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PROVINCIAL HYDRO EXPANSIONS: REQUIRED TO SERVE INDUSTRIAL
DEVELOPMENT IN CANADA AND CONTINENTAL INTEGRATION

by

KARL FROSCHAUER

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of the requirements for the degree of
Doctor in Philosophy

Department of Sociology and Anthropology

Carleton University

Ottawa, Ontario

January 1993

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DEVELOPMENT IN CANADA AND CONTINENTAL INTEGRATION**

submitted by

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in partial fulfilment of the requirements
for the degree of Doctor of Philosophy

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ABSTRACT

Infrastructures such as railways and canals during the nineteenth century and hydro-electric developments during the twentieth century were assumed to be powerful forces in Canada's transition from a natural resource-based economy to a more diversified and self-reliant industrial economy. The findings from five provincial hydro development cases, one starting in the 1880s (Niagara Falls in Ontario), the others starting in the 1960s (James Bay in Quebec, Churchill Falls in Labrador, Nelson River in Manitoba, and Peace River in British Columbia), indicate that power companies and the state invited manufacturers to use hydro-electricity and natural resources in order to diversify provincial economies. These hydro expansions additionally show that utilities and the government did not limit their plans to serving industries in Canada but also designed hydro projects to serve continental requirements. Serving both objectives became problematic.

It is argued that, when the Canadian state and firms (such as utilities) use hydro expansions to serve both continentalism and industrialization, then, at best, they foster dependent industrialization and staple processing; at worst, they overbuild the infrastructure to generate provincial surplus energy for continental, rather than national, integration. Besides examining the circumstances of state intervention, questions about industrial development, the overbuilding of infrastructure, and the

national or continental use of surplus plants need to be raised

How did hydro developments become subject to state intervention? Mostly, through the failures by private utilities (after obtaining water power licences) to provide power for the less lucrative industrial markets within provincial subregions. For instance, at Niagara Falls, Ontario, the US plant owners found it more lucrative to export industrial power than to supply it to Ontario manufacturers. Small-town manufacturers opposed such exports and solicited the Ontario government to repatriate the electricity for domestic industrial expansion.

This raises the question, did the addition of hydro projects foster industrial development? The state and utilities invited some foreign firms to manufacture hydro equipment within the province and others to use electricity to diversify production beyond resource-processing. But did manufacturing firms use the fresh supplies of power to diversify the natural resource economy? They did not. The provincial cases outside Ontario show that, since 1962, about 80 per cent of the industrial energy was used by manufacturers to semi-process pulp and paper, chemicals, primary metal, and wood products. During the same period, besides a lack of economic diversification, provincial utilities developed surplus capacities.

What contributed to such surplus capacities? Both the unpredictable outcomes of the "industrialization by invita-

tion" strategies by the provinces and the early development (pre-building) of hydro plants for intermittent or long-term exports.

How did continental, rather than national, use of provincial power surpluses become legitimate? The US owners of the Niagara Falls plants simply claimed that they were surplus to Ontario's needs, and the resulting repatriation struggle taught Canadian policy-makers that power constituted a valuable national industrial input. Thinking of this kind informed Prime Minister John Diefenbaker's plan for a national power network. Such a national network became undermined in the East by Quebec's refusal to allow transport of Labrador electricity across its territory and in the West by interprovincial contentions over Manitoba's employment benefits from hydro projects. Therefore, since 1963, the federal government's national/continental power policy prevailed and allows the National Energy Board to legitimate the development of a balkanized Canadian hydro-electric system, the continental network integration, and the separation of energy from natural resources.

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TABLE OF CONTENTS

	PAGE
Abstract	ii
Acknowledgements	v
Table of Contents	vi
List of Tables	vii
List of Figures	ix
List of Appendices	x
Definitions and Abbreviations	xii
Chapter 1	
Introduction: The Canadian Political Economy of Hydro Power and Industrial Development	1
Chapter 2	
Ontario: Niagara Power Repatriation	63
Chapter 3	
Quebec: Taking Northern Power out of Confederation	121
Chapter 4	
Newfoundland: The Churchill Power Trap	187
Chapter 5	
Manitoba: Nelson River Power for Industry in the West or the Mid-Continent	243
Chapter 6	
British Columbia: Peace River Power for Staples and the Continental Power Trap	309
Chapter 7	
Conclusion and Summary of Evidence from Five Provincial Cases	379
Bibliography	420
Appendix I Generator and Turbine Diagram	437
Appendix II Ontario Tables and Supplements	438
Appendix III Quebec Tables	451
Appendix IV Newfoundland Tables	455
Appendix V Manitoba Tables	459
Appendix VI British Columbia Tables	463
Appendix VII All Five Provincial Cases, Tables	470

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
2.1	Demand for Electricity North of Guelph (1911)	94
2.2	Annual Quantity of Electricity Exported to the United States, 1908-20	109
3.1	Hydro Plants Inventory of Prime Mover and Electric Generating Equipment at the James Bay Phase 1, Powerhouses 2, 3, and 4, La Grande River, Quebec	139
3.2	Consumption of Purchased Fuel and Electricity by Manufacturing Industries in Quebec, 1962-84, GW.h.	145
3.3	Hydro-Québec Les Grandes Secteur Industriels marchés canadiens, 1973 et 1976	147
3.4	Hydro-Québec Les Grandes Secteur Industriels marchés canadiens, 1981 et 1984	152
3.5	Northern Hydro Expansion, 1971-84	157
3.6	Hydro-Québec Power Surplus, 1977-84 (MW)	159
3.7	Hydro-Quebec Surplus, 1984-90 (MW)	160
3.8	Provincial Electricity Generation and Exports 1986, 1988 (GW.h)	164
4.1	Turbines and Generators installed in Newfoundland at Baie d'Espoir and Churchill Falls 1967-85	208
4.2	Major Consumption of Electricity by the Manufacturing Industries in Newfoundland 1975-8 (GW.h)	215
4.3	Consumption of Electricity by Fish Products and Food & Beverage Industry in Newfoundland 1975-8 (GW.h)	216
4.4	Major Consumption of Electricity by the Manufacturing Industries in Newfoundland 1975-8 (\$1,000)	217
5.1	Turbines and Generators Installed in Manitoba by Various Manufacturers from 1900-86	256

LIST OF TABLES
continued

TABLE	DESCRIPTION	PAGE
5.2	Turbines and Generators Installed in Generating Station over 100 MW by year of Installation and Manufacturer 1923-85	257
5.3	Manitoba Hydro Industrial Contracts with Major Customers, Their Capacity and Energy Demand 1975	264
5.4	The 15 largest Industrial Customers of Manitoba Hydro in order of Consumption 1989	265
5.5	Consumption of Electricity by Manufacturers of Primary Metals, Pulp and Paper, Food and Beverages, and Chemical Products in Manitoba 1975-84 (GW.h)	267
5.6	Estimated and Actual Annual Firm Energy Supplied in Canada from the Manitoba System 1978-87 (GW.h)	279
5.7	Energy Purchased and Energy Sold from the Integrated System of Manitoba Hydro and Winnipeg Hydro 1977-86 (GW.h)	293
6.1	Imported Generators, Turbines, and Electrical Gear used in British Columbia Hydro-Electric Projects by Manufacturers or Company of Origin 1968-80	332
6.2	Turbines and Generators Installed in Generating Station over 100 MW by year of Installation and Manufacturer in British Columbia 1930-84	333
6.3	Turbines and Generators Installed in British Columbia by Various Manufacturers in Power Stations larger than 100 MW from 1930-84	334
6.4	Manufacturing Industry in British Columbia (1975-83), B.C., Yukon, and Northwest Territories (1962-74), Largest Purchasers of Electricity	338
6.5	B.C. Hydro's Estimate of Capacity and Surplus at the time of Peak Load on the Export Grid (MW) 1984-90	358
6.6	British Columbia Electricity Imports and Exports	368

LIST OF TABLES

continued

TABLE	DESCRIPTION	PAGE
7.1	Government Takeovers of Hydro-Electric Power Production	382
7.2	Generating Capacity in Five Provinces Installed between 1960-88	393
7.3	Type of Manufacturers Who Constitute About 80 per cent of the Total Consumption by Manufacturing Industries During Key Historical Periods 1962-84	395
7.4	Provincial Electricity Generating Capacity, Interprovincial Trade, and US Export Revenue in Five Provinces 1984-8	406

LIST OF FIGURES

FIGURES	DESCRIPTION	PAGE
1.1	Five Major Hydro-Electric Generating Stations	53
2.1	Diagram of Hydro-Electric Generating Station with Turbine and Generator Detail	437
3.1	Hydro-Quebec's Main System Features 1989	122
4.1	Newfoundland and Labrador, Churchill Falls, and Baie d'Espoir	188
5.1	Manitoba Hydro Main System Features 1984	244
6.1	British Columbia Main System Features 1989	310

LIST OF APPENDICES

APPENDIX (TABLE)	DESCRIPTION	PAGE
II.1	Niagara Falls Power Company List of Short-Distance Customers	438
II.2	Niagara Falls Power Company List of Long-Distance Industrial Customers	439
II.3	Hydro Plants with a Generating Capacity of 100 MW or more and Inventory of Prime Mover and Electric Generating Equipment Installed in Ontario from 1905-30	441
II.4	Hydro Plants with a Generating Capacity of 100 MW or more and Inventory of Prime Mover and Electric Generating Equipment Installed in Ontario 1905-71	442
II.5	Industrial Power Applications (1922) in Ontario	443
II.6	Ontario (1911) Hydro-Electric Power Commission Survey	446
III.1	Manufacturers of Turbines and Generators Installed in Quebec Hydro Plants Larger than 100 MW (1911-86)	451
III.2	Installation Chronology of Turbines and Generators by Different Manufacturers in Quebec Hydro Plants Larger than 100 MW (1911-86)	452
III.3	Local Content of the La Grande Phase 1 Project	453
III.4	Provincial Electricity Imports and Exports (GW.h)	453
III.5	Canadian Electricity Exports by Exporter and Importer 1988	454
IV.1	Purchases in Newfoundland by the Churchill Falls (Labrador) Corporation by 1972	455
IV.2	Costs of the Churchill Falls Project by 1972 (\$Millions)	456
IV.3	Electricity as a Percentage of Cost of Production (1966)	457

LIST OF APPENDICES
continued

APPENDIX (TABLE)	DESCRIPTION	PAGE
IV.4	Turbine and Generator Contract, Press Release Churchill Falls	458
V.1	Electrical and Steam Power used by Business and Manufacturing in Brandon, Manitoba, during 1916	459
V.2	Manitoba Hydro's 50 Largest Industrial Customers (1989)	460
V.3	Industrial and Other Electricity Sales as a Percentage of Total Sales by Manitoba Hydro	462
VI.1	B.C. Hydro's Actual Electrical Sales for 1985-6 and Growth over 1984-5 by Standard Industrial Classification (SIC) (Billed Basis)	463
VI.2	Composition of Transmission Rate Sales (Pulp and Paper, Wood Manuf., Chemical, Metal Mining, Mineral Fuels, Commercial) Historic (1974-85) and Probable Projections (1985-95), Prepared on 31 January 1986	464
VI.3	Increases in "Purchased" versus "Self-Generated" Electricity by Industrial Sector (1965 and 1971)	467
VI.4	Provincial Summary, 1945-65 and 1966-84: Total Electricity Generated by Utility and Industry in British Columbia (excludes exports, firm, and surplus)	468
VII.1	Main Turbines and Main Generators (Installed in Hydro Plants Larger than 100 MW) in Five Provinces from 1900-86	470
VII.2	Major Provincial and US Transmission Interconnections	471

DEFINITIONS AND ABBREVIATIONS

(Selectively transcribed, with minor modifications, from
Energy, Mines and Resources'
Electric Power in Canada 1988, 108-12)

HYDRO-ELECTRIC POWER STATION: a power station which generates electricity from hydraulic sources. The water rotates turbines connected to generators.

CAPACITY: In the electric power industry, capacity has two meanings:

1. **System Capacity:** The maximum power capability of a system. For example, a utility system might have a rated capacity of 5,000 megawatts, or might sell 50 megawatts of capacity (i.e., power).

2. **Equipment Capacity:** The maximum power capability of a piece of equipment. For example, a generating unit might have a rated capacity of 50 megawatts.

ENERGY SOURCE: The primary source that provides the power that is converted to electricity. Energy sources include coal, petroleum products, gas, water, uranium, wind, geothermal, and so on.

ELECTRICAL ENERGY: The quantity of electricity delivered over a period of time. The commonly used unit of electrical energy is the kilowatt-hour (kW.h)

ELECTRICAL POWER: the rate of delivery of electrical energy and the most frequently used measure of capacity. The basis unit is kilowatt (kW).

FIRM ENERGY OF POWER: Electrical energy or power intended to be available at all times during the period of the agreement for its sale.

INTERRUPTIBLE ENERGY OR POWER: Energy or power made available under an agreement that permits curtailment or interruption of delivery at the option of the supplier.

VOLTAGE: The electrical force or potential that causes a current to flow in a circuit (just as pressure causes water to flow in a pipe). Voltage is measured in volts (V) or kilovolts (kV). 1 kV = 1000 V

WATT: The scientific unit of electric power. A typical light bulb is rated 25, 40, 60, or 100 watts, meaning that it consumes that amount of power when illuminated. A horse power is 746 watts.

DEFINITIONS AND ABBREVIATIONS
(cont'd)

KILOWATT (KW): The commercial unit of electric power; 1,000 watts. A kilowatt can be visualized as the total amount of power needed to light ten 100-watt light bulbs.

KILOWATT HOUR (KW.h): The commercial unit of electric energy; 1000 watt hours. A kilowatt hour can best be visualized as the amount of electricity consumed by ten 100-watt light bulbs burning for an hour.

MEGAWATT (MW): A unit of bulk power; 1,000 kilowatts.

MEGAWATT HOUR (MW.h): A unit of bulk power; 1,000 kilowatt hours.

GIGAWATT (GW): One million kilowatts.

GIGAWATT HOUR (GW.h): A unit of bulk energy. A million kilowatt hours. A billion watt hours.

TERAWATT HOURS (TW.h): One billion kilowatt hours.

MILL: 1/1000 of a dollar; or 1/10 of a cent.

HYDRO INFRASTRUCTURE: The power system of one utility or several interconnected utilities into a provincial or national power system. State intervention is mostly behind the expansion of the hydro infrastructure.

POWER SYSTEM: All interconnected facilities of an electrical utility. A power system includes all the generation, transmission, distribution, transformation, and protective components necessary to provide service to customers.

LOAD: The amount of electric power or energy consumed by a particular customer or group of customers.

LOAD FACTOR: The ratio of the average load during a designated period to the peak or maximum load in that same period. (Usually expressed in per cent.)

CONVERSION FROM EXPORT in GW.h to MW capacity plant needed: e.g., an export amount of 10,000 GW.h divided by 8,760 (hours per year) x 1.25 (for load factor of approx. 80%) would result in the size of plant needed in GW. Thereafter GW can be converted into MW.

CHAPTER 1

INTRODUCTION: THE CANADIAN POLITICAL ECONOMY OF HYDRO POWER AND INDUSTRIAL DEVELOPMENT

Canadians have built canals and national railways during the nineteenth century and thereby fostered the country's partial industrial development. But have Canadians of the twentieth century developed a national (hydro) power network and used it as a "powerful agent" for the transition from an economy primarily based on resource exports to an economy which is more fully industrialized?

Politicians, utility executives, and analysts of the transition claimed throughout this century that the hydroelectric industry was and continues to be "a revolutionary force" leading the provinces and the country into a "new kind of economic development."/1 John Dales argues that the "power station succeeded the railway as the main development agency;" and that in situations where power companies had to develop their own industrial markets the effect on diversification has been most successful./2

In such situations, hydroelectric development has been a powerful agent in the promotion of a twentieth-century industrial revolution in Canada - an agent, that is to say, in the transition from an economy based on the exploitation and exportation of a few natural resources to an economy which is more diversified, which depends to a larger extent on manufacturing industry, and which is more self-reliant./3

The self-reliance of the Canadian economy would be derived from interprovincial power supplies and the resulting indus-

trial benefits. As he saw it, "Quebec power supports industrialism in Ontario."/4

Basing his claim on a comprehensive analysis of the industrial development as an outcome of the installation of regional power systems within Québec (1898 to 1940), he did not hesitate to extend his provincial thesis to the entire country and his findings from four decades to the entire century - hydro development for Dales became "a powerful agent in the promotion of a twentieth century industrial revolution in Canada."

Contending such an interpretation of the influence of hydro development, the argument advanced in this dissertation is that the development of Canada's large waterfalls and other power sites has brought no such transition (industrial revolution) in the past nor will it bring such a transition in the future, given that a national/continental power policy persists and that "industrialization by invitation" serves as the national industrial development policy. Rather than bringing a full transition or "industrial revolution," hydro development fostered, at best, dependent (branch plant) industrialization and extended the dependence on resource exports. In some respects power stations did succeed the railway as one of the development agents, it will be argued that power stations, like the "colonial" railway, served more than Canadian industrialism. Hydro generating plants were required to serve continentalism in addition to "domestic" industry in Canada.

Members of the provincial political elite (Robert Bourassa, W.A.C. Bennett, Joseph Smallwood, René Lévesque, Edward Schreyer, et al.) and hydro planners supported the expansion of their provincial hydro systems. Particularly since the 1960s, they thought such additional hydro plants could serve continentalism as well as diversify their respective provincial economies by inviting manufacturers to use the power (paradoxically, in Québec this was done so that Quebeckers could become masters in their own house).

In short, based on the analysis of five provincial "transition" cases (Newfoundland, Québec, Ontario, Manitoba, and British Columbia), I advance the thesis that provincial hydro system expansions, when required to serve industrialization (by invitation) and continentalism, at best foster dependent industrialization and staple processing, and at worst, generate a provincial surplus for continental, rather than national, industrial use.

Within the new Canadian political economy, railway expansion and the National Policy (from the 1870s) serve as as explanations for how infrastructural expansion contributed to Canada's transition to industrialization. However, the Canadian political economy does not offer a similar analytical construct and explanation for national and provincial hydro-related industrial development.

