

## 1.0 INTRODUCTION

The British Columbia Hydro and Power Authority ("B.C. Hydro" or "the Applicant") is a Provincial Crown Corporation, established by amalgamation of the former British Columbia Electric Company Limited and British Columbia Power Commission in 1962. Its mandate is to generate, transmit and distribute electricity in British Columbia. B.C. Hydro presently operates under the Hydro and Power Authority Act and is subject to regulation by the British Columbia Utilities Commission ("the Commission"). All the provisions of the Utilities Commission Act ("the Act") apply to the utility except for Sections dealing with utility financing and asset dispositions.

This Decision represents one of the most significant determinations by the Commission since B.C. Hydro came under regulation in 1980. When the Government determined to place B.C. Hydro under the jurisdiction of the Commission in 1980, it did so largely to provide a vehicle to allow B.C. Hydro's monopoly generation, transmission and distribution activities to be scrutinized by the public and regulated in a manner consistent with other energy utilities in British Columbia. At that time, B.C. Hydro was a very large organization in the process of building a large dam project at Revelstoke.

Today, B.C. Hydro is a smaller organization and is in the process of restructuring itself to meet the very different priorities and needs of the 1990's. B.C. Hydro has been a leader in setting the stage for electricity to be a more highly valued resource, a dominant factor in the attainment of Provincial and Federal environmental goals and a vehicle to promote economic growth in British Columbia.

B.C. Hydro is to be commended for attempting to respond to shifting public attitudes by coming forward with its Rate Application at this time when many social influences are rapidly changing. Not only have environmental concerns regained national priority as a result of concerns about carbon dioxide emissions and global warming, but economic efficiency has become vital to survival in competitive global markets. Since the Commission last held a public review of B.C. Hydro's rates in 1986, the utility has undergone significant restraint and restructuring of its activities. Furthermore, B.C. Hydro has participated in Provincial privatization ventures which have seen the utility shed its interest in natural gas distribution and rail transportation. Finally, the Application by B.C. Hydro comes forward at a time of significant change, with the Federal Goods and Services Tax ("GST") slated to commence next year and the Provincial Government's directives with respect to the sharing of net revenues from the utility.

The importance of this hearing is highlighted by the change in circumstances facing B.C. Hydro with respect to future electricity generation costs. For two decades, prior to the completion of the Revelstoke dam, B.C. Hydro benefited from economies of scale in development of its transmission and distribution system, and from declining costs in the development of new generation. This situation has reversed as B.C. Hydro now faces the prospect of developing higher cost resources to supply the growth in demand for electricity. In addition, many key sections of the transmission system will require upgrading over the course of the next two decades.

B.C. Hydro is not unique in facing a higher cost future environment and the utility has adopted many of the most progressive resource planning techniques in North America. These include the development of Power Smart as a program of electricity conservation and Demand-Side Management ("DSM"), and Resource Smart to use existing facilities more efficiently. The utility has also adopted Least-Cost Integrated Resource Planning ("LCIRP") as a sophisticated method of determining resource additions.

Not only has B.C. Hydro responded to a changing environment, but the Provincial Government has provided leadership in the development of policies and programs to meet the needs of the 1990's. In particular, the issuance of Special Direction No. 2 to the Commission provides for a premium payment to Independent Power Producer ("IPP") projects which will reduce environmental pollution in the communities where they are developed. In June 1988, the Government encouraged the development of the British Columbia Power Export Corporation ("Powerex") as an agency to coordinate firm exports of power from British Columbia. Most recently the Government issued Special Direction No. 3 to the Commission which revokes and replaces Special Direction No. 1 (Revised) previously issued in 1984. The Commission is directed to ensure that B.C. Hydro meets minimum financial standards and to require B.C. Hydro to have rates which promote energy conservation and avoid future rate shock by raising rates in a smooth, predictable, and stable manner to meet the cost of future supply, ensuring that rates are fair, just and reasonable.

B.C. Hydro has responded to these changes by adopting initiatives which substantially modify its corporate mandate and organization structure. B.C. Hydro's actions will impact other utilities in British Columbia, both electrical and natural gas. B.C. Hydro's progressive DSM programs are also being recognized elsewhere in Canada with two other large electric utilities considering adopting the B.C. Hydro Power Smart programs.

This Decision includes a review of management restructuring, Power Smart as the preferred resource supply, Resource Smart programs, LCIRP which sets the priority for resource additions, the development of Powerex as a working entity and a discussion of the importance of future rate design for all classes of customers. As part of its LCIRP, B.C. Hydro has adopted a strategy of deferring construction of high cost, major resource additions such as Site C for as long as possible.

The Commission was impressed with the stated goals of B.C. Hydro's Application and the input received from intervenors and intervenor groups throughout the hearing. In the simplest of terms the Commission views this Application as B.C. Hydro's recognition of the higher costs and environmental implications of the future and its response to those influences. Indications are that existing inefficiencies in the system will be corrected before future high cost resources are built and brought into the rates.

The Commission believes that this public hearing has been an important event in that it has provided the means for interested parties to acquire detailed information from B.C. Hydro regarding its plans; for them to provide views to the utility as to the conduct of its business; and for opening dialogue on how energy can be conserved and used more effectively. In this connection the Commission is particularly pleased with the comments made by the intervenors as to a much improved responsiveness by B.C. Hydro in this proceeding compared with the past.

This Decision provides recommendations and directions to assist B.C. Hydro through its planning and program development. These should not be interpreted as lessening the very substantial efforts that B.C. Hydro has made. The Commission intends to provide the utility with flexible, pro-active regulation while still ensuring that customers receive safe, adequate supplies of reasonably priced electricity into the future.

## 2.0 APPLICATION

B.C. Hydro applied on October 11, 1989 for an interim increase of 3 percent, applicable uniformly to all classes of service, effective with consumption on and after November 15, 1989.

The Commission approved the interim increase subject to refund with interest by Commission Order No. G-49-89 dated October 13, 1989. By that Order, B.C. Hydro was instructed to provide a full Application, inclusive of detailed information as specified in the Order, by November 30, 1989. The hearing of B.C. Hydro's full Application was set for Monday, February 5, 1990.

The Commission received two Applications in November requesting that the Commission reconsider the interim increase effective November 15, 1989. Those Applications by the Consumers' Association of Canada (B.C. Branch) et al and the Industrial Customers ("COFI et al") were considered by the Commission and rejected by Commission Order No. G-60-89 dated November 15, 1989. Notwithstanding the fact that the Applications were rejected, it is to be noted that the interim increases remained subject to refund with interest, pursuant to the terms of Commission Order No. G-49-89.

On November 30, 1989 B.C. Hydro filed its full Application in support of the 3 percent rate increase referred to above, and two further 3 percent increases commencing April 1, 1990 and April 1, 1991. The Commission issued Order No. G-63-89 on December 1, 1989 detailing the procedures for notification of participation in the hearing and the filing of evidence in advance of the hearing commencement.

Two pre-hearing conferences were convened to clarify procedural and other matters in advance of the hearing. The first pre-hearing conference occurred on December 14, 1989 and the second pre-hearing conference was held on January 26, 1990.

By letter dated January 18, 1990, the solicitors for B.C. Hydro advised the Commission that B.C. Hydro wished to open its case with a statement of policy from the Chairman of B.C. Hydro, Mr. Larry Bell. Since Mr. Bell would not be available at the commencement of the hearing scheduled for February 5, 1990, B.C. Hydro indicated it would apply for a postponement. For this reason and others, the Commission by Order No. G-5-90 postponed the commencement of the hearing from February 5, 1990 and set it for commencement February 12, 1990 in Vancouver, B.C.

The Application, which broke new ground in the form of regulation to be applied to B.C. Hydro, was heard over 15 days, with final argument being heard on March 5, 1990.

### 3.0 REGULATORY FRAMEWORK AND POLICY

Before considering the particulars of the Application and the policy issues it entails, it may be useful to review the regulatory framework against which the Application must be viewed.

Public Utilities Commissions, often referred to as regulatory tribunals, are a North American invention. The reason for this is historic. Due to the excesses in which a number of public utilities engaged during the early years of this century there were protracted court cases, involving railroads, in particular, but some other utility companies as well, to redress the abuse of customers' rights. Going through the ordinary procedures of the courts proved to be cumbersome and ineffective. Therefore regulatory tribunals were conceived to take care of this special function in society. Their purpose was to provide a substitute for the discipline of the free market place in the activities of utility companies, which for the most part were natural monopolies. This purpose still holds true today.

Regulatory tribunals, in general, are created by legislation to carry out certain administrative functions. The functions, powers, and scope of authority are determined by the governments which create them. While such tribunals are quasi-judicial bodies, they differ from the judiciary proper in that their authority does not extend to reviewing the propriety or constitutionality of legislation passed by governments. This Commission is no different from other regulatory tribunals in this respect.

#### 3.1 Policy Considerations

The Commission is instructed and guided by the provisions of the Act inclusive of Special Directions pursuant to Section 3 of the Act. Without limiting the Commission's responsibility to meet all requirements of the Act, the following sections are particularly applicable to this Rate Application.

Section 28(1) says:

"The Commission has general supervision of all public utilities and may make orders about equipment, appliances, safety devices, extension of works or systems, filing of rate schedules, reporting and other matters it considers necessary or advisable for the safety, convenience or service of the public or for the proper carrying out of this Act or of a contract, charter or franchise involving use of public property or rights."

With more particular reference to this Application, Section 65 states:

"(1) A public utility shall not make, demand or receive an unjust, unreasonable, unduly discriminatory or unduly preferential rate for a service furnished by it in the Province, or a rate that otherwise contravenes this Act, regulations, Orders of the commission or other law.

(2) A public utility shall not, as to rate or service, subject any person or locality, or a particular description of traffic, to an undue prejudice or disadvantage, or extend to any person a form of agreement, a rule or a facility or privilege, unless the agreement, rule, facility or privilege is regularly and uniformly extended to all persons under substantially similar circumstances and conditions for service of the same description, and the commission may, by regulation, declare the circumstances and conditions that are substantially similar.

(3) It is a question of fact, of which the commission is the sole judge, whether a rate is unjust or unreasonable, or whether, in any case, there is undue discrimination, preference, prejudice or disadvantage in respect of a rate or service, or whether a service is offered or furnished under substantially similar circumstances and conditions.

(4) In this section a rate is "unjust" or "unreasonable" if the rate is

(a) more than a fair and reasonable charge for



(b) insufficient to yield a fair and reasonable compensation for the service rendered by the utility, or a fair and reasonable return on the appraised value of its property, or

(c) unjust and unreasonable for any other reason."

The Act also contains the following Section:

"3.(1) The Lieutenant Governor in Council may issue a direction to the commission specifying the factors, criteria and guidelines that the commission shall or shall not use in regulating and fixing rates for the authority and the commission shall comply with the direction notwithstanding

(a) any other provisions of this Act, or

(b) any previous decision of the commission."

It is not uncommon for legislation that governs regulatory commissions to contain provisions whereby governments may give direction to their respective agencies, although in many cases such direction is limited to general direction on broad policy matters. In British Columbia, however, it should be noted that the Government has chosen to enable both general and specific direction to be given. It is the prerogative of government to pass such legislation as it considers proper.

By Order-in-Council No. 1418, dated October 5, 1989, the Commission was issued Special Direction No. 3 which is as follows:

### **"Application**

1. This Special Direction is issued by the Lieutenant Governor in Council to the British Columbia Utilities Commission ("the Commission") under authority of Section 3.1 of the Utilities Commission Act with respect to the exercise of the Commission's powers and functions applying to the British Columbia Hydro and Power Authority (B.C. Hydro).

### **Conservation and Efficient Electricity Use**

1. In setting B.C. Hydro electricity rates, the

conservation and efficient electricity use by recognizing that electricity rates should gradually increase to meet the higher costs of new electricity supply.

2. The Commission shall further ensure that B.C. Hydro electricity rates remain fair, just and reasonable.

### **Financial Standards**

1. The Commission shall ensure that electricity rates meeting the above requirements must also allow B.C. Hydro to generate adequate revenues in each financial year to:
  - (a) sustain an operating and capital regime that continues to provide a quality and reliable electrical service to all its customers and that contributes to conservation;
  - (b) meet all debt service, tax and other financial obligations and generate a distributable surplus;
  - (c) achieve before the end of the 1991/92 financial year, and maintain thereafter, a minimum interest coverage ratio of 1.3:1; and
  - (d) achieve before the end of the 1991/92 financial year, and maintain thereafter a maximum debt/equity ratio of 80:20.

### **Return on Public Investment**

1. Electricity rate setting pursuant to this Special Direction shall generate annual distributable surpluses for B.C. Hydro, which will be allocated in a manner specified by the Lieutenant Governor in Council by Special Direction No. 1 to B.C. Hydro under Section 54.1(a) of the Hydro and Power Authority Act.

This Special Direction revokes and replaces Special Direction No. 1 (Revised) of March 16, 1984."

The Direction is definitive in certain respects. It fixes the minimum interest coverage ratio to be 1.3:1 and sets the target for achieving this to be before the end of the 1991/92 fiscal year (March 31, 1992). It sets, by the same target date, the maximum debt/equity ratio to be 80:20. Similarly, by reference to Special Direction No. 1 to B.C. Hydro, issued under Order-in-Council No. 1417, also dated October 5, 1989, the Government fixed the return (in this case the

1989/90 fiscal year. In subsequent years, the return on public investment is to be paid according to a formula.

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It is important to note that while the Special Direction to the Commission introduces some new concepts as well as specific financial standards, it does not set aside any of the provisions of the Act, and therefore it must be seen to be an overlay or an addition to the basic thrust of the statute. It is also important to note, that while the Act makes many references to rates being fair, just and reasonable, the Government has repeated this requirement in the Special Direction, in item 2 under the heading "Conservation and Efficient Electricity Use".

Legislation that relates to electric energy service in B.C. can be found in acts other than the Utilities Commission Act. For example, the "Economic Development Electricity Rate Act" provides the Provincial Cabinet the authority to set electricity rates for the sale of surplus electric power within the province. The determination of what authority is incorporated in the Act and what authority is more effectively administered by Cabinet is an ongoing part of a dynamic regulatory and governmental process. It is in this context that the important issue of efficient energy use is currently being considered.

The Commission must be cognizant of evolving policies of government and relevant activities in the economy. Most recently, government policies at the Federal and Provincial levels have focused on environmental issues inclusive of global warming and carbon dioxide emissions, along with pollution standards for nitrogen oxides and sulphur oxides. In addition, there is a growing global commitment to improvement of air emissions not only in particular air sheds, but internationally. These environmental concerns will influence the competition among alternative energy forms. B.C. Hydro is fortunate to have an electrical generation system predominantly driven by hydro power. However, future initiatives of both the utility and the Government will focus on conservation and the environment by examining a range of alternative measures to meet the incremental requirements of new loads. If successful, these measures will act so as to postpone the addition of new generation capacity.

The Commission must also remain aware of international activities that may influence plans and priorities. These include DSM and the trend towards LCIRP. LCIRP differs from earlier planning systems, mainly by including energy use efficiency, that is, reductions in usage, as a supply resource alternative. Utilities invest in programs to change customer use (DSM) at a resource cost that is economic by comparison with long-run supply alternatives. Also, the most recent focus on sustainable development will have ongoing ramifications on the load and generation requirements of B.C. Hydro.

The Commission must also consider activities and policies which affect competing energy forms. In British Columbia, this focus relates to natural gas which is broadly available and in abundant supply. B.C. Hydro has initiated programs with the natural gas industry to shift appropriate load from the electric utility to natural gas distributors.

In this Decision, the Commission is faced with legislative and policy influences and with constraints which it must judiciously meld together to provide an appropriate and fair basis for the determination of B.C. Hydro's 3-year revenue requirement. The Commission Chairman alerted all participants at the hearing to the difficult problem facing the Commission in differentiating between competing objectives and arriving at the the most appropriate decision. At Transcript p. 4 ("T. 4") the Chairman stated the following:

"The decisions that the panel will make following the completion of this hearing will have considered the combined regulatory responsibility of the Commission pursuant to both the Utilities Commission Act and Special Direction No. 3.

This general responsibility results in a number of competing objectives which the panel will blend together to ensure that B.C. Hydro electricity rates remain fair, just and reasonable."

"The Application by B.C. Hydro reflects fundamental changes in direction by the utility. The conservation, demand side management, and non-utility generation components of the Application deal with the longer term analysis which is presumed in Special Direction No. 3.

As I have stated the challenge for this panel is to set rates and approve programs which will result in fair, just and reasonable rates for all customers while at the same time providing an opportunity to meet the financial efficiency and conservation objectives."

### 3.2 Positions and Interpretations of Parties

#### 3.2.1 B.C. Hydro

B.C. Hydro has applied for three simple across-the-board increases totalling 9.27 percent, compounded over the period. This was argued on the grounds that it was the quickest way to "send a signal" to consumers about the need to conserve.

The B.C. Hydro Application postulated the utility's interpretation of legislative and other matters. The Executive Summary of the Rate Application stated:

"The Application for a rate increase is based on the mandate given to the BCUC by the Provincial Government which includes ensuring that rates:

- \* are smooth and stable
- \* encourage conservation and efficient use of electricity
- \* are fair, just and reasonable
- \* permit B.C. Hydro to meet its financial standards
- \* generate a return on public investment."

In other words, the Rate Application is B.C. Hydro's response to Special Direction No. 3.

Reviewing the evidence, further clarification of the interpretation is obtained. At T. 13, Mr. Bell, Chairman of B.C. Hydro said:

"Mr. Chairman, in my view this hearing is a hearing on environment and not rates."

