

**REFORMING
BRITISH COLUMBIA'S
ELECTRICITY MARKET:
A WAY FORWARD**

DR. MARK JACCARD

**BRITISH COLUMBIA TASK FORCE ON
ELECTRICITY MARKET REFORM:
FINAL REPORT**

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BRITISH COLUMBIA TASK FORCE ON ELECTRICITY MARKET REFORM

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Honourable Dan Miller, Minister of Employment and Investment

Dear Mr. Minister:

On March 26 1997, I was charged with the mandate to lead a Task Force to bring forward to government a package of electricity market reform proposals.

I have the honour of submitting my Final Report, as required by the Terms of Reference.

In keeping with the Terms of Reference, I sought consensus among the Stakeholder Group. However, the diversity of positions prevented an agreement. I am solely responsible for the reform proposal presented herein.

Respectfully,

MARK K. JACCARD

IN MEMORY

DICK BRYAN

On January 5, 1998, Dick Bryan, who served as a stakeholder representing the Council of Forest Industries, passed away. Dick was well known to those of us in the energy field in British Columbia, having represented COFI for many years. Although Dick was an effective interest group advocate, his personality was not what one typically expects with that kind of function. Dick was sincere and was always in good spirits. He always tried to understand the position of those pitted against his interest group. He was easily able to get beyond positions to see and sympathize with the humanity of the people whose interests diverged from his. In essence, Dick really cared about people, and that came through so strongly to all of us who knew him. He will be sorely missed.

ACKNOWLEDGEMENT

The BC Task Force on Electricity Market Reform has been fortunate to have had the support of a dedicated technical and administrative staff without whom the work of the Task Force could not have been completed: many thanks for the hard work of Kristan Boudreau, Maureen Cheng, Michael Margolick, Mark Moseley and Andrew Pape.

Members of the Stakeholder Group -- B.C. Hydro, BC Gas, the Council of Forest Industries and the Mining Association of BC in particular -- generously supported the Task Force process by providing meeting spaces and amenities that provided a conducive environment in which to conduct meetings. Stakeholders and their alternates also gave generously of their time in an effort to reach consensus on a market reform package.

Staff of the Ministry of Employment and Investment -- Kate La Vertu, Wendy Silver, Doug Callbeck, Debbie DeRoche, Dana Publicover, Karen Taylor, Maureen Murphy, Kathy Reid, Peter Cech, Helen Davies and Kim Laurett, Wendy Thompson, Patti Croutch, Marie Mitchell and David Tse in particular -- all contributed substantially to the successful operation of the Task Force by assisting staff with various administrative, financial and logistical aspects of its work.

John Horgan, of the Crown Corporations Secretariat, provided invaluable support and government liaison services. John Calvert, of the Crown Corporations Secretariat, also made a substantial contribution.

The work of the Task Force was informed by citizens, local governments and representatives of organizations who wrote, telephoned or spoke to Technical Staff or Stakeholder Group members, or who made presentations at the public forums held in various communities in the province.

All of this support, input and feedback has helped to shape the content of this report.

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Background

This final report of the B.C. Task Force on Electricity Market Reform presents the reform proposal of Dr. Mark Jaccard, head of the Task Force. The Stakeholders on the Task Force were unable to reach consensus on the basic components of electricity market reform in B.C. This "Advisor's Reform Proposal" presents a middle ground, in keeping with the direction in the Terms of Reference to "seek consensus to the greatest extent possible".

Throughout the world, there is a growing recognition that the technological and economic fundamentals of the electricity market have changed. In the past, it was generally assumed that a "vertically-integrated monopoly", providing all generation, transmission, system operation, distribution and customer service, was the best industry structure. Today, competition in generation is widely recognized as offering several benefits from both a consumer and societal perspective. The benefits for consumers include greater choice, customer responsiveness, lower prices and less risk. The broader social benefits include the economic development and job creation resulting from lower prices and greater returns to publicly-owned assets, and the potential for regionally-dispersed resource development as environmental and social considerations are combined with market reform.

Many jurisdictions have already reformed their electricity markets in response to these new conditions, and the rate of change globally is accelerating. Four critical issues of reform are:

1. determination of whether or not any publicly-owned assets should be privatized;
2. determination of how to achieve competitive electricity commodity prices in a de-regulated generation market (prevention of "generation market power");
3. determination of the extent to which customers will be allowed direct access to sellers of electricity (degree of "retail competition"); and
4. determination of the changes in industry structure that are necessary to ensure that control over the common carrier functions related to the grid is not used to hinder fair competition (prevention of "transmission market power").

In the Terms of Reference, the government has provided the policy framework for the work of the Task Force. A key policy direction is that all B.C. Hydro assets remain in provincial government ownership, removing issue #1 from the Task Force's mandate.

This policy also limits the prospects for "horizontal de-integration" (breaking up generation into several competing producers), as a mechanism for preventing generation market power. But there are other means of addressing issue #2. In the Advisor's Reform Proposal, this issue is dealt with by retaining B.C. Utilities Commission price regulation of most of the generation resources of B.C. Hydro and West Kootenay Power, and by

having independent oversight of the operation of a provincial electricity trading market.

Issues #3 and #4 are the focus of the Advisor's Reform Proposal: extension of customer market access and prevention of transmission market power. It is the view of the Advisor that the Terms of Reference are best satisfied by electricity market reforms that allow industrial customers and electricity suppliers to contract directly with each other for electricity supply (issue #3), with the grid-related assets of B.C. Hydro and West Kootenay Power controlled and operated in a structure that ensures fair and efficient transmission services, including system operation, transmission planning and transmission tariffs (issue #4).

Advisor's Reform Proposal

The Advisor's Reform Proposal contains a phased approach to reform. Phase 1 reforms should be in place by January 1, 1999, while the target date for Phase 2 reforms is January 1, 2001. This approach allows government to gain experience with the first phase of reform before initiating the second.

The Advisor's Reform Proposal has four major elements: customer access (issue #3), market structure (issue #4), social concerns about reform, and environmental concerns about reform.

Customer Access

Industrial customers can leave B.C. Hydro and West Kootenay Power tariffs in order to buy their electricity directly from sellers. However, in Phase 1, half of this industrial load must still be purchased from the power sales divisions of B.C. Hydro and West Kootenay Power, even if at non-tariff, negotiated rates.

In Phase 2, this constraint is eliminated, meaning that all purchases by industrial customers could be from non-utility sources. Also, by Phase 2 the B.C. Utilities Commission will have decided whether or not to extend market access to large commercial customers.

All other customers (and any industrial who wishes) remain on regular utility tariffs, regulated by the B.C. Utilities Commission.

Market Structure

Prevention of transmission market power requires a transition toward "vertical de-integration", which separates grid-related, common carrier functions (system operation, transmission planning, transmission tariffs) from generation and distribution. In Phase 1, the vertically-integrated structure of the utilities is retained, but grid-related functions are further separated from other utility activities (generation, distribution). In addition, an independent Grid Oversight Committee is established (with representatives from utilities, independent power producers and customer groups), with a mandate to ensure that decisions of the new Transmission Business Units of B.C. Hydro and West Kootenay Power are truly independent from the interests of their generation divisions. A trading market for electricity buyers and sellers is also established, called the B.C. Power Exchange.

In Phase 2, vertical de-integration is completed. The new Transmission Business Unit of B.C. Hydro is converted into a publicly-owned B.C. Grid Company, which leases the grid-related assets of West Kootenay Power. The Grid Oversight Committee is eliminated, but the board of directors of the new B.C. Grid Company is selected from among the same interest groups. The B.C. Grid Company is regulated by the

B.C. Utilities Commission. It also operates the B.C. Power Exchange.

Social Concerns

The Advisor's Reform Proposal contains measures to ensure that the social values associated with the existing electricity market are protected and enhanced. It retains the entitlement of domestic customers to the low cost generation resources of B.C. Hydro and West Kootenay Power and does not alter the existing "postage stamp rate" structures, extension policies, and connection policies of B.C. utilities, as approved by the B.C. Utilities Commission. The reform proposal also retains the existing responsibilities for system reliability and security of supply. Amendments to the *Utilities Commission Act* ensure that the B.C. Utilities Commission has the necessary authority to protect consumers under retail competition, although experience with retail competition in the natural gas industry suggests that significant changes to the Act are not required. Finally, employment opportunities for electric sector employees are likely to expand, with retraining and support for employees faced with changing skill requirements. Reforms to address social concerns are all implemented in Phase 1.

Environmental Concerns

Market reform that allows direct access between independent power producers and customers will favour electricity generation resources with the lowest financial cost, even though these may have greater environmental impacts. In British Columbia, the likely outcome is a significant increase in the use of natural gas, in simple and combined cycle gas turbines, with a consequent increase in CO₂ emissions from 2 megatonnes / year today to between 6 to 10 megatonnes / year in 2010. The Advisor's Reform Proposal contains measures to increase energy efficiency, on the one hand, and to favour the development of

British Columbia's plentiful environmentally desirable electricity generation technologies, on the other.

With the shift toward a vertically de-integrated market structure, distribution utilities take on responsibility for energy efficiency that is cost-effective from a strict utility and customer perspective. Additional energy efficiency, justified once environmental considerations are included, will be the responsibility of a new division of BC21, called BC21-Energy Efficiency (BC21-EE). The Phase 1 budget of \$15 million will be funded 2/3 by a "non-bypassable wires charge" on transmission or distribution bills and 1/3 from government revenue. The Phase 2 budget of \$25 million will be funded using the same ratio to determine the government contribution, but will include natural gas utilities, so that utility funds are collected from a wires charge and a pipeline charge. The impact on rates will be negligible.

With increasing direct access between buyers and sellers of electricity, the utility regulator loses the ability to use "integrated resource planning" to incorporate environmental considerations in the selection of generation resources. The Advisor's Reform Proposal includes a "portfolio standard" to foster "environmentally desirable technologies" (cogeneration, wood waste, small hydro, resource additions at existing large hydro, solar, tidal, geothermal, landfill gas and wind). The portfolio standard requires all sellers of electricity, including the generation divisions of B.C. Hydro and West Kootenay Power, to supply a minimum percentage of electricity from environmentally desirable technologies. The portfolio would grow to 5% of total sales in the first five years, climbing to 15% by the year 2015.

The Advisor's Reform Proposal does not open market access to smaller customers, yet some of these also desire greater choice, with potential environmental benefits. Therefore, the proposal requires B.C. Hydro and West Kootenay Power to develop "net metering", "green power", and "fish enhancement" tariff options for their customers. A net metering tariff allows customers with self-generation capabilities to "reverse the flow" of the meter at times, paying only the net consumption in each billing period. A green power tariff allows customers to pay extra to support environmentally desirable technologies, where these are in addition to the technologies supported by the portfolio standard. A fish enhancement tariff program provides a mechanism for customers to make voluntary contributions to prevent or mitigate fish impacts from electricity generation.

Overall Impact

Under the Advisor's Reform Proposal, British Columbia will have competition among electricity producers and more pricing and service choices for customers, without sacrificing system reliability, protection for small consumers and consumers in high cost regions, security for electric sector employees or environmental protection. This will benefit all British Columbians by creating a favourable climate for investment in smaller, more labour intensive and environmentally desirable electricity generation and efficiency projects, resulting in economic spin-offs and job creation throughout the province.

**REPORT AND
RECOMMENDATIONS**

1. INTRODUCTION

Electricity market reform is occurring around the world, including Canada and the United States, and within many different electric systems, including those that are hydroelectric and publicly-owned as in British Columbia. The key element of electricity market reform is government action to replace “monopoly” with competition in electricity generation, while retaining monopolies in transmission and distribution, these latter functioning as common carriers. Competition in electricity generation does not require privatization. Public power plants compete with private plants in various jurisdictions.

Electricity market reform is primarily driven by technological change and falling natural gas prices. While for most of this century it has been assumed that electricity is most economically produced in large power plants, technological changes, especially favouring natural gas-fired combined cycle turbines, have enabled smaller plants to compete with large ones, eroding the justification for monopoly in generation. This technological change has had different effects depending on the jurisdiction. In high cost regions, there is a greater desire to open the electricity market to competition among generators in order to achieve immediate electricity price decreases. In low cost regions, the desire for access to competing generators may still exist among some customer groups, but additional motivations include preserving or enhancing electricity trade markets, fostering generation competition in order to retain a regional cost advantage, responding to customer demands to choose suppliers, and granting fair market access to “independent power producers” (“IPPs”).

In effect, every jurisdiction has its own unique concerns depending on factors such as the predominant generation technology (coal, nuclear, hydropower, etc.), the desire to maintain public ownership and control, and the relationship to neighbouring jurisdictions. As a low cost jurisdiction, British Columbia generally falls into the latter category. The price reduction benefits of market reform are certainly important, but other issues are also of concern, notably protection of export rights, fair market access for IPPs, greater customer choice and ensuring sound long term investment practices.

To address these issues, on March 26, 1997 the British Columbia Minister of Employment and Investment, the Honourable Dan Miller (“the Minister”), appointed Dr. Mark Jaccard (“the Advisor”) to head a Task Force mandated to bring forward to the provincial government a package of electricity market reform proposals. The Task Force includes the Advisor, a government-appointed Stakeholder Group of 17 members and a small staff. The Terms of Reference for the Task Force direct the Advisor to seek consensus among the Stakeholders to the greatest extent possible.

The first meetings of the Advisor and Stakeholders took place in April. The Task Force issued its first interim report on June 1, 1997. That report:

- discussed general and B.C.-specific drivers for market reform;
- set out the principal aspirations and concerns of the Stakeholder Group Members (Appendix B);
- summarized the changes the industry is undergoing, focusing on reforms and reform proposals in jurisdictions with

hydroelectric, publicly-owned generation systems and in jurisdictions with trade ties to B.C.; and

- outlined the structure, timeline and process of the Task Force.

During the summer months following the first interim report, the Task Force focused on research and established four Technical Sub-Committees to determine the effect of market reform on, and mechanisms to address potential impacts on:

- domestic electricity prices and the entitlement of B.C. consumers to the province's low-cost resources;
- system operation (reliability, economic dispatch of resources, obligation to serve, fairness for competing generation, load balancing, etc.);
- different groups of customers (without market access, in non-urban areas, in non-integrated areas, in regions that are costly to serve, etc.) and electric sector employees; and
- environmental objectives.

In September and October, once much of the research had been completed (although several specific research objectives exceeded the availability of information), the Task Force focused on negotiations. Unfortunately, by mid-October, after considerable effort by all parties, the Stakeholders acknowledged that consensus would not be achieved as the fundamental views of several parties were too far apart. In late October and early November, the Advisor presented variations of a reform proposal in an effort to find a "package of least resistance" that would find support of almost all parties. This effort was unsuccessful. By mid-November, it became clear that the Advisor should proceed to develop a reform proposal that, in his view,

best satisfied the Terms of Reference. This draft proposal was issued December 19, 1997. The deadline for public comments was set as January 17, 1998. These comments have not lead to significant changes to the draft proposal, which is presented here in this final report as the "Advisor's Reform Proposal".

While the lack of Stakeholder consensus provides greater flexibility to the Advisor in designing the reform proposal, it is the Advisor's belief that the general intent of the Terms of Reference is that he should nonetheless try to design his proposal in ways that take into account key concerns of the Stakeholders (Appendix B). The Advisor's Reform Proposal is developed with this objective in mind. It contains two distinct reform phases.

Phase 1 comprises reforms that should be in place by January 1, 1999. These reforms are similar, but not identical to, reforms contemplated in the earlier "package of least resistance". Although this package was never agreed to in its entirety by any Stakeholder, in the Advisor's view, it came close to bridging the gap between those who felt that little or no restructuring and customer access is needed and those who felt that significant changes are needed. It is the Advisor's recommendation that the government should immediately move to implement all reforms proposed in Phase 1.

Phase 2 comprises further reforms with a target date of January 1, 2001. These reforms achieve the degree of change that, in the Advisor's view, is required to effectively respond to the realities of technological and market change in the electricity sector. The changes contemplated in Phase 1 are an essential short-term response. However, it is the Advisor's view that very soon the government must effectively respond to the calls for independence of common carrier functions, fair access to the market for IPPs,

and direct access to suppliers for those customers who desire it. Thus, there are substantial benefits to British Columbia from the reforms of Phase 2.

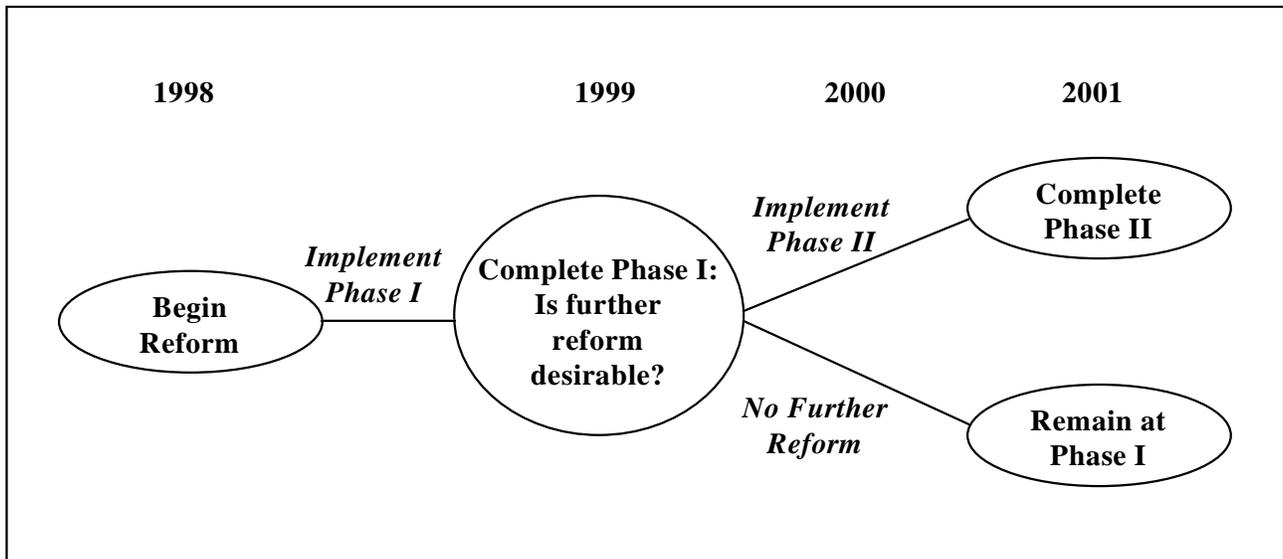
However, the decisions leading to Phase 2 can be delayed until government has had some experience with Phase 1. This flexible strategy is consistent with the principles of adaptive management in the face of uncertainty: information gained from Phase 1 may prompt changes to Phase 2, or the government may decide not to make further changes after Phase 1. This sequential approach to reform decision making is illustrated in the diagram below.

This final report contains the following:

- background information, including the Terms of Reference, the Task Force, B.C.-

specific drivers for reform, and general reform options (chapter 2);

- the Advisor's Reform Proposal (chapter 3);
- an evaluation of the elements in the Advisor's Reform Proposal (chapter 4); and
- a number of detailed appendices describing the estimated impacts of reform on B.C. Hydro dividends (Appendix I), the estimated costs of implementing the reform proposal (Appendix G), the legislative changes necessary to implement the proposal (Appendix H), and the options for addressing environmental concerns in competitive markets, namely mechanisms to foster environmentally desirable technologies and to implement energy efficiency programs (Appendices E and F respectively).



Sequential approach to electricity reform decision making in British Columbia.

2. BACKGROUND

2.1. Developments in Electricity Market Structure and Customer Access

A common way to depict the electricity market is to distinguish five functions: generation, system operation, transmission, distribution and customer service. Their functions are as follows.

<i>generation</i>	production of electricity
<i>system operation</i>	co-ordinated control of generation and transmission to meet demand and maintain reliability, subject to physical laws and constraints
<i>transmission</i>	wires, equipment and services associated with high-voltage electricity transportation
<i>distribution</i>	wires, equipment and services associated with low-voltage electricity transportation
<i>customer service</i>	metering, billing, energy efficiency and energy purchasing services

“Market structure” refers to the number of sellers and buyers in a market. Historically, in the electric industry, all five market functions have been performed by monopolies and in most jurisdictions by a single, “vertically-integrated monopoly”. The economic advantages of large generating units, and disadvantages of multiple sets of transmission and distribution wires, suggest that an efficient monopoly is in society’s best interest, provided that it is prevented from earning monopoly profits, either by public ownership

or regulated private ownership of the monopoly.

British Columbia Hydro and Power Authority (“B.C. Hydro”) and West Kootenay Power Ltd. (“WKP”) are the vertically-integrated utilities that dominate the B.C. market, WKP being about one tenth in size. B.C. Hydro is publicly-owned while WKP is investor-owned. Both are regulated by the BCUC. There are also a few small investor-owned utilities and six municipally-owned distribution utilities, all but one of the latter being supplied by WKP.

The energy source for about 85 percent of generation in B.C. is hydropower, supplemented by wood waste, natural gas, diesel and small amounts of other energy forms. The most important hydroelectric developments are on the Peace and Columbia River systems. The transmission grid is interconnected with those in Alberta and Washington State.

It has been recognized for some time that the arguments in favour of monopoly in transmission and distribution are stronger than those for generation. Over the last two decades, regulators and governments throughout the world have experimented with policies that required vertically-integrated monopolies to supply some portion of their customers’ needs with electricity purchased from IPPs. B.C. Hydro has, on occasion, established competitive processes to select IPPs with whom it signed long term supply contracts. However, B.C. Hydro retains its position as monopoly supplier to final customers.