To understand how hydro failed to be an agent in the transition from staple to diversified industrial economy in Canada, the interventions by the state, the nature of

industrialization, the overbuilding of the hydro infrastructure, and the continental power network integration need to be conceptualized. To derive a suitable analytical framework and explanation for earlier (1900-30) and more recent (1960s to mid-1980s) hydro-related industrial development, a review of relevant concepts derived from Canadian and European political economy approaches needs to be organized around the following questions:

- Should the provision of hydro power be understood as an infrastructure for industrial capital accumulation, as an energy input to intensify the production of new staples, or as a staple in its own right (surplus energy development)?
- What are the similarities and differences between the development of railways and hydro-electric projects as capitalist ventures or ventures by the state?
- Are Canadian infrastructures serving national economic goals or economic activities within historically changing economic boundaries?
- Does Canada have a national or continental hydro integration policy?
- Would Québec allow a national policy? Does inter-provincial conflict or class fraction conflict shape province-specific hydro and industrial development policies?

HYDRO POWER PROVISION AS INFRASTRUCTURE AND STAPLE

Should the provision of hydro power be understood as an infrastructure for manufacturing and staple processing or should hydro power be understood as, itself, a staple? The three conceptions, (1) hydro as an infrastructure for private accumulation in manufacturing, (2) hydro as energy input to extend staple production, and (3) hydro as turned into a staple for US export, have not been conceptually integrated within political economy approaches. Before this

can be done, it has to be decided which conception should be emphasized.

An examination of actual use eases the choice regarding conceptual emphasis. The product of power plants - electricity - is used within a variety of staple processing facilities (e.g., for making pulp and smelting metals) and in manufacturing industries (e.g., for automobile production). In addition, power is produced in provincial plants for US export.

For the key historical period under study, from the 1960s to the 1980s, the provincial exports of electricity have increased from 5 per cent to 9 per cent of total generation in Canada, while industrial consumption has declined from 60 to 44 per cent (in 1988).^{/5} Given that, since the 1960s, about half of the energy was used by industry, it is appropriate to analyze the provision of hydro energy, primarily, as an infrastructure for industries (including staple industries) and, secondarily, as a staple for US export.

Understood as a staple, electric power is a natural resource product which has been extracted with hydro technology at choice river sites for the purpose of export to the United States (where its use includes industrial application).^{/6} This was the case in Québec and, particularly, in Ontario at Niagara Falls, where, in 1903, the treatment of electricity as a staple was reversed to favour its use as a national industrial input. Fifty years later,

in 1963, the federal government allowed a return to the practice of developing hydro-electricity for export.

Can a Canadian development pattern be discerned in the way infrastructure is typically developed for industrial expansion? Clement (1977) draws an analogy between Ontario's state intervention in the development of hydro infrastructure and the provisions of previously installed infrastructures. He argues that, "as it had been with canals and railways, the state would be initiator of the necessary [hydro] infrastructure of economic activity; it would provide the necessary conditions for private capital accumulation."/7 He finds parallels between state initiation of rail and hydro to advance private capital accumulation. But are there similar patterns in the way infrastructures are used to advance industrial development, the way they become overbuilt, and in the preference for an all-Canadian network?

SUBSTANTIVE SIMILARITIES AND DIFFERENCES BETWEEN THE DEVELOPMENT OF RAILWAYS AND HYDRO-ELECTRIC SYSTEMS IN CANADA

Within capitalist societies such as Canada, infrastructures can be provided either as capitalist ventures or by the state. Both the provisions of railway service and hydro power were first carried out by private firms, in an often unco-ordinated way, as capitalist ventures (with government subsidies and land concessions) and then directly as state run operations for advancing industrial growth. It started in 1906, with Ontario's distribution of power, and continued when the private generating facilities were taken over by

the Ontario Power Commission. This is similar to the way private regional railways were nationalized under the name Canadian National Railways in 1918./8 Eventually, nearly all power systems were developed and operated by provincial, government-owned utilities. Thus, by the end of the 1980s, the electric power industry in Canada was 85.1 per cent provincially owned./9

The second similarity between them is that both railways and hydro-electric systems were expected to advance industrialization and staple production. Industrial development would be enhanced through the growth of supply industries (tracks, rail cars, locomotives, and power generating equipment), by inviting US branch plants to open in Canada, and by the provision of rail transport or energy input for staple processing in newly opened regions (pulp and paper, grain, iron-ore). The major difference between them relate to ownership (federal versus provincial), jurisdiction, and the spatial dimension of the networks.

The third similarity between the development of railways and hydro-electric systems is that they became seriously overbuilt. The laying of railway track accelerated after the 1890s; by 1917, the outcome was an "ill-planned proliferation of railways," which was stifled only by the lack of British capital due to World War I./10 Development of the largest Ontario water power site, Niagara Falls, started in 1901, while the majority of the large hydro projects in the other provinces have been built since

the 1960s: Nelson River (Manitoba), Churchill Falls (Labrador, Newfoundland), James Bay (Québec), and the Peace River (British Columbia) (Figure 1.1). By 1987, for example, the federal Department of Energy, Mines and Resources indicated Canadian excess generating capacity for Ontario as 30 per cent, for Québec as 21 per cent, for Newfoundland as 79 per cent, for Manitoba as 18 per cent (despite the serious drought), and for British Columbia as 43 per cent./11 The overbuilding of a Canadian infrastructure has been repeated.

A comparison of the patterns of the railway infrastructure expansions with those of the recent hydro networks makes their similarities apparent in terms of nationalization, serving industrialization and staples production, and becoming overdeveloped. The key difference between these two infrastructure expansions is that the railway was built as a national infrastructure (in part as a defensive reaction to US expansion), whereas Canada's hydro-electric system, since the 1960s, was built as part of a continental infrastructure (in part a reaction by the provinces (particularly Québec) to national energy integration and the historic centralization of industry).

While the railway system became a trans-Canadian network owned primarily by the federal government and under federal jurisdiction, the hydro-electric networks became primarily a continentally integrated network (100 international transmission lines) and secondarily an interprovin-

cial network (only 35 major provincial power lines, without a complete east-west linkage between Saskatchewan and Alberta until 1988) owned, developed, and operated under the jurisdiction of provincial governments./12 While inter-provincial electricity exchanges declined from 5 to 4 per cent between the 1960s and the 1980s, US exports increased from 5 to 9 per cent of total generation in the same period./13

To gain better insight into Canada's shift in priority from building a national hydro network to strengthening its continental energy axes, a review of the infrastructure-related economic activities within historically changing economic boundaries is necessary.

INFRASTRUCTURE INSTALLATIONS AS ESSENTIAL FOR ECONOMIC ACTIVITIES WITHIN HISTORICALLY CHANGING BOUNDARIES

Within Canadian political economy analyses, infrastructure installations in Canada are understood as serving economic activities within the following historically changing boundaries: British colonial, continental, centralized national, and de-centralized continental.

Ryerson and Naylor agree that Canadian infrastructure installations, such as the railway during the nineteenth century, did not serve as an infrastructural base for "autonomous nation building." While for Ryerson the railway served as an instrument of colonialism and as an engine of domestic industrialization, Naylor argued that this infrastructure went beyond the imperial axis of investments and staples trades. Together with the National Policy, it

strengthened the continental axis, which intensified the dependence (via branch plants) characteristic of Canada's industrialization./14

Such dependency on American industry was actively pursued by officials of the Canadian state through bonuses for "attempted hot-house industrialization by invitation."/15 As Naylor found:

The federal and provincial governments gave direct cash subsidies to the construction of commercial infrastructure and to the primary iron and steel industry associated with the railroad building.
...New industries sprang up, amply assisted by the municipal subsidies./16

The growth of railroad supply industries should not be overstated as a contribution to the diversification of Canada's industrial base, since, simultaneously, resource transport by rail helped, as Naylor argued, extend the staple economy and repay the infrastructure debt. "Quick development of staple traffic reinforced the primary export orientation of the economy and was forced by the need of the railways to generate immediate revenue to cover their fixed interest debt. The result was that local lines and secondary processing alike were underdeveloped."/17 The secondary processing that did develop was largely located in central Canada.

Clement argued that through "the centralized control over transportation and capital by dominant capitalists," regional structures became set./18 Thereby, development became unevenly structured.

Uneven development is marked by the fact that the centre of Canadian manufacturing and finance is located in the "Golden Triangle" (Windsor-Toronto-Montreal) area. The rest of the country is heavily reliant upon key resources which typically are foreign controlled and mainly destined for external markets. For the North, it is minerals and energy, following traditional furs; in British Columbia, it is lumber, pulp and paper, minerals, fish, agriculture, and some hydro power; it is natural gas, petroleum, and potash along with grain on the Prairies; mineral and pulp and paper in northern Manitoba, Ontario, and Quebec, along with hydro; in Atlantic Canada, it is pulp and paper, agriculture, fish, some coal and hydro. These regions feed the "Golden Triangle" and the American markets with their resources and in turn consume the manufactured products from these centres./19

In the interrelationship between resource regions and manufacturing centre, both the "American market" and the industrial centre of Canada benefit from regional staple production. The industrialism of the centre, as described in the restatement of the Naylor/Clement thesis by Watkins, became increasingly dependent on American technology and branch plants welcomed by the (finance-cum-mercantile) capitalist class and the political elite./20

For Gordon Laxer, such reliance on dependent industrialism was not inevitable, for Canada, like other countries, had a choice./21 Other northern countries with similar take-off conditions blocked direct investment by their powerful neighbours, while Canada invited US industrialists to come right in. Sweden's reaction to foreign ownership in the resource and branch plant sector, for example, differed, considerably from Canada's:

As early as the 1870s and 1880s, German industry began to locate branch plants and resource subsidiaries in nearby countries. However, Germany's neighbours reacted differently from Canada. They took steps to

block German investment ... Furthermore, they strengthened domestically owned industry through measures such as changes to industrial finance (e.g., industrial banks) [and] government procurement programs."/22

According to Laxer, two additional factors were of major importance in pushing Canada off the path of late industrial development (during the industrial regression rather than transition to late industrialization between 1900-13): one was that many Canadian manufacturers entered licensing agreements with American firms and imported their technology; the other was that the Canadian manufacturing sector, through direct investment or takeover, became dominated by American branch plants./23

Glen Williams supports a relational approach, whereby industrialization is best analyzed by relating "Canadian manufacturing to manufacturing in more advanced centers and examining the regional differences within Canada."/24 His concept of import substitution industrialization can be adapted to explain the "complex network of human choices primarily made by firms and the state," choices which were involved in setting up branch plants to manufacture equipment, formerly imported, for infrastructure expansions./25 Such choice-of-relations approaches within changing boundaries are important to an understanding of infrastructure installations, since during the twentieth century infrastructures in Canada have broken through the north/south economic boundary and strengthened new continental axes.

Stevenson claims that nineteenth century east/west centralization of infrastructural benefits were but temporary,

and that, during the twentieth century, infrastructure actually had a de-centralizing effect. He stresses that transnational (US/Canadian) regionally installed infrastructures opened up several continental axes (Alberta/US, Québec/US, Manitoba/US), which fed the American regional markets via the provinces./26

For instance in the development of the transportation infrastructure, Stevenson claims the colonial east/west railway axis was superseded by north/south airline routes, Canadian/US highway linkages, and railways carrying staples in a north/south direction./27 In addition, "the mining and pulp and paper industries and the continentally integrated automobile industry account for most of its [Canadian Pacific] railway freight revenue."/28 He argues that, while in the last century "economic nationalism benefited the CPR [Canadian Pacific Railway] of Shaughnessy and Van Horne" [-] "balkanization would benefit the CPR of Crump and Sinclair" in the second half of this century./29 In addition, Stevenson sees increased integration of energy infrastructures (such as the control over oil and gas (in Alberta) and the Columbia River Treaty, which allows US utilities to influence regulation of the Columbia River reservoirs in British Columbia) as other instances whereby twentieth century infrastructural development directly serves continentalism. Members of the provincial, rather than the federal, political elite increasingly shaped the development of power

systems. However, whether continental or national energy trade would be emphasized depended on federal policy.

Trade (interprovincial or international) in energy and the installation of international transmission lines brings energy producers under federal jurisdiction, whereas the planning, development, and distribution within provinces is the responsibility of the provinces./30 In the absence of clear directions in industrial and energy policy at the national level, provincial approaches to the development of energy varied. Some provinces left development of water power sources to private firms, but most eventually took over the production of electricity because it could be used in a variety of manufacturing processes and, thus, provided enhanced private accumulation conditions in a variety of industries.

During the early 1960s, long-distance transmission technology had advanced to the point where hydro planners and politicians had the option to develop the best remaining hydro sites in Canada and share the resulting economic benefits within the nation or to open several continental energy axes and develop more hydro plants for export to the United States. At this juncture, political development concepts were promoted, which, in theory, allowed Canadian hydro development to serve either the national or the continental axis of hydro development.

FEDERAL STATE: THE NATIONAL/CONTINENTAL POWER POLICY

Minister of Trade and Commerce, Mitchell Sharp, in his power network policy statement in the House of Commons on 8 October 1963, indicated that the federal government would pursue two directions in distributing the benefits from Canada's large, low-cost power sources; one would require the interconnection of Canadian power systems in a national, the other in a continental, fashion.

The government has decided to develop and carry forward effective policies embracing two essential concepts, first encouraging development of large low cost power sources and the distribution of the benefits thereof as widely as possible through interconnection between power systems within Canada; second, encouraging power exports and interconnections between Canadian and United States power systems where such induce early development of Canadian power resources./31

By the early 1960s Canada had the technology and skill to integrate provincial networks on a national scale, and concepts, studies, and policies were developed to bring this about.

THE NATIONAL PATH: INTERCONNECTION OF PROVINCIAL POWER SOURCES WITHIN CANADA

Lauding the economic benefits of a "unified power grid," Thomas Hughes warns of conflict over ownership and control when power plants need to be interconnected across political boundaries./32 Assuming a Canadian power market without provincial boundaries, Hugh Aitken expected that Canada would develop hydro-electricity (as industrial energy) only within the boundaries of Canada.

He argued that the railway encouraged building an all-Canadian network within a national economy and assumed that a similar development would occur with hydro-electric power.

Access to cheap Canadian industrial power will be restricted to plants within the political boundaries of Canada; it is hoped that this inducement, combined with the protective tariff, will encourage manufacturing within Canada and counteract the tendency for Canadian resources to be exported in their natural condition to industries in the United States./33

To supply power within the boundaries of Canada its hydro plants need to be interconnected. Thomas Hughes identifies the economic benefit of a "unified power grid," which can be derived from interconnecting and operating low-cost generating plants near full capacity through serving a variety of energy demands./34 Such economic benefits of a unified power system for Canada were highlighted in a federally commissioned national power network study.

The consulting engineers at Ingledow & Associates provided a comparative analysis of the benefits of two development plans, one whereby hydro systems are developed according to individual provincial interests, and another whereby the National Power Network, from Vancouver, B.C., to Corner Brook, Newfoundland, is provincially interconnected./35 The Ingledow group concluded that "the greatest economy is to be derived through the interconnection and coordination of all systems on a national basis."/36 If put into service by the mid-1970s, the report estimated that the benefits of implementing a National Power Network could

save \$644 million annually within a thirty-year period (1970-99)./37

Such benefits would be derived, they argued, by making use of low-cost power sources (Churchill Falls and other sites) available through interconnected provincial power systems (replacing coal and other energy sources in Ontario for instance) and by accelerating major northern hydro projects.

[Economic benefits are] ...resulting from the accelerated development of major hydro-electric developments including the Peace and Columbia River developments in British Columbia, the Nelson River developments in Manitoba and the Churchill Falls development in Labrador at relatively low incremental cost to serve loads [consumption by industry for example] in adjacent provinces and the replacement or deferment of higher cost forms of generation in these provinces [the development of high-cost nuclear energy in Ontario could have been avoided]. (emphasis mine)/38

Hughes argues that building a nationally "unified power grid" would bring economic benefits but that the politics related to mixed ownership interests make the economic benefits of integration highly problematic. He found that "the particularisms" of ownership (public and private forms of ownerships and divergent interests) is often at the root of the failures to form a unified system, especially when interconnection across political boundaries is involved./39 Integrating the benefits of Canada's large northern sites would have meant developing a "form of central planning and operating authority."/40 Provincial politicians' refusal to yield to national operating and ownership arrangements, as well as the desire by provinces to pursue their own hydro

development strategies (especially during Québec's Quiet Revolution) is one of the key reasons behind Prime Minister John Diefenbaker's failed "effort to form a unified system."

In 1961, like Altken before him, John Diefenbaker understood hydro-electricity to be a national industrial input and informed the provincial premiers that a national power grid system would allow large, remote water powers (e.g., Churchill Falls) to be used for industrial development in the more or less industrialized areas of Canada./41

Newfoundland, Quebec, Manitoba, British Columbia and the Yukon have large but remote reserves of water power which in all probability will more than satisfy the local industrial development needs. Large blocks of power are therefore available at these sites for transmission to the more industrialized areas of Canada. (emphasis mine)/42

He also stressed that "the availability of low-cost electric power has been one of the most important factors in the economic growth and industrial development of Canada," and "that interprovincial connection and arrangements would make possible substantial economies in reserve and in capital requirements."/43 Neither the prospects of national industrial benefits nor hydro infrastructure savings were sufficient for the provincial premiers to yield the necessary authority to Ottawa.

Both the letters to Diefenbaker during 1961 and 1962 and the Provincial Premiers' Conference in Victoria on 6 and 7 August 1962 reflect that the resistance to centralization of authority over hydro facilities appears to be the main reason for its failure. Québec refused to take part in

federal power grid discussions; the premier of Québec, Jean Lesage, argued "l'énergie électrique ... c'est une matière de juridiction provinciale que nous nous proposons d'étudier lors de la prochaine conférence des provinces à Victoria l'été prochain."/44 Québec would have had to surrender some energy sovereignty to national control, while viewing l'électricité as the clef qui nous rendra MAÎTRES chez nous since the early 1960s.