At T. 20 he continued:

"Here we are casting off the logic of the past and developing new concepts for new challenges of the future. We are focusing on much broader issues. We are focusing on what kind of society, what kind of environment do we wish to have in the future.

Neither of us, in my mind, can look behind these lawful instructions of our Government. This Rate Application is not motivated by dollars, is not driven by financial requirements.

Secondly, efficiency, given policy-based rates, would probably become a more central concern of Treasury Board rather than the Minister responsible for B.C. Hydro. I anticipate, though, that within the context of more general public concern a public forum to review our efficiency remains important, and perhaps even more so. It is important to realize that the income that may flow from our policy-based rates result in dividends to our province."

And again at T. 45:

"We felt that this hearing, on the basis of policy-driven rates, was the key and underlying principle that needed to be established."

B.C. Hydro interprets "policy driven" rates as the level of rates needed to satisfy some enunciated policy of government that has priority over meeting the traditional requirements of recovery of historical costs of construction, fair return on investment in public utility plant, plus all prudently-incurred operating expenses. This statement is corroborated in the answer to Sierra Club question 3 in Exhibit 42, "the present Rate Application is not driven by the need for additional revenue." At T. 49, Mr. Bell alluded to the fact that B.C. Hydro does not need the increases applied for in this

operating expenses for a period well in excess of the term of this Application, perhaps for the next 10 years. Instead, the gradual increasing of rates is seen by B.C. Hydro to be the most important way in which customers must be encouraged to conserve electricity and to use it more efficiently. In argument, B.C. Hydro's counsel at T. 2150 summed up the utility's position:

"But in conclusion I repeat again that the rate increases applied for here are not put forward to meet financial standards. They are proposed to meet the conservation and efficient use objectives and it is those objectives that drive this Application."

Earlier in the hearing, evidence was furnished regarding the priorities pertaining to the different elements of policy set out in the Special Direction No. 3. Mr. Craig said, at T. 1888, "We believe that the criteria (before the Commission) that deal with conservation and efficient use of energy is the one that should predominate and that's why this question (Sierra Club No. 3) has been answered this way." He went on to say, "The criteria that deal with Financial Standards, and particularly achieving 1.3 times interest coverage by 1992, do require us to obtain additional revenues." (emphasis added)

Further information is provided on B.C. Hydro's view as to priorities within the Special Direction, in an exchange that takes place between Mr. Craig and Mr. Gathercole (T. 1896 and 1897) which, in effect, said that to the extent that Items 2 and 3 conflict with Item 1 of Special Direction No. 3, Item 1 should have first priority; that is, that conservation and efficient use take precedence over financial standards and return on public investment.

In addition to the foregoing, the important changes which B.C. Hydro would propose to the regulatory climate in which it operates are:

1. That the traditional tests for determining the appropriate level of rates, as prescribed in the Utilities Commission Act proper, be set aside and replaced by directives from Government.



2. That high priority be given to price as an instrument to achieve conservation and efficient use of electricity.
3. That the rate of inflation be used as the reference point in measuring rate changes.
4. That regulation should encourage the electric utility to emulate as far as feasible the competitive marketplace.

### 3.2.2 Consumer's Association (B.C. Branch) et al

Mr. R.J. Gathercole, representing the Consumer's Association (B.C. Branch), B.C. Old Age Pensioners' Organization, Council of Senior Citizens' Organizations, Federated Anti-Poverty Groups of B.C. and West End Seniors Network, was generally supportive of B.C. Hydro's major strategic initiatives but opposed the rate increases proposed in the Application as an inappropriate means to encourage public debate since the Application was constrained by Special Directives. He took the position that a rate increase "not justified by the need for additional revenue does not meet the criteria of just and reasonable rates as set out in the Utilities Commission Act" (T. 2155). He also stressed that caution should be exercised with regard to actions designed to introduce competition in the market so that core-market customers would not be disadvantaged.

Mr. Gathercole supported a comprehensive rate design application with appropriate consultation with all customer classes. The impact of rate design proposals should be supported by elasticity studies. In addition, he felt that the Commission should require B.C. Hydro to file a comprehensive DSM study as part of its request for approval of Power Smart programs and rates.

### 3.2.3 Peace Valley Environmental Association ("PVEA")

Mr. C. Sandborn, representing the PVEA, also complimented B.C. Hydro for its emphasis on preservation of environmental values. He did not support the planned increases of the Application, stating that rate redesign was a more effective tool for complimenting demand-side management. In reviewing testimony, he pointed out that B.C. Hydro witnesses agreed that rate design was a finer-tuned instrument than across-the-board increases. He felt that the environmental goals of his clients would be better served by rate restructuring. He was supportive of government action to legislate efficiency standards. He also urged that all resource alternatives be explored before a decision is taken to build a Site C major project.

### 3.2.4 Council of Forest Industries The Mining Association of British Columbia Electrochemical Producers

Mr. R.B. Wallace, appearing on behalf of the above, rejected B.C. Hydro's proposition that annual 3 percent increases would induce customers to conserve energy. He cited the lack of evidence and the fact that in some cases consumption may well increase because increased rates would force changes in the production process. He took the position that "B.C. Hydro has failed to justify the rate increases...on the basis of conservation and accordingly...the only increase that should be considered are increases necessary to achieve the financial objectives set out in the Special Directives..." (T. 2232).

Mr. Wallace opined that the dividend under Special Direction No. 3 was a tax. If it were considered a return, then it was excessive in comparison to that allowed other utilities. He supported B.C. Hydro's Power Smart and resource smart initiatives but stressed the necessity of Commission regulation and monitoring. He also urged both the Commission and B.C. Hydro to give co-generation opportunities more attention. As did other intervenors,

Mr. Wallace expressed the industrial intervenors' concerns that the B.C. Hydro/Powerex arrangement may have the potential of disadvantaging the customers of B.C. Hydro. In this regard, he asked that all contracts be reviewed and approved by the Commission and that Powerex be fully regulated.

### 3.2.5 Kootenay/Okanagan Electric Consumers Association

This Association was represented by Mr. D. Scarlett during the hearing. The Association argued that "the price signal alone, without rate restructuring and an expanded Power Smart program is no signal at all" (T. 2282). They submitted that an across-the-board increase is neither fair, just, nor reasonable and has a severe effect on certain segments of the population. They urged the expansion of conservation programs and a public review of rate design. Like other intervenors, they also expressed some concern regarding the objectives of Powerex in relation to domestic sales and revenues.

### 3.2.6 Other Intervenors

Mr. J. Black appeared on behalf of himself regarding his concern about the early construction of Revelstoke when demand did not require the facility. He expressed concerns regarding B.C. Hydro's exports and the fact that Seattle City Light residential customers pay much less for electricity than do B.C. Hydro customers. He supported rate design as the correct means to encourage conservation.

Mrs. E. Hadley intervened in an active manner at the hearing (Exhibit 20B). She expressed serious concern regarding the procedures used to promulgate the hearing and the lack of public participation. She stated her preference for a low affordable base rate with higher trailing rates for "luxury" consumers. Mrs. Hadley questioned the cost of B.C. Hydro's marketing programs.

Mrs. A. Edwards, M.L.A. for Kootenay and the New Democratic Party's critic for energy appeared at the hearing on day 4 and presented a prepared statement (Exhibit 20A). She expressed her concern for the government directives which, she suggested, constrained the Commission. It was her view that an across-the-board increase would have minimal effect in encouraging conservation, and that the evidence to assess responses was insufficient. She also noted B.C. Hydro's low estimate of potential saving in demand in DSM. Ms. Edwards urged the Commission to reject the Application and to prepare B.C. Hydro's rate design application.

Mr. G.S. McDonell, Manager, Synex Energy Resources Ltd. submitted a written brief (Exhibit 18) and appeared as a witness on day 10 of the hearing (T. 1425). He expressed his views regarding B.C. Hydro's proposed contract terms for small IPP's. He felt that the price (3 cents) should be increased and that certain other cost factors should also be recognized.

Ms. Laura Stannard appeared on day 11 of the hearing (Exhibit 18A) on behalf of the Downtown Eastside Resident's Association. In addition to comments on B.C. Hydro's proposed new office building, she recommended that no rate increase be granted to low-income tenants or to social housing projects that house low-income people.

Mr. James Campbell appeared on day 11 to represent himself as a concerned electrical consumer. He opposed the Application on the basis that it would not be fair to increase prices before new rate structures are submitted.

Mr. C. Garside submitted a brief (Exhibit 20A) and appeared on day 11 of the hearing. He opposed the Application.

Mr. John Harter appeared on day 11. He urged the generation of a sense of openness in the development of electricity policies. He strongly suggested that B.C. Hydro investigate heat pump technology in its DSM programs.

Mr. W. Beaumont appeared on day 11 and submitted a statement (Exhibit 20A). In addition to opposing the dividend, he suggested the idea of an electricity surcharge to be used on selected areas for the protection of recreational and environmentally sensitive areas.

### 3.2.7 Interested Parties

As distinct from the intervenors, who made presentations at the hearing, 77 people from various locations around the Province took the time to write in comments, either directly to the Commission, or to B.C. Hydro, before the hearing. A list of these interested parties appears as Appendix A. The Commission appreciates such comments and it recognizes that it is impracticable for many people to attend public hearings. B.C. Hydro's policy and planning witness testified that he had given thoughtful reading to the letters (T. 2105).

The Commission has made its own study of the letters, and has broadly categorized the issues raised. This list is also included in Appendix B. It is significant that the three issues raised more than any others, by quite a margin, are as follows:

1. People are already conserving as much as they can without the need for further incentives.
2. The writers were insulted by B.C. Hydro's reasons given for the increase.
3. The proposed rate increases will cause hardship to low income customers.

All the views expressed have been taken into consideration by the Commission in rendering this Decision.

### 3.2.8 Commission Determinations

The changes in approach which were raised by this Application have far-reaching implications. Directives which provide parameters for setting rates (but which do not set the rates), do not eliminate the requirement for identifiable and determinable costs.

It is incumbent on the Applicant to either demonstrate its need for increased revenue or present evidence which clearly supports and justifies the proposed rates. The onus of proof on the utility extends beyond philosophical contentions and must include evidence of reasonable probability of the success of the policy.

The Commission must still examine prudence of construction expenditures and the propriety of operating expenses. If interest coverage on bonded indebtedness replaces rate of return on rate base as the measure of fair earnings, the Commission has a responsibility to satisfy itself that the "bond base" of the utility properly reflects the level of capitalization that the utility requires to furnish service. The tests of fairness, justice, and reasonableness cannot rest on mere arbitrary statements. The onus of proof on the utility extends to supporting its request for the Commission to move away from traditional cost-based tests by offering alternative measures that are appropriate to the new regulatory format.

The delicate relationship between the Commission, itself an agency of government, and a Crown Corporation is made more difficult by diminution of readily understandable, quantifiable measures by which the Commission can, and can be seen to exercise its jurisdiction. Public suspicions could be heightened by the appearance of philosophical rather than tangible processes. Without widely-held credibility, a regulatory commission would lack the essential element for its functioning. Thus, the impartiality and the acceptance of regulation could be called into question by B.C. Hydro's initiative to introduce a "policy-driven" rate application without satisfactory restraints to ensure the public of efficient operations, prudent decision making and fair rates.

Insofar as the concept of policy-driven rates is concerned, the Commission notes that while this approach might be invited by Special Direction No. 3 considered in isolation, the Order-in-Council does not replace or eliminate any section of the Act. While Special Direction No. 3 instructs the Commission how it must deal with certain specific items contained in the Direction, it is the totality of the regulatory framework which must be considered in making decisions in this case.

**The Commission interprets this Application for a percentage increase uniformly to all rates to be a revenue requirement application in which the explicit financial standards and Return on Public Investment direction as set out in Special Direction No. 3 will apply directly, while the Conservation and Efficient Electricity direction must be interpreted within the context of all provisions of the Act.**

The B.C. Hydro position is that an annual 3 percent increase in rates is a minimum level which will promote conservation and defer future resource additions, even though the rate of increase will fall below the level of general inflation. B.C. Hydro supported its proposal with the axiom, "price increases reduce consumption", and simple, broad-gauged elasticity estimates (Exhibit V, questions 105-108). While admitting that "the most direct way to measure price response is to (use) an econometric model of relating income and prices and so on to consumption", (Mr. Peterson, T. 240), B.C. Hydro's material did not do so. Across-the-board increases apply to everyone, but influences them each in a different manner (T. 248, 337). The increase could be trivial compared to income so that it makes no difference at all to consumption, or it may take bread off the table (T. 91, 252).

However, in evidence, the B.C. Hydro witnesses readily agreed that marginal consumption by individuals would be influenced by the level of rate applied to the next increment of consumption. They further agreed that pricing to induce energy efficiency was most effectively handled in a rate design application

(T. 761). Indeed, B.C. Hydro confirmed that it intends to file a rate design application with the Commission before the end of 1990.

The major intervenors and a noted economist, Dr. John Helliwell, also held that rate design would be the most efficient vehicle for the delivery of the conservation and efficient use objective.

**The Commission is in accord with B.C. Hydro about the desirability of deferring high cost major supply projects.** It agrees, also, that British Columbians need to be advised how to reduce total consumption and they need to be encouraged to be prudent in their use of electricity. In addition, profligate users must be forced to reduce their consumption. The consensus of informed opinion supports the conclusion now that new sources of supply will be more expensive, probably much more expensive when all the costs are quantified, than those sources already in service. If that is so, it is clearly in the best interests of all to utilize present resources efficiently to keep new generation needs to a minimum.

There was much evidence adduced that customers of all classes had already applied conservation measures to the extent that further rate increases could produce no further reduction in usage. There was also evidence in the hearing that in some instances, rate increases would increase, not decrease, demand; and that rate increases might well lead to inefficient, rather than efficient use. At T. 341, the point is made that conservation may be motivated by considerations quite apart from price, and one would need to look no further than the current popularity of recycling programs as an example. **A fair and reasonable conclusion from the total evidence is that conservation is realized in individual cases based on environmental awareness as well as the structure of the rate and elasticity of demand applicable to each individual.**



The Commission believes that price, per se, can promote conservation and efficient use, only if its is selectively and appropriately applied to consumers. But price alone and, in particular, uniform across-the-board price increases, do not merit priority to achieve conservation. While increasing the price of a commodity does, normally, reduce consumption of that commodity, it can be argued that it is rather ineffective where high levels of consumption result from a high income to commodity price ratio (T 92, 525). Reducing general affordability is not the same thing as conservation. To use price as a primary instrument raises important social and economic issues as to: fairness, allocation of the burden of conservation, entitlement to energy, and achievement of results.

Hardship was another theme that cut across customer classes, from industries operating on a thin margin to residential customers on low, fixed incomes. It was distressing that beyond giving passing acknowledgement to the fact that this rate proposal would indeed cause hardship in some cases, B.C. Hydro gave little, if any, appreciation for the impact that this Application would have on many customers (T. 337). Compounding the negative aspect of this lack of appreciation is the fact that B.C. Hydro is in no way endangered in respect of its own financial condition. In these circumstances, it would be nothing short of unconscionable to visit upon customers who have no means of compensating for it an across-the-board increase simply because it was quick and easy to apply. As Mr. Sandborn (T. 2206) said:

"There's no reason that the consumers of British Columbia should be subjected to three years of clumsy hammering with a blunt instrument, across the board increases, all in the name of conservation, when a more finely honed set of rates specifically aimed at maximizing conservation and efficiency and recognizing social equity goals could be in place before the end of those three years."

For the reasons above, the Commission rejects the Application for the across-the-board rate increases as an appropriate or effective signal to promote conservation and efficient use of electricity. It further feels that sufficient publicity has been generated by this Application so that the public is not likely to significantly increase demand between now and the point when B.C. Hydro can more properly address the subject of conservation.

The Commission is therefore encouraged that B.C. Hydro is working towards the filing of a rate design application this year. Facing a situation, as B.C. Hydro does, where the cost of identified future additions to generation capacity will occur at much higher costs compared to the embedded cost of existing supply, it is clear that consumers generally should recognize the price of the future supply in their determination to increase or decrease their existing level of consumption. The insertion of this objective into the rate design will not be a simple matter, since consumers within any particular customer class consume much different levels of energy. While the task is difficult, the Commission believes the rate design issue must be faced squarely so as to avoid the perpetuation or inducement of gross inefficiencies into the economy. For these reasons the Commission will reinforce B.C. Hydro's commitment to rate design by ordering the filing of the Rate Design Application by December 1, 1990.

Another area of regulatory determination with respect to this Application relates to the attainment of smooth, stable and predictable rate changes. While the objective of smooth, stable and predictable rate changes is clearly laudable, its attainment will not be easy to accomplish. The prospect of a rate design application, which by its nature changes the relationship of pricing to consumption and the architecture of which is as yet unknown, may be contrary to this objective. Gradualism and the forewarning of future rate shock have long been hallmarks of utility regulation and phasing-in may well be a prominent feature of this exercise. This stability objective, though consistent with traditional utility regulation, will require careful implementation for both

the determination of revenue requirements and the adjustment to rate structures through rate design.

External impacts may also affect consumers and could cause a rate anomaly. For example, the GST will have a varying impact dependent on customer class and the nature of industrial activity. Some industrial customers may actually see a reduction in overall costs, even though the electricity bill may increase by 7 percent (in some cases they may recover this cost and avoid the existing 13.5 percent Federal sales tax). For residential customers the GST will cause a 7 percent rate increase to whatever rates are in place at that time. Another external impact to rates may come from a pass-through of changes to the water rental fee. It should be anticipated, however, that the water rental increases would be set by the Provincial Government in a smooth, stable and predictable way, so as not to frustrate its special direction to the Commission.