By the late 1980s, some countries began to look beyond selected purchases from IPPs to

“vertical de-integration”. The argument is that full competition can only occur if the monopoly (common carrier) segments of the industry are separated from the competitive (generation) segments. This prevents what is referred to as “transmission market power”, which occurs when control of transmission is used by one competing generator to sustain an advantage over other competing generators.

By the early 1990s, Norway and England were among the first jurisdictions to create further breaks in the vertical structure of their electricity industries as part of a package of market reforms, separating the transmission and system operation functions from generation. Since then, change in the industry has become commonplace as one jurisdiction after another opts for market restructuring.

Vertical structure is not, however, the only issue in electricity market reform. Another key issue is whether or not customers and competing power producers can deal directly with each other instead of always via the utility. The competitive market model that excludes this direct contact is called “wholesale competition” (“wholesale wheeling”). In this model, generators or marketing agents (retailers) compete to sell to the distribution utility, which then has the monopoly of sales to end-use customers (industrial, commercial, institutional, residential) through its tariffs that bundle together commodity and delivery charges, which are regulated by a utilities commission.

The alternative competitive market model is called “retail competition” (“retail wheeling”). In this model, generators or retailers may sell directly to customers, with the distribution utility delivering the commodity under separate (“unbundled”) delivery tariffs, regulated by a utilities commission. In jurisdictions that are implementing retail competition, it is usually

large industrial customers who first get access to electricity sellers, although the trend is to extend this to all customers. Retail competition is about to be implemented for all customers, for the first time in North America, in California by spring of 1998. Retail competition is now the norm in the natural gas industry throughout North America; it was extended to all B.C. natural gas customers in 1993.

2.2. Recent Developments in British Columbia

The Task Force follows several years of active electricity policy review and development in British Columbia. In the last two years, three significant events stand out. The British Columbia Utilities Commission (“BCUC”) conducted an inquiry for the government into retail competition and market reform. B.C. Hydro applied for and received both a wholesale transmission tariff and a “real time pricing” (“RTP”) tariff, the latter to allow industrials to buy directly from the market under certain circumstances. The provincial government passed legislation to support its intentions to sell power directly from the “downstream benefits” (“DSBs”) owed to B.C. under the *Columbia River Treaty* to new and expanding industrial customers. Each of these is described below.

In 1995, the government had the BCUC conduct a 10 month inquiry into the benefits and risks of retail competition and market restructuring in B.C. In its Electricity Market Review, the BCUC recommended that the market be vertically de-integrated and that fairer wholesale competition be implemented initially. The government did not explicitly respond to the recommendations of the Electricity Market Review until naming this Task Force. However, several of the recommendations were implemented via

B.C. Hydro and the BCUC. The two most significant were the implementation by B.C. Hydro of a wholesale transmission tariff and a RTP tariff for industrial customers.

Recent Electricity Policy Review and Development in British Columbia

- In 1995, the BCUC conducted the Electricity Market Review to inquire into the benefits and risks of retail competition and market restructuring in B.C.
- In 1996, B.C. Hydro applied for and received a wholesale transmission tariff and a RTP tariff to allow industrials to buy directly from the market under certain circumstances.
- In 1997, the Provincial government passed legislation to support its intentions to sell power directly from the downstream benefits of the *Columbia River Treaty* to new and expanding industrial customers.

In early 1996, B.C. Hydro applied to the BCUC for a wholesale transmission tariff, which would require B.C. Hydro to operate its transmission system as a common carrier for anyone who wished to transmit wholesale electricity across or within its system. B.C. Hydro was in part motivated by the “comparable access” requirement of the U.S. Federal Energy Regulatory Commission (“FERC”). This requires B.C. Hydro to provide similar access to its system if it wishes to demand transmission access from other jurisdictions which it needs in order to access the California market. In June 1996, the BCUC accepted B.C. Hydro’s tariff, although requiring some revisions. However, the FERC rejected the application of B.C. Hydro’s export subsidiary, Powerex, for direct access to wholesale markets in the U.S., stating that the new tariff did not fully address its concerns. B.C. Hydro then filed a new application with the BCUC, which was granted interim approval. This was accepted by the FERC in September 1997, when it

awarded Powerex a power marketing certificate, although the BCUC still must hold a hearing to determine its final decision.

In early 1996, B.C. Hydro also applied for a RTP tariff. This allows industrial customers to purchase incremental electricity based on the prices revealed by Powerex spot transactions in the west coast market. Incremental electricity is defined as purchases above the average consumption of the past three years. Where industrials can demonstrate difficult economic conditions, the average may be adjusted downward, effectively allowing them to go to the “spot market” for a much greater share of their load.

In June 1997, the provincial government tabled the *Power for Jobs Development Act*. This Act allows the government to use B.C.'s hydroelectric power, including DSBs, to create jobs and further economic development. Under this Act, new investments in the province consuming more than 35 kilowatts of power may qualify for discount electricity prices. Existing industries in distress may also apply for discount prices. In both cases the prices will be set by the government on a case-by-case basis.

In March 1997, the provincial government launched this Task Force on Electricity Market Reform. The Terms of Reference, presented below, provide the government’s policy framework for the work of the Task Force. They call for greater choice for electricity consumers and reasonable access for electricity producers, while retaining public ownership of the assets of B.C. Hydro and sustaining revenues to the government. Other social and environmental benefits of the existing system should not be put in jeopardy by market reform. Finally, the economic development benefits (job creation, lower prices, returns to crown assets) associated

with assured access to export markets and an economically efficient electricity industry are also of critical concern to the government.

2.3. Terms of Reference

Whereas, in September 1995 the BCUC submitted its report and recommendations to government, The British Columbia Electricity Market Review, which although not advocating the immediate implementation of retail electricity tariffs did advocate significant market reforms of the B.C. electricity market to allow for greater competition among electricity producers and greater customer choice, while ensuring continued public stewardship of the province's hydropower and endowment, maintenance of high reliability standards, unfettered access to export markets for B.C. electricity producers, and continued incorporation of environmental and social considerations in the management and regulation of the electricity producers, and continued incorporation of environmental and social considerations in the management and regulation of the electricity industry.

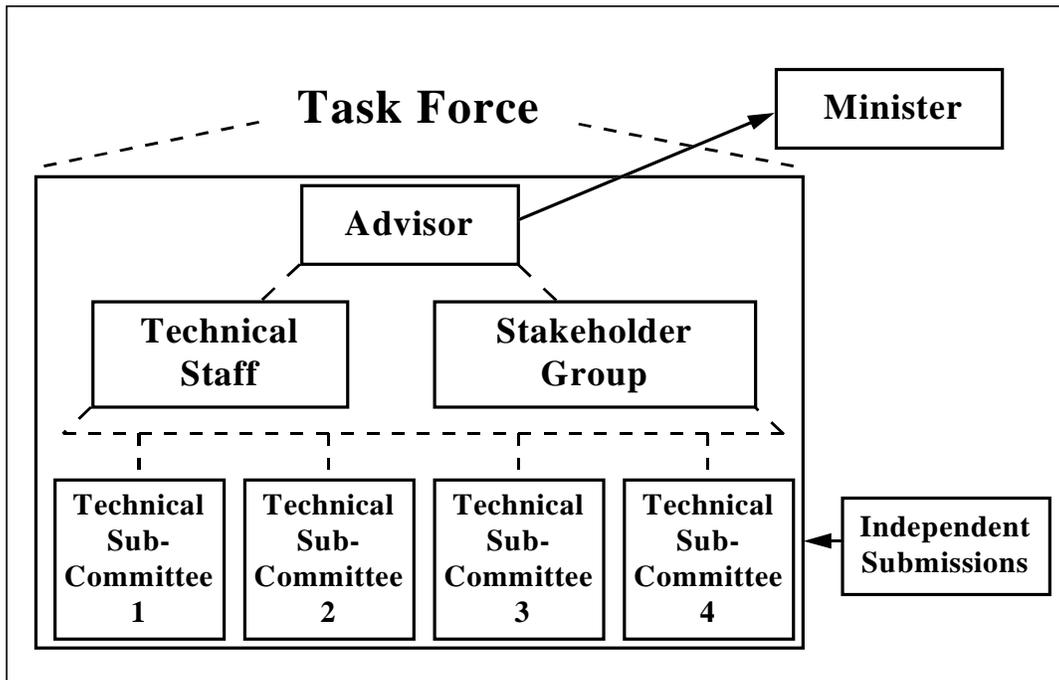
Whereas, in response to applications by West Kootenay Power and B.C.'s large transmission class customers, the BCUC is slated to address the issue of implementing retail competition in electricity in a hearing to commence April 1, 1997, but is unable to address the full complement of market reform issues in the absence of a comprehensive government policy.

Now therefore, the Minister of Employment and Investment appoints Mark Jaccard, as his advisor, charged with the mandate to lead a task force to bring forward to government a package of electricity market reform proposals, including legislative changes if necessary.

The advisor shall undertake this assignment with the following Terms of Reference.

- 1. The advisor shall establish a task force comprised of key stakeholders, as determined by the Minister, and seek consensus to the greatest extent possible on all recommendations to the Minister.*
- 2. The advisory shall review all available current and historical information that is considered relevant to this undertaking.*
- 3. The advisor shall take into account the following objectives:*
 - a) job creation and economic development,*
 - b) greater choice for electricity consumers,*
 - c) continued public stewardship of the province's hydropower endowment,*
 - d) maintenance of high reliability standards,*
 - e) reasonable access for electricity producers,*
 - f) access to export markets for B.C. electricity,*
 - g) continued incorporation of environmental and social considerations in the management and regulation of the electricity industry.*
- 4. The advisor shall be bound by the following constraints:*
 - a) continued public ownership of the assets of B.C. Hydro,*
 - b) no negative impact of B.C. Hydro's dividends to the province (water rentals, dividends, taxes, grants in lieu of taxes),*
 - c) no adverse effects on specific classes of customers or customers in particular regions,*

- d) no adverse effects on electric sector employees.
- 5. The advisor shall seek to meet the following timetable:
 - a) submit a first Interim Report by June 1, 1997, listing options and recommendations,
 - b) submit a second Interim Report by November 1, 1997, providing a detailed outline of proposed market reforms,
 - c) submit a detailed final report by December 31, 1997 providing a comprehensive description of proposed market reforms including draft legislation.
- 6. The advisor shall consider any other matters that may be specified in supplementary Terms of Reference.

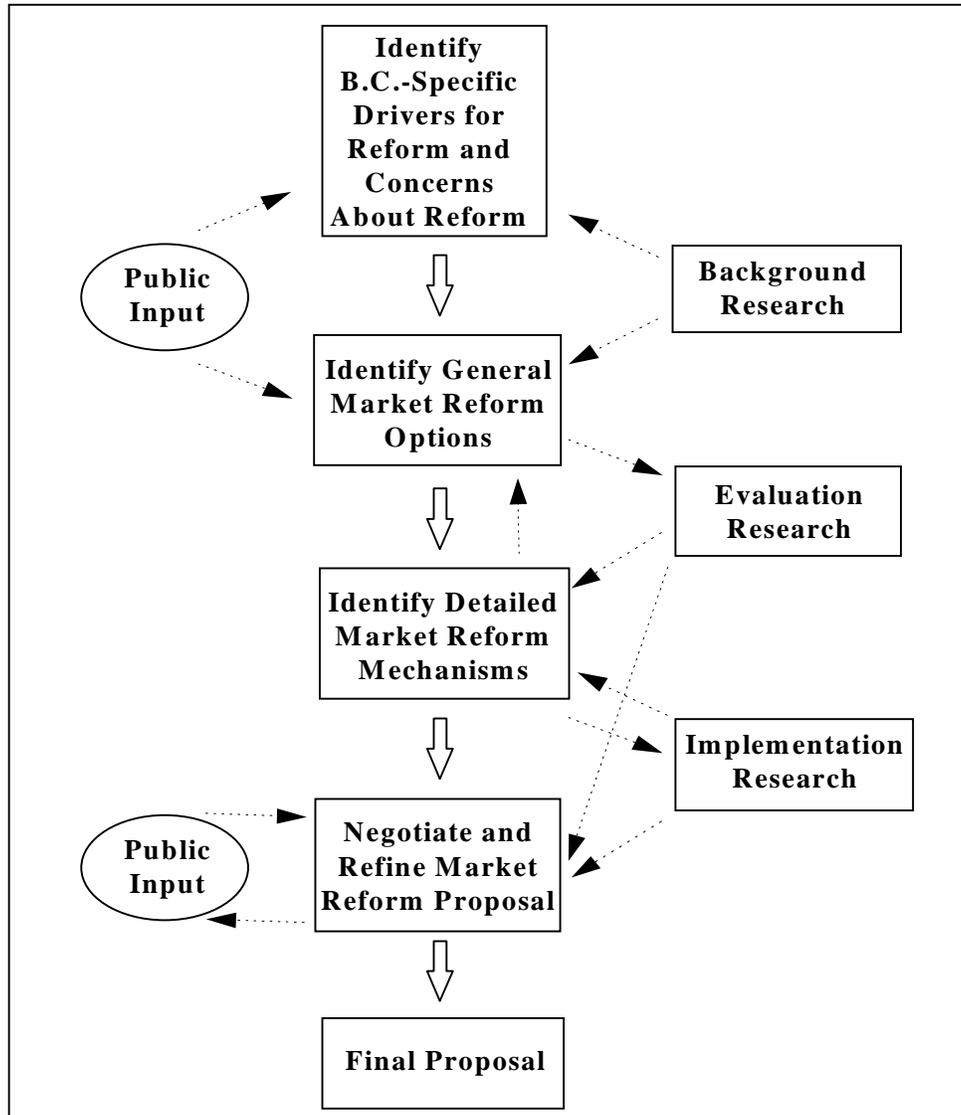


Structure of the British Columbia Task Force on Electricity Market Reform.

2.4. Task Force Structure, Process and Timeframe

The figure above describes the Task Force structure. The Advisor is responsible for presenting a market reform package to the Minister, seeking consensus to the greatest extent possible among the Stakeholders.

The Stakeholders were selected with the goal of providing broad coverage of the diversity of British Columbian interests with respect to the issue of electricity market reform. However, there is no presumption that this coverage is complete. Several other groups have argued for representation. The Task Force process was designed to provide several opportunities for public input in addition to Stakeholder participation. This is depicted in the figure on the following page.



Task Force process.

First, public input in the form of letters and longer submissions was encouraged and accepted throughout the process; individuals who expressed an interest were included on a mailing list for key information. Second, the Task Force has a Web page providing key information. Third, the Advisor held open houses in several communities throughout the province during September and October. Fourth, advertising asked for submissions for a two day open forum in Vancouver in late September. Fifth, the second interim report provided an opportunity for public

commentary on the draft of the Advisor's Reform Proposal.

Further details on the Task Force process are provided in Appendix C, which describes the activities of the Stakeholder Group and the Technical Sub-Committees, and Appendix D which outlines the schedule of community visits and public forums and provides a list of individuals and organizations that have provided the Task Force with their input. The next figure shows the timeframe for the various stages of the Task Force.

Project Step	Start	Finish	Month/Year					
			4/97	6/97	8/97	10/97	12/97	02/98
Task Force Composition And Process Determined	1/4/97	25/4/97	—					
Stakholder Group Meetings	25/4/97	5/11/97	—————					
First Interim Report	1/5/97	1/6/97	—*					
Work of the Technical Sub-Committees	2/6/97	10/10/97	—————					
Development of Market Reform Proposal (Second Interim Report)	1/6/97	15/12/97	—————*					
Final Report	16/12/97	31/01/98	—————*					
			* Indicates a Deliverable					

Timeframe of the Task Force.

2.5. Drivers for Change in British Columbia Today

As noted in the Introduction (Chapter 1) the erosion of the argument for monopoly in generation is the primary force driving electricity market reforms throughout the world. This explains why so many jurisdictions are now following the path first taken by countries such as England and Norway. However, the rationale for reform will be different depending on a jurisdiction's current prices, its technologies and resources, its trading potential, as well as other factors.

The Stakeholder Group discussed what factors, if any, might be relevant to British Columbia. There was not complete agreement among the Stakeholders that the four "B.C.-specific drivers for change" listed

below are of equal weight, nor that any or all are sufficient justification for significant market reforms in B.C. Nonetheless, there was a general agreement that each of these was of some concern and needed to be addressed in some way.

Market reforms continue in jurisdictions from which British Columbia receives substantial net benefits from electricity trade. Reciprocal arrangements may be necessary to ensure that access to markets in those jurisdictions is preserved. Therefore, market reforms that ensure maximum trade benefits, and that do not sacrifice other domestic objectives, are desirable. Some reforms, which have already been implemented, notably B.C. Hydro's wholesale transmission tariff, were motivated by the need to retain and improve access to importing jurisdictions in the U.S. Additional reforms in B.C. may

be required by jurisdictions, such as California, that develop retail competition and demand reciprocal reforms as a condition of market access.

Drivers for Change in B.C.

- Market reforms continue in jurisdictions from which British Columbia receives substantial net benefits from energy trade, and reform may be necessary to maintain access to markets in those jurisdictions.
- British Columbian electricity customers should have a greater choice in determining their response to electricity supply investment risk.
- British Columbian industrial, and some commercial, electricity customers desire a fuller range of market-based electricity purchase options.
- IPPs and marketers in British Columbia (current and prospective) want fair access to customers.

British Columbian electricity customers should have a greater choice in determining their response to electricity supply investment risk. Competition in generation can allow customers to determine for themselves their response to generation investment risk by taking long or short term contracts and preferring one technology over another. As in other markets, it is likely that much of the risk of misinvestment will in future reside with the shareholders of electricity generation companies instead of resting almost completely with the captive customers of a monopoly, as is currently the case in the vertically-integrated monopoly market structure model. With reform, the misinvestment costs of Ontario Hydro, for example, would be a loss for shareholders, not an obligation to be paid by customers.

Many industrial, and some commercial, electricity customers in B.C. desire a fuller range of market-based electricity purchase options. Based on their experience in the regulatory process, these customers do not believe that these options can be achieved via regulated tariffs from vertically-integrated monopolies. In their view, the necessary contract flexibility can only be found through retail competition. Given the cyclical nature of the markets in which some of these British Columbian industries operate, flexible contracting options may improve their ability to weather economic downturns, thereby protecting domestic jobs.

IPPs and marketers in British Columbia (current and prospective) want fair access to customers. They ask why, given the technological change in the electricity market, they should continue to be barred from competing to provide value to customers. They believe that they should be allowed to compete, and that if there are any potential negative impacts on other social or environmental objectives, that these can be mitigated by various mechanisms, as has occurred in other jurisdictions implementing electricity market reform.

2.6. Key Elements of Electricity Market Reform

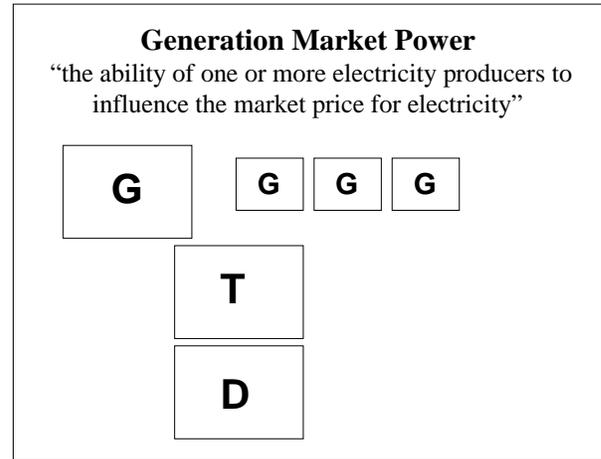
Electricity market reforms in other jurisdictions can be characterized in a general way by the following four issues.

1. Determination of whether or not any publicly-owned assets should be privatized.
2. Achievement of competitive electricity commodity prices in an effectively functioning de-regulated market (prevention of “generation market power” in determining prices).

3. Determination of the changes in industry structure that are necessary to ensure that the common carrier functions related to the grid are not used to distort or prevent fair competition (prevention of transmission market power in determining market share).
4. Determination of the extent to which customers will be allowed direct access to producers and retailers for commodity supply.

As for the first issue, the Terms of Reference are clear that the provincial government will not privatize B.C. Hydro assets. This issue is outside the mandate of the Task Force. This does not prohibit, however, reforms that provide market access for IPPs, be they privately- or publicly-owned. Indeed, the Terms of Reference have as an objective reasonable access for electricity producers. It is important to note that substantial market reforms have been enacted in other jurisdictions without noticeable changes to predominantly public ownership. Examples include Norway, Sweden, New Zealand's hydropower resources and New South Wales, Australia.

As for the second issue, the Terms of Reference have also significantly reduced the reform options of the Task Force. Market reform in some jurisdictions is associated with efforts to break up the generation resources into a sufficient number of players to create a competitive market ("horizontal de-integration"). The objective is to ensure enough sellers such that one or more electricity producers cannot influence the market price of electricity (generation market power). The next figure depicts a situation in which one producer is too large relative to the total size of the market.



Retaining B.C. Hydro's hydropower resources in public ownership means that horizontal de-integration would require several competing publicly-owned hydropower companies. Although a few Stakeholders were interested in exploring this option, the Advisor and most Stakeholders were not of the opinion that this would lead to effective competition. Thus, horizontal de-integration is not explored in detail in this reform proposal. Instead, the central issue is how to achieve competitive prices, while retaining access of domestic consumers to the low cost domestic hydropower resources. This is achieved, in part, by retaining price regulation of much of the generation resources and using competition at the margin to moderate competitive market prices.

It is thus the third and fourth issues which define the policy challenge of the Task Force. Within the options examined for determining market structure and customer access, other social values and concerns must also be addressed, including environmental protection, rate equity, access to export markets, customer protection and job security.

The following matrix illustrates the possible combinations of reform models with respect to customers access and market structure (degree of vertical de-integration). All four quadrants of the matrix are possible.

