New Brunswick's Power Failure

Choosing a competitive alternative

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by

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Executive Summary

The New Brunswick Power Corporation (NB Power) is in state of operational and financial crisis, the dimensions of which can only be understood by looking at the utility's rates, costs, and accounts together. The utility is bearing excess debt, excess generating capacity, and unduly high operating costs. The utility's accounts do not accurately reflect its actual financial condition. Major risks to the utility include a shortfall in future sales and a shortfall in nuclear production.

The study outlines and recommends options to respond to these problems. The principal themes of the proposals are competition and customer empowerment. The report advocates creating a market structure to facilitate open competition. Privatization of parts of NB Power is proposed as a mechanism to promote the conditions that will allow competition to flourish.

Electricity is not efficiently priced in New Brunswick. NB Power's costs are inflated and at the same time the utility is subsidized, neither of which is in the public interest. The prices NB Power charges its municipal utility customers in Saint John and Edmundston appear to be above the price an open market would require. NB Power charges utility customers inside New Brunswick 42 percent more than it charges those outside.

During the summer of 1995, the municipal utility serving Saint John, Civic Hydro, initiated a competitive bidding process to seek supply options. For reasons that have not been publicly revealed, Civic Hydro's process to price power in the competitive market was not completed. Instead, Civic Hydro signed a sole-supplier contract with NB Power for a period of 10 years. The provisions of the deal provide for a very small reduction in rates to Civic Hydro relative to the rate increases imposed by NB Power on the rest of the province. Civic Hydro's failure to obtain the results of its bidding process before signing a long-term contract with NB Power was a failure to exercise due diligence and was a major mistake. Customers in Saint John lost the opportunity to potentially receive lower rates. All of New Brunswick lost an opportunity to establish a competitive benchmark against which to judge NB Power's rates.

Edmundston's municipal utility does not have a long-term contract with NB Power. Edmundston's utility should purchase power on terms most attractive for its customers-whether the supplier is NB Power or not. NB Power should refrain from anti-competitive interference in Edmundston's choice of supplier.

Any rate advantage industry in New Brunswick may once have enjoyed is slipping away. While industrial rates in New Brunswick are increasing, rates in the U.S. are dropping, and industrial rates in most of the rest of Canada are stable. Although the discounts are uncertain, it is certain that actual industrial electricity prices in competing U.S. jurisdictions are often below posted prices.

Because of aggressive accounting practices, NB Power's reported net income figures exaggerate and distort the utility's actual profitability. The utility is doing much worse

financially than its accounts suggest. More objective accounting standards are required regarding the treatment of capital costs. Nuclear waste disposal and decommissioning costs should also be subject to more strict accounting measures.

Correcting the weakness in NB Power's accounts without restructuring the corporation would reveal that either rates must go up or the utility must recognize significant losses. The financial weakness of the utility may negatively influence the credit rating of the province. NB Power's accounts should be subject to ongoing, independent, and public review by the Public Utilities Board.

NB Power's weak financial condition leaves the corporation exposed to a number of significant risks-key among them is the risk of domestic and export sales failing to meet the forecast. The introduction of natural gas poses a competitive threat to the utility. The utility's high reliance on industrial sales and on residential space and water heating make the utility very vulnerable to load loss in the event that gas becomes available. NB Power's export market prospects are also subject to significant uncertainty over the longer term. Market conditions in New England are rapidly changing, and bulk power costs are dropping-primarily due to the utility reform process underway there. These competitive challenges could reduce NB Power's revenue due both to dropping volumes and prices. NB Power's business plans should include an assessment of the options available to meet the contingency of a declining volume of sales.

NB Power's capital spending during the 1990s-in excess of $2 billion so far-has been almost entirely wasted. This spending has increased the utility's debt by 70 percent while providing little corresponding benefit, thereby undermining its long-term financial viability. There is an urgent need for NB Power to immediately discontinue all debt-financed spending related to generation.

The utility's two most recent major generating investments were brought into service during a time of excess capacity. Even if they had been needed, the costs of these projects were far above their market value. The utility now has more than twice the amount of reserve generating capacity it requires. This excess capacity should be rationalized.

NB Power has the highest variable and semi-variable cost structure of the major Canadian utilities. One reason is excess coal costs. Domestic New Brunswick coal is more than 120 percent more costly than imported coal. There appears to be no economic justification for NB Coal to continue to operate since its operating costs exceed the market value of its output. NB Coal should be institutionally separated from NB Power. Except for the satisfaction of the terms of any existing contracts, NB Power should be relieved of any future commitment to buy NB Coal's product at any price above market price. NB Coal should be privatized. NB Power has the lowest labour efficiency of the four major comparable utilities in Canada. Payroll costs s u reduced by at least IO%.

The Point Lepreau nuclear station is demonstrating significant financial and operational problems. Key longer term issues that could negatively affect Point Lepreau's future are ongoing reactor aging and NB Power's reliance on AECL. Unlike many of NB Power's other business

activities where considerable cost savings appear possible, cost control in the utility's nuclear operation may be relatively difficult to achieve. NB Power lost approximately $40 million at Point Lepreau in 1995, counting only incremental costs and leaving aside historic capital costs including interest and depreciation. Reactor aging has already cut the station's production and, in light of Ontario Hydro's experience, is likely to continue to be a major problem. Based on Ontario Hydro's experience, the performance of Lepreau by the 20th year of operation should be expected to be approximately 60 percent capacity factor, dropping at a rate of 2 percentage points per year. NB Power should analyse and report on the risks and implications of nuclear production shortfalls. NB Power is highly dependent on AECL to provide technical assistance for the operation of Point Lepreau. This reliance exposes NB Power to the uncertainties over the future of AECL. Just as NB Power depends on AECL, AECL is reliant on generous funding from the federal government, but this funding is in jeopardy over the long term. NB Power, an indirect beneficiary of subsidies to AECL, may have to perform more work without the aid of AECL or pay more for AECL's services.

Utilities in other jurisdictions are pursuing a number of alternative routes to respond to problems similar to those NB Power faces. There is a world-side trend toward electric sector competition and utility privatization. Models that New Brunswick can learn from include the new and evolving systems in U.K. and Alberta. The recently released Macdonald report in Ontario provides another useful input.

The condition of NB Power is comparable in many respects with that of Ontario Hydro and in some cases worse. NB Power's interest coverage ratio is less than one-indicating that interest costs cannot be fully covered by cash flow but must be partly covered by new debt. Ontario Hydro has not suffered from the same shortfall in its interest coverage ratio. In some cases, Ontario Hydro is in much the same condition as NB Power. Both have expensive surpluses of generating capacity and major operational inefficiencies. Both utilities have high exposures to liability-ridden coal and nuclear investments, with nuclear operations proving to be increasingly difficult. Both enjoy significant government protection through franchises, tax-exempt status, and loan guarantees. Both have engaged in cost-cutting programs. In some respects, Ontario Hydro's condition is somewhat weaker than NB Power's. Ontario Hydro is facing a widespread revolt with customers actively seeking alternatives to Ontario Hydro's uncompetitive rates. Ontario Hydro is attempting to respond to this competitive pressure with an extensive program of discriminatory rates.

New Brunswick should embrace a competitive future and adopt a series of much more sweeping transition measures than those so far set out by the utility. Competition, not monopoly, is a proven way to successfully organize economic activity and make society flourish. Only through true competition can New Brunswick's power market gain the flexibility to respond to new technologies and new service opportunities, such as converging power services with information services. To the greatest extent possible, generation, transmission, or local distribution should be rationalized in processes that maximize the use of market forces to identify

efficient structures rather than relying on central planning solutions. NB Power should be structurally separated into separate corporate entities. Power generation and marketing, which are naturally competitive, should take place in an open, competitive market. Transmission, distribution and system dispatch should be separated structurally from competitive functions and subject to regulation. The purposes of privatization are to create the conditions to support competition, reduce conflicts of interest where government is both the regulator and the regulated, realize fair value for the public from publicly owned assets, and eliminate or contain liabilities against the public purse. Designing appropriate rate regulation instruments is a key task for the restructuring effort. The regulatory process in New Brunswick should be empowered to review all natural monopoly activities.

During the transition stakeholder interests must be dealt with fairly. The technical function of system control, called "dispatch", should be separated from NB Power's control and reconstituted as an independent, regulated entity with a mandate to promote open access to the system. A variety of options are available to deal with stranded costs. Privatization should proceed incrementally with a view to maximizing long-term value for the public of New Brunswick

Summary of Recommendations

Introduction

The New Brunswick Power Corporation (NB Power) is a provincial Crown corporation serving the electricity needs of New Brunswick. It produces electricity from a variety of sources, including hydroelectric stations, fossil-fired stations, and a single nuclear reactor at Point Lepreau. It is the centre of electricity trading in the Maritimes due to its location and electrical interconnections with neighbouring states and provinces; it actively trades power interprovincially and internationally with, and through, the State of Maine.

This study investigates and evaluates the financial and operational status of NB Power and its ability to serve the people of New Brunswick. The report examines the exposure of provincial taxpayers through the guarantee on NB Power's debt.

NB Power is in a financial and operational crisis. To understand the full dimension of the crisis, it is necessary to look at NB Power's rates, accounts, and costs together since not one of these alone describes the entire condition of the utility. The study attempts to identify the main risks NB Power is exposed to. Briefly summarized, the utility is found to be bearing excess debt, excess generating capacity, and unduly high operating costs. The utility's accounts are criticized as not accurately reflecting its actual financial condition. Rates to wholesale customers are identified as too high. Risks to the utility's future sales and nuclear production projections are also examined. The condition of NB Power is compared with that of Ontario Hydro, with both similarities and differences identified.

The study outlines and recommends options to respond to these problems. The principal themes of the proposals are competition and customer empowerment. The report advocates creating a market structure to facilitate open competition. Privatization of parts of NB Power is proposed as a mechanism to promote the conditions that will allow competition to flourish. The implications of privatization and competition are discussed, and a practical transition strategy is recommended.

The scope of this study is not limited to an examination of NB Power alone but also addresses other key aspects of New Brunswick's power system including the regulation of NB Power and the role of municipal utilities. An analysis of the utility's environment and public health record and a discussion of the reinforcements needed in this area, with or without institutional reform of NB Power, are beyond the scope of this paper.

Information for the study was obtained primarily from interviews, material published by NB Power (particularly annual reports and business plans), and other published materials as noted. Persistent attempts were made to obtain directly from the utility detailed and systematic information that is not available in published reports. The requested information was of the type that ought to be readily available to the management of any utility. The information would have allowed the report to address aspects of the utility's operations in greater detail. Appendix A contains the correspondence addressed to senior utility officials. Unfortunately, the utility

refused to answer these requests. The public of New Brunswick is ill-served by an attitude of secrecy on behalf of NB Power officials. Given that the utility is publicly owned, financed with taxpayer guaranteed securities, and recovers the vast bulk of its costs from captive provincial consumers, the public is entitled to a higher standard of access to information.

