



# **B.C. Electricity Market Reform**

## **Policy Recommendations**



**Submitted to the**

**B.C. Energy Policy Development Task Force**  
**by the**

**Independent Power Association of British Columbia**  
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**Foreword**

This paper is submitted to the B.C. Energy Policy Development Task Force to assist in creating electricity policy by providing the perspective of the Independent Power Association of B.C. ("IPABC").

The IPABC has focussed this paper primarily on the fundamentals of market structure and transmission access.

This paper secondarily addresses some other specific issues and makes recommendations that will increase the attractiveness of investing in new independent power production ("IPP") projects in B.C.

## 1.0 Executive Summary

The simplest summary of the IPABC's recommended electricity market structure is: **"More buyers and better access to wires"**. The result will be a larger, vibrant and competitive IPP industry which will provide significant benefits to consumers, governments and private industry.

To achieve this, however, private electricity generators must have fair access to domestic and export markets and fair and open access to transmission and distribution wires to move their product from generation to the point of consumption. Further, BC Hydro must be divided into its three functional areas: generation, transmission and distribution.

The IPABC supports the new government's stated general electricity and IPP-related policies and goals and makes the following specific recommendations which will ensure that substantial new IPP generation investment takes place.

Three fundamental policy changes are required.

### 1. **Improve open access to transmission wires.**

Establish an independent, crown owned and regulated transmission company that would:

- Avoid conflicts by not owning generation or distribution facilities.
- Operate as a common carrier to provide domestic and export services.
- Maintain adequate transmission capacity
- Provide clear and frequent information on matters such as existing capacity, usage and planned expansions.
- Maintain a postage stamp tariff
- Provide locational credits for new generating sites that would enhance system efficiency or minimize new transmission requirements.
- Calculate system losses for new generation on an actual basis.
- Charge the cost of transmission lines which primarily serve very large hydro electric projects to these projects.

No single entity would be allowed to monopolize the existing firm transmission capacity for export.

### 2. **Establish a more competitive wholesale generation market.**

Increase the number of electricity buyers by:

- Establishing an independent, crown owned and regulated, distribution company, or possibly more than one, which would buy electricity directly from IPPs.
- Enable industrials and commercial users to have the choice of buying electricity directly from IPPs.

The distribution company or companies would flow the benefit of B.C.'s legacy generation "entitlement" and corresponding transmission "entitlement" to all B.C. electricity consumers.

BC Hydro would continue to own and manage its existing generating facilities and the sale of electricity from those facilities. These facilities are stated to be capable of producing approximately 53,000 GWh of electricity per year compared to approximately 4,000 GWh of current B.C. IPP generation (less than 8%).

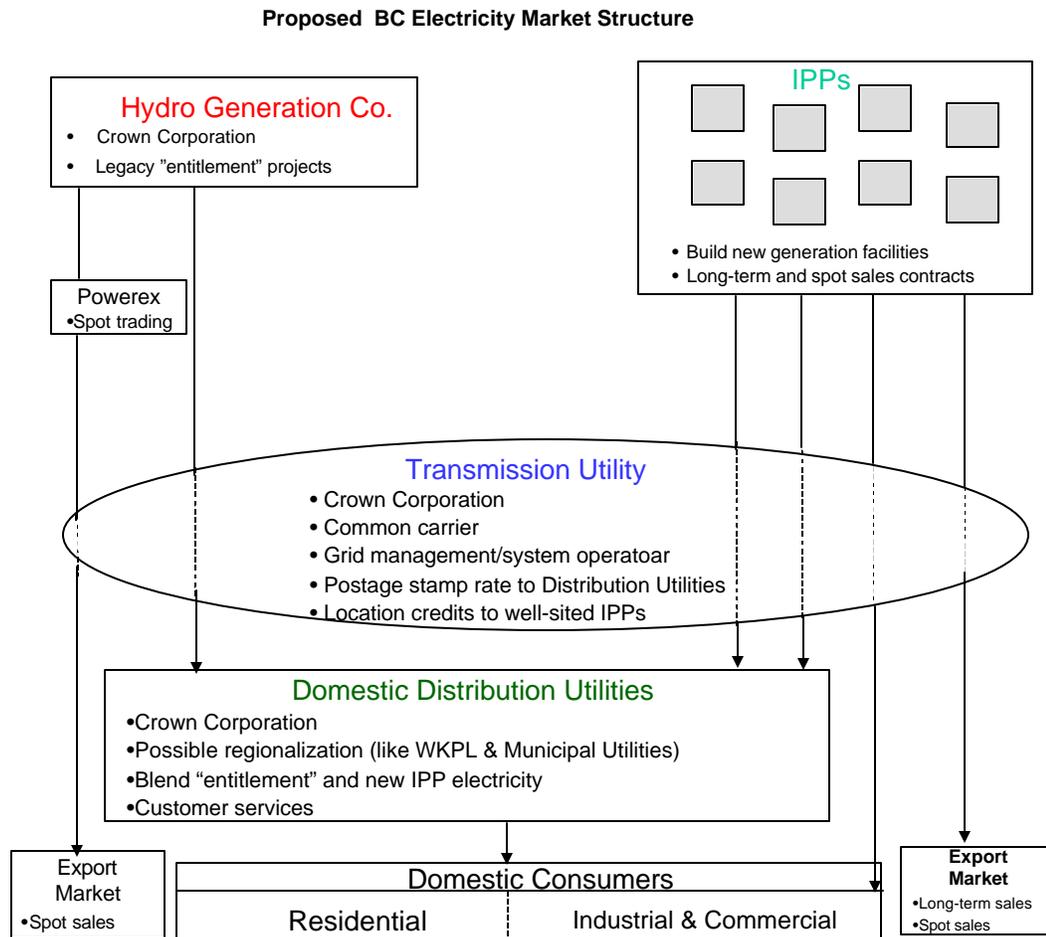
All new generation would be developed by IPPs until BC Hydro's dominant share of total generation decreased to a level where a truly competitive market could exist.

**3. Regulation should emulate market principles as much as possible.**

The B.C. Utilities Commission (“BCUC”) should be restructured and upgraded to:

- Regulate the transmission and distribution companies and the price for entitlement generation.
- Provide an overview of the demand/supply balance and conduct market surveillance services.

The proposed market structure would appear as follows:



The several lines running down the right hand of the above structure show that IPPs would have the opportunity to sell to different buyers including; the domestic distribution utility(s), or to an industrial or commercial consumer, or to the export market. Under the current market structure an IPP can only practically sell to one buyer - BC Hydro. Also, by making the transmission utility independent and not owning any generating or distribution interests, IPPs will receive non-discriminatory transmission service, so their electricity can be carried to the buyer they choose. The structure provides the prerequisites for a competitive industry: more buyers and better access to wires.

The IPABC also recommends that the B.C. Government:

- ◆ Become directly involved in structuring RTO West.
- ◆ Create a comprehensive green electricity policy which would value low environmental impact and renewability.
- ◆ Continue to implement its recently announced plan to reduce the backlog of Water License applications by 90% in 2 years
- ◆ Encourage the distribution company(s) to implement net metering.
- ◆ Convene a forum to discuss the pros and cons of establishing a market hub to further increase the number of wholesale buyers and sellers.
- ◆ Direct the transmission and distribution companies to improve the interconnection procedures with IPP generators by:
  - Updating interconnection standards
  - Providing a more streamlined, transparent and disciplined transmission study process.

If the policies recommended in this report are adopted, **private sector investment in new generation in B.C. could exceed \$1 billion over the next 5 years.** This will generate significant employment, supply security, new businesses, tax revenue and technical innovation. B.C. would add more value to existing energy resources without increasing the Province's debt or using subsidies.

### 2.0 Overview of the IPABC

The Independent Power Association of British Columbia (IPABC) is an industry organization representing approximately 60 companies and individuals engaged in, or associated with, the development of electricity generation projects.

Members have successfully developed and operate many different types of electricity generating facilities including natural gas-fired thermal projects, run-of-river-hydro projects, wood-waste fueled projects and geothermal projects. Collectively, IPABC member companies have assets totaling over \$20 billion, and invest approximately \$1 billion each year in new generating facilities all around the world.

The IPABC membership also includes financial institutions, equipment manufacturers and service providers such as engineering, environmental, accounting and law firms.

The IPABC has been in existence for over 10 years and is similar to other private power organizations in North America and throughout the world. During this period, the IPABC has endeavored to create a policy and regulatory framework in British Columbia that supports the participation of independent generating projects to meet B.C.'s growing electricity requirements. As a result, a number of independent power projects have been developed and are currently operating in the province.

The IPABC believes there is a significant need for present and future additional generation in British Columbia and that the private sector can best put this in place. B.C. is an energy rich province and the generation should be built here, not elsewhere.

The purpose of this paper is to present to the British Columbia Energy Policy Development Task Force the IPABC's recommended key policy changes and options that will encourage and enhance the development by private enterprise of new, highly efficient, cost effective and environmentally preferable generation for British Columbia.

### 3.0 Guiding Principles

#### 3.1. Government Guiding Principles for Energy Policy

The IPABC fully supports the guiding principles set out by the Government of British Columbia for the development of an energy policy:

1. British Columbians are entitled to continue to benefit from their wise past investments in electricity facilities.
2. Policies must result in a secure, reliable and environmentally sound supply of energy for British Columbia.
3. Policies are to be guided by the consistent application of market forces.
4. Regulation should emulate market principles as much as reasonably possible.
5. Government regulatory services must be efficient and accountable.