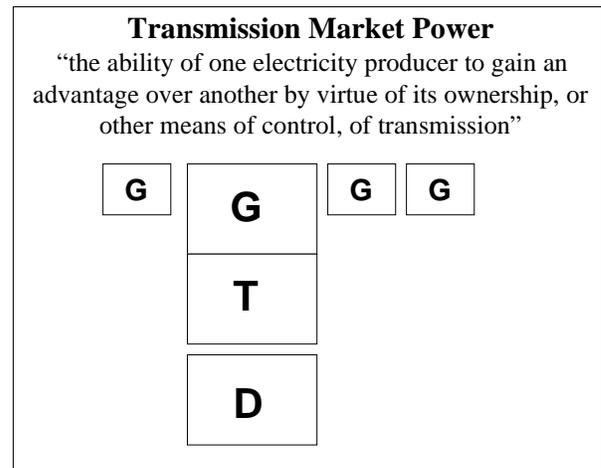
	VERTICALLY-INTEGRATED MARKET STRUCTURE	VERTICALLY-DE-INTEGRATED MARKET STRUCTURE
RESTRICTED CUSTOMER ACCESS	<ul style="list-style-type: none"> • functional separation of common carrier functions related to grid • no or very limited retail access 	<ul style="list-style-type: none"> • corporate separation of common carrier functions related to grid • no or very limited retail access
UNRESTRICTED CUSTOMER ACCESS	<ul style="list-style-type: none"> • functional separation of common carrier functions related to grid • access to all customers 	<ul style="list-style-type: none"> • corporate separation of common carrier functions related to grid • access to all customers

Matrix of possible market reform models.

The top left cell of the matrix represents approximately the current situation in B.C. B.C. Hydro has carried out functional separation of its grid-related common carrier functions (system operation and all related services, transmission costing, transmission rate design, transmission planning) from its generation and distribution functions. At the same time, B.C. Hydro remains a vertically-integrated company, with the transmission vice-president serving on the corporate management committee alongside other executives of the company. As for customer access, B.C. Hydro does not allow direct market access to consumers.

The bottom left cell of the matrix represents a situation in which B.C. Hydro would remain vertically-integrated but would allow full market access to its customers, starting first with industrial customers. This would appear to satisfy some of the concerns of both customers and IPPs. It would require a mechanism to address the generation market power problem, but that will be required under any reform given the Terms of Reference. However, it does not include the mechanisms necessary to address the transmission market power problem illustrated in the next figure. Industrial customers, IPPs, and independent observers

argue that effective and fair competition cannot occur without a minimal degree of vertical separation so that common carrier grid-related functions are not coordinated with the generation division of B.C. Hydro to the detriment of competing producers and all customers. This also may be eventually interpreted as unfair by U.S. regulators, threatening B.C.'s export revenues.



The top right cell of the matrix represents a situation in which B.C. Hydro would vertically de-integrate but would not allow direct market access by its customers. This is effectively the wholesale competition model.

This model may satisfy the Term of Reference calling for reasonable access for electricity producers, if the mechanism for selecting suppliers to B.C. Hydro's regulated distribution company is seen as independent and fair. IPPs, both publicly- and privately-owned, do not have confidence that this would be the case. However, this model does not satisfy the Term of Reference calling for customer access. All customers would be captive to the supply purchasing decisions of the distribution monopoly. This reduces the flexibility for industrial customers to respond to changing market conditions in terms of their supply contracting and may, therefore, also fail to satisfy the economic development Term of Reference. It is interesting to note that Alberta, which became, in 1994, the only North American jurisdiction to implement the wholesale competition model, is now working on a reform to retail competition. Similarly, wholesale competition in natural gas shifted to retail competition throughout Canada as some customers successfully lobbied for market access, and this soon was extended to all customers.

The bottom right cell of the matrix represents a situation in which B.C. Hydro would vertically de-integrate and allow full market access to its customers, starting first with industrials. This meets the Terms of Reference calling for reasonable access for electricity producers, greater customer market access, access for electricity exports and economic development. It is believed by some to cause the greatest threat to other social values associated currently with our electricity system as identified by various other Terms of Reference, namely those calling for maintenance of reliability, protection of smaller consumers, protection of consumers in high cost regions, protection of the environment, and security for electric sector employees. Therefore, the critical issue becomes the extent to which the reform

implied by the bottom right cell of the matrix can be achieved with little or no negative impact on the other, constraining Terms of Reference.

It is the Advisor's view that the B.C. electricity market requires both vertical de-integration and customer market access in order to meet the Terms of Reference calling for reasonable access for producers, greater customer access, electricity export access and economic development. Furthermore, the Advisor believes that the necessary reforms in this regard can be achieved without jeopardizing the other objectives and constraints stated in the Terms of Reference. The elements of the Advisor's Reform Proposal are presented in the next section. The section after that provides an evaluation of this proposal and considers why, in the view of the Advisor, it represents the best compromise between the concerns and aspirations of the Stakeholders and all British Columbians.

3. ADVISOR'S REFORM PROPOSAL

3.1. Customer Access

With the demise of the rationale for monopoly in generation, there is no justification for preventing buyers and sellers of electricity from trading with each other if they wish to do so. The positive economic impacts of customer access are substantial and mechanisms can be developed, and have been developed elsewhere, to prevent or offset any social or environmental effects. Any costs that may arise from the adjustment to allowing direct market access should not be borne by

customers who remain on utility tariffs, except insofar as these other customers may also benefit from such trades (downward pressure on prices in general, less risk, etc.). This reform proposal suggests that market access should start with large customers, and then be extended to other customers if it is demonstrated that it can be done cost-effectively and to the benefit of all. This would be a similar model to the reform of the natural gas industry in B.C. over the last decade.

Customer Access

Phase I (January 1, 1999)

- all industrial load eligible for market rates, but 50% of purchases must be from B.C. Hydro or WKP power supply
- B.C. Hydro and WKP resources freed by customers going to market are no longer price regulated
- all tariff sales remain price regulated by the BC Utilities Commission
- BC Utilities Commission to ensure no cross-subsidy between tariff resources and non-tariff resources
- B.C. Hydro and WKP to redesign commercial class to distinguish large commercial customers

Phase 2 (January 1, 2001)

- restriction of 50% sales from B.C. Hydro or WKP eliminated
- BC Utilities Commission to have decided if large commercial customers to have market access

Phase 1: (by January 1, 1999)

- As soon as possible, and no later than Jan.1, 1999, 50% of total existing industrial load (existing defined as 50% of average total B.C. Hydro 1821 customer load - and WKP equivalent - during the period 1995-1997), and all incremental or new load, shall be allowed to switch to non-B.C. Hydro / WKP suppliers. Subject to the above constraint, all present and former industrial customers have the right to negotiate conditions of commodity supply from B.C. Hydro / WKP and any other supplier (i.e., leave the regulated tariffs of B.C. Hydro). Customers seeking non-tariff supply may do so for all or part of their load. Any partial shift must be done fairly so as not to cause a detrimental and material impact on the remaining customers.
- For retail sales, B.C. Hydro / WKP shall develop unbundled commodity and transmission tariffs and related charges for approval by the BCUC.
- Customers who leave B.C. Hydro and WKP commodity tariffs must negotiate with B.C. Hydro and WKP to return to these tariffs. On application, the BCUC may examine whether industrials negotiating with B.C. Hydro or WKP for return to tariffs have adequate access to competitive suppliers and whether the terms offered by B.C. Hydro / WKP are fair and reasonable under the circumstances.
- Customers who remain on B.C. Hydro / WKP tariffs retain full entitlement to the low cost resources of the utilities, at cost-based rates regulated by the BCUC.
- Commodity sales to non-tariff customers shall not be price-regulated by the BCUC. Resources which provide tariff

requirements must not subsidize non-regulated commodity sales.

- WKP shall provide wholesale and retail access on the same principles and the same contract demand eligibility criteria prescribed above for B.C. Hydro.
- The BCUC shall require B.C. Hydro / WKP to re-examine the basis and definition of their rate classes. A specific objective of the review will be to identify and separate large commercial customers into a rate class which may eventually be eligible for market access.

Phase 2: (by January 1, 2001)

- The 50% restriction on industrial customers will no longer be in force.
- The BCUC shall determine and set changes to market access. A key determination will be the degree of market access, if any, to be accorded to large commercial customers.

3.2. Market Structure: Addressing Transmission Market Power

Phase 1: (by January 1, 1999)

The development of competitive wholesale and, increasingly, retail electricity markets requires sufficient independence and impartiality of common carrier functions at the grid level (system operation, transmission planning, transmission tariffs) to prevent abuse of transmission market power. B.C. Hydro has already achieved some degree of functional separation, especially for system operation, as part of the development of its wholesale tariffs. Further separation and ultimately independence of these common carrier functions is necessary for the next

phase in the development of competitive generation markets. To achieve a minimal degree of independence and impartiality of the grid-related common carrier functions of B.C. Hydro and WKP, without vertical de-

integration of these corporations, further vertical separation is required along with the creation of an independent oversight committee.

Market Structure

Phase 1 (January 1, 1999)

- further functional separation of B.C. Hydro and WKP grid-related, common carrier functions (system operation, transmission planning, transmission tariffs)
- creation of a Grid Oversight Committee
- creation of a BC Power Exchange

Phase 2 (January 1, 2001)

- publicly-owned, BC Grid Company created from B.C. Hydro assets (leases WKP assets), responsible for system operation, transmission planning, transmission tariffs and BC Power Exchange
- BC Grid Company board of directors named from interests represented on Grid Oversight Committee (this latter is eliminated)
- BC Grid Company is fully regulated by the BC Utilities Commission

Further functional separation of B.C. Hydro and WKP without vertical de-integration

In order to ensure the further functional separation of grid-related common carrier functions, B.C. Hydro and WKP shall be reorganized in the following manner.

- The Transmission and Distribution Business Unit of B.C. Hydro shall be split into two separate business units. The determination of asset allocation between distribution, generation and grid-related common carrier functions remains, as always, the responsibility of the BCUC.
- The new Transmission Business Unit, which will include Grid Operations and Interutility Affairs and its System Control Department, will report directly to the

B.C. Hydro CEO and will not fall within the responsibility of the Corporate Management Committee.

- The new Distribution Business Unit (and other existing business units, such as Power Supply and Marketing and Customer Service) would continue to fall within the responsibility of the Corporate Management Committee.
- Equivalent separation for WKP's grid-related functions shall be implemented simultaneously.
- There will be no change in ownership of B.C. Hydro or WKP grid-related assets.

Creation of an independent Grid Oversight Committee

In order to ensure greater independence and impartiality of decision making with respect to the grid-related common carrier functions of B.C. Hydro and WKP (effectively the decisions of the B.C. Hydro Transmission Business Unit), a “Grid Oversight Committee” should be created.

- A Grid Oversight Committee shall be appointed by government from lists of candidates put forward by the interests represented on the committee. It will consist of one representative each from the following, with decisions by majority vote:
 - B.C. Hydro
 - WKP
 - IPPs
 - Industrial customers
 - Commercial customers
 - Residential customers
 - Municipal utilities
- Costs of the Grid Oversight Committee shall be recovered from suppliers and users of direct market access.
- The Grid Oversight Committee shall review transmission grid operation throughout B.C. to ensure the impartiality of allocation and dispatch decisions.
- The Grid Oversight Committee shall review and seek coordination of transmission expansion plans put forward by utilities or others.
- The Grid Oversight Committee shall review transmission reliability plans of the utilities.
- The Grid Oversight Committee shall be consulted in the development of all major regulatory initiatives of the B.C. Hydro and WKP Transmission Business Units.

- Where differences of view occur between the Grid Oversight Committee and the B.C. Hydro and/or WKP Transmission Business Units, the route of appeal for the Grid Oversight Committee shall be first to the CEO of B.C. Hydro and the CEO of WKP, and then to the BCUC.
- The Grid Oversight Committee shall submit an annual report to the Minister of Employment and Investment on the operation of the system and the work of the committee.
- The Grid Oversight Committee shall also oversee the operations of the B.C. Power Exchange (see sections below).
- The Grid Oversight Committee shall have the authority to acquire advisory and consultant services as required to assist in its oversight role.
- The Grid Oversight Committee shall have a consultative role in the selection of consultants by B.C. Hydro and WKP Transmission Business Units for reviewing grid-related activities or preparing grid-related regulatory applications.
- All grid-related tariffs and charges shall remain under the regulatory domain of the BCUC.

Creation of a B.C. Power Exchange

A new agency (call it the “B.C. Power Exchange”, “BCPE”) shall be created. It will be a market-making agency for sellers and buyers accessing the transmission grid in B.C.

- Initially, the BCPE will be developed and jointly operated by the Transmission Business Units of B.C. Hydro and WKP, with ongoing review by the Grid Oversight Committee, and regulation by the BCUC.

- During the start-up phase of direct access, B.C. Hydro will settle imbalance accounts as requested using an RTP-like index on both over and under delivery within 10% of bilateral deal volumes. Greater imbalances will be settled between buyers and sellers.
- B.C. Hydro will provide “ancillary services” until the BCUC decides that the market for ancillary services has sufficiently developed.
- Participation in the BCPE is voluntary.

Phase 2: (by January 1, 2001)

Experience elsewhere suggests that the measures outlined in Phase 1 are not as effective as simply creating a separate corporation responsible for grid-related common carrier functions in the electricity sector. The government can delay this decision for the next two years, but it is recommended that this corporate separation be completed by January 1, 2001.

This restructuring need not be costly, has no risk of social or environmental impacts, and dramatically clarifies the functions and missions of the corporate entities that comprise B.C. Hydro. In particular, the generation and electricity marketing entities of B.C. Hydro, once freed from the regulated common carrier activities, can become truly effective competitors both domestically and in other jurisdictions. In turn, the entity responsible for the grid achieves a clarity of mission that relates to its responsibility for addressing the interests of all network users.

Corporate vertical de-integration of B.C. Hydro and WKP to enable the establishment of an independent, publicly-owned B.C. Grid Company

- The Transmission Business Unit of B.C. Hydro will become a separate, publicly-

owned corporation, with a separate board of directors (call it “B.C. Grid Company”). B.C. Grid Company leases the necessary grid-related assets of WKP.

- The Board of Directors of B.C. Grid Company will be appointed by the Minister of Employment and Investment, ensuring coverage at a minimum of the interests represented on the Grid Oversight Committee.
- B.C. Grid Company will be responsible for all grid-related, common carrier and market functions, including system operation, transmission planning and investment, transmission tariffs, and operation of the BCPE.
- B.C. Grid Company will be fully regulated by the BCUC. Any changes to the *Utilities Commission Act* necessitated by this reform must be implemented. One amendment to the *Utilities Commission Act*, or a Special Direction from the provincial government to the BCUC, shall ensure that the return to the shareholder(s) of B.C. Grid Company’s assets are protected from decisions by B.C. Grid Company’s board of directors that are ruled imprudent by the BCUC.

3.3. Social Concerns

The Advisor believes that customer market access and the measures to mitigate transmission market power in both Phases 1 and 2 of this reform proposal do not adversely affect any of the social benefits associated with the current market structure of the B.C. electricity industry. Nonetheless, some mechanisms should be put in place to guarantee this.

Social Concerns

Phase 1 (January 1, 1999)

- retains entitlement of tariff customers to the low cost generation resources of B.C. Hydro and WKP
- BC Utilities Commission retains control over all tariff policies, including postage stamp rates, system extensions, connections, etc.
- BC Utilities Commission retains authority over system reliability and security of supply
- BC Utilities Commission retains authority for consumer protection
- no effect on employment prospects for electric sector employees

Phase 2 (January 1, 2001)

- no additional changes required

Phase 1: (by January 1, 1999)

Impacts on Electricity Consumers

- This market reform package does not require or include any change from the existing postage-stamp retail rates, extension charges, connection charges and other service charges of B.C.'s electric utilities, as determined by the BCUC.
- There will be continued access to the regulated, "embedded cost" tariffs of B.C. Hydro and WKP (for those customers who do not switch to direct access). Evidence suggests that the likely movement of tariffs during the period of reform will be downward.
- Customers who depart from B.C. Hydro and WKP supply are not entitled to bring with them any of the benefits associated with the low embedded costs of the B.C. Hydro and WKP generation resources.
- Reforms to the *Utilities Commission Act* (see section on legislative reform below) will provide the BCUC with the authority to ensure that deregulated electricity commodity market activity is effectively

competitive and protective of the interests of consumers. Market access in this reform proposal is limited to customers (industrial and possibly large commercial in Phase 2) who have considerable experience in dealing in competitive energy commodity markets, most notably with natural gas.

Impacts on Electric Sector Employees

- As the market place changes, electric utilities should not be restrained from competing fairly in non-regulated areas (fairly means that the utility should not be allowed to transfer resources from, or risk to, its captive monopoly customers in order to participate in non-regulated markets). With this qualification, allowing utilities to fairly compete in non-regulated markets can create job opportunities for utility sector workers.
- B.C. Hydro must commit to fostering an atmosphere of security and trust with employees by agreeing to successor status for any portion of its new or existing business which it spins off, along with a proactive program to deal with the

transition in the work place. This would include developing options for employees affected by the change in the industry, beginning with best efforts to find comparable suitable positions with B.C. Hydro, its subsidiaries or subsequent joint ventures. B.C. Hydro must create strategies to assist the employee(s) affected, including training strategies, thus enhancing success through a transition period. If a suitable comparable position is unavailable, B.C. Hydro should either find another position within the organization, or provide a combination of retraining (for outside employment) and a severance package.

Economic Development

This reform package is focused especially on the goal of economic development. Job creation in the B.C. electricity sector has been stymied by tension (and the resulting investment uncertainty) between B.C. Hydro, IPPs, industrial customers, the BCUC, and the Ministry of Environment, Lands and Parks. This reform resolves this impasse, creating a framework in which various kinds of labour intensive economic activity will occur. The Grid Oversight Committee, the Ministry of Employment and Investment and the BCUC should be especially focused on facilitating developments in the following areas in conjunction with this reform proposal.

- The economics of “cogeneration” projects by industrial and large commercial customers will improve because of access to the spot market for load balancing and other ancillary services. These projects are more labour intensive than traditional electricity generation megaprojects.
- Small hydro projects will now have access to the market. These also tend to be more labour intensive than electricity megaprojects.

- Wood waste projects will now have access to the market. Investment in new incineration technologies has been mandated by the Ministry of Environment, Lands and Parks and desired by many forest communities because of local air quality concerns. Even though small wood waste electricity generation projects are unlikely to be highly profitable, municipal governments (for motives of air quality and job creation), the forest industry (to conform to environmental regulations), and the provincial government (as part of its forest community jobs strategy) may all be willing to contribute to improving returns on investment. The resulting employment and economic development will be distributed around the province.
- Other public and private independent power companies (Columbia Power Corporation, Westcoast Energy, smaller IPPs) will now have access to the market and be more likely to invest under this reform proposal.
- More energy efficiency initiatives will be forthcoming, given the recognition that environmental costs should also be a factor in the determination of energy efficiency potential. These activities are more labour intensive than electricity generation projects.
- This reform package maximizes the chance that electricity intensive industrial and commercial activities will be sustained. These firms will now have the opportunity to purchase on the short-term spot market when the very cheapest available electricity is required to maintain operation. These firms will also have greater flexibility in designing supply contracts that hedge or transfer some of the risks associated with electricity price fluctuations.

Legislative Reform of the B.C. Utilities Commission Act

The *Utilities Commission Act* has proven itself to be effective in the development of commodity competition in natural gas, including the exercise of important consumer protection responsibilities. Nonetheless, some amendments to the Act will help to further strengthen the BCUC's consumer protection responsibilities. The government should immediately establish a committee to design the necessary amendments to the *Utilities Commission Act* and the legislation should be in place by January 1, 1999. It should include the following.

- Clarification and strengthening of the BCUC's authority to control marketing practices in energy commodities and to ensure other forms of consumer protection.
- Clarification of the BCUC's role as a mechanism for government "social costing" policies, especially with respect to "integrated resource planning" ("IRP") and rate design.

Appendix H provides a summary of the legislative measures necessary to implement Phase 1 of the proposed reforms, including changes to existing legislation.

Phase 2: (by January 1, 2001)

No additional reforms to address social impact concerns are required in Phase 2.

3.4. Environmental Concerns

As experience throughout the world has shown, the environmental challenge from electricity market reform relates to the choice of generation technology. The regulator of a vertically-integrated electric utility often

required the utility to consider environmental impacts when determining its next generation investment (or power purchase) and the operation of existing generation units. The utility regulator loses this control over generation under direct access, when individual consumers are free to determine with which generator they will contract. This is why jurisdictions that have allowed direct market access for some customers have tended to include, as part of reform, a mechanism to foster electricity generation technologies that have less negative environmental impacts. This reform proposal includes a "portfolio standard" to provide market share guarantees for competing "environmentally desirable technologies" ("EDTs"). There are compelling arguments that the captive tariff customers, in the absence of market access, should be provided with options that would allow them to pay extra to provide additional support to preferred technologies, to develop, if feasible, their own electricity generation potential, and/or to support fish enhancement. Therefore, this reform proposal also has a green rate option, a net metering option, and an option for customers to support a fish enhancement program.

Energy efficiency programs are only at risk under market reform if the costs of such programs are added to the costs of only one of the competing producers. This would be the case if the former monopoly utility were still responsible for energy efficiency, and the costs of such programs were added to the cost of its electricity sales. That is why jurisdictions which are moving to allow direct market access are recovering the costs of energy efficiency from use of the transmission and distribution wires. The most common practices are either energy efficiency efforts by the regulated utility, or energy efficiency activities of a separate agency, funded by a "non-bypassable wires charge". This reform

proposal includes efficiency efforts both by the distribution utility and by a public agency (call it “BC21-Energy Efficiency”, “BC21-EE”). BC21-EE, funded by a non-bypassable wires charge and government revenue, is

responsible for additional energy efficiency efforts that are primarily justified on environmental grounds.