Recommendation:

1. New Brunswick's monopoly-based electricity system should be restructured to create an open, competitive system based on customer choice.

Chapter 1 **Rates and Competitiveness**

NB Power's rates reflect the quality of its past investments and its ongoing operational efficiency. Two separate perspectives from which to evaluate the utility's rates are those of the customer and the taxpayer. The fact that every customer is also a taxpayer does not obviate the fact that each citizen has two separate and distinct interests in the utility.

As discussed later, the utility's investment and operational performance tends to drive prevailing rates above economically efficient prices, thereby injuring customers. Rates tend to be too high because NB Power's costs are not properly controlled.

On the other hand, NB Power's aggressive accounting practices and its relief from the taxes and dividends it would bear if it was a normal private industrial enterprise injure the interests of taxpayers, although these practices have the tendency to drive rates down. Taxpayers are injured because current rates do not fully reflect its direct costs if those costs were properly accounted for, nor do rates reflect the opportunity costs of foregone taxes and dividends.

The approach that I have adopted here is to seek to maximize the interests of both customers and taxpayers by recommending measures that will promote economically efficient prices. Neither inflated costs nor artificially suppressed costs are in the public interest.

Given the monopoly-ridden nature of the electricity industry in most jurisdictions, it is difficult to discover the efficient value of power. This report analyses the competitiveness of NB Power's rates compared with those of competing jurisdictions and with market prices to the extent that market prices can be estimated or imputed. Since the clearest competitive benchmarks exist for prices to distribution utilities rather than prices for industrial or residential customers, this study focuses primarily on the first class of customers. Brief remarks on NB Power's assessment of its industrial electricity price competitiveness are also included.

NB **Power Rates for Saint John and Edmundston**

NB Power's wholesale electricity prices, for municipal utility customers in Saint John and Edmundston, currently appear to exceed the prices that an open, private market would charge.

One rough indicator of rate competitiveness is to compare NB Power's rates for captive and non-captive customers. Limitations with this method are that average power costs do not reflect the term of the supplier's commitment to the customer or other qualitative differences. However, the measure does provide a helpful indication of the difference between monopoly prices and prices reflecting a balance of supply and demand in a more market-like environment.

In fiscal 1995, NB Power's average wholesale price of power was 6.1 ¢/kWh. By comparison, the average price for power sold to neighbouring utilities customers not captive to

NB Power-was 4.3 ¢/kWh. By this comparative measure, wholesale customers within the province pay a 42 percent premium for being captive to NB Power.

Another, more direct method to measure competitiveness is to compare current prices with those offered in competitive bidding. Municipal utilities, if they are to serve the interests of their customers, should remain abreast of market developments and should constantly seek to minimize the cost of power that flows through to their customers.

During the summer of 1995, the municipal utility serving the City of Saint John, Civic Hydro, initiated a competitive bidding process to seek supply options. Civic Hydro purchases approximately 6.6 percent of NB Power's in-province sales.

Civic Hydro retained the firm of Weil and Howe of Augusta, Maine to advise them and to conduct the request for proposals (RFP) from prospective power suppliers. Weil and Howe is a well-recognized firm that has completed similar competitive bidding processes for U.S. municipal and industrial customers in a number of states in New England and elsewhere. One of the firm's prominent successes was the completion of a deal in 1994 whereby the town of Madison, Maine, switched from its traditional supplier, Central Maine Power, to an alternative, much lower cost supplier from out of the state. The Madison deal was the first of its kind in New England and was initiated by an RFP.

Soon after the RFP was announced, NB Power issued public statements suggesting that competitive power purchasing might be illegal or that NB Power might have the right to block an independent purchase. NB Power asserted publicly that it would block Civic Hydro from using its transmission lines.

Civic Hydro apparently conducted a legal investigation of its rights to purchase power independently. However, the municipal utility apparently did not comment publicly on the legal strength of its case for commercial freedom to procure the lowest cost electricity for its customers.

Some of the key legal questions in any such investigation relate to the applicability of U.S. laws to NB Power. The municipal utility should have considered remedies under a wide variety of laws. These would include: U.S. anti-trust law; the 1992 U.S. Energy Policy Act, which was a milestone in the transition toward electricity liberalization; U.S. Federal Energy Regulatory Commission rules, which require utilities to open their transmission systems; and the NAFTA treaty.[1] NB Power's extensive electricity trade in the U.S. might make the utility accountable under U.S. law and international treaties. Although the legal precedents permitting U.S.-based producers to sell directly to wholesale customers in Canada do not exist, such contracts may be legally enforceable.

[1] For a more complete discussion see, "The regulation of trade in electricity: A Canadian perspective" by Robert Howse and Gerald Heckman in "Ontario Hydro at the millennium: Has the monopoly's moment passed?" edited by Ronald J. Daniels (McGill-Queen's University Press, 1996).

For reasons that have not been publicly revealed, Civic Hydro's RFP for competitive power, which was about to be released in the late summer of 1995, was never sent out. Instead, it appears that the mere knowledge by NB Power of Civic Hydro's RFP caused negotiations. Civic Hydro signed a sole-supplier contract with NB Power for a period of I 0 years. The provisions of the deal provide for a very small reduction in rates to Civic Hydro relative to the rate increases imposed by NB Power on the rest of the province. Specifically, NB Power made a commitment to narrow the revenue-to-cost ratio for Civic Hydro from 1. 14 to 1.05 by the end of the year 2000.

Civic Hydro's failure to obtain the results of its R.FP before signing a long-term contract with NB Power was a failure to exercise due diligence and was a major mistake. Customers in Saint John lost the opportunity to potentially receive lower rates. All of New Brunswick lost an opportunity to establish a competitive benchmark against which to judge NB Power's rates. Civic Hydro acted as if the RFP was not initiated sincerely, but was simply a "stalking horse" strategy to bring NB Power to the bargaining table.

Although Civic Hydro gained a small rate reduction from its supplier, a utility spokesman was quoted saying that "Some rates may go up"[2] The decision by Civic Hydro to accept being locked into a I 0-year contract will reduce the utility's bargaining power during a time when the North American power market is widely anticipated to go through wholesale restructuring, vigorous competition, and general rate cuts.

As noted in Appendix B, during the preparation of this report an effort was made to review aspects of the Civic Hydro RFP and its deal with NB Power. The General Manager of Civic Hydro did not respond to the telephone and fax inquiries.

After completing its contact with Civic Hydro, NB Power instituted a new rate schedule specifically directed at Edmundston's municipal utility. Under this rate schedule, Edmundston is offered discounts if it signs an exclusive supply contract with NB Power for 1 0 years. Under the current rate schedule, in order to maintain its flexibility, Edmundston pays a 1.6 percent premium for monthly peak demand and an 8.2 percent premium for its first block of consumption.[3] Also under the short-term price option, Edmundston will receive a 13 percent rate reduction for usage above the previous year's consumption, but this benefit is unlikely to be realized given the slow rate of sales growth. In total, under the short-term price option, Edmundston is likely to pay a premium of approximately 5 percent to 7 percent.

Edmundston has so far not agreed to the lower cost but inflexible I 0-year option. It is not

[2] "NB Power losing $5 million to keep Civic Hydro happy", *Evening Times Globe*, 27 September 1996.

[3] The first block is based on the minimum monthly energy purchases that would have been required from NB Power during the previous year, assuming normalized generation from Edmundston's hydroelectric generating facilities.

in the interests of electricity consumers in Edmundston for their utility to delay its decision about its relationship with NB Power. It is possible that Edmundston is considering options other than remaining a captive of NB Power.

Recommendation:

2. NB Power's prices to municipal utilities appear to exceed market value. Edmundston's municipal utility should purchase power on terms most attractive for its customers-whether the supplier is NB Power or not. NB Power should refrain from anti-competitive interference in Edmundston's choice of supplier.

Industrial Power Prices

New Brunswick's posted industrial power rates are lower than those of its neighbouring utilities except for Hydro-Quebec but New Brunswickers, should be concerned about the upward trend in industrial rates and the competitiveness of industrial rates relative not to posted prices, but to the prices actually paid for power in other jurisdictions.

The Association of Major Power Consumers in Ontario (AMPCO) has prepared a study comparing standard published rates for the same conceptual large industrial customer located in each province except PEI.[4] Data from the study shows that for the period from 1989 to 1996, power costs rose the second fastest for New Brunswick (after Ontario). For the period from 1995 to 1996, power costs rose fastest in New Brunswick. Costs in New Brunswick were only surpassed by those in Ontario and Nova Scotia.

NIB Power's public statements exaggerate its industrial rate advantage relative to competing New England jurisdictions. The comparative rates quoted by NB Power, for example, in its published business plans, reflect posted rates rather than actual rates. Most major U.S. utilities now engage in rate negotiation with industrial customers. Posted rates are now actually price ceilings. Rate discounts are often in the order of IO percent to 3 0 percent below posted rates.[5] Unfortunately, actual power prices are very difficult to track. The lack of price transparency in the U.S. market place reflects the electricity industry's transition from monopoly

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[4] "1996 Large industry power costs", Association of Major Power Consumers in Ontario, 1996. The conceptual users required 20 MW monthly demand and 12,000 MWh/month at unity power factor served at the maximum service voltage available

[5] See for example, testimony of Maurice Brubaker, Brubaker and Associates Inc., St. Louis, Missouri, presented to the Ontario Energy Board, HR 24, 11 June 1996.

toward competition, with competition not yet fully established.

The three U.S. utilities that NB Power tracks are Public Service of New Hampshire, Boston Edison, and Central Maine Power. Each of these is infamous for their high costs, primarily due to failed nuclear investments and above-market power purchase agreements with non-utility generators. A more complete and useful rate comparison would include lower cost suppliers. For example, New England Electric Service's cost per kWh is the lowest of any major New England utility, by in most cases IO to 3 0 percent.

U.S. electricity prices in general and prices for industrial customers in particular are in decline. A recent study by Jersey City-based Regulatory Research Associates of posted power rates found that the average price per kWh to ultimate customers of investor-owned utilities in the U.S. have been declining in inflation-adjusted terms since 1984 with the pace of decline accelerating significantly in the last two years.[6] Prices in New England, which have historically been among the highest in the U.S., are among those falling fastest due to the advent of competition and ongoing utility restructuring there.

One example of the ongoing changes is the restructuring plans initiated by the Office of the Attorney General in Massachusetts, announced 12 September 1996. The plan would allow all Massachusetts residential and business consumers of the state's investor-owned utilities to choose their supplier of electricity on 1 January 1998; it would require all customers be given an option that guarantees a minimum of I 0 percent savings on their monthly bills; and it would create a national model for reducing air pollution from older power plants. While the exact savings resulting from competition cannot be predicted, a pilot program by a utility participating in the restructuring plan, Massachusetts Electric, has already resulted in savings of 14 percent. The Attorney General's plan would provide all consumers with a "Standard Offer" option that will guarantee a savings of at least IO percent off today's prices, even if they do not enter the competitive electricity market right away. On 30 September, New England Electric Service announced its intention to divest itself of all of its non-nuclear generating assets, in order to cut rates and encourage competition while ensuring recovery of historic costs.