While the rate of inflation is normally one of many considerations in the setting of rates, the proposition that it be used in a formula methodology as a base reference point for rate determination is of concern to the Commission for two reasons. First, electricity prices are a component of the Consumer Price Index; and second, such simplistic referencing may influence other organizations to follow suit and so contribute to de-stabilization of the economy. As Mr. Peterson aptly put it at T. 2091, "But we can, you're certainly correct, we can go into a situation where we're chasing our tails trying to catch up with ourselves."

The implications of a regulatory climate which encourages competition in the marketplace, suggest the possibility of structural changes to facilitate competition. The most important opportunity in this regard is dealt with in Section 6.2 with respect to the development of a power pool.

Another complication in setting smooth, stable and predictable rates to avoid the potential of a future rate shock (which could come from the addition of a project like Site C), is the inexactness of forecasting. B.C. Hydro goes through a thorough and impressive demand forecasting methodology to estimate its future demands. Unfortunately, factors beyond the predictive power of the forecasting models have resulted in these forecasts being widely divergent from actual load requirements. These forecasts set the timing for the planning of new alternative resources. The nature of the resource additions have not yet been determined precisely and the introduction of Site C or another comparable resource component may not occur for 10 or 20 years from today. It is, therefore, very difficult to set smooth, stable and predictable revenue requirement increases to meet the addition of a large plant addition far into the future and of indeterminate timing. While it does do 20-year load forecasts, B.C. Hydro does not attempt to forecast in detail resource additions beyond ten years.

Even though the foregoing problems ensure that the assessments of today are most likely to differ from the assessments to occur a couple of years hence, the Commission recognizes that it is desirable to make a best estimate of loads and revenue requirement impacts at this time and reassess the situation periodically into the future. In this Decision the Commission viewed a 20-year horizon and was reassured that through upcoming rate design and revenue requirement applications, regular and current reviews will be conducted. The B.C. Hydro proposal is compatible with this methodology since the utility intends to return for a future revenue requirement Application in less than two years from the date of this Decision.

## 4.0 ELECTRICITY DEMAND

### 4.1 Load Forecast

#### 4.1.1 Introduction

The Application contains two different 20-year electric load forecasts - one prepared during 1988 (Exhibit I, Tab 4) and another in December 1989 (Exhibit I, Tab 5). While the initial Rate Application was based upon the 1988 version of the load forecast, pro forma estimates incorporating the more recent load forecast were provided by B.C. Hydro during the course of the hearing. The 1989 forecast provides a more up-to-date portrayal of the electricity demand situation, as it incorporates the impact of the Vancouver Island Natural Gas Pipeline and other changes in key input assumptions not taken into account in the 1988 forecast.

#### 4.1.2 Forecasting Approach

The forecast process and methodology employed by B.C. Hydro are described in Appendix A of the 1988 forecast (Exhibit I, Tab 4). Separate computer-based models were employed to forecast the electrical requirements of the residential and commercial sectors. In addition, the requirements of the key industrial subsectors such as pulp and paper, metal mines, etc. were forecast using more detailed analyses of market and technology factors influencing electricity use in each industry.

Reductions in electricity use achieved through DSM programs are treated as a source of electricity supply, rather than as reductions to the demand forecast. The difficulty here is to estimate the incremental impact of DSM programs, as opposed to conservation that would occur in any event as a result of electricity price changes, the availability of more efficient technologies, or government-mandated energy efficiency standards. This subject is discussed in

more detail in Section 5.2 of the Decision which deals with the Power Smart programs of B.C. Hydro.

A review of the individual forecast models upon which the 1988 and 1989 forecasts were based indicates that they are not equipped to incorporate internally the impact of price changes on electricity demand. Instead, adjustments were made to the overall demand forecast, using aggregate elasticity coefficients as discussed in more detail in Section 4.2. B.C. Hydro has indicated, however, that it is in the process of implementing new forecast models in each sector which will have this ability to adjust for the impact of price elasticity. Figure 16 of Exhibit I (Tab 1, p. 43) graphically portrays B.C. Hydro's estimates of how different rate increase strategies will influence load growth.

Another deficiency of the current forecasting approach is the manner in which it deals with linkages among various sectors. In particular, the projections of sectoral Gross Domestic Product ("GDP") prepared by the Provincial Ministry of Finance and Corporate Relations, which are the main driver of sectoral growth, may not be consistent with the forecasts of output in major industrial subsectors. For example, the Provincial forecast of sectoral pulp and paper GDP was made independently of the Woodbridge, Reed & Associates forecast of pulp and paper output (Exhibit I, Tab 4). This inconsistency could result in different forecasts of levels of electricity demand in the residential, commercial, and industrial subsectors linked to the pulp and paper industry, than if a sectorally-integrated forecasting methodology were used.

#### 4.1.3 Review of Forecast Assumptions and Electricity Demand

Input assumptions influencing forecast electricity demand for each sector were reviewed in detail. Key macroeconomic variables reviewed included the increase in GDP by sector and in aggregate, components of population increase, and labour force participation rate. For each sector assumptions that

were reviewed included: forecast of competitive fuel prices; future growth and mix of building stock or industrial output; electricity use per unit of building stock or output; electric capture rates where electricity competes with other types of energy; and conservation potential.

## 1. Natural Gas Prices

B.C. Hydro has adopted a natural gas price escalation of 1.25 percent per annum in real terms. While there is a wide range of opinion as to the future rate of gas price increases, the foregoing estimate is significantly lower than other forecast agencies including the National Energy Board. In the absence of electric rate restructuring, if gas prices increase faster than projected by B.C. Hydro, the penetration of electric space heating in the residential and commercial sectors will tend to be underestimated, increasing the load requirement beyond that forecast by B.C. Hydro.

## 2. Pulp and Paper

Pulp and paper electricity load growth is forecast to account for 4,863 GW.h, or 70 percent of total industrial load growth for 1988/89 to 1999/2000. For this reason, the assumptions underlying the forecast requirements of this sector were subjected to considerable scrutiny. The two main components of this growth are an assumed increase in the tonnage of pulp and paper output in the province during the forecast period, and an expected shift from the currently-predominant kraft process to the much more electricity-intensive Chemi-Thermomechanical Pulping ("CTMP") process. This shift is assumed to occur in response to the tightening fibre supply in the province and B.C. Hydro's competitive advantage in power rates relative to other major pulp and paper producing regions.

There are, however, a number of key factors which, in aggregate, could result in B.C. Hydro's forecast of pulp and paper electricity requirements tending to be on the high side.

### Level of Output

The B.C. Hydro background study indicates that there is likely to be sufficient global demand for pulp and paper products to absorb the forecast levels of B.C. production, while B.C. producers are likely to continue to be cost-competitive relative to other producing regions. However, there may be constraints to future fibre supply, particularly as a result of withdrawals from the forest land base. The Applicant's witness, in response to questioning by Commission Counsel, admitted that Native land claims are a concern to industry commentators (T. 743).

In response to concerns about the shrinking forest land base, B.C. Hydro cited a recent Science Council document that indicated the potential for increasing the timber harvest by 50 percent in 30 years from a land base that has been reduced by 10 percent (Exhibit 14, (BCUC staff question 40). This, however, assumed annual R & D expenditures of \$100 million (versus \$34 million at present), plus increases in silvicultural costs of up to \$2/cubic metre of medium to good sites.

### Impact of Recycling Legislation

The answer to Commission staff question 9 (Exhibit 14) indicated that there is a widespread move to mandatory recycled fibre content in newsprint throughout the U.S., which consumed about 1 million of the 1.7 million tonnes produced in B.C. during 1988. This is significant in that the recycled component of newsprint requires much less electricity for pulping than does virgin fibre via the CTMP process (500 versus 2200 kW.h/tonne, respectively) as noted in Exhibit 51. The testimony of B.C. Hydro (T. 750) confirmed that the forecast did not take into account the impact of recycled fibre content on the electricity requirements of B.C. newsprint mills.



If 25 percent of B.C. newsprint output were constituted from 40 percent recycled fibre, B.C. Hydro (Exhibit 51) calculated that the forecast electricity needs of newsprint mills in the province could be reduced by 455 GW.h annually by the year 2005. Recycling of paper products other than newsprint could further reduce the demand for virgin fibre, and hence reduce electricity consumption by B.C. pulp and paper mills. Such action would be supportive of current environmental policy. Other actions such as a legislated reduction in the amount of packaging as a means of reducing solid wastes and conserving resources could obviously impact on paper and paperboard products, as well as on plastics and other packaging materials.

#### Continued Production of Dissolving Pulp Capacity

The original B.C. Hydro forecast assumed that 160,000 tonnes of dissolving pulp capacity on the South Coast would be withdrawn after 1995 and replaced with more electricity-intensive mechanical pulp capacity. However, in answer to Commission staff question 39 (Exhibit IV), it was conceded that this dissolving capacity could instead be upgraded to paper-grade pulp. Compared to the original assumption of this capacity being replaced with CTMP, this change in assumptions would have the effect of reducing annual electricity requirements by 320 GW.h.

The foregoing factors indicate that there is some potential for B.C. Hydro's forecast of pulp and paper electricity demand to represent a high-case scenario, although Hydro's witness did not accept this conclusion (T. 750).

Exhibit 48 indicated that the impacts of Power Smart reductions (330 GW.h) and updated cogeneration potential could reduce the need for pulp and paper sector power purchased from B.C. Hydro by 1,530 GW.h by the year 2000. Thus, while a gross increase in pulp and paper power needs of 4,863 GW.h from 1988/89 to 1999/2000 is shown in the forecast, the net increase in purchased power would be only 3,333 GW.h. The 1989 Resource Plan upon which the Application is based assumes a cogeneration potential increase of only 700 GW.h.

## Overall Assessment of Load Forecast

While there are some indications that the pulp and paper load forecast could constitute a high case scenario, the Commission believes this bias is at least partially offset by several factors:

1. The potential for underestimation of electric space heating in the residential and commercial sectors in the event that natural gas prices rise more rapidly than the modest rates of increase assumed by B.C. Hydro.
2. A general trend towards the substitution of electricity for fossil fuels in all sectors of demand as a means of reducing emissions.

On balance, B.C. Hydro's 1989 probable load forecast is determined to be reasonable in terms of its methodology and major input assumptions and has been used in the revenue requirement determinations in Section 8.

### 4.2 Impact of Price Changes on Electricity Demand

#### 4.2.1 Overview of B.C. Hydro's Approach

The responsiveness of electricity demand to changes in the price of electricity is a key issue in this Application, given the goal of conservation as a prime justification for the requested rate increase. Special Direction No. 3 directs the Commission to set rates so as to encourage conservation. The method by which the Commission evaluates rate design relies to a great extent on the elasticities of demand of customers in each rate category.

As previously noted, a review of the forecast models upon which the 1988 and 1989 load forecasts were based indicates that the models are not equipped to internally incorporate the impact of price changes on electricity demand. This was confirmed in testimony (T. 631). Instead, the price sensitivity was calculated as an adjustment to the overall forecasts, using an estimated aggregate elasticity coefficient.

The Application is somewhat confusing as to which coefficients were used to adjust the forecast. In Table 3 of Exhibit I of the Rate Application, elasticity coefficients were developed, based upon a time series analysis of average residential use per account in B.C. Hydro's service area from 1962 to 1988 in relation to the changes in real income and electricity price over the same time period. Short-term and long-term price elasticity values of - 0.37 and - 0.64, respectively, were derived. The long-run coefficient is reasonable in comparison to other estimates; the short-run coefficient was not well documented and appears high.

In any event, the foregoing coefficients were not used in the actual adjustment of the probable load forecast to take into account the impact of alternative rate increase assumptions. Nor were the elasticity estimates developed in Tab 2 of Volume I used, other than for illustrative purposes. Instead, the answer to Commission staff question 107 (Exhibit V) indicated that short-term and long-term coefficients of - 0.1 and - 0.67, respectively, were applied to the overall demand forecast to adjust for the impact of different rate escalation scenarios. [The application of these coefficients over time was discussed in the answer to BCUC staff question 106 (Exhibit V)]

#### 4.2.2 Literature Review of Electric Demand Elasticity

The answer to Gathercole question 16 referred to a literature survey by a consultant, Sergio Gai. This survey, entitled "Analyzing Electric Demand Elasticity in the B.C. Hydro System" is dated August 1989. It reviews about 60 residential, 25 commercial, 35 industrial, and five time-of-day electricity demand studies. These studies typically used regression approaches to attempt to model the relationship between energy use and price. This survey (p. 23) found that:

"The estimates of price and income elasticities vary between the short and long run, among and within customer sectors, among end-uses, across geographical areas, and from season to season. In addition, the estimates also vary depending on the methodology used."

The variations in long-run price elasticity in the residential sector were quite large among regions of the U.S. compared in Table 6 of the consultant's study, ranging from a low of - 0.33, to a high of - 2.50. Wide variations were also shown in comparisons of commercial and industrial sector elasticities (Tables A.7 and A.8) in the consultant's study.

The consultant's report (p. 25) reached the following conclusion:

"The results of the literature survey described in Section 4 suggest that the long run own-price elasticity for B.C. Hydro's system might be in the order of - 0.5 to - 0.7. However, only a study conducted for the specific conditions of the utility's system can provide reliable estimates."

The intention to undertake more sophisticated price elasticity studies was confirmed in testimony by the Applicant (T. 244).

#### 4.2.3 Estimation of Elasticity by Sector and End-Use

Tab 2 of Exhibit I of the Application estimated elasticity response by major end-use for the residential, commercial, and industrial sectors of demand over a 10-year time frame for various rates of electricity price increase. Figures 1 through 3 of Tab 2 illustrated the estimated impacts on demand of various rate increase scenarios in each sector. (It should be emphasized that the elasticity responses calculated in this section are preliminary and were not used to adjust the probable load forecast to account for the impact of price changes.)

Demand in the industrial sector is estimated to be most inelastic, being reduced by only 2.3 percent per unit of output by the year 2000 in the higher rate scenario (4.5 percent rate increase per annum) versus the alternative of zero rate increase. In the commercial sector the reduction per unit of output is estimated to be about 9.5 percent, while residential usage is reduced by about 10 percent per account. For the 3.0 percent per annum rate increase scenario versus zero rate increase, industrial usage is shown to drop by about the same amount as the 4.5 and 6.0 percent rate increase scenarios, while commercial and residential usage decrease by about 6 percent by the year 2000.

The elasticity coefficients derived in Tab 2 of Exhibit I were calculated on the basis of a theoretical model, rather than by empirical observation and analysis of past consumer behaviour. This model assumed that electricity consumers will attempt to minimize their total cost for a given end-use. If the price of electricity increases, the model assumes that they will invest in higher efficiency appliances and equipment to minimize life-cycle costs, based upon an assumed 30 percent discount rate. The discussion of this method of analysis at the end of Tab 2, Exhibit I conceded that:

"The resulting elasticity estimates thus represent only a portion of the expected consumer response to price changes. Insufficient information is available to assess all possible responses to price increases. Accordingly, analyses of specific end-use investment decisions must be combined with statistical analyses."

#### 4.2.4 Discussion

A major advantage of the approach taken in Exhibit I, Tab 2 is that it can explicitly take into account the technical potential for conservation in specific end-uses of electricity. The econometric approach illustrated in Exhibit I, Tab 1, p. 44 of the Application, on the other hand, implicitly assumes that the same technical potential for conservation that was realized over the past 25 years is available over the next 25 years. In practice this may not be the case, particularly in the industrial sector where the opportunity for further efficiency improvements in large electric motors may be limited. This results in estimated total elasticities of only - 0.05 to - 0.15 in the industrial sector, calculated in Exhibit I, Tab 2, p. 14 of the Application.

The long-run aggregate price elasticity coefficient (- 0.67) used by B.C. Hydro to adjust its forecast electricity requirements to different rate increases scenarios is within the range suggested by Sergio Gai. His literature review comparisons of industrial sector price elasticities shows long-run coefficients for British Columbia (- 0.12 to - 0.32) that are much lower than in other jurisdictions, as detailed in Table A.8 of the literature review. Given that the industrial sector constitutes about 45 percent of total forecast electricity sales in the B.C. Hydro service area, overestimation of industrial price elasticity would overstate projected electricity requirements as rate increases fall below the rate of inflation.

The prepared testimony of Mr. Peterson (Exhibit III, Tab 1, p. 6) stated that "three percent per year in my judgement is about the lowest price increase that will give the needed price signal." In response to Gathercole question 16 (Exhibit VI), the Applicant conceded that sector-specific studies to determine the impact on consumption of the specific rate increases proposed in the Application have not been done, other than the model discussed in Tab 2 of Exhibit I.

#### 4.2.5 Commission Determinations

By B.C. Hydro's own admission, much more study is needed to improve methods of estimating the impacts of price changes on sectoral electricity demand. There is some indication that the aggregate B.C. coefficient of - 0.67 employed by B.C. Hydro may be high, particularly in the industrial sector. In forecasting the responsiveness of electricity demand to price, the influence of technological, policy and regulatory factors must also be taken into account.

Special Direction No. 3 to the Commission specifies that rate increases should encourage conservation and the efficient use of electricity. In Section 3.3 of this Decision, the Commission determined that adjustments to rates to encourage conservation should occur through rate design rather than through the revenue requirement. This determination is a response to B.C. Hydro's Application that all components of the rates be increased by 3 percent, primarily to encourage conservation. In testimony, the Chairman of B.C. Hydro encouraged the Commission to consider increasing all components of the rates by inflation so as to provide a stronger signal of conservation to the public. The logic of increasing rates generally to encourage conservation was partially refuted through the testimony of B.C. Hydro's own experts when they readily agreed that it is the price of the last unit of consumption which bears upon the consumer with respect to his determination to increase or decrease his consumption. This rationale was supported further by Dr. Helliwell at T. 560, and by other intervenors.

