meaning that the costs of new supply were less than average costs for the utilities. But the approach is equally applicable to ‘weak natural monopolies,’ like BC Hydro today, in which the costs of new supply are higher than average costs.¹⁵ In the BC Energy Plan, the government directed BC Hydro and its regulator, the BCUC, to implement non-linear pricing (a two-tiered rate structure) first for industrial customers but eventually for all customers. In other words, the government recognized the problem Shaffer has identified and implemented a policy to address it. The important issue, therefore, is how effective this policy is likely to be.

Shaffer seems to understand that BC Hydro’s establishment of a two-tiered rate structure for industrial customers is an application of this long-standing regulatory rate design practice, whose goal is to establish a ‘second-best’ pricing regime that closely approximates the consumption outcome that would occur under a ‘first-best’ pricing regime – one in which every unit of consumption was priced at marginal cost. In BC Hydro’s two-tiered structure, the final 10% of an industrial customer’s consumption should be priced at BC Hydro’s cost of new supply while the rate for the remaining 90% should be set to ensure that the total bill payments of the industrial customer equal the total cost of providing them with service.

But, in spite of this apparent understanding, Shaffer makes statements that suggest some misunderstanding of two-tier pricing. For example, on page 7 he says, “A potential new industrial customer, for example, will evaluate the economics of its project and the relative merits of any process alternatives that affect electric intensity, on the assumption that electricity costs 3.63 cents per kWh.” The whole point of non-linear pricing is to give the customer a clear incentive to ‘evaluate the relative merits

¹⁵ For an excellent review of the theory and empirical research, see S. Berg and J. Tschirhart, *Natural Monopoly Regulation* (Cambridge: Cambridge University Press) 1988 – especially chapter 4, “Efficiency with non-linear prices.”

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of process alternatives at the marginal price rather than the average price.’ Under the two-tiered rates of BC Hydro, this consideration of efficiency will occur with new plants as well.

To estimate the effect on demand of a shift to marginal cost pricing of all electricity for industrial customers, Shaffer then ignores the effect of the non-linear rates and simply assumes that all electricity to industrial customers is sold at the average rate. To this rate, he applies what appears to be an upward-biased price elasticity estimate to show that there would be a great reduction in industrial electricity demand if his policy were implemented, thus reducing the need for new IPP power.

Shaffer takes an electricity own-price elasticity value from a single study suggesting that it may be greater than -1.0 for industrial customers and concludes that a shift to marginal rates in BC would halve industrial electricity demand. His selection of this value reflects bias in my view. BC Hydro uses a value of -.28 for industry. The recognized world leader in surveying energy elasticity estimates is C. Dahl at the University of Colorado.¹⁶ Her most recent update of OECD elasticity studies since 1992 provides a mean long-run elasticity value for industrial electricity use of -.56 and a mean value of -.32 for all consumption of electricity (this is a summary of 44 studies, so is not focused on Canada or BC). My own research, focused explicitly on Canadian industrial electricity use (latest article is under review), indicates a value of -.2 for the long-run electricity own-price elasticity.¹⁷ In any case, the high price tier of Hydro’s new tariffs should result in the efficient level of electricity conservation, whatever that true elasticity value is.

In conclusion, Shaffer criticizes the Energy Plan because it does not force BC Hydro customers to purchase all their electricity at the high cost of new power, especially power from new, small-scale, renewables projects by IPPs. He argues that the current pricing regime leads to excessive electricity consumption, thus working in opposition to the government’s conservation goals. I concur that this can be the outcome, but the extent of the inefficiency depends on the extent to which this ‘first-best solution’ diverges – in terms of the consumption level of each customer – from the ‘second-best solution,’ in which the non-linear price reforms demanded by the Energy Plan are successfully implemented by BC Hydro and its regulator, the BCUC.