Environmental Concerns

Phase 1 (January 1, 1999)

- distribution utilities to retain responsibility for energy efficiency programs justified on the basis of utility costs or customer costs, as regulated by the BC Utilities Commission
- a new agency, BC21-Energy Efficiency, responsible for additional energy efficiency justified when environmental impacts are more fully included
 - public agency
 - total annual budget of \$15 million
 - budget 1/3 from government and 2/3 from a wires charge on customers
 - tenders work to energy service companies
- guaranteed market share (portfolio standard) for “environmental desirable technologies”
 - technologies include wood waste, small hydro, cogeneration, resource additions at existing large hydro, solar, tidal, geothermal, landfill gas, and wind
 - every seller of electricity required to include minimum percent from these technologies, or buy a credit
 - minimum market share set at 5% of sales in first five years, climbing to 15% by 2015
- B.C. Hydro and WKP required to come forward with tariff options for net metering, green power and fish enhancement

Phase 2 (January 1, 2001)

- BC21-Energy Efficiency mandate extended to include natural gas

Phase 1: (by January 1, 1999)

EDT Portfolio Standard

Market analysis suggests that if customers having direct access were to seek alternatives to B.C. Hydro or WKP supply, the most likely candidate for future investment is natural gas based technologies (combined cycle and simple cycle condensing turbines). The

impact would be a dramatic increase in the amount of greenhouse gas emissions from B.C.'s electricity sector. It is expected that emissions will increase from the current level of about 2

megatonnes/year to 6-10 megatonnes/year by 2010, depending on financial and market conditions. Yet, there are many electricity generation options in B.C. that are relatively environmentally desirable and which are very

close to cost competitiveness with natural gas turbines. An EDT is defined as an electricity generation technology that has no net greenhouse gas emissions, no net impact on local or regional air quality, only minor impacts on watersheds or landscapes, and no contribution to toxic waste buildup. EDTs include biomass (wood waste), environmentally-benign hydroelectricity (see Appendix F for definition), cogeneration retrofits to existing combustion of natural gas (and other fossil fuels), landfill and sewage gas generators, solar, wind, geothermal and tidal. A mechanism is required to stimulate the market penetration of EDTs. Research in B.C. and elsewhere indicates that a portfolio standard (market share guarantee) is the most cost-effective and administratively simple means of fostering EDTs.¹

- An EDT must be certified by Environment Canada under its Green Power Environmental Choice consumer product labeling scheme, or by the B.C. Ministry of Environment, Lands and Parks.
- A minimum percentage of electricity sold by any retailer of electricity in B.C. (including B.C. Hydro and WKP to all their end-use customers, be these via tariffs or direct sales) must be derived from EDTs. In this proposal, this requirement is set at the following levels:

1998 - 2004	-	5 %
2005 - 2009	-	10 %
2010 - 2014	-	15 %

- Retailers of electricity who do not have EDT generation facilities can purchase EDT credits from producers or those retailers having excess credits. The Transmission Business Unit of B.C. Hydro (Phase 1) and eventually the B.C.

Grid Company (Phase 2), will facilitate the market for trading EDT credits.

- The rate impact of this program for B.C. residential customers is estimated to be about .1 ¢/kwh over the next decade, about \$1 per month per residential customer.

Net metering

Electricity can be generated on-site in many ways. Consumers should be allowed and encouraged to explore “self-generation” based on EDT resources. “Net metering” is a billing approach that charges customers for their net electricity consumption in each billing period, allowing their self-generation to “reverse the flow” of the meter at certain times.

- The distribution entities of B.C. Hydro and WKP shall implement net metering tariffs for all customers, with regulation by the BCUC.
- A “time-of-use” meter may be required (as determined by the BCUC) to ensure that other ratepayers are not subsidizing those who adopt net metering. The net metering customer must pay the cost of the meter and any required safety equipment.

Green power

This reform proposal does not provide small consumers with choice of electricity supplier. Yet survey research shows that some consumers are willing to pay a premium over and above their tariff rate in order to support EDTs. The EDT portfolio standard only goes a small way toward including the social and environmental costs of electricity generation. Individual customers should also have an option of paying extra to support the technology of their choice.

- The distribution entities of B.C. Hydro and WKP shall implement “green power”

¹ Andrew Pape. 1997. “Implementing Sustainable Energy in Competitive Electricity Markets”.

tariff options for all customers, with regulation by the BCUC.

- Resources must be certified by Environment Canada under its Green Power Environmental Choice consumer product labeling scheme, or by the B.C. Ministry of Environment Lands and Parks.
- Resources benefiting from green power support are not eligible for inclusion in an EDT portfolio.

Fish Enhancement Program

British Columbians have become increasingly concerned with the survival of fish species in the province, in particular salmon species. Hydroelectric operations have impacts on fish, although there are several measures that can be undertaken to prevent or mitigate those impacts. The proposed Fish Enhancement Program includes the following characteristics.

- Electricity suppliers with hydroelectric operations (i.e. B.C. Hydro, West Kootenay Power, Columbia Power Corp./Columbia Basin Trust) will give their customers an opportunity to financially contribute toward a program to protect or enhance fish.
- The program will be coordinated by those electricity suppliers for their own operations, with specific measures approved by the Ministry of Environment, Lands and Parks.
- A voluntary customer wires charge will be the source of funding for the program.

Energy efficiency - BC21-EE

Many jurisdictions, both those that have reformed the electricity sector and those that have not, recognize a value from increased initiatives to foster energy efficiency investments. The distribution entities of B.C.

Hydro and WKP should continue to assume responsibility for energy efficiency that is justifiable under the *Utilities Commission Act*. This includes energy efficiency that avoids financial costs to the utility, including risks of future environmental taxes or pollution permit costs, as well as public benefits not captured in prices. This reform proposal continues with energy efficiency by distribution utilities, and adds to this energy efficiency by a government agency to push for energy efficiency efforts that are justified on an environmental basis.

- The government shall create a special energy efficiency division of BC21¹ called BC21-EE. A Steering Committee comprised of government, labour, electricity distributors, environmental interests, and ratepayer interests will direct the financial and policy components of the division.
- The division will have a small staff, tendering most of its activities to competing energy service companies.
- The mandate of BC21-EE shall be to use incentives (most of which should be recovered from benefiting customers) to foster energy efficiency investments that are above market costs of electricity supply.
- This division shall be 1/3 funded from government general revenue and 2/3 funded by a non-bypassable wires charge levied by all electricity distribution entities in B.C. The non-bypassable wires charge will be recovered from customers on the basis of shares of utility gross revenues. It will be \$10 million per year in Phase 1, for a total annual BC21-EE budget of \$15 million, including the government's contribution.

¹ Properly known as the BC21 Committee under the *Build BC Act*.

At the beginning of its mandate, and every five years following that, the BC 21-EE division will undertake a detailed assessment of the energy efficiency potential in the province and develop an EE measure supply curve.

Phase 2: (by January 1, 2001)

Only one additional reform for environmental concerns occurs in Phase 2. In the interests for a level playing field between the natural gas and electric sectors, and the equivalent need for environmentally justified natural gas energy efficiency, the following changes to BC21-EE shall occur in Phase 2.

- In the interest of a level playing field between the natural gas and electric sectors, and the equivalent need for environmentally justified natural gas energy efficiency, the mandate of the BC21-EE division will be expanded to include energy efficiency in natural gas consumption.
- The annual budget of BC21-EE shall increase to \$25 million, with \$10 million per year collected from natural gas consumers through an energy charge.
- District energy systems will be given explicit attention by BC21-EE under this phase.
- Given the importance of transportation fuels in generating B.C.'s contribution to greenhouse gas emissions, the government may wish to extend the mandate further to include all energy forms. Another possibility is to extend the mandate to include water consumption, which is also linked to energy consumption. In this case, the funding base should be expanded as well.

4. EVALUATION

In this section, the Advisor's Reform Proposal is tested against the Terms of Reference. In preparing this analysis, the Advisor took into consideration the following:

- the evidence provided by the research of the Task Force's Technical Sub-Committees;
- expressions of concerns and aspirations by Stakeholders (Appendix B);
- contacts with the public (written submissions, town hall meetings, radio, public commentary on the second interim report); and
- other material available via electronic and print media, especially detailing reforms in other jurisdictions.

4.1. Job Creation and Economic Development

Economic development and job creation are contingent upon economic efficiency (lowest possible prices), labour intensity of investment, expenditure spin-offs (multiplier effects), labour skills development and local control of resources.

This reform proposal will open the door to more small projects because: (1) it provides market access to all prospective producers, and the economic trend is toward smaller projects; (2) it includes a spot market, which makes it easier for small producers to participate effectively in the market; and (3) it includes an EDT portfolio standard, which supports smaller scale "renewable technologies". This proposal also supports continued effort in energy efficiency investment.

Monopoly electric utility mega-projects have historically been seen as drivers of economic development. Today, this assumption is seriously challenged. Smaller electricity-related investments, whether in supply or energy efficiency, are consistently shown to be more labour intensive in terms of jobs per dollar invested or jobs per kwh produced and usually to be more economically efficient, generating lower prices for consumers and greater social wealth (returns to shareholders). A recent summary report by the Pembina Institute for Environment Canada showed that, per \$1 million of investment, conventional energy supply (hydro, oil, natural gas, coal, nuclear) creates 7 person-years of employment, while EDTs create 12 person-years of employment and energy efficiency creates 35 person-years of employment.¹ Different studies give different numbers, but the ratios tend to be in this range.

Smaller projects tend also to be more equitably distributed throughout the province, whereas mega-projects tend to be concentrated at one location, requiring a transient workforce which then disperses upon construction completion. In B.C., many natural gas cogeneration projects, wood waste projects, small hydro projects, energy efficiency projects, and other smaller-scale investments, will lead to job creation (generally well-paying, skilled jobs) and economic spin-offs more equally distributed throughout the province. The competition in generation will lead to lower domestic

¹ Pembina Institute (Campbell, Dufay and Macintosh). 1997. "Comparative Analysis of Employment From Air Emission Reduction Measures" (prepared for Environment Canada, Global Air Issues Branch).

electricity prices in the long run with significant job creation implications. Our energy-intensive forestry, mining and chemical industries are at times critically dependent upon low electricity prices for their survival. This reform proposal would allow them to seek diversity of contracting arrangements, including options in which their rate may be tied to the price of the commodity they produce.

This reform proposal leads to a separation of the grid-related common carrier functions of B.C. Hydro and WKP. However, at the same time, it retains one large B.C. Hydro generation company. With a clear mandate, and increased freedom from regulation, this company should be able to play an important role in North America and globally, taking advantage of our world-recognized expertise in hydropower systems. The result will be high-skilled jobs for British Columbians. Likewise, the B.C. Hydro distribution company would now also have a clear mandate. Like its natural gas counterpart, British Columbia Gas Utility Ltd. ("B.C. Gas"), it would be positioned to participate in domestic and international ventures.

This reform proposal also ensures a maximum return from electricity exports. By moving to made-in-B.C. independence for grid-related common carrier functions and increasing direct access for consumers, British Columbians need not fear market restrictions from our traditional trade partners. Ironically, without a made-in-B.C. market reform of this type, our regulatory independence is jeopardized. Recently, B.C. Hydro was forced to apply for changes to its wholesale transmission tariff to comply precisely with the FERC pro-forma tariff in order to retain full market access in the U.S. Maximum returns from exports keeps domestic taxes from rising, again with positive effects for

domestic economic development and job creation.

This reform proposal does not cause new costs for system operation. The same customers will be receiving the same power at the same locations. By keeping all grid-related common carrier functions in the same corporation, even in Phase 2, instead of separate transmission, system operation and power exchange entities, the costs of market structure reform are minimized.

4.2. Greater Choice for Electricity Consumers

This reform proposal results in greater choice for all electricity consumers. Within three years, industrial customers will have full market access, after already having significant market access in one year. Depending on the outcome of rate class reform and BCUC assessment, larger commercial customers may get market access within three years. Other customers do not get full market access. However, the low prices associated with B.C.'s hydropower resources make it unlikely that direct market access will be demanded by most residential and small commercial customers in the near future. At the same time, the required availability to all customers of a green power option and a net metering option does result in a meaningful increase in choice for these other electricity consumers.

4.3. Continued Public Stewardship of the Province's Hydropower Endowment

Nothing in this reform proposal diminishes the provincial government's control over the province's hydropower endowment. First, the Terms of Reference are clear, as is this reform proposal, that there be continued public

ownership of B.C. Hydro's assets. Second, stewardship of the province's water resources remains the responsibility of the Comptroller of Water Rights under the provincial Ministry of Environment, Lands and Parks.

4.4. Maintenance of High Reliability Standards

Nothing in this reform proposal changes or interferes with the already existing responsibilities for system reliability. The Transmission Business Unit (Phase 1) and the B.C. Grid Company (Phase 2) remain under BCUC regulation, which has always placed a priority on system reliability.

4.5. Reasonable Access for Electricity Producers

The Terms of Reference provide that electricity producers, which includes IPPs, should have reasonable access to the market. As discussed above, the original rationale for monopoly supply by a utility is no longer valid since other producers may be able to provide a better service and/or a lower price. This proposal results in reasonable market access for producers. In the current market structure, IPPs, be they privately or publicly-owned, must either convince B.C. Hydro or WKP to purchase their product, find an export customer, or convince one of the few municipal utilities (New Westminster, Kelowna, etc.) to become their customer. Given that B.C. Hydro and WKP have little incentive to purchase IPP power, only a small percentage of the domestic market is actually available to them. Under this reform proposal, IPP access to 50% of the industrial load by January 1, 1999 and 100% of industrial, and probably some large commercial, by January 1, 2001 represents a significant increase in market access. In

addition, the EDT portfolio standard and the green power tariff provide a special opportunity for specific kinds of British Columbian IPP projects, notably wood waste, small hydro and upgrades of existing large hydro facilities.

4.6. Access to Export Markets for B.C. Electricity

As noted under economic development and job creation, unfettered access to export markets is critical for British Columbia because of the large net revenues that may be earned in years when price and water flow conditions are favourable. This reform proposal meets the requirements of the U.S. FERC for mitigation of transmission market power. With increasing retail access, albeit initially only for industrial customers, the reform proposal will also meet foreseeable requirements for reciprocal retail access, possibly emanating from future decisions of the FERC or U.S. state regulators.

4.7. Continued Incorporation of Environmental and Social Considerations in the Management and Regulation of the Electricity Industry

Social considerations

Most of the key social concerns related to electricity market reform are covered explicitly in other Terms of Reference. These include concern for any impacts on specific classes of customers or customers in particular regions, impacts on electric sector employees, aspirations for job creation and economic development, and concerns about system reliability.

An additional social concern has been raised with respect to the traditional utility function as supplier of last resort. Some members of the public have expressed a concern that competition will lead to them being quickly disconnected if their supplier fails to supply power to the grid. This is a misunderstanding of how the grid is operated. Before and after reform, the system operator is responsible for maintaining load balance on the system. If generation from a particular source is not provided when scheduled (a not infrequent occurrence in the existing integrated monopoly system due to unscheduled outages), the system operator calls upon standby generation resources to balance the system. This service is usually provided by the monopoly's own facilities in the existing market structure, but can be contracted from any power producer, as would more likely be the case under a reformed market. The standby service has a cost. Customers whose suppliers fail to generate when scheduled would be responsible for these costs, but would not be cut off. These customers would then have a claim against the supplier with whom they had contracted. In any case, residential and small commercial customers will not be receiving electricity from any suppliers other than the generation divisions of B.C. Hydro and WKP.

An additional social concern that is not covered by other Terms of Reference is customer protection from unethical marketing practices. However, this reform proposal opens direct market access only to industrial customers and perhaps, in Phase 2, large commercial customers. Representatives of these customer groups have not asked for special measures to protect them from unethical marketing practices. They do not believe that the marketing practices associated with electricity will differ materially from those associated with other industry inputs. Moreover, the BCUC has had no difficulty

dealing with marketing practices since natural gas direct access was extended to all customers in the early 1990s. Nonetheless, as a precaution, the amendments to the *Utilities Commission Act*, envisioned in Phase 1 of this reform, will make any changes to the Act necessary to ensure that the BCUC can protect electricity and natural gas customers from any unethical marketing practices that arise.

Environmental considerations

The three major environmental concerns associated with electricity market reform are: (1) reform may decrease the incentive and ability of electric sector industries to pursue "demand-side management" ("DSM")¹; (2) reform may lead to more environmentally damaging operation of existing generation facilities; and (3) reform may decrease the ability of regulators to require environmental cost considerations in the selection of generation resources.

DSM programs in the 1980s and early 1990s were undertaken by monopoly, vertically-integrated utilities, usually at the behest of their regulators. Any additional costs of DSM were charged to all customers. With electricity market reform, it would be a distortion of the market, and unfair, for the costs of DSM to be added to the cost of electricity of only one (say the former utility's de-integrated generating company) of several competing generators. Therefore, the costs should be allocated to the remaining monopoly segment of the industry, either the transmission or the distribution utility, to be passed on to all customers. One possibility is to follow the model in the vertically de-integrated natural gas industry, where DSM is undertaken by regulated, monopoly distribution utilities, meaning that any net

¹ Energy efficiency programs of electric utilities in the 1980's are known as DSM. This is the term used in the discussion in the next sections.

utility costs are shared by all customers. Another possibility is to assess a non-bypassable wires charge (on transmission or distribution) which collects revenue that a separate entity (corporation, institution, etc.) uses to design and implement DSM programs. This reform proposal results in a hybrid of the two approaches: regulated distribution utilities would continue to implement DSM, but a publicly-owned agency or corporation would be responsible for additional DSM that is driven by environmental cost considerations, as opposed to direct utility cost considerations.

The challenge for DSM from an environmental perspective is that utility DSM programs are usually based on an analysis of rate payer impacts or the total social costs, but in a manner that does not fully take into account environmental costs. The extent of the authority of utilities commissions to be determining, and making, DSM or resource selection decisions based on environmental costs has never been clear. This is why governments also use their own resources to encourage energy efficiency, as the B.C. government did recently with its BC21 Power Smart initiative. In this reform proposal, the *Utilities Commission Act* is amended to confirm and demarcate the inclusion of environmental considerations in the commission's regulatory mandate. However, with this amendment it is expected that the mandate for utility DSM will still only include a modest, conservative estimate of environmental impacts (as described in the BCUC's Reconsideration Decision on Social Costing).

This proposal responds to the clear evidence that more needs to be done than is possible from a regulated distribution monopoly, given the diverse environmental impacts of different uses of energy (including, for example, transportation sector uses) and the stronger

objectives of governments as the full extent of environmental concerns become apparent (of note is the recent international agreement in Kyoto to reduce greenhouse gas emissions). This explains why this reform proposal calls for a combination of revenue from the government and from a non-bypassable wires charge for DSM purposes, to be administered by BC21-EE. Eventually, the mandate of BC21-EE should be extended to all forms of environmentally damaging energy use, not just that involving the regulated distribution monopolies of natural gas and electricity. This would require changes to how it is funded.

The non-bypassable wires charge will collect a total of \$10 million per year from all electric customers, in proportion to their share of electricity expenditures, leading to a total budget of \$15 million per year when the government share is added. In Phase 2, this budget is increased to about \$25 million per year with the broadening of the mandate of BC21-EE to include natural gas DSM (with revenue again collected on the basis of relative expenditures and a 2:1 ratio of utility customers to taxpayers). The total cost to government will be about \$8 million per year.

As noted above, the second key environmental concern is that competitive electricity commodity markets will lead to environmentally adverse changes in the operation of existing hydropower (and thermal) facilities. There is no basis for this concern. Thermal facilities in B.C. have air emissions licences and hydropower facilities have water licences, approved, or with regionally delegated approval, from the Ministry of Environment, Lands and Parks. There is no evidence to suggest that operation practices would change with market reform and, in any case, the issue of the appropriateness of the existing licences is an issue for the permitting authorities.

The third key environmental concern is that reform may decrease the ability of utility regulators to incorporate environmental cost considerations in the selection of generation resources. The evolving practice in the regulated monopoly, vertically-integrated electric industry has been for the regulator to require IRP, a public involvement process in which the utility explicitly considered environmental and social impacts in the selection of resources. This was in addition to any environmental approvals that energy facilities required from government environmental agencies or ministries. With direct access between buyers and sellers of electricity, the utility regulator loses the ability to influence or determine the investment in electricity generation via IRP. Environmental impacts not covered by existing regulations tend to get overlooked as most buyers focus on least financial cost. As a consequence, it is estimated that much of the future growth in electricity generation in B.C. will be combustion turbines (simple and combined cycle, at times in cogeneration applications) fired by natural gas, leading to a 300% increase in electricity-related CO₂ emissions from 2 megatonnes/year in 1997 to about 6-10 megatonnes/year in 2010.

To offset this possible development, this reform proposal will create an EDT portfolio standard, which requires all sellers of electricity, including the generation divisions of B.C. Hydro and WKP, to supply a minimum percentage of electricity they sell from EDTs (or buy credits from other sellers).

Although the cost of the EDT portfolio standard is small, it can make a significant contribution to various environmental objectives in the province. There will be improved prospects for the efforts of the Ministry of Environment, Lands and Parks to eliminate beehive burners, as resource

communities, local forestry companies and perhaps the provincial government combine their resources to finance these investments that now have a market niche. There will also be more cogeneration projects in urban areas (hospitals, universities, commercial buildings, institutional buildings, etc.) as turbines are added to existing heating systems using natural gas. The result is a net decrease in CO₂ emissions relative to the electricity and heat being produced by separate natural gas burning technologies.