The IPABC is confident that policies, developed around these principles, in consultation with stakeholders, can create the conditions necessary for IPPs to invest in B.C. and contribute to B.C.'s future electrical policy goals.

#### 3.2. Government Electricity and Related Policy Statements

The IPABC supports the following electricity policy statements:

From B.C. Liberal's New Era policy platform, that: A B.C. Liberal Government will:

"Encourage job creation from viable, independent power production projects that will increase benefits to consumers through greater competition."

"Restore consumers' right to Hydro rates that are independently set by the BCUC, and not artificially inflated by government interference."

"Oppose the Sumas 2 power project and phase out Burrard Thermal."

From the Minister of Energy and Mines at the Core Services Review at the Open Cabinet on October 24, 2001:

- "We have to foster and maintain competition ... making sure that industry knows we're open for business". "We have to restructure to one-window permitting processes for the mining and electricity industries"

From the Minister of Sustainable Resource Development at the same event:

"We will provide faster approvals to Crown land ... and streamline the (Water Licensing) approval process ... reducing the backlog by 90% in two years"

### 3.3. IPABC Principles and Policy Recommendations

The IPABC recommends that 4 principles be considered in the development of an electricity policy based on accepted market forces:

1. There must be fair, certain and transparent rules that allow all parties to participate on an equal basis.
2. Sellers and buyers must be able to communicate with each other and, with supply/demand information, arrive at a reasonable price for the product.
3. Sellers and buyers must have fair and open access to transmission and distribution facilities.
4. The risk of developing and operating new generation is with the private seller.

Simply stated, private electricity generators and suppliers must have fair access to both domestic and export markets and must have fair and open access to transmission and distribution wires in order to move the product from generation to the point of consumption.

In order to achieve these objectives, the IPABC recommends that the following policies and changes to B.C.'s electrical framework be put in place:

**A. Transmission:** A single crown owned transmission company in B.C. be established and operated as an independent, regulated, common carrier, with a legislative mandate to provide domestic and export transmission services as required by generators and consumers. Almost all of the assets for this company would be provided by BC Hydro and a very small amount leased from Utilicorp Networks Canada/West Kootenay Power.

- A transmission entity, without generation or distribution facilities avoids conflicting internal business interests.
- 'Entitlement' generation would be provided with regulated access to transmission.
- The transmission entity would operate the system on an immediate and long run basis, maintain adequate transmission capacity, oversee all typical operating functions and perform long range planning. It would provide clear and frequent information on matters such as existing capacity and useage, and planned expansions.
- A postage stamp/single rate tariff would be maintained with respect to the use of the transmission system. Transmission lines which primarily serve large hydro electric projects would be for the account of these projects.

- Location credits would be provided to support and promote the siting of generation to enhance system efficiency and eliminate or minimize new transmission requirements. For similar reasons, system losses for new generation would be calculated on an actual basis.
- B. Export Transmission:** No single entity, such as Powerex, would be allowed to monopolize the existing firm transmission capacity for export and everyone should pay the same rate.
- C. Generation:** A more competitive wholesale generation market be established that flows the benefits of B.C.'s electrical generation entitlement to B.C. consumers while ensuring that the private sector provides for the future growth in B.C.'s domestic electrical requirements.
- BC Hydro would continue to own and manage its existing generating facilities and the sale of electricity from those facilities but would be precluded from directly or indirectly participating in the development of new generation, or the replacement of its existing thermal facilities until a competitive wholesale electricity market is established.
  - Industrials and commercial users would be given the choice of buying electricity directly from independent power sources while retaining the benefits of existing hydroelectric generation.
- D. Distribution:** The distribution company, or possibly more than one, would buy electricity directly from IPPs while retaining the benefits of existing hydroelectric generation ("entitlement").
- E. Regulation:** A regulatory body with a clear legislative mandate, (such as a restructured and upgraded BCUC, would be put in place to regulate the transmission and distribution companies. It would also provide an overview of the demand/supply balance and regulate the price for entitlement generation. It may also provide market surveillance services. Regulation should emulate market principles as much as possible.

## 4.0 Reasons for Change

Over the past 25 years, the electric utility industry has been subject to a variety of forces that have resulted in significant changes to what was historically a relatively staid industry. The traditional integrated utility, once considered a natural monopoly combining generation, transmission and distribution, has begun to give way to a system of competitive, multiple suppliers with open access to the transmission systems due to the following global pressures.

### 4.1. Global Pressures for Change

Around the world, the change from the traditional integrated utility model to the separation of functions has been due to the following pressures.

1. **New technology:** The principle cause allowing this change to occur in the area of generation is new generation technologies. Historically, the most economic and reliable way to produce electricity in commercial quantities was to develop large hydroelectric or thermal generating stations. More recently, natural gas fired turbines, small run-of-river hydro, wind power and wood waste fuelled generation has allowed for small-scale generation within the financing capabilities of the private sector to be developed. See Appendix 1.0 for a discussion of the various technologies and their capacity to help meet B.C.'s electricity requirements.
2. **Changing costs and environmental concerns:** If technology changes have allowed for restructuring of the utility industry, the drivers for the change include the increasing cost of electricity provided by large integrated utilities and public concern with the environmental and social impacts of mammoth hydroelectric and thermal projects.
3. **Growth of IPPs and competition:** The IPP industry has grown around the world to meet consumer demand for competitively priced, reliable electricity. In some jurisdictions, IPPs have taken construction and operating risk under contract with a monopoly buyer. In a few jurisdictions, IPPs have carried market risk through the development of merchant plants. Competition ensures that only the most modern, efficient and strategically located plants would secure a place in the market.
4. **De-regulation and regional trading:** To increase competition many countries, states and provinces have unbundled the traditional vertically integrated utilities into separate companies for transmission, distribution and generation. To better utilize fixed assets through fitting different seasonal and daily loads cross-regional trading, has increased. In the U.S., the Federal Energy Regulatory Commission ("FERC"), has pushed for more competition and trade through requiring open access to transmission

The above pressures have resulted in most jurisdictions moving from heavily regulated structures to competitive markets and open transmission access. The

jurisdictions in which the new market structures have proved successful were characterized by existing adequacy of supply, a mix of generation facilities in both age and fuel type, generator access to transmission and customers, and absence of a single or a few sellers able to influence market control. While B.C. does not currently fit all aspects of this profile, it can make its market more competitive by moving incrementally forward on several fronts.

### 4.2. The British Columbia IPP Potential

The current situation in B.C. presents unique challenges to developing a fully functioning competitive market for IPP investment.

BC Hydro supplies virtually all the existing electricity requirements in this market. Its generation assets were developed some years ago at a low cost relative to today and under a different regulatory regime. They are predominantly hydro-electric facilities and, therefore, do not bear fuel costs comparable with gas turbine or coal-fired generation. And, it is an accepted principle that the benefit of these past investments will continue to flow to British Columbians on an ongoing basis rather than through sale or other monetization of the assets.

Nevertheless, because of its need for additional generation, proximity to Western Canada and Pacific Northwest markets and the availability of a diverse range of energy sources, the IPABC views B.C. as a prime location where taxpayers, consumers and the IPP industry can benefit from greater IPP involvement.

The IPABC has reviewed a number of recent documents pertaining to provincial electrical supply and demand. Conclusions drawn from this work suggest that B.C. requires as much as 7,500 GWh of energy at the present time. The analyses may be found in Appendix 2.0 – B.C. Supply/Demand: Need to Import. If this need for additional generation is met by the government or public sector, debt will accrue to government. The IPABC believes that IPPs can develop the required generating projects efficiently, reliably, and, unlike Crown Corporations, not at taxpayer risk.

Domestic generation and the diversity of energy forms in British Columbia offer an ideal launching pad for a vibrant generation industry tailored to both the domestic and export markets. But to do so, meaningful changes must be made to the B.C. electricity market structure to allow IPPs access to buyers, both export and domestic, and access to the transmission system to get the electricity to them.

**If the policies recommended in this report are adopted, private sector investment in new generation in B.C. could exceed \$1 billion over the next 5 years. This will generate significant employment, supply security, new businesses, tax revenue and technical innovation. B.C. would add more value to existing energy resources without increasing the Province's debt or using subsidies.**

### 4.3. Access to the U.S. Market

B.C.'s domestic market is limited. To encourage more IPPs and especially to not preclude large, efficiently scaled projects being built in B.C., access to other markets is required. Obtaining access to the U.S. market on an ongoing basis will require changes to the B.C. electricity market.

The U.S. FERC has been at the forefront of reforming the U.S. electricity markets. It has used its regulatory authority to open up U.S. transmission system access. The concept is quite simple - if there is open access to the U.S. transmission system, there will be greater competition in the U.S. electricity markets leading to the best-priced supply of electricity.

As an agency of the U.S. Government, FERC's authority does not extend directly into Canada. However, indirectly, it can affect changes in the Canadian electricity market through its role as gatekeeper to the U.S. market. In order to sell electricity into that market on a broad, continuous basis, Canadian generators require a Power Marketing Authorization ("PMA") from FERC. Generally, a generator that also owns transmission must give equal access to third parties on a reciprocal basis.

FERC is refining its initial work in the transmission area through the promotion of Regional Transmission Organizations ("RTOs") to forge the patchwork of U.S. transmission systems into a network of regional organizations thereby creating a transportation system with fewer boundaries and potential bottlenecks, and more competitive electrical markets.