Shaffer ignores the extensive literature on the long history of applied regulatory experience with non-linear pricing. Any standard text surveying this literature shows that non-linear pricing rate designs can lead to consumption levels that are close to those that would occur under full marginal cost pricing. There has been much success with this regulatory approach over many decades. From a political realism perspective, one can easily argue that a more fruitful strategy than Shaffer’s would be for the BC government and those involved in the electricity regulatory process in this province to work toward effective implementation, for all customer groups, of this economically attractive regulatory development initiated by the BC Energy Plan – rather than complaining about the non-implementation of a policy that neither left-of-centre nor right-of-centre political parties have been able to deliver in BC or jurisdictions with similar conditions, such as Manitoba and Quebec.

¹⁶ C. Dahl and C. Roman, 2004. “Energy demand elasticities: fact or fiction? A survey update.” In: *Energy, Environment and Economics in a New Era*, 24th Annual North American Conference of the United States and International Association for Energy Economics (USAEE/IAEE), Washington, DC. July 7-10.

¹⁷ C. Bataille and M. Jaccard, 2008. “Greenhouse gas and energy price elasticities using a hybrid top-down, bottom-up model,” Paper under review – *Energy Economics*. An earlier published article using the same methodology is M. Jaccard and C. Bataille, “Estimating future elasticities of substitution for the rebound debate,” *Energy Policy* V28, 2000, 451-455.

3. Forces BC Hydro to Acquire High-Cost, Small-Scale Renewables of Low Value

Shaffer's third paper criticizes the BC Energy Plan because it will 'force' BC Hydro to acquire low value / high cost resources, in particular small-scale hydropower and windpower projects developed by IPPs in BC. He claims that such projects, as intermittent generators dependent on uncertain flows of water and wind, offer little in the way of dependable electricity. He also claims that the generation from small hydropower projects will be correlated with times when BC Hydro's system will have full reservoirs and excess electricity generation capacity, so the value to BC Hydro of small hydropower will be particularly low.

I first note that the title of this third paper is misleading. The title – “Is the Energy Plan really green?” – leads one to assume that this paper will provide evidence to show that the energy projects more likely to result from the Energy Plan may not be as environmentally desirable as some alternative that might otherwise have been pursued. But this is not the case. The paper provides no comparative evidence about the environmental impacts and risks of alternative types of electricity generation projects and makes only a passing comment that run-of-river hydropower projects and windpower projects, along with the additional transmission lines they require, (page 5) “can have significant cumulative land use and resource conflicts.” These are listed briefly on half of page 11, the only discussion of environmental impacts. Shaffer's sub-title is more appropriate as the sole title for the paper – “The Supply Side: Targeting Low Value / High Cost Resources” – since this is what he focuses on.

As would any independent energy analyst, I agree with Shaffer that small-scale renewables are not as unequivocally attractive as some of their advocates tend to claim. In my book, *Sustainable Fossil Fuels* (referenced above), I devoted 30 pages to explaining the challenges posed by the fact that most small-scale, renewable sources of energy are characterized by low energy density, intermittency and remoteness, which increases their costs and decreases their value as sources of energy for human use. I also explained how these sources can have substantial environmental and social impacts, ranging from the air emissions of biomass combustion to the land use conflicts associated with windpower, small-scale hydropower, the growing of crops for fuels, and so on.

So, while Shaffer's third paper tells an energy analyst nothing they do not already know, the paper nonetheless provides a useful service to the extent that it shows especially how the value of run-of-river hydropower in BC is somewhat compromised by the fact that the seasonal generation profile of this resource closely matches that of BC Hydro's existing large-scale hydropower system. In brief, much of the energy from run-of-river hydro is provided to BC Hydro just when Hydro needs it least. And I therefore agree with Shaffer that BC Hydro should be engaged in carefully estimating the most likely value of these supply sources in comparison to its alternatives.

But where I cannot agree with Shaffer is in his strong language claiming that the Energy Plan 'forces' BC Hydro to acquire these resources even if they are inferior to its other options. I do not find evidence for such a 'requirement' in the Energy Plan. To explain, I must provide some quotes, including an extensive one from the Energy Plan itself.