The green power option for commercial and residential customers will have similar benefits to the EDT portfolio standard, although most research shows that only a small percentage of customers will take up this option.

A similar logic holds for net metering. With this mechanism, some consumers can contribute to the electricity system in ways that are environmentally desirable.

Finally, the fish enhancement program simply provides an easier way for some customers to voluntarily contribute to fish enhancement related to hydroelectric facilities.

4.8. Continued Public Ownership of the Assets of B.C. Hydro

This reform proposal does not lead to privatization of any part of B.C. Hydro. Phase 2 separates governance from ownership of the assets of the B.C. Grid Company, but ownership remains in the hands of the provincial government. The provincial government will set the legislation (and any special directions from cabinet) for the BCUC's regulation of the B.C. Grid Company.

4.9. No Negative Impact on B.C. Hydro's Dividends to the Province

This reform proposal does not negatively affect B.C. Hydro's existing dividends to the province. Under retail access, end users can choose an alternative supplier. However, the commodity itself is still traded at a wholesale level. Although B.C. Hydro may lose retail customers, it can still sell electricity in commodity markets, either to other suppliers within the province or to customers outside of the province. Thus, the financial impacts of retail access largely depend upon the anticipated market price of the electricity commodity.

To test the value of such competitive commodity sales, B.C. Hydro, with oversight by the Task Force's Pricing and Entitlements Technical Sub-Committee, hired Compass Resource Management Ltd. (Compass) and Henwood Energy Services Inc. (HESI) to conduct a simulation study of market prices in the Western System Coordinating Council for the period between 1998 and 2008.¹ The executive summary of the study is reproduced in Appendix I. Scenarios were developed to represent a range of conditions, including relatively extreme situations. Under every reasonable scenario, B.C. Hydro's full cost of production (including all debt payments and returns to government equity) was found to be below the market price that B.C. Hydro could obtain from a combination of short and medium term sales contracts.²

¹ Compass Resource Management Ltd. and Henwood Energy Services Inc., 1997. "Final Report to the B.C. Task Force Pricing and Entitlements Technical Sub-Committee".

² This is consistent with the findings of another recent study. Energy Information Administration. August 1997. "Electricity Prices in a Competitive Environment: Marginal Cost Pricing of Generation Services and Financial Status of Electric Utilities, A Preliminary Analysis Through 2015".

4.10. No Adverse Effects on Specific Classes of Customers or Customers in Particular Regions

This reform proposal has no adverse effects on any set of customers. As the study by Compass and HESI showed, if electricity prices in B.C. were allowed to rise to market levels, there would likely be an increase in electricity prices for all customers, perhaps especially residential and commercial customers. Therefore, a key issue in reform, in order to satisfy this Term of Reference, is to ensure the continued entitlement of B.C. consumers to the existing generation resources of B.C. Hydro and WKP (and those resources already contracted from IPPs) at embedded cost.

This reform proposal achieves this by maintaining the BCUC's regulatory control over these generation resources. Generation surpluses (whether because of resource additions, industrial customers leaving, or favourable water conditions) will be outside of regulation and free to earn market level returns. Regulated resources, which will remain the bulk of B.C. Hydro and WKP generation resources, will be regulated by the BCUC in a manner that allows for some cost flow-through adjustments (changes to taxes, water licences, interest rates, the allowed return on equity, or to the debt-equity ratio) but also provides profit sharing incentives for B.C. Hydro and WKP management to continue to seek efficiency gains. In other words, the regulation of these resources will follow the worldwide trend toward more longer-term incentive-focused price regulation.

With market access, some industrial customers may achieve lower electricity costs and see price reductions relative to residential

customers. The evidence suggests that this will be attributable either to the willingness of industrial customers to take longer-term price risk or to their advantageous load profiles. In any case, the evidence is clear that market reform will not lead to higher costs for residential customers. B.C. Hydro will be able to find alternative buyers and/or defer higher cost investments that in aggregate will be positive for other customers classes. Allowing market access for industrial customers will have no upward price risk for non-industrial customer groups and will likely contribute to the competitive innovations that will help to lower residential and commercial customer tariffs in the long run.

It is instructive to examine the effect of introducing competitive market reforms in the Canadian natural gas industry. During the reform period, from 1985-1994, natural gas wellhead prices fell about 40% after adjusting for inflation. In B.C., this translated into decreases for all customer classes. However, industrial classes had their prices fall much further than residential customers. This is because, simultaneous with the movement to competitive natural gas commodity markets, the pricing of both the commodity and its delivery were adjusted to reflect new evidence on the relative costs of service. Utilities commissions, in B.C. and elsewhere, held rate design hearings in which they examined the true costs of natural gas commodity and delivery service. The resulting changes offset some of the natural gas cost decreases for residential customers while accentuating the decreases for industrial customers. Similar rate design studies for electricity customers in B.C. do not suggest that significant costs should be shifted from one group of customers to another, except that certain commercial customers may be paying too much. Therefore, the off-setting effects that occurred in natural gas should not happen to the same extent in electricity.

Another concern with market reform is that it may have negative effects on customers in particular regions. This market reform proposal does not require or include any change from the existing postage-stamp retail rates, extension charges, connection charges and other service charges of B.C.'s electric utilities. All of these are determined by the BCUC. This will continue, even for the pricing of the generation resources to which consumers remain entitled via regulated tariffs. In the future, the BCUC may look at different rate design proposals for use of the transmission system. However, nothing in this proposal pushes the BCUC toward any particular kind of rate design.

4.11. No Adverse Effects on Electric Sector Employees

This reform proposal has no adverse effect on electric sector employees. In some jurisdictions, electricity market reform is associated with privatization, deregulation and a shift toward less labour intensive generation technologies. A key example is England, where the industry was simultaneously privatized, deregulated and allowed to shift from coal electricity generation to natural gas. While this created a substantial environmental improvement and favourable longer-term price effects, it triggered dramatic job loss in coal mining, significant job loss in the deregulated generation sector, and even job loss in the loosely regulated transmission and distribution monopolies (where high profits were allowed, with little regulatory oversight).

The Terms of Reference for this Task Force, the specific measures of this reform proposal, and the cost of production and character of B.C.'s electricity industry ensure that the experience in England is not applicable to

B.C. A better example would be a country like Norway, where the move to competitive electricity markets did not involve privatization or a shift to different generation technologies, and the system is hydro-based. Reform in Norway had no negative effects on electric sector employees.

The Terms of Reference rule out privatization. This reform proposal does not deregulate generation resources, except to the small extent that resources are surplus to tariff requirements, and does not change the regulatory practices of the BCUC. The BCUC will continue to regulate the business units and separate corporate entities (Phase 2) of B.C. Hydro and WKP in a manner that creates efficiency incentives but does not allow for unjustified cost cutting. The transmission and distribution entities remain 100% regulated monopolies, with virtually no competitive pressures. B.C. Hydro's generation entity, which will be partially involved in the competitive market, is one of the lowest cost producers in North America. Only 16% of B.C. Hydro's workforce is involved in the generation activity (operation and maintenance of hydropower systems is at the extreme among economic activities for minimal labour requirements). Finally, if there is any small amount of job loss or job change associated with this reform proposal (caused, for example, by some changes in skill requirements), there are generous measures in the proposal to cover retraining and severance.

If B.C. keeps pace with developments elsewhere in North America, electricity market reform is likely to have positive impacts for electric sector employees. Competition will have a North America-wide effect of lowering prices and increasing consumption, meaning an expansion of activity by electricity generation and distribution companies and job growth. It is

interesting to note that similar market reforms in the natural gas sector over the last decade have led to lower prices, an expanding market and more jobs in natural gas utilities. For example, from 1991 to 1996 the number of employees at B.C. Gas increased from 1540 to 1779, while the number has risen and then returned to the original level at Westcoast Energy, even though productivity (output per employee) at both of these utilities has increased substantially.¹

¹ B.C. Gas Utility Ltd. Annual Reports for 1991 to 1996, and West Coast Energy Inc. Annual Reports for 1988 to 1997.

5. CONCLUSIONS

Throughout the world, there is a growing recognition that the technological and economic fundamentals of the electricity market have changed. In the past, it was generally assumed that a vertically-integrated monopoly, providing all generation, transmission, system operation, distribution and customer service, was the best industry structure. Today, competition in generation is widely recognized as offering several benefits from both a consumer and societal perspective. The benefits for consumers include greater choice, customer responsiveness, lower prices and less risk. The broader social benefits include the economic development and job creation resulting from lower prices and greater returns to publicly-owned assets, and the potential for regionally-dispersed resource development as environmental and social considerations are combined with market reform.

The Terms of Reference provide a policy direction for this Task Force which focus it on key implications of the potential for competition in electricity generation. These are (1) the degree of customer access that should occur and (2) the degree of separation and independence of key grid-related common carrier functions that is required for effective competition.

The Advisor's Reform Proposal allows industrial customers and electricity suppliers to contract directly with each other for electricity supply, with B.C. Hydro and WKP required to provide fair and efficient transmission services, including system operation, transmission planning and transmission tariffs. The proposal recommends a phased approach to reforming B.C.'s electricity market. Phase 1 reforms

should be in place by January 1, 1999, while the target date for Phase 2 reforms is January 1, 2001. This approach allows government to gain experience with the first phase of reform before initiating the second.

In Phase 1, 50% of industrial customers are allowed to switch to non-B.C. Hydro / non-WKP suppliers. The transmission services of B.C. Hydro and WKP are functionally separated from other corporate divisions. A Grid Oversight Committee comprised of utility, producer and customer representatives, is appointed by the Minister. A new provincial trading market is created, the B.C. Power Exchange.

In Phase 2, the 50% restriction on industrial customers is removed and market access is possibly extended to large commercial customers, as determined by the BCUC. Although separate ownership of transmission assets is retained, a single, publicly-owned, B.C. Grid Company is created (owning the transmission assets that were formerly with B.C. Hydro and leasing the transmission assets of WKP), responsible for transmission planning, transmission tariffs, system operation, and operation of the B.C. Power Exchange.

The reform proposal contains measures to ensure that social values associated with the existing electricity market are protected and enhanced. It retains the entitlement of domestic customers to the low cost generation resources of B.C. Hydro and WKP and does not alter the postage-stamp rate structures, extension policies, and connection policies of B.C. utilities, as approved by the BCUC. The reform proposal also retains the existing responsibilities for system reliability and

security of supply. Amendments to the *Utilities Commission Act* ensure that the BCUC has the necessary authority to protect consumers under retail competition, although experience with retail competition in the natural gas industry suggests that significant changes to the Act are not required. Employment opportunities for electric sector employees are likely to expand, with retraining and support for employees faced with changing skill requirements.

The reform proposal also contains measures to ensure that environmental values associated with the existing electricity market are protected and enhanced. While distribution utilities will continue to have responsibility for energy efficiency that is economic from a utility and customer perspective, a new agency will be responsible for energy efficiency that is justified once environmental considerations are included. This agency will be funded by a non-bypassable wires charge on all customers

and by government. A portfolio standard will require all sellers of electricity, including the generation divisions of B.C. Hydro and WKP, to supply a minimum percentage of electricity from environmentally desirable technologies. B.C. Hydro and WKP will also be required to develop net metering and green power tariff options for their customers.

Under this reform proposal, British Columbia will have competition among electricity producers and more pricing and service choices for customers, without sacrificing system reliability, protection for small consumers and consumers in high cost regions, security for electric sector employees or environmental protection. This will benefit all British Columbians by creating a favourable climate for investment in smaller, more labour intensive and environmentally desirable electricity generation and efficiency projects, resulting in economic spin-offs and job creation throughout the province.

APPENDICES

APPENDIX A: GLOSSARY

(ABM) aggregator / broker / marketer	A firm or individual engaged in assisting electricity producers to find and reach sales agreements with electricity purchasers, the latter being LDCs or final consumers (firms, institutions, households).
ancillary services	Transmission support services necessary to ensure integrity of the transmission network, including voltage control, reactive power, load following, loss compensation, energy imbalance, scheduling and dispatch services, and system protection (operating reserves).
bilateral contract	An electricity transaction in which generators or ABMs enter into contracts with end-users or LDCs, outside a centralized power pool, explicitly stating price and conditions for the physical dispatch of power, and paying intermediate transmission providers for the delivery service.
cogeneration	Co-production of heat and electricity from the same combustion source, resulting in a high energy conversion efficiency.
contracts-for-differences	A contractual arrangement between generators or ABMs and either end-users or LDCs that is used to hedge financial risk in power exchanges, in which the buyer must pay the spot price. If the spot price exceeds the contract price, the seller will compensate the buyer for the difference. If the spot price is less than the contract price, the buyer will compensate the seller for the difference.
(DSM) demand-side management	Efforts to modify customer demand, especially by encouraging energy efficiency.
deregulation	In a given industry or segment of an industry, the replacement of controls over prices, investment and service with competition. Because competition is also associated with regulation, some argue that the term deregulation is misleading.
Disco	See LDC.
distributed generation	Generation that is relatively small scale and located close to the final consumer.
embedded cost	The average total cost of existing assets, including both fixed and variable costs.
energy imbalance	An ancillary service that involves ensuring that the system is kept in balance when actual demand and supply do not equal the amounts contracted or scheduled for. For example, if a contract calls for the delivery of 100 megawatts to a particular customer between 8 and 9 am, but the customer's demand actually rises to 110 megawatts, an additional 10 megawatts must be supplied to keep the system in balance.

(EDT) environmentally desirable technology	A technology with one or several favourable environmental attributes relative to conventional technologies. Because some of these technologies are high cost from a financial perspective, various policies may be applied in competitive markets to assist their market penetration. Another common term is renewable technologies. However, renewable technologies do not include technologies that use non-renewable resources yet may be environmentally desirable in certain situations, an example being natural gas-based cogeneration applications that do not involve a significant increase in natural gas consumption (e.g., retrofitting a turbine at a site that was already using natural gas to meet thermal requirements).
EDT portfolio standard	A mechanism for fostering the market penetration of renewable technologies in a competitive electricity market. Each seller of electricity is required to provide a specified percentage of their electricity from EDTs.
externality	A positive or negative impact that is not accounted for in market prices.
(FERC) Federal Energy Regulatory Commission	The federal agency that regulates the price, terms and conditions of power sold in interstate commerce and regulates the price, terms and conditions of all transmission services.
Genco	A generic name for an electricity company that is exclusively concerned with electricity generation, as would occur after vertical de-integration of the industry.
green power	see EDT
Gridco	A generic name for an electricity company that is concerned with electricity transmission, as would occur after vertical de-integration of the industry. Another generic name is Transco.
(ISO) independent system operator	A neutral operator responsible for maintaining an instantaneous balance of the grid system. The ISO performs its function by controlling the dispatch of some plants to ensure that loads match resources available to the system. The ISO could also be responsible for operating a power exchange.
(IRP) integrated resource planning	A planning process aimed at minimizing the costs of providing energy services by explicit consideration of all known resources for meeting the demand for such services, including alternative supply resources as well as DSM.
load following	An electric system's ability to regulate its generation to follow the minute-to-minute changes in its customers' demand.
(LDC) local distribution company	A utility (natural monopoly) that owns and operates the local delivery network for commodities such as electricity natural gas and water. In a vertically-integrated utility, local delivery is just one of several functions (e.g., B.C. Hydro). Thus, an LDC only exists when the delivery function has been vertically de-integrated (e.g., B.C. Gas). Another generic term is Disco.

loss compensation	An ancillary service that involves generating additional electricity, beyond the amount demanded by end users, to compensate for losses that occur on the transmission and distribution system. In other words, if a system has a 5-percent loss rate, 105 megawatt-hours would have to be generated to meet a 100-megawatt-hour customer need.
loss of load probability	The probability that an outage will occur in any particular time interval.
marginal cost	The cost to the utility of providing the next (marginal) kilowatt-hour of electricity. Fixed obligations, such as interest on debt, are not included in marginal cost.
marginal cost pricing	Pricing based on the marginal cost of production of electricity.
market power	The ability of a firm to raise its price above the marginal cost of production. In a fully competitive market, prices will be set at the cost of production of the most expensive (marginal) unit that is producing. The FERC distinguishes two types of market power in electricity. Transmission market power refers to the ability of one electricity producer to gain an advantage over another by virtue of its ownership, or other means of control, of transmission. Generation market power refers to the ability of one or more electricity producers to influence the market price for electricity.
natural monopoly	An industry whose market output is produced at the lowest cost when production is concentrated in the hands of a single firm. The term utility is sometimes applied synonymously with natural monopoly.
net metering	A billing approach that charges customers for their net electricity consumption in each billing period, allowing their self-generation to “reverse the flow” of the meter at certain times.
non-bypassable wires charge	A surcharge imposed in such a way that consumers cannot avoid paying it, whether they stay with their current supplier or choose a new supplier.
(NERC) North American Electric Reliability Council	A council formed in 1968 by the electric utility industry to assure the reliability and adequacy of the bulk power supply in the electric utility systems of North America. NERC consists of nine regional councils and encompasses essentially all the power regions of the contiguous United States, Canada, and a small portion of Mexico. There is also one affiliate member in Alaska, the Alaskan System Coordination Council.
open access	Providing access to the transmission system to others than the transmission system owners. FERC Order Nos. 888 and 888-A order open access for wholesale sales on United States inter-state transmission systems.
operating reserves	The reserve generating capacity necessary to allow an electric system to recover from generation failures and provide load following and frequency regulation.
(PBR) performance-	Any regulatory mechanism that links company rewards (usually profits) to

based regulation	desired results or targets.
Poolco	See power exchange.
postage-stamp rates	Uniform rates for customers of the same customer class, regardless of differences in the specific cost of serving each customer.
power exchange	An entity responsible for pooling electricity generation and determining spot prices in order to facilitate economic dispatch, as well as providing other ancillary services of the electric system. The power pool and spot market could be mandatory or voluntary. A generic name is Poolco.
reactive power	The necessary production of electric current that leads or lags the phase of the electric voltage. Reactive power supplies the stabilizing power for electromagnetic loads and the reactive needs of the transmission system.
rate-of-return regulation	A regulatory mechanism in which electricity prices are set to allow utilities just enough sales revenue to recover the expected total costs incurred in producing or acquiring electricity, including a rate of return equal to the utility's cost of capital.
(RTP) real time pricing	Pricing of electricity in which the price depends on the cost of providing electricity during each time segment (e.g. by half hour or hour time segment).
regional rates	Rates which are location-specific in order to reflect the different costs of serving customers in different locations.
reliability	Electric system reliability has two components: adequacy and security. Adequacy is the ability of the electric system to supply customers at all times, taking into account scheduled and unscheduled outages of system facilities. Security is the ability of the electric system to withstand sudden disturbances, such as electric short circuits or unanticipated loss of system facilities.
renewable portfolio standard	see EDT portfolio standard
renewable technology	Electricity generation technology based on a renewable energy resource such as biomass, hydropower, wind, and solar.
reserve margin	The percent of generating capacity needed above the expected maximum demand.
retail competition	Permitting end-use electricity customers to contract directly with competing electricity producers or ABMs for their electricity commodity, while continuing to deal with transmission and distribution utilities for the commodity delivery. Also referred to as retail wheeling.
self-generation	Generation of electricity by a customer for part or all of its own load requirements.
social costing	Adjusting market prices to incorporate (internalize) the estimated monetary value of negative and positive externalities.

spot market	A market in which goods are traded for immediate delivery.
stranded benefits	Low electricity prices, resulting from embedded costs below the price of new generation, which are at risk of being lost to consumers in a competitive electricity market.
stranded costs	Utility costs, which are at risk of not being recovered in a competitive electricity market, because the market price of new generation is less than the costs of existing plants.
system benefits	Benefits to specific utility consumers or to the public at large (low price, subsidy to some customers by customer class or location, environmentally-based subsidies) which may be difficult to sustain when the electricity commodity price is set in open markets.
time-of-use rates	The pricing of electricity based on the estimated cost of electricity during a particular time block. Time-of-use rates are usually divided into three or four time blocks per 24-hour period (on-peak, mid-peak, off-peak, and sometimes super off-peak) and by seasons of the year (summer and winter). Real-time pricing differs from time-of-use rates in that it is based on actual (as opposed to projected) prices, which may fluctuate many times a day and are weather-sensitive, rather than varying with a fixed schedule.
(T & D) transmission and distribution	Transmission is the process of conducting the flow of electricity at high voltages from the points of generation to the location of groups of electricity users, such as residential neighborhoods, industrial parks and commercial centres. Distribution of electricity is the process of transforming high-voltage electricity to lower voltages and then physically delivering it to households, industrial facilities, commercial establishments, government offices, and other electricity users.
Transco	See Gridco.
utility	See natural monopoly.
vertical de- integration	Separation of a vertically-integrated utility into its vertical functional units (generation, transmission, distribution) either by formal divestiture of ownership or through separation into distinct and independent corporate entities.
voltage control	The regulation of transmission voltage by adjusting generator reactive output and transformer taps, and by switching capacitors and inductors on the transmission and distribution systems.

wheeling

The service of delivering the electricity commodity. The transmission of power to customers. Wholesale wheeling is the transmission of bulk power over the grid. Retail wheeling is the transmission of power from a supplier to end users, such as homes, businesses, and factories.

**wholesale
competition**

Requiring end-use electricity customers to purchase both the electricity commodity and its associated delivery service through their LDCs (which may be integrated with transmission assets). The energy commodity is provided in a competitive market in which the only buyers are LDCs. Also referred to as wholesale wheeling.