The foregoing analyses indicate that increasing the revenue requirement to induce conservation is an inefficient means of encouraging conservation. In the extreme, one could envisage an increase in revenue requirement which was applied solely to the fixed charges of each consumer. Such an increase would have no effect on the marginal unit consumption price and the increase in revenue requirement would have no conservation impact.

Economic theory carefully applied on reasonable assumptions can provide a useful basis upon which to discuss rate changes for conservation purposes. Theory would indicate that the marginal unit of consumption should be priced at the marginal price of future supply. Indeed, all units of consumption could be priced at the marginal price of future supply and consumers would be induced to use the resource efficiently from an economic standpoint. However, the adoption of the economic theory ignores market reality.

In addressing the environmental implications which underpin the conservation objective, B.C. Hydro is in a fortunate position to have the majority of its power supplied from water resources. If B.C. Hydro is successful in its DSM and conservation initiatives, inclusive of conservation rate structuring, the utility will make an even more substantial contribution to the limitation of carbon dioxide emissions which has become a high priority of the public. Thus, efficient pricing is only one goal of rate design and practical concerns must also be taken into account.

For all the foregoing reasons, the Commission believes that the upcoming rate design application by B.C. Hydro is important to the restructuring of the utility rates for many purposes, not the least of which is conservation. The Commission commends B.C. Hydro on its many conservation programs and supports B.C. Hydro in its endeavour to have consumers understand the value of the resource that they are consuming. Rate design can be effective in setting rate structures that expand public awareness by sending appropriate pricing signals.



## 5.0 RESOURCE ADDITIONS

B.C. Hydro demonstrated a thorough understanding of resource planning standards that are "state-of-the-art". In its responses to information requests at Exhibit V, questions 144 and 145, B.C. Hydro recognized two major objectives of the resource planning process to meet growing demand:

- "1. Meeting reliability requirements;
2. Minimizing long run revenue requirements."

Reliability carries the higher priority of these objectives because it is a greater error to be short of energy.

B.C. Hydro introduced Power Smart, Resource Smart and non-utility generation to its resource portfolio in 1988 and has emphasized its commitment to these supply opportunities. The graphic illustration of "Existing and Planned Resources" found at Exhibit 1, Tab 6, Exhibit 4-1 indicates that B.C. Hydro is giving higher priority to these resources than to building new generation plants and that the utility is in the progress of implementing least-cost planning. This is further indicated in the "Policy and Planning Framework" section of B.C. Hydro's 1989 Resource Plan (Exhibit I, Tab 6).

### 5.1 Least-Cost Integrated Resource Planning ("LCIRP")

#### 5.1.1 Introduction

LCIRP is a planning approach adopted by electric and gas utilities with the goal of minimizing future revenue requirements while recognizing the uncertainties of future load requirements and resources. LCIRP generally involves the following components:

1. the development of a range of load forecasts;

2. the consideration of all feasible alternatives for balancing supply and demand;
3. the assessment of supply and demand resources on a consistent and equal footing, including cost and size (amount) of available resource;
4. a focus on resources that:
  - (i) reduce uncertainty of meeting future load growth;
  - (ii) are flexible with regard to short lead times, size and cost;
  - (iii) improve system diversity and have low environmental impacts;
5. the development of a least-cost resource portfolio to meet a range of expected futures;
6. the active involvement of the public in the process; and
7. an action plan to determine the specific actions which are required in the short-term (usually 3-5 years) to implement the long-term strategy.

A typical process followed by utilities to ensure the implementation of LCIRP is shown in Figure 5.1.1.1.

FIGURE 5.1.1.1

A Typical Process Used for Least-Cost Integrated Resource Planning

B.C. Hydro has made substantial progress toward the goal of LCIRP and recognizes that more work still needs to be done (Exhibit V, question 145). For example, moving toward end-use load forecasts will allow the utility to better assess and account for the effects of their DSM programs. The utility is taking steps to acquire state-of-the-art "hybrid" forecasting models (T. 621) that combine end-use and econometric load forecasting. B.C. Hydro also intends to refine its uncertainty analysis.

Finally, B.C. Hydro explicitly recognizes that the demand-side resource technical potential has not been adequately quantified, and that substantial work needs to be done to determine how much of this resource would be available and at what cost (Exhibit 116 - "Draft: Assessment of Conservation Potential for B.C. Hydro Service Area - Terms of Reference"). In this regard, B.C. Hydro stated the following at Exhibit V, question 148:

"Under current estimates available within B.C. Hydro 3200 GW.h/a of energy savings can be expected to be achieved after 20 years (Ref. reply to Sandborn question 4). By comparison, Site C would produce 4700 GW.h/a.

Studies of conservation potential in B.C. are currently underway. Until these studies provide a 'supply curve' for purchased conservation, there is no accurate estimate of how many GW.h would be available from Power Smart as the least-cost resource."

With all of these improvements in place, LCIRP will become a much more effective strategic instrument in B.C. Hydro's efforts to become "The most efficient utility in North America" (Exhibit 2, Tab 16, p. 12 - "Corporate Vision").

### 5.1.2 Economic Tests

The cost used to measure the overall conservation resource in LCIRP is the long-run avoided cost. This would be the 4.7 cents/kW.h cost of Site C (Exhibit V, question 121) plus incremental transmission and distribution costs beyond Kelly Lake. B.C. Hydro also considers a more sophisticated avoided cost level through its development of a supply function that reflects the progression of traditional supply-side resources over the short to long-term planning horizon. B.C. Hydro refers to this as its "value of electricity" (Exhibit 1, Tab 3, Appendix A). This tabulation shows a short-run value of 1.8 cents/kW.h and a long-run value of 5.0 cents/kW.h; both values stated in 1989 dollars, including Site C at 4.7 cents/kW.h. From this range, B.C. Hydro further develops a "levelized cost" over the entire 1990-2008 planning horizon and it is this cost that is used to test the economic feasibility of individual Power Smart programs (Exhibit V, question 128). For example, the residential sector "levelized cost" test is 3.4 cents/kW.h.

### 5.1.3 Equal Treatment of Supply and Demand Resource Options

A general principle of LCIRP is the equal treatment of supply and demand resources in all phases of the process but B.C. Hydro does not fully apply this principle in its plan. The test for equal treatment focuses on two points in the process: the resource assessment and the economic test used. In the first assessment, while substantial attention is paid to the range of supply side options and technologies in the resource plan, no similar analysis is available on the demand side. In the second test, while both supply and demand options compete against the "value of electricity", the environmental benefits of DSM programs are not explicitly addressed in the calculation.

To the credit of B.C. Hydro, both of these shortcomings have been recognized in the testimony of Mr. Peterson (T. 842). However, in the absence of a comprehensive demand-side resource assessment and conservation environmental premium, the Application cannot be considered at this time to be either least-cost, or fully integrated.

**The Commission anticipates that issues such as credits for diverse supply, taxes, and refinements to valuations for environmental or other issues will have to be addressed over the next 2 to 3 years.**

#### 5.1.4 Resource Portfolio

B.C. Hydro provided its April 1989 "Twenty-Year Resource Plan" at Exhibit I, Tab 6. The purpose of the process and the resulting "Recommended Resource Plan" is to develop a portfolio of resources that anticipates a range of possible forecast demands ten years into the future and a set of alternative scenarios for a further ten years into the future.

Historically, B.C. Hydro has relied mainly upon large hydro projects with long lead times, 7 to 10 years or more, to meet forecast load growth. Economies of scale supported this approach in a rapidly growing market.

The current recommendation by B.C. Hydro is a "balancing act". Lower cost, more flexible but essentially untried supply alternatives are planned to precede the next major hydro generation facility. This results in Site C currently being scheduled by B.C. Hydro for an in-service date in the year 2002 (T. 28). However, construction of the dam would need to begin seven years earlier. To assure reliable supply and minimize revenue requirements, a "window of opportunity" exists for B.C. Hydro, represented by the length of time prior to the start of construction of Site C.

The duration of B.C. Hydro's "window of opportunity" was thoroughly tested during the hearing with alternative resource portfolios (Exhibits 22, 22A, 22B, see Appendix C).

Figure 5.1.4.1 that follows, summarizes and portrays graphically the evidence examined in Exhibits 22A and B. This figure illustrates a possible Resource Portfolio that could satisfy a wide range of possible load growth forecasts to the year 2005. **Even though Figure 5.1.4.1 is considered a probable resource forecast there is a considerable degree of conservativeness within it that enables alternatives to vary but the forecast to still be achievable.** For example, if the Columbia River Treaty Downstream Benefits ("DBS's) did not become available, the use of Burrard could make up the difference. Then in any year, other than a critical water year, the existing dams would offset the need to operate Burrard. In addition, indications are that the other elements of supply may prove to have greater resource potential. Two years from now, when B.C. Hydro will be presenting its next revenue requirement Application, more will be known about the performance of the lower cost resources such as Power Smart and non-utility generation. **The "window of opportunity" before committing to Site C is likely to be at least eight years.**

The Commission is convinced that the long-range plan for revenue requirement purposes should be based on "most probable" estimates of load requirements and supply availability. Regular public reviews will allow for refinements to load and supply projections. The Commission rejects the notion of long-range pricing based on pessimistic supply. Such planning is unduly conservative and will force unreasonable costs on the domestic customers.

## FIGURE 5.1.4.1

Alternative Least Cost Integrated Resource Plan for the Year 2005

### 5.1.5 Commission Determinations

Although significant development of LCIRP remains to be done, the Commission is impressed with the very substantial steps already taken by B.C. Hydro and the utility's commitment to further development.

**The Commission believes that B.C. Hydro should issue formal LCIRP guidelines.**

The resulting plan should clearly present the utility's preferred options, the process and the decisions that went into selecting those options and the critical decisions that need to be made to achieve the goals of the plan. B.C. Hydro should ensure that the general principles of LCIRP are addressed as identified in Section 5.1.1.

The plan should strive for consistency in the analysis of alternatives by identifying major end-use market segments in the load forecast, price elasticity studies, DSM program design and DSM resource assessment.

B.C. Hydro has indicated its willingness to consult with the Commission regarding its planned study of price elasticity (T. 512), as well as the forthcoming study by B.C. Hydro of its demand-side resource technical potential (T. 31). To set the stage for such consultation, the Commission emphasizes its concern regarding the importance of a consistent method by which to identify the market for efficient electricity services. The following illustration Figure 5.1.5.1 stresses the key role that effective identification of market segments by end-use performs within an integrated planning process. B.C. Hydro should re-examine its current methods for identifying market segments with this concern in mind.



FIGURE 5.1.5.1

Consistent Market Identification for Price Elasticity Studies  
Assessment of Demand-Side Resource Potential and Load Forecasting

## 5.2 Power Smart

### 5.2.1 Introduction

B.C. Hydro has embarked on an important initiative regarding demand-side management. This activity is intended to support a balanced resource acquisition strategy to provide adequate, reliable and cost-effective power for British Columbians. B.C. Hydro's efforts compare favourably with those of Ontario Hydro and the utilities within the jurisdiction of the Northwest Power Planning Council. In Exhibit 83, B.C. Hydro provided evidence that indicated a level of commitment competitive with other jurisdictions on a cost per kW.h basis.

Power Smart has been launched on the strength of positive results in other jurisdictions and encouraging results from pilot projects. The major source of uncertainty results from incomplete knowledge concerning the magnitude of the resource specific to electric energy use in British Columbia. A rigorous assessment of the potential for electric energy conservation will be the goal of a major study to be undertaken by B.C. Hydro in the near future (Exhibit 116).

Messrs. Bell and Peterson spoke of a strong commitment to LCIRP and to DSM. However, evidence presented as to the actual implementation of these activities is contradictory. B.C. Hydro considers DSM an important resource, and indicates in the evidence that its estimates are preliminary (Exhibit VI, Sandborn question 5). Additionally, the evidence indicates that the estimates are low, and each subsequent revision and response increased the amount of the resource estimated to be available and the budget provided to acquire the resource. During the hearings, Mr. Peterson accepted as possible the Commission staff's estimate of 4600 kW.h per year (Exhibit 22B), an almost 100 percent increase over B.C. Hydro's first estimate (Exhibit 23). The utility stated that it may acquire more of the resource if the circumstances were right, particularly as "no budget constraint" applies to Power Smart. Power

Smart is the number one preferred resource to meet future load growth and should be approached with the same level of detail, knowledge and precision with which B.C. Hydro has approached major, new supply-side alternatives.

### 5.2.2 Other Elements Affecting Power Smart

The evidence resulting from this Application is that small price increases to the marginal units of consumption will have only a minimal effect on energy use (refer to Section 4.2). Rate design, directed at increasing block rates, would have an additional effect. However, many utilities in North America have very high rates and increasing block rates and have also embarked on extensive conservation and DSM resource acquisition programs, primarily because these resources are least-cost, and the "price signals" effect of high rates is substantially less than anticipated.

The Commission is aware that comprehensive approaches to DSM include low income programs and rewards for consumers already taking conservation action. A common characteristic of low income weatherization programs is that the rebate incentive is somewhat greater than for higher income residences, resulting in 100 percent of the actual costs being covered. These programs attempt to capitalize on varying elasticities among income groups.

**The Commission finds that considerably more work needs to be done to maximize the joint impact of rate design and DSM programs.**

In response to its current perception of risk, B.C. Hydro has conditioned its Power Smart projects with what appear to be limitations to the full acceptance of the program. While B.C. Hydro states that it is committed to acquiring resources at the least cost, it is not yet willing to pay for DSM resources up to the full avoided cost of generation alternatives (Exhibit V, question 123). While the utility states it is committed to using a "Total Resource Test" to value DSM resources, it is not yet maximizing its incentive to customers to

acquire those resources as soon as possible. This strategy could have a negative impact on the cost of electric energy for all B.C. Hydro customers, unless B.C. Hydro is able to acquire all the DSM resource up to the avoided cost before another more expensive resource addition is needed.

A major benefit of B.C. Hydro's proposed study, "Assessment of Conservation Potential", (Exhibit 116), could be sufficient information to set incentive levels to maximize penetration targets. In the absence of the results of that study, B.C. Hydro has little primary research upon which an optimum incentive level can be determined. B.C. Hydro may discover through its conservation resource assessment study that the majority of the resource is represented by causing a change in the end-use appliance technology and that attempts to modify customer behaviour should be directed to this end.

**The Commission believes that future filings should contain at least three conservation scenarios - a baseline, an enhanced scenario and an aggressive scenario. These plans could be distinguished by the number of programs offered, the levels of incentives offered, and assumptions regarding different market penetration rates. Again, the successful completion of the assessment of DSM potential is critical.**

#### 5.2.3 Monitoring and Evaluation of Power Smart

Monitoring cost and benefit performance through a combination of process and impact evaluations assures that the most effective, efficient and economical methods are utilized to produce measurable improvements in electrical energy efficiency. B.C. Hydro presented some detail on how it intends to measure the actual performance of its DSM programs and improve program delivery (Exhibits 46 and 112). The evidence indicated that B.C. Hydro's efforts are preliminary. **The Commission directs that monitoring and evaluation plans and reports are to be filed with the Commission for each program.**

#### 5.2.4 Program Monitoring and Evaluation Budgets

Budgets should be commensurate with the scope of the program and the value of the savings. Guidelines developed from actual program evaluation budgets in utilities across North America suggest that an overall commitment of between 5 percent and 25 percent of the total program budget provides sufficient resources to meet most evaluation needs (T. 911). **The Commission believes that the utility's initial estimates of \$13,000 per program, less than 2 percent of total budget, may be insufficient to provide the quality of information required for maximum effectiveness of the programs and should be reconsidered.**

#### 5.2.5 Environmental Premium with Regard to Power Smart

DSM programs provide a clear environmental advantage over most supply-side options, and have the further advantage of saving transmission and distribution resources. In the Pacific Northwest, the BPA and the Northwest Power Planning Council are required to recognize a 10 percent environmental premium to conservation resources (T. 925). In Wisconsin this premium is 15 percent, and the Boston Edison Company recently agreed to a 20 percent premium. B.C. Hydro has stated that an environmental premium for conservation is a viable and reasonable concept, but one which has not been implemented. The adoption of this premium could cause the utility to consider a wider range of DSM alternatives. Explicit consideration of external components of the value of electricity should form part of B.C. Hydro's assessment of the DSM potential. **The Commission therefore directs B.C. Hydro to submit a report by September 1, 1990 on the desirability and extent of environmental premiums it would propose to apply to Power Smart programs.**

### 5.2.6 Commission Determinations

Most utility commissions in North America require substantial formal filings prior to the implementation of major resource acquisitions since large amounts of capital are required for the acquisition of supply resources. DSM is a major resource acquisition as its \$330 million budget verifies. B.C. Hydro is required to comply with review sections of the Act governing major additions to its generation and transmission plant. **In the opinion of the Commission, a similar approval process is required for DSM. The filings should detail program descriptions including: tariffs, acquisition targets, expected penetration rates, end-use market segment, level of incentive, economic tests, prior accomplishments and action plans, including milestones, budgets and staffing plans.** Increasingly, commissions require detailed monitoring and evaluation plans for DSM programs, to ensure that program accomplishments are based upon objective, professional methods and that costs and benefits are performing according to plan. The program descriptions and evaluation plans serve as the basis for the development of annual reporting requirements for all DSM programs and are prerequisites to effective monitoring and evaluation.