FERC's refinements are spilling over the border as efforts are underway to create a regional transmission organization in the Pacific Northwest known as RTO West. The IPABC understands that BC Hydro and West Kootenay Power intend to participate in RTO West. The IPABC supports this initiative, subject to the full details of this participation, being made well known in advance of any binding commitments being made and the ability to deal with local transmission issues such as location credits, losses, expansion etc. remaining in B.C.

For the B.C. IPP industry, if properly structured, the creation of the RTO could create improved access to transmission capacity for the movement of electricity to the U.S. Whether this access will come about as a consequence of FERC's activities is unclear.

The IPABC urges the Government of British Columbia to become directly involved in the structuring of RTO West in order to ensure equitable access to cross border transmission for British Columbia IPP projects. The IPABC further recommends that, in addition to BC Hydro's representatives, the interests of other British Columbians be represented, including the IPABC and various industry and public interest associations.

## 5.0 Required Improvement of Fundamentals

### 5.1. B.C. Electricity Supply/Demand: Need to Import or Add Generation

As stated earlier, the IPABC's review of available information indicates that B.C. may require as much as 7,500 GWh of additional energy. As an indication of physical-cross border movements, there has been an almost uninterrupted flow of imports into B.C. so far this year.

However, it must be noted that it is almost impossible to be definitive as to the situation due to the lack of necessary information.

Typically, both government and investor-owned electric utility companies, prepare annual forecasts of energy and capacity requirements. Generally, these documents report in considerable detail on the status of the electricity supply and demand. The information is made available to the public and subsequently is reviewed in a public hearing.

This has not been the case recently in British Columbia. This presents a major challenge to public policy makers and a significant barrier to potential investors.

It is crucial to IPP investors and consumers that unbiased analysis and public debate take place on demand and supply needs so that investors can evaluate potential developments knowing that consumers and interest groups are aware of the energy needs. As well, it is essential that IPPs are able to obtain information on the B.C. electricity system so that they can determine the best location for new generation based on the demand in B.C. or elsewhere, and the availability of transmission capacity. Location is a critical factor in the success or failure of new IPP projects.

The IPABC recommends that the relevant entities be required to annually publish detailed supply and demand and transmission system information.

### 5.2. Transmission Capacity

The existing transmission capacity is limited and cannot be increased significantly in the short term due to the long lead times required to construct new facilities. IPP's can reduce or defer the need for new investment in new transmission facilities by building new generation "downstream" of bottlenecks. Ultimately, the upgrading of British Columbia's transmission and distribution systems will be a prerequisite to meeting the increasing needs of the domestic market and to expand opportunities to export to United States.

Appendix 3.0 contains excerpts from BC Hydro's "Transmission and Distribution Capital Plan" and from a US energy publication "Clearing Up". Brief reference is also made to studies done by BC Hydro Grid Operations for BC Hydro Power Supply.

The picture that emerges is that capital expenditures in excess of \$1 billion will have to be made to upgrade the transmission system to facilitate increasing domestic loads and exports.

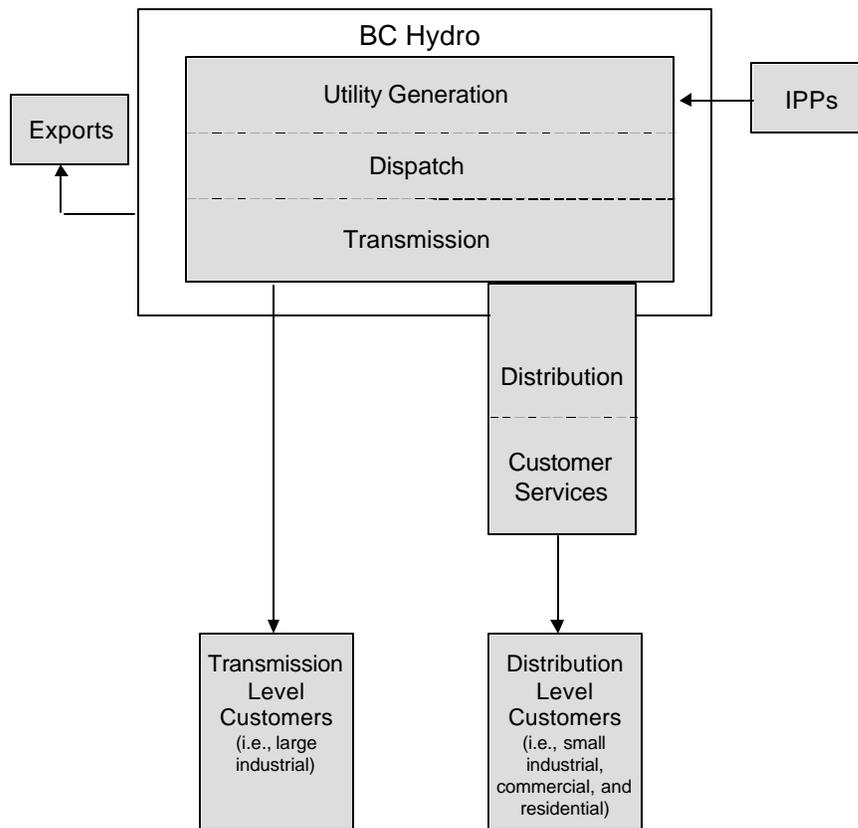
An ancillary issue to the development of new transmission facilities is the allocation of existing facilities. Clearly, domestic requirements have the first priority but with respect to exports, no party, including Powerex, should be able to monopolize the existing scarce space.

## 6.0 Recommended Structural Changes to the B.C. Electricity Market

### 6.1. The Current Structure

The B.C. electric industry is dominated by BC Hydro with UtiliCorp Networks Canada/West Kootenay Power playing a relatively minor role.

Figure 1. Current Structure



This structure served B.C. well during the period of mega-projects construction. Consumers paid for large lumpy capacity additions, often prior to when the generation was needed. The government, and thus taxpayers, were the only entities capable of financing projects of such magnitude.

However, with the advent of new technologies that lend themselves to smaller scale applications financable by the private sector and public objection to mega projects for financial, environmental and social reasons, a new structure is required. The new structure must allow the private sector to take the risk for new generation and ensure that the new generation is the most efficient, economic and environmentally desirable while allowing consumers to benefit from the low cost generation provided by past wise investments.

### **6.2. The Proposed Structure**

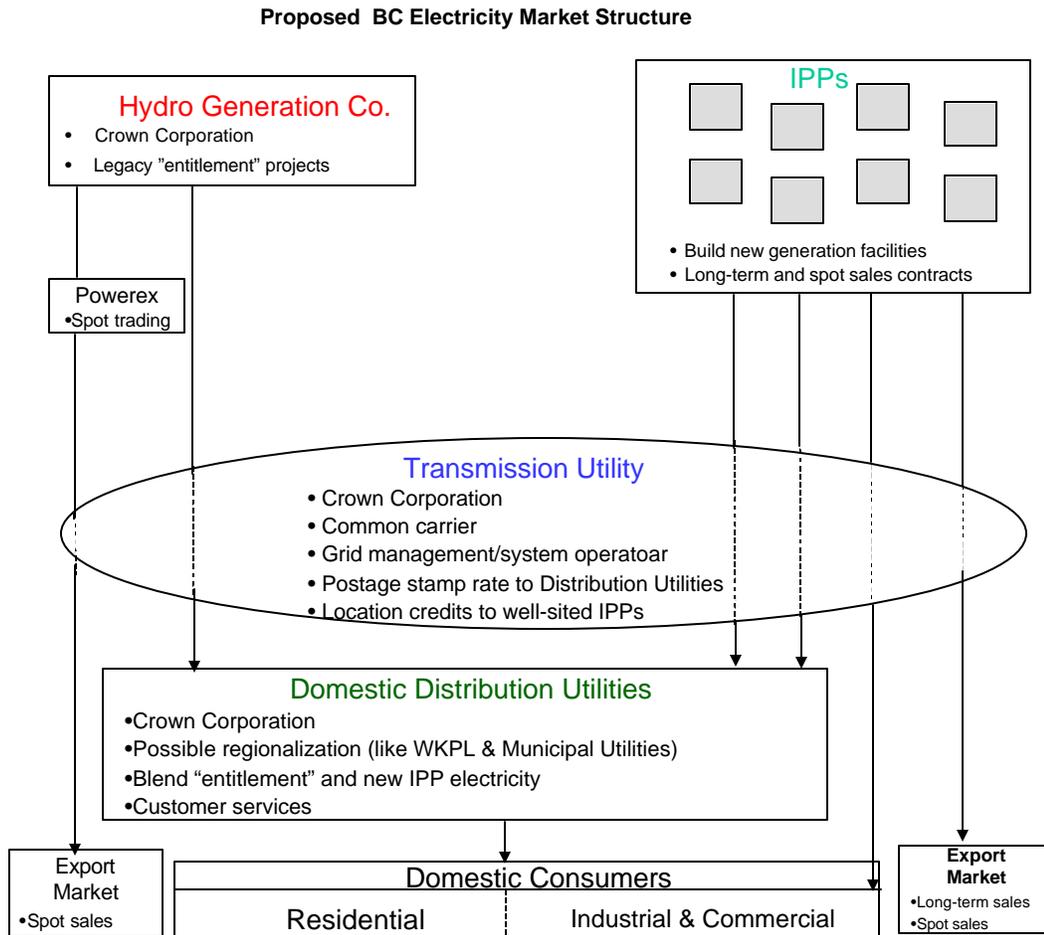
The IPABC recommends that the Energy Policy Development Task Force and the Government of B.C. focus on 3 policy changes in restructuring the electricity market. These are:

Establish a common carrier for all transmission in B.C. and to export markets. Incidentally, a separate distribution company would be created.