APPENDIX B: STAKEHOLDER ASPIRATIONS AND CONCERNS ABOUT MARKET REFORM

Aspirations are statements of desired objectives or outcomes. Concerns are negative expectations about the effects of specific mechanisms. At the outset of the Task Force process, the Advisor asked Stakeholder Group Members to submit brief summaries of their aspirations and concerns concerning electricity market reform in B.C. The table below summarizes desirable and/or undesirable objectives or outcomes, by Stakeholder. In cases where no concerns are listed, the implied concern is the non-achievement of aspirations.

Stakeholder	Aspirations	Concerns
Association for the Advancement of Sustainable Energy Policy	<ul style="list-style-type: none"> • Enhance environmental quality relating to energy production and use • Preserve social benefits: security of supply, embedded benefit for core; service quality 	<ul style="list-style-type: none"> • Conservation and efficiency neglected • River operations insensitive to environmental and social requirements • Future and seasonal price shock • No integrated planning
B.C. Hydro	<ul style="list-style-type: none"> • Maximize benefits of B.C. Hydro facilities for province • Customer choice • Protect existing customers from adverse effects of competition • Reliability and efficient system operation • Get / keep access to export markets • Preserve ability for environmental and social policy and for economic development initiatives • Protect / enhance jobs in electricity and other industry 	
B.C. Health Services Ltd.	<ul style="list-style-type: none"> • Access to supply choices and markets • Greater flexibility • Lower prices 	<ul style="list-style-type: none"> • Adverse effects of cost shifting • Reduced reliability

Stakeholder	Aspirations	Concerns
B.C. Public Interest Advocacy Centre	<ul style="list-style-type: none"> • Generally satisfied with the current structure • Potential benefit from retail if new technologies are fostered 	<ul style="list-style-type: none"> • Cost shifting • Retail without continued provision for energy efficiency and renewables and small user protection • Impact of any restructure on future of B.C. Hydro • Maintenance of public benefits of existing system
Columbia Basin Trust	<ul style="list-style-type: none"> • Market-based pricing for generation and storage • Regional economic development • Participation in Columbia River Treaty • Municipal tax revenue • Basin river management for environment • Retain embedded benefit • Neutral impact on existing employees • Harmonisation of regional distribution wires prices to remove significant separation costs • Immediate Retail Access decision and formation of an independent system operator 	<ul style="list-style-type: none"> • Piecemeal reform implementation • Improper allocation of costs between generation and transmission within monopoly utilities resulting in failure to induce competition in B.C. • Failure to address generation market power and the efficient functioning of the market within B.C. • The actual independence of the system operator • Value and option of Trust's agreement with the province, with respect to East Kootenay distribution, be maintained
Columbia Power Corporation	<ul style="list-style-type: none"> • To advance viable core projects • Access to more customers, to grid and storage • A made-in-B.C. Level Playing Field 	<ul style="list-style-type: none"> • Current wholesale access limited in price and conditions • Integrated monopolies can hinder CPC's development
International Brotherhood of Electrical Workers	<ul style="list-style-type: none"> • Quality and number of jobs • Reliable supply • Protection of province-wide equal rate structure • Safety • Prevent foreign ownership or control of our commodities 	<ul style="list-style-type: none"> • Unregulated mega-generators or utilities • Process too rushed • Rural customers uninformed • Inability to maintain safe and reliable supply with an already down-sized workforce threatened by further reductions to achieve "economic efficiencies"

Stakeholder	Aspirations	Concerns
Industrial Customers: Council of Forest Industries, Mining Association of B.C. and Electrochemical Producers	<ul style="list-style-type: none"> • Low price • Reliability • More and better purchase options • Limits on revenue collection by province • Efficiency and accountability in operations and investment 	<ul style="list-style-type: none"> • Process bogged down by extraneous issues • Non-departing customers may not be eligible for embedded benefits or traditional rates • Terms of Reference interpreted too restrictively
Independent Power Association of B.C.	<ul style="list-style-type: none"> • Non-discriminatory, well-priced transmission access • Retail for industrials now and for others later • Determination of embedded benefits • Environmental considerations in generation operations 	<ul style="list-style-type: none"> • Absence of a competitive market will handicap B.C. IPPs who seek to export their expertise to the U.S. and international markets
Inland Pacific Energy Corporation	<ul style="list-style-type: none"> • Open access, including to distribution • Economically efficient operation and investments • Effective regulation of Crowns • Transfer of generation risk to investor, not buyer • Preservation of embedded benefits • Reliability to be priced • Environmental regulations specific to impact 	<ul style="list-style-type: none"> • No market constraints on new investment • Limited opportunity for investment, especially small power • Limited customer choice and opportunity for innovation in energy services • Inferior transmission pricing and use • Environmental costs not internalized

Stakeholder	Aspirations	Concerns
Office and Professional Employees' International Union	<ul style="list-style-type: none"> • No compelling argument for reform; however, modifications to the current system are desirable <u>only</u> insofar as access to additional trade benefits can be <u>substantiated</u> and achieved and providing these additional benefits result in well paying, full time family union jobs 	<ul style="list-style-type: none"> • Deregulation would profit few and disadvantage many • Unregulated mega-generators or utilities • Positive current roles of B.C. Hydro and BCUC would be diminished • Reform would over-emphasize analogies with natural gas • Reform would be undertaken to comply with U.S. regulators, but they would deny fair access regardless • Cost and stress increases for small consumers • Market reforms driven by ideologically committed industry managers, regulators and powerful special interest groups, leading to further significant reductions in electric sector employment • Loss of equity of the public electricity assets by the people of the province resulting in cost shifting
Powerex	<ul style="list-style-type: none"> • Competitive market prices for new industry locating in B.C. • Industry access to prices, terms and conditions that are comparable to their competitors' • Regulation / siting / operation of generator independent of buyer or end-use • Maximize value of public assets • Assign new investment risk to generator • No obligation to supply for customers taking market power; let the buyer beware 	<ul style="list-style-type: none"> • Reform not sufficient to achieve reciprocity in U.S. • Alberta-style reform inadequate • Power exchange unnecessary and too costly

Stakeholder	Aspirations	Concerns
Union of B.C. Municipalities	<ul style="list-style-type: none"> • Low price and better service for rural and municipal customers • Potential benefits that may exist in a less regulated structure • Clear and understandable justification for reform • Attraction of future development • Net benefit for all areas and regions of the province 	<ul style="list-style-type: none"> • Cost shifting • Decrease in service • Local governments uninformed regarding determinants / implications of change • Potentially inequitable allocation of access, costs and benefits under any new system
West Kootenay Power	<ul style="list-style-type: none"> • Competitive market where all customers have access to multiple suppliers • Entitlement of low embedded cost of existing generation • All customers have opportunity to benefit from market reform • Coordination of operation and planning of the B.C. transmission system • Disaggregated decision-making to meet regional and customer interests 	<ul style="list-style-type: none"> • Need to ensure non-discriminatory transmission access • Need to mitigate existing generation and distribution market power • B.C. industry and business disadvantaged by lack of choice • Lack of electricity trade will negatively impact B.C. economy • Economic efficiencies will not be realized without increased competition

APPENDIX C: STAKEHOLDER GROUP AND TECHNICAL SUB-COMMITTEE ACTIVITIES

Stakeholder Group

The B.C. Task Force on Electricity Market Reform was announced in March 1997, with Mark Jaccard to act as Advisor to the Minister of Employment and Investment and to chair a Stakeholder Group whose members were appointed by the Minister in April 1997. Members were chosen with a view to attaining the greatest possible coverage of key electricity market interests without exceeding a manageable size for a consultative process. A complete membership list is provided at the beginning of the report. The Stakeholder Group held a total of 16 meetings throughout the Task Force process in an effort to reach consensus on an electricity market reform package for the province. Their meeting schedule is shown below.

Friday, April 25	Tuesday-Wednesday, August 19-20
Friday, May 9	Tuesday-Wednesday, September 9-10
Friday, May 16	Tuesday-Wednesday, September 23-24
Thursday, May 22	Monday-Thursday, September 29-October 2
Wednesday, May 28	Tuesday-Wednesday, October 7-8
Wednesday, June 11	Tuesday-Wednesday, October 28-29
Wednesday, June 25	Monday, November 3
Wednesday, July 9	Wednesday, November 5

Technical Sub-Committees

Consistent with the process followed in other jurisdictions, the Task Force established technical sub-committees to produce balanced research and provide detailed advice to the Task Force. These sub-committees gave the Task Force the opportunity to integrate various experts into its process. There were four sub-committees formed focusing on the following topics: competitive pricing and entitlements, system operations, social concerns, and environmental concerns. The sub-committees began their work in June and remained active until October. The research agendas and general findings of each of the sub-committees is described below. The membership lists for each of the four technical sub-committees are also provided.

Competitive Pricing and Entitlements

The Competitive Pricing and Entitlements Sub-Committee worked closely with BC Hydro and consultants (Compass Resource Management Ltd. and Henwood Energy Services Inc.) to develop and apply a market pricing model. It also researched mechanisms for preserving BC customers' entitlement to BC's low-cost hydroelectric resources. This entitlement arises from the cost advantage that BC's hydroelectric resources are expected to have over other generation sources in the long-term. Preserving the entitlement means ensuring that customer prices in BC reflect that cost advantage.

The market pricing modeling work focused on the next five to ten years. The model estimated near-term market prices under varying assumptions about the mix of regulated and competitive generation on the West Coast. The research suggests that price differences between current rates and the market will be small in the near-term. In turn, these estimated prices were used to assess the potential impact on BC Hydro's dividends to the province and on specific classes of customers. A summary of the market pricing modeling and research on entitlements is provided in Appendix I.

System Operations

Subjects covered by the System Operations Technical Sub-Committee include:

- the estimated costs of implementing market mechanisms, information systems and independent system operators in other jurisdictions;
- the potential impacts of reform on electrical reliability and power quality;
- the treatment of financial and legal liability associated with non-performance; and
- the estimated costs of installing metering and associated data processing hardware and software where retail competition has been permitted.

The most general conclusions of the sub-committee were as follows.

- Market reform increases the number of and complexity of financial transactions and operating decisions. There are many possible mechanisms for coping with this complexity, most of which involve establishing new institutions. The success of these new institutions appears to depend less on the type of institution set up than on the rules and procedures developed for those institutions.
- There are a variety of ways of arranging the interaction of physical and financial market operation systems.
- In other reformed jurisdictions, physical system operators have been given both the responsibility for, and authority necessary to maintain, system reliability.

Social Concerns

The Social Concerns Technical Sub-Committee researched the following eight areas:

1. electric sector employment;
2. provincial economic impacts;
3. effects on customers with high relative transaction costs;
4. effects on customers in regions with higher costs of service;
5. effects on customers not yet connected to the grid;
6. foreign or external influences in BC's electricity market;
7. customer responsiveness and disaggregated decision-making; and
8. consumer protection.

The Sub-Committee assembled information on the indicators of impacts of electricity market restructuring in each area of concern. It also carried out some research on options for mitigating such impacts, including mechanisms to uphold social objectives related to that issue. In many cases, the sub-committee was limited in its ability to reach conclusive findings: data from other jurisdictions on these topics were often difficult to obtain and did not usually reveal clear trends given that most electricity market reform initiatives are still recent. This was particularly true of information from other reformed jurisdictions on impacts in the following areas: electric sector employment (item 1), customers with high relative transaction costs for market participation (item 3), trends in foreign ownership and influence (item 6), customer responsiveness and disaggregated decision making (item 7).

The provincial economic impacts of electricity price changes (item 2) were estimated using a macroeconomic model assuming price changes of up to $\pm 25\%$. Whether prices increased or decreased by 25%, the effect on provincial GPP did not exceed 0.5% relative to no price change. Similarly, for both cases, the effect on total provincial employment did not exceed 0.4% relative to no price change. This model was also used to estimate the economic impacts of increased electricity trade (item 2); however, only one illustrative scenario was examined. This scenario was later refined by the Competitive Pricing and Entitlements Technical Sub-Committee in their modeling work (Appendix I).

One of the mechanisms assessed with respect to its ability to uphold social objectives under reform was that of breaking up B.C. Hydro's distribution into several regional companies. In particular, the sub-committee was concerned with the potential impact of horizontal de-integration on customer service and responsiveness (item 7) and on customers in regions with higher costs of service (item 4). The evidence on this issue was inconclusive.

With respect to consumer protection (item 8), the sub-committee identified the following issues to be addressed under a reformed market, including: supplier of last resort and low-income consumer protection; credit, security deposits and discrimination; disconnection; unfair marketing and "slamming" (stealing customers from other suppliers without the customer's informed consent); privacy of customer information; and, consumer aggregation. Experience in Canada with natural gas retail competition shows that regulators and utilities commissions have played an effective role in addressing these issues. In any case, it should be noted that most of these concerns only arise in

competitive markets where retail customers are granted market access: a reform option which is not being recommended by the Advisor at the present time.

Environmental Concerns

The Environmental Concerns Technical Sub-Committee examined the potential impact of reform on the following four areas: demand-side management programs, investment in environmentally-desirable electricity generation technologies, power plant operation, especially river flow and storage regimes, and overall consumption of electricity. The sub-committee identified indicators of impacts of electricity market restructuring in each area of concern and researched options for mitigating these potential environmental impacts. These options include a number of mechanisms for implementing DSM and for fostering EDTs under competitive markets, as outlined below.

Implementing DSM

DSM involves influencing the equipment acquisition and use decisions of firms, institutions and households. However, another approach is to argue that DSM is not required and that the socially desirable level of DSM can and should be established simply by across-the-board government energy efficiency regulations. Successful DSM programs involve both *funding mechanisms* and *implementation mechanisms*. These are discussed in Appendix F.

Fostering EDTs

One of the potential impacts of introducing competition into BC's electricity market is increased utilization of natural gas generating technologies. This could result in environmental impacts such as increased greenhouse gas emissions. The sub-committee identified a number of mechanisms which could be implemented to foster EDTs in an effort to mitigate these impacts: an EDT portfolio standard, a non-bypassable wires charge to provide subsidy to EDTs, government funding for EDTs, an environmental cost adder on dispatch, government externality adders, reverse metering for distributed EDTs, and green marketing. These are described in Appendix E.

Technical Sub-Committee	Members (Alternates)	Affiliation
<p>System Operation</p> <p>Chair: Michael Margolick</p>	<p>Rod Byrnell (Gerry Bramhill) Doug Cave George Clayton Ken Epp Don Fairbairn Lloyd Guenther (Brian Wallace) Doug Little (Ken Peterson) Del Secord</p> <p>Robin Siddall (Robert Hobbs) Joe Smeets (Tony Flanders)</p>	<p>International Brotherhood of Electrical Workers B.C. Hydro West Coast Energy Columbia Basin Trust Inland Pacific Energy Corporation Industrial Customers Powerex Association for the Advancement of Sustainable Energy Policy West Kootenay Power Office & Professional Employees' International Union</p>
<p>Competitive Pricing and Entitlements</p> <p>Chair: Trent Berry</p>	<p>Ken Epp Dick Gathercole (Jim Quail) Jane Gauthier Robert Hobbs (Robin Siddall) Doug Little (Ken Peterson) Ann McDowall (Suzanne Morrison) Mark Moseley Dick O'Callaghan Marvin Shaffer</p> <p>Joe Smeets</p> <p>Brian Wallace (Lloyd Guenther) Ron Zeilstra</p>	<p>Columbia Basin Trust B.C. Public Interest Advocacy Centre B.C. Hydro West Kootenay Power Powerex West Coast Energy Task Force Technical Staff B.C. Health Services Ltd. Inland Pacific Energy Corporation (Marvin Shaffer & Associates) Office & Professional Employees' International Union Industrial Customers Columbia Power Corporation</p>
<p>Social Concerns</p> <p>Chair: Mark Jaccard</p>	<p>Daryl Fields Robert Hobbs (Robin Siddall) Joe Judge Michelle Laurie (Gerry Bramhill) Peter Leighton Dick O'Callaghan Jim Quail (Dick Gathercole) Joe Smeets</p> <p>Josh Smienk Brian Wallace</p>	<p>B.C. Hydro West Kootenay Power Union of B.C. Municipalities Int'l Brotherhood of Electrical Workers West Coast Energy B.C. Health Services Ltd. B.C. Public Interest Advocacy Centre Office & Professional Employees' International Union Columbia Basin Trust Industrial Customers</p>
<p>Environmental Concerns</p> <p>Chair: Mark Jaccard</p>	<p>Don Fairbairn Dermot Foley</p> <p>Lorne Grasley Robert Hobbs (Robin Siddall) Josh Smienk Andrew Pape Paul St. Pierre Glenn Stewart Ron Zeilstra (Lorne Sivertson)</p>	<p>Inland Pacific Energy Corporation Association for the Advancement of Sustainable Energy Policy Industrial Customers West Kootenay Power Columbia Basin Trust Task Force Technical Staff B.C. Hydro West Coast Energy Columbia Power Corporation</p>

APPENDIX D: PUBLIC PARTICIPATION

As described in the background chapter, the Task Force explored various mechanisms to expand the opportunities for broad input into its analyses and deliberations, including the following:

- consideration of independent written submissions to the Task Force as well as of the submissions to the postponed BCUC hearing on Retail Access and Unbundled Tariffs;
- organization of public forums in various communities throughout the province where individuals and organizations could become more informed about the activities of the Task Force and make oral submissions;
- scheduling of interactive radio interviews with the Advisor on a number of stations throughout the province; and
- public review and comment on the Advisor's two interim reports.

Below is a list of individuals and organizations that provided valuable input and feedback to the Task Force, either by attending a public forum or by sending in a written submission. Also included in this appendix are the schedules of public forums and radio interviews held throughout September and October 1997.

Participant List

The following individuals and organizations participated in the consultation process of the B.C. Task Force on Electricity Market Reform.

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Highland Valley Copper	National Public Relations
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Mark Jenkins	M. Nicols
Gwen Johansson	Northern Pacific
Sonny Joyce	Reid Page
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Kelowna Residents' Associations	Rick Price
	Prince Rupert Labour Council
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3rd Millenium Construction
Society
Kevin Tweddle
Albert Van Marrewyk
Mary Venneman
John Warner
Paul Wheatley
Paul Wiering
Willis Energy
Paul Willis
Tania Wilson
Randy Wright

Public Forums

Date (1997)	Time	City	Location
Monday, September 8	7:00 - 9:30 p.m.	Nanaimo	Coast Bastion Inn - Malaspina Room
Monday, September 15	7:00 - 9:30 p.m.	Fort St. John	Pioneer Inn
Tuesday, September 16	7:00 - 9:30 p.m.	Prince George	University of Northern British Columbia - Weldwood Theatre
Wednesday, September 17	7:00 - 9:30 p.m.	Prince Rupert	Coast Prince Rupert Hotel
Friday, September 26	9:30 a.m. - 1:00 p.m.	Vancouver	Hyatt Regency Hotel Vancouver
Monday, October 6	7:00 - 9:30 p.m.	Kelowna	Rutland Centennial Hall

Appearances on Radio Programs

Date (1997)	Time	City	Station	Host / Interviewer
August 21	12:30 - 12:45 p.m.	Vancouver	CBC Radio (690 AM)	Jo Mrozewski (no talk show)
August 28	11 a.m. - 12 p.m.	Victoria	CFAX-AM (1070)	Terry Spence
September 2	9:30 - 10 a.m.	Vancouver	CKNW-AM (980)	Rafe Mair
September 8	8:30 - 9:30 a.m.	Nanaimo	CKEG-AM/CKWV (1570/102.3)	D'Arcy Rinald
September 11	9 - 10 a.m.	Prince George	CKPG-AM (550)	Ben Meisner
September 12	9:30 - 9:45 a.m.	Vancouver	CBC Radio (690 AM)	Jo Mrozewski
September 19	9:30 a.m.	Kamloops	CFJC	Larry Read (no talk show)
September 22	8:55 a.m.	Kamloops	CFJC	Mel Rothenberger
October 6	9:30 - 10:30 a.m.	Kelowna	CKOV-AM (630)	Barry Clark

APPENDIX E: MARKET MECHANISMS TO FOSTER ENVIRONMENTALLY DESIRABLE ELECTRICITY SUPPLY

Introduction

Environmentally desirable technologies (EDTs) are defined as those electricity generation technologies which have no net greenhouse gas (GHG) emissions, no net impact on local or regional air quality, only minor impacts on watersheds or landscapes, and no contribution to toxic waste buildup. EDTs include the following.

- **Biomass energy** is derived from plants or trees (e.g., wood residue) which absorb carbon dioxide in their growth cycle. Hence the net carbon dioxide (and GHG) emissions from biomass combustion are zero assuming that the rate of growth is equal-to or greater than the rate of consumption. The impact of biomass combustion on local air pollutants (e.g. NO_x, VOCs, PM-10) needs to be assessed on a case-by-case basis for EDT eligibility. In cases where the wood residue from a pulp and paper mill or sawmill was previously disposed of in open air burners, the diversion of the wood residue to a modern, efficient biomass plant will improve local air quality. Also, where previously landfilled wood residue is utilized in a biomass plant, landfill gas emissions (e.g. methane - a GHG) are reduced.
- **Environmentally-benign hydroelectricity.** Hydroelectric facilities require a water license in B.C. which includes certain environmental standards, recently strengthened under the *Fish Protection Act*. Environmentally-benign hydroelectric plants share the following characteristics: (a) complete aquatic organism protection or impact mitigation is possible; (b) water storage is minimal or zero (i.e. run-of-river) or generation capability at existing reservoir hydro facilities is expanded with no reservoir expansion (for new plants only); and (c) they induce little or no alteration of water flow patterns.
- **Cogeneration retrofits to existing combustion of natural gas (and other fossil fuels).** The cogeneration of electricity and heat dramatically improves the efficiency of the overall energy system relative to generating heat in a boiler. Eligible EDT technologies include those turbines that are added to existing heating systems (e.g. hospitals, universities, commercial buildings, industry, institutional buildings, etc.) using natural gas, scaled in proportion to the heat load of the facility. The additional air emissions from such systems are minimal because the net increase in natural gas consumption of a cogenerator is small relative to its consumption in a boiler. The net effect for the entire energy system is to reduce emissions from what they would otherwise be with a single purpose heat boiler and a single purpose electricity generation boiler.
- **Wind.** Wind generating technologies generate electricity without any air emissions or water impacts. However, siting must also minimize impacts on birds, visual aesthetics and other factors. Land impacts are negligible if they are placed on agricultural lands or in rural areas. Eligible EDT facilities include those placed off of major bird migration routes.
- **Landfill and sewage gas.** Technology systems which collect landfill or sewage gases (both GHGs) and generate electricity from those gases, or cogenerate electricity and heat, have zero

net GHG emissions. Local air quality impacting emissions should be mitigated to be eligible for EDT status.