Any rate advantage industry in New Brunswick may once have enjoyed is slipping away. Although the discounts are uncertain, it is certain that actual industrial electricity prices in competing U.S. jurisdictions are often below posted prices. In addition, there is clear evidence that prices are generally declining.

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[6] Regulatory Research Associates, Inc., "Utility Focus: Special Report", 23 May 1996

Chapter 2 **Aggressive Accounting and Weak Balance Sheet**

NB Power accounts have recently been subject to a very careful, professional examination by Professor Betts of the University of New Brunswick.[7] Professor Betts' report identified excessive fixed costs, particularly due to megaprojects, as a key financial issue. The report described NB Power's highly unusual four-year phase-in of the Belledune coal-fired station's capital costs as a "shallow accounting mask for the imminent financial crisis". The report drew attention to the utility's unduly levered 90 percent debt ratio. A key finding of the report is that NB Power's reported net income figures exaggerate and distort the utility's actual profitability. Based on more rigorously calculated net income figures, the report recalculated the utility's interest coverage ratio and finds it to be less than unity-indicating that interest costs cannot be fully covered by cash flow but must be partly covered by new debt. Ontario Hydro has not suffered from the same shortfall in its interest coverage ratio.

Professor Betts drew attention to the utility's highly unusual practice of capitalizing interest and depreciation costs on plants under planned and forced outages. This practice was used recently by the utility during the Dalhousie fuel conversion and the Point Lepreau rehabilitation outage last year. The practice of capitalizing interest and depreciation on plants under planned and forced outages increases the utility's leverage and artificially inflates reported short term net income.

Based on my own analysis of NB Power's accounts, there are only a few additions I can make to Professor Betts' 1995 report. One addition is a criticism of the utility's practice of maintaining almost $22 million in its construction-in-progress account pending a decision on construction of a potential second unit at Belledune. Given the gravity of the error in building the first unit of Belledune, all costs currently carried for future units should be promptly written off as an extraordinary expense.

A final addition would be to recommend more strict nuclear waste disposal decommissioning provisions policies. In 1985, the Environmental Assessment Panel inquiring into plans to build a sister station to Point Lepreau recommended tighter decommissioning provisions. The panel recommended that the annual decommissioning levy be scaled so that contributions are higher during the first years of operation.[8] Such a policy is justified by uncertainties in ultimate disposal costs and uncertainties over forecasts of future production of the nuclear facility. Instead, the utility recovers funds for waste fuel management on the basis of a conceptual charge on each unit of fuel consumed and recovers funds for plant decommissioning

[7] Norman M. Betts, "A layperson's guide to the impending financial crisis at New Brunswick Power", 22 August 1995.

[8] Environmental Assessment Panel-Lepreau 11, "Second Nuclear Reactor, Point Lepreau, New Brunswick: Report of the Environmental Assessment Panel", May 1985

on a conventional straight-line basis. Both of these practices should be redesigned to accelerate near-term fund accumulation. Accounting methods that might be appropriate for conventional facilities cannot necessarily be applied to nuclear facilities, given the higher degree of uncertainty. A further strengthening of nuclear accounting that is required is to transfer the accumulated funds from a deferred liability account to an actual funded provision maintained at arm's length from the utility. Ontario Hydro's board-appointed Taskforce on Sustainable Development made the same recommendation for Ontario Hydro in 1994.

Professor Betts' report examined NB Power's fundamental underlying revenue and cost trends and concluded that a rate increase in the order of 50 percent for residential customers may result. Ontario Hydro increased rates to its customers by slightly over 20 percent in inflation-adjusted terms during the early 1990s. The result was a significant drop in usage. Despite a rate freeze that came into effect in 1994 and also despite a large expansion of economic output in Ontario since the early 1990s, Ontario Hydro's electricity sales volumes have yet to recover to their 1989 peak level. The implication of the Ontario experience for Professor Betts' rate assessment is that a major rate shock in New Brunswick could cause sales volumes to decline significantly. Unless overhead costs were cut to match the declining volumes, rates would have to rise, perhaps triggering a further rate increase. Such a situation would be unstable and potentially disastrous for the utility.

The only major difference between Professor Betts' prescriptions and my own relate to the advisability of the guarantee fee now charged to NB Power and recovered by the provincial government. In fiscal 1995 the guarantee fee was approximately $21 million. Professor Betts drew attention to a 1994 finding of the Crown Corporations Committee that the guarantee fee may not be warranted. In my view, the value of the guarantee fee is two-fold: It makes the cost of capital to NB Power more like the cost of capital to an ordinary commercial firm, thereby making investment criteria more rigorous, and it provides the people of New Brunswick with some small compensation for the risk they are exposing themselves to in guaranteeing NB Power's debt. The government of B.C. implemented a strict net income and dividend policy on B.C. Hydro in 1989, analogous in concept to the debt guarantee fee. The net income and dividend policies contributed to a marked turnaround in B.C. Hydro's investment approach and operational efficiency. After being put under more commercial financial discipline, the utility abandoned megaproject construction plans and markedly enhanced its labour efficiency.

Professor Betts' assessment of NB Power's finances was confirmed in a study by Dominion Bond Rating Service (DBRS), released in February 1996, of public electric utilities in Canada.[9] The study comments:

> The greatest problem faced by utilities on the cost side is their high fixed costs caused by

[9] Dominion Bond Rating Service, "The public electric utilities in Canada: An emerging problem for provincial credit ratings", February 1996.

> having too much debt in their capital structure and having substantial new plant coming on line over a relatively short time period. It is for this reason that Ontario Hydro and New Brunswick Power have such high fixed costs (interest and depreciation)... . Most margins are near 0.400 per kWh, except New Brunswick which, because of high excess capacity and high cash costs, operates at a loss.

The DBRS study concludes with a warning that NB Power's financial weakness "may ultimately influence the Province of New Brunswick credit rating."

For all the criticisms that have been addressed to NB Powers accounts, a comparatively strong aspect of the utility's accounts is the service life estimate it uses for depreciating Point Lepreau. Rather than assuming a 40-year service life as Ontario Hydro does, NB Power uses a 3 1 -year period. Given uncertainties in the long-term production forecast for Point Lepreau and the developing worldwide experience with premature nuclear closure on economic grounds, the shorter depreciation period is appropriately risk averse and should be maintained.

NB Power's accounts provide an overly optimistic view of the utility's financial condition and must be reformed to provide objective information. Without objective financial information, the utility cannot be properly held to account by the public.

Recommendation:

3. NIB Power's accounts should be subject to ongoing, independent, and public review by the Public Utilities Board.

Chapter 3 **Risks in the Domestic and Export Sales Forecast**

NB Power's weak financial condition leaves the corporation exposed to a number of significant risks-key among them is the risk of domestic and export sales failing to meet the forecast. A reduction in the volume of domestic sales by one percent would reduce NB Power's forecast net income in the next two years by 16 to 21 percent.[10] Since 1989, forecasts of sales volumes two years in the future have overestimated actual sales by as much as seven percent.[11]

A full discussion of the ma or factors underlying NB Power's load forecast is beyond the scope of this report. Instead, this report addresses two key forecast uncertainties with a significant down side potential for the utility's finances: the availability of natural gas in New Brunswick and the risk of a shortfall in export revenues. The importance of these factors do not appear to be fully reflected in NB Power's forecasts.

NB Power is expecting a steady rise in sales within New Brunswick for the next 20 years at a rate of 1.3 percent to 1.5 percent.

A variety of proposals are currently under consideration which could provide energy users in New Brunswick with access to natural gas for the first time. The most promising of the available options appears to be Sable Island gas. Sable Island gas development is currently under consideration by a group including Mobil Oil, PanEnergy, and Westcoast Energy. The group's proposed pipeline route to carry the gas to other pipelines and developed gas markets in the U.S.-the proposed Maritimes & Northeastern Pipeline-is through Nova Scotia and southern New Brunswick. The group hopes to have the project in service by 1999. Another proposed route would carry the gas north through Quebec with lateral pipelines serving major southern load centres and is supported by Gaz M6tropolitain and TransCanada Pipeline Limited.[12] All large industrial loads along both pipeline routes are being evaluated for their market potential.[13] The National Energy Board will decide the pipeline's route following hearings in the fall of 1996.[14]

The U.S. gas market that backers of the Sable Island development hope to serve is very competitive and well supplied. To make their product attractive in the New England market, their production and pipeline costs will have to be very well controlled. The pressure of gas-on-gas

[10] NB Power, 1996-2001 Business Plan, p. 65.

[11] NB Power, 1996-2001 Business Plan, p. 42.

[12] "Chredtien, Bouchard Support Canadian Pipeline for Sable Gas", *Energy Analects, 24* June 1996.

[13] New Brunswick Natural Resources and Energy, Annual Report 1994-95, p. 68.

[14] "Pipeline proposal would raise gas prices", *Globe and Mail,* 29 August 1996.

competition in the U.S. would be very beneficial to Maritime gas users who would be upstream of those markets.

Although introduction of natural gas would be good for energy consumers in the Maritimes, it could be very damaging to NB Power's interest unless it could restrict the supply of gas to its customers and potential competitors. NB Power officials, focusing their attention narrowly on their own fuel options, have historically recognized the benefits that might accrue to the utility, should low cost gas become available in New Brunswick. However, NB Power officials appear not to have recognized the threat to the utility posed by gas.

Industrial use, the largest share of the ultimate market in New Brunswick, represents 42 percent of NB Power's electrical energy sales. Residential use, including residences served by municipal utilities, represents 38 percent of the market. Of the power consumed by residences, about two-thirds is used for space and water heating. The utility's high reliance on industrial sales and on residential space and water heating make the utility very vulnerable to load loss in the event that gas becomes available.

Since gas deregulation started to dramatically reduce gas costs in the mid 1980s and Ontario Hydro increased its rates in the early 1990s, Ontario Hydro has lost a considerable amount of sales to gas. Ontario Hydro has lost market share in heating end-uses in all customer classes. In addition, Ontario Hydro has lost additional sales to load displacement generation powered by gas. As noted previously, Ontario Hydro's electricity sales volumes have yet to recover to their 1989 peak level despite a large expansion of economic output in Ontario.

NB Power's export market prospects are also subject to significant uncertainty over the longer term, although in the very near term, its prospects look reasonably attractive. NB Power's export program benefits from current high power prices in New England. According to the New England Power Pool (NEPOOL), which helps coordinate inter-utility power exchanges and system reliability, export volumes from NB Power up until late August this calendar year are above those of last year at the same time. The main reasons were the return to operation of Point Lepreau after an extended outage last year and robust summer demand in southern New England due to outages at a number of key nuclear units.[15] For the duration of this year, nuclear problems in New England could continue to present short-term market opportunities for NB Power.