Establish a competitive wholesale market to allow the private sector to supply all of BC Hydro's new load growth in B.C. and replacement of thermal generation providing B.C. consumers with entitlement to the benefits of legacy generation and a corresponding transmission entitlement.

Put in place an independent regulator to regulate the transmission and distribution companies and the price for entitlement generation. It would also provide overview of the demand/supply balance and regulate the price for entitlement generation. It may also provide market surveillance services.

Figure 2. Proposed Structure



The several lines running down the right hand of the above structure show that IPPs would have the opportunity to sell to different buyers including; the domestic distribution utility(s), or to an industrial or commercial consumer, or to the export market. Under the current market structure an IPP can only practically sell to one buyer - BC Hydro. Also, by making the transmission utility independent and not owning any generating or distribution interests, IPPs will receive non-discriminatory transmission service, so their electricity can be carried to the buyer they choose. The structure provides the prerequisites for a competitive industry: more buyers and better access to wires.

The IPABC recognizes the uniqueness of B.C.'s large hydroelectric projects especially those with large reservoir storage capacity such as Williston on the Peace River and Mica on the Columbia River. The public policy issues associated with the operation and management of the dams, the generators and the water (e.g. the Columbia Treaty) and environmental impacts, dictate that they remain in public hands. These facilities are not candidates for sale, lease or transfer to the private sector. Retention of this core group of public assets provides the residents of B.C. with added security. The potential upside from the ownership of

these assets such as additional revenue from large snowpacks and storage usage fees will still be available for distribution in B.C.

### 7.0 Transmission

#### 7.1. A Regulated, Common Carrier

A key recommendation of the IPABC is the formation of an independent, regulated, common carrier transmission company. That is the preferred alternative over the creation of an independent system operator for the BC Hydro and West Kootenay transmission assets.

Independent system operators are better suited to jurisdictions where there are a multitude of separately owned private and public transmission systems in a region. Usually, the owners of these systems own generating assets and are in an apparent conflict of interest. Instead of moving the generation or transmission assets into separate entities, the independent system operator is introduced into the mix as the gatekeeper to a number of different systems. In B.C., where almost all the transmission assets are owned by BC Hydro, the IPABC recommends moving these transmission assets into a separate regulated crown entity.

An annual supply/demand forecast for the transmission system, including public hearings, must be initiated.

The IPABC is not opposed to the notion, that at some future date, the transmission company be owned by the private sector. This would allow for the maximum separation between transmission activities and those of the generation assets that would remain under government ownership.

#### 7.2. Tolls & Tariffs

In the days of vertically integrated electric monopolies, very little attention was given to the true cost of building and operating the transmission lines. The generation sites were chosen, the transmission lines built and the costs were passed through to the utility's captive customers. Third parties weren't allowed access to the transmission system so there was no need to set rates that were based on the true cost of third party use.

If IPP generation is to be encouraged, the amount paid by IPPs to use the transmission system has to bear some resemblance to the actual cost. The basic principle should be to utilize the advances in technology and develop generation facilities as close as possible to the demand, thereby reducing the amount of money that has to be invested in the wires and reduce the losses which occur when electricity is transported. These benefits must be reflected in the actual cost IPPs must pay to use the wires.

There are 2 potential ways to improve the postage stamp system of tolls and transmission losses:

1. Produce a system, which is based on the actual costs and losses of transporting electricity. This would recognize, for instance, that the price of transporting electricity from Mica Creek to the U.S. border is different than from Delta to the U.S. border, or
2. Give IPPs that build generation where it is needed a credit for reducing the corresponding costs to the transmission and distribution systems.

The latter is likely the preferred option for B.C.. Its main advantage is that the postage stamp system remains in place providing comfort for electricity customers in regions of the Province such as Vancouver Island, while allowing generation siting decisions to take into account the important factor of location.

### 7.3. RTO West

The IPABC supports the creation of trans-border regional transmission organizations RTOs provided transmission issues that are specific to requirements in B.C. are, and continue to be met, and concerns can be considered in a cost effective and timely manner. It is difficult to provide informed comment on this topic because very little information on the specific details (e.g. agreements, commitments etc.) is publicly available. As potential users of the transmission system, IPPs must have full access to all of the system information in order to complete a proper analysis of the risks and benefits.

Formal commitments with respect to the formation of RTO West should await a full and fair public hearing that considers the impacts on Provincial electricity policy. As an interim measure, the Provincial Government should be directly involved in the structuring of RTO West on behalf all British Columbians including BC Hydro, each class of electricity consumer, IPPs and public interest organizations.

## 8.0 Generation

### 8.1. Legacy Generation

BC Hydro would continue to own and manage the existing generating assets and past IPP contracts for the benefit and entitlement of B.C. consumers. It would provide electricity to the distribution company on an entitlement basis. In return, the distribution company would pay a regulated price based on the cost of production, a prescribed rate of return for the equity the Provincial Government has invested in the generating assets, etc.

Financial responsibility for the transmission lines, which serve the existing remote generating projects on the Peace and Columbia Rivers would be included in the

cost base of the legacy generating company. Under the current transmission tariff structure, any third party that uses the BC Hydro transmission system pays to support the cost of these lines even though they are almost entirely for the benefit of BC Hydro as owner of the generation.

### 8.2. Storage and Shaping

Consideration should be given to using some of the storage associated with BC Hydro's large hydro-electric generation facilities to increase the value to the province of long term B.C. IPP exports. Currently, this unique storage asset is used almost exclusively to facilitate Powerex's short term electricity trade. Making it available to B.C. IPPs might enable them to improve their chances of building for the export market, thereby creating jobs in B.C. and more long-term provincial revenues from taxes.

For example, the electricity production from most run-of-the-river IPP plants peaks in June and is at its lowest in January. An export buyer may want a constant supply year round. The storage could be used to shape the profile of the generation to meet the requirements of the buyer. A similar scenario could be developed for an IPP natural gas combined cycle plant in B.C. BC Hydro would earn a fee for providing the storage service and the Provincial and local governments would earn tax revenues and water rental or gas royalty revenues from the corresponding IPP investment and operation. Direct construction and operating jobs would occur and they would also contribute to provincial tax revenues. This long term approach is more likely to provide increased and more stable provincial revenue than short term trading profits.

### 8.3. Generation

BC Hydro should not be allowed to develop new generation facilities for a number of years. It should be allowed to invest in upgrades or expansions to the existing hydroelectric system, subject to regulatory review.

All new generation should be developed by IPPs until BC Hydro's huge dominance decreases to a point where fair competition can occur. BC Hydro's current share of generation is over 90%. Only after BC Hydro's share of generation decreases to 60% of total generation, should it be allowed to develop new generation.

## 9.0 Distribution

The regulated distribution company would be the primary seller of electricity and provide access on a common carrier basis to its distribution facilities. As with transmission, conflict of interest would be avoided if the distribution company does not own generation.

The electricity required to meet most of the distribution company's existing requirements would come from legacy generation. The distribution company would receive an entitlement to the firm output of this generation. The entitlement would be adjusted annually to reflect changes in the legacy generation portfolio such as equipment retirements, environmental restrictions, etc.

The distribution company would also receive a similar pro rata transmission entitlement.

Rather than a single customer class, such as industrials, receiving a preferred generation or transmission entitlement, they should be shared by all British Columbians through the distribution company. As pointed out in the BC Hydro's Transmission & Distribution System Capital Plan - 2001/02, "Residential load growth is now expected to be about 7 times greater than industrial load growth". If industrials receive a fixed entitlement, then, as the residential customer base grows, the residential customer would receive proportionally less of the benefits of the legacy generation.

The distribution company would purchase all new supplies of electricity required from IPPs, or in the open market.

### 9.1. Multiple Distribution Companies

The IPABC encourages the government to consider the division of the distribution company into 3 or 4 self-managing distribution companies. This would allow these companies to more fully address regional differences and aspirations while providing IPPs with multiple buyers, a prerequisite for healthy competition. This less monolithic approach to distribution is the norm in almost all competitive electrical markets. For instance, there are over a dozen utility districts in each of Washington and Oregon.

### 9.2. Industrial and Commercial Users Allowed to Make Direct Purchases

Industrial and commercial users should be free to contract with whomever they wish for electricity. Realistically, they will want to obtain as much electricity as possible from the distribution company which has access to the legacy generation portfolio. Given the current difference between low cost old generation and new generation, the point at which new generation becomes competitive on a stand-alone basis is very distant.

In order to increase the number of buyers and sellers in the B.C. wholesale electricity market in the near term, industrials and large commercial customers could contract directly from IPPs in a manner which provides them with some of the benefits of the existing generation. For example, an industrial could enter into a fixed priced contract with an IPP. The distribution company which formerly supplied the equivalent quantity of electricity to the industrial would now have additional electricity to meet new demand, or to sell into the open market. On the basis of an open market sale, the industrial would receive from the distribution company an amount equal to the open market price, as referenced to Mid-Columbia or some similar pricing point and as adjusted for transmission charges, reasonable transaction fees etc., for this electricity. In some cases, the price received would not offset the fixed amount payable to the IPP and in some cases it would be more. It is possible to devise a "fixed" to "fixed" strategy or various hybrids.