In Victoria, the "interprovincial co-ordination," ownership of the national grid (provincial or federal property), the Ontario market, and the nuclear option came up for discussion./45 Duff Roblin, Manitoba's premier, thought that his province could benefit through financial and technical contributions from the federal government's national grid development without the federal government owning or managing it./46 British Columbia's premier, W.A.C. Bennett, stressed that "we would not want the federal government to own the national grid within the province," and Lesage added, on behalf of Québec, that "we are not thinking in terms of federal control." When Premier Blakeney of Saskatchewan raised the problem of the development of large hydro projects without the assurance of Ontario as a base market, Premier Robarts of Ontario "indicated that Ontario is investigating nuclear power, and that there are ample resources of uranium in the province."/47 Since the 1960s, the goal of a national energy grid has been raised

only when Canada's energy supplies were threatened by an energy crisis.

Energy Minister Donald Macdonald announced during January 1974, that "a national power grid is now much closer to realization in Canada because of the impetus of the energy crisis" - it remained an announcement without results./48 Even the development of a western grid linking Manitoba with Alberta and Saskatchewan failed in 1980, because "the shift in capital expenditures as a result of the Western Electric Power Grid would mean large increases in employment and income for Manitoba and a moderate reduction of employment and income in Saskatchewan and Alberta."/49 Since Alberta and Saskatchewan disliked the fact that additional employment benefits would accrue to Manitoba, possibly at their expense, the western power grid did not proceed. This supports Hughes' thesis that once power networks need to be interconnected across political boundaries, given the particularisms of ownership, politician are unlikely to resolve such issues.

Since the interprovincial conflict became a contributing factor, it is not surprising that the first path of Sharp's national/continental policy (encouraging the development of large power sources so that they will provide benefits through interconnection of provincial systems) was postponed in favour of the second path: strengthening the interconnection of provincial networks with the United

States and allowing US utilities to share the benefits of Canada's large northern power sources.

THE CONTINENTAL PATH: INTERCONNECTION OF PROVINCIAL POWER SOURCES WITH THE UNITED STATES

The government has decided to develop and carry forward effective policies ... encouraging power exports and interconnections between Canadian and United States Power Systems where such induce early development of Canadian power resources. (Mitchell Sharp, House of Commons, 8 October 1963)

The continental integration of provincial hydro networks has been given priority over their national integration. The federal government was aware that if northern projects were built before they were needed within the province, energy surpluses could be used by industry in Canada as part of the national grid strategy or exported to the United States with the help of the National Energy Board. Since Sharp's national/continental statement on Canadian power policy in 1963, the National Energy Board has largely ignored the use of surpluses as national industrial input and has asymmetrically legitimated that surpluses be used as provincial continental staples. Most provinces, particularly Québec, have encouraged "power exports and interconnections" with the United States power systems so that they could advance the development of their northern power resources (such as James Bay).

In part, the reason northern projects were advanced to serve the continental market during the early 1960s was to attract portfolio capital for individual provincial power systems. Smith argues that in 1962 "Ottawa ... was anxious

to attract U.S. dollars into Canada. It also felt the need for some sort of imagination-firing construction project to prime the national economic pump."/50 Capital would be available only if there was a larger energy market for Canadian electricity./51 Therefore, "the government resolved to change the [export] policy which had persisted more than fifty years."/52 By the mid-1980s Robert Bourassa, the premier of Québec, subscribed almost entirely to the US continental energy policy.

Bourassa introduced his book, *Power from the North*, with a "Foreword," written by James Schlesinger, the first US secretary of energy (1977-9), who drafted the US national energy policy and the Department of Energy plan for implementation./53 Schlesinger admitted that "during the early 1970s the United States pressed Canada to establish what was known as the continental energy policy."/54 However, during the 1980s, with reference to the second phase of the James Bay project, Bourassa's attempt to bring low-cost northern power to the United States, he concluded that:

Not only in Quebec, Manitoba, and British Columbia is there a new eagerness to export power, but such exports have been blessed by Ottawa.

No higher pragmatism can be imagined than the joint use -- for benefits of both American and Canadian economies -- of this unutilized and renewable resource" [Canadian renewable water power].

It would be the height of irony -- if irrational nationalism caused us to forego this extraordinary, nature-given, opportunity for joint economic benefit from Canada's development./55

Twenty years earlier, during the 1960s, the National Energy Board dutifully approved of continental integration

and abdicated responsibility for the interprovincial inter-connection of networks. The federal state became less an initiator of necessary hydro infrastructure confined to within the boundaries of Canada than an advocate of export-induced advances of northern power projects to serve continental integration.

THE PROVINCIAL STATE AS AN INITIATOR OF THE NECESSARY HYDRO INFRASTRUCTURE

Since the national network policy failed due to province-building interests (exemplified by the nuclear policy in Ontario and Québec's intensified energy continentalism), an analysis of hydro system expansions, industrial development, and continentalism is required at the provincial level.⁵⁶ As the similarities and differences discussed above concerning rail/hydro infrastructure show, questions need to be raised about provincial ownership, diversification and independent industrial development, the state's ability to plan and coordinate capacity of its hydro installations with the industrialists' requirements (in light of energy surpluses), and the federal legitimization of fostering provincial/continental integration. First, the changing hydro ownership relations need to be probed.

- PUBLIC OR PRIVATE OWNERSHIP

Why have provincial governments nationalized private hydro utilities, sometimes fifteen to twenty years after they granted water power franchises for privatized hydro-electric production? In provincial political economy analyses, a variety of reasons are given for state intervention

in the production of hydro-electricity: cleavage in regional class fraction interests, economic backwardness, and the failure by private capital to provide unprofitable but necessary hydro-electricity.

Several authors claim that provincial state intervention in the production of hydro-electricity is due to the cleavage in regional class fraction interests. Bringing together the theses of various provincial analyses shows that each author claims a unique historic class event within the Canadian and continental context. Nelles argues that in Ontario, control of the hydro-electric industry took a course contrary to continentalism - Ontario manufacturers resisted American ownership to advance their own industrialization process./57 Fournier argues that, in Québec, "to a large part nationalization was an expropriation of English Canadian capital [albeit financed by New York capital], which controlled 80% of the sector, and its transfer to the Québec bourgeoisie."/58 Nelles finds the Ontario class fraction dynamic not transferable to the Manitoba situation, since "the business interests of Winnipeg who advocated public enterprise at the outset did not seek to eradicate the private company, only its monopoly."/59 Tieleman maintains that, in British Columbia, "large-scale Canadian and American capitalists in the resource sector, who worked with the regional resource bourgeoisie in a wholeheartedly continentalist plan for economic development," supported nationalization - "a complete reversal of the Ontario/Québec

case."/60 Class fraction analyses as explanations for the state acquiring control over hydro development have not been able to move beyond explaining each provincial case as a unique historical event.

Some analysts enhanced their arguments concerning state hydro as an institutional innovation advanced by Ontario manufacturers by emphasizing contributing economic conditions and ownership

Nelles found that linking state intervention in the production of hydro-electricity to prior Crown ownership of the resource and to Ontario's conditions of economic backwardness yielded insufficient explanation. He argues that state intervention cannot solely be explained by determinants such as property rights or direct management, although "waterpower regulation grew to include the distribution of hydro-electric and ultimately public ownership of the industry."/61 He offers two other determinants: "the energy requirements of the provincial manufacturers, their fear of economic stagnation, and the metropolitan tensions of the provincial economy were far more important determinants of state intervention."/62 Dewar specifies that the tensions arose from the backwardness of manufacturers in Toronto's hinterland; they "were consumers of power and wished to control production in the service of their own interests," which divided them in interests from "those capitalists who already owned facilities for generating and distributing hydroelectricity."/63 The threat of backward-

ness can be seen as a contributing factor, but the argument that reappropriation of hydro development due to lack of profitable (as judged by capitalist hydro entrepreneurs) but necessary industrial infrastructure provides a formulation allowing explanations which, potentially, give credence to the rise of unique historical class fraction cleavages./64

The argument advanced in this dissertation is that state intervention in the production of hydro-electricity results, primarily, from the failure of private capital to provide unprofitable but necessary hydro-electricity for private accumulation in a variety of industries./65 In other words, it will be argued that whether a hydro power system is operated as a capitalist or as a public enterprise depends upon whether a private entrepreneur finds running a hydro company sufficiently profitable, given the economic situation at the time./66 One Canadian and two American utilities operating power plants at Niagara Falls, Ontario, in the first decade this century, did not find it sufficiently profitable to transmit electricity to the small manufacturers in the Toronto hinterland. As a result, the small-town manufacturers used the state to distribute and, later, to generate electricity. In this way, infrastructure, including productive inputs, starts being provided by the state.

- LINKAGES TO INDUSTRY

Why is it that low-cost hydro-electric power available in abundance is not put to use making a greater variety of

finished products from Canada's natural resources and thereby advancing a more independent industrialism?

There are essentially three conceptions of how hydro-electric development is related to industrialization.

The first argues that once hydro-electricity is available, it diversifies the economy and leads to greater Canadian economic independence from the United States. T.C. Keefer, a professional engineer, foresaw a new energy-invigorated industrialism. Giving the value-added manufacture of spruce as an example, he argued:

'Heretofore we have cut our spruce into deals and exported it to Europe, and more recently into pulp wood and exported that to the United States; but manufactured by our water power into paper, the raw material would yield this country ten times the value it is now exported for.' In the future Canada's own 'white coal' of falling water would deliver the Dominion from its 'hewer of wood' servitude to American industry and its bondage to American coal./67

He expected that some Canadian entrepreneurs would seize the opportunity to generate their own electric power (rather than leaving it up to US investors) and that others would use it to manufacture more sophisticated goods and, thus, liberate Canada from continental subservience.

The second conception of hydro-related industrial development argues that hydro utility becomes the key industry in towns near the power site and attracts manufacturers, thus forging industrial linkages./68 For Dales, unlike Keefer, the attraction of industry to hydro-electric power was not automatic. He argues, that if hydro-electricity is developed "in advance" of a manufacturing market and manu-

facturing activities are actively encouraged, an obvious contribution is made to the "growth of manufacturing."/69 This was the case in 1897, when two US immigrant entrepreneurs bought the Shawinigan Falls on the St. Maurice River, in Québec. They first built power plants and thereafter "encouraged the development of a wide range of manufacturing activities in their areas."/70 In the case of the Shawinigan Power Company, it was a simple matter of "Canadianizing" their operations./71

This, however, was not the case when Canadian hydro branch plants at Niagara Falls were used by their US parent utilities to transmit power to their US industrial markets in Niagara Falls, Buffalo, and Syracuse in 1906./72 In this case the relationship of Canadian hydro development to industrial development involves the internal transfer of Canadian electricity to the US parent company's industrial customers. Foreign ownership of power plants did not lead to industrial development in Ontario.

The "successful" hydro-related industrial development in Shawinigan was carried out by independent émigré American power developers, who used their power site in Québec to attract industrialists. In contrast was the failure of the Niagara power companies with ownership ties to American parents, whose internal transfer of electricity to its US industrial market did not attract industry to Niagara Falls, Ont., and "stultified" the transition from steam to electri-

cal manufacturing for manufacturers in small southern Ontario towns.

Dales did not consider foreign ownership of hydro plants or of manufacturing facilities important to understanding the Canadian transition problem. As with southern Ontario, he noted that, in the Eastern Townships, the Southern Power Company supplied the growing "branch plants of American, Canadian, and occasionally, British parent firms."/73 As the US-owned Niagara power companies retained their US integration, manufacturing branch plants, similarly, retain their continental linkages./74

While at the turn of the century, *émigré* industrialists without direct ownership ties to foreign firms often "Canadianized" their operations, direct investment by American firms in Canadian branch plants retained their continental integration. Those pursuing "industrialization by invitation" strategies overlooked such differences. Independent industrialists tended to use portfolio capital to finance their operations, while branch plants were subject to direct investment. As Clement found, "the ruling and economic interests ... assumed that the jump over the border would result in 'Canadianization' of these [branch plant] industries. What was ignored, however, was the fact that these corporations were vertically integrated and often horizontally linked with their U.S. counterparts and unlike portfolio debt, the debt of direct investments do not go away but instead strengthen."/75 Even for branch plants or domestic

industries the availability of hydro power was at best a temporary attraction.

The hydro-related diversification argument, whether by spontaneous entrepreneurialism or industrial promotion, applies under very limited conditions. Since the advent of long-distance transmission, it was no longer necessary for industrialists to relocate their factories near water power sites. By 1906, power was brought to industry and resource processing facilities from the power plant rather than industries moving to the source of electricity. In the case of US-owned plants at Niagara Falls, it allowed the internal transfer to the parent company's industrial market, while small-town manufacturers in Ontario were held up in the transition from steam manufacture to manufacture by electric motor.

The third conception of hydro-related development includes industrialization (by invitation) and continentalism. This is part of a larger development tendency, whereby Canada combines the increasing state-organization of its productive forces with the invitation of industrialists, that is, we invite economic control.⁷⁶ Acknowledging the influence of direct ownership, the lack of Canadianization, and the objectives in the use of long-distance transmission (by firms and the state), this thesis argues that if provincial hydro expansions are required to serve "industrialization by invitation" and continentalism, then industry and staple processing cannot help but be depen-

dently developed. Drawing foreign firms to use public hydro tends not to diversify the economy but to replicate dependent industrialization and staple production.

- OVERDEVELOPMENT OF INFRASTRUCTURE

Why was the hydro infrastructure overbuilt? Generally, it is assumed that the state and industrial capital interests coincide. However, when examining the state as a producer of industrial inputs, often state production and industrial requirement do not coincide./77 Infrastructures become overbuilt despite consultation with industries (three national railways were built; the electrical system in Canada had 24 per cent surplus capacity in 1988)./78 Building infrastructures in excess of industrial requirements is not a new problem in Canada.

The lack of fit between the needs of Canada's manufacturers and provincial hydro capacities during 1919 and 1928 was identified by John Glassco, manager of the City of Winnipeg hydro-electric system. He found that "on closer examination of the records of the different provinces that the electrical industry has expanded quickly in spite of, relatively speaking, stagnant conditions in the manufacturing industries."/79 His analysis was an early sign of Canada's problem in matching the size and timing of its hydro installations with its regional industrial development requirements. No agreement exists among analysts about the reasons for overbuilding infrastructures.

Laxer interprets the overbuilding of the national railway system as a costly "mania." He argues: "Even though Canada needed only one transcontinental railway before the Great War, it was felt that three would be good; the more expensive the building methods, the better ... As a result Canada borrowed enormous amounts of British portfolio capital."/80 For Naylor the overdevelopment of the railway infrastructure stems from the portfolio funds and decisions made by finance capital./81 For Innis, writing in the 1930s, the dangers of overdevelopment are avoided through criticism and effective checks in the form of inquiry commissions./82 And Nelles sees the roots of overdevelopment of resources in managerial misjudgments or poor planning, such as the giving of too much power to promoters rather than to scientific experts./83 Neither approach relates the origins of infrastructure overdevelopment to Canada's dependent industrial development or calls for a closer examination of the limits of planning by the provinces./84

Crown ownership of resources (water power, forests, minerals, etc.) initially allowed the provinces a measure of political autonomy over hydro and resource policy, but relying on "industrialization by invitation" and a continentalist approach to energy and resource development means that decision-making over hydro and resources becomes reliant on directives from outside the province. Under such circumstances, the provinces' abilities to comprehensively plan

and to build power systems to fit industrial expansion becomes limited./85 This is the case because information about domestic industrial consumption is determined by whether or not foreign industries will expand their operations within provinces./86 At times the information passed on by foreign corporations is misleading (e.g., oil reserves were predicted to be exhausted twelve years after the mid-1970s oil crisis). This dissertation's position on overbuilding the infrastructure is that there is a recurrent lack of fit between the requirements of externally directed industry and the state's energy production. Much of provincial surplus energy is an outcome of the reliance on foreign industry. Such valuable renewable hydro energy (in contrast to the finite fossil fuel-sourced energy) surplus can be shared within Canada or exported.

- DIRECTING SURPLUSES

Would the provincial surplus capacity be used as a national industrial input, or would it be exported like a provincially produced continental staple? Aitken argued that "access to cheap Canadian industrial power will be restricted to plants within the political boundaries of Canada," and that any "export ... has been permitted only under very unusual conditions."/87 As indicated above, Dales argued that, since some hydro-electric power has been exported in small amounts, it fits, in part, the characteristic of a staple. Dal Grauer proposed that "export of hydro-electricity can safely be allowed in those few big

river developments where such relatively short-term export is needed to make the development economically feasible [short-term exports finance the extra capacity and can be stopped when Canadian consumers need to power]."/88

Mitchell Sharp's continental/national power strategy shows a classic staple dependence mentality: he advocated "the export of large blocks of power to the United States for a relatively long period of years to assist in the immediate development of certain large scale Canadian power projects."/89 These views range from "power only for industry in Canada" to building for export: Aitken and Dales understand provincial surpluses as national industrial inputs and, therefore, view exports as exceptional; Grauer understands short-term exports as revenue support to finance large projects; and Sharp advocates "exports of large blocks" for a "relatively long period" to start immediate "large scale" hydro projects.

One would expect that a nation would use new transmission technology to join its provincial power systems into a national energy infrastructure before integrating its provincial systems with a foreign country. This was not the case in Canada. For instance, 100 power lines are interconnected with the United States, only 35 interprovincially, and the east/west link was still incomplete by 1988./90

A strictly provincial-based explanation of overbuilding is insufficient: the federal policy on energy trade needs to be taken into consideration. Since Sharp's

national/continental statement on Canadian power policy in 1963, the National Energy Board has followed a continentalist electricity policy. It has largely ignored the use of provincial surplus energy as national industrial input and has asymmetrically legitimated that surplus power be used as a provincial continental staple.

METHODOLOGY FOR PROVINCIAL CASE STUDIES

The research upon which this dissertation is based does not rely on only one provincial case but focuses on provincial hydro as a "powerful agent" in the transition towards an industrial economy. The earlier Ontario expansion from Niagara Falls as a power source (1880s to 1920s) is examined as well as the most recent expansions in Québec, Newfoundland, Manitoba, and British Columbia (1960s to 1980s).