Although Shaffer's third paper is only about 8 pages of text, he nonetheless quotes the same part of a phrase from the Energy Plan twice in the first three pages. But in both cases, he substitutes his own strong words at the beginning of the quote, rather than using the full quote. The strong words he inserts are 'requires' and 'directs.' According to Shaffer, the Energy plan “directs” or “requires” (page 5 and 7) BC Hydro to “further recognize the value of intermittent resources such as run-of-river and wind ... and examine ways to increase the amount of firm energy calculated from [those] resources.” And in a similar

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statement earlier in the text (page 5) he says the Energy Plan “will force BC Hydro to acquire low value, high cost resources to meet the inflated requirements.”

But the full paragraph from which Shaffer selects the quote says something very different than how it sounds when he uses his own strong words to introduce only a part of one phrase of the paragraph. Here is the full paragraph from page 15 of the Energy Plan. Interestingly, the title of the paragraph is “Ensure Electricity is Secured at Competitive Prices.”

“One practical way to keep rates down is to ensure utilities have effective processes for securing competitively priced power. As part of the BC Energy Plan, government will work with BC Hydro and parties involved to continue to improve the Call for Tender process for acquiring new generation. Fair treatment of both buyers and sellers of electricity will facilitate a robust and competitive procurement process. Government and BC Hydro will also look for ways to further recognize the value of intermittent resources, such as run-of-river and wind, in the acquisition process – which means that BC Hydro will examine ways to value separate projects together to increase the amount of firm energy calculated from the resources.”

As one can see from the full quote, the Energy Plan does not ‘direct,’ ‘require’ or ‘force’ BC Hydro to ‘acquire’ electricity supply from run-of-river or windpower. What it simply says is that the government and BC Hydro will be careful to make sure, when assessing a slate of small-scale renewables projects and comparing them to other options, to be fair in giving credit where credit is due. If a group of such projects, when considered collectively, has a high probability of providing a certain amount of firm energy, Hydro, in fairness, should give them credit for that – when it compares these to its other options and decides if it should acquire any of them via long-term contract. Nowhere does the Energy Plan actually ‘direct Hydro to acquire these resources.’

In fact, the message throughout the Energy Plan is just the opposite of mandating the acquisition of specific resources. Frequently it says that BC Hydro should choose the resources that are best in a fair and competitive bidding process – as in the above quote. This means that BC Hydro is not forced to acquire run-of-river projects. The Energy Plan leaves Hydro with many options and it can turn to any of these if it feels they provide better value when financial, environmental and social factors are all considered.

BC Hydro can opt for IPP projects that add cogeneration to existing natural gas use. Hydro can accept other small-scale renewables that provide firm energy, like biomass combustion. Hydro can accept landfill gas and solid waste combustion projects. Hydro can accept small-scale hydropower projects that provide storage via modest sized reservoirs. Hydro can accept a coal generation project involving carbon capture and storage for enhanced oil recovery, which may soon emerge as a proposal in the north-east. Hydro can tell the government that it wishes to proceed with its own development and ownership of the Site C project, with the cabinet of course making the final decision on such a major public investment. Hydro can tell the government that the new supply cost information has convinced it to push beyond the Energy Plan’s demand-side management target of 50% (as it recently did). With new information on the cost of new electricity supply, Hydro can apply to the BCUC (as it recently did) for a rate increase in the high price block of its two-tiered rate structure, which will create a greater incentive for energy efficiency.

The only option the Energy Plan expressly prevents BC Hydro from pursuing is to build or contract for power from a nuclear plant in BC. All the other options being considered in other jurisdictions around the world are there: small renewables, large hydropower, waste-to-energy, greater effort at energy efficiency, natural gas with cogeneration, and coal with carbon capture and storage. In this regard, the process in BC in terms of competitive resource acquisition looks similar to that in most other jurisdictions in OECD

countries. Most other jurisdictions, for example, are wrestling with how to determine the true value to the system from small-scale renewables, especially as these increase in importance as part of a universal strategy to promote GHG-free electricity sources. In that regard, the BC Energy Plan appears to provide one of the better policy approaches. While various jurisdictions have mandated specific amounts of wind generation (Quebec) and solar electricity (Ontario), the BC Energy Plan repeatedly calls on BC Hydro and its BCUC regulator to make sure that only the best resources from a multiple accounts perspective are selected. In spite of Shaffer's selective use of partial quotes, there is no direction in the BC Energy Plan requiring BC Hydro to acquire small-scale renewables if these are an inferior option relative to its many alternatives.