As noted in the early rates discussion, market conditions in New England are rapidly changing, and bulk power costs are dropping. In addition to the utility reform process underway there, new generating capacity is being committed, which will help reduce prices. For example, earlier this year, the firm U.S. Generating announced plans to build a major gas-fired facility at Charlton, Massachusetts with a view to benefitting from the opening market. The construction of a pipeline through Maine to carry Sable Island gas to other existing pipelines would doubly jeopardize NB Power's exports. Potential ultimate consumers of NB Power's product along the pipeline route could switch to gas. In addition, power utilities between NB Power and higher

[15] Bill Sheppardson, NEPOOL, personal communication, 27 August.

priced southern New England markets might suffer load loss themselves due to fuel switching and find themselves with further excess capacity-capacity that NB Power would have to compete against.

NB Power has already been the victim of changes in the New England market that have injured the utility's exports. After a period in the mid to late 1980s of rapid load growth, limited gas supply, and a perception of high cost alternative sources of supply, the market turned around. Starting in 1990, a deep recession in New England transformed the demand side of the market. On the supply side, completion of the Seabrook nuclear station, rapid independent power development, declining fuel prices, enhanced gas availability due to completion of the Iroquois gas pipeline from Ontario, and completion of Hydro-Qu6bec's DC line to New England all contributed to increased availability of alternatives and lower costs. As Professor Betts' report indicates, NB Power's export sales to the U.S. fell from 29 percent of total revenue in 1988 to 10 percent in 1995.[16]

Gordon Weil, a principal with the firm Weil and Howe of Augusta, Maine, has been a close observer of NB Power's export practices. He notes that historically NB Power was a good exporter. However, NB Power did not successfully change when the market changed. The utility failed to adapt to the new competitive market. NB now relies on sales of non-firm power and is not making new capacity sales. Whereas NB Power was once able to find customers for capacity sharing contracts for Point Lepreau, existing contracts expired in the early 1990s and have not been renewed. Successful at the time they were made, these types of contracts are no longer attractive to the market. Mr. Weil observes that NB Power does not develop attractive power packages for non-utility or utility customers in the U.S., but suggests that it should. He suggests that possible reasons NB Power has not adapted to the new market conditions include a desire not to offend fellow utilities by bypassing them to directly deal with customers, concerns that becoming a competitor for industrial and wholesale customers might strengthen the cause of U.S.-based suppliers seeking to make deals directly with users in New Brunswick, high operating costs, and transmission access difficulties in the U.S. "upstream" of major New England markets. Mr. Weil also suggests that the utility should be more responsive to larger in-province customers.[17]

[16] Betts, Op. Cit..

[17] Gordon Weil, personal communication, 26 September.

NB Power faces major competitive challenges in both the domestic and export markets. These competitive challenges could reduce its revenue due both to dropping volumes and prices.

Recommendation:

4. NB Power's business plans should include an assessment of the options available to meet the contingency of a declining volume of sales.

Chapter 4 **NB Power's Capital Program: Where Is the Value?**

NB Power's capital spending during the 1990s-which has so far spent in excess of $2 billion-has been almost entirely wasted. The utility's capital spending in the 1990s has increased its debt by 70 percent while providing little corresponding benefits, thereby undermining its long-term financial viability. There is an urgent need for NB Power to immediately discontinue all debt-financed spending related to generation.[18]

The utility's two most recent major generating investments were brought into service during a time of excess capacity. Even if they had been needed, the costs of these projects were far above their market value. The new 450 MW Belledune coal-fired station was completed in 1993 for $1 billion or over $2,200 per installed kilowatt of generating capacity. The 306 MW Dalhousie, originally a coal- and oil-fired station, was refitted to bum bitumen at a cost of $264 million, or over $860 per kilowatt. These plants compete for sales in markets where combined-cycle gas-fired generating units, with fuel costs that are often substantially lower than those of Belledune and Dalhousie, can be built at costs well below $700 per kilowatt.

There are signs that the utility's management understands the need to curtail its capital program. In the 1995-2000 Business Plan, NB Power anticipated capital program spending of $1 110 million to $119 million per year for the period 1997-2000 inclusive. In the 1996-2001 Business Plan, NB Power anticipates capital program spending of $85 million to $86 million per year for the period from 1997 to 2001 inclusive. However, it appears that most of the cost is attributable to ongoing maintenance and repair since this capital spending will acquire no new generating facilities. The public is at risk if NB Power is permitted to capitalize ongoing maintenance and repair programs. Capitalizing these costs allows the utility to finance its ongoing operations in the short term without increasing rates or directly reducing net income. The result is a loss of accountability and a danger that long-term liabilities will continue to expand unchecked.

Recommendation:

5. NB Power's capital spending should be eliminated. If it is not eliminated, it should be curtailed sharply, the practice of generation maintenance and repair capitalization eliminated, and the remaining capital spending subject to ongoing public review and regulation by the Public Utilities Board.

[18] Some transmission and distribution projects might continue to be appropriately capitalized, if found prudent by the Public Utilities Board.

A key indicator of capital efficiency in electric utilities is the amount of reserve capacity available. Reserve capacity provides a means of responding to generating or transmission facility outages or occasions when sales volume exceeds forecast, thereby enhancing reliability. However, the facilities that make up the reserve are expensive to maintain since they are generally not used to their potential. Prudent utilities therefore attempt to minimize reserve consistent with maintaining reliability.

The ratio of operable generating capacity to firm sales commitments is known as the reserve margin. Traditional fossil-reliant utilities usually require a reserve in the order of 18 percent in the short term basis and 20 percent in the longer term. Utilities with reliance on nuclear production should maintain higher levels of reserve than fossil-reliant utilities. The need for extra reserve reflects the greater risk of forced outages or unplanned extensions to outages at nuclear units relative to fossil units. Utilities like NB Power, which are strongly interconnected with neighbouring utilities, can share capacity reserves and reduce their costs.

NB Power has a very large amount of generating capacity relative to the size of its load. Importantly, NB Power's business plans do not include reserve margin calculations or forecasts. I estimate that in 1995 the reserve was in excess of 46 percent.[19] This very high reserve margin prevails despite old fossil-fired units at Courtenay Bay, Chatham, Moncton, and Grand Lake being mothballed or put into lay-up condition in 1993-94.

The presence of excess generating capacity in Nova Scotia and New England, as well as mothballed capacity in New Brunswick and in neighbouring jurisdictions, all support the view that reserve capacity is more than twice as high as necessary.

The first response to the costly excess reserve and excessive capital spending is to discontinue spending on capacity additions or programs to make new commitments for unneeded capacity, including unneeded non-utility generation capacity. Consistent with the need for greater accountability and more objective accounting practices, all maintenance or refit activities should be expensed and charged to current rates rather than capitalized. In addition, NB Power should be reducing its own capacity on the basis of cost, consistent with maintaining system reliability. In weighing reliability options, domestic generating capacity should be compared with more market-oriented methods of achieving security. Security can be advanced through interconnection agreements, interruptible sales agreements, implementation of demand-sensitive

[19] Calculated on the basis of the actual 1996 peak of 2826 MW (apparently including firm export sales but not unused interruptible commitments), current NB Power capacity of 4116 MW, and current non-utility generation capacity commitments of IO MW (with an additional 63 MW by 1998).

real-time prices, and agreements to buy displaced power from neighbouring or domestic power users with rights to firm capacity.

Recommendation:

6. NB Power's reserve capacity should be rationalized with a view to providing reliability at minimum cost.

Chapter 5 **Controlling Operating Costs**

In its February 1996 study of public electric utilities in Canada, the Dominion Bond Rating Service (DBRS) found that NB Power has the highest variable and semi-variable cost structure of the utilities studied. It found that NB Power's variable and semi-variable costs of fuel and labour are "so high at 3.23 cents per kWh that they exceed Hydro-Qu6bec's final sales prices to large industrial customers (about 2.75 cents per kWh).[20]

While the need to control operating costs has been a theme of virtually all of NB Power's official statements related to finance or rates for at least five years, there are some key operating cost inefficiencies that the utility appears unable to solve.

Domestic New Brunswick coal is vastly more expensive than imported coal. According to the utility's 1995-2000 Business Plan, the cost of domestic coal was anticipated to be 43 percent more than the cost of imported coal in 1995-96 without counting the fixed costs of NB Coal's operation. Adding the fixed costs of depreciation, interest, reclamation, and amortization to the price of domestically produced coal increases the cost by over one third.[21] I estimate the full cost of domestic coal in 1995 was more than 120 percent above the cost of imported coal. As noted in Appendix A, Brian Crowley of AIMS attempted to obtain directly from NB Power a comparison of the full cost of domestic and imported coal but was unable to obtain a response.

Despite the uncompetitiveness of NB Coal on an operating basis relative to imported coal, leaving aside the coal company's capital costs, NB Power has recently invested further in NB Coal. For example, a new dragline was added to the Coal Creek mine in 1992. According to NB Coal's fiscal 1995 audited financial statements, in fiscal 1994, $91,000 was invested, and in fiscal 1995, $374,000 was invested. NB Coal decided to cut back its production of coal from 450,000 tons per year to 300,000 tons per year starting in the spring of 1994.

There appears to be no economic justification for NB Coal to continue to operate since its operating costs exceed the market value of its output. NB Coal should be institutionally separated from NB Power. Except for the satisfaction of the terms of any existing contracts, NB Power should be relieved of any future commitment to buy NB Coal's product at any price above market price. NB Coal should be privatized. The object of its privatization should be to maximize value for its owners, the people of New Brunswick. Value may be maximized either by sale of the ongoing operation or sale of its component assets.

[20] Dominion Bond Rating Service, "The public electric utilities in Canada: An emerging problem for provincial credit ratings", February 1996.

[21] According to NB Coal's audited 1995 "Consolidated Statement of Income", the total cost of production in 1995 was $24.86 million, of which $8.86 million was due to depreciation, interest, reclamation, and amortization.

Recommendation:

7. NB Coal should be separated entirely from NB **Power. Except for satisfying the terms of existing contracts, NB Power should not purchase any coal at above market prices.** NB **Coal should be privatized.**

Another area where expenditure control has proven difficult is in the factors driving payroll costs. In 1994-95 the utility's payroll cost over $144 million. I estimate that the average compensation per employee at NB Power in that year was over $52, 700.[22] This figure includes regular, term, and casual labourers. As with coal costs, NB Power was requested to provide the precise figure but did not respond.

Despite a more than two-thirds reduction in capital program costs from a peak of about $540 million in 1993 to $150 million in 1995 due to the completion of a number of construction or refit projects, the number of employees only dropped from 3195 to 2848, or 12 percent. During the same period, Ontario Hydro reduced its number of employees by about one-third.

NB Power has the lowest labour efficiency of the four major vertically integrated utilities in Canada, reliant primarily on non-hydroelectric power sources, measured by the ratio of millions of dollars of sales per person.

Electric Utility Labour Productivity by Sales in 1993[23]

Utility	Revenue (millions)	Employees (person)	Ratio of Sales/Person
NB Power	**$903**	**3,027**	**0.30**
Nova Scotia Power Corp.	$738	2,213	0.33
Saskpower	$790	2,300	0.34
TransAlta Utilities	$1,388	2,736	*0.51*

[22] Calculated as labour cost/total work force, with the figures of $144 million/2730 workers as per page 28 of the 1996-2001 Business Plan.