Provinces with the most hydro energy potential have, since the 1960s, enlarged their hydro infrastructures via the development of northern river sites such as the James Bay project in Québec, the Churchill Falls development in Labrador, the Nelson River development in Manitoba, and the Peace River development in British Columbia - they are all part of this analysis (see Figure 1). Several aspect of these large hydro projects received more detailed analysis within the context of each provincial power system: their development under private or state ownership, their use as industrial infrastructure, whether they contributed to overbuilding the infrastructure, and their use for energy staple production. Both in the formulation of the analytical

research questions and in the explanation of the findings, a synthetic approach drawing on concepts from Claus Offe and the new Canadian political economy will be used./91 The roots of each of the five provincial cases of hydro and industrial development were probed with four analytical questions:

- 1) How did private hydro development become subject to state intervention?
- 2) Have hydro schemes (developed by the state and private firms) been used for advancing industrial diversification in a dependent manner (as backward, forward, and fiscal linkages)?
- 3) What contributed to the building of too many power plants and the resulting provincial energy surplus? The failure by (invited) manufacturers to use the energy or the continentalist planning by the provinces?
- 4) How did the Canadian state legitimate continental, rather than national, sharing of surplus energy from provincial hydro projects?

To explain the similarities and variations of findings in the way state intervention, industrial development, the surplus, and exports occurred in these cases (for instance at Niagara Falls and Churchill Falls), the following analytical construct will be applied.

- PUBLIC OR PRIVATE OWNERSHIP

How did private hydro development become subject to state intervention?

Whether infrastructures, such as hydro plants and the distribution system, are operated as a capitalist enterprise or as a public enterprise depends on whether private entrepreneurs find the provision of an infrastructure, such as a hydro-electric system, sufficiently profitable, given

the historic and economic conditions at the time./92 The failure of private firms to provide less profitable production inputs (for instance, electricity in less industrialized regions), which are nevertheless necessary to continue industrial expansion, often results (due to decisions by the state and firms) in a change in provincial intervention.

In Canada, the allocation of virgin natural resources, which included undisturbed river sites with potential for power extraction to private owners, was, historically, the main form of provincial involvement in industrial development. However, the state-administered process of merely allocating water powers for profitable private development often failed to result in the development of the necessary infrastructure, especially in small towns and in the less lucrative regional power markets within the provinces of Québec, Newfoundland, Manitoba, British Columbia, and Ontario.

As will be shown below, by 1903, granting hydro power franchises to private owners at Niagara Falls failed in three ways: first, the speculation by US franchise holders with Canadian Niagara Falls power for fourteen years delayed the transition from steam machinery to electrical machinery in small-town manufacturing plants during a key historical period (1887 to 1901); second, all three private companies used up to two-thirds of the Falls' Canadian power to supply US industries; and third, they left transmission gaps

between towns and manufacturing industries in southern Ontario.

Such failures sparked small-town Ontario manufacturers to resist exports so that power would be returned from Buffalo to Berlin (now Kitchener) and to resist private extra-profits (by the Electrical Power Company) so that power at cost would be available. To carry this out, manufacturers requested the formation of the public Ontario Power Commission, which filled the infrastructural gap from Niagara to Berlin and provided power at cost to enhance their accumulation possibilities.

At times the state advances the provision of infrastructure (such as the building of northern hydro schemes since the 1960s) to accelerate economic development and the associated accumulation process. In Canada, provincial governments went beyond bridging the hydro infrastructural gaps and the integration of provincial systems, they tried to make electricity production a key feature of their provincial industrial development strategies. Thus, from the 1960s on, the largest hydro stations were built: Churchill Falls (Labrador), La Grande 2 and La Grande 4 (James Bay, Québec), Gordon M. Shrum (Peace River, B.C.) and the hydro stations on the Nelson River in Manitoba. The installation of these projects was accelerated because it was expected that they would have strong industrial linkage effects./93

In addition, provincial governments and private firms often combined hydro schemes with continentalist strategies for provincial development. Typically, the "emphasis was on growth through staples-led exports," on open-door policy to US investors and manufacturers, power system integration across the US border, and provincial surpluses turned into exports to the United States./94 Furthermore, hydro schemes were used by utilities and provincial governments to actively promote "industrialization by invitation" which included not only opening the door to the continent but soliciting foreign capital, foreign entrepreneurs, and their technologies from Europe and Asia.

- LINKAGES TO INDUSTRY

Have the hydro schemes (developed by the state and private firms) been used for advancing industrial diversification in a dependent manner (as backward, forward, and fiscal linkages)? To answer this question, each provincial case needs to be examined to determine whether manufacturers and resource processing companies used the expanding infrastructure to diversify production (as the state intended) by tracing physical (backward and forward) and fiscal (use of state rent from hydro for industrial incentives) linkages./95

If hydro schemes lead to new investments in input supplying facilities, such as turbine, generator, and electrical apparatus, then backward linkages are formed; if they lead to "new investments in output using facilities," such

as using "power at cost" to produce more sophisticated products from natural resources formerly processed into staples, then forward linkages are formed./96 Besides such production linkages, more indirect linkages are created when profits (or rent) from energy projects are invested to establish manufacturing facilities. Then the energy infrastructure fosters fiscal linkages./97 These processes, however, do not operate on their own.

The type of industrial linkages related to hydro development are due to choices and courses of social action taken by firms and the state./98 Whether the state relies on established foreign firms or indigenous firms to set up infrastructure-related industries determines whether the economic growth process follows a path of dependent or of indigenous entrepreneurialism and technological development./99

If the state makes its procurement of technical equipment conditional upon its manufacture within the province through the imposition of "nationalistic" manufacturing conditions, then the backward linkage formation of equipment industries (such as turbines and generators) can be the result./100 Often this is done by the substitution of hydro-electric equipment, formerly imported, for the same or similar equipment now manufactured within the respective provinces. This is akin to the import substitution industrialization (ISI) process identified by Williams./101 Through examining whether the substitute manufacturing of

such equipment is carried out by invited branch plants directed from head offices outside of Canada rather than by indigenous manufacturers, the dependent or independent formation (reliant on foreign technology and entrepreneurialism) of backward linkages can be determined./102 Whether such government-sought backward linkages are captured in Canada outside of Ontario and Québec depends on the strength of "nationalistic" procurement practices and the technological strangeness of new economic activities./103

As shown below, the insistence upon a buy-Québec policy by Hydro-Québec executives and the James Bay Energy Corporation during the 1960s and 1970s did result in strengthening both the state-owned and private turbine and generator industry (Marine Industries, Dominion Engineering Works) as well as is in the establishment of more branch plants of hydro-electric supply industries (ASEA Electric (Sweden), Brown Boveri (Switzerland), Canadian General (USA) etc.).

When hydro schemes lead manufacturers to invest in facilities that apply the new hydro energy to diversify the products made from natural resources, then new *forward linkages* are fostered. The formation of these linkages is not due to the characteristic of the staple but to choices by firms and the state. Such forward linkages were sought by provincial governments via *manufacturing conditions* being written into natural resource harvesting leases as part of the state's proprietary right when virgin resources were allocated to private owners./104

Should such forward linkages be developed through "industrialization by invitation" programs targeting firms already integrated in manufacturing centers elsewhere, the linkages are unlikely to be diversified./105 Such firms are likely to minimally process natural resources as staples rather than use them for new manufacturing activities. If foreign firms do not "Canadianize" their operations, the forward linkages using cheap power and natural resources continue to be of the staple processing variety.

Despite the addition of southern and northern hydro plants, between 1962 and 1984, the manufacturers in Québec continued to use about 80 per cent of Québec's electricity in primary manufacturing or in staple-based production. As indicated in Chapter 3, Hydro-Québec's own industrial contracts (over 5 MW) show that industries processing pulp and paper, chemicals, and primary metals made up 83 per cent of its industrial contracts in 1981 and 85 per cent in 1986. And, particularly during the 1970s, Québec government agencies continued to invite new "industrial masters," who supported manufacturing elsewhere, into their house.

In summary, many of the developers of backward linkages (such as the manufacturers of hydro-electric technology, who supplied the new hydro installations) as well as many of the developers of forward linkages (such as the users of electricity who were to diversify and value-add to the crude natural resource products so far produced) were invited from

outside the province or country by decision-makers in the state.

- OVERBUILDING THE INFRASTRUCTURE

What contributed to the building of power plants which exceeded provincial requirements? Matching the size and timing of infrastructures built for specific uses with the changing profit-oriented production of private industry, as Offe indicates, poses severe difficulties in relatively independently developed capitalist countries./106 However, in Canada this situation is aggravated by external influences. By "inviting" external relations of economic control in installing infrastructures and industry makes the state more and more unable to plan and coordinate infrastructural and industrial development. For instance, provincial governments were increasingly unable to plan and co-ordinate provincial hydro and industrial development. Too many production decisions are made outside the province or the country, and the ability to plan, say, capacity and timing of hydro plants within the province is, therefore, limited.

Especially when provinces have relied on US and other foreign owners to develop plants (Niagara Falls and Churchill), to build and run industry, or to consume provincial power (US utilities), their ability to co-ordinate industrial and hydro development became severely reduced. Allowing foreign ownership in the hydro-electric industry itself, as at Niagara Falls, meant the Ontario government lost its ability to use this power for Ontario industry. At

Churchill Falls, inviting in the British Newfoundland Corporation resulted in Newfoundland's loss of decision-making over power exports, plant ownership, and power repatriation. In addition, when foreign manufacturers, unexpectedly, advance insufficient production linkages (forward and backward), then an overbuilding and energy surplus results./107

At times, the state attempts to plan an economy using electricity and its related infrastructure for invited industries, to advance the transition to more diverse industrial development; only to have foreign controlled industrial firms thwart the process./108 As will be shown in the Manitoba case, Alcoa (an aluminium company) took advantage of a joint study with Manitoba to obtain a better energy deal elsewhere; a Nelson River power plant was overbuilt to serve the politically created Cold War demand of the International Nickel Company (Inco); and the Interprovincial Pipelines, whose energy consumption is determined by the continental oil swap, renders predicting its consumption nearly impossible.

The federally promoted acceleration of hydro schemes, reliant upon US utilities to consume their power, contributed to building plants surplus to provincial needs. However, developing hydro for US export does not mean exports are assured. As will be shown below, B.C. Hydro's exports to California were restricted by the US federal gatekeepers to the California market - the Bonneville Power

Authority - and Hydro-Quebec experienced \$32 billion in US utility contract cancellations within the last three years.

If key hydro expansion and industrial promotion strategies produce linkage failures within one province, then the resulting "unplanned surplus" of electricity could be transmitted for use by industries in other provinces. However, decision-makers in the federal and provincial state as well as in the United States advocated that such provincial energy surpluses should be available for "joint economic benefit" as part of a continental energy policy./109

- DIRECTING SURPLUSES

How did the Canadian state legitimate the continental, rather than national, sharing of surplus energy from provincial hydro projects? While the planning and building of hydro projects comes under provincial jurisdiction, continental and national (interprovincial) trade is the responsibility of the federal government./110 The sharing of a provincial surplus has allowed the National Energy Board a choice between two paths of action, each having different infrastructural needs: (1) reinforcing its use as a national industrial input requires a national power network, interprovincial sharing of surplus and transmission, and the blocking of exports; or (2) reinforcing its use as a provincially produced continental staple requires US interconnection, no enforced interprovincial sharing of surplus and transmission, and the allowing of exports. Rianne Mahon argues that decision-making within federal departments is

subject to preferred pre-selected imperatives./111 Similarly, Williams identifies continentalist and nationalist schools within the federal government./112 Since Sharp's national/continental statement on Canadian power policy in 1963, the National Energy Board has largely ignored the use of provincial surplus energy as *national industrial input* and has asymmetrically legitimated hydro surpluses be used as *provincial continental staples*. To add the appearance of legitimacy to export decisions, the National Energy Board holds public hearings.

Does the hearing process balance utility program interests and Canadian public interests? It does not. Through the pre-selection of interveners (potential opponents) and the pre-selection of imperatives, the critical effect of such hearings is undermined, and all that remains is the "scientifically" supported commercial glorification of Canadian "benefits" from continental integration./113 To accomplish this, the spectrum of themes allowed to inform official decisions is reduced to a minimum (i.e., those that have export relevance) with the result that problematic planning matters brought forward by the public can be neglected./114 In their decisions, the National Energy Board and the federal government are not neutral mediators between export planning interests (utilities, provinces, the public) and the planning impacted (neighbouring provinces, opponents); they favour a continental infrastructure integration.

Chapter 4 indicates that Newfoundland supported the position that its provincial surplus be available to a Canadian energy market without provincial boundaries. The province wanted present and future Labrador surplus plant capacity to be used by industries in Canada as "opposed to making such benefits available outside Canada," and it wanted a national objective to have priority over the provincial in export questions.

The National Energy Board did not exercise its inter-provincial jurisdiction, dismissed Newfoundland's request to stop Québec exports and to repatriate 1,200 MW (return about one-quarter of the capacity of Churchill Falls to Newfoundland), did not make Québec offer its surplus electricity to Newfoundland (because it is not "directly interconnected"), and did not support Newfoundland's argument that movement between producing and consuming provinces, guaranteed by the BNA Act and applicable to gas and oil pipelines, should also apply to electricity transport across Québec. Québec was allowed to block Labrador electricity and to sell its provincial surplus to the United States.

SUMMARY ARGUMENT

Recent hydro developments neither brought diversified industrial development nor advanced national integration. This is because the way private and public hydro entrepreneurs carried out provincial hydro and industrial policies resulted in dependent industrial development,

staple processing, provincial energy surpluses, and continental integration.

Both private and public firms developed new hydro plants, but the trend has been towards increased state intervention. I have argued that whether hydro plants and the power network are developed by a capitalist enterprise or as a public enterprise depends on whether or not a private entrepreneur finds running hydro plants to diversify industrial development sufficiently profitable, given the historic and economic circumstances. If the state or private power companies follow industrial development strategies which use new hydro plants to serve "industrialization by invitation" and continentalism, then at best, they foster dependent industrial development and extend or intensify staple processing. However, at worst, by "inviting" external relations of economic control in installing infrastructures and industry, the state becomes increasingly unable to plan and co-ordinate infrastructural and industrial development. Particularly when provinces rely on US and other foreign owners to develop plants, to build and run industry, or to consume provincial power (US utilities), their ability to coordinate industrial and hydro development becomes severely reduced. Provincial utilities planning to serve such a combination of precarious objectives, given that the capital is available, overbuild their hydro infrastructures and rely on short- or long-term exports. Because of interprovincial conflict and US inter-

vention, the development and use of provincial energy surpluses are federally legitimized as provincially-produced continental staples rather than as national industrial inputs.

CHAPTER PREVIEW

Chapters two to six contain individual provincial cases with a focus on five major hydro projects and related industrial development: Niagara Falls (Ontario), Churchill Falls (Newfoundland and Labrador), James Bay (Québec), Nelson River (Manitoba), and Peace River (British Columbia). Since Ontario's hydro-related industrial development set precedents and occurred much earlier than did the others (1900-30), the analysis of this case is focuses on the first three decades this century. The other cases contain only a brief review of the pre-1960s histories of private and state hydro expansions. For all cases, that is, Ontario and the subsequent post-1960s provincial expansions, the focus of my inquiry is on state intervention, industrialization, surplus power, and power export. These four themes are integral elements of the analytical construct informing the examination of the five cases and conclusions in chapter 7. It contains a historical comparison between the earlier Ontario case and the later provincial cases in order to demonstrate how old industrial and continental relations to water power development have intensified and how new relations have been established./115 By examining Canada's regional hydro-related development of industrial diversification, of exten-

sion and intensification of staple processing, and of continental energy integration, conclusions about interprovincial relations are drawn.

STATISTICS AND UNITS OF MEASUREMENT TO DESCRIBE CANADA'S HYDRO-ELECTRIC INDUSTRY

Energy, Mines and Resources reports that, by 1987, the electric power industry directly employed about 93,000 people, and that "the total assets of the industry were about \$98.7 billion" in all of Canada. Unlike the railway infrastructure, which was financed to a large extent by British portfolio investment, Canada's hydro infrastructure was financed largely from within Canada. By the end of 1987, the long-term "debt of major electric utilities was \$67 billion. Of this total, about 57 per cent (or \$38 billion) was borrowed on the domestic market, and 43 per cent (or \$29 billion) on international markets [86 per cent raised in the US]."/116 US-financed debt amounts to about \$25 billion, and the availability of this capital to hydro utilities had a bearing on building for export. In terms of assets, the three largest utilities are Ontario Hydro (\$32.7 bill.), Hydro-Québec (\$31.7 bill.), and B.C. Hydro (\$9.5 bill.), and, in terms of assets among all Canadian companies, they were ranked first, second, and sixth respectively./117

However, to adequately discuss relations between hydro utilities and industry, other provinces, and the United States requires more than units of finance and percentages - units of electrical power and energy are required. Most

users of electricity are familiar with the unit of electrical power called the "kilowatt," or "kW," which is equal to 1,000 watts. "A kilowatt can best be visualized as the total amount of power needed [from a generating source] to light ten 100-watt bulbs."/118 To burn ten bulbs for one hour consumes one kilowatt hour or kW.h. These units may be adequate for household or commercial consumption, but, when discussing generating stations such as Churchill Falls, units of bulk power and energy are required.

The power (capacity) of generating stations is described in terms of 1,000 kilowatts or megawatts (MW), and the unit of bulk (industrial) consumption frequently used in this dissertation is the equivalent of one million kilowatt hours or gigawatt hours (GW.h). For example, the most powerful generating plant in Canada is Churchill Falls, with 5,429 MW. It is larger than Manitoba's entire electrical capacity, which was 4,125 MW in 1988. Electrical bulk power consumers, such as universities, require, typically, 10 to 12 MW of power. The Churchill Falls generating equipment could generate enough power to supply 500 universities the size of Laval in Québec City or McGill in Montreal. Industries such as the average pulp mill in Québec require about 40 MW, and an aluminum plant requires about 100 MW of generating capacity. The Canadian Reynolds Metal Company in Baie Comeau required between 102 and 108 MW between 1974 and 1979./119

Electrical energy delivered over a period of time is always measured in bulk units. The entire energy delivered to Québec from Churchill Falls amounts to about 30,000 GW.h per year./120 The Churchill Falls plant would be unable to supply all the manufacturing industries in Québec, since the consumption of all electricity used by "manufacturers" (as categorized by Statistics Canada) in Québec amounted to 42,277 GW.h (in 1984), of which the pulp and paper sector consumed 20,946 GW.h, the chemical sector 3,732 GW.h, the primary metal sector 8,996 GW.h, and a variety of industries the remainder (see Table 3.2). In contrast, Manitoba's total consumption of electricity purchased by manufacturers is relatively small, it reported a consumption of only 2,530 GW.h in 1984 (see Table 5.4).