And because no option is perfect, good decision-making requires that all options be considered in comparison to the others, including electricity efficiency. On page 10 Shaffer says "Whether Site C is a good project to develop will have to be assessed on its own merits." This suggests a process in which each option is looked at in isolation, resulting in a simple yes or no decision. But the yes decision is only legitimate if other options have been considered in concert and found to be less attractive in a multiple accounts framework. The same goes for the no decision. Options (including electricity efficiency) are selected because they are better than the alternatives, not just on an individual assessment of 'their own merits.'

Indeed, this question about which resources are optimal for BC Hydro ratepayers and BC citizens reflects back on the issue Shaffer would have dealt with had this third paper reflected its title. Scientists today are almost completely unified in saying that climate change is an enormous risk whose impacts will affect every ecosystem and human on the planet. Its solution involves shifting to zero-emission technologies and behaviours, especially with respect to our use of energy. Analysis consistently shows that a shift toward zero-emission electricity is one of the least expensive technological changes to reduce GHG emissions. This does not mean this is a cheap option. But it means that it is one of the least expensive, suggesting that there are unlikely to be other actions (some call these 'offsets') that society can do as an alternative to a wholesale shift toward zero-emission electricity.

All the zero-emission options have their unique local and regional impacts and risks, whether the option is nuclear power, zero-emission use of fossil fuels or large- and small-scale renewables. What societies have to assess, however, is the extent to which these local impacts are acceptable given the necessity of addressing the global risk, which in turn will cause local impacts everywhere on the planet, including in the ecosystems that would be affected by small renewables projects. Thus, it is insufficient to point out that small-scale renewables have local environmental and social impacts here in BC. This is obvious. What is critical is how these local impacts might compare with the other local impacts in BC from climate change – and, more importantly, with the aggregate risks to people and ecosystems around the planet.

For Shaffer to answer the question his title posed – "Is the Energy Plan really green?" – he would need to do this kind of trade-off or comparative analysis, even if only in a rudimentary way as befits a short report of this kind. This is a common activity in energy system analysis. In *Sustainable Fossil Fuels*, I devote the 50 pages of chapter 7 to this critical step (the chapter title is *Sustainable energy choices: comparing the options*.) I conclude that in spite of their sometimes high cost and high local impacts, small-scale renewables like hydropower and windpower are likely to grow rapidly in importance in most jurisdictions when compared to the alternatives of large hydropower, nuclear and zero-emission use of fossil fuels – especially in the electricity sector where zero-emission technologies have the best prospects for rapid penetration.

When making this comparison of our energy options, it is important to look at all the key dimensions of impacts and risks. Shaffer should agree with this, as indicated by his concluding statement (page 15) that BC Hydro should “develop or acquire the best sources of new supply, in the best possible manner, taking all economic, environmental and social factors into account.” And when comparing small-scale projects, like run-of-river hydropower with large hydropower, this multiple accounts evaluation would include attributes like the distribution in time and space of positive and negative socio-economic impacts. Indeed, while Shaffer does not refer to these characteristics in his 2007 report, he discussed them in some detail in a consulting report back in 1987 when assessing the likely benefits and costs of potential small hydro in BC in comparison to the proposed Site C dam. In that report’s Executive Summary he says:

“Given the economic advantages of small scale, short lead time projects, these sites could well be competitive with BC Hydro’s potential Site C project. ...the estimates do indicate that the economic impacts of small hydro development could be substantial. Comparison with similar economic impact estimates developed by BC Hydro for the Site C project indicate that small hydro would generate higher income and employment per MW of capacity than very large hydro projects. Small hydro projects would also be more geographically dispersed and more evenly spread out over time than larger projects, thus resulting in a broader distribution of employment opportunities and more stable economic growth which does not strain the labour, goods and service capabilities of local and provincial economies.”¹⁸