Given the current financial status of most industrials in the B.C. resource industry, the market for direct sales from IPPs is expected to be very small.

## 10.0 “Green Generation” Policy

Green generating facilities include run of river hydro, wind, tidal, solar, and certain types of biomass power plants. High efficiency gas co-generation is sometimes also defined as green. Traditional hydro facilities with storage reservoirs are not considered as green.

The public's increased concern for the environment has prompted governments and electric utilities to try to increase the amount of green generation. It is low impact, renewable, and reduces the demand for additional carbon-based energy production.

Only about 1% of B.C.'s energy currently comes from green generating facilities. Although green power's share is expected to grow, the majority of B.C.'s new generating capacity will most likely come from combined cycle gas turbines.

Green generation is much less well known than traditional thermal plants and reservoir-based hydro. Accordingly, to assist policy makers in considering green generation policies the following features should be noted:

- Green generating facilities have lower emissions than traditional thermal power plants and a smaller footprint than traditional hydro reservoirs. They also enable fuel diversification away from the current predominance on natural gas fired generation.
- Although small in comparison to thermal electric potential, B.C. has a significant amount of untapped green power, especially run-of- river hydro.
- Green generating facilities are generally much smaller than the typical thermal generating plants.
- Green projects are typically more remote and spread throughout the Province.
- Relative to a thermal plant of equal output, a green project has a higher ratio of capital cost to total life-cycle cost than the thermal plant whose biggest cost is on-going fuel.

Various government ministries and BC Hydro have taken steps to promote “green technologies”. Though programs and initiatives, they have set the stage for a comprehensive policy on environmentally responsible government, industry and public actions, however, there have been inconsistencies in inter-agency coordination and implementation of programs. A comprehensive government “green generation policy” would encourage and facilitate industry and public actions that would benefit the environment and economy of B.C.

The IPABC suggests the following elements be included in any provincial green generation policy:

**Value lower environmental impacts and renewability:** Governments at the national level have made strong commitments to stabilize emissions (e.g. the Kyoto Accord). At the provincial level, monetary values are increasingly being placed on emissions or conversely on emission reduction, especially for green house gases. In B.C. in the early 1990's, an "environmental premium" was paid for electricity from biomass plants that reduced smoke from bee-hive burners. Although this was the first time environmental impacts of electricity generation were valued in Canada, the amount of the premium was not explicitly linked to specific emission offset values.

Thermal generators with lower emissions should be rewarded over those with higher emissions. Similarly generators with no emissions should be further rewarded.

BC Hydro currently plans to purchase 10% of its load growth from green sources. The 10% allocation level appears arbitrary. An example of a non-arbitrary approach might be to require any purchase of electricity from new thermal generators to be fully offset, in relation to green house gas emissions, by buying a related amount of green electricity generation in B.C.

**Improvement of Market Access:** Although it is clearly stated elsewhere in this paper, with respect to all B.C. IPPs, improved access to other markets is essential to the development of new generating projects in B.C. If green projects are not being fairly valued in B.C., then IPPs should have the option of trying to sell elsewhere.

**Water License Application:** The IPABC supports the Ministry of Sustainable Resource Developments recent objective of reducing the current backlog of Water License applications by 90% in 2 years.

### 11.0 Net Metering

One of the fastest ways to encourage the development of distributed generation facilities is to require distribution companies to purchase electricity from their customers at the same price as they sell it. Normally, there are restrictions on the quantity of electricity which is supplied in this manner. This practice is common in Europe, Japan and half of the U.S. states and presents B.C. with the opportunity to be the first province in Canada to implement this progressive policy. It may be appropriate to restrict the quantity of electricity purchased from a single customer.

### 12.0 Market Hub

The IPABC has considered the concept of a establishing an electricity "hub" as a means of increasing the number of buyers and sellers in the wholesale B.C. electricity market. The details of this concept require more discussion between

market participants and it is worthy of further consideration. Under this approach, IPPs could chose to build merchant plants and sell it at the hub while industrials, commercial consumers and distribution companies could purchase some or all of their needs through this trading hub. The challenge of this approach is that for the near future, the market size of the hub would be too small to provide adequate price discovery and could be subject to manipulation.

In addition to providing a market for buyers and sellers, trading hubs provide price signals to these participants. It would be extremely helpful in B.C. if there was an electricity pricing point equivalent to the Sumas pricing point which is used in the natural gas industry. Although it would not be a full service hub, it would still provide price information. The development of this hub, will be contingent upon separation of the generation and distribution assets in order to create some competition. Some type of a financially settled index in B.C. could also be created. An appropriate base could be Mid-C pricing minus the variable cost of transmission.

### **13.0 Ancillary Issues**

#### **13.1. Columbia Basin Trust/Columbia Power**

Columbia Power Corporation should be wound up and its assets consolidated with those of the Columbia Basin Trust.

Columbia Power is described by Dr. Mark Jaccard, previous BCUC Chairman, in a paper entitled, Deconstructing Hydro: The B.C. Electricity Sector in this Decade, and published in B.C. Studies, as "not a utility - being, in effect, a publicly owned IPP - it is exempt from BCUC regulation." There is no need in this Province for additional taxpayer supported generation companies. Its position of unfair advantage distorts the B.C. electricity market and is a deterrent to private sector investment.

As soon as all Columbia Power Corporations assets have been producing electricity for at least one year they should be packaged for sale on a competitive bid to the private sector. The sale would be made when the conditions are most favourable.

#### **13.2. Interconnection Requirements**

Whether a separate transmission company is created or BC Hydro remains unchanged, IPP interconnection issues need to be addressed.

All IPPs must seek interconnection with BC Hydro through its transmission or distribution systems to bring their generation to market. This is accomplished by a process that starts with BC Hydro interconnection standards, followed by a BC Hydro study process, ending with possible BC Hydro network upgrades and the IPP interconnection. Once the IPP project is ready for commissioning and BC

Hydro has deemed the IPP acceptable for interconnection, both parties must live under contractual arrangements for the life of the relevant generating project.

### **13.3. Interconnection Standards**

BC Hydro introduced interconnection standards in the early 90s. These are now in need of updating to reflect Western System Coordinating Council reliability and generator testing criteria as well as changes in practice. The standards should be updated.

### **13.4. Transmission Study Process**

Since the first interconnection criteria were published, BC Hydro has implemented tariffs for bulk transmission access, closely modeled on FERC's Order 888 Pro-forma tariff. This transmission tariff has defined a study process that BC Hydro follows when dealing with requests for transmission interconnection. For example, although timelines are defined for studies BC Hydro is required to complete, they are not being met and IPPs have no recourse if the study schedule is not met. However, tight timelines are placed on IPPs to accept the results of the study and if the IPP doesn't accept the results then the whole process, including, the payment of fees starts again.

### **13.5. Distribution System Process**

Currently a different process is followed with respect to IPP connections to the distribution system. This process should be harmonized with the transmission process with respect to study times, queuing and technical requirements. It should be recognized that small projects have minimal impact on the distribution system and should not be treated with the same rigor as larger projects.

### **13.6. Other Interconnection Improvements**

#### **13.6.1. Standards**

The interconnection standards need to be updated to reflect current practices. While this upgrade is underway, BC Hydro needs to include IPPs in the standard review and setting process. BC Hydro needs to release the engineering design standards for transmission and distribution equipment to allow compatible practices be followed for transmission/distribution extensions to interconnect IPPs. The issue is two-fold: first, making equipment compatible with BC Hydro utility practice should the new lines be turned over for BC Hydro, and second, reducing the workload on BC Hydro's internal engineering resources.

### 13.6.2. Cost Control

During the study process and network upgrade work, IPPs have no cost control over work that is undertaken by BC Hydro on their behalf. Cost discipline needs to be introduced. IPPs require:

- A standard fee schedule for standard work or the ability to review and approve hours worked prior to payment
- The ability to have the study work performed by third party consultants rather than entirely through BC Hydro.
- The ability for IPPs to review the study's progress and working papers/backup material.
- Scope control of work performed by BC Hydro.
- The ability for IPPs to obtain competitive procurement of materials for network upgrades as an alternative to BC Hydro purchase.
- The ability for IPPs to obtain competitive construction pricing for system improvements required in support of an interconnection.

### 13.6.3. Transparency

The state of BC Hydro's transmission and distribution system needs to be disclosed to all users by making data available on a timely basis. Specifically:

- Transparent separation of interconnection requirements from planned system improvements for load growth.
- Regularly publish line outage information.
- Publish all interconnection studies and costs.
- Make transmission line data available for third party transmission studies.
- Regularly publish the Electric System Plan with the detailed load forecast assumptions used.
- Make Transmission and Distribution Design Standards available for the printing cost.
- T&D planning and operating criteria, standards and procedures must be published.

#### **14.0 Other Issues to be addressed in the future by the IPABC**

This paper primarily addresses the IPABC's concerns about market structure and transmission access.

Secondarily, it addresses some specific barriers like interconnection procedures, Columbia Power Corporation, and Water License Application backlogs.