Following Sharp's 1963 national/continental power system interconnection policy to encourage the development of large power sources, the building of the largest plants in Canadian history began and the generating capacity of provincial electrical systems more than tripled. Since the 1960s, the largest hydro stations in Canadian history were built, Churchill Falls (5,429 MW, Labrador), La Grande 2 (5,328 MW, James Bay, Québec), La Grande 4 (2,635 MW, James Bay, Québec), Gordon M. Shrum (2,416 MW, Peace River, B.C.), and the hydro stations on the Nelson River in Manitoba (2,602 MW). In all provinces, such projects contributed to the enormous provincial system expansions: between 1960 and 1988, Québec's capacity increased from 8,920 MW to 27,258

Figure 1.2 Five Major Hydro-Electric Generating Stations

Sources: Energy, Mines and Resources Canada. *Electric Power in Canada 1988*. Ottawa: Supply and Services, 1989, 24.

MW, British Columbia's capacity increased from 2,963 MW to 12,497 MW, Québec's capacity tripled, while British Columbia's quadrupled.

Within Canada, the five provinces which are the largest users of hydro power (water falls, river rapids) for the generation of electricity are: Québec, British Columbia, Newfoundland, Ontario, and Manitoba./121

By 1988, provincial power from hydro resources had substantially increased. Manitoba had a hydro generating capacity of 3,641 MW, British Columbia had 10,848 MW, Québec had 25,585 MW, Newfoundland had 6,644 MW, and Ontario had 7,775 MW (Ontario uses coal, nuclear, and oil generation for the total capacity of 32,955 MW)/122 With such large capacity additions, by 1986, Canada had developed the third largest hydro-electric capacity, with 56,800 MW, among 188 countries./123

NOTES

- 1 John Dales, 1957, *Hydro-Electricity and Industrial Development - Quebec 1898-1940*, 182-3. Keefer thought the development of abundant electrical power would start a "new industrialism," as it had on the US side of Niagara Falls, and would "deliver the dominion from its 'hewer of wood' servitude to American industry and its bondage to American coal." T.C. Keefer, "Canadian Water Power and Its Electrical Product in Relation to the Undeveloped Resources of the Dominion." (Also cited by H.V. Nelles, *Politics of Development*, 1974, 213.) Marc Eliesen claimed that "low cost electricity supply maintains and attracts new investment to the province, helping to encourage a stable, diversified economy." Manitoba Hydro, Marc Eliesen, "Chairperson's Message," Annual Report, 1987, 6.
- 2 John Dales, *Hydro-Electricity and Industrial Development - Quebec 1898-1940*, 184.
- 3 Ibid., 182.
- 4 Ibid., 264, footnote 1.

- 5 Energy, Mines and Resources, *Electric Power in Canada 1988*, 47. During 1988, residential consumption of electricity constituted 27 per cent, commercial 22 per cent, and industrial 44 per cent. Energy, Mines and Resources, *Electric Power in Canada 1988*, 18.
- 6 Wallace Clement, 1989, "Debates and Directions: A Political Economy of Resources," 37. Dales argues, based on his analysis of the relationship between hydro development and industrial development in Québec before 1940, that "historically, Canadian staple industries have been characterized by dependency on export markets, and in part the Quebec hydroelectric industry fits this pattern: small amounts of electricity are exported directly to the United States." John H. Dales, *Hydroelectricity and Industrial Development*, 183.
- 7 Wallace Clement, 1977, *Continental Corporate Power*, 72.
- 8 Except for American lines and the Canadian Pacific Railway, the Intercolonial, the National Transcontinental, "the old Grand Trunk, the Grand Trunk Pacific and the Canadian Northern [were] brought together into one system, to be owned by the people of Canada." *Canadian Encyclopedia*, 1988, 1822.
- 9 Energy, Mines and Resources, *Electric Power in Canada 1988*, 1. The remainder of hydro generating facilities was owned by municipalities, private utilities, and industrial firms (e.g., Alcan, Cominco, pulp and paper companies).
- 10 *Canadian Encyclopedia*, 1822.
- 11 Energy, Mines and Resources, *Electric Power in Canada 1988*, 34.
- 12 *Ibid.*, 47.
- 13 The export is estimated as a percentage of net generation, and the interprovincial transfers (without Churchill Falls) are estimated as percentage of total generation. Energy, Mines and Resources, *Electric Power in Canada 1988*, 36, 45.
- 14 Ryerson, 1973, *Unequal Union*, 13. Tom Naylor, "Canada in the European Age," 125.
- 15 Tom Naylor, 1983, "Canada in the European Age," 97. Tom Naylor, 1975, *The History of Canadian Business*, II, 276.
- 16 *Ibid.*, 279.
- 17 *Ibid.*, 279, 280.
- 18 Wallace Clement, 1983, "Regionalism as Uneven Development: Class and Region in Canada."
- 19 *Ibid.*, 3rd page.
- 20 Mel Watkins, 1989, "The Political Economy of Growth," 22.
- 21 I would like to thank Rianne Mahon for making me aware of the importance of choice in the development of dependent industrial relations.
- 22 Gordon Laxer, 1985, "Foreign Ownership and Myths about Canadian Development," 333.
- 23 Tom Naylor, *The History of Canadian Business*, II, 56. Cited also by Laxer, 1985, "Foreign Ownership and Myths

- about Canadian Development," 332.
- 24 Ibid.
- 25 Neil Bradford and Glen Williams, 1989, "What Went Wrong? Explaining Canadian Industrialization," 55.
- 26 Garth Stevenson, 1983, "Federalism and the Political Economy of the Canadian State." Wallace Clement, "Regionalism as Uneven Development: Class and Region in Canada."
- 27 Politically, he argues "for the most part the present decentralized character of Canadian federalism suits the purposes of Canadian - and American - capitalists." Donald V. Smiley, 'Canada and the Quest for a National Policy,' *Canadian Journal of Political Science*, VIII 1 (March 1975), 40; cited by Garth Stevenson, "Federalism and the Political Economy of the Canadian State," 94.
- 28 Ibid.
- 29 Ibid.
- 30 Wallace Clement, 1989, "Debates and Directions: A Political Economy of Resources," 44. Canada, National Energy Board, 1987, "Regulation of Electricity Exports."
- 31 House of Commons Debates, First Session - 23rd Parliament, Vol. IV, 1963, 8 October 1963, 3,301.
- 32 Thomas P. Hughes, 1974, "Technology as a Force for Change in History: The Effort to Form a Unified Electric Power System in Weimar Germany."
- 33 Hugh Aitken, 1969, "Defensive Expansionism: The State and Economic Growth in Canada," 220.
- 34 Thomas P. Hughes, "Technology as a Force for Change in History: The Effort to Form a Unified Electric Power System in Weimar Germany," 154.
- 35 This technical and economic assessment report was prepared for the Federal-Provincial Working Committee on Long Distance Transmission with staff from the National Energy Board, the Department of Energy, Mines and Resources, and various utility managers, engineers and technical advisors on long distance transmission from most provinces. Québec was not represented on the committee. "National Power Network, Stage II Assessment," vol. I, February, 1967, prepared by T. Ingledow & Associates Limited, Consulting Engineers (Vancouver), for the confidential use of the Federal Working Committee on Long Distance Transmission, February 1967. Covering letter (28 February 1967) addressed to Dr. C.M. Isbister, Deputy Minister of Energy, Mines and Resources, Ottawa. Source: Library of the National Energy Board, Ottawa. An interim report with the same title, dated March 1966, was also prepared. Source: B.C. Hydro Library, Vancouver.
- 36 T. Ingledow, "National Power Network Stage II Assessment, Interim Report," 1.
- 37 T. Ingledow, "National Power Network Stage II Assessment: Volume I," 21.
- 38 Ibid., 4, 5.
- 39 Thomas P. Hughes, "Technology as a Force for Change in

- History: The Effort to Form a Unified Electric Power System in Weimar Germany," 163.
- 40 T. Ingledow, "National Power Network Stage II Assessment: Volume I," 25.
 - 41 Canada. Unpublished Sessional Papers, 24th Parliament, Session 5, vols. 912-19 #81-238, 1962, Reel 22/22. Sessional Paper No. 199, Canada. Department of the Secretary of State, Friday 16 February 1962 states that the information has been received from the Department of Northern Affairs and National Resources and from the Prime Minister's Office. Paper No. 199 states the content as: "A copy of all correspondence, telegrams, and other documents exchanged between the government and each province since January 1, 1961, regarding the establishment of a national power grid system."
 - 42 Letter by Walter Dinsdale, Minister of Northern Affairs and National Resources, to David Cass Beggs, President of the Canadian Electrical Association. Dated Ottawa, 17 January 1961. Unpublished Sessional Papers 24th Parliament, Session 5.
 - 43 John Diefenbaker, Prime Minister, letter dated Ottawa, 27 January 1962, sent to all provincial premiers. It was an invitational letter to the premiers regarding a conference in Ottawa, where they, accompanied by their technical experts, could "discuss with Federal Ministers the basic problems associated with the development and transmission of electric power within Canada." Unpublished Sessional Papers, 24th Parliament, Session 5.
 - 44 Jean Lesage, Premier of Québec, letter dated 8 February 1962, contained this reply to Diefenbaker's invitation to meet for discussions about the national energy grid in Ottawa. Unpublished Sessional Papers, 24th Parliament, Session 5.
 - 45 Third Provincial Premiers' Conference, Victoria, British Columbia, 6 and 7 August 1962. Proceedings, 6 August 1962, Legislative Library, Victoria, B.C., pp. 161-8, CANZC, 6 August 1962.
 - 46 Ibid., 163-4.
 - 47 Ibid., 167.
 - 48 During his public speeches, he referred to the energy conference of first ministers in Ottawa late on 22-3 January 1974, at which the federal government offered financial assistance to the provinces to enhance the interconnection between provincial utilities. Donald S. Macdonald, Minister of Energy, Mines and Resources, First Ministers' Conference on Energy 22-3 January 1974. Document No. FP-3133.
 - 49 Steering Committee, Western Electric Power Grid Study Agreement, Western Electric Power Grid, 1980, vol. I, Executive Summary, 5. Source: Energy Policy Branch, of Energy Mines and Resources, Manitoba. I was made aware of the "job issue" related to the Western Grid by Ron W. Pritchard, director of the Energy Policy Branch of

- Energy Mines and Resources, Manitoba, at an interview in his Winnipeg office, 24 August 1989.
- 50 Philip Smith, 1975, *Brinco*, 146, 147.
- 51 Mitchell Sharp saw such exports as being in the national Canadian interest as long as the "the export price of the power is just and reasonable in relation to the public interest." And he added that "a NATIONAL SYSTEM MIGHT BE DEVELOPED by a succession of stages" (emphasis mine).
- Government of Canada, Ottawa, Parliament, First Session 1963, 3300-1.
- 52 Philip Smith, *Brinco*, 147.
- 53 James Schlesinger, 1985, "Foreword," *Power from the North*, by Robert Bourassa.
- 54 Ibid.
- 55 Ibid., x.
- 56 The province-building interests in hydro developments differ from those identified in oil and gas developments by J. Richards and L. Pratt in *Prairie Capitalism*. Rent was expected from "future" exports to US utilities rather than from existing multinational oil and gas companies. However, a similar desire by the provincial political elite to gain political power from the federal government and economic power from central Canada are part of the province-building strategies behind provincial hydro development.
- 57 H.V. Nelles, 1974, *The Politics of Development*, 308.
- 58 Pierre Fournier, 1980, "Parameters of the Quebec Bourgeoisie," 82.
- 59 H.V. Nelles, 1976, "Public Ownership of Electrical Utilities in Manitoba and Ontario, 1906-1930," 483-4.
- 60 Tieleman's statement of opposition to American capitalists and to continentalism in Québec's hydro development case cannot be sustained, since US capital as well as continental integration was seen as a means to gain economic independence from federal and Anglophone domination. William Tieleman, 1984, "Political Economy of Nationalization," 84.
- 61 H.V. Nelles, *The Politics of Development*, 382.
- 62 Ibid., 492, 255. Nelles claims, with reference to Gerschenkron and Innis, that it was the condition of "economic backwardness" which "drove the manufacturers to use the state, in Harold Innis' phrase, to throw a bridge 'from a retarded development to an advanced state of industrialism.'"
- 63 K.C. Dewar, "State Ownership in Canada: Origins of Ontario Hydro," 345.
- 64 The delineation of social conflict around infrastructure installation follows more along the lines of those negatively affected by the project versus the project interests. Those impacted by (and opponents of) the project can be from a variety of classes and groups, as can those representing project interests. The class and social conflicts preceding or resulting from

- infrastructure installations do not easily follow the ownership of the means of production dialectic. Claus Offe, 1972, "Tauschverhältnis und Politische Steuerung: Zur Aktualität des Legitimationsproblems," 54; "Demokratische Legitimation der Planung," 134.
- 65 Claus Offe, "Tauschverhältnis und Politische Steuerung: Zur Aktualität des Legitimationsproblems," 54.
- 66 Ibid.
- 67 T.C. Keefer's address (in 1899) to the Royal Society of Canada entitled, "Canadian Water Power and Its Electrical Product in Relation to the Underdeveloped Resources of the Dominion," is cited by H.V. Nelles, *The Politics of Development*, 216.
- 68 Mel Watkins' conception of diversified growth (whereby "the character of the staple" provides a comparative advantage which can lead to diversified backward, forward, and final demand linkages), can be applied to test whether the provision of hydro-electricity engendered forward industrial linkages, as predicted by T.C. Keefer. Mel Watkins, 1989, "The Political Economy of Growth."
- 69 John Dales, *Hydroelectricity and Industrial Development - Quebec 1898-1940*, 156-7.
- 70 Ibid., 156, 157, 99, 100. Between 1915 and 1940, Shawinigan directly promoted manufacturing industries, aluminum, carbide, chemical, pulp and paper, textile, chemical, and other industries in small factories.
- 71 Tom Naylor, *The History of Canadian Business*, II, 283.
- 72 Robert B. Belfield, 1981, "The Niagara Frontier," 91, 110-14.
- 73 Dales found that "a count of the new firms listed in these reports from 1920 to 1939 inclusive indicates that some 137 located in the company's territory during that period." John Dales, *Hydroelectricity and Industrial Development - Quebec 1898-1940*, 138-9.
- 74 Unlike Dales, Mel Watkins deems it important to examine whether industrial linkage formation was indigenous or came about through foreign ownership. Mel Watkins, "The Political Economy of Growth."
- 75 Wallace Clement, *The Canadian Corporate Elite*, 7.
- 76 The provinces increasingly socialized productive forces (e.g. in productive Crown corporations), but by "inviting" relations of economic control, they were active in replicating the larger Canadian contradictory development logic: the socialization of "backward" productive forces and invitation of dependent relations of economic control.
- 77 Claus Offe, "Tauschverhältnis und politische Steuerung," 55.
- 78 Energy, Mines and Resources, *Electric Power in Canada 1988*, 34.
- 79 J.G. Glassco, "Water-Power Development: Public or Private Development," *The Commercial Manchester*, England, 13 June 1929.

- 80 Gordon Laxer, "Foreign Ownership and Myths about Canadian Development," 333.
- 81 Tom Naylor, *The History of Canadian Business*, II, 279.
- 82 Harold Innis, *The Problems of Staples Production in Canada*, 75.
- 83 H.V. Nelles, *The Politics of Development*, 452.
- 84 Claus Offe, "Tauschverhältnis und Politische Steuerung: Zur Aktualität des Legitimationsproblems," 55.
- 85 Claus Offe, "The Theory of the Capitalist State and the Problem of Policy Formation."
- 86 Kari Levitt, "Silent Surrender."
- 87 Hugh Aitken, "Defensive Expansionism: The State and Economic Growth in Canada," 220 (emphasis mine).
- 88 Dal Grauer, 1981, "The Export of Electricity from Canada," 280.
- 89 Mitchell Sharp, House of Commons Ottawa, Session 1963, p. 3,300. It is Watkins who points out that "Staple exporters - specifically those exercising political control - will develop an inhibiting 'export mentality,' resulting in an overconcentration of resources in the export sector and a reluctance to promote domestic development." Mel Watkins, "A Staple Theory of Economic Growth," 62.
- 90 Energy, Mines and Resources, *Electric Power in Canada 1988*, 47.
- 91 Concepts from Claus Offe, Mel Watkins, Albert Hirschman, Wallace Clement, Melissa Clark-Jones, Neil Bradford and Glen Williams, Tom Naylor, Glen William, H.V. Nelles, and Rianne Mahon guide the inquiry and the interpretation of findings.
- 92 Claus Offe, "Tauschverhältnis und Politische Steuerung: Zur Aktualität des Legitimationsproblems," 54.
- 93 Mel Watkins pointed out that infrastructure could have "powerful spread effects, potentially exceeding the original linkage from the staple itself and leading to pervasive industrialization." Mel Watkins, "The Political Economy of Growth," 18. Hirschman adds the notion that such developments are, at times, speeded up; "that development is accelerated through investment in projects and industries with strong forward linkage effects." Albert Hirschman, 1981, "A Generalized Linkage Approach to Development, with Special Reference to Staples," 63.
- 94 Melissa Clark-Jones, 1987, *A Staple State*, 223
- 95 Mel Watkins, "A Political Economy of Growth." Glen Williams, 1989, "What went Wrong? Explaining Canadian Industrialization," 5.
- 96 Mel Watkins, "A Staple Theory of Economic Growth." Mel Watkins, "The Staple Theory Revisited." Albert Hirschman, "A Generalized Linkage Approach to Development, with Special Reference to Staples," 66.
- 97 While Watkins stresses the political aspects of reinvesting rent in industrial ventures to create fiscal linkages, Hirschman points out that reinvestment

elsewhere in the economy (not physically linked to local resources) is an aspect of fiscal linkage. Mel Watkins, "A Political Economy of Growth," 18-19. Albert Hirschman, "A Generalized Linkage Approach to Development, with Special Reference to Staples," 88. For example, the Newfoundland government discounted the electricity for industry from the rent anticipated for electricity from Churchill Falls, which could not be transmitted to the island. A fiscal linkage without the transmission of the physical input (electricity) to industries on the island.