[23] From "Electric Power in Canada 1993", by Natural Resources Canada, p. I 1. Note that the employment figures used are the sum of the permanent and temporary employees at year-end rather than the more accurate figure of full-time equivalents on an annualized average. Ontario Hydro, which is also primarily thennal-reliant was excluded from this table because the distribution function in Ontario is mostly performed by separate municipal entities.

NB Power's low labour efficiency may be related to the utility's tendency to perform a wide range of functions internally rather than relying on outside specialists. For example, the utility creates a number of high technology products internally, such as software for work planning and time keeping, which could be acquired outside the corporation.

The scope of options considered to control payroll costs appears to be unduly narrow. The 1996 Business Plan notes that costs for cutting and clearing trees and brush along NB Power lines, costs that are primarily labour related, is expected to double in the next five years. However, there is no indication that internal costs are being compared to the costs that would prevail in the event of contracting the work out.[24]

Recommendation:

8. NB Power's payroll costs should be reduced by at least 10%.

[24] NB Power, 1996-2001 Business Plan, p. 52.

Chapter 6 **Ongoing Operational and Financial Problems at Point Lepreau Nuclear Generating Station**

The 635 megawatt nuclear generating station at Point Lepreau went into operation in January 1983. The reactor, one of five CANDU 600s now operating worldwide, was designed by Atomic Energy of Canada Limited (AECL), a federal nuclear research and development agency. The reactor is demonstrating significant financial and operational problems. Key longer ten-n issues that could negatively affect Point Lepreau's future are ongoing reactor aging and NB Power's reliance on AECL. Unlike many of NB Power's other business activities where considerable cost savings appear possible, cost control in the utility's nuclear operation may be relatively difficult to achieve.

Point Lepreau had consistently been among the top IO power reactors over 150 MW in the world since its official start-up in 1983, rated in terms of annual electrical productivity-that is until 1995. After operating at an annual capacity factor (the ratio of actual production to theoretically perfect production assuming no outages) averaging over 90 percent, the reactor's capacity factor fell to just 29.2 percent.

Although the publicly available information is incomplete, it appears that NB Power lost a significant amount of money at Point Lepreau in 1995, counting only incremental costs and leaving aside historic capital costs including interest and depreciation. The Atomic Energy Control Board (AECB), the federal nuclear safety regulator, reports Point Lepreau's operating and maintenance budget for fiscal 1995-96-the fiscal year that included the major maintenance This cost translates outage discussed later-as approximately $62 million on a forecast basis.[25] into a cost to the utility of Point Lepreau's power of approximately 3.90lkVVh just to recover the operating costs in 1995 (the figure is not exact since the fiscal year is not equal to the calendar year). The marginal capital costs associated with the outage would add significantly to this figure. Adding fuel costs to this calculated running cost-a cost which averaged 1.5¢/kWh for 1993-1994 and 1994-1995[26] - results in a total incremental cost of 5.4¢/kWh, not including incremental capital. By comparison, during this same period, the marginal price charged to

[25] AECB, "AECB Staff Annual Assessment of the Point Lepreau Nuclear Generating Station for the year 1995", June 1996, BMD 96-104.

[26] Calculated as fuel cost/production which for 1993-1994 and 1994-1995 corresponded to $7.8 million/5.593 TWh and $9.0 million/5.704 TWh respectively, based on the "Statistical Over-view" tables in the 1994-1995 Annual Report. It is noteworthy that the cost of nuclear fuel calculated here is 3 to 5 times the nuclear fuel costs reported in Ontario Hydro's annual reports for the respective periods.

industrial customers was 3.83 ¢/kWh,[27] a cost that includes administration and delivery, in addition to generation. The total amount of the operating loss at Point Lepreau in 1995 was somewhat offset by the Point Lepreau participation agreement with Maritime Electric Corporation Ltd. of Prince Edward Island.

I estimate the operating loss NB Power sustained in running Point Lepreau in 1995 to exceed $40 million.

Recommendation:

9. NB **Power should provide a comprehensive report of the fixed costs, variable costs, and annual incremental capital costs specifically related to Point Lepreau in its annual reports.**

The loss NB Power sustained at Point Lepreau in 1995 raises the issue of the plant's long term viability. An operating loss can only be sustained in the short run if there is a credible prospect of future operating profits. As discussed later based on Ontario Hydro's experience, aging CANDU units have frequently failed to live up to profitability forecasts.

The indication that Point Lepreau's operating costs per unit of production exceed the marginal industrial power rate also raises a significant concern over the appropriateness of NB Power's power pricing practices. It is inefficient and injurious to the public interest for NB Power to price power at below its own variable costs. To do so results in unacceptable losses.

The causes underlying Point Lepreau's poor performance in 1995 may portend future events. From April to October of 1995, Point Lepreau underwent a planned outage to attempt to stop an aging process and design flaw in the reactor core. Pressure tubes in the reactor core, which contain the uranium fuel bundles and form part of the pressure boundary for the hot primary coolant, were sagging and contacting their surrounding calandria tubes. Spacer springs, designed to support the pressure tubes and prevent contact with the calandria tubes, were incorrectly located due to an error during the reactor's design and assembly. The process of correcting the problem, called Spacer Location And Repositioning (SLAR), required a robotic tool to visit suspected tubes, identify the location of the spacer outside the tube, and move the spacer by remote manipulation into the correct location.

In October 1995, following the six month SLAR shutdown, the reactor was restarted. After running briefly, plant workers noticed steam coming from a shaft seal on one of the primary heat transfer pumps and the reactor was shut down. Failure to remove a wooden pipe cover from Boiler No. 1, which was used during the maintenance work, allowed it to be sucked into a primary heat transfer pump. The pump shaft then broke. Soon after the accident, the utility estimated that the costs resulting from the delayed return to service would be $9 million to $10

[27] NB Power, 1996-2001 Business Plan, p. 35.

million per month. The outage lasted about IO weeks. The AECB staff now believes that as many as 30 wood screws may remain in the heat transport system although they also believe that the remaining debris should not jeopardize pressure tube integrity or safety.[28]

Human errors that might be described as concentration errors or quality of work deficiencies appear to be increasing at Point Lepreau. The AECB staff has found a sharp increase in failures to comply with licence conditions starting in 1992. In its annual safety report on Point Lepreau for 1995, the staff noted:

> "NB Power failed to comply with the terms of the Operating Licence we issued on 14 occasions in 1995. In addition, NB Power reported an unusually large number of events. None of the events themselves directly affected public safety. However, if this level of performance continues unchecked, it might result in increased risk from operation in the future. Human error was an important feature of these problems. NB Power had already introduced safety culture training for their staff, but they will need to undertake further work urgently to resolve the problems... . NB Power's level of compliance with Operating Licence conditions was not satisfactory during 1995. A feature of these failures to comply, and of other significant events, was human error.[29]

Several recent examples of human errors prove that the problem has not been resolved. In January this year, the reactor was briefly shut down to repair a problem with a condensate extraction pump. During the shutdown, a 12-tonne spill of radioactive heavy water into containment occurred when a heat transport auxiliary system was over pressurized as a result of a valving error[30]

In May, NB Power discovered that a number of utility and AECB staff had been unwittingly exposed to high doses of radiation. The exposure resulted from radiation escaping from the reactor through a port which was left uncovered. The port was supposed to be closed with a shield. However, the shield had been removed in July 1995 during the SLAR outage and had not been replaced. As a result, a beam of radiation was emitted through the port.

The October accident involving the tool being sucked into a primary coolant pump is an

[28] Atomic Energy Control Board, "Point Lepreau Nuclear Generating Station Renewal of Operating Licence", 23 July 1996, BMD 96-132.

[29] AECB, "AECB Staff Annual Assessment of the Point Lepreau Nuclear Generating Station for the year 1995", June 1996, BMD 96-104.

[30] Atomic Energy Control Board, "Significant Development Report No. 1996-2", February 2, 1996, BMD 96-3 8.

example of a maintenance-induced accident. Experience in Ontario indicates that reactor maintenance often inadvertently causes accidents, introduces design flaws or even accelerates aging.

An example where maintenance at one of Ontario Hydro's reactors has induced premature aging occurred at the Bruce reactor no. 2. In 1986, workers at Bruce reactor no. 2 working on one of its eight steam generators left a lead radiation shielding blanket inside a heat exchange component. After the reactor returned to service, the operating heat inside the generator caused the lead to melt and slump. The lead-contaminated boiler then experienced accelerated metallurgical aging due to an increase in the rate of stress corrosion cracking of the steam tubes. The AECB became concerned about the integrity of the tubes, which is critical to the overall safety of the reactor. The steam tubes are subject to the high pressure of the primary coolant, and failure of the tubes could lead to a loss-of-coolant accident-one of the main type of potential nuclear accidents. To return to service, the reactor would require steam generator replacement and other necessary repairs, including pressure tube replacement. In October 1995, after being in service for only 18 years, Ontario Hydro decided that the cost of these repairs would not be recoverable at the prevailing value of electricity. Ontario Hydro removed the reactor from service. Officially the unit is in "lay-up" condition and still under consideration for restart. However, plans for the necessary reinvestment have recently appeared to have faltered.[31] It now appears likely that Bruce reactor no. 2 will never restart.

One of the explanations for the phenomenon of causing problems with reactors while trying to fix their problems is their profound complexity.

In Ontario, reactor performance has failed to meet the utility's expectations every year since 1983, often by very large margins. In 1990, for example, actual production fell short of the 4 year ahead forecast by 50%. Some of the reasons for the nuclear production shortfall in Ontario are not directly applicable to Point Lepreau. However, though often overlooked, and sometimes denied, by utilities, a factor that appears to have caused deteriorating performance in CANDU units is reactor aging. The effect of aging on Point Lepreau should be examined carefully.

Nuclear capacity factor regression analysis can be used to quantitatively examine the effects of aging on reactor performance. The purpose of the analysis is to attempt to filter out factors that diminish performance that are not age related, thereby isolating aging itself. The analytical task is difficult. Factors causing diminished performance are themselves often caused by complex factors that often include an age dimension. Data sets are limited due to limited long-term experience with reactor operations. The operating history of reactors often reflects varying levels of maintenance activity, thereby introducing time series problems in data.

The most recent and thorough published regression analysis of CANDU performance

[31] "Hydro puts off Bruce retubing as hope for Pu (plutonium) mission fades", *Nucleonics Week, 15* August 1996.

factors is a 1992 study by Charles Komanoff.[32] Focusing only on Ontario Hydro's reactors, he identified a quadratic relationship between age and performance. The identified trend suggests that reactor performance measured in terms of capacity factor should be expected to peak the eighth year of operation and then begin declining at an increasing rate each year. Performance by the 20th year of operation should be expected to be approximately 60 percent capacity factor, dropping at a rate of 2 percentage points per year.