The IPABC intends to address the following issues in the future;

- Access to and Pricing of Ancillary services (including IPP standby rate, loss compensation, energy imbalances, and operating reserves)
- Motor Fuel Tax on natural gas used to produce electricity
- Minimum Stream Flows
- BC Hydro "Joint Ventures"
- Burrard Thermal
- Vancouver Island Supply

## Appendix 1.0 Opportunities for Electricity Production in B.C.

B.C. is blessed with a tremendous variety and amount of energy resources that are well suited for electricity production.

**Natural Gas:** Currently, the natural gas fired turbine operating in combined cycle mode ("CCGT") has become a favoured base-load generating source. This form of generation, which is replacing the more traditional thermal plants, has proven to be economic and reliable.

During the past twenty years, the technology of the CCGT has improved significantly allowing increasingly larger plants to be built with corresponding economic improvements due to scale. Unlike hydroelectric facilities whose location is determined by natural circumstances, CCGT can be more conveniently sited with respect to the load centers thereby reducing transmission costs and energy losses. Natural gas fired turbine plants can be scaled in size from 1 MW to 1000 MW. A modern "2 on 1" (2 gas turbine generators also supplying waste heat to raise steam for 1 steam turbine) can approach 600 MW.

CCGT is expected to produce the majority of electricity all along the west coast of North America for the foreseeable future. The balance of electricity generation will come from other energy sources such as run-of-river hydro, and wood waste of which B.C. has more than any other jurisdiction. Wind, solar, tidal, ocean wave, and fuel cells can play a role in meeting electricity requirements, especially as their technology advances.

**Run of river hydro:** Run of river hydro uses simple technology and has proven to be reliable. If the site is good, it can be economically competitive with thermal IPPs other than when gas prices fall to extremely low levels. The main siting considerations are; sufficient stream flow and head, minimal impact on fish habitat, and proximity to interconnecting transmission. Previous surveys of B.C.'s run of river sites list hundreds of creeks with a total economic capacity ranging from 400 MW to 800 MW for electricity prices from \$50 to \$70/MWh. That could increase to over 1000 MW if more remote sites can be developed by reducing interconnection costs through cooperative transmission line construction.

**Biomass:** Historically, B.C.'s large forest industry historically created huge volumes of wood waste. During the late 1980's and 1990's several woodwaste-to-energy generation facilities were built. Wood waste is not as plentiful as it was before, in part because of the decline in the forest industry and because wood residue is finding other higher value uses through remanufacturing. Securing a long-term supply of waste is more difficult. Approximately 100 MW of new wood waste to electricity potential remains.

**Alternative Sources:** Wind, solar, tidal and ocean wave technologies tend to be costly on a per unit of production basis. However, as more are built (e.g. wind), these units cost are declining.

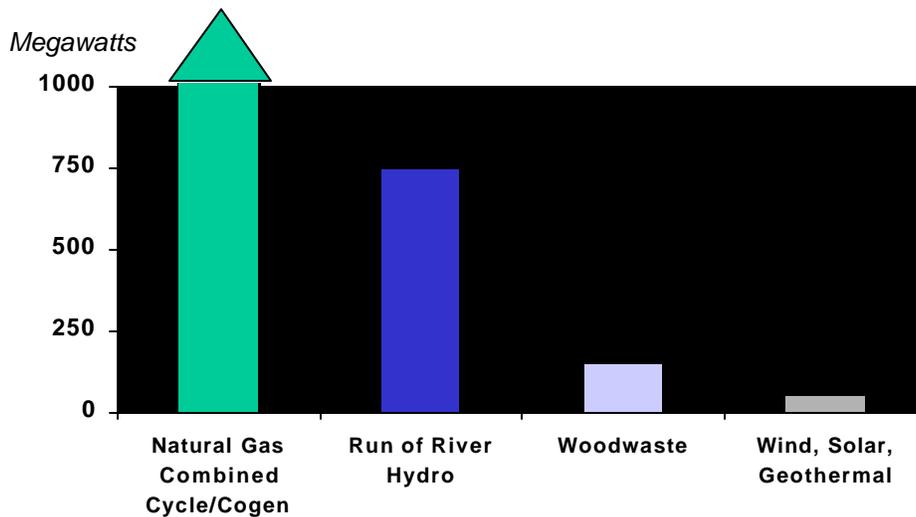
**Coal:** Coal-fired thermal electric plants are again receiving consideration because of the abundance of this fuel and new technologies that will reduce air emissions.

However the development of technology to substantially eliminate emissions economically is at least 20 years off. As well, the impact of open pit mining on the environment and in an increasingly populated countryside may be difficult to overcome.

**Large Hydro:** Historically, the most economic and reliable way to produce electricity in large commercial quantities in B.C. was to develop large hydroelectric generating stations. BC Hydro has frequently indicated that Site C is the next new large hydro project but the review of its major environmental impact may take many years. This may both increase cost and extend the in-service date beyond a reliable price projection horizon.

B.C. has the unique distinction of being able to choose from all of the above options. In the medium term, the major energy source will likely be natural gas to fuel CCGT generating plants. The only barriers to this type of IPP electricity production are the availability of natural gas, its price and the demand for electricity. Figure 4 following illustrates the potential for IPP generation from several of the energy resources mentioned above.

**Figure 3. Potential IPP Generation from Various Energy Sources**



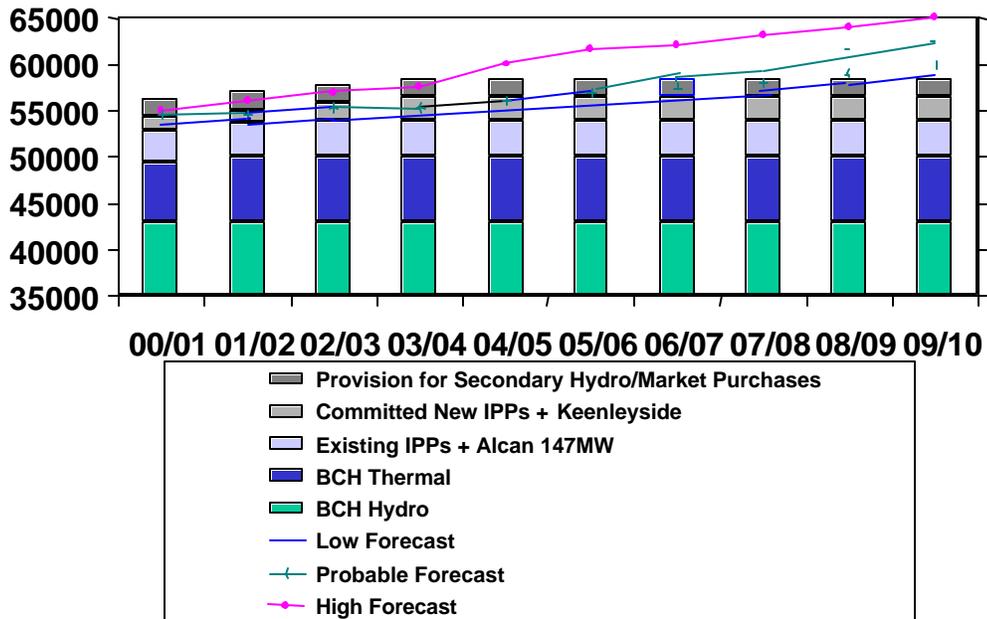
**Appendix 2.0 B.C. Supply/Demand: Need to Import**

The true state of BC Hydro's current supply/demand balance, including capacity reserve margins, is the subject of unnecessary conjecture. In most jurisdictions where a vertically integrated monopoly controls the electricity market, documents containing the full details of the status of the electricity supply and demand are regularly published and subsequently reviewed in a public hearing. It is imperative that the monopoly's captive customers know whether the monopoly is procuring too much or too little generation to meet their demands and investing too much or too little in the transmission and distribution systems that are required to deliver the product to them. Either way, they are going to have to pay because they don't have the option of switching to another supplier.

This is not the process which is followed in B.C., which functions as an unregulated monopoly market.

In 1995 BC Hydro released its Integrated Electricity Plan ("1995 Plan") and no public hearing was ever held to discuss it. In January 2000, BC Hydro published an update ("2000 Update"). In December 2000, it released a document entitled Electric Load Forecast 2000/01 - 20/20/21. According to a table in the 2000 Update, "Energy Balance with Existing and Committed Resources", the energy balance with existing and committed resources is as follows:

**Figure 4. Energy Balance with Existing & Committed Resources (GWh/yr)**



There is also a corresponding graph for "Dependable Capacity Balance with Existing & Committed Resources". With its predominantly hydroelectric system and subject to transmission constraints, BC Hydro should be able to provide "capacity" more cheaply than IPPs. The 1995 Plan states:

*"The electric system must produce and distribute sufficient electrical power at any one moment in time while maintaining a margin of safety for equipment maintenance and unscheduled outages on critical system components. This is analogous to the maximum rate of supply (cubic feet/second or gallons/minute) a municipal water system can produce at any one instant, which in turn, depends on water intakes at the storage reservoirs, water mains, etc."*

Capacity is measured in kilowatts or megawatts.