The Commission is aware that B.C. Hydro has been implementing some Power Smart programs with specific financial incentives without Commission approval. The Commission believes that this is not in compliance with the Act and directs B.C. Hydro to file tariffs including terms and conditions for each program before July 1, 1990. In reviewing these programs the Commission will consider any mechanisms that may be required to allow flexibility in changing incentives or alternating programs so as to maximize program effectiveness. The Commission encourages B.C. Hydro to work with Commission staff in this regard.

B.C. Hydro's current approach is to design Power Smart programs with a rebate incentive level sufficient to cause initial penetration by energy efficiency technologies. In the category of "lost opportunities", such as new buildings, where the cost of retrofit would be uneconomic at a later date, B.C. Hydro indicated that if the rebate incentive did not capture sufficient market, then mandatory standards would be quick to follow (T. 30).

The Commission agrees with "legislated standards" in some instances and in "incentive" programs in others but it is concerned about the possible use of the "legislated" approach as a back-up to an ineffective incentive program. Lack of voluntary acceptance may signal a defect in the plan.

### 5.3 Resource Smart

In its hierarchy of resource additions, B.C. Hydro has, understandably, assigned a high ranking to Resource Smart initiatives. The Resource Smart concept entails the development of additional electrical energy from existing facilities at an economic cost. This implies that the cost must be something less than the long-term value of electricity, currently the upper limit of which is about 5 cents/kW.h. Exhibit I, Tab 6 (B.C. Hydro's Twenty-Year Resource Plan - 1989-2008) presents an in-depth analysis of the B.C. Hydro Resource Smart projects that are currently under active consideration.

To date, preliminary studies by B.C. Hydro have identified over 70 Resource Smart projects. Those given priority by virtue of their technical, economic and environmental suitability are anticipated to augment the utility's annual energy capability by approximately 4600 GW.h by 1999 (Exhibit II, Tab 6, p. 4). However, this figure has been reduced to 2000 GW.h (Exhibit 22B) to reflect a conservative estimate for the purposes of this Rate Application.

B.C. Hydro regards the installation of new power plants at existing dams, such as Keenleyside, as part of the Resource Smart program. However, such a project will be of much larger size and cost than the typical smaller Resource Smart projects that make existing installations more efficient. As projects at existing dams are perhaps more comparable to totally new projects at new sites, it can be argued that inclusion of new power plants in Resource Smart programs will tend to obscure the benefits of the smaller projects and to overstate the overall energy output of the program.

The Commission believes that most Resource Smart projects have limited, if any, incremental impact on the environment. The most environmentally threatening of these would be the raising of water levels in reservoirs, and the diverting of water into existing reservoirs. The Commission envisages that the dredging of channels below power plants, the replacement of inefficient power station and other plant equipment, the introduction of more efficient maintenance programs and the general reduction of overall system losses by design modifications or other means, will all serve additional energy resource needs in an environmentally benign manner. In Exhibit II, Tab 6, p. 5, the Applicant presents a project cost sequencing arrangement which indicates that the annual contribution from Resource Smart projects will be determined by applying the marginal value of electricity test to these projects in order of ascending costs. The implication is that projects costing 5 cents/kW.h are not scheduled to be developed until year 2000. **The Commission sees this schedule as possibly being inconsistent with the test currently being applied to purchase energy from large Independent Power Producers ("IPP's"), which will have an in-service date timing around 1993/1994. At T. 283, B.C. Hydro testified that the threshold for procurement of such IPP supply was 5 cents/kW.h.**



However, in testimony at (T. 1079), B.C. Hydro stated: "...we have a priority given to Resource Smart and subject to the other considerations that we've mentioned that we would try to pursue those as aggressively as we can, in fact try to bring them on ahead of the specific need in any given year if they could be captured then, but the given end-point like 1999 is not necessarily the target." While the Commission recognizes that there are limitations to the available manpower and other resources necessary to bring projects to fruition, it holds the opinion that much more could be done in this area to maximize the contribution from this resource. The Commission therefore urges B.C. Hydro to take a more aggressive approach to the development of Resource Smart projects.

A question was raised at the hearing (T. 1082) of the possibility of an environmental premium being ascribed to environmentally benign Resource Smart projects. This would mean that some projects that fail B.C. Hydro's avoided cost test could qualify for construction. A case in point is the Duncan Power Plant project. As indicated in Exhibit 34, the estimated unit cost of 6.7 cents/kW.h is significantly higher than many currently investigated Resource Smart projects, hence, a very large premium would have to be justified.

To estimate the full social cost of any project, the Commission could envisage a system of environmental credits and debits to account for any project's environmental detriment or environmental benefit compared to current conditions and urges B.C. Hydro to explore this matter further.

B.C. Hydro is also studying non-generation Resource Smart projects such as minimizing transmission and distribution system losses, raising voltage levels, increasing conductor sizes and other initiatives to optimize the existing plant. In the Commission's opinion, these projects are highly desirable.

B.C. Hydro testified (T. 1002-1008) that the generating plants were the first initiative but the transmission and distribution project assessments have recently been initiated. These non-generation projects would be environmentally benign, therefore the Commission expects B.C. Hydro to do whatever is necessary to implement those that are economically feasible at the earliest possible opportunity. **In this connection, the Commission expects these economically feasible projects to be reflected in the B.C. Hydro's 10-year Electric System Development Plan, as these projects are identified.**

## 5.4 Coordination and Purchases

### 5.4.1 Alcan

Alcan presently supplies B.C. Hydro with 670 GW.h of firm energy per year under contract until 1994 (Exhibit III, Tab 7, p. 5). B.C. Hydro testified at the hearing (T. 1102) that a 15-year contract beginning in January 1995 is about to be signed with Alcan. This contract will be for 285 average MW at 95 percent load factor and will deliver 2500 GW.h of energy annually to B.C. Hydro. The price for this energy is just under 3 cents/kW.h with inflation adjustments added according to a pre-arranged formula.

Additionally, coordinated operation of B.C. Hydro's and Alcan's reservoirs is expected to benefit B.C. Hydro by an additional 260 GW.h/year (Exhibit I, Tab 6, p. 20) for a total of 2760 GW.h/year by 1995.

**In light of B.C. Hydro's projected long-term energy costs, the Commission sees these Alcan transactions as a distinct advantage to B.C. Hydro's customers and the Commission will consider these benefits when it reviews the new contract pursuant to Section 85.3 of the Act.**

#### 5.4.2 Alberta Interconnected System ("AIS")

B.C. Hydro is in the process of negotiating coordination agreements with Alberta (Exhibit I, Tab 6, p. 20). Estimates are that up to 2000 GW.h/year of relatively economical off-peak coal-fired thermal energy, and a further 2000 GW.h/year of the more costly off-peak natural gas-fired thermal energy could become available in the short term. However, of the 4000 GW.h annual total, Exhibit 22A identifies a maximum yield to B.C. Hydro of 2000 GW.h, a reliable yield of 1000 GW.h and a likely yield of 1500 GW.h.

Apparently B.C. Hydro has no formal power purchase agreements with AIS at this time (T. 1059) but avails itself of spot purchases as and when they become available. These purchases can be resold in the United States, utilized in the domestic system, or stored in one of B.C. Hydro's reservoirs. Since the anticipated cost of this energy is significantly cheaper than B.C. Hydro's long-term marginal cost of new resources, **the Commission expects that B.C. Hydro will endeavour to conclude a formal purchase contract if an attractive pricing arrangement can be negotiated.**

The Commission acknowledges that coordination is a worthwhile and economical method of firming-up secondary or non-firm energy on the B.C. Hydro system. To obtain firm energy at a non-firm price (currently approximately 2 cents/kW.h - T. 26) is of significant benefit to B.C. Hydro's customers especially in the medium term future when the value of electricity will approach 5 cents/kW.h.

#### 5.4.3 Bonneville Power Administration ("BPA")

The 1989 Twenty-Year Resource Plan (Exhibit I, Tab 6, p. 20) includes 1000 GW.h/year of firm energy from coordinated operation of BPA and B.C. Hydro reservoirs, even though it notes that negotiations are yet to be completed.

The 1000 GW.h/year might appear to be overly conservative, but is realistic since a low water year would normally impact both systems simultaneously.

B.C. Hydro includes no power purchase quantities from BPA. However, the Commission expects that non-firm energy will flow both ways between the systems, to the benefit of both systems and therefore Figure 5.1.4.1 includes 1000 GW.h.

#### 5.4.4 Others

In Exhibit I, Tab 6, p. 21, B.C. Hydro states that in an emergency about 4000 GW.h/year of expensive thermal could be purchased from U.S. utilities. It is reasonable that this resource would be listed in Exhibit 22A only under the most optimistic load growth scenario (95th percentile). However, the Commission notes that when this is combined with an additional 2000 GW.h or more which is potentially available from Alberta, it does provide a considerable emergency reserve to meet the probable load growth scenario should B.C. Hydro experience a period of critical low-water years. In effect this resource helps to offset any risk involved in planning resources to meet the most probable long-term demand forecast as previously discussed in Section 5.1.5 of this Decision.

### 5.5 Non-Utility Generation

In 1988, the Provincial Government enacted Bill 46, the Utilities Commission Amendment Act. This Act provides the facility for the encouragement and enhancement of non-utility generation in the province.

Non-Utility Generation ("NUG") or Independent Power Production is defined as sources of electric power generation from producers other than utilities. They include small hydro, medium and large hydro, and all complexions of thermal generation.

### 5.5.1 Small Hydro

In Exhibit I, Tab 6, p. 39, B.C. Hydro stated that "Studies completed in 1983 identified a total small hydro potential of about 5800 GW.h/year that could be connected to the B.C. Hydro grid. Although some of this potential could not be developed due to environmental or economic constraints, small hydro can make a significant contribution".

In spite of this acknowledgement, B.C. Hydro has not included any resource contribution from small hydro in the probable scenario in its 1998/99 Expected Resource Usage (Exhibit 22A). This is somewhat inconsistent with B.C. Hydro's present plans, considering that several small hydro proposals are currently being evaluated by B.C. Hydro in response to a 1989 Request for Proposals ("RFP") for projects less than 5 MW for the integrated system. B.C. Hydro expressed confidence (T. 1048) that some of these small hydro contracts will be signed, therefore the 500 GW.h included in Exhibit 22B is a likely scenario in 1998/99.

The Commission recognizes that these projects are mainly run-of-river projects and may not entail significant environmental costs.

B.C. Hydro envisages (T. 1046, 1047) a significant element of risk with respect to small hydro - specifically in terms of reliability and capacity factor. With this in mind, B.C. Hydro has selected a flat purchase price of 3 cents/kW.h with certain escalators built-in. The justification advanced for this low price offering was that the capacity was uncertain (T. 1046), that the risks inherent with small hydro would be assumed by B.C. Hydro and that no technical or financial security would be required of these producers to protect the utility against default (T. 1097). B.C. Hydro's rationale for taking this position is clearly enunciated at Exhibit I, Tab 3, p. 14 where it is stated: "...the most cost-effective means of reducing risk is to allocate the risk to the party able

61to bear it or manage it most cheaply, perhaps by diversifying it away". B.C. Hydro further stated that: "...whoever bears a specific risk will attempt to get compensation for it."

This low price offering for small hydro was seriously challenged by some intervenors and precipitated several questions from the Commission. B.C. Hydro admitted (T. 2077) that the price is based on the assumption that the smaller IPP's will be providing the equivalent of secondary energy, which the utility rates at about 70 percent the value of firm. However, B.C. Hydro concluded that the pricing formula was subject to adjustment commensurate with the quality of electricity provided.

It was also brought out in testimony that no consideration was given to school taxes, the pending Goods and Services Tax, and income tax in the determination of this purchase price. B.C. Hydro has acknowledged this omission and has indicated its willingness to ensure that IPP's will not be disadvantaged by taxes and other unavoidable costs incurred after contracts have been signed. **The Commission believes that such assurances can and should be incorporated in the language of the contracts.**

A criticism levelled against B.C. Hydro by one intervenor was the tardiness with which it was processing these small hydro contracts. In view of the firm price of 3 cents/kW.h, which was first mentioned in 1988, the intervenor proposed that an adjustment to reflect the changed conditions since 1988 should be considered for any contract executed in 1990. In situations such as this, where a firm price has been declared, **the Commission urges B.C. Hydro to do its utmost to complete contracts in a timely fashion, but more particularly to take steps to recognize any changed circumstances prior to finalizing the contracts.**

### 5.5.2 Medium and Large Hydro

In December 1988, B.C. Hydro issued a RFP for projects greater than 5 MW (totalling 150 MW) for the integrated system. Some of the respondents proposed hydro developments that previously were not seriously considered in B.C. Hydro's resource plans.

In Spring 1989, B.C. Hydro's export subsidiary, Powerex, issued a call for an Expression of Interest for projects greater than 50 MW (totalling 400-600 MW) for the export market.

It should be noted that while no projects that are presently listed in B.C. Hydro's 20-year Resource Plans (Exhibit I, Tab 6) were proposed for the domestic market, a proposal was received by Powerex for development of the Murphy Creek project near Trail which is being contemplated for development by B.C. Hydro. This project did not make Powerex's short-list, which is not unexpected, since Powerex's President testified (T. 1234, 1235) that the subsidiary would not compete with the parent for the same projects. However, Hydro testified (T. 279) that it is not precluding the possibility that some of the larger hydro projects listed in its Resource Plans would eventually be developed by the private sector for the domestic system.

### 5.5.3 Thermal

In its planning documents, B.C. Hydro often refers to stand-alone private thermal power plants where there is little or no utilization of by-product steam as "IPP's", while "cogeneration plants" usually include existing industrial or large commercial steam plants where there is the simultaneous production of electricity and process steam.

B.C. Hydro's 1989 Resource Plan makes an allowance of only 1000 GW.h from IPP's, beginning in 1994. This would equate to only 143 MW, assuming an average availability of 7,000 hours/year. In addition, the Resource Plan allowed for an incremental 700 GW.h (100 MW) of cogeneration in the pulp and paper sector.

The foregoing figures have been increased dramatically through the course of the hearing. Exhibit 48, based upon preliminary estimates for the 1990 Resource Plan, shows pulp and paper cogeneration increasing annually by 1,200 GW.h commencing in 1995/96. B.C. Hydro's testimony (T. 194) confirms a target of 400 to 500 MW of incremental cogeneration capacity by the turn of the century, with stand-alone IPP plants providing additional potential (T. 195). In B.C. Hydro's own study of cogeneration potential, upon which Exhibit 16 is based, about 500 MW of additional cogeneration potential is identified in the pulp and paper sector alone, along with another 727 MW of potential cogeneration outside the forest industry. The study notes however, that not all of this potential may be economically developable.

In B.C. Hydro's December 1988 RFP for 150 MW from IPP's for the domestic system, B.C. Hydro short-listed four projects totalling 280 MW (T. 1108). All but one of these projects were thermal (T. 1109), with one utilizing woodwaste material. This latter project is the recently-signed 55 MW (net) deal between North West Energy and B.C. Hydro. This is a stand-alone plant and provides some confidence that woodwaste-fired plants of this type are viable. Negotiations are still continuing with the three other IPP proponents (T. 1107), and the Commission expects that more announcements will be made in the near future.



B.C. Hydro further testified that a tender call for another 150 MW of large-scale IPP capacity will likely be issued later this year. If the first two proposals totalling 300 MW are satisfied, 2,100 GW.h annually would result. With the opportunity for further proposal calls to be made over the forecast period as power demand grows, the Commission believes that IPP's could provide a much larger contribution to the Provincial electricity supply by the turn of the century.

In light of the foregoing developments, the Commission is of the view that the estimate of large-scale IPP potential by the year 2005 in Exhibit 22B is reasonable, if not conservative. This estimate shows 700 GW.h of cogeneration plus 5,250 GW.h contribution from large-scale, stand-alone IPP's, for a total of 5,950 GW.h. These two figures would equate to roughly 100 MW and 750 MW of capacity, respectively, for a total of 850 MW.

The estimate of cogeneration potential, as noted earlier has already been increased to 1,200 GW.h in B.C. Hydro's preliminary 1990 Resource Plan. The Commission believes that it is quite likely that this figure will be revised upwards when the 1990 Resource Plan is finalized.

A major area of uncertainty with respect to NUG may be the quantity that is available to the domestic market, versus that which is exported through Powerex. There may be a substantial quantity of NUG capacity that B.C. Hydro may deem to be too costly to be developed for the domestic market in the short-term, but which will be less costly than B.C. Hydro's marginal cost after the turn of the century (i.e., 5 cents/kW.h). If projects in the 4-5 cent/kW.h range are committed to the export market through long-term (20-25 year) contracts, the Commission envisages a strong probability that domestic power consumers would end up paying more than they otherwise would for power, as B.C. Hydro's marginal value for electricity is expected to escalate to the 5 cent/kW.h level during the last 3 years of this decade, as shown in Exhibit I, Tab 3, p. 18. This concern was a recurring theme expressed

by intervenors throughout the hearing (T. 66 and 1236). In response to this expressed concern, B.C. Hydro witnesses could provide no real guarantees that this scenario would not happen.

In testimony (T. 66) B.C. Hydro indicated that it would ultimately require the Minister of Energy to make judgments as to how IPP projects will be allocated between the domestic and export markets. This leads the Commission to the conclusion that the relationship between B.C. Hydro and Powerex is still evolving and could undergo further changes. The Commission deals further with Powerex in Section 6.1.