- 98 Neil Bradford and Glen Williams, "What Went Wrong?"
- 99 Tom Naylor, *The History of Canadian Business*, II, 276.
- 100 The idea of "nationalistic" procurement of hydro equipment stems from Faucher and Fitzgibbons. Philippe Faucher and Kevin Fitzgibbons, "The Political Economy of Electrical Power Generation: Procurement Policy and Technological Development in Québec, Ontario and British Columbia." The American connection to technology is discussed by Mel Watkins in "The Political Economy of Growth," 29.
- 101 Glen Williams, 1986, *Not for Export*.
- 102 Tom Naylor, *The History of Canadian Business*, II.
- 103 Albert Hirschman, "A Generalized Linkage Approach to Development, with Special Reference to Staples," 71-2.
- 104 Nelles states that "the principle of crown ownership of the forest survived intact and was used by the landlord state to bind its industrial tenants to contractual manufacturing commitments." For example, "the sawlog and pulpwood manufacturing clauses were made conditions of tenancy. The government merely wrote these conditions into the crown timber licences and the courts upheld this as a legitimate use of the provincial proprietary right." H.V. Nelles, *The Politics of Development*, 382, 106.
- 105 Tom Naylor, *The History of Canadian Business*, I, 38.
- 106 Claus Offe, "The Theory of the Capitalist State and the Problem of Policy Formation," 1975. Claus Offe, "Tauschverhältnis und Politische Steuerung: Zur Aktualität des Legitimationsproblems," 55.
- 107 Such a path of development is similar to the over-emphasis on the production of a dominant staple leading to a staple (or power) trap, as identified by Watkins. Mel Watkins, "A Staple Theory of Economic Growth," 63.
- 108 Ibid. And Melissa Clark-Jones, *A Staple State*.
- 109 James Schlesinger, "Foreword," x.
- 110 Adapted from Wallace Clement, "Debates and Directions: A Political Economy of Resources," 44.
- 111 Rianne Mahon, "Canadian Public Policy: Unequal Structure of Representation," 1977, 173.
- 112 Glen Williams, *Not for Export*.
- 113 Adapted from Claus Offe, "Demokratische Legitimation der Planung," 139, 146.

- 114 Ibid., 139.
- 115 Hans-Jürgen Krupp, "Probleme der Messung des Integrationseffektes von Infrastrukturinvestitionen," 1977, 290-1.
- 116 Energy, Mines and Resources, *Electric Power in Canada 1988*, 53.
- 117 Ibid., 1-2.
- 118 Canada, Energy, Mines and Resources Canada, *Electric Power in Canada 1988*, 110.
- 119 Contract between Canadian Reynolds and Hydro-Québec # 440-75, dated 10-1-75. Secretariat Conseil Executif. Hydro-Québec Articles 159 and 160 for the period 169-76. Source: Archives nationales du Québec, St. Foy.
- 120 This accounts for roughly the Churchill Falls capacity of 5,000 MW x 8,760 hrs per year, less the efficiency losses, which amount to about 30,000 GW.h.
- 121 In 1988, Québec produced 143,391 GW.h from hydro power; British Columbia 58,573; Newfoundland 39,731; Ontario 38,314; and Manitoba 15,379. Energy, Mines and Resources, *Electric Power in Canada 1988*, 25.
- 122 Canada, Energy, Mines and Resources, *Electric Power in Canada 1988*, "Table 5.2. Installed generating capacity by fuel type and province, 1988," 30.
- 123 Total capacity from hydro and other sources: the United States had the largest generating capacity in 1986, with 719,444 MW, the former USSR had 321,671, Japan 173,329; Canada 98,400; West Germany 82,660; and East Germany 22,059. Energy, Mines and Resources, *Electric Power in Canada 1988*, 7.

CHAPTER 2

ONTARIO: NIAGARA POWER REPATRIATION

INTRODUCTION

The development of Niagara Falls water power between 1880 and 1910 demonstrates that relying on private American and Canadian power companies is not in the interest of Ontario's indigenous manufacturers. Private utility owners delayed their transition from steam to electrical power and set the roots of dependency in Canada's generating equipment industry. Small-town manufacturers (acting in their own interest) did resist private power production for maximum profit and were instrumental in the development of public power at cost. In small-town Ontario, the provision of hydro-electric power brought some new industries but, otherwise, served industrialization through branch plants, the processing of staples, and the transition from steam to electric manufacturing. The public Ontario Power Commission, having built plants to fit such diverse paths of industrial growth (and simultaneously being undermined by US continentalist expansion), produced surplus capacities. However, Ontario's surplus electricity would not be lost to export - that had been decided after the repatriation crisis (1917-18). At that time Canada had not been successful in reclaiming its export electricity as national industrial energy. The lesson learned, albeit temporarily, was that "power exported is power lost."

During the first two decades of this century, essentially two views of how power from Niagara Falls best advanced industrial development became prominent. Some Ontarians promoted private power development for profit, others claimed power at cost would bring industrial growth. This became an issue, as James Mavor stressed, since every tourist could notice the difference in industrial development at the Falls.

For more than fifty years every observant tourist who found his way to Niagara Falls has been impressed by the vigorous industrial development on the American side and the complete absence of any such development on the Canadian side of the Falls./1

On the American side, at first, owners of water rights built diversion canals from above the Falls and sold the use of this flowing water (hydraulic power) to drive the water wheels (turbines) of their "industrial tenants" (grist and pulp mills) along the canal shores and on the bank./2 Then, starting in 1881, private power companies generated and sold power to electro-processing industries (chemical, abrasive, electro-plating), paper mills, food processing companies, and so on./3 For example, the Niagara Falls Power Company installed two power houses and, by 1904, had attracted more than eighty industrial customers in the short-distance and long-distance markets in Niagara Falls, NY, and Buffalo./4

Supporters of the private enterprise view argued that if private capital were allowed to make a profit from hydro development without government constraints, then vigorous industrial development, similar to that experienced in

Niagara Falls, NY, would be repeated on the Ontario side. This would work only, so they argued, if water power became private property (in Ontario it was owned by the Crown) and if the power companies were allowed to develop power for the most profitable markets (in Canada and in the United States).

Public power advocates, on the other hand, predicted that once Niagara power was unburdened by private profit it "[would] attract to the district the enterprise of others" and would be an "incalculable stimulus to the productive and competitive efficiency" of manufacturers in Ontario.⁵ Reliable public power, so they argued, could be brought to areas which had so far experienced energy shortages due to dry hydro sites during the summer and US coal supply problems in the winter. Power, they insisted, was essential for the survival of manufacturing. In Adam Beck's words, "an abundant supply of motive power is to the manufacturing arts what blood is to the human body."⁶ Furthermore, public power would retain Ontario as the industrial heart of Canada. As E.W.B Snider, a miller, farm implement manufacturer, lumberman, and former provincial politician foresaw, "[it] would easily enable our manufacturers to make Ontario the workshop of the Dominion and to control the home market for manufactured goods in Canada."⁷ Both views, however, overlooked the influence of foreign direct investment on industrial development.

The public enterprise view was opposed to foreign hydro ownership but was blind to the lack of "Canadianization" when branch plants were set up. Businesspeople thought of them as Canadian corporate citizens: "We manufacturers say when an American factory establishes its plant in Canada, does its work here, engages Canadian labor, it is to all intents and purposes a Canadian company."/8 However, as will be shown, since their foreign "parents" predict and decide their energy needs, planning public power facilities (size and timing) becomes problematic.

Mavor, holding to his "hydro by private enterprise" view, overlooks two potential developments: (1) that the failure of private power companies to provide adequate energy for industry can become a source of special interest pressures to start public hydro ventures, and (2) that such a failure can stem from private hydro companies not "Canadianizing" their operations. Within the electric power industry it was common practice to vertically integrate transmission line companies with power supply companies and to make maximum profits from the generating equipment and small staff of operators by supplying the most lucrative US or Canadian industrial market (in day/night operations).

In 1903 Ontario, American owners initially secured the exclusive rights to extract water power from the Canadian Falls and treated this energy resource like a staple to be exploited for export to US industry. As a result, southwestern Ontario manufacturers were delayed, since the 1860s,

in converting their Canadian industries from American-coal-fueled and steam-powered machinery to Niagara Falls-powered electrical motor operations since the 1880s. The threat of de-industrialization, falling behind, and losing their businesses motivated manufacturers and municipalities to start the public power movement and the public Hydro-Electric Commission of Ontario.

STATE INTERVENTION

The argument advanced for the state's intervention in the production of hydro-electricity is that the failure of private capital, especially foreign capital, to provide the less profitable production inputs necessary for the accumulation process of a variety of industries tends to result in the state initially filling the infrastructural gap and, eventually, nationalizing infrastructure development./9

In the case of Niagara Falls, then, the Ontario government and three private companies used Niagara Falls power as if it were a staple, and failed to use it as an industrial input in Ontario. The government's Ontario Power Commission, formed to remedy this problem, eventually reappropriated the energy and filled the transmission gaps. The historical account of such failures is evident in three ways: (1) a private American investor and an American power company delayed power development at Niagara Falls for fourteen years, which had implications for Ontario's industrial development in a key historical period and brought an end to the US power monopoly; (2) subsequently, three private

companies used the Falls power for US industries and exported two-thirds of the power; and (3) the same companies left transmission gaps between towns and manufacturing industries in southern Ontario. Such failures sparked Ontario manufacturers to request the formation of the public Ontario Power Commission. Its members requested that the Ontario government get directly involved in the production and distribution of Niagara Falls electricity. What follows is a more historically detailed account of the corporate approach to Canadian hydro development, in particular how American ownership in the production of hydro-electricity came to be resisted.

The first unsuccessful attempt to allow an American "investor" to develop Niagara Falls power started in 1887. The Queen Victoria Niagara Falls Park Commission granted the exclusive rights to extract the water power from the Ontario side of the Falls to A.D. Shaw. As Nelles describes these events, the commissioners granted the use of the Canadian Falls to Col. A.D. Shaw of Watertown, New York, for a \$10,000 advance./10 This was to help pay for turning the river-front property from a gaudy tourist business area into a park. Shaw sold his monopoly franchise to the Niagara Falls Power Company, which had already built up an industrial market on the American side of the Falls and now incorporated its Canadian water power lease as the Canadian Niagara Power Company (1892). Shaw became its nominal president./11 From now on, "this company had the first

choice of location for power development works within the Park" and was expected to be "the first power company to produce power on the Canadian side of the Falls." It received "the right, for one hundred years," to construct power development works and to transmit and distribute electricity for sale outside the river front park./12 Although the Ontario government held title to the water power and had imposed construction conditions on the franchise holders, Shaw and Canadian Niagara were able to hold up construction of power plants on the Ontario shore of the Falls until 1901./13

The failure to build a plant meant that a crucial historical period (before long-distance transmission, when industries had to locate close to power sources) was forfeited through the stalling tactics of American investors. Until 1886, industries, especially energy-intensive industries and electro-process industries (those producing abrasives, plating silver, processing chemical and food, etc.), had to locate close to power sites. It is in this period that most industries in Niagara Falls, NY, became "industrial tenants" of the Niagara Falls Power Company (see Appendix II, Table II.1). Not only was the pre-transmission market lost on the Ontario side of the Falls, but, by locking up water resource development, foreign owners contributed to the creation of hydro-related "industrial backwardness" in southern Ontario.

New transmission technology allowed the American monopoly the choice of whether or not to use future Ontario plants to supply the Ontario or New York state industrial market. It meant that Niagara power could be transported to industries in London and Guelph or across the border, like a staple, to industries in Buffalo and Syracuse. With improvements in technology, energy could be transported to industries in a widely scattered market, and, therefore, industries no longer needed to locate near the power site./14 While the company stalled on its Canadian development it expanded its US power system. On 10 November 1896, the Niagara Falls Power Company's twenty mile-long transmission line reached Buffalo, where it had a growing industrial market, with electric power from its Niagara plants on the American side./15 On the Niagara peninsula, suspicions about the US power company grew.

The spectacular growth sparked by hydro-electric development on the American side of the Falls exasperated the residents of the Niagara peninsula who had long since grown suspicious of the endless excuses advanced by the Canadian Niagara Power Company for the total lack of progress on its monopoly concession within the park./16

It was then that Ontario's Liberal premier, A.S. Hardy, "asked the Supreme Court of Ontario to rule whether the total absence of construction prescribed by the agreement at the 1897 deadline constituted a breach of contract."/17 But, "before the final showdown could take place the government and the company worked out a satisfactory compromise. In July of 1899 the company relinquished its monopoly on the

Canadian side of the Falls."/18 Despite the failure, Canadian Niagara retained the right to develop 100,000 h.p. (75 MW), less than a third of the total power rights subsequently granted to other private corporations from the Canadian side of the Falls./19

By 1903, the Queen Victoria Niagara Falls Commission had granted additional power franchises. As is the practice for American corporations establishing branch plants in Canada, the Canadian Niagara Power Company had added "Canadian" to its name; and the new American franchise holder, the Ontario Power Company, added "Ontario" to its name, while the Canadian-owned company, the Electrical Development Company, made reference neither to nation nor to province. The monopoly concession turned out to be the first failure in the provision of industrial electricity to Ontario. Yet, it was expected that the new water licence holders would surely replicate the spectacular industrial growth in the Niagara area. However, the choices of the three power companies to pursue the most profitable and low-risk strategy of supplying the lucrative urban and US industrial market resulted in the second failure to use Niagara energy for industrial energy in Ontario.

CANADIAN NIAGARA POWER COMPANY

The original franchise holder was the first to build its plant to provide exports to its US market. Harold Buck, the electrical director of the Canadian Niagara Power Company's American parent (the Niagara Falls Power Company),

simply conceived the Ontario plant as an extension of two New York plants./20 The plant's construction began in 1901 and the first internal transfers of power were made in 1905./21 Having been vertically integrated in the United States rather than having "Canadianized" its operations, the Canadian Power Company became a supplier to its parent firm's US transmission grid./22

By 1906, some of the exported energy supplied the short-distance industrial market in Niagara Falls, NY, but the bulk of it went to its long-distance industrial market in Buffalo./23 The Niagara Co. dominated both these industrial markets, having built them up before developing its Canadian plant (see Appendix II, Tables II.1, II.2). Connected by short-distance cables, some of its Niagara Falls, NY, industrial customers were less than half a mile from its plant. For example, the abrasive-producing Carborundum Company became an "industrial tenant" in 1895./24 Union Carbide's plant was built in 1899, two miles from the plant, and used up to seventy-two furnaces to produce Calcium Carbide ingots (Calcium carbide was usually transformed into gas for lighting). In 1904, companies such as the Natural Food Company, the International Paper Company, the Francis Hook and Eye and Fastener Company, and, in total, twenty-two industrial customers located less than two miles from the company's plant in Niagara Falls, NY (Appendix II, Table II.1). The second industrial market, also established well before the company built its Canadian

supply plant, constituted its long-distance market in Buffalo. About thirty-five miles from its plant, industrial consumers included the Great Northern Elevator Company, the Buffalo Cereal Company, the US Rubber Reclaiming Works, the Spencer Kellogg Company, and milling companies; in all, there were more than sixty long-distance transmission customers (Appendix II, Table II.2). The private company found it more profitable to transmit Canadian power a short distance across the river to supply expanding US industrial demand, than to transmit it to manufacturers in southern Ontario.

ONTARIO POWER COMPANY

The second company which failed to produce industrial energy for Ontario also had its corporate parents in the United States. In 1901, the Ontario Power Company, owned by "a syndicate of Buffalo industrialists," received its second franchise with the right to eventually develop 180,000 h.p. (134 MW) of Niagara Falls.²⁵ Its controlling parents were the Buffalo-owned transmission company Niagara Lockport and the Ontario Power Company. To ensure internal transfer, parents and Canadian off-spring signed long-term contracts. "The initial contract between the subsidiary and parent companies was dated July 16, 1904, and called for the delivery of 60,000 horsepower [45 MW] on or before January 1, 1907. The contract was to remain in force until April 1, 1950, with certain provisions for renewal."²⁶ As Belfield found, "Niagara Lockport's strategy was to build first a trunk line between Lockport and Syracuse, and then install

branch lines from the trunk to smaller urban centers in the region - rather like a general railroad track strategy."/27 One of the customers, the Lackawanna Steel Plant in West Seneca, NY, abandoned the gas engine it had used to generate its energy; what "persuaded plant executives to contract with the Niagara based power enterprise" was the Ontario Power Company's capacity, which aided by its Canadian plant, had the ability to "supply guaranteed and uninterrupted power" and "to meet the plant's occasional peak demands."/28 Having a Canadian electric energy supply company added to the companies' vertically integrated structure of supply, transmission, and customer distribution between Buffalo and Syracuse. Both the New York-owned Canadian Niagara Falls Power Company and the Buffalo-owned Ontario Power Company connected their Canadian power plants to their U.S. transmission lines and treated their Canadian subsidiaries as supply companies.

ELECTRICAL DEVELOPMENT COMPANY

Not only the American companies but the only Canadian company building a plant at Niagara Falls failed to produce and transmit industrial electricity to southwestern Ontario towns. On the 29 January 1903, the Queen Victoria Niagara Falls Park Commissioners granted the Electrical Development Company, for a period of fifty years, the right to develop a franchise of up to to 125,000 h.p. (93 MW)./29 The Electrical Development Company was owned by a Toronto syndicate, whose members, up to that point, were obsessed with railway

development. These members were William MacKenzie, a railroad man, Frederic Nicholls, an electrical engineer and head of Canadian General Electric, and Henry Mill Pellatt, a general financier-entrepreneur./30 These people comprised the "Mackenzie Syndicate [which] represented what was in fact the foundation of a private utility monopoly in Toronto: the head of the traction business, the head of the electric light business [the Toronto Electric Light Company], and the head of the major Canadian electrical manufacturer."/31 Although interested in attracting energy-intensive manufacturing near its Niagara plant, its aims were divided between the Toronto and the US industrial market.