Application of regression analysis for forecasting CANDU performance has been controversial in Ontario. Despite objections from Ontario Hydro, the approach has gained recognition. The Ontario Energy Board has recommended that Ontario Hydro develop regression models. The Ontario Ministry of Energy Nuclear Power Advisor, Peter Fraser, published a report on CANDU performance recommending the approach.[33]

While it is difficult to apply the specific output of the regression analysis performed on Ontario Hydro's reactor to forecasts of Point Lepreau's future output, the general observation of a negative effect of age on performance should be recognized. The design of Point Lepreau is very similar to that of Ontario Hydro's reactors. Several of Ontario Hydro's reactors, including older reactors that are now performing very poorly, have had operating histories during their early years that match closely Point Lepreau's performance so far.

The phenomena of aging and repairs introducing new problems are two reasons that Ontario Hydro's reactors have generally performed poorly following major investments. Following the renovation of the reactor cores of the four reactors at Pickering A, at a direct cost in excess of $1 billion in 1989 dollars, the reactors have had capacity factor of less than 70 percent, although they were forecast by Ontario Hydro to produce at 80 percent.

One implication of Ontario Hydro's difficult experience with reactor repairs is that repair costs and future production delays are very difficult to forecast. Another implication is that the major repair investment should be scrutinized very carefully with a clear recognition of the risks and uncertainties that cloud the future return of those investments.

One of the age-related technical problems that Ontario Hydro has suffered is degradation in the performance of its steam generators-a technical problem that has now appeared at Point Lepreau. Although Point Lepreau's steam generators have generally performed well so far there are now indications of aging. According to an AECB staff report related to the station's licence renewal, a small amount of radioactive heavy water was escaping from the primary heat transport

[32] "Performance reliability of Ontario Hydro CANDU plants: What should be expected in ftiture?", by Charles Komanoff, Komanoff Energy Associates, (New York: 1992). This study was commissioned by a coalition of environmental organizations and submitted to the Ontario Environmental Assessment Board hearing into Ontario Hydro's 25 year "Demand/Supply Plan".

[33] "Reliability of CANDU nuclear generation in Ontario Hydr6's Demand/Supply Plan", Peter Fraser, Ontario Ministry of Energy, 8 March 1991.

system through a leak in one of the steam generators.[34] The utility first announced discovery of the boiler tube leak in April 1996. On 5 September, NB Power reported that another tube leak had been detected in one of the Point Lepreau Generating Station's four boilers. The station was returning to service on 20 September. However, on 30 September, a further steam generator problem indicated by safety system detectors caused another shutdown. At the time of shutdown, the utility estimated that Point Lepreau will remain shut down for a further two weeks in order to carry out an inspection of the problem steam generator. NB Power's long-term plan for addressing the problem of steam generator aging is to use chemical cleaning and pressurized spray cleaning to remove scale deposits implicated in metallurgical degradation.

Given the Ontario Hydro experience with CANDU units failing to produce up to expectations and also given NB Power's reliance on Point Lepreau for about 30 percent of its total electricity production, the utility should be analysing the risks of production shortfalls. Ontario Hydro's business plans routinely discuss the risks of nuclear production shortfalls. NB Power's 1996 business plan, in its review of business risks to the corporation, does not mention that nuclear production shortfall is a risk. This shortcoming should be remedied in future business plans.

NB Power's Reliance on AECL

NB Power is highly dependent on AECL to provide technical assistance for the operation of Point Lepreau. This reliance exposes NB Power to the uncertainties over the future of AECL.

Just as NB Power depends on AECL, AECL is reliant on generous fimding from the federal government. That funding is now under sustained attack. The Standing Committee of Environment and Sustainable Development of the federal parliament, in its recommendations for the 1996 budget, recommended a radical reduction in AECL funding.

> Recommendation 5: That the federal government announce in the 1996 budget that it will terminate its involvement in the CANDU Owners Group agreement as of 31 March 1996, thereby significantly reducing its contribution in support of commercial application of nuclear power. At a minimum, the federal government should discontinue support for commercial nuclear research by the end of the 1997-98 fiscal year.[35]

[34] Atomic Energy Control Board, "Point Lepreau Nuclear Generating Station Renewal of Operating Licence", 23 July 1996, BMD 96-132.

[35] Report of the Standing Committee on Environment and Sustainable Development, "Keeping a promise: Towards a sustainable budget", December 1995, p. 12.

The environmental community attacked AECL funding in the lead-up to this year's federal budget. In a report released in February, sponsored by the Campaign for Nuclear Phaseout, authors David Martin and David Argue concluded, after examining the fimding history of AECL:

> Despite recurrent promises that the nuclear industry will become profitable through domestic and export reactor sales, it continues to be a drain on the public purse. After more than 40 years of consistent financial failure, it is safe to presume that this trend has become destiny-a turn around should not be expected.[36]

The March 1996 federal budget cut AECL's funding from $172.494 million in the federal govenu-nent's 1995 -96 fiscal year to $ 1 00 million in 1997-98.

After the budget, another study was released favouring an end to AECL's government funding for CANDU development. The study by University of Lethbridge Management Studies Dean, George Lermer, analysed the economics of federal investment in nuclear power. Professor Lermer calculated that the present value of the federal investment in CANDU to be $56.5 billion, or more than I 0 percent of the current federal debt. Professor Lerrner concludes, after comparing the benefits and the costs of the investment, that "the federal expenditure on CANDU has been a financial disaster." Professor Lermer also notes that, "The CANDU project should have been declared a commercial failure and wound up at least two decades ago, even before Ontario Hydro's difficulties with the CANDU surfaced.[37]

Given previous cutbacks, continuing federal government restraint, and criticism of the past spending on AECL, it appears likely that subsidies to AECL in the longer term may be further reduced. NB Power, an indirect beneficiary of subsidies to AECL, may have to perform more work without the aid of AECL or pay more for AECL's services. NB Power's 1996-2001 Business Plan indicated an intention to achieve "reduced dependence on consultants", perhaps reflecting these concerns.

[36] "Nuclear sunset: The economic costs of the Canadian nuclear industry", February 1996 by David Martin and David Argue.

[37] George Lermer, "The dismal economics of CANDU", *Policy Options*, April 1996.

Chapter 7 Models for Institutional Reform of New Brunswick's Electricity System

Utilities in other jurisdictions are pursuing a number of alternative routes to respond to problems similar to those NB Power faces.

The conventional responses at Canadian Crown power utilities in similar condition, such as 0 o Hydro and Saskpower, are rate rebalancing to s costs to residential customers, rate discrimination to mollify selected industrial customers, internal restructuring, and a push for strengthened monopoly powers or regulatory reforms to reduce competitive pressures. The end result of these changes-typically better static efficiency but no improvement in dynamic efficiency-is unattractive as a long-term solution.

NB Power's recent public statements regarding its "rebuilding" program are consistent with the approaches adopted by Ontario Hydro and Saskpower. After studying several deregulation models, New Brunswick Power announced this summer that it will "rebuild" the utility to prepare for a competitive marketplace. The utility will be restructured into four separate business units: Generation; Wires (transmission/distribution); Marketing; and Services (human resources, administration, engineering and finance and information systems). The new business unit structure will be in place by April 1997.

In the last five years, NB Power has attempted to manage its operations on the model of private sector corporations but, in the opinion of the utility itself, more aggressive changes are needed to move to a more market-driven culture. New president and CEO, James Hankinson, has been appointed, apparently with the purpose of assisting in this transition. In recent public comments Mr. Hankinson has indicated his belief that NB Power is in "pretty good shape" while expressing support for the utility's official assertion that it is "not ready to be sold at this time."

An alternative solution to the inwardly focused effort of NB Power, an alternative which offers the prospect of better long-term efficiency, is separation of the utility into its component parts, full or partial privatization of those components, and the introduction of competition in the production and sale of electricity. Privatization and competition models have been advanced in the U.K., Norway, New Zealand, Argentina, Chile, Victoria (Australia), and elsewhere. A variety of models are proposed for Ontario. A brief overview is provided here of the U.K. experience with privatization and competition, the leading proposal for reform in Ontario, and the Alberta experience with the introduction of competition.

U.K. Model

Since breakup and privatization of the U.K.'s electricity monopoly in 1989, the new competition-oriented system is producing excellent results. Rates are down for all customer

groups. Rate relief has not been at the expense of power company balance sheets. Rather, the privatized companies are financially healthy, having made successful transitions to private enterprises. Customer choice in supply is becoming a reality. Labour efficiency has improved dramatically.[38]

The U.K. experience shows that competition and privatization can lower rates for all customers. Homeowners so far have enjoyed more rate relief than the largest industrial consumers. The biggest winners have been medium-size institutional and business users whose rates have dropped 17 percent.

Table 1: Estimate of Electricity Price Changes in the U.K.

from 1989-90 (the beginning of competition) to 1995[39]

Market Segment	Real Price Change
Domestic	-10.1
Small Sites	-11.7
Medium Sites	-17.0
Moderately Large Sites	-16.3
Extra Large Sites	-6.4

While customers are seeing their electricity rates go down, service quality has improved. Utilities that miss appointments, for example, pay the inconvenienced customer E20 (about 43). Customers behind in their payments-once subjected to disconnection-now have a variety of new payment options. As a result, disconnections for nonpayment are down by more than 98 percent in the new profit-oriented system.

Independent power generating companies, who in 1990 had virtually no market share, have already grabbed I 1 percent of the electricity production market, with many additional independent plants now under construction.

[38] David Newbery, "Power Markets and Market Power," in the *Energy Journal* vol. 16, no. 3, pp. 39-66, 1995.

[39] Professor Stephen Littlechild, Director General of Electricity Supply, Office of Electricity Regulation, "The development of the regulatory system in the U.K.," presentation to the Adam Smith Institute conference on the future of utilities, 12-13 December 1995.

Some customers now have the option of choosing their supplier, and many have. Distribution utilities, which retail power to customers, are seeing their market shares for sales of electricity plunge. In 1989, the state-owned distribution utilities commanded I 00 percent of the market for local power sales. In 1995, the privatized, franchised distributors saw their market share fall to 37 percent as customers with the right to shop for power found more attractive suppliers. In 1998, all customers will be empowered to shop for power.

Power pricing innovations developed in the U.K. power pool, have been developed to allow competition-based price discovery to function in the power industry. In the U.K., bidding from competing generators determines price. The raw power price is the sum of the marginal bid price plus the short-run scarcity value of generating capacity if there is a risk of shortage. Fluctuations in price reflect the changing balance between demand and supply. Price changes over short periods help to balance supply and demand. Price changes over longer periods help guide electricity producer decisions about investment in new supply and consumer decisions about how they will use electricity.

This summer, a large portion of the goveniment-owned nuclear generating system was successfully privatized. One of the express purposes of the nuclear privatization was to reduce the public's exposure to financial risks.