#### 5.6 Columbia River Treaty Downstream Benefits ("DSB")

DSB arising from the operation of the Columbia Treaty dams will be reverting to the Province commencing in 1998. Appendix II, p. 14 of B.C. Hydro's 1989 Resource Plan (Volume 1, Tab 6) presents a tabulation of the forecast annual benefits to the Province between 1998 and 2007. Capacity values are anticipated to start at 100 MW and peak at 1100 MW in 2002, whereas energy values are dependent on growth rates in the Pacific Northwest and can be as low as 350 GW.h in 1998 and as high as 6630 GW.h in 2007.

B.C. Hydro testified (T. 57) that because of the large capacity component in the benefits, particularly from year 2000 onwards, significant trading opportunities exist to supply BPA and Alberta, who are both capacity short. This signifies that it might be to the Province's economic advantage to market a portion of these benefits rather than make the entire amount available to B.C. Hydro. In speculating on this matter, **the Commission believes that if the value of capacity is higher in Alberta or the U.S. than in this province, the Provincial Government may be able to negotiate a package which will maximize benefits to B.C. Hydro's customers and the people of British Columbia.**

In testimony (T. 1035 and 1036), B.C. Hydro acknowledged that the downstream benefits would amount to approximately 5,000 GW.h by year 2003 (roughly the equivalent of Site C), and B.C. Hydro estimated this would be adequate to defer construction of Site C, if the more economical elements in the resource plan can materialize to sustain load growth until 2003.

Referring to Figure 5.1.4.1 (also Exhibit 22B), a scenario is developed whereby B.C. Hydro's probable load growth could be supplied up to the year 2005. The mix of resources includes a sizeable component from the DSB (3,230 GW.h) and no contribution from Site C. This DSB component is quite conservative compared with the most optimistic value in year 2004/2005 of 6,620 GW.h or the probable value of 4,760 GW.h. Similar amounts will accrue to the Province in year 2003/2004. **In view of the environmentally benign nature of this resource, the Commission recommends that B.C. Hydro give priority in its planning for the maximum use of this source of supply.**

On several occasions during testimony B.C. Hydro reiterated the risks inherent in large mega projects, especially the technological obsolescence aspect. The Commission recognizes this and endorses B.C. Hydro's plan to vigorously pursue all cost effective initiatives, including procurement of the downstream benefits, before embarking on a mega project such as Site C.

## 5.7 New Generation Projects

B.C. Hydro states (Exhibit III, Tab 2, p. 3) that its strategy is to pursue Power Smart, Resource Smart, purchase and coordination, Independent Power and co-generation, and other initiatives before building new plant. When new large scale facilities are eventually required, it says it would look to the next most attractive energy sources - Keenleyside and Site C.

In testimony (T. 97) B.C. Hydro's Chairman, Mr. Bell stated "I see the completion of the Columbia and the Peace Systems in terms of their power potential, from our assessment of alternate options, as occurring sometime in the next 20 years."

The Lower Columbia projects would include new dams at Murphy Creek upstream of Trail, at Border at the confluence of the Columbia and Pend d'Oreille Rivers, a new power plant at Keenleyside, four "Resource Smart" projects at Duncan, Seven Mile, Waneta and Brilliant, and "other" small Resource Smart projects. The individual studies carried out to date have been summarized by B.C. Hydro under one "Columbia River Studies Summary".

### Keenleyside

The new Keenleyside power plant would be a major project in which a whole new powerhouse would be designed and built on an existing dam facility. This project has a unit energy cost marginally greater than Site C (Exhibit I, Tab 1, p. 34), however, B.C. Hydro plans to develop this project ahead of Site C because of its smaller size and lower capital requirement.

This project has been classified as a Resource Smart project because of the presence of the existing dam, and the Commission does not anticipate that incremental environmental impact would be as significant as for the Site C development.

### Site C

The Site C hydro-electric project would be built on the Peace River near Fort St. John, and would complete development on the Peace River to maximize the energy output from the existing storage and river regulation provided by the Williston reservoir. Site C, like all major generation projects, will be the subject of a separate Application for approval of construction and operation but it is identified in the Rate Application as an essential part of the overall

Resource Plan and future resource cost contemplated by Special Direction No. 3. Inherent in Special Direction No. 3 is a Government direction to the Commission to consider all costs and projects of B.C. Hydro over the long-term future and set rates to meet those most likely future costs in a smooth, stable and predictable way.

A 60 metre high earthen dam would be built across the Peace River at Site C, 7 km upstream from Fort St. John and downstream from the existing G.M. Shrum and Peace Canyon power projects. The proposed Site C would have six 150 MW units, and this 900 MW of capacity could be expected to produce 4570 GW.h firm and 4710 GW.h on average.

Site C was previously the subject of a public review process and Report in 1983. At that time deficiencies in B.C. Hydro's plans were identified, and since that time some of the technical studies have become outdated. The illustration from the progress report (Exhibit II, Tab 5, p. 22) quotes a budget of \$3 million to bring Site C to shelf ready status but the total may be several times that amount. Shelf-ready status envisages completing all necessary approvals and being ready to go to construction tenders within 30 days of final authorization by management to proceed. The \$3 million quoted is partly for environmental studies and particularly fishery studies extending downstream to the Alberta border and to be completed in 1991. It also includes a renewed public consultation process that is currently underway.

In addition to the above noted \$3 million, about \$7.5 million will be required to bring the engineering investigation and design up to date. This will include additional drilling and proving of the foundation conditions for the proposed dam. About \$6 million will be spent in 1989/90 and the remainder will be for work deferred into the next year. Previous engineering work was carried out in-house and some in-house expertise will be retained even though the engineering review has been contracted out to the private sector.

B.C. Hydro's tentative in-service date for this project is 2002 (T. 28) and this is reflected in B.C. Hydro's 1990 Resource Plan. Since this date is not firm, current work on this project is to bring it up to shelf-ready status. Construction will reportedly require seven years to bring the project into service. However, in view of the alternative energy resource scenarios developed during the hearing (Exhibits 22A and 22B), the Site C in-service date could be deferred to 2005 and possibly beyond.

The Commission concludes that inasmuch as the requirement for the commencement of construction of Site C is not imminent (minimum 5 years and probably in excess of 8 years) and since both the costs to bring a project to shelf-ready status and the ongoing costs to maintain that status are significant, caution should be used in this regard so that deemed inevitability does not become the basis for early expenditures. The Commission expects that B.C. Hydro's current review into this matter (T. 1124) will clarify this situation in the near future.

### Hat Creek

Using existing technology, Hat Creek thermal plant appears to be an economic development that could be staged to match annual load growth. Even with the first major capital cost of a new mine and power plant site to be absorbed, it would probably be less capital intensive than a major hydro project and more conducive to rate smoothing.

Hat Creek could also be phased in with existing and new hydro projects, and the thermal generation operated at higher capacity factors to take advantage of the storage available in the major reservoirs. Its geographic location relative to the Williston Reservoir on the Peace River and the major transmission from the Peace Projects also favour its integration with hydro generation.

Working against Hat Creek development is the current concern about thermal plant air emissions and particularly the so-called "greenhouse gases". The major Hat Creek projects are said to include sulphur dioxide removal but otherwise the estimates are based on current burner and boiler technology. It would still be a major undertaking but it is doubtful that it would meet new emission standards cost effectively if it is to utilize existing combustion technology.

Assuming that some form of the Federal initiative and 15-year target date to reduce greenhouse gas emissions to less than what they are today is implemented, it appears likely that the technology for any Hat Creek development will have to be thoroughly reviewed and justified on economic, environmental and social grounds. Although some development at Hat Creek is possible within the next 15 years it does not appear likely, based solely on the need to supply the domestic requirements in B.C.

#### New Sites

Apart from the developments on the Peace and Columbia systems, the Twenty-Year Resource Plan (Exhibit I, Tab 6, Appendix V, p. 41-45) becomes speculative in terms of project priority and timing. Although three scenarios for future development are presented they are probably not intended as serious proposals from which to choose. Their value is in focusing attention on one type of generation and the likely projects of that type.

The probable LCIRP scenario will almost certainly combine and integrate projects from these and other scenarios, e.g. B.C. Hydro is studying combined operation with the Alberta thermal system. A smaller thermal power plant that was economically viable, such as the 600 MW East Kootenay project, would appear likely to have benefits similar to those reported for coordinated operation with the Alberta system; and some other combination of hydro and thermal and alternative energy may become an attractive alternative. Also,

the importance of short-term versus long-term considerations shifts with the cost of capital, and a lowering of interest rates would improve the economics of capital intensive projects with long service lives. Such a change in the financial environment may be necessary before major hydro projects on a new river system appear attractive.

Since the choice of one of the three scenarios, or some other scenario in the next century, does not change the planning for the first ten or so years, particularly if B.C. Hydro takes advantage of all the attractive alternatives available to it now, there appears to be no reason to lock in any of the new projects. **In fact, the Commission believes that there is a window of opportunity to study some of the new projects in depth even before committing to Site C.**

Based on information developed during the hearing about alternative resources and the B.C. load, major hydro projects do not appear to be needed for domestic consumption within 10 to 15 years. However, the public opposition to thermal power plant emissions might cause an accelerated development of major hydroelectric sites.

Two or three projects could be completed in the Homathko River basin early in the next century. Of the new hydro developments, these projects are the best match to the annual load growth and in total would match the output of Site C. However, B.C. Hydro shows a cost for Homathko energy of 5.5 cents/kW.h versus 4.7 cents for Site C (Exhibit 22A) and a similar cost for Hat Creek (all 1989 equivalent long-term costs).

Four projects could be developed on the Stikine and Iskut Rivers, with the first in service before the year 2005. The total power and energy developed would be of the magnitude of the existing Peace River development and major new transmission lines would be required. In addition to the major hurdles of initial financing and environmental and social impacts of a project of this magnitude, the energy would be produced at a cost of about 5 cents/kW.h, the current upper economic limit.



The proposed three-project development of the Liard River would also be of Peace River magnitude, and could supply about ten times the B.C. system projected annual electric energy growth to the year 2010. After accomplishing major financing for the initial development, these projects would also have long-term energy costs of about 5 cents/kW.h.

Several other projects, of about one year's load growth in size, are proposed, namely, Border, Elaho, and McGregor Lower Canyon (Exhibit I, Tab 6, p. 34). Costs are uncertain but the Border project surfaced in testimony (T. 97) and is apparently being seriously considered by B.C. Hydro along with development of the Lower Columbia.

## 5.8 Transmission

B.C. Hydro's transmission extension plans are presented in the Electric System Development Plan document included as Tab 7 of Exhibit I. Transmission reinforcement is required to the main system within the next few years to ensure system reliability as the load increases, to accommodate planned power purchases from Alcan in 1995 and to reduce existing transmission losses. This latter benefit may be classified under the umbrella of Resource Smart.

The environmental and social impacts associated with new transmission lines are studied and evaluated early enough in the planning process to accommodate whatever corridor, route adjustments or mitigation measures are deemed necessary.

Of growing concern to today's public is the phenomenon of the Electromagnetic Fields ("EMF") associated with these lines and the possible biological affect of these emissions on human health. At T. 999-1001, in response to an intervenor's question, B.C. Hydro advised of initiatives the utility is undertaking in this regard which included constant monitoring of research and studies in the field, exploring opportunities to participate in EMF research and the practice of "prudent avoidance" - configuring new lines to keep EMF levels at the edge of the right-of-way to a minimum.

The Commission recognizes these EMF related initiatives on the part of B.C. Hydro. Commission Order No. G-44-89 requires B.C. Hydro to seek a separate Certificate of Public Convenience and Necessity for transmission projects of 138 kV or greater.

With respect to the planned transmission facilities for proposed exports to Washington Water Power and Puget Power, B.C. Hydro advised (T. 1013) that the export IPP contracts will include budgets towards the cost of interconnecting with the B.C. Hydro system. Since these projects will be subject to Provincial regulatory approval, the Commission recognizes that all costs will be subject to scrutiny at that time.

## 6.0 EXPORTS

B.C. Hydro's electricity exports have been primarily short-term interruptible sales to United States utilities or agencies which for the fiscal year ending 1986, generated record revenues of \$252 million. In recent years, B.C. Hydro's export earnings have been lower, reflecting reduced water conditions and operating agreements entered into with other large producers that have reduced non-firm surpluses available for export.

British Columbia firm power exports continue to be constrained by the lack of transmission access in the United States which is required to deliver power to potential export customers in the Pacific Northwest and California. Transmission access is hindered by BPA's Long-Term Intertie Access Policy. BPA has had surplus generating capacity throughout most of the 1980's and, to protect its marketing position, a restrictive transmission access policy has prevented competing producers from using its Pacific Intertie.

Transmission access is anticipated to improve in the future and firm export markets are expected to be available by 1995. B.C. Hydro is planning to expand its transmission capacity with adjacent Pacific Northwest utilities, and these interties will be independent of BPA (T. 1013 and 1375). Other developments such as declining United States power surpluses, transmission upgrades proceeding on the Pacific Intertie and on-going B.C. Hydro/Powerex negotiations with BPA suggest a favourable export market opening up in the mid-1990's. British Columbia power resources are expected to be increasingly cost-competitive with alternative resources available to the Pacific Northwest and California utilities over the long-term.

## 6.1 British Columbia Power Export Corporation ("Powerex")

Prior to 1983, British Columbia electricity exports were limited by Government policy to interruptible sales and short-term firm sales (of six months or less) from existing facilities. The exception to this policy was the 30-year firm sale of British Columbia's 50 percent entitlement of the Columbia River Treaty power benefits which was signed in the 1960's. In 1983, with B.C. Hydro's Revelstoke project nearing completion at a time when load growth was declining, the Government approved the policy of allowing long-term firm electricity exports, subject to surplus availability and minimum price tests. (Ref. Ministry of Energy, Mines and Petroleum Resources Press Release, November 8, 1983.)

In June of 1988, the Provincial Government approved the creation of Powerex as the Province's long-term electricity export agency. In December of 1988, Powerex was incorporated as a wholly-owned subsidiary of B.C. Hydro and a Board of Directors was appointed. Since incorporation, Powerex has undertaken a major United States export marketing study and completed its first short-term firm export sale to the Sacramento Municipal Utility District over the four-month period ending December 31, 1989.

The responsibilities of Powerex include, assessing electricity export demand, recommending strategies to B.C. Hydro for export projects and transmission access, negotiating purchase contracts with independent power producers and overall marketing of firm exports. Powerex has been established as the Government's single window firm export agency to facilitate the development and functioning of the private power industry in British Columbia and will be involved in electricity transactions associated with the import and export of electricity. The policy decision was also made that interruptible exports would remain under the control of existing exporters unless they elected to market through Powerex. (Ref. Ministry of Energy, Mines and Petroleum Resources Press Release, May 24, 1989.)

Powerex's office is located in a separate building from that of B.C. Hydro. The subsidiary is staffed and operated by B.C. Hydro personnel with B.C. Hydro providing cash and loan management services as Powerex's agent. Assistance is also provided with power contracts and environmental affairs when required. The majority of Powerex's Board of Directors are either B.C. Hydro Board members or employees. The operating agreement between B.C. Hydro and Powerex identifies the specific responsibilities of each company and the services that B.C. Hydro will provide to Powerex (Exhibit 53). Powerex intends to contract services from B.C. Hydro for storage, shaping, exchange, wheeling and scheduling of energy transactions (T. 63, 402, 1216).

Powerex requires written approval from B.C. Hydro confirming a commitment of the B.C. Hydro system to any Powerex transaction. In addition, B.C. Hydro bears full cost of studies investigating the merits of all proposed joint projects requiring either an intertie or significant facility development by B.C. Hydro, whether or not the project proceeds. If a project is developed, B.C. Hydro will be entitled to recover all of its costs plus a return on its investment. B.C. Hydro's rate of return on potential export projects is not set out or qualified in the operating agreement. To date the Agreement between B.C. Hydro and Powerex has not been officially filed with nor accepted by the Commission.

For firm electricity sales by B.C. Hydro to Powerex, all charges are to be separately negotiated on a contract-by-contract basis and will be identified in written agreements between B.C. Hydro and its subsidiary. For interruptible electricity sales by B.C. Hydro to Powerex for export, the price is currently determined by a formula set out in Appendix A of the operating agreement (Exhibit 53). This arrangement would allow B.C. Hydro to recover its cost on the basis of the value of the non-firm energy in the domestic market, plus a share of the difference between that figure and the export price. Powerex's revenues from interruptible sales is to be the residual share of the difference between the export price and B.C. Hydro's price. After deduction of Powerex's direct expenses, Powerex's net income eventually becomes part of B.C. Hydro's consolidated revenues.

### Intervenor Views

A major concern of the intervenors was the rationale for Powerex being a separate, but wholly-owned subsidiary of B.C. Hydro. Mr. Wallace, representing the industrial intervenors, indicated that his clients are concerned about the creation of Powerex and the fact that Powerex appears to be making a profit from export sales which B.C. Hydro previously received directly (T. 2025, 2253). The industrial intervenors realize that Powerex's profits are presently being returned to B.C. Hydro, however, they fear these profits could be removed in future and prevented from flowing back to B.C. Hydro customers who paid for the resources from which the exports are being generated. Another intervenor, Okanagan Electric Consumers' Association concluded that Powerex appears to have been established for the purpose of avoiding critical public scrutiny of power exports that would have occurred if B.C. Hydro itself were carrying out the exports (T. 2291).

A second issue raised by the intervenors was the regulatory implications of B.C. Hydro power sales to Powerex. It was argued during the hearing that B.C. Hydro sells power to Powerex at rates that have not been submitted to the Commission for approval. The industrial intervenors' view of this practice is that since Powerex is a separate company purchasing power and making a profit upon resale in the export market, the sale of power to Powerex should be at rates regulated like other sales by B.C. Hydro.