IPPs can certainly compete with BC Hydro on a cost-effective basis to build the generation which is required to produce the "energy" BC Hydro's domestic customers require. According to the 1995 Plan:

*"The electric system must produce and distribute sufficient electrical energy to meet annual requirements. This is analogous to the total quantity of water (cubic feet or gallons) a municipality requires over a year."*

Energy is measured in kilowatt-hours (kWh) or gigawatt hours (GWh)

*The 2000 Update states that:*

*"BC Hydro has adequate existing and committed resources to meet the probable growth in electricity demand until 2007." It then adds that "the key generation elements of the Ten-Year Outlook are: Addition in 2007 of a combined cycle gas turbine on Vancouver Island..."*

The untested 1995 Plan and 2000 Update are the basis on which IPPs are suppose to decide whether to pursue the development of projects in B.C. or to look elsewhere for opportunities.

When the Update and Plan are augmented by information provided by the then B.C. Minister of Finance Paul Ramsey on March 19, 2001 ("Budget Material") the supply/demand balance isn't as rosy as BC Hydro paints it i.e. no new generation is required until 2007. Mr. Ramsey was defending his 2001 Provincial Budget that forecast a net income of \$300 million for BC Hydro.

### **Demand**

As indicated in Figure 4, the base domestic energy demand in 2000/01 is 53,935 GWh and is forecast to rise at 1.8 % per annum for the next 10 years. The Electric Load Forecast 2000/01 - 20/20/21 shows demand increasing at 1.5% per annum.

The provincial government expects the provincial economy to grow at a much higher annual rate than 1.8% per annum. Normally, there is a closer correlation

between electricity demand and economic growth. Compared to the provincial government's expectation of economic growth, the forecast increase in demand for electricity is low.

### **The Over Stated Supply**

The IPABC has much larger concerns about the amount of energy that can be produced from the existing resources shown in Figure 4. The supply side figures in Figure 4 for "BC Hydro" and "B.C. Thermal" are overly optimistic. The amount of electricity that may be available under the heading "Committed New IPPs + Keenleyside" and in 2007 from a 640 MW combined cycle gas turbine project on Vancouver Island is open to serious questioning.

### **BC Hydro...Output From Existing Hydro Generation**

"Firm" Output is subject to adjustments because of the weather.

Figure 4 shows the amount of "firm" electricity that is expected to be available from BC Hydro's existing hydroelectric generating facilities as 43,100 GWh. The output varies with the amount of precipitation and the underlying concern is always the inevitable dry cycle. According to the 2000 Update:

*"As a predominantly hydroelectric system, BC Hydro plans resources to ensure that adequate energy is available to meet customer needs even during low streamflow conditions. The "firm" annual energy capability of the hydroelectric system is based on what it can reliably produce during an extended period of low streamflows. Under better streamflow conditions, the hydroelectric system produces additional energy, referred to as "secondary" or "non-firm" hydro, averaging about 4000 GWh/yr."*

The Budget Material contains the following table ("Energy Table"):

**Figure 5. Energy Table:  
Load-Resource Balance for 2001/02**

Energy in GWh	IEP (low water year)	Projection (preliminary)	Adjustment
<b>Resources</b>			
Hydro	43100	41000	-2100
Thermal	7200	5400	-1800
IPP-existing	1800	1800	0
IPP-new	2000	1700	-300
Alcan	1200	800	-400
Market purchases (net)	2500	2700	200
<b>Total Resources</b>	<b>57800</b>	<b>53400</b>	<b>-4400</b>
Domestic Load	55100	53400	-1700
Surplus (deficit)	2700	0	-2700
Resource Management			2001 February 06

Under the heading "IEP (low water)" the hydro output is shown as 43,100 GWh but under the heading "Projection (preliminary)" it is shown as 41,000 GWh or as the table states an "Adjustment" of -2100 GWh. No adjustment is suppose to be necessary because the 43,100 GWh figure in Figure 4 is "firm" and has already been adjusted to take into account the amount of electricity that can be generated during low streamflows. However, this spring it was being revised downwards, as it was becoming apparent there was going to be a low snowpack. There is a big difference between a low snowpack and the prolonged dry period like the one that occurred from October 1940 to April 1946. It is the basis for the term "extended period of low streamflows". Apparently, the 43,100 figure isn't "firm" under all streamflow conditions.

In the early 1990s, precipitation in B.C. was relatively low and according to BC Hydro's 1994 Annual Report:

*"In lower than average water years the hydroelectric system must be reinforced by operating Burrard Thermal Generating Station near Port Moody and/or by purchasing energy. During fiscal 1994, 3248 gigawatt-hours (GWh) of electricity were generated from Burrard and 5436 were purchased."*

*"There was less than average rainfall in 1992, however, and Williston reservoir levels remained much lower than usual. As well, 1993 was a poor water year for Mica, the system's other major reservoir. Overall, the Hydro system had its lowest overall inflows since the creation of our last important reservoir, Revelstoke, in the mid-1980s."*

For fiscal 1994, total requirements were 48,978 GWh, including export sales of 2,645 GWh and the output from the hydroelectric generation was 40,101 GWh. In 1995, the output was 39,921 GWh.

The inference to be drawn is that the output of the hydroelectric generation under all stream flow conditions is not a "firm" 43,100 GWh. and this amount of energy is not always available to meet domestic requirements. The question is: "Why?".

### **The Mackenzie Factor**

One probable answer is the "Mackenzie Factor". If the Williston Reservoir is drawn down to an elevation of between 2,145 to 2,150 feet, the town of Mackenzie will effectively be shutdown. Politicians of all persuasions have vowed not to let this happen. As evidenced by the Budget Material, this doesn't appear to be the case. According to this material, one foot of drawdown in this reservoir provides 170 GWh of energy. Pursuant to the BC Hydro's Water Licence, the reservoir can be drawdown to 2,100 feet. The Budget Material contains a calculation that shows that if the reservoir is drawn down to between 2,135 feet and 2,145 feet the additional energy produced will be 1,700 GWh. The calculation is qualified by the statement "Order of magnitude only - much more work needs to be done to refine the numbers".

Although the IPABC does not have access to BC Hydro's Williston reservoir model, its calculations indicate approximately 1/3 of the useable Williston reservoir storage is below the elevation of 2,150 feet. Conservatively, there is roughly 3,500 GWh of energy that is stored in the form of water that is politically inaccessible.

The hydro output figures from 1994 and 1995 provide support for the results of this calculation. Instead of letting the reservoir level fall below 2,150 feet in 1994 and 1995, it appears the equivalent energy was "made up" from the Burrard Thermal Plant or imported. Burrard is now required to meet increased load growth and is no longer available to provide this type of backup support in lower than average water years.

The "firm" hydro output figure of 43,100 GWh should probably be reduced by 3,500 GWh to reflect the Mackenzie factor.

Further reductions may be required if there are additional reasons for the revisions to the firm output figure in the Budget Material.

### **Downward Revisions Because of Environmental Factors**

BC Hydro has been operating its hydro facilities in accordance with Water Licences that were issued prior to the time when environmental impacts were given serious consideration. The 2000 Update states:

*In 1998, the Province announced the policy on the Water Use Planning (WUP) process. This multi-stakeholder review process is designed to address the competing interests for water use (e.g. fish, recreation, and habitat management) associated with existing and new electricity generation facilities. Water Use Plans are to be drafted for facilities on a priority basis. Each Water Use Plan, once authorized under the Water Act, will define the operating boundaries of each*

*licensed facility... The likely outcome of the Water Use Planning process is some reallocation of water from power production to non-power values. BC Hydro will be compensated for any lost power value through a reduction in water rental fees collected by government. The IEP recognizes outcomes from the WUP as a resource planning issue but considering the status, the IEP does not propose advancing resources at this time."*

Elsewhere it states:

*"Potential reductions from WUP may be somewhat offset by increases in system capability from the Resource Smart program. Preliminary estimates of impacts could advance the need for resources by one year."*

This translates into a reduction in firm hydro energy output of approximately 1,000 GWh.

In the 1995 Plan it states:

*"Changes in operations for environmental management (e.g. to maintain minimum flows from large hydroelectric facilities in support of fish and habitat requirements) may result in reduced energy generating potential..."*

*Minimum flow requirements would have the greatest impact in low flow years. This scenario was therefore constructed to reflect reductions in energy capability for various water conditions, as shown in Table 7.5. This scenario affects only hydroelectric facilities with significant storage capacity..."*

*The largest impact from these reductions in hydroelectric availability is on the existing BC Hydro system, resulting in an expected average loss of some 3,300 GWh per year..."*

The material from the 1995 Plan relates to scenario analysis and it is likely the material from the 2000 Update is more current. Whatever the final outcome, some adjustment has to be made to BC Hydro's firm hydro energy output figure to reflect environmental considerations. If they are ignored, they may become a trade issue between the U.S. and Canada that results in restrictions or barriers being placed on BC Hydro's access to the U.S. electricity market. The Expert Group Report, dated February 2000, prepared for The Council of the North American Commission for Environmental Cooperation may be an indication of future problems. The report relates to allegations that Canada is failing to effectively enforce its environmental laws, particularly Fisheries Act Section 35 (1) with respect to BC Hydro's electric operations. This commission is established pursuant to the terms of the North American Free Trade Agreement.

The "firm" hydro output energy figure of 43,100 GWh should be reduced by 1,000 GWh to reflect environmental constraints.

## BC Hydro Thermal...Burrard Thermal

BC Hydro's thermal generation consists almost entirely of the Burrard Thermal plant. In Figure 5 under the heading "IEP (low water)" the thermal generating output is shown as 7,200 GWh. Under the heading "Projection (preliminary)" the output is shown as 5,400 GWh. The difference is 1,800 GWh or the yearly output from a brand new 200 megawatt natural gas fired thermal plant.