Blueprint for Electricity Competition in Ontario: The Macdonald Committee Report

This May, a government-appointed review group called the Advisory Committee on Competition in Ontario's Electricity System, headed by former federal minister of Energy, Mines and Resources, Donald Macdonald, produced its report. The Macdonald committee proposed sweeping competitive restructuring and partial privatization of Ontario's electricity system.

Ontario Hydro is in much the same condition as NB Power. Both have expensive surpluses of generating capacity and major operational inefficiencies. Both have high exposures to liability-ridden coal and nuclear investments, with nuclear operations proving to be increasingly difficult. Both enjoy significant government protection through franchises, tax-exempt status, and loan guarantees. Both have engaged in cost-cutting programs. In some respects, Ontario Hydro's condition is somewhat weaker than NB Power's. Ontario Hydro is facing a widespread revolt with customers actively seeking alternatives to Ontario Hydro's uncompetitive rates. Ontario Hydro is attempting to respond to this competitive pressure with an extensive program of discriminatory rates.

The Macdonald committee report is grounded on a basic respect for the judgement of consumers and a confidence in the benefits of an open, competitive power system. The vision is of the status quo giving way to a structurally unbundled power system. The committee urged separating the interests of power producers, the long-distance and high-voltage transmission

function, the local distribution function, the system dispatch function (or independent system operator), and the exchange function. The naturally competitive parts of the industry-power production and marketing-would be opened to competition. In order to make competition effective, the report proposed a variety of measures to level the playing field, eliminating the inefficient bias favouring public over private enterprise. The natural monopoly aspects of the industry-transmission, distribution, dispatch, and exchange-would remain regulated. The report discusses the principles that should guide regulation, particularly giving regulators a mandate to support the development of competition, and the need to employ incentives to ensure the good performance of regulated enterprises.

The report also reflected the committee's commitment to social responsibility. The report specifically noted the need to deal fairly with the past grievances of aboriginal communities and to respect treaty rights. The report also emphasized the need for tougher envirom-nental rules.

The public in Ontario appears to have a number of concerns about market reforms of Ontario Hydro. These concerns arise in part out of aggressive propaganda campaigns from Ontario Hydro's self-serving unions. However, the Macdonald report's reaction to the public's concerns was respectful and responsive. The report not only captured the economic concepts and social responsibilities, it also reflected the delicate balance of political realities. For example, the privatization recommendations focus only on about one-third of Ontario Hydro's generating capacity, leaving out the nuclear stations and Niagara Falls. The report also recommended a mechanism to continue subsidization of rural electricity rates in the new system.

Albertals Electricity Market Reform[40]

Starting 1 January this year, an open electricity market started operating in Alberta. Alberta has embarked on a deliberate effort to implement competitive market principles in its electricity market. The reforms, which are radical in the Canadian context, are consistent with developments in the U.K., Chile, New Zealand, parts of Australia, Argentina, and elsewhere. The Electric Utilities Act[41] enshrines the principles of the power system. Implementation of the principles is largely the responsibility of an independent regulatory process.

Alberta's electricity needs have traditionally been met by a group of franchised, investor-owned utilities, TransAlta and Alberta Power, and publicly-owned utilities, the largest of which is Edmonton Power. In recent years but prior to liberalization, independent power producers

[40] This section draws upon a study by Leigh Hancher, "Alberta's new competitive electricity system", published in the newsletter of the Canadian Institute of Resources Law, No. 55 Summer 1996.

[41] S.A. 1995, **c.** E-5.5.

expanded their market share under contract to utilities to a point where they now generate about IO percent of the province's power. Since liberalization, an expanding group of power marketers has appeared, seeking to market electricity within and outside the province.

The declared purpose of Alberta's reforms was to preserve the "Alberta Advantage" of competitive electricity prices-among the lowest in Canada-and to establish a mechanism that will continue to guarantee equalized prices across the province (as has been the case since 1982).

Market transition in Alberta was assisted by extensive consultation with stakeholders through the regulatory process and through an advisory committee representing the utilities, consumer groups, independent power producers, and environmental groups. The advisory committee, in particular, was involved in an intensive two-year consultation process and is credited by Hancher as having helped eliminate most of the initial opposition to the governments plans.

Alberta's new structure is based on three principles: service and rate unbundling, an open, competitive power pool, and open, non-discriminatory access to the transmission system. Existing utility companies have been required to create separate accounts for generation, transmission and distribution. This separation is regulated by the Energy and Utilities Board (EUB).

All high voltage transmission assets are managed collectively at a technical level, although fair and reasonable cost recovery for the owners is guaranteed through the EUB. Electricity producers bid to supply their product to a power pool which accepts bids in order of cost from lowest to highest to an amount sufficient to meet customer requirements. Power customers provide corresponding offers to buy. Should the availability of supply not be sufficient to meet requested demand, consumption is curtailed in reverse order, with those bidding least for service cut off first.

Existing power utilities are guaranteed cost recovery for their generating facilities through regulatory intervention. Interestingly, in its first nine months of operation, pool prices were generally lower than regulated prices and also lower than forecast. The full (regulated) cost of existing generation ranges from 2.4¢/kWh for TransAlta to 3.2¢/kWh for Alberta Power and 4.5¢/kWh for Edmonton Power. By comparision, the average monthly pool price ranged from a high of 1.46¢/kWh in January, to a low of 0.926 ¢/kWh in May. Peak prices have occasionally been over 5.0¢/kWh and off peak prices have occasionally been below 0.5¢/kWh-a difference The low average and off-peak pool price levels are partly explained by of more than 10 times.[42] the fact that high water levels in British Columbia are allowing B.C. Hydro to bid in large amounts of hydroelectric-generated power at low prices, thus displacing more expensive gasfired units within Alberta. Another explanation is existing surplus capacity in Alberta.

So far, Alberta's electricity market reforms have not involved privatization. However,

[42] These prices can be observed directly on the Internet at the homepage of the Alberta Power Pool at http://www.powerpool.ab.ca/.

publicly-owned utilities are prohibited from using their tax exempt status, loan guarantees, exemption from having to produce dividends, and other special privileges for competitive advantage. This concern is not particularly acute in Alberta since investor-owned utilities currently enjoy a major cost advantage over the main publicly-owned utility, despite having to recover their own full debt costs and taxes.

There are some recognized deficiencies in the Alberta market. One major issue is how to deal with market power of the existing generators. Independent power producers have expressed concern about the potential of existing producers to hold pool prices down. A well-recognized shortcoming of the U.K. pool in its early years was the excess market power of a few generators, although there the main concern has been about the ability of producers to force the price up. In Alberta, as distinct from the U.K., pricing strategies of incumbent generators may keep independent producers out of the market but such strategies will not disadvantage the utilities as long as they are covered by regulated cost recovery for the capital costs of existing stations. With regulated capital cost recovery in place, consumers are unable to directly benefit from this strategy.

Although the power system remains under the close regulatory scrutiny of the EUB, the Board's power is restricted to a traditional cost-of-service approach. The Board's ability to deal with market power in the pool is unclear. Once units are taken out of regulated service, generators will no longer fall directly under the EUB's jurisdiction. The generators will, however, remain subject to the federal Competition Act, which regulates collusive behaviour and abuse of monopoly positions.

The independence of the current transmission system administrator - currently TransAlta- may also be questioned. The government has announced that it will put this role out to tender at the end of the year.

Some independent producers have complained that Alberta's power pool does not allow Canadian buyers to enter into bilateral transactions and requires sellers to Canadian markets to deal only with the pool. They have also complained that the transmission grid company's proposed tie line charge to companies outside Alberta transacting with the pool, which would be based on the differential between power supply costs at receipt and delivery costs, may be excessive and designed to discourage power exports from Alberta. However, Alberta's restructured power industry applies the same rates, terms and conditions to all potential users of the transmission system, and allows all producers with access to the Alberta transmission system to reach markets in B.C. and the U.S. There is no Alberta-based limitation on the ability of sellers in B.C. and the U.S. to use the Alberta pool and transmission grid to reach potential Canadian markets.

Chapter 8 Objectives and Principles for Electricity Reform in New Brunswick

New Brunswick should embrace a competitive future and adopt a series of much more sweeping transition measures than those so far set out by the utility. The main purpose of electricity reform is to create a system that can produce economically efficient prices to guide both consumers and producers in making decisions related to their energy needs.

Electricity reform should be designed to create benefits that are sustainable over the long term. New Brunswick should seek a decentralized, rationalized, and appropriately regulated power system that can increase the province's competitiveness and improve the efficiency of energy production and use. All customers need the right to buy power from the producer of their choice. This choice must not be fettered by unnatural constraints or distorted by subsidies. The benefits of competition must be available to all on a non-discriminatory basis.

Competition, not monopoly, is a proven way to successfully organize economic activity and make society flourish. Only through true competition can New Brunswick's power market gain the flexibility to respond to new technologies and new service opportunities, such as converging power services with information services.

Production has no other purpose than consumption. The historic tendency to use policy in aid of the interests of power producers is inappropriate. Electricity market reform should be directed to serve the interests of consumers, taxpayers, and society at large rather than narrowly focused on benefitting producers.

The electricity market should be structurally separated into its constituent parts. Power generation and marketing, which are naturally competitive, should take place in an open, competitive market. Transmission, distribution and system dispatch, which are in part natural monopolies, should be separated structurally from competitive functions and subject to regulation. Private ownership of the entire power industry should be maximized, perhaps with the exception of Point Lepreau. To the greatest extent possible, generation, transmission, or local distribution should be rationalized in processes that maximize the use of market forces to identify efficient structures rather than relying on central planning solutions.

Recommendation:

10. **NB Power should be structurally separated into separate corporate entities. Power generation and marketing, which are naturally competitive, should take place in an open, competitive market. Transmission, distribution and system dispatch should be separated structurally from competitive functions and subject to regulation.**

The purposes of privatization are to create the conditions to support competition, reduce conflicts of interest where government is both the regulator and the regulated, realize fair value for the public from publicly owned assets, and eliminate or contain liabilities against the public purse. One of the ways to realize benefits for the public is through future taxation of the electricity sector, a sector which currently produces a tiny fraction of the tax revenue that it would produce if it were in private hands. Privatization should provide an opportunity for government to realize tax gains in the future.

The history of the Canadian power industry demonstrates repeatedly that politically determined investments and pricing are inefficient. A major objective of privatization ought to be to separate politics from electrical power. Political accountability has generally proven to be a poor or counterproductive solution for the problems in the power sector.

Recommendation:

11. Most of NB Power's constituents components should be privatized.

Designing appropriate rate regulation instruments is a key task for the restructuring effort. Transmission, distribution and dispatch, which are all natural monopoly functions, must be regulated. Regulatory reform must parallel institutional reform of NB Power. The current means of regulating NB Power, which deregulates annual rate increases below three percent along with debt accumulation, capital expenditures, and accounting practices, is likely to be ineffective at protecting the public interest over the long term.

Future decisions on capital spending in New Brunswick's electricity system should not be made without the discipline of competition and private investors (or public regulation in the case of decisions on capital spending for natural monopolies). In 1994-95, NB Power invested $162 million in fixed assets without any organized public scrutiny of any kind.[43] Given the utility's recent history, there is a very high likelihood that today's capital spending is being wasted.