### Commission Concerns

With respect to the rationale for establishing Powerex, it is the Commission's understanding that the subsidiary was created not only to facilitate the development of the private power industry and to foster competition, but also to separate the domestic and export operations of B.C. Hydro. The basis for this separation of activities is to ensure export power resources are surplus to domestic requirements and distinct from domestic operations. Power

resources are not to be developed for the export market to the detriment of domestic customers. The Commission's understanding of Provincial Government policy is that export projects must be stand-alone ventures covering all costs (including adequate environmental protection) and provide compensation to B.C. Hydro for all services rendered, while providing overall benefits to British Columbia. (Ref. Ministry of Energy, Mines and Petroleum Resources Press Release, November 28, 1989.)

Historically the Commission has been concerned about inter-company utility transactions, especially between regulated and non-regulated operations. The Commission has vigorously reviewed the substance and validity of transactions between parent and subsidiary companies and on more than one occasion disallowed costs. The Inland, Columbia and BC Gas organization is a British Columbia case in point but it is a typical problem experienced in most jurisdictions where, for whatever reason, regulated utilities are allowed to operate non-regulated subsidiaries.

Testimony provided at the hearing gives the Commission cause for concern regarding the adequacy of the separation of B.C. Hydro and Powerex operations. The relationship between Powerex and B.C. Hydro is not arms-length and some of B.C. Hydro's services are being provided to Powerex for its benefit without an adequate assignment of costs. B.C. Hydro continues to operate and dispatch sales to the export market as it did before Powerex existed. A specific concern is the sale, through Powerex, of B.C. Hydro interruptible power that is made available through prior investments in plant and equipment paid for by B.C. Hydro customers. B.C. Hydro appears to be carrying out interruptible sales for Powerex while, on an initial accounting basis, receiving less profit than before Powerex was created.

The evidence of Powerex's president (T. 1234-1235) that Powerex would not compete with B.C. Hydro for IPP projects highlights the restraint of competition and also the degree to which Powerex operates like a division within B.C. Hydro.

The fact that Powerex's profits flow back to B.C. Hydro's consolidated revenues obscures the fact that Powerex was originally established to keep the accounting of domestic operations separate from export sales. The Commission realizes that Powerex requires a cash-flow and that interruptible sales have provided this revenue, but these earnings are being made from investments paid for by domestic ratepayers without any special expertise by Powerex. Powerex's cash-flow requirements could have been provided through a shareholder loan from B.C. Hydro or other financial vehicle. **It is the Commission's view that Powerex should be a stand-alone export marketing company. In this way Powerex will be evaluated as to whether it is able to add value to export sales, as originally planned. Powerex should provide incremental benefits sufficient to justify any receipts it receives from B.C. Hydro sales, including interruptible sales.**

A separation of firm and interruptible export sales, distinct from B.C. Hydro's domestic operations, is required in order to monitor Powerex's export earnings. Powerex, as a marketer of firm export power must strive to generate new firm export revenues without relying upon an indirect subsidy from B.C. Hydro's domestic operations. Government policy pronouncements have stated that existing ratepayers should in no way subsidize or bear risk from the export of power by Powerex. This further underlies the need for a more independent relationship between Powerex and B.C. Hydro operations.



Another Commission concern is B.C. Hydro's obligation to obtain regulatory approval of any contract for power sales to Powerex pursuant to Sections 67 and 85.3 of the Act. Provided it is not selling power to domestic customers, Powerex would not be classified as a public utility. However, B.C. Hydro is a public utility selling to Powerex and that subsidiary transaction is subject to regulation. The Commission is further required under Sections 65 and 66 of the Act to ensure that B.C. Hydro's rates are fair, just and reasonable and yield a fair return for the service rendered by the utility. **B.C. Hydro is required to submit its rates, applicable to all transactions between B.C. Hydro and Powerex to the Commission for approval. The Commission recognizes that flexibility is needed with respect to commercial arrangements particularly for short-term sales and will consider proposals to provide flexibility with effective regulation. B.C. Hydro is directed to file the current contracts for approval with the Commission by June 1, 1990.**

#### Alternative Organization Structures

There is a need to develop an alternative organization structure for Powerex that would meet the Commission's regulatory concerns and be more consistent with Provincial Government policy. **The Commission determines that the existing arrangement between Powerex and B.C. Hydro is inadequate to protect the interests of B.C. Hydro's domestic customers. In the current form Powerex places the domestic customers at risk with respect to the commercial arrangement it undertakes.** To explain the conflict the following two examples are relevant:

##### 1. Interruptible Sales

Until now B.C. Hydro sold interruptible power when domestic supply and export demand conditions were propitious. B.C. Hydro maximized its return on these sales through its Burnaby Mountain dispatching facility. The current arrangement is that B.C. Hydro still dispatches the power but shares the profit

with Powerex. There is no indication that B.C. Hydro is receiving value for service in the new transactions.

## 2. Future Firm Exports

Powerex is to seek out firm export sales and IPP supply to match the sales. If Powerex incurs risk or financial loss, the impact will presently flow to B.C. Hydro's domestic customers through the consolidation of Powerex's profit or loss into B.C. Hydro. The domestic customers will legitimately wish to have a say in Powerex costs and export activities if they bear an ultimate risk from those sales.

At the present time Powerex is viewed simply as a division of B.C. Hydro. It has not as yet fulfilled the intentions of its creation. It exists as a monopoly broker of export power with indirect financial support provided by the domestic customers and no explicit performance measurement criteria.

The Commission cannot ignore Powerex if the broker is using assets of the regulated utility at less than a fair, just and reasonable rate. Unless Powerex is restructured to preclude financial risk for domestic customers, the Commission will have no alternative but to regulate B.C. Hydro so as to effectively review all sales by Powerex. The Commission anticipates that a restructured Powerex could be left unregulated if it purchased power, storage, wheeling or consulting services from B.C. Hydro at regulated prices or market values as the appropriate circumstances dictate and did not resell them within British Columbia. For example, the sale of power to Powerex by B.C. Hydro should be conducted by B.C. Hydro employees operating with the express intention of maximizing the sale price to the advantage of the domestic customers. Alternatively, if Powerex is to operate only as a broker, then B.C. Hydro should pay Powerex an appropriate broker's fee for the services rendered in the sale.

In order to arrive at an amenable alternative, it is suggested that B.C. Hydro develop an alternative structure for Powerex that addresses the Commission's concerns and Government export policy. The regulatory implications of B.C. Hydro sales to Powerex need to be resolved.

## 6.2 Power Pool

The Commission was made aware of Powerex's intention to develop a pool for interruptible power involving energy transactions with any party wishing to purchase or sell into a spot power market. The power pool is a concept presently under development and would offer a market for domestic and out-of-province non-firm surplus to be bought and sold by domestic and export customers through Powerex. Powerex intends to operate the power pool by purchasing power from diverse suppliers and with the use of B.C. Hydro's system, provide storage, shaping and wheeling, and operate a non-firm power pool under a competitive bid system. Potential purchasers from the power pool would be large domestic and export customers capable of using interruptible power and willing to take the supply risk.

It is the Commission's understanding that B.C. Hydro intends to handle all non-firm sales and purchases through the Powerex power pool, while B.C. Hydro will continue to supply firm power to its domestic customers (T. 1310). Under this arrangement Powerex would be involved in selling non-firm power from the power pool directly to domestic customers. **By doing so, under the Act Powerex would be classified as a public utility and would be required to submit its proposed rates to the Commission for approval.**

The Commission is aware of the advantages inherent in developing and operating a power pool in British Columbia. However, while the Commission recognizes that the power pool must not be detrimental to any of B.C. Hydro's customers, it can potentially be of great benefit to some industrial customers. The Commission considers a power pool as desirable provided the power pool can be structured and operated in a way that satisfies the Commission's concerns.

It is the Commission's view that the value added from a power pool in British Columbia arises primarily out of the use and flexibility provided by B.C. Hydro's hydroelectric system. B.C. Hydro's system storage ability can match non-coinciding interruptible supplies and demands and is the key element in making the power pool work. B.C. Hydro's existing system has been built and is being paid for by domestic customers and they should be entitled to maximize the value of those resources.

If the proposed Powerex power pool is developed the Commission will require B.C. Hydro to sell its storage and non-firm power to the pool at market related prices so as to maximize the value of the domestic resources otherwise paid for by all domestic firm customers. In this way the B.C. Hydro firm rates to all domestic customers will be kept as low as possible to meet the revenue requirement of the utility. (It is presumed that wheeling charges will be at fixed rates to avoid discrimination.)

The Commission suggests an alternative structure be considered for the power pool. Since B.C. Hydro owns virtually all the assets that will make the concept possible, B.C. Hydro should own and operate the power pool. Powerex, like any other potential purchaser of non-firm power, could bid for surplus power for sale in the export market on a non-discriminatory basis. This arrangement could better ensure the market value of the power is recovered directly by B.C. Hydro, which in turn reflects the value added from use of the B.C. Hydro

The Commission recognizes that under a power pool arrangement, energy rates would vary with market conditions which in turn would be influenced by such variable factors as rainfall, load growth and alternative energy prices. Under any arrangement of operation of the power pool involving sales of power to domestic customers, rates would be subject to regulatory approval by the Commission. Prices for non-firm sales reflecting varying market conditions require regulatory flexibility to allow rates to vary within certain bounds while complying with regulatory requirements. The Commission has regularly provided such flexibility to other utilities offering peaking sales or when facing interfuel competition.

The power pool concept and a related flexible tariff arrangement require further development. It is suggested that B.C. Hydro develop an appropriate structure for the operation of the power pool which is acceptable to all parties and meets the Commission's regulatory concerns. Until an alternative structure is devised, the Commission directs that each transaction be filed with the Commission for approval pursuant to Sections 67 and 85.3 of the Act. During the transition period B.C. Hydro/Powerex may apply for Commission approval of range rates or other flexible regulatory method to facilitate immediate sales completion.

## 7.0 UTILITY OPERATIONS

In the early 1980's B.C. Hydro had a very large staff - in excess of 10,000 employees. The recession in the early 1980's precipitated the introduction of the Provincial restraint program. During this period B.C. Hydro divested itself of its gas and rail operations, and reduced staff by approximately 50 percent. Restraint in B.C. Hydro, which lasted until early 1988, resulted in deferred plant maintenance, drastic reduction in new plant construction and a general in staff morale (T. 1791).

B.C. Hydro is now in a rebuilding mode. In 1989, the utility embarked on several new initiatives including a greater emphasis on decentralization, the formation of subsidiaries, the adoption of Power Smart and LCIRP. In addition, the utility embraced measures to improve efficiency, service quality and customer service and instituted techniques to assess performance of the various entities within the company.

These changes have been dramatic on all fronts and B.C. Hydro indicates that, when fully implemented, they should improve the overall performance of the utility.

Specifically, the utility is reorganizing from a centralized operation to three Strategic Business Units ("SBU's") and three Corporate Groups with an aggregate of 105 decentralized Key Business Units ("KBU's"). Recently instituted is a system of Key Business Indicators ("KBI's") by which the efficiency of KBU's will be gauged. B.C. Hydro is also striving for improved productivity with the introduction of the new computerized management information system.

The operation of the utility appears to be expanding, developing and reorganizing all at once, and the internal measurements of its performance (i.e., KPI's), are being put into use while they are still being developed. While indications are that the organization restructuring will be beneficial, the Commission has insufficient information at this time to judge the prudence and success of the reorganization and decentralization, and whether costs are being minimized.

**The Commission is concerned from the evidence that reorganization was embarked upon without the establishment of any pre-determined measurable objectives for the initiative.** This concern was heightened when witnesses could not give budgeted or estimated cost amounts for decentralization. It was confirmed that B.C. Hydro is not keeping separate records to collect those costs attributed to decentralization.

Information presented in the Application and in testimony (T. 1729) indicated that there was a significant maintenance backlog that was created during the restraint period when expenditures and manpower had to be reduced. B.C. Hydro testified that this backlog is now being addressed, albeit at higher cost than if it have been done previously (T. 1730).

The contracting out practices adopted by B.C. Hydro appear sound in principle in that the varying work load is contracted out and B.C. Hydro staff numbers are held at just below the level required for all regularly recurring work. Contracting practices are cost effective to the extent that contractors are expected to complete the work at no more cost than if it were done by B.C. Hydro.

**The Commission directs that restructuring and decentralization should proceed and that a full report on the productivity improvements is to be submitted to the Commission comparing 1989/90 results with 1990/91. The report is to be filed no later than September 1, 1991.**

## 8.0 REVENUE REQUIREMENTS

The determination of a utility's revenue requirement requires a detailed analysis of utility revenues and costs. This Application was not presented in a traditional manner. At p. 21 of this Decision the Commission determined that it must deal with the Application in the totality of the regulatory framework. Setting B.C. Hydro's revenue requirement is complex not only because of the utility's large size, but because of the special circumstances that currently exist. These include the shift within the utility from a construction oriented company to an operating company, with an emphasis on DSM within the context of LCIRP. Further, although the revenue requirement is to be set over a three-year horizon, the Commission has considered revenue requirement needs in future years so as to ensure that rates change in a smooth and predictable manner to reflect the anticipated higher costs of new electricity supply.

B.C. Hydro is currently operating under an interim Order approving an increase in electricity service rates of 3 percent effective November 15, 1989. B.C. Hydro had premised its request for the interim increase on many reasons. The Commission considered Clause 14 of the Interim Application as being most critical in that it stated "with its present rates it will not be able to generate a normal return on capital or meet the minimum financial standards required by Special Direction No. 3 to the BCUC".

The supporting information at Tab 1 of the Interim Application showed that, without the 3 percent increase, B.C. Hydro might only achieve an interest coverage of 1.14 to 1 by 1991/92. Based upon this, Commission Order No. G-49-89 approved the Interim Application, subject to submission of a full rate application by November 30, 1989, and subject to refund with interest.



In Section 3 of this Decision the Commission determined that it interprets the full Application by B.C. Hydro as being a revenue requirements application to confirm general rate increases for a three year period. In doing so it rejected the policy-based Rate Application for 3 percent annual across-the-board rate increases over three years as an appropriate signal for conservation and efficient use of energy. Revenue requirements applications are distinct from rate design applications which restructure the rates within each class of customer to ensure that each class contributes a fair share of the utility's revenue requirement in a manner which contributes to efficient electricity use, stability of earnings, conservation and other equity considerations. B.C. Hydro will be making a detailed rate design application by December 1990.

#### 1. Financial Requirements

Special Direction No. 3 is explicit with respect to the attainment of financial standards for interest coverage and debt/equity ratios. The Direction states that B.C. Hydro is to attain an interest coverage ratio of at least 1.3 to 1 by 1992 and increase its equity component to at least 20 percent of the capital structure in that year.\*

B.C. Hydro does not have any substantial external financial needs in the immediate to foreseeable future. It is not in the capital markets raising funds for major projects and will not be there in any significant way for many years. B.C. Hydro has just had its debt ratings either confirmed at next to the best levels or raised to or near those levels (AA+ by S&P, Aa 1 by Moody's, AA+ by CBRS and AA (Low) by DBRS). Even if B.C. Hydro were to require significant new debt, it is clear that bondholders would look to the provincial guarantee when rating B.C. Hydro borrowings (T. 1902).

\* Interest Coverage Ratio equals net income before finance charges plus other income and rate stabilization transfers, divided by finance charges plus Interest During Construction.

The B.C. Hydro cost of service is dominated by debt servicing costs related to the high fixed costs of dam construction and transmission facilities. The interest coverage ratio thereby results in a significant return to the utility.

**The Commission determines that the minimum financial standards required by Special Direction No. 3 will be sufficient to ensure the continued financial stability of the utility.**

## **2. Rate Stabilization Account**

B.C. Hydro applied for an Order rescinding paragraph 5 of Commission Order No. G-26-82, effective April 1, 1990 and directing the transfer of the balance in the Rate Stabilization Account into general revenue.

The account was originally created in 1982 to provide a mechanism for stabilizing year-to-year variations in revenue requirements and the related rates by utilizing the large annual variations in export surplus revenues. Operation of the account was changed by Commission Order No. G-62-85 and the May 9, 1986 Decision to permit greater flexibility.

**The Commission concurs that the Rate Stabilization Account created in 1982 be terminated and the balance in the account be taken into general revenue.**

## **3. Return on Public Investment**

Special Direction No. 3 states that the annual distributable surplus for B.C. Hydro is to be allocated in a manner specified by the Lieutenant Governor in Council in Special Direction No. 1 to B.C. Hydro. That Direction states that B.C. Hydro will pay to the Provincial Government \$130 million for the financial year ending March 31, 1990 and 75 percent of the distributable surplus in future years provided the debt/equity ratio after deducting the payment is between 80/20 and 75/25. If the equity component

improves beyond 25 percent the payment shall be 90 percent of the distributable surplus.

#### 4. Fair, Just and Reasonable Rates

The guiding principle of the Act is that customers and shareholders of the utility should be treated in a fair, just and equitable manner. Customers must receive safe delivery of adequate energy supplies at reasonable prices based on efficient operations and a fair return on shareholder equity.