The syndicate's industrial power park near its Niagara plant failed, but its primary plans were to transmit electricity to the industrial market in the US and to Toronto, where the same directorate owned the light and rail company. Copying US efforts in creating local industrial parks and promoting its own market, "the Mackenzie Syndicate purchased a huge plot of land (530 acres) in the vicinity of its generating plant. 'It was expected that this land would be taken up by manufacturers using electro-chemical processes, or [by] other large power-using businesses.'"/32 That strategy failed because the U.S.-owned Niagara Co. had, years before, "established a grip" upon the industrial market in Niagara, ON./33 The owners of the Electrical Development Company established two transmission subsidiaries: the Toronto & Niagara Power Co. (to serve

"Toronto and the intermediate territories") and, in 1906, it formed "the Niagara Falls Electrical Transmission Co. (to compete with Niagara Lockport in the safe, established markets of upstate New York")./34 By 1908, the Electrical Development Company's plant at Niagara Falls became a supply source for the Toronto Power Company (in turn controlled by the Toronto Railway Company) set up by Mackenzie to vertically integrate supply, transmission, and distribution./35

When franchises of Niagara Falls power were granted to American and Canadian owners by Ontario government officials, hopes were high that such an excellent power resource would be used to enhance Canadian industrial development not only in Toronto but in other southern regions of Ontario. The assumption that private, particularly American, power companies would share Ontario industrial development goals was wrong. The strategy of extending licences to foreign hydro developers and to the Toronto syndicate so that they would supply energy to local industry failed. The private companies were simply disinterested in, even opposed to, smaller Ontario manufacturers' goals of integrating into the provincial power infrastructure. Their interest lay in the more lucrative industrial markets in Toronto and from Buffalo to Syracuse.

RESISTANCE: AFTER TWENTY-FOUR YEARS TO BUFFALO, NIAGARA POWER FLOWS TO BERLIN

As Nelles observed, "geographically it may be" Canada's water power at the Falls, "but commercially and practically it will belong to the American manufacturer."/36 By 1910,

64 per cent of the power was for export; that is, the total installed capacity of generating plants on the Canadian side of Niagara Falls was 142,800 h.p. (107 MW); of this, 91,000 h.p. (68 MW) was committed for export./37 The realization by some Ontario businessmen that US power companies had not "Canadianized" their operations came somewhat late.

It was not until Ontario businessmen took envious notice of the industrial revolution brought by cheap electricity across the Niagara River in the state of New York that they discovered that their Niagara water-power had been gobbled up by Americans./38

By 1903, at the time the American companies and the Toronto Syndicate had received their licences, the threat of being left behind became very real to many smaller manufacturers in southwestern Ontario. They started a public power movement and their aims were clear; they did not want bureaucratically regulated power for profit; they wanted power at cost. They did not want an urban power monopoly running the hinterland; they wanted an inter municipally organized (and, thus, politically-based) public power company. And they did not want more power exported to Buffalo; they wanted power in Berlin. This meant building provincially owned transmission lines and making supply contracts with private power companies, until enough capital could be raised to build a plant, and the eventual "provincialization," rather than the internationalization, of private power plants.

Starting in 1902, small-town manufacturers met among themselves, with the public, and with key politicians to

form the Ontario Power Commission as an instrument for bringing Niagara Falls power and progress into their towns and factories. Progress meant using electric motors rather than steam-powered machinery, and it meant drawing electrical power from municipal circuit plants rather than coal-fired steam plants. Progress also meant inviting industries to small towns, and power was to be offered to such guests. One key spokesman for the pressure group, E.W.B Snider, the miller, farm implement manufacturer, lumberman, and former provincial politician, sold his idea to the Waterloo Board of Trade meeting on 11 February 1902:

"If Waterloo could offer cheap power to manufacturers it would greatly assist its further progress." Toronto, on its own merits, could attract a power line from the plants at Niagara, but the scattered towns of southwestern Ontario were certain to be left behind unless, as Snider suggested, the Board of Trade banded together to create an attractive, co-operative market for Niagara power./39

One year later in a meeting in the Berlin YMCA on 17 February 1903, he recommended to sixty-seven delegates from the main towns and cities in the region "that the municipalities should build a transmission system only, purchasing their power from one of the existing generating plants at Niagara" (at \$8 plus transmission, it would be \$15 per hp per year at municipal boundaries)./40 In February 1903, Snider led a group of twelve to meet Premier G.W. Ross and "begged the province either to distribute hydro-electricity itself or permit the municipalities to do it themselves;" he objected to the monopoly of Niagara water power in the hands of a few companies and predicted that lack of cheap power

would de-industrialize southwestern Ontario./41 The subsequent Act to Provide for the Construction of Municipal Power Works and the Transmission, Distribution and Supply of Electrical and Other Power and Energy allowed the "creation of the Ontario Power Commission, consisting of an electrical engineer and several businessmen whose job it would be to conduct detailed feasibility studies."/42 On 12 August 1903, at "a general meeting of the interested municipalities and manufacturers in Toronto City Hall, [E.W.B. Snider,] P.W. Ellis, a Toronto wholesale jeweler, W.F. Cockshutt, a farm implement manufacturer from Brantford, and Adam Beck, factory owner, mayor of London, and Conservative MPP" were selected commissioners./43 Beck took over the leadership of the Ontario Power Commission in 1904.

With continuing opposition from the Toronto Syndicate and its Electrical Development Company, Snider headed a commission of inquiry and filed his report during March 1906. The Snider Commission recommended that, since the towns "could not afford to build a generating station of their own at Niagara," they "[should propose] buying and distributing" electricity "at cost;" and that "a municipal co-operative [should] build and operate the transmission system linking the major towns with Niagara."/44 The Power Act allowed the Commission to proceed with its own transmission network. The Hydro-Electric Commission signed a contract with the Ontario Power Company on 21 March 1908 and on 13 August 1908 it contracted "to build a transmission

line from Niagara Falls to Dundas with branches running to Toronto in the east and the municipalities in the southwest."/45 On 11 October 1910, the first "switching on" ceremony took place in Berlin (later Kitchener) with great fanfare./46

In summary, in 1887, the Queen Victoria Niagara Falls Parks Commission, with the approval of the Ontario government, granted an exclusive water power licence to private American hydro developers, who were able to stall the building of power plants and, thereby, prevented industrial users from establishing themselves on the Ontario bank of the Niagara River before long-distance transmission. All subsequent licence holders, the two American power subsidiaries, the Canadian Niagara Power Company, the Ontario Power Company, and the Toronto Syndicate (owners of the Electrical Development Company) used their power plants to supply the lucrative New York industrial market. Their vertically integrated cross-border and urban capitalist approach to hydro development left transmission and distribution gaps between plants and Ontario manufacturing. In particular, their failure to provide the less profitable yet necessary power for a variety of small-town manufactures in Ontario resulted in the formation of the manufacturers' municipally-based power movement and in the formation of the Ontario Power Commission. The Ontario Power Commission bridged the private enterprise failure to supply industrial energy to the hinterland.

So far, it has been shown that Niagara Falls power, treated like a continental staple, had first been licensed by the Ontario government to private power corporations, and that they extracted Canadian energy as profitable supply sources for the US industrial market. Municipal (public) and manufacturers' resistance and state intervention helped to change the development of electricity as a staple to its use as industrial energy by the manufactures of Ontario.

LINKAGES TO INDUSTRY

The state, it was argued, needed to intervene to provide the necessary physical input, especially for small manufacturers, to continue profitable accumulation within an overall industrialization process (e.g., branch plant implantation, installation of staple production facilities, growth of smaller local manufacturers). The more specific hydro-related industrial development process is best seen in the choices made by firms and the state to develop backward and forward hydro-related linkages. Some manufacturers developed new forward linkages; in other words, they started new productive activities which required electricity rather than other forms of energy, such as, was the case with electro-process industries (plating silver, chemical processing). But mostly, whether privately or publicly produced, electricity served the growing branch plants in southern Ontario and the staple industries in northern Ontario. Further it supplied the industrial energy which transformed steam manufacturing in small Ontario towns. In the former

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tion of backward linkages, the private power corporations and the public Ontario Power Commission helped set the roots of dependency in the generating equipment industry. This was done initially by transferring US and European generating technology to power plants in Canada and, later, by substituting imports for the same generating equipment manufactured by branch plants in Ontario.

BACKWARD LINKAGES

"Already developed firms from the United States" were key agents in the formation of backward linkages between the 1880s and 1920s in central Canada./47 One way to trace backward linkages is to examine how some electrical firms became established in Ontario and another way is to examine whether or not the technology was transferred from other countries into Niagara Falls power plants. Established, government-invited US firms, such as Westinghouse and General Electric, came to Ontario to supply the growing electrical industry.

Some electrical firms came to Ontario lured by the bonuses, and they brought or imported their technology, or set up branch plants. For Naylor, a development strategy of "industrialization by invitation," complementing the commercial capitalism (centred in banking and trade) of the time, "[led] to the development of an inefficient, non-innovative, and backward industrial structure with a penchant for dependence on foreign technology, foreign capital, and state assistance as its *sine qua non*."/48 Naylor indicates that

rich firms, including wealthy electrical companies, took advantage of the municipal bonus systems (e.g., tax reductions, grants, stock purchases, cheap or free industrial sites, etc.)/49 "The Westinghouse Co. began roving Ontario in 1895 looking for a site and 'creating quite a stir in several Canadian towns.' It ultimately settled in Hamilton."/50 In 1892, Frederic Nicholls effected the merger of Edison Electric's two Canadian branches into Canadian General Electric and held manufacturing rights under licence with General Electric./51 By 1895, Senator Nicholls, a member of the Toronto syndicate developing power at Niagara Falls, owned most of the shares. Upon his death in 1923, the American General Electric purchased and controlled the Canadian Company./52 Like many branch plants, Canadian General Electric was to capture the Canadian electrical equipment market and its export rights were restricted to Newfoundland (which was not, at that time, part of Canada)./53

The choice of electrical and mechanical equipment for power plants at Niagara set the pattern for technological dependence. The three private power companies and the public Ontario Power Commission simply depended on General Electric, Westinghouse, and European technology. In addition, the private power companies imitated each other's selection of equipment./54 The initial choices over technology for Canadian plants were made by US parent companies in the United States. A more detailed examination of power

plants will show Canada's technological dependency and how dominant American manufacturers were strengthened by this backward linkage formation.

The US-owned Niagara Power Company had already installed two power plants on the US side of the Falls before it built its third power plant on the Canadian side. As Belfield found, its electrical director, Harold Buck, took charge of the design and arrangement of electrical equipment for the Canadian project, which was to be integrated with its power system on the US side./55 Canadian Niagara's power house was built in Queen Victoria Falls Park, about one half mile above Horseshoe Falls. Its eleven generators were each 10,000 hp (7.5 MW) and were the largest, most cost-effective installed so far./56 "With few exceptions the firm adopted the hydraulic features of the second plant, and again ordered the Francis (inward discharge type turbines from Escher Wyss of Zurich)," and General Electric was the manufacturer of the generators./57 The Canadian Niagara Power Company installations were simply a copy, with minor modifications, of the US plants. Thus, the choice over hydro technology was made outside the country. Because the Canadian power company was just as imitative, Canadian ownership of the third plant made little difference.

The Canadian-owned Electrical Development Company also copied previous equipment installations and, thereby, helped to replicate Ontario's technological dependence. The

Toronto Syndicate's Electrical Development Company power station was located upstream from the Canadian Horseshoe Falls on the river's edge. It planned for eleven generators of 8,000 kW (8 MW) capacity, each made by General Electric./58 Belfield found that "these generator designs followed Canadian Niagara designs to the extent that slides to illustrate them in public addresses were actually slides of the Canadian Niagara unit." This, of course, was not by chance. Belfield found that "this bold imitation makes sense if we bear in mind the common manufacturer involved, and the fact that the head for Canadian General Electric, Frederic Nicholls, was also one of the incorporators" of the Toronto-based Electrical Development Company, which built the plant. The turbines, like those of Canadian Niagara, were 12,000 hp (9 MW) Francis type units built by I.P. Morris of Philadelphia./59 Both power plants show the imitative nature of the technology and how dominant American manufacturers are strengthened by the backward linkage formation.

The location of the Ontario Power Company's power house was not above the Falls but near river level downstream. Again, although a different US parent company made the choice, for the first of six of its eighteen planned units, 10,000 hp [8 MW] General Electric generators were installed./60 The other US-owned utility, Ontario Power, freely borrowed the designs from Canadian Niagara./61 Ontario Power installed turbines supplied by the German com-

pany, J.M Voith, and the US company, Welman Seaver Morgan, and its generators were manufactured by Western Electric and Canadian General Electric (Appendix II, Table II.3). All the private power plants' equipment choices reveal that, by 1904, the backward linkages from hydro development had been captured by two dominant US manufacturers: Westinghouse and General Electric. Would a private utility make different equipment choices to foster less dependent manufacturing? This was not the case because branch plants have advocates in high political places.

To the dislike of Beck, Ontario Power Commission chairman, but on insistence of Whitney, the premier of Ontario, Westinghouse and the Canadian General Electric Company shared the transformer and equipment contracts for the power line from Niagara Falls to Toronto./62 For the Queenston-Chippawa project, the Ontario Power Commission purchased its generators from Canadian General Electric and Canadian Westinghouse. The two US branch plants took root and dominated the core hydro-electric component manufacturing in Canada in this century./63 Notes from a meeting between the Canadian Manufacturing Association and the Hydro-Electric Power Commission on 4 May 1920 reveal that, at the Queenston-Chippawa project during "September 1921, three generators of 55,000 H.P. [41 MW] each, two built by the Canadian Westinghouse Company and one by the Canadian General Electric Company," were contracted for installation. Furthermore, these notes indicate, "contracts have already been placed

for two additional units to be installed ready for operation by July 1922, making a total of 250,000 H.P. [187 MW] available by July 1922 with a maximum peak capacity for 275,000 H.P. [205 MW]"/64 Once such technology was installed in one province, it was copied in other provinces.

The influence of the U.S.-owned Niagara Co. on technological designs also extended to the Shawinigan project in Québec./65 Although some innovation did take place in transmission technology, once technological dependence on prime moving equipment was transferred into Canadian power houses by American power companies the technological dependence was continued - even by the public Hydro-Electric Commission.

The formation of backward linkages was pervaded by the following: dependence on technology and US electrical equipment firms, decisions on transfer of technology made outside the country, insider (Canadian General Electric) choices for equipment selections, and import substitution without export rights - all with no evident manufacturing conditions. The energy generated by such equipment can also influence industrial development as a new source of energy by replacing steam or by allowing new electro-chemical processes. In this way, extension of transmission lines to manufacturers, towns, and cities (and the establishment of some electro-process industries) constitutes the development of forward linkages.

FORWARD LINKAGES: NIAGARA FALLS POWER IN SOUTHWESTERN
 ONTARIO TOWNS 1910-20

The Ontario Power commissioners argued that power at cost to manufacturers would "in obedience to a natural law," stimulate their "productive and competitive efficiency" and attract "the enterprise of others." /66 Are there indications that the availability of Niagara Falls electricity fostered industrial development in southwestern Ontario communities? As shown below, its availability allowed new industries to develop, to serve US branch plants, and to aid the stifled small-town manufacturers. In a few instances, hydro-electricity did allow the development of new manufacturing processes such as silver plating and chemical processing. In addition, it did serve the Ontario industrialization process undertaken by small Canadian firms, branch plants, and within staple processing. Eventually, it would bring industrial energy to the small-town manufacturer, who was already constrained commercially (as indicated by Naylor and Clement, through competition with branch plants, takeovers, and insufficient financing deprived of Niagara electricity through US export, and dependent on expensive and unreliable energy. Evidence for these assertions about forward linkages derived from energy use will be the provided by an examination of industrial industrial energy users near Niagara Falls, ON, south of Guelph, ON, and, finally, further north.

Before 1904, no remarkable new industries were developed on the Ontario side of the Falls. The Niagara Falls

Power Company's industrial customers at Niagara Falls, ON, consisted of three contractors: the Carborundum Company, the Toronto and St. Catherine's railway, and the Niagara Electric Light Company. The three construction companies, A.C. Douglass, M.P. Davis, and A.C. Jenckes, used the electric power for air compressors, excavation equipment, machine shops, cranes, and lighting to build the power plants on the Canadian side./67 The industrial markets in the Niagara Falls, NY, and Buffalo region were well established before construction on the Canadian plants even began. Since southwestern Ontario manufacturers were ignored, the main purpose for building the Canadian Niagara plant became export to the United States./68

Although not on the same scale as earlier industrial development across the Falls (which started in 1881), the availability of hydro-electricity did allow the development of new electro-processing and other energy-intensive, abrasive industries (mostly US branch plants) in Niagara Falls between 1904 and 1930. One Ontario-grown company was the "first firm to begin manufacturing in Niagara Falls, the Ontario Silverplate Company, ... started in 1880 by Mr. Leonard McGlasham and Dr. G. Clarke in Humberstone, Ontario. In 1895, the plant was moved to Niagara Falls. The business, located at the corner of Jepson Street and Palmer Avenue, continued to expand and by 1905, the name was changed to the Mcglasham-Clarke Company." Oneida (Canada), established in 1916 by its parent at Oneida, New York, now

substituted former imports with silver plated objects produced in its new factory in Niagara Falls./69 In this way, electricity served not only Canadian corporations but but was used as an additional attraction to lure US corporations to Canada.