Elsewhere in the Budget Material it states:

*"Burrard will run flat out increasing from approximately 4000 GWh FY 2001 to 5000 GWh in FY 2002"*

*"Burrard: Power supply's 50/50 for Burrard is 5350 GWh. Even though they have sunk considerable upgrading \$\$\$ into the plant, they still having problems with one of the units, and are concerned that the plant has never done more than 4300 GWh in one year. Notwithstanding this, if we assumed 5500 GWh (500 GWh more than the Feb 28 numbers) the net income benefit would be \$92 million."*

In BC Hydro's 2001 Annual Report it says :

*"Generation upgrade costs include \$22 million which was primarily for the Burrard Upgrade Project, a necessary expenditure to comply with regulatory requirements and to retain the plant's energy supply capability...These expenditures include rehabilitation work on one of the generators that had a major failure during the year; it is expected to be in-service in August 2001."*

It is not clear whether this failure refers to the unit, which failed 3 years ago, and is being repaired with the assistance of a California utility or the unit, which failed this spring and is expected to be back in service by November.

Elsewhere in this report it states:

*"The increase in OMA expenses was also due to costs needed to maintain the company's aging fleet of assets in order to ensure continued system reliability and to service customer growth."*

Most of the generating equipment at Burrard was installed in the 1960s and 70s and is at the end of its useful life. To rate this plant's output at 7200 GWh for the purposes of the 2000 Update when all the evidence points in the other direction is open to serious question. It is likely B.C. Hydro's firm thermal output should be no higher than 4300 GWh, which is a reduction of 2900 GWh from the current level.

### **Pipeline to Vancouver Island**

The 2000 Update shows the 240 MW Port Alberni Cogeneration Project (In-service 2002-2003) as a "Committed New Resource". It will be committed only when BC Hydro signs a power purchase agreement with the relevant IPP and BC Hydro and its partner, Williams receive the necessary approvals from governments in the United States and Canada to build the pipeline to supply gas to the plant. Currently, there is significant opposition to the proposal.

### **The Hard Wired Requirement to Import Electricity**

Contrary to public perception, BC Hydro needs to import electricity under certain streamflow conditions. BC Hydro is not energy self-sufficient. The 2000 Update says:

*"BC Hydro currently applies an energy reserve criterion that allows for up to 2,500 GWh/yr. of resources, based on secondary hydro and market purchases, in the scheduling of new energy resource requirements. This allowance is consistent with the energy reserve criteria that has been used by BC Hydro since the mid-1980s."*

Figure 5 shows "Market purchases (net)" rising from 2,500 GWh under the column headed "IEP (low water)" to 2,700 GWh under the column headed "Projection (preliminary)". Given all the downward revisions which are likely required to some of the sources of supply shown in Figure 4, BC Hydro's need to import electricity in a protracted dry period will probably be much higher than 2500 GWh. The problems in California illustrate the risk to BC Hydro's customers with respect to availability of supply, and price. Media reports indicate the Governor of California has plans to acquire 15% more electricity than the State needs. IPPs aren't suggesting this course be followed in B.C., but note that as the requirement to import increases, so does the risk.

In order to show this potential risk, the IPABC has recast Figure 5 making the noted downward revisions to some of the supply components. To further illustrate the risk to domestic customers, "Domestic Load" or the demand side of the equation, is left at 55100 GWh to reflect the probable load growth of 1.8% of the 2000 IEP.

Figure 6. Energy Table - As Recalculated by the IPABC

Energy in GWh	IEP (low water year)	IPP Projection	Adjustment
<b>Resources</b>			
Hydro	43,100	38,600 <sup>1,2</sup>	-4,500
Thermal	7,200	4,300 <sup>3</sup>	-2,900
IPP-existing	1,800	1,800	0
IPP-new	2,000	1,700	-300
Alcan	1,200	1,200	0
Market purchases (net)	2,500	<b>7,500</b>	+5,000
<b>Total Resources</b>	57,800	55,100	Not Relevant
Domestic Load	55,100	55,100	0
Surplus (deficit)	2,700	0	Not Relevant

<sup>1</sup> 3,500 GWh deducted from the base level to reflect the Mackenzie factor

<sup>2</sup> 1,000 deduction for environmental factors

<sup>3</sup> Adjusted to reflect previous maximum performance of 4300 GWh

The above table shows that if B.C. was in a low streamflow period, and the Mackenzie, environmental and Burrard "factors" were fully accounted for, BC Hydro would have to purchase 7,500 GWh of electricity in the open market to meet its domestic requirements. This is the equivalent of 3 x 250 megawatt natural gas fired combined cycle plants.

Conservation can temper demand, but there is a difference between energy conservation, and industry curtailments, which would have an adverse impact on the B.C. economy. In the U.S. Pacific Northwest, there has been a 12% reduction in the demand for electricity in the last year. Of this amount, 8% is the result of curtailment by industry such as the shutdown of aluminum smelters, and the remainder attributable to conservation. It is also important to note that during the same period, there have been double-digit increases in the price of electricity.

### **Conclusion: New Generation is Needed**

The conclusion is that B.C. needs new sources of generation to buttress the existing supply, and to meet new demand. These new sources could be provided by IPPs built in B.C. In any event, all the evidence should be tested in a public hearing as soon as possible.

### Appendix 3.0 The Need to Rebuild the BC Hydro Transmission System

The need to rebuild the BC Hydro transmission and distribution systems would not normally be viewed as an impetus for change in the B.C. electricity market unless the rebuilding process required large amounts of public money and an increase in the public debt. However, this is the situation that currently exists in B.C.

BC Hydro's Transmission & Distribution System Capital Plan - 2001/02 contains the full details of the planned expenditures for the 10-year period 1 April 2001 to 31 March 2011 and they total \$1,079,853. About half this amount will be spent by 2004. Some of the highlights are:

*"Planned amounts are projected to remain relatively high until the year 2003/04 primarily due to high levels of expenditures on aging and unreliable facilities (230 kV underground cables, telecommunications systems, and station equipment)*

*Note that this ten-year Plan shows a significant reduction in planned expenditures from 2004/05 onward. However, if the gas pipeline generation option for the supply to Vancouver Island fails to proceed, there will be an urgent need to restore and initiate the transmission option. (Vancouver Island HVDC Replacement, Guichon 50% Series Compensation and Ashton Creek Shunt Capacitor Bank) cancelled in 1999. This will significantly increase planned expenditures in the last half of the Plan. As a contingency measure, the HVDC Replacement is being brought up to shelf ready status.*

*Much of BC Hydro's equipment, installed in the boom years of the 1960s and 1970s, is at its end-of-life. Replacement/upgrade of aging facilities (high voltage cables, circuit breakers, protection and control, telecommunications, etc.) is expected to continue to assume a significant proportion of capital expenditures over the ten-year-period.*

*BC Hydro's electric system is unique. Long high voltage transmission lines, and submarine and underground cable connect remote generating facilities in the interior to the load centres in the Lower Mainland and Vancouver Island.*

*On December 14, 2000, BC Hydro experienced a new domestic system peak of 8,995 MW (excludes exports to West Kootenay Power, etc.). Given a dependable winter generating capacity of 9,638 MW, our generating assets were more than 90 percent utilized. Due to lower than normal precipitation in fiscal 2000/01, BC Hydro is expected to be a net importer of electricity. Like most large utilities, BC Hydro has historically maintained a healthy margin above reserve capacity, but this margin has been eroded over the past several years. This indicates that new sources of generation will have to be provided soon to meet requirements.*

*BC Hydro has two major bottlenecks in the transmission system: the Interior to the Lower Mainland, and the Lower Mainland to Vancouver Island. During system peaks and depending upon generation patterns, these links could be 100 per cent*

*utilized. Other portions of the transmission system are generally utilized from 70 to 80 percent.*

*It is important to note that growth of export load will impact the electric system in a similar fashion. T&D's interties with other utilities were designed to provide system stability and transfer emergency power; not explicitly to export or import power. If T&D is to significantly increase exports of power, the further reinforcement of the transmission system and associated protection and control equipment will be required."*

If the following excerpt from the May 14, 2001 edition of Clearing Up, a U.S. energy publication, is correct the transmission system may already be overextended:

*"Tuesday's Stage Three event [rotating outages in California] was triggered by transmission line problems out of B.C. rather than financial concerns. The net effect was the same, with a loss of between 600 MW and 1,000 MW flowing south on the intertie. The weather was still hot--well over 100 degrees in the desert and the Southwest--and consumers turned to air conditioning early in the day. The two east-west lines that went out in B.C. were restored within two hours."*

According to two system studies dated September 13, 2001, done by BC Hydro Grid Operations for BC Hydro Power Supply, Power Supply's request for 400 MW and 1000 MW of firm import capacity from BPA can't be granted. The reports conclude that the firm import capability to B.C. is restricted by a frequency excursion that would result if the 2 500 kV lines connecting BC Hydro to BPA at Custer Washington were lost. According to the studies, the solution is more generation in B.C. or a third 500 kV circuit to keep the strong tie with the U.S. system.

## **Conclusion**

The picture that emerges is that over a billion dollars will have to be spent on an aging transmission and distribution system that wasn't designed to support the level of electricity trade which BC Hydro is engaged in, and the increasing domestic load. A public hearing should be held as soon as possible to get the full and complete picture.