The Commission must take into account any increase in revenue requirement above the minimum financial standards necessary to adequately compensate the utility. In considering those sections of the Act which direct the Commission to allow a utility to earn a fair return, while also protecting the customers from excess monopoly profits, the Commission is satisfied that the minimum standards should be interpreted on behalf of the customers as being a fair return. **The Commission interprets the minimum financial standards in Special Direction No. 3 to be a "fair and reasonable return on the appraised value of the plant or system of the public utility used." (Ref. Section 66(2) of the Act.)**

The Commission will set rates to comply with these directives. **The Commission orders the establishment of a new Rate Stabilization Account ("RSA") to assist in the setting of smooth, stable and predictable rates while also ensuring that the minimum financial standards for the utility are maintained.** The RSA will operate so that excess earnings over and above an interest coverage of 1.3 to 1 will be credited to the RSA and used to provide sufficient income in years of unusual need.

The RSA is planned to balance on a 10-year rolling basis from the time of each revenue requirements application. Ten years is chosen as being long-term because it matches the longest time period for which B.C. Hydro undertakes detailed forecasts. Forecasts rarely have much relevance beyond that time frame.

To continue to allow for maximum flexibility the Commission will permit such transfers to income from the RSA as may be required and justified by the circumstances prevailing in each fiscal year. The Commission directs that applications by the utility for such transfers are to be made annually on a prospective basis supported by forecasts, in summary format, of the upcoming revenue requirement. Applications for such transfers must be filed with the Commission prior to commencement of each fiscal year, to provide a target or objective for financial planning purposes.

#### 5. Conservation and Efficient Use of Energy

Special Direction No. 3 states that: "The Commission shall ensure rate increases are smooth, stable and predictable and contribute to conservation and efficient electricity use by recognizing that electricity rates should gradually increase to meet the higher costs of new electricity supply." The Commission is further directed to "ensure the B.C. Hydro electricity rates remain fair, just and reasonable."

This direction instructs the Commission to seek the attainment of this objective within the competing objectives to be met.

In Section 3 of this Decision, the Commission considered in detail the competing priorities with respect to the objective of conservation and efficient electricity use. The Commission concluded insofar as rates are concerned that conservation and efficient use of electricity are most appropriately attained through the restructuring of customer rates so that customers recognize the future cost of electricity generation when making consumption decisions.

The Commission has determined that a rate design application is to be filed by B.C. Hydro by December 1, 1990. Attainment of the conservation and efficient use objectives set out in the directive is a high priority for the Commission and B.C. Hydro. In addition, customer groups recognize the importance and desirability of meeting this goal. However, its attainment may be difficult since conservation and efficient use will compete with other rate design objectives for priority. To increase the effectiveness of the public hearing on the rate design application, the Commission is planning to hold a seminar on rate design issues, which will be open to utility personnel, government officials and customer groups.

#### 6. Smooth, Stable and Predictable Rates Over the Long-Term

Gradualism and the mitigation of future rate shock have long been hallmarks of utility regulation. Therefore the objective of setting smooth, stable and predictable rate increases for the future is consistent with traditional utility regulation. However, in the case of B.C. Hydro, the potential for future rate shock is more than ten years away. The Commission is therefore taking a much longer term perspective in the analysis of revenue requirements than previously done.

Section 5 of this Decision provides a detailed assessment of each of the resource items available to meet load growth as determined in Section 4. B.C. Hydro is placing considerable emphasis on LCIRP and DSM programs. Resource items, in the priority given to them by B.C. Hydro, are Power Smart, Resource Smart, Coordination and Purchases, Non-utility Generation, Columbia River Treaty Downstream Benefits, and last of all, the addition of a major new generation project such as Site C. Hearing Exhibits 22A and 22B provided an analysis of resource components needed to meet the probable load forecast in the year 2005. Those resources are graphically shown in Figure 5.1.4.1. It would appear that based on the probable estimates of demand and supply, a major new generation resource will not be required until after the year 2005.

It should be noted that the original Application by B.C. Hydro indicated a requirement for Site C in the year 1999. The Chairman of B.C. Hydro said in his opening remarks at the hearing that B.C. Hydro had deferred that requirement under its probable load forecast to the year 2002 (T. 28). During the hearing the estimated amount of resource available from Power Smart and other sources increased substantially. The postponement of Site C under these forecasts would result in large financial benefits to British Columbians.

The "most probable" estimates available indicate that neither the customers nor B.C. Hydro are at risk with respect to the supply of energy. The Commission will be reviewing B.C. Hydro's load resource profile on an annual basis, and in public in approximately two years. As the load resource requirements change with time, the estimates of future revenue requirement increases will move towards actual results in a smooth, stable and predictable manner.

**The detailed financial tabulations matching the key components of the Commission revenue requirements determination were filed as Exhibit 77C to the hearing. On this basis the rate increase required to meet the financial standards is 1.5 percent per year for three years. All customers will be refunded their excess payments made to B.C. Hydro between November 15, 1989 and April 30, 1990, with interest. Industrial rates are to be calculated based on a three decimal place accuracy.**

It is interesting to compare the foregoing Exhibit 77C with Exhibit 77A which would have created a RSA on a 20-year rolling basis. In that case a rate increase of 2.3 percent per year was needed and B.C. Hydro's customers would be required to pay an additional \$2 billion. Exhibits 77, 77A and 77C are provided in Appendix D.

A key aspect of the RSA is that it can be used to ensure that B.C. Hydro will attain a 1.3 interest coverage in each year even if unforeseen costs occur. Based on current debt interest costs of about \$800 million the net revenue to B.C. Hydro would be \$240 million, which, in turn, provides for a dividend of \$180 million to the Provincial Government.

DATED in the City of Vancouver, Province of British  
Columbia, this                      day of April, 1990.

John G. McIntyre, Chairman

N. Martin, Commissioner

Harold J. Page, Commissioner

## APPENDIX E

### Summary of Commission Directions Contained in this Decision

#### Reference Page

#### Power Smart

- 51 The Commission directs that monitoring and evaluation plans and reports are to be filed with the Commission for each program.
- 52 The Commission directs B.C. Hydro to submit a report by September 1, 1990 on the desirability and extent of environmental premiums it would propose to apply to Power Smart programs.
- 53 The Commission directs B.C. Hydro to file tariffs including terms and conditions for each program before July 1, 1990.

#### Powerex

- 80 B.C. Hydro is directed to file the current contracts for approval with the Commission by June 1, 1990.

#### Power Pool

- 84 Until an alternative structure is devised, the Commission directs that each transaction be filed with the Commission for approval pursuant to Section 67 and 85.3 of the Act.

#### Utility Operations

- 86 The Commission directs that restructuring and decentralization should proceed. A full report on the productivity improvements is to be submitted to the Commission by September 1, 1991 comparing 1989/90 results with 1990/91.

#### Rate Stabilization Account

- 91 The Commission directs that applications by the



IN THE MATTER OF  
the Utilities Commission Act  
S.B.C. 1980, c. 60, as amended

and

IN THE MATTER OF  
a Rate Application by  
British Columbia Hydro and Power Authority

DECISION

April 30, 1990

BEFORE:

John G. McIntyre, Chairman  
N. Martin, Commissioner  
Harold J. Page, Commissioner

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Himself  
Himself  
Himself  
Herself

Commission Staff

W.J. GRANT  
B. MCKINLAY  
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IN THE MATTER OF  
the Utilities Commission Act  
S.B.C. 1980, c. 60, as amended

and

IN THE MATTER OF  
a Rate Application by  
British Columbia Hydro and Power Authority

EXECUTIVE SUMMARY

April 30, 1990

BEFORE:

John G. McIntyre, Chairman  
N. Martin, Commissioner  
Harold J. Page, Commissioner



EXECUTIVE SUMMARY OF COMMISSION DECISION DATED APRIL 30,  
1990

**British Columbia Hydro and Power Authority ("B.C. Hydro")**  
**Rate Application dated**  
**November 30, 1989**

B.C. Hydro applied on October 11, 1989 for an interim increase of 3 percent applicable uniformly to all classes of service effective with consumption on and after November 15, 1989. Commission Order No. G-49-89 approved the interim increase on the basis that any refund of monies to customers as a result of a Commission Decision following a full public hearing would be paid with interest. The full Application, which was received on November 30, 1989, requested confirmation of the interim increase and additional 3 percent increases for each of the years commencing April 1, 1990 and April 1, 1991. The hearing of the Application commenced on February 12, 1990 and lasted 15 days. The Commission Panel, comprised of John G. McIntyre, Chairman of the Commission and Chairman of the Hearing Panel, Norris Martin and Harold J. Page, issued its Decision with respect to the Application on April 30, 1990.

The Decision represents one of the most significant determinations by the Commission with respect to B.C. Hydro since B.C. Hydro came under regulation in 1980. B.C. Hydro is at a cross-roads in its evolution and very significant decisions that will impact all British Columbians are being made. Prior to completion of the Revelstoke Dam, B.C. Hydro had been accustomed to economies of scale benefits with respect to the development of its transmission and distribution system, and had faced declining costs in the development of new generation. Since then B.C. Hydro has restructured, focussing its activities on the electric utility business and shedding its ancillary operations in rail and natural gas. As a result staff numbers have been reduced by approximately 50 percent. The Corporation has embarked on a decentralization program to increase its efficiency. The evidence indicated that this organizational restructuring is taking place on an accelerated approach with internal performance measurements being developed as the activity takes place.

B.C. Hydro now faces a future where load growth will eventually have to be supplied from anticipated higher cost resources. This could threaten rate stability for all British Columbia customers in the long-term. Additionally, environmental considerations have taken on a very high priority and B.C. Hydro is making greater efforts to minimize environmental damage from new resource additions.

B.C. Hydro has anticipated the higher costs and the environmental implications of future growth and has responded by developing plans to optimize its system before embarking on new major projects. The engine for this optimization comes from B.C. Hydro's Least-Cost Integrated Resource Planning ("LCIRP") process. The LCIRP sets forth the priority of resource additions to meet the future load. Of these, the first priority of the utility is Demand-Side Management ("DSM") in the form of its "Power Smart" conservation initiatives. The last choice of the utility is the addition of a major new generation plant like Site C.

The review of B.C. Hydro's Application came under the legislative direction of the Utilities Commission Act ("the Act") inclusive of a recent Special Direction from the Government to the Commission called Special Direction No. 3. The latter mandates financial standards which the Commission must ensure that B.C. Hydro attains before the end of the 1991/92 financial year. In particular the utility is to achieve and maintain a minimum interest coverage ratio of 1.3:1 and increase the equity component of its capital structure to 20 percent. The distributable surpluses from the attainment of the minimum financial standards are to be allocated as specified in Special Direction No. 1 to B.C. Hydro. That Direction requires B.C. Hydro to make a payment to the Provincial Government of \$130 million for the financial year ending March 31, 1990 and to pay 75 percent of the distributable surplus in future years when the debt/equity ratio is between 80:20 and 75:25. If equity rises above 25 percent of the capital structure, payment to the Government will rise to 90 percent of distributable surplus.

Special Direction No. 3 also directs the Commission to ensure that rate increases are smooth, stable and predictable and contribute to conservation and efficient electricity use by recognizing that electricity rates should gradually increase to meet the higher costs of new electric supply. The Commission is to further ensure that B.C. Hydro rates remain fair, just and reasonable and meet the other requirements of the Act.

B.C. Hydro's witnesses and the intervenors testified at the hearing that the conservation and efficient electricity use objectives are most appropriately achieved through the structure of customer rates so that customers recognize the future cost of electricity generation when making consumption decisions. The attainment of the conservation and efficient use objectives are a high priority for the Commission and B.C. Hydro. B.C. Hydro indicated it would submit a Rate Design Application and the Commission has re-enforced the commitment by ordering the filing of the Application by December 1, 1990. A rate design application restructures the rates within each class of customer to ensure that each class contributes a fair share of the utility's revenue requirement in a manner which contributes to efficient electricity use, stability of earnings, conservation and other equity considerations.

Gradualism and mitigation of future rate shock have long been hallmarks of utility regulation. However, in the case of B.C. Hydro the potential for future rate shock is more than ten years away. The Commission is therefore taking a much longer term perspective in the analysis of the revenue requirements than previously done. In setting the rates for the 3 year application period, the Commission has assessed the outlook for revenue requirements of the utility over a 20 year period. Rates have been determined so that, if best estimates of load growth, interest rates and resources of the utility come true, the annual increase in rates to meet revenue needs will be the same each year. These increases do not include external costs such as the proposed Goods and Services Tax or increases in water rental fees.

The Commission must ensure that the utility meets the minimum financial standards mandated in Special Direction No. 3. Beyond that level of increase the Commission must consider the fair, just and reasonable treatment of the customers of the utility and the utility itself as set out in the Act. Customers are entitled to receive safe delivery of adequate energy supplies at reasonable prices through the efficient operation of the utility; and, the utility must be provided a fair and reasonable return on the appraised value of its assets.

The Commission therefore considered what increase beyond the minimum financial standards would be required to adequately compensate the utility. In considering those sections of the Act which direct the Commission to allow a utility to earn a fair return, while also protecting customers from excess monopoly profits, the Commission is satisfied that the minimum standards should be interpreted on behalf of the customers as being an adequate return for the utility.

The Commission has therefore established a new Rate Stabilization Account ("RSA") to be used for the benefit of the customers and the utility, to maintain the minimum financial standards over the long term. In this way, customers will face minimum overall rate increases and the utility will maintain its financial standards and be capable of paying a dividend of approximately \$180 million/year to the Provincial Government. The RSA will operate so that excess earnings over and above an interest coverage of 1.3:1 will be credited to the RSA and be used to provide sufficient income in years of unusually high costs. The RSA will balance on a ten-year rolling basis from the time of each revenue requirements application.

The Commission has determined that the allowable revenue requirement of B.C. Hydro should be increased by 1.5 percent effective November 15, 1989, and 1.5 percent in each of the two financial years commencing April 1, 1990 and April 1, 1991. All customers will be refunded their excess payments made to B.C. Hydro from November 15, 1989 to April 30, 1990, with interest.

The foregoing determination of revenue requirements comes from a detailed analysis of load growth and resource additions. B.C. Hydro has significantly improved its planning methods by the adoption of LCIRP. In reviewing the load growth forecasts of the utility, the Commission was impressed with the detailed forecasts undertaken. In adopting the 1989 load forecasts for the purposes of determining this revenue requirement, the expectation is that the probable increase in requirements by the year 2005 will be 23,590 GW.h above the fiscal 1988/89 consumption of 42,150 GW.h. Figure 5.1.4.1 of the Decision identifies the Commission's estimate of a load resource balance for the year 2005. The components of the LCIRP are listed vertically in order of priority. The plan does not include Site C since there is an abundance of other lower cost resource items which should be utilized to meet the load growth in that time period. The LCIRP estimates are conservative so that even if the downstream benefits of the Columbia River Treaty were not repatriated for domestic use the loss of that resource in the plan could be made up by additional Power Smart activity, Independent Power Producer generation or the use of Burrard Thermal. The plan assumes only a minor use of Burrard Thermal even though it might be prudent to plan for the full use of Burrard, since the plant would not be used in most years, when stream flows are expected to exceed the critical level assumed in the LCIRP.

**FIGURE 4.1.4.1**

Alternative Least-Cost Integrated Resource Plan for the Year 2005

At various points in the Decision, the Commission has considered matters related to the determination of the opportunity costs that B.C. Hydro uses to assess the viability of other projects. The Commission believes that a refinement of the opportunity cost estimate will occur over time so that matters such as a social evaluation of environmental considerations will be made explicitly in determining the opportunity cost of DSM projects or any other component of the LCIRP. Other refinements to the opportunity cost estimates that could be made include an accounting for line losses on the transmission system, taxes, location of new supply and diversity of additional supply sources.

The Commission also reviewed the development of the British Columbia Power Export Corporation ("Powerex") as a wholly-owned subsidiary of B.C. Hydro. In June 1988, the Provincial Government approved the creation of Powerex as the Province's long-term electricity export agency. It is the Commission's understanding that the subsidiary was created not only to facilitate the development of the private power industry and to foster competition, but also to separate the domestic and export operations of B.C. Hydro. The Commission's understanding is that Provincial Government policy requires export projects to be stand-alone ventures covering all costs (including adequate environmental protection) and to provide compensation to B.C. Hydro for all services rendered, while also providing overall benefits to the British Columbia economy.

Intervenors at the hearing argued that Powerex was not an arms-length company from B.C. Hydro and that the domestic customers bore the ultimate risk or reward from Powerex's activities. The Commission agrees with those intervenors and believes that Powerex should be a separate export marketing company and should not be credited profit from interruptible sales that otherwise would have been earned by B.C. Hydro. Powerex should provide benefits sufficient to justify its existence. In the current format, Powerex places the domestic customers at risk with respect to commercial arrangements it undertakes. Unless the organizational structure of Powerex is changed, the Commission will have no alternative but to regulate B.C. Hydro so as to effectively review all sales by Powerex.

The Commission heard ideas by B.C. Hydro regarding the development of a power pool which would offer a market for domestic and out-of-province non-firm surplus to be bought and sold by domestic and export customers through Powerex. The Commission is aware of the advantages inherent in developing and operating a power pool in British Columbia and recognizes that it can potentially be of benefit to some industrial customers. However, the power pool must not be detrimental to any of B.C. Hydro's customers. It is the Commission's view that the value added from a power pool in British Columbia arises principally out of the use and flexibility provided by B.C. Hydro's hydro-electric system. The Commission proposed an alternative structure for the power pool, wherein B.C. Hydro would own and operate the power pool. Powerex, like other potential purchasers of non-firm power, could bid for surplus power for resale in the export market on a non-discriminatory basis. Powerex could also sell power under contract into the power pool.

The value of this public hearing is evident from the substantial changes proposed. The hearing encouraged the public to provide input to the utility and the Commission as change is being considered. The Commission was pleased with the cooperation and openness of B.C. Hydro and the quality of participation of intervenors and interested parties throughout the hearing.