Shaffer may have changed his mind about the relative merits of small-scale renewables in comparison to a large hydropower project like Site C. There is nothing wrong with this, as there are many years of new evidence to consider. But it is somewhat troubling that in a paper that purports to assess the key benefits and costs of small-scale renewables, partly in comparison to a large-scale alternative like the Site C dam, Shaffer never mentions the very factors he flagged in 1987 for their importance. The geographical dispersion, the smoothing of investment over time, and the smaller financial risk are factors that are just as valid today as they were 20 years ago.

BC Hydro may soon decide to push ahead with the Site C dam. At that point, we will quickly learn more about the past concerns for its environmental impacts and risks, and its cost estimate is likely to be revised upward dramatically, given the rapid increase in construction costs around the world over the past two years – and almost a doubling of construction costs in neighbouring Alberta. When this occurs, the relative merits of small-scale projects may also have to be re-evaluated. The important lesson, however, is to avoid looking at the negative aspects of just one of the options, but instead to fairly consider all negatives and positives of all key options at the same time. Shaffer’s paper does not do this. But the Energy Plan sets a policy direction that improves the chances that British Columbia will continue to do this better than most other jurisdictions.

4. Concluding Comment

In three separate papers within his report, Shaffer presents three major criticisms of the BC Energy Plan. His overall conclusion (page 15 of the third paper) is that “the province’s 2007 Energy Plan is designed more than anything else to augment and distort the market for IPP electricity supply.”

In reviewing each of the three papers, I find that I am unable to agree with some of the evidence Shaffer provides and especially with the conclusions he draws. In the first paper, he claims that the Energy Plan requirement for electricity self-sufficiency in BC by 2016 and for the acquisition of additional ‘insurance

¹⁸ M. Shaffer and Associates and Sigma Engineering, *Electricity Deregulation and Small Hydro: A Preliminary Assessment*, Consulting report to Energy, Mines and Resources of Canada, 1987.

power' by 2025 (along with the requirement to favour 'clean electricity sources' for 90% of domestic supply) will lead to higher than necessary costs to BC Hydro, higher than necessary rates for BC Hydro's customers, and an inflated demand for domestic IPP production. The evidence suggests, however, that one can only reach this conclusion by ignoring the clear and substantial risk of sustained high prices for electricity from fossil fuel combustion over the coming decades for reasons of scarcity and climate concern. When these risks are incorporated, along with provincial, national, North American and global requirements to reduce GHG emissions, then the self-sufficiency and perhaps even the insurance policy are likely to prove advantageous from a financial and environmental perspective. I agree with Shaffer that more risk analysis of this issue is desirable.

In the second paper, Shaffer claims that the failure to charge BC customers the high price of new power for all of their electricity consumption leads again to higher than necessary domestic electricity consumption and therefore higher than necessary demand for new IPP facilities in the province. However, Shaffer fails to assess the likely effect of the Energy Plan's thrust toward non-linear pricing, a mechanism to get the right price signals to customers for the critical part of their consumption that is amenable to greater efforts at electricity efficiency. A long history of empirical studies of utility regulation suggests that this policy may achieve the outcome Shaffer says is desirable, which would render his critique moot.

In the third paper, Shaffer claims that the BC Energy Plan requires BC Hydro to acquire run-of-river and windpower electricity from IPPs, even though this power is of high cost and low value. One can only draw this conclusion, however, by taking a partial quote in the Energy Plan out of context. Returned to its original context, the full quote simply says that BC Hydro will endeavor to assess fairly its many options for clean power in terms of their full value. Moreover, in a full comparative, risk-based analysis of BC's energy options, these IPP resources are likely to prove much more valuable than Shaffer suggests.