Competition and privatization should be phased in as quickly as possible without jeopardizing reliability during the transition. Delays in implementing competition and privatization mean delays in realizing the benefits - economically efficient prices, fairness in rates, rationalized investments, and more independent regulation.

Recommendation:

12. The regulatory process in New Brunswick should be empowered to review all natural monopoly activities.

[43] NB Power, 1994-1995 Annual Report, p. 26.

Chapter 9 **Making the Transition to Retail Competition**

New Brunswick should pursue open retail competition. The practicalities of making the move to competition give rise to a host of policy and technical issues. Some of the non-technical policy issues are of key importance. Stakeholder interests must be dealt with fairly. All New Brunswickers should benefit from the change. Current employees are key stakeholders who deserve special attention to ensure fair treatment and an opportunity to participate in the transformation. Employee buy-outs and other forms of equity participation by employees should be encouraged.

The natural environment and public health must not suffer, nor appear to suffer, as the result of open retail competition. Discussion of the measures necessary to provide this protection are beyond the scope of this paper.

In dealing with technical issues created by the transition to competition, New Brunswick is in a position to benefit from the experience and wisdom of others. Extensive expertise is available from economists and engineers who have developed market-oriented power systems in other parts of the world capable of accommodating competition while achieving both efficiency and reliability.

Reliability and power quality are among the key priorities of consumers. Any move toward competition must ensure that these areas of performance are not compromised. On a grid that connects all producers and consumers, power flows instantaneously according to physical laws. Every action of each participant directly and immediately affects every other participant. Production and consumption must be balanced continuously and almost instantaneously. This balancing must be done, not just for the system as a whole, but also with regard to its spatial configuration. Complex physical restraints on power flows, such as grid congestion, must be managed. A further consideration is that while an accounting system can track production, consumption, and line losses, individual kilowatt-hours are indistinguishable and cannot be tracked in any physical sense.

Power sector competition can be developed to accommodate the special demands of modem, integrated power systems. Power systems in Alberta, the U.K., Norway, Victoria (Australia), Chile, and Argentina are working examples of how competition can be designed to achieve reliability and efficiency. There are a number of main themes that characterize successful market systems for power around the world which New Brunswick should incorporate. As discussed above, it is necessary to structurally separate transmission, distribution, generation/marketing, and dispatch. All functions that are not natural monopolies should be opened up to market forces. Efficient direct purchase for all customers should be facilitated through spot market pricing and payment settlement through a power exchange. As the Macdonald committee recommended for Ontario, New Brunswick should establish an Independent System Operator (ISO). The California Public Utilities Commission, in its 20

December 1995 decision, has also embraced the concept of an ISO, assigning it the duty to manage reliability and power quality within allowable engineering parameters in a market environment. The role of the ISO could be expanded beyond maintaining system reliability, providing comparable open access, and coordinating with neighbouring utilities to include facilitating efficient bilateral trading and operating the physical spot market. The ISO must be subject to regulatory oversight.

Recommendation:

13. The system dispatch function or ISO should be separated from NB Power's control and reconstituted as an independent, regulated entity with a mandate to promote open access to the system.

An uncoordinated profusion of simple bilateral "retail wheeling" arrangements between individual producers and consumers is unfortunately impractical. Such an uncoordinated market could lead to a technological collapse of the transmission system.

Fair competition requires that all sellers, and all buyers, must have equal rights. All direct and indirect power sellers must ultimately gain equal rights of access to individual consumers with no special advantage for particular vendors. All sellers must have equal opportunity to obtain information about conditions in the power market and about individual consumers. In addition, all power vendors must have access to transmission and distribution services on a nondiscriminatory basis. Most importantly, consumers must have the right to choose among power vendors without compulsion.

While all customers must have the right to choose their supplier, all customers must also have the right to continue to purchase reliable, efficiently priced power as conveniently and effortlessly as at present. Methods must be found to ensure that the consumers who do not wish to shop for power are able to enjoy continuity of reliable service without any significant demands on their time or attention. But, these methods must not diminish or delay the rights of their neighbours to choose among power vendors.

Ideally, power distributors should not be permitted to market power themselves. Power transmission and distribution entities, which should be regulated monopolies, should not take title to the power they carry. The reason for this separation is that power marketing should be entirely unregulated. To make an analogy to transportation, railway companies generally do not buy commodities at one end of the line and sell them at the other. Rather, railways charge a cost of carriage for other people's goods. Electricity transmitters or distributors should similarly be common carriers, transmitting other people's energy on a user-pay basis.

As demonstrated by the Canadian experience in gas deregulation, distributors have many advantages which could be provided to affiliated vendors through self-dealing at the expense of economic efficiency and competitors. For example, cross-subsidies from regulated to unregulated

affiliates could distort prices and impair competition. Distributors have detailed knowledge of individual customer's usage and credit history that can create special advantages for affiliated vendors. Additionally, distributors may have control over a generator's access to transmission facilities and could impede access. Clear, structural separation between power distribution and power marketing is desirable to maximize the potential for competition.

The traditional notion of the monopoly's "obligation to serve," which has come to mean the customer's "obligation to pay excess cost," needs to be transformed into the distributor's obligation to connect to the grid." Regulators should have the task of ensuring that distributors connect customers and producers to the grid on reasonable terms.

New Brunswick consumers have no experience purchasing power in a competitive environment. Adopting mandated separation between distribution and marketing at the outset of structural reforms could inconvenience some customers who would be unwilling to shop for a supplier. There are a number of alternative paths to follow to introduce competition.

As a transitional measure, local power distributors could be allowed to sell power to customers on a cost-flow-through basis. This would be analogous to the private natural gas distributors in Ontario and Manitoba who now sell gas on this basis to those customers who choose not to buy from other suppliers in the deregulated market. Regulatory instruments would be required to control the marketing activities of distributors. Regulators would promote competition, attempt to limit cross-subsidies between distribution and marketing, and protect the public interest. Non-regulated power marketers would also freely compete for local customers. After a brief but defined period, the local distributors would be required to divest their marketing businesses to separate owners. Distribution and marketing would then become structurally separate. With a separation of distribution and marketing interests, the need for regulatory oversight would be reduced. Customers would then be free to stay with the former utility affiliate or move on to another supplier. Customers who did not wish to exercise their right to shop would retain uninterrupted service.

Alternatively, all customers who do not opt to purchase power through some bilateral arrangement (such as a fixed-price contract) could receive power at a market price, averaged over a time interval. However, if this approach is adopted, the interval of price averaging should be minimized to the extent possible, e.g., a one-month billing cycle. As seen from Ontario's and Manitoba's experience with the Weighted Average Cost of Gas (WACOG), a system based on long-interval-averaged pricing is inherently unstable and inefficient.

Some of the initiatives undertaken intenally by NB Power can contribute to the development of competition. Two key initiatives that should be sustained are its institutional unbundling which will result in functional separation of many of it operations, and its withdrawl from major capital projects which will reduce the growth of uneconomic or stranded costs.

Stranded costs occur when sunk costs exceed market value. Except for a brief discussion of the principles that should apply, a full discussion of options to manage stranded cost in the event of electricity market liberalization is beyond the scope of this paper. A primary concern is

preventing the amount of stranded sunk cost from increasing. One of the chief reasons I am proposing the complete institutional reform on New Brunswick's electricity system, including the introduction of competition, privatization, and regulatory reform, is to ensure that stranded sunk costs do not increase. Another major concern is managing stranded cost to ensure that incumbent interests cannot use stranded cost recovery for anti-competitive purpose. Another concern is recovering stranded cost in a manner that interferes as little as possible with the efficient allocation of resources.

The most efficient and fairest-if politically unattractive-method of recovering stranded cost is to have that cost absorbed by the taxpayers. Tax-based recovery spreads the cost more evenly in the economy than a recovery method that collects the cost from electricity users, thereby reducing distortions in the energy economy. Tax-based recovery is fairer than rate-based recovery because it was taxpayers, through NB Power's loan guarantees, that provided the shadow equity against which NB Power borrowed.

A second-best method of stranded cost recovery, now being used or developed in many jurisdictions, is a special charge included in rates. To minimize the negative effects of such charges on efficiency, it is desirable to design rates with a fixed, customer-based component which is insensitive to usage. Regardless of the method adopted, there is no easy, attractive way to manage stranded cost.

Even if NB Power is not going to be institutionally reformed in the near future, there are many interim steps that can be taken to enhance competitive conditions. Costs and rates should be unbundled to make them more closely based on the principle of user-pay. Customers should be billed on the basis of fixed customer charges that recover overhead costs, capacity charges that reflect the value of generating capacity when the supply is constrained, and energy charges that reflect the short-run marginal cost of electricity supply. NB Power should have to post transmission and back-up power tariffs that facilitate other economically efficient electricity suppliers entering the market.

The process of asset privatization can be incremental, allowing policy makers to learn from experience. The first candidates for privatization should be unused and loss-making assets. These could be sold through a no-reserve auction. The purpose should be to maximize the salvage value. Other, more productive assets should be carefully and independently assessed for their value. A reserve bid could be established for all working assets equal to their current value to NB Power. The assets could then be auctioned in a process that could assure the public that value was enhanced through the sale.

Recommendation:

14. Privatization should proceed incrementally with a view to maximizing long-term value for the public of New Brunswick.

Appendix B Thomas Adams' Inquiries of Civic Hydro for Information

The attached correspondence documents efforts Thomas Adams for this study to obtain information from Civic Hydro. A discussion of the matters surrounding this letter is found at page 3.

October 2, 1996

Richard A. Burpee
General Manager
Power Commission of the City of Saint John Saint John, New Brunswick
fax: 506-658-0868

Dear Mr. Burpee,

I am conducting a study on NB Power in association of the Atlantic Institute for Market Studies (AIMS). The study has a chapter dealing with Civic Hydro's contractual arrangements with NB Power. I have been unsuccessfully seeking an opportunity to discuss some of my findings with you and have left at least five telephone messages for you starting September 27.

The questions I am seeking your response to are:

- Why did Civic Hydro prepare its 1995 RFP for a competitive alternative to the supply of electricity from NB Power and was it Civic Hydro's intention to send out its RFP?
- Why did Civic Hydro's not send out its RFP?
- Did Civic Hydro communicate any of the advice of its consultants Weil and Howe to NB Power during the period prior to signing the ten year deal with NB Power?
- Why did Civic Hydro sign a ten year deal with NB Power, particularly in light of rapidly changing conditions in the power market and declining prices?
- Did you have reason to believe that Civic Hydro's RFP had a strong legal position vis-a-vis potential NB Power actions to block a competitive purchase?

My report will be submitted to a committee of the Legislative Assembly next week. If I do not hear from you I will append a copy of this correspondence with an explanatory note.
Sincerely,

Executive Director and Director of Utility Research

c: Dr. Brian L. Crowley, AIMS
Energy Probe Research Foundation