- **Geothermal.** Geothermal electricity generation projects utilize energy from the earth in the form of heat (e.g. hot springs). Those geothermal projects which do not have significant land or watershed impacts are eligible EDTs.
- **Solar.** All solar electricity technologies (e.g. photovoltaics) and solar heating technologies which offset electric loads (i.e. solar water preheat for electric boilers or solar space heating) are eligible EDTs.
- **Tidal.** Freestream tidal technologies (e.g. vertical-axis hydro turbines) are eligible for EDT status.

The BC Government and BC Hydro have historically provided support for the development of EDTs. About 5% of existing electricity capacity in the province is supplied by EDTs. Examples of these existing plants are included in Table 1. This list is by no means exhaustive as there are numerous private facilities in the province which do not sell power to BC Hydro or West Kootenay Power. Also, there are several additional grid-connected hydroelectric facilities that may qualify as EDTs.

Table 1: Existing EDT Facilities in British Columbia

McDonald Ranch Hydro	Shushwap Hydro
Morehead Creek Hydro	Brown Lake Hydro
Coats Hydro	Falls River Hydro
Seaton Creek Hydro	Walter Hardman Hydro
Goat River Hydro	Akolkolex Hydro
Clayton Falls Hydro	Soo River Hydro
East Twin Creek Hydro	Salmon Inlet Hydro
Hluey Lake Hydro	Elko Hydro
Spillimacheen Hydro	Ocean Falls Hydro
Doran Taylor Hydro	Walden North Hydro
North Island Woodwaste (construction)	Purcell Power Woodwaste (planned)
Evans Forest Products Woodwaste	Mamquam River Hydro
Ptarmigan Creek Hydro	Williams Lake Woodwaste
Moresby Lake Hydro	Keenleyside Hydro (planned)
Scuzzy Lake Hydro	McMahon (Taylor) Gas Cogeneration
Aberfeldie Hydro	

Source: BC Hydro and West Kootenay Power

Electricity market reform is expected to reduce the current market share of EDTs unless an explicit mechanism is developed to support these technologies under competitive markets. It is estimated that much of the future growth in electricity generation in B.C. will be combustion turbines (simple and combined cycle, at times in cogeneration applications) fired by natural gas.

EDT Resource Potential and Cost

An estimate of the EDT resource potential and unit cost for British Columbia is outlined in Table 2. In some cases, specific projects are listed, including three Columbia River watershed hydroelectric projects. In other cases, a generic category is listed with the resource potential being equivalent to the sum of several potential projects across the province. In this case, an attempt has been made to reflect the average unit cost of production for that resource despite the fact that the unit costs for individual projects may vary significantly.

Table 2: The Cost of New EDT Supply

New EDT Supply	Energy (GWh)	Unit Cost (\$/kWh)	Information Source
Brilliant	516	\$ 0.035	CPC ¹
Waneta	850	\$ 0.035	CPC
Wood Waste Cogen	2391	\$ 0.040	SFU ² and Willis ³
Seven Mile	250	\$ 0.040	Several sources
Landfill Gas	1577	\$ 0.042	BC Hydro
Geothermal	2365	\$ 0.042	BC Hydro
NatGas Industrial Cogen	4000	\$ 0.042	SFU and Willis
Small Hydro	1577	\$ 0.043	SFU
NatGas Micro Cogen	399	\$ 0.055	SFU and Willis
Wind	2628	\$ 0.060	SFU
Tidal	8760	\$ 0.100	BC Hydro
Solar PV	20000	\$ 0.220	SFU

Objectives of Policy for EDT Support

Job Creation and Economic Development

Environmentally desirable technologies are largely small-scale technologies. Smaller electricity-related investments are consistently shown to be more labour intensive in terms of jobs per dollar invested or jobs per kwh produced as well as more economically efficient, generating lower prices for consumers and greater social wealth (returns to shareholders). A recent summary report by the Pembina Institute for Environment Canada showed that, per \$1 million of investment, conventional energy supply (hydro, oil, natural gas, coal, nuclear) creates 7 person-years of employment, while EDTs create 12 person-years of employment.⁴ Different studies give different numbers, but the ratios tend to be in this range.

¹ Columbia Power Corporation.

² Pape, Andrew. "Implementing Sustainable Energy Under Competitive Electricity Markets". Simon Fraser University. 1997.

³ Willis Energy Services Ltd.

⁴ Pembina Institute (Campbell, Dufay and Macintosh). 1997. "Comparative Analysis of Employment From Air Emission Reduction Measures" (prepared for Environment Canada, Global Air Issues Branch).

Smaller projects tend also to be more equitably distributed throughout the province, whereas mega-projects tend to be concentrated at one location, requiring a transient workforce which then disperses upon construction completion. In B.C., many natural gas cogeneration projects, wood waste projects, small hydro projects, energy efficiency projects, and other smaller-scale investments, will lead to job creation (generally well-paying, skilled jobs) and economic spin-offs more equally distributed throughout the province.

Environmental Considerations

One of the principle objectives of providing policy support for EDTs is to mitigate environmental impacts of electricity market reform. EDTs, by definition, have environmentally desirable attributes.

Under electricity market reform, the ability of utility regulators to incorporate environmental cost considerations in the selection of generation resources may be reduced. The evolving practice in the regulated monopoly, vertically-integrated electric industry has been for the regulator to require IRP, a public involvement process in which the utility explicitly considered environmental and social impacts in the selection of resources. This was in addition to any environmental approvals that energy facilities required from government environmental agencies or ministries. With direct access between buyers and sellers of electricity, the utility regulator loses the ability to influence or determine the investment in electricity generation via IRP. Environmental impacts not covered by existing regulations tend to get overlooked as most buyers focus on least financial cost.

An example of a possible environmental impact of electricity market reform is increased greenhouse gas emissions in the province. Without including environmental cost considerations in resource planning, it is expected that much of the future growth in electricity generation in B.C. will be combustion turbines fired by natural gas, leading to a 300% increase in electricity-related CO₂ emissions from 2 megatonnes/yr in 1997 to about 6-10 megatonnes/yr in 2010.

Policy Options for EDT Support under Competitive Electricity Markets

Several policy and market mechanisms can be adopted to support EDTs. They are listed below. The ones that are recommended for application in British Columbia are the EDT Portfolio Standard, Green Power Marketing, and Net Metering for Distributed EDTs, the latter two being voluntary mechanisms that have no impact on rates for non-participants.

EDT Portfolio Standard

A Portfolio Standard for EDTs requires that every retail power supplier acquire EDT Credits equivalent to some percentage of its total annual energy sales. The EDT Credits are created for kWhs of electricity generated from EDTs. Power retailers could generate EDT power with their own facilities or purchase EDT power from separate companies to then resell. The government or regulator must pre-determine the level of portfolio requirement in the market based on a variety of economic, environmental and social criteria. The EDT Portfolio Standard mechanism is ideally

suited for competitive market conditions as it uses market pressure to foster investment in the most cost-effective EDTs.

A national “Renewable Portfolio Standard” has been proposed in the U.S. It is expected that the U.S. climate change (greenhouse gas reduction) strategy will include electricity market restructuring across the country with a national Renewable Portfolio Standard. Also, several Congress and Senate Bills have called for a national portfolio standard of between 4% and 20% of the electricity supply. A recent Tellus Institute study¹ estimates the rate impact of one such proposal (Congressman Schaefer’s Bill) to be about 0.03 ¢/kwh in 2010, with an increase in generation from EDTs of 56 twh. Some of the proposed portfolio standards include hydroelectricity, while others do not.

Nevada, Arizona, Massachusetts, Vermont and Maine have adopted EDT Portfolio Standards, Nevada and Arizona supporting solar technologies exclusively, and Maine adopting a 30% portfolio standard (including hydroelectricity).

Non-Bypassable Wires Charge to Provide Subsidy to EDTs

Another mechanism for fostering EDTs under competitive markets is to subsidize EDT costs through the collection of a non-bypassable wires charge on all sales of electricity in the jurisdiction, also referred to as a system benefits charge. The wires charge is collected over a period of time to build a pool of funds used to support the development of EDTs. The funds could be distributed as direct subsidies to existing or new EDT facilities on a per-kwh basis (contracts-for-differences) or through guaranteed financing via a competitive bidding system for new EDT facilities.

Environmental Cost Adder on Dispatch

The Environmental Cost Adder (ECA) mechanism adds a charge to the bid/offer price of generation facilities into the market that is reflective of environmental impacts. Environmentally-undesirable technologies will be at a competitive disadvantage, and the mechanism may change the order of technology dispatch in the market. The mechanism favors EDTs by potentially improving their dispatch ranking. In order to minimize rate impacts of the mechanism, it could be designed to be “revenue-neutral”, meaning that any money that is collected via the ECA is transferred into a reduction in the wholesale price of electricity to consumers.

Net Metering for Distributed EDTs

Net metering is the practice of using a single meter to measure the difference between the total generation and total consumption of electricity by customers with small EDT generating facilities by allowing the meter to run backwards. Net metering can increase the economic value of small EDTs for customers. It allows the customers to use the utility grid to “bank” their energy: producing electricity at one time and consuming it at another time, giving them flexibility in their electricity consumption patterns. By using the existing meter, the utility is in essence buying EDT-generated electricity at full retail rates.

Currently 17 U.S. States have net metering programs, and Toronto Hydro has a small trial program. Among the U.S. net metering programs, two states have enacted specific legislation (CA, MI), 14

¹ Electricity Journal, May, 1997, pp. 42-52.

have utilities commission orders requiring utilities to file net metering tariffs, and one utility has voluntarily adopted a net metering tariff, similar to what Toronto Hydro has done. Some of the programs allow a wide variety of customer-owned generation technologies (including cogenerators), while in the California legislation only solar technologies are eligible. Most programs specify a capacity or energy limit per project, and two specify a total limit within the jurisdiction.

Green Power Marketing

Green power marketing is an electricity pricing scheme (green pricing) that voluntarily recovers from customers the cost premium required to sustain EDT development and operation. This type of program is being tested by West Kootenay Power, Enmax (Calgary) and several utilities in U.S. jurisdictions. Residential consumers pay monthly bill premiums of between \$0.50 and \$10 (commercial customers pay up to triple that), and the participation rate is up to 3% of customers.

Description of the EDT Portfolio Standard

The EDT Portfolio Standard is a mandatory mechanism applied to all retailers of electricity in British Columbia. Characteristics of the policy include:

- A minimum percentage of electricity sold by any retailer of electricity in B.C. (including B.C. Hydro and WKP to all their end-use customers, be these via tariffs or direct sales) must be derived from EDTs. In this proposal, this requirement is set at the following levels:

1998 - 2004	-	5 %
2005 - 2009	-	10 %
2010 - 2014	-	15 %

- An EDT Credit is created when one megawatt-hour of electricity is generated from a certified EDT technology in the province of British Columbia by any business entity.
- Retailers of electricity who do not have EDT generation facilities can purchase EDT Credits from producers or those retailers having excess credits. The Transmission Business Unit of B.C. Hydro (Phase 1) and eventually the B.C. Grid Company (Phase 2), will facilitate the market for trading EDT Credits.
- The BCUC will track the creation of EDT Credits on an annual basis to ensure that all retailers comply with the EDT Portfolio Standard.
- EDTs include biomass (wood waste), environmentally-benign hydroelectricity, cogeneration retrofits to existing combustion of natural gas (and other fossil fuels), landfill and sewage gas generators, solar, wind, geothermal and tidal.
- An EDT must be certified by Environment Canada (e.g. EcoLogo) or the B.C. Ministry of Environment, Lands and Parks.

Calculation of the Rate Impact of the EDT Portfolio Standard

A forecast of the impacts of the EDT Portfolio Standard on electricity rates is provided below. The methodology for this forecast is as follows:

1. Determination of the existing EDT supply in British Columbia in gigawatt-hours per year.
2. Determination of the EDT Portfolio Requirement in gigawatt-hours per year using the Canadian Electrical Association / National Resources Canada electricity demand forecast with additional transmission losses of 7%.
3. The net required EDT supply is calculated, equivalent to the requirement minus the existing supply.
4. The cost of new EDT supply and resource potential is specified in Table 2 (see above).
5. The cost of non-EDT supply is specified in Table 3, based on results of the study performed for the Pricing and Entitlements Subcommittee.
6. The rate impacts in mills (1/1000 of a dollar) per kilowatt-hour are outlined in Table 3.
7. The average monthly rate impact on a residential customers' bill is also specified in Table 3, assuming that those customers consume 10 megawatt-hours of electricity per year.

The anticipated rate impact of the EDT Portfolio Standard in the year 2000 is 0.12 mills/kwh or about 10 cents per month for a residential customer. In the year 2006, the anticipated rate impact is 0.81 mills/kwh or about 68 cents per month for a residential customer. In 2012, the anticipated rate impact is 1.5 mills/kwh or about \$1.27 per month for a residential customer.

Voluntary Mechanisms for Environmental Protection

Green Power Marketing and Net Metering are two voluntary mechanisms which can help to support small-scale EDTs that are not competitive within the EDT Portfolio Standard. The rationale for supporting these mechanisms is that certain consumers are willing to invest their private money into supporting EDTs, either by voluntarily paying higher electricity rates for specific EDTs in their community or region (green power marketing), or by purchasing and installing EDTs for their home, business or industry (net metering). An additional voluntary mechanism, Fish Enhancement, allows consumers to financially contribute towards preventing and mitigating impacts of hydroelectric facility operations on fish.

Table 3 - Calculation of the Rate Impact of the EDT Portfolio Standard

Year	1998	2000	2002	2004	2006	2008	2010	2012	2014
Electricity Demand (GWh)	72,240	78,017	80,436	82,854	85,248	87,618	89,987	93,806	97,787
Cost of Supply (HESI) (\$/kWh)	0.025	0.025	0.027	0.027	0.027	0.027	0.027	0.027	0.027
EDT Portfolio Requirement	5%	5%	5%	5%	10%	10%	15%	15%	15%
EDT Supply Required (GWh)	3612.0	3900.9	4021.8	4142.7	8524.8	8761.8	13498.1	13601.9	14668.1
Existing EDT Supply (GWh)	3228.2	3228.2	3228.2	3228.2	3228.2	3228.2	3228.2	3228.2	3228.2
New EDTs required	383.8	672.6	793.6	914.5	5296.6	5533.6	10269.8	10373.6	11439.8
Cost of New EDTs (/kWh)	0.035	0.038	0.038	0.038	0.040	0.040	0.044	0.044	0.044
Cost Premium for EDT (/kWh)	0.010	0.013	0.012	0.011	0.013	0.013	0.017	0.017	0.017
Rate Impact (Mills / kWh)	0.0521	0.1162	0.1153	0.1245	0.8128	0.8168	1.8853	1.8268	1.9325
Dollars Per Month for Residential	0.04	0.10	0.10	0.10	0.68	0.68	1.57	1.52	1.61

Green Power Marketing

This reform proposal does not provide small consumers with choice of electricity supplier. Yet survey research shows that some consumers are willing to pay a premium over and above their tariff rate in order to support EDTs. Individual customers should have an option of paying extra to support the technology of their choice. This mechanism will be implemented under the following steps:

- The distribution entities of B.C. Hydro and WKP shall implement “green power” tariff options for all customers, with regulation by the BCUC. WKP’s current application to the BCUC for a green power rate is appropriate for this requirement.
- Resources must be certified by Environment Canada under its Green Power Environmental Choice consumer product labeling scheme.
- Resources benefiting from green power support are not eligible for inclusion in an EDT Portfolio Standard.

Net Metering

Electricity can be generated on-site in many ways. Consumers should be allowed and encouraged to explore “self-generation” based on EDT resources. “Net metering” is a billing approach that charges customers for their net electricity consumption in each billing period, allowing their self-generation to “reverse the flow” of the meter at certain times. This mechanism will be implemented in the following way:

- The distribution entities of B.C. Hydro and WKP shall implement net metering tariffs for all customers, with regulation by the BCUC.
- The BCUC will determine requirements for the net metering tariffs, including the use of “time-of-use” meters to ensure that other ratepayers are not subsidizing those who adopt net metering, any required safety equipment, and a cap on the number of net metering systems or total capacity of net metering systems within the province based on reliability criteria.
- The net metering customer must pay the cost of the meter and any required safety equipment.

Fish Enhancement Program

British Columbians have become increasingly concerned with the survival of fish species in the province, in particular salmon species. Hydroelectric operations have impacts on fish by altering water flows and reservoir levels, blocking fish migration routes, and in some cases, changing the stream chemical composition below turbines. There are several measures that can be undertaken to prevent or mitigate such impacts. Under this reform proposal, electricity customers would be given an option to financially support those types of measures through a Fish Enhancement Program.

Several similar programs are already in place in the province, including: the BC Hydro Strategic Fisheries Project, the Columbia Basin Fish and Wildlife Compensation Program, Fisheries Renewal B.C., and numerous community-based initiatives such as Project Watershed in the Comox Valley.

The proposed Fish Enhancement Program should include collaboration with those existing initiatives.

The proposed Fish Enhancement Program would have the following characteristics.

- Electricity suppliers with hydroelectric operations (i.e. BC Hydro, West Kootenay Power, Columbia Power Corp./Columbia Basin Trust) will give their customers an opportunity to voluntarily contribute toward a program to protect and enhance fish. The objective of this program will be to prevent and mitigate impacts of hydroelectric facility operation on fish.
- The program will be coordinated by those electricity suppliers for their own operations, with specific measures approved by the Ministry of Environment, Lands and Parks.
- Specific activities of the programs could include: water flow ramping modifications, increasing instream flow at certain times, changing reservoir levels, conducting scientific research, installation of fish ladders, screens and passageways at hydroelectric facilities, fishery enhancement activities, and cooperation with community-based projects to protect or enhance fish.
- A voluntary customer wires charge will be the source of funding for the program.

Consumers that contribute to the proposed Fish Enhancement Program will receive a “Fish Friendly Electricity Consumer” sign and/or logo to display in their home, business or marketing literature.

APPENDIX F: MECHANISM TO ENHANCE ENERGY EFFICIENCY (BC21-EE)

Introduction

Energy efficiency and conservation programs target reductions in energy end-use consumption. This can help to delay the development of new energy or capacity infrastructure, leading to environmental benefits. Utilities have traditionally referred to these programs as demand-side management (DSM) initiatives. Currently, both B.C. Hydro and West Kootenay Power have DSM programs, the costs of which are shared by all customers. With electricity market reform, it would be a distortion of the market for the costs of DSM to be added to the cost of electricity of only one of several competing generators. Therefore, the costs should be allocated to the remaining monopoly segment of the industry, either the transmission or the distribution utility, to be passed on to all customers. Several options for fostering energy efficiency under competitive electricity markets are listed below.

Energy Efficiency Potential and Cost

Between 1991 and 1994, a consensus based collaborative committee consisting of representatives for commercial, residential and industrial electricity users, environmental interests, first nations, local governments and utilities, oversaw the development of a comprehensive assessment of the potential for electricity efficiency in B.C. Hydro's service territory. This committee, referred to as the B.C. Hydro Conservation Collaborative (BCHCC), evaluated the amount of efficiency which could be cost-effectively achieved through technological change and the amount which could be achieved through behavioral change. The BCHCC determined that about 11,000 GWh per year could be saved by the year 2010 through the adoption of cost-effective technologies¹. It also determined that an additional 6,000 GWh could be saved with minimal lifestyle or behavioral impacts. The combined total potential using adoption of technologies and minor behavioral change is about 17,000 GWh per year.

In developing estimates for efficiency potential through adoption of technologies, the committee's consultants also developed a reference case to determine how much energy efficiency would occur as a result of revised building standards and other initiatives which were underway in 1994. The consultants determined that approximately 8,500 GWh may be saved via existing initiatives. Thus, the net annual efficiency potential is about 2,500 GWh for efficiency initiatives or 8,500 GWh with minor behavioral changes.

The cumulative energy saved through BC Hydro DSM programs since the BCHCC report was published amounts to approximately 879 GWh of annual energy savings. Energy saving forecasts for the next two years amount to an additional 500 GWh. Thus, the remaining annual efficiency

¹ Cost competitive with an average end-use electricity supply cost of 4 cents / kwh which is well below the retail cost of electricity for residential and commercial customers.

potential is on the order of 1,100 GWh assuming no behavioral changes or 7,100 GWh assuming minor behavioral changes. West Kootenay Power estimates that they have captured about 46% of the efficiency potential in their service area with existing programs.

The costs of energy efficiency programs vary significantly. The total cost of an efficiency program, divided by the energy saved over the life of the program, provides an estimate of the unit cost which can be compared with supply-side projects. The total cost typically includes those costs to the utility or any contractors to the utility. The costs of BC Hydro DSM programs over the past 5 years have varied between 0.86 and 1.56 cents per kilowatt-hour of electricity saved¹, far below the cost of new electricity supply in the province.