Appendix 1 – Abridged CV of Mark Jaccard

Bachelors of Arts, Simon Fraser University, 1978.

Masters of Resource Management, Simon Fraser University, 1984.

Doctorate of Energy Economics, Institute of Energy Economics and Policy, University of Grenoble (now called Universite Pierre Mendez-France), 1987.

Professor, School of Resource and Environmental Management, Simon Fraser University, 1986 – present.

Panel Member, Blue Ribbon Panel of the Royal Society of Canada on Canadian Options for Greenhouse Gas Emission Reductions, 1992.

Chair and CEO, BC Utilities Commission, 1992-1997.

Chair, BC Utilities Commission Electricity Market Review, 1995.

Chair, BC Public Inquiry on Gasoline Pricing, 1996.

Chair, BC Task Force on Electricity Market Reform, 1997-1998.

Lead Author, Intergovernmental Panel on Climate Change, Second Assessment Report, 1993-1996.

International Member, Energy Technologies and Strategies Working Group, China Council for International Cooperation on Environment and Development, 1996-2002.

Editorial Board Member, The Energy Journal, 1997 – present.

Editorial Board Member, Energy Studies Review, 2001 – present.

Top Policy Book in Canada awarded by the National Policy Research Institute for The Cost of Climate Policy (University of BC Press, 2002).

Editorial Board Member, International Journal of Energy Sector Management, 2006 – present.

Top Policy Book in Canada awarded by the Donner Foundation for Sustainable Fossil Fuels (Cambridge University Press, 2006).

Panel Member, National Roundtable on the Environment and the Economy, 2006 – present.

Simon Fraser University Outstanding Alumni Award, 2007

Nobel Peace Prize, awarded in 2007 as a contributing author to the Intergovernmental Panel on Climate Change.

British Columbia 2008 Academic of the Year, awarded by the Confederation of University Faculty Associations of BC

Convening Lead Author for Policy, Global Energy Assessment, 2007 – present.

Special Advisor, BC Climate Action Team, 2008.

Publications: Over 90 publications in peer-reviewed academic journals.

Appendix 2 – Clauses of Contract between Mark Jaccard and IPPBC

Purpose of the Review

Independent power producers are responding to the British Columbia Government's Energy Plan directives with respect to the development of additional electric generation facilities by BC Hydro and private power producers sufficient to meet growing consumer demand, return the province to energy self-sufficiency and help to meet the Government's greenhouse gas reduction goals.

There has been strong opposition to the Energy Plan and to private power production from public sector unions in B.C. and from the B.C. New Democratic Party. The rationale for that opposition has been drawn largely from two publications: *Liquid Gold*, authored by John Calvert, and *Lost in Transmission*, authored by Marvin Shaffer.

The Independent Power Producers Association of B.C. (IPPBC), the organization representing the majority of private power producers in British Columbia, has requested a proposal from Professor Mark Jaccard to conduct an independent peer review of the Calvert and Shaffer documents. The results of that review are to be made available to the general public.

Scope of Work

The review will focus on the key elements of the arguments against private power production which would include the following but not to the exclusion of other subjects at the discretion of Professor Jaccard:

BC's power requirements have been exaggerated in order to artificially increase the market for private power.

The potential for the reduction of power demand through conservation has been underestimated.

It is more cost-effective for BC Hydro to import and store power than to purchase power from domestic, private producers.

BC Hydro can produce renewable power more efficiently and at lower cost to ratepayers than can private producers.

Deliverables

Professor Jaccard will prepare a written document which provides a peer review and critique of the essential issues identified in the Scope of Work as they are characterized in the two publications: *Liquid Gold* and *Lost in Transmission*.

The review will be completed by June 1, 2008.

Professor Jaccard will be available to the news media and to selected interest groups to discuss the results of the review.

Important Contract Provision

IPPBC requests this independent peer review from Professor Jaccard with the understanding that his analysis and conclusions may be counter to the interests of the IPPBC. Moreover, the IPPBC is not entitled to review and comment on any drafts of Professor Jaccard's report in advance of its public release.