Objectives of Energy Efficiency Policy

The objectives of promoting energy efficiency through public policy are similar to those of supporting EDTs, detailed in the previous appendix (Appendix E).

In terms of job creation, energy efficiency measures support much higher employment levels than any electricity supply technology, including EDTs. A recent summary report by the Pembina Institute for Environment Canada showed that, per \$1 million of investment, conventional energy supply (hydro, oil, natural gas, coal, nuclear) creates 7 person-years of employment, while energy efficiency creates 35 person-years of employment.²

Policies Options for Fostering Energy Efficiency under Competitive Electricity Markets

This section describes the options for implementing energy efficiency (DSM) with retail competition. The general assumption is that energy efficiency (EE) measures involve influencing the equipment acquisition and use decisions of firms, institutions and households. Another approach is to argue that EE programs are not required and that the socially desirable level of EE can and should be established simply by across-the-board government energy efficiency regulations.

Two aspects that need to be addressed with respect to fostering EE programs under competitive electricity markets include sources of funding and mechanisms for EE program implementation.

Funding Sources

EE programs would be *self-funding* if the entity implementing them were required to recover all of its costs (including the cost of capital) from the customers benefiting from EE measures. Electric utilities in North America have moved partly in this direction in recent years, requiring an increasing share of the utility EE program costs to be borne by benefiting customers. Even in the cases where

¹ Task Force Environmental Sub-Committee Final Report.

² Pembina Institute (Campbell, Dufay and Macintosh). 1997. "Comparative Analysis of Employment From Air Emission Reduction Measures" (prepared for Environment Canada, Global Air Issues Branch).

non-customer funds are used (below) most EE programs assume that at least some of the funds will be provided by the benefiting customers.

EE programs would be **government-funded** if tax revenue of some kind were collected and then dedicated to EE program implementation by whatever means. The government funds may come from general revenue or from a special levy on electricity users, but still passing directly via government.

EE programs would be **electricity consumer-funded** if revenues were collected from consumers and then passed directly to a non-government entity responsible for implementing EE programs. This is like the revenue collected for covering the costs of regulation by an independent utilities commission; this revenue is not considered to be taxation. Different non-government entities are possible recipients of this funding, as described below. This kind of charge is frequently referred to as a wires charge because the most effective means of implementation is via the billing of the distribution utility.

Implementation Mechanisms

Government agencies could implement EE programs. Since the 1970s, most governments have had at least some staff responsible for administering energy efficiency programs, usually funded from general government revenue. In North America, government EE efforts in electricity have been modest because of the substantial efforts of electric utilities to implement EE programs. However, efforts to improve energy end-use efficiency with respect to fossil fuels (transportation, heating) have remained substantial in some jurisdictions.

In British Columbia, the Ministry of Employment and Investment (MEI) used its BC 21 program in concert with electric and natural gas utilities to fund EE programs. The program was called BC 21 Power Smart, established by the Treasury Board and enshrined in an agreement between MEI, BC Hydro, the administering body, electricity and gas utilities, and local/regional government partners (e.g. water utilities). The budget was \$17.3 million over two years, with about \$12.3 of that from government, \$2.8 million from BC Hydro, and \$2.1 million from the remaining utility and local/regional government partners. A steering committee provided direction to the program. Two distinct program components were completed: (1) a “direct install” program which included an inspection of over 100,000 homes in B.C. and the installation of water heater blankets, pipe insulation, faucet aerators, low flow showerheads, weatherstripping and draftproofing; and (2) an open Request-for-Proposals for specific energy or water efficiency initiatives. The electrical energy savings for the program between April, 1995 to March, 1996 were estimated to be 16.4 gigawatt-hours and 3.0 megawatts. The direct cost of the programs for BC Hydro was 2.26 cents/kwh and the total resource cost was 3.59 cents/kwh.

Distribution utilities could implement EE programs. This approach has been especially prevalent in North America over the past 15 years. In the case of natural gas, EE programs are implemented by distribution utilities, regulated by a utilities commission. In the case of electricity, EE programs are implemented by vertically integrated utilities, again regulated by a utilities commission. It is assumed that if electricity is vertically de-integrated into competitive commodity and monopoly delivery (the latter being transmission and distribution), the responsibility for EE programs would, as with natural gas, be placed with the delivery utilities.

Various other institutions could implement EE programs. Electricity market reformers in other jurisdictions are exploring various institutions to implement EE. Often these institutions are some mix of private and public, although they could be completely private or completely public. The Association for the Advancement of Sustainable Energy Policy (AASEP) proposes creating an entity in B.C. called Conservco, which would be a public, non-profit organization responsible for key elements of EE programs, although actual implementation may be done via competitive bidding.

Description of the BC21-EE Mechanism

This proposal differentiates between energy efficiency (EE) measures that are cost-effective for electricity retailers from a private cost perspective and those measures that are above the market cost of electricity supply on a per kilowatt-hour-saved basis. Cost-effective EE programs are to be implemented by distribution utilities (i.e. WKP, BC Hydro) and regulated by the BCUC, as is the current practice. Efforts should be made to adopt EE incentive mechanisms similar to the current West Kootenay Power DSM program.

Those EE programs that are above the market cost of electricity supply in the province, but can be justified on an environmental basis, are implemented by a government agency similar to BC 21 Power Smart outlined above. This new agency, BC21-EE, would have the following characteristics.

Phase 1 (by January 1, 1999)

- The government shall create a special energy efficiency division of BC21, called BC21-EE. A Steering Committee comprised of government, labour, electricity distributors, environmental interests, and ratepayer interests will direct the financial and policy components of the division.
- The division will have a small staff, tendering most of its activities to competing energy service companies.
- The mandate of BC21-EE shall be to use incentives (most of which should be recovered from benefiting customers) to foster energy efficiency investments that are above market costs of electricity supply.
- This division shall be 1/3 funded from government general revenue and 2/3 funded by a non-bypassable wires charge levied by all electricity distribution entities in B.C. The non-bypassable wires charge will be recovered from customers on the basis of shares of utility gross revenues. It will be \$10 million per year in Phase 1, for a total annual BC21-EE budget of \$15 million, including the government's contribution.
- At the beginning of its mandate, and every five years following that, the BC 21-EE division will undertake an assessment of the energy efficiency potential in the province and develop an EE measure supply curve.
- BC21-EE will collaborate with the newly formed Office of Energy Efficiency, established by Natural Resources Canada to promote energy efficiency activities in Canada and broaden the reach of federal programs.

Phase Two (by January 1, 2001)

- In the interest of a level playing field between the natural gas and electric sectors, and the equivalent need for environmentally justified natural gas energy efficiency, the mandate of the BC21-EE division will be expanded to include energy efficiency in natural gas consumption.
- The annual budget of BC21-EE shall increase to \$25 million, with \$10 million per year collected from natural gas consumers through an energy charge.
- District energy systems will be given explicit attention by BC21-EE under this phase.
- Given the importance of transportation fuels in generating B.C.'s contribution to greenhouse gas emissions, the government may wish to extend the mandate further to include all energy forms and possibly on water consumption because it often ties directly with energy consumption. In this case, the funding base should be expanded as well.

Determination of Rate Impacts of the BC21-EE Mechanism

The total cost to B.C. industrial customers for electricity-related energy efficiency by BC21-EE, would be about \$2 million per year, equivalent to an addition of 0.01 ¢/kwh to their average charge of 3.4 ¢/kwh. The total cost to residential customers, for electricity-related energy efficiency by BC21-EE, would be about \$4 million per year, an addition of .03 ¢/kwh to their average charge of 6.1 ¢/kwh.

APPENDIX G: ESTIMATING THE COST OF IMPLEMENTING THE REFORM PROPOSAL

Introduction - Experience in Other Jurisdictions

In attempting to estimate the cost of implementing reform proposals for British Columbia, the Task Force obtained information from a number of other jurisdictions concerning their experiences. This information revealed that the range of expenditures in other jurisdictions was very wide, and that the costs depended both on the extent of the reforms and the nature of the marketplace that existed prior to reforms being initiated.

In Alberta, relatively limited reforms were introduced in 1996 involving, firstly, the creation of the Alberta Grid Company to manage the transmission system and, secondly, the creation of the Alberta Power Pool to administer a modified version of a pre-existing pool. These initial reforms did not involve retail access. In total, these initial reforms cost the Alberta government approximately \$5 million. This figure does not, however, include costs to other parties involved in the process nor the costs that are now being incurred for additional initiatives, such as the establishment of a new independent system control centre.

A somewhat larger figure was spent by the Australian state of Victoria, in respect of the first phase (i.e. the non-privatisation phase) of its reform measures. This phase involved the vertical and horizontal disaggregation of the state-owned integrated utility and the creation of new market arrangements for limited retail access, over a period from 1992 through to 1995. During this process, the state government incurred expenses in respect of project management, legal, accounting, technical and departmental services of approximately \$20 million, in Canadian funds. Again, this number does not include the expenses of the other participants, including those of the state-owned utility.

In California, the costs to date have been significantly greater, in the order of US\$250 million. However, this figure reflects very significant differences in the reforms undertaken in California and proposed in British Columbia. Firstly, the California electricity system, particularly in terms of numbers of consumers, is of an order of magnitude larger than British Columbia. Secondly, the reforms undertaken in California are sweeping and complex, involving a transition, without phasing, to a full retail access regime, with both an Independent System Operator (ISO) and a completely separate Power Exchange (PX). Finally, there are a number of unique features in the new California arrangements, notably in terms of software requirements and the need for full-scale backup systems for both the ISO and PX.

Costs in British Columbia

The phased approach proposed in this Report has the advantage of keeping implementation costs to a minimum, while experience is gained with each progressive stage.

Phase 1 (by January 1, 1999)

The key elements of the Phase 1 reforms, from a cost viewpoint, are:

- i) the creation of the Grid Oversight Committee, including the development of new tariff provisions for limited direct access;
- ii) the creation of the voluntary B.C. Power Exchange, including the establishment of bidding rules and other market arrangements;
- iii) the creation of a division of BC 21 responsible for DSM activities;
- iv) the establishment of an EDT Portfolio Standard; and
- v) other miscellaneous items, such as the reforms to the *Utilities Commission Act*.

Based on information supplied by some of the Task Force stakeholders, including B.C. Hydro and WKP, and having regard to the experience in other jurisdictions, the Advisor believes that the total transitional costs for the government, B.C. Hydro and WKP, for this phase, would collectively amount to approximately \$7 to \$10 million. In addition, the government would have the annual costs associated with the new BC21 DSM programs as detailed in the Report.

In terms of consumers, these transitional costs would not have any significant impact on the rates of residential or commercial customers of B.C. Hydro or WKP, or on the industrial customers who chose to stay with utility tariff services. Industrial customers who chose to opt for direct market access would pay for the costs of the Grid Oversight Committee and of the B.C. Power Exchange, as detailed in the Report, and may also be responsible for new metering costs. Of course, these additional charges for individual large industrial customers may be more than off-set by reductions in their total costs of energy, depending on the market arrangements which they make.

Phase 2 (by January 1, 2001)

The key elements of the Phase 2 reforms, from a cost viewpoint, are:

- i) the transformation of the Grid Oversight Committee into a distinct corporate entity, the B.C. Grid Company, which would operate the grid throughout the province, on the basis that the new company would own the transmission assets formerly possessed by B.C. Hydro and lease the transmission assets of WKP;
- ii) the opportunity for direct access would be extended to all industrial customers, and possibly some large commercial customers, with a corresponding increase in the number of transactions to be processed by the B.C. Grid Company and the B.C. Power Exchange; and
- iii) the budget for the BC 21 DSM program would be increased, as described in the Report.

As indicated in Chapter 3 of this report, the creation of the B.C. Grid Company need not be expensive. The Advisor estimates that the total cost incurred by B.C. Hydro and the government

would be approximately \$2 to \$4 million, with some additional, but much lesser, expenditures by WKP.

The cost impact of expanding the opportunity for direct access is particularly difficult to assess, given the uncertainty as to what rights the BCUC may wish to give large commercial customers and as to the actual number of industrial and commercial customers who will take advantage of the opportunity. Conceivably, however, a large number of additional users could impose significant software and other system control costs on the B.C. Grid Company and the B.C. Power Exchange - perhaps in the order of \$25 million - in addition to any new metering costs. Finally, as indicated in the Report, the Phase 2 reforms call for a \$10 million increase in the annual budget of the BC21 Energy Efficiency division, from \$15 million to \$25 million, partly funded by the non-bypassable wires charge and partly by the government.

A Perspective on Implementation Costs

In evaluating the estimates contained in this appendix, a critical point to be kept in mind is that, in the context of the electricity market in British Columbia, the projected cost figures are very small. During the 1996/97 fiscal year, the revenues of B.C. Hydro amounted to more than \$2.403 billion and, in that fiscal period, B.C. Hydro's total payments to the Province and to municipal governments amounted to \$744 million. These figures do not include sales by WKP or taxes paid by WKP. In short, the costs of reform are minor in relation to the total value of the electricity market in British Columbia.

APPENDIX H: OUTLINE OF THE ELECTRICITY MARKET REFORM ACT

In order to implement the reforms set out in this Report, the Advisor recommends that the Minister should table in the Legislature an *Electricity Market Reform Act* (EMRA).

The EMRA would be comprehensive, in the sense that it would contain, in one enactment, all of the necessary legislative measures to implement Phase 1 of the proposed reforms, including consequential changes to existing legislation. However, it should be noted that many of the proposed reforms do not require legislative changes.

On this basis, the EMRA would contain the following elements.

General Provisions

It would be useful for the EMRA to have, in one of its opening sections, a statement of legislative purpose, of the type found, for example, in the *Build BC Act*. In this section of the EMRA, the key objectives set out in the Terms of Reference of this Task Force would be reiterated. Specifically, there would be a clear recognition that the reason for creating a more competitive and open electricity market was to enhance economic development and promote job creation, while protecting system reliability and the interests of consumers, electricity sector employees and the environment. Such a provision in the EMRA would be a useful guide to future interpretations of the other, specific, provisions in the Act.

Creation of the Grid Oversight Committee

The EMRA should formally constitute the Grid Oversight Committee, as contemplated in Chapter 3 of this report, for two reasons.

Firstly, under Phase 1 of the proposed reforms, the Grid Oversight Committee will have substantial responsibilities - in terms of overseeing both the grid operations and the new B.C. Power Exchange - and the recognition of the Committee in legislation will enhance its independence and credibility and will regularize its funding.

Secondly, if the Province subsequently decides to implement the Phase 2 reforms, which include the creation of the B.C. Grid Corporation, it would be administratively simpler to do so if its predecessor, the Grid Oversight Committee, had already been legislatively established.

In creating the Grid Oversight Committee, the EMRA would identify the membership, governance, functions and powers of the Committee. At this Phase 1 stage, the provisions of the *Company Act* and the *Company Clauses Act* would not apply to the committee.

In addition, the EMRA would explicitly provide a mechanism for funding the Grid Oversight Committee. One possible approach would be to empower the Lieutenant Governor in Council to issue a new type of special direction to the BCUC. This direction would require the BCUC to evaluate the reasonableness of the budgets and costs of the Grid Oversight Committee. In addition, it would set out a mechanism whereby owners of transmission facilities in the province would collect, from 'direct access' users of such facilities, revenues sufficient to cover the authorised costs of the Grid Oversight Committee, which revenues would then be paid directly to the Committee.

Creation of the B.C. Power Exchange

For the reasons given above in respect of the Grid Oversight Committee, the Advisor recommends that the B.C. Power Exchange should be explicitly established in the EMRA.

A variety of options could be used. One possibility would be to create a not-for-profit corporation, as was done for the California Power Exchange. If this approach were taken, the EMRA could, in turn, identify which generic provisions of the *Company Act* and other corporate legislation would apply to the B.C. Power Exchange and, in addition, specify any unique arrangements - concerning, for example, governance - which would pertain exclusively to this particular body.

In terms of oversight and regulation, the EMRA should provide that the B.C. Power Exchange would not be subject to the provisions of the *Securities Act* regarding other types of exchanges in British Columbia. The EMRA would provide, instead, for the arrangements discussed in Chapter 3 of the report, whereby the B.C. Power Exchange would be subject to oversight by the Grid Oversight Committee and would be regulated by the BCUC.

The funding requirements of the B.C. Power Exchange could be handled in a manner similar to that proposed for the Grid Oversight Committee - i.e. a new form of special direction to the BCUC. In terms of the imbalance and ancillary services which B.C. Hydro is to provide to the B.C. Power Exchange during the start-up phase, this could be mandated by means of an amendment to the *Hydro and Power Authority Act*, so as to give the Lieutenant Governor in Council the ability to issue directives to B.C. Hydro in respect of such matters.

Amendments to the *Utilities Commission Act*

As noted in the Report, the transition to a competitive market in natural gas did not necessitate extensive changes to the *Utilities Commission Act* ("UCA"). Accordingly, the move towards competition in electricity should not require significant amendments to this particular legislation. The ERMA ought, however, to provide for revisions to the UCA in the following areas.

Recognising Competition

The need for traditional rate regulation is diminished as markets become more competitive and less monopolistic. Accordingly, the BCUC should be provided with the power of forbearance, so that the BCUC may back away from regulation where circumstances warrant. Section 88 of the UCA allows the BCUC to exempt a person from regulation with the prior approval of the Lieutenant Governor in Council. This process is cumbersome and the BCUC should have greater flexibility in this regard. Section 71 of the UCA requires the oversight of Energy Supply Contracts but the section is not reflective of the frequent and often short term contracting that ensues in a competitive marketplace.

At the same time, however, competition can give rise to consumer protection issues. Accordingly, the BCUC should be given some additional powers in this regard, while recognizing - as indicated in the Report - that the need for consumer protection measures is limited in view of the restrictions on direct market access.

Resource Planning

The legal debates over integrated resource planning in the past few years have highlighted the limitations of the UCA with respect to the BCUC's oversight of utility resource planning. In a competitive electricity market, the generation resource acquisition may require less oversight but the planning of the transmission and distribution systems will continue to have a large impact on customer rates. At the present time, some 80 percent of the electricity rates paid by consumers comes from the capital assets invested in by the utilities. Sections 45 and 46 of the UCA will require revamping so as to ensure that the BCUC explicitly has the ability to monitor and control such capital investments.

Environmental Issues

The BCUC has determined that the current wording of the UCA limits the BCUC's consideration of new investments by utilities to the financial consequences for ratepayers. However, recent evaluations of project additions undertaken by the Crown Corporations Secretariat reflect a "total cost" methodology, which is inconsistent with the methodology the BCUC must use.

The current UCA also has the defect of being silent on environmental issues in regard to the impact of pricing and dispatch decisions in a competitive electricity market. As one specific remedy in this regard, the EMRA should amend the UCA to provide for the recognition of the "green power" initiative discussed in Chapter 3 of the report.

In addition to giving the BCUC the power to deal with the environmental consequences of capital investments and operating decisions, the UCA will need to be amended to enable the BCUC to ensure that retailers of electricity are utilising the required levels of environmentally desirable generation resources under the EDT Portfolio Standard program described in Chapter 3 of the report. As noted below in the section dealing with additional amendments, this program will also require revisions to the *Environmental Assessment Act*.

New Regulatory Methods

The nature of utility regulation has changed significantly in the last 10 years. The cost and effectiveness of the traditional adversarial hearing process are in question, and regulatory tribunals are employing a range of alternative methods to ensure that regulation remains relevant and responsive to ratepayer needs.

In particular, the BCUC now sees most of its rate applications dealt with by alternate dispute resolution techniques where the affected parties are brought together in an effort to reach a consensus on the appropriate utility costs and allocations between the various customer classes. In a competitive world, utilities recognize the value of good customer relations and wish to avoid adversarial processes. In addition, the BCUC has increasingly accepted multi-year rate settlements with incentives which cause utilities to take actions which will be in the best interest of the ratepayers.

Currently, the UCA contains, throughout the Act, references to hearings, without recognition of alternative methods of processing applications. Sections 85 and 86 should be amended to give the BCUC greater flexibility, so that it can process applications in whichever way will provide the fairest and best results.

Additional Statutory Amendments

There are a variety of other existing statutes which need to be amended by the EMRA in order to implement the proposed reforms - either to remove provisions inconsistent with the reformed marketplace, or to facilitate new initiatives described in the Report.

Included in this category are amendments which should be made to the *Hydro and Power Authority Act* to restrict, for example the ability of B.C. Hydro to expropriate private generating facilities and to require owners of such facilities to provide information to B.C. Hydro. Further, as noted above, the Lieutenant Governor in Council should be granted wider powers to direct the affairs of B.C. Hydro, in a manner consistent with the purposes of the EMRA.

In addition, certain of the new environmental protection measures contained in the Report will necessitate revisions to existing legislation. The *Build BC Act* will need to be revised to establish and fund the special division of BC21 responsible for energy efficiency programs. Finally, as noted above, mechanisms will be required in the *Environmental Assessment Act* to allow the Environmental Assessment Board to certify that a particular source of generation qualifies as an Environmental Desirable Technology under the EDT Portfolio Standard arrangements.

APPENDIX I: EXECUTIVE SUMMARY OF THE FINAL REPORT TO THE PRICING & ENTITLEMENTS TECHNICAL SUBCOMMITTEE

In the printed (bound) version of this Final Report of the Task Force, the following pages contain the “Executive Summary of the Final Report to the Pricing & Entitlements Technical Subcommittee of the B.C. Task Force on Electricity Market Reform”. This executive summary is reproduced with the permission of Compass Resource Management Ltd., subject to a disclaimer contained in the report from which it is taken.

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