An energy-intensive chemical company and an abrasive industry began in Niagara soon after electricity became available. Cyanamid of Canada Ltd. (calcium cyanamid, a synthetic fertilizer) came to Niagara in 1907. Its two plants became one of the largest users of electricity in Ontario. The two ingredients essential to attracting abrasive companies were "reliable electric power and cooling water." "The Carborundum Company of Niagara Falls, New York, decided to start a Canadian operation [since 1919 called the Canadian Carborundum Company] in the former Township of Stamford, now part of Niagara Falls."/70 In 1930, the Norton Company prospered due to the closing of the plant in Niagara Falls, NY. "All the production of the Norton Company is exported to the United States and it is interesting to note that abrasives are one of the few commodities that pass back and forth across the border free of duty."/71 The shredding and baking of "Triscuit," by the Natural Food Company, had gone on across the river before 1904. Eventually, wheat was also shredded on the Canadian side. "The Canadian Shredded Wheat Company, along with the other Shredded Wheat Companies in the United States and England, was purchased in 1928 by the National Biscuit Company." It

since has been renamed Nabisco Foods./72 Indications are that new electro-process manufacturing did develop at Niagara Falls but, primarily, as branches of established US companies.

The industrial power users that applied to the Hydro-Electric Power Commission during 1920 from London, Guelph, Stratford, Woodstock, and Brantford were typical of the mix of smaller Canadian entrepreneurs and larger US firms, which either acquired Canadian businesses or set up their own. Meanwhile Ontario's industrial development became increasingly US-dependent.

A diverse group of existing and new industrial customers - Canadian and US branch plants - continued to apply to the Ontario Hydro Commission for cheap electricity. In London, some of the largest industrial customers were in the transportation sector. The Ford Motor Co. applied in Feb. 1920 for 1,000 hp (746 kW), the Republic Truck Co. in Jan. 1920 for 500 hp (373 kW), and the Stanley Railway in Nov. 1919, also for 500 hp (373 kW). In 1919 and 1920, the industrial customers in London consisted of a diverse group of industries, such as the Holeproof Hosiery Co., Carling Brewing and Malting Co., the Nut Crust Co. (bread makers), London Shoddy Mills etc.; all for a total of 3,402 hp (2,538 kW) of industrial consumption (see Appendix II, Table II.5). In smaller towns the industrial applicants showed that were ready to use electricity in their manufactures./73

For example, by 1920 the Guelph rubber, machinery, and carpet producing companies (e.g., F.E. Partridge Rubber Co., the Sterling Rubber Co., Malleable Iron Co. and Guelph Carpet & Worsted Spinning) requested a total of 1,200 hp (895 kW). In Jan. 1920, from Stratford, the Canadian Edison Appliance Co. asked for 300 hp (223 kW), and the four industrial customers together asked for 440 hp (328 kW). In Woodstock, with its wagon, furniture, and piano companies, the industrial power requests amounted to 960 hp (716 kW) between 1919 and 1920. Brantford required 1,545 hp (1,152 kW) of industrial power for motor, engine, oven, and kitchen manufacturing (by Robins & Meyers, Watrous Engine Works, Brantford Oven & Rack Company, and Hamm & Nott) to be carried out between 1919 and 1920 (see Appendix II, Table II.5).⁷⁴ Such applications for industrial energy indicate that the demand for public power by industry continued. So far, it has been shown that some new manufacturing industries did develop, and that the availability of Niagara power served Canadian and US owned industries.

What has not been shown is that, while Niagara power was exported to Buffalo and Syracuse, the electrical power for small manufacturers in towns such as Palmerston and Collingwood was lacking. US owners supplied Niagara Falls electricity to Buffalo by 1896, and only fourteen years later did they supply it to Berlin. It thus contributed to the slow transition from steam power to electrical power in manufacturing businesses. By 1910, small-town manufacturers

were not only subject to takeovers and competing with US branch plants, they were also deprived of low cost water power and were dependent on steam fueled by coal and expensive local electricity. If only industries in the US, Toronto, and Hamilton would obtain cheap power, then surely industries would leave the small towns in southern Ontario./75

Still working with steam machinery, small towns were at a real disadvantage. For example, were industrial electricity available, manufacturers could have benefited in the following way: they could have produced the same with one-third less energy because of doing away with steam-driven mechanical shafting; they could have saved floor space because of the smaller size of electrical machinery, and they would have been able to operate only sections of machinery rather than having to run it all at once. These were the findings of the Ontario Power Commission.

As the result of an investigation covering more than one hundred plants, varying in size from the Baldwin Locomotive Works, down to plants employing not more than one hundred horse-power, it was found that the introduction of electric power reduced the average power needed in factories running at varying loads to one-third of what was used. This reduction, much greater than was anticipated, was found to be due in part to the fact in the great majority of such factories, the power used in turning the shafting and countershafting absorbed the largest part of the energy.

Another unanticipated advantage ... the increased facility for operating at maximum output ... more machinery can be employed in the same floor space ... greater flexibility of operation, the fact that one section of a factory can work overtime without the necessity of running the entire power drive, the ease in changing the position of machinery, the saving of

the floor space which would otherwise be used by engine and boiler, the savings in the cost of the heavy structural work necessary to support long lines of shafting, and the increased facilities for using cranes in consequence of the absence of much overhead shafting./76

While the Niagara Falls Power Corporation held on and left Ontario water power undeveloped at the Falls, it transmitted electricity to Buffalo in 1896. Fifteen years later, in 1911, a survey shows that communities north of Guelph were still dependent on coal and steam power, and that they indicated their need to the power commission by 29 August 1911 (see Table 2.1).

Table 2.1
Demand for Electricity North of Guelph (1911)

Municipality	H.P.
Mt. Forrest	100
Harriston	150
Palmerston	250
Listowel	250
Durham	500
Hanover	300
Meaford	250
Thornbury	125
Collingwood	750
Owen Sound	1200
Shallow Lake	1000
Warton	600

Source: Ontario Hydro Archives, archival folder #3, Sir Adam Beck, General (1911); Survey of the district north of Guelph, a report on each town and industry, 29 August 1911; "Cost of Power from Guelph," 23.

Excerpts from the 1911 power survey of towns and industries, prepared for Adam Beck, indicate that manufacturers in such communities either burned coal, wood, or refuse to generate steam power (see Appendix II, Table II.6). The steam engines they employed were, in some instances, used to drive generators sufficient only to provide lighting.

For instance, Collingwood (population 3,500 in 1911) showed a diverse group of manufacturers. The industries surveyed were: Cronk Brick Yards, 15,000 bricks per day; Telfer Bros., biscuit manufacturers; F.W. Brown (planing mill); Collingwood Sash Building Co.; Imperial Steel & Wire Works; Charlton Lumber Co.; Collingwood Packing Co. (pork and meat packing); Collingwood Milling Co.; Burns Mfg. Co. (furniture); Wilson Bros. (sash, door, and hardwood flooring); Tannery Co.; and the Dixon Foundry Co. All of them, except one, had boilers and steam engines to run their machinery. Two excerpts from the survey describe the typical equipment.

F.W. Brown - planing mill - have two 100 H.P. boilers, one engine 130 H.P. "Leonard Corliss", one 25 H.P. engine. They burn approximately 12 [railway] cars of slack [coal] per year costing \$3.00 per ton. Considerable refuse is burn [sic] for which there is a market and they could use approximately 100 H.P. motor capacity.

Imperial Steel & Wire Works - have two boilers 12 x 72 - one Collingwood engine # 7, compound, with a rope to the mill; they burn approximately 3000 tons of coal a year, operating 24 hours a day, coal costing from \$2.55 to \$2.85 per ton.

Belted to engine is a Westinghouse 54 K.W. 125 v. D.C. generator for factory lighting. They could use from 100 to 150 H.P. in motor capacity./77

Another typical example is the town of Harriston (population 2,000). Its industries include the Davis Packing Company; J. Merrigan (casket makers); Gunn Coal Storage; G. Walkey (veneer plant and grist mill); Dryden Grist Mill; George Gray (planer mill); Harriston Stove Works; and the Harriston Furnishing Company. The comment about the need to

convert to electrical motors is typical for many communities.

Harriston Furnishing Company - Have an 80 H.P. Engine Jerome-Wheelock; burn refuse and coal, average on ton per day at present; require steam for kiln and heating purposes. Could use three or four motors totaling 75 H.P. average 45 H.P. Many of the plants in the town [Harriston] require steam for their process and a motor drive would permit a more economical steam system being installed and a cheaper result of factory output being obtained./78

Some towns also had their own water powers, but they were not always affordable for the small manufacturers. For example, in Palmerston (population, 2500), a town with a planing mill, grist mill, and malting company, the Hydro-Electric Commission's chief engineer reported:

The various industries of the Town are very desirous of having electric power; the Town were [sic] apparently unable to supply it from their plant, one reason given being - Cost too great. It appeared to me quite a nice industrial load could be got up in this Town if power were available. Present demands are placed at 250 H.P./79

The wish for public power was strong throughout the region. Not having public power at hand, many needed to rely on expensive or unreliable electricity from smaller water power companies. Many of the manufacturers from such smaller towns were instrumental in founding the Ontario Hydro-Electric Power Commission.

Further north, in the New Ontario, where exploitable resources were still available for invited extractive industries, the development of hydro power helped to continue the sequential exploitation of resources. Nelles summarized the extraction of resources and hydro power.

New Ontario more than lived up to its abundant promise during the first decades of the twentieth century. As has been predicted, hydro-electric plants and pulp mills appeared along the northern rivers; iron mines, smelters and steel mills were opened; and the miners of the province, in a wild, exhilarating succession of rushes, uncovered a series of fabulous gold and silver bonanzas./80

However, some government officials were not at ease with the foreign exploitation of Canadian resources. As Nelles points out, "to the director of the Bureau of Mines it seemed unforgivable 'that where nature has been so bountiful the citizen folds his arms and the enterprising foreigner is invited to step in to win and carry away the treasure.'"/81 Reliance on outsiders for the development of new ventures during the 1890s was not confined to manufacturing but was also typical of staple extraction.

In summary, the state needed to provide electricity as an input for a variety of industries in order to advance the accumulation process in general. The state expansion of Ontario's hydro-electric infrastructure was required to serve dependent industrialization in general and the generating equipment industry in particular. The forward linkages captured because of the availability of hydro-electric power between 1900 and 1920 were new electro-process industries; otherwise electricity became a service for the contemporary economic growth in branch plant manufacture and staple processing. Allowing exports delayed the technological transition (steam to electricity) of small manufacturers. First, Americans set the roots for the growth of a dependently developed generating industry; thereafter, the

Ontario utility continued this practice. Turbines and generator technology were imported by US-based utilities, the Toronto-based utility, and the public Ontario Power Commission and, thereby, set the roots for dependence in Canada's prime moving equipment industry. In this way, the electricity generated by plant equipment was transmitted, and it contributed to the formation of forward-linked electro-process industries. Such electricity also served the continentalist branch plant expansion, while power exports and supply neglect for small-town manufacturers stifled their transition from steam to electrical motors. Thus, the initial reliance private capital had a detrimental outcome.

So far, I have argued that the Ontario government and private power companies combined the Niagara Falls scheme with continentalist strategies for Ontario's provincial development. The provincial electrical infrastructure was integrated by US power companies with New York state across Niagara Falls to export power to US industries. At the same time, the roots for the development of a dependent generating industry were set by US power companies. Continentalism did not only go one way - there was resistance to exports by Ontario manufacturers, who were threatened by technological backwardness. The resistance to US ownership did not extend to other economic sectors, and public power was used to serve branch plant expansions and foreign staple processing. Not surprisingly, co-ordination problems arose between what

was considered to be an appropriate public infrastructure and uncertain foreign-directed economic development.

CAPITAL/STATE PRODUCTION CO-ORDINATION PROBLEMS: POWER ON FOR BRANCH PLANTS, LIGHTS OUT FOR SMALL-TOWNS, EXCUSES FOR PULP & PAPER BOOM AND BUST/82

Capital, in its problematic industrial formation, and the state, in the necessary provision of productive inputs, are unable to sufficiently co-ordinate their decisions over infrastructure production. This is especially the case when the state is required to get involved in the production of an infrastructure and also needs to use that infrastructure to produce industrial inputs. As is the case with building hydro facilities (power plants, transmission, etc.) and the production of hydro-electricity, the lack of fit between requirements by industry and what the state produces becomes apparent in the overbuilding of infrastructures (e.g., building three national railways). I will argue that the state strategies, when trying to provide productive inputs to serve three industrialization processes disconnected by private (foreign) capital formation, result in severe planning difficulties, including the overbuilding of infrastructures. This was the case when the Hydro-Electric Power Commission of Ontario expanded its infrastructure to serve small manufacturers, US branch plants, and the staple production (pulp and paper) industry in Ontario.

In order to supply municipalities and industries, which increasingly demanded to benefit from public power at cost rather than private power at profit, the power commission

first signed private supply contracts and, subsequently, bought power plants and power companies. Its first purchase was the Big Chute plant (built in 1909, purchased in 1914) on the Severn River (4 MW). The Ontario Power Company station at Niagara Falls, Ont., built in 1905 for Buffalo industry, was absorbed by 1917 into its system.^{/83} In the Thunder Bay service area, it added the Cameron Falls development on the Nipigon River to serve pulp and paper companies and to supply the twin cities of Port Arthur and Fort William by 1920. During 1921, it officially inaugurated its Queenston-Chippawa, which "would use Canada's full share of the hydraulic resources of the Niagara River," at the time hailed the largest in the world.^{/84} And by 1922, the commission negotiated to purchase the Toronto syndicate's Toronto Power Company, also owner of the Electrical Power Company's plant at Niagara Falls. However, the commission was soon accused of having surplus capacity and of being unable to appropriately forecast industrial loads.

Unlike the US power companies forty years earlier (whose infrastructure was developed to suit its "industrial tenants" within a more predictable service area), the power commission needed to match the size of its provincial infrastructure and electricity production with industrial growth which had disintegrated into domestic manufacturing, branch plant manufacture, and staple production. For instance, the unreliability of private corporations (especially those integrated into other economies) with

regard to predicting their future demands left a gap between changing the requirements of private industrial capital and publicly built infrastructure. This is what occurred when the Gregory Commission indicated that by October 1921, the Chief Engineer Gaby's "estimates of a demand for from 25,000 [19 MW] to 30,000 h.p. [22 MW] were far from reached."/85

On the one hand, the power commission tried to serve the staple interests; on the other hand, their information was so unreliable that planning became problematic. While the commission chairman was accused of overbuilding the infrastructure, he argued that the Ontario government failed to make a "binding contract with the Carrick interest," also known as the "the old Tory Timber Ring," which included the former mayor of Port Arthur./86 Since the Carrick interests did not honour their commitment, the power commission incurred a surplus capacity of "10,000 to 15,000 horsepower [8 to 11 MW]."/87 In the other case, Beck argued, had "agreements with certain elevators and other Fort William customers" been supported by the town of Fort William, the Commission could have sold "5,000 horsepower, and this would have been equivalent to an annual increase in revenue of about \$100,000."/88 Such difficulties in matching industrial forecasts (subject to unreliable commitment by industries) with the size of the public infrastructure is not only found in the "boom and bust" cycles of staple-based growth but also in branch plants expansions.

A meeting was held on Tuesday, 4 May 1920, between ten representatives of the Canadian Manufacturers' Association and four representatives of the the Hydro-Electric Commission. Key spokesmen for the interests of large consumers of industrial power were Mr. C.H. Carlisle, manager of the Goodyear Tire & Rubber Co. of Canada, and Mr. J.G. Perrin, manager of the Willys-Oberland Company. Beck, chairman of the Hydro-Electric Power Commission of Ontario, defended the commission's approach to hydro development and its allocation practices regarding industrial customers.

Carlisle, after briefly addressing chairman Beck and the other members of the executive, opened the discussion by stating "that the manufacturers are 100% backing you, and your Commission and your development of hydro power." Then, he quickly used the meeting to lobby for cheap hydro power for the Goodyear plant expansion in Ontario. He argued that, since industry employs people and manufacturing interests are the backbone of commerce, power line building to industry should come before supplying small Ontario towns./89 Perrin, who broke into the conversation by recounting that, between 2 December and 27 April 1920, his factory's power stoppages amounted to 38 1/4 hours, that he thought it a waste that small communities (he did not think of small manufacturers) should have lights and that, instead, more reliable power should be supplied to him and to Goodyear.

A short time ago I had occasion to pass through a number of hamlets and small villages in the Province.

Now it is very nice to see them all lighted up and all that but it seems a waste and this power should be devoted to industrial lines. (emphasis mine)/90

By continuing to stress the employment, the capital investment, and, thus the importance of the Goodyear branch plant to the Ontario economy, Carlisle expected to get priority for the installation of the urgently needed hydro line in time for his company's plant expansion and industrial energy consumption.

We are just about completing another building that will increase our consumption, and we have another building to construct, and when that is completed our power requirements will be six thousand five hundred horse power [6500 hp]. Our present plant is one twelfth of the plant we planned for New Toronto, our Company is employing about three thousand people, and this new development will call for about six thousand five hundred people. I have been informed that we can get no increase of power. When I located in New Toronto I took it up with some of your representatives and was assured of continuous power and plenty of power. We have made an investment at the present time of \$6,842,000. The additions mean two and a half million dollars more, so we have quite an investment. In planning this plant we made no provision for space for steam plant... We will need by January 1st, (1921), 6500 H.P. and we get a promise of 2300. That is one reason that I think we should first see that the manufacturing interests that employ the people of this Province and the concerns that are practically the backbone of commerce should be first considered, and their future extensions be provided for. (emphasis mine)/91

Adam Beck, the chairman of the Ontario Hydro-Electric Commission, replied that power supply to industry can be more easily controlled than can power supply to individual households. "We can control big industry, but it would seem almost impossible to control a householder."/92 And, addressing his fellow manufacturers, he laid out the difference between a public utility's and private utility's

responsibility towards supplying electricity to Ontario municipalities.

You [manufacturers] are getting power at cost, and I think we have always made an equitable adjustment as between the manufacturer, street lighting service, and the individual householder. You say the manufacturer should have some preference, but as I have already explained, this is not possible. It is a municipal affair, and we cannot say as a private company might say that we will not take on this town or that village, because the manufacturers pay us a better price and it is cheaper and more convenient to render one bill instead of 10,000 bills./93

Since the power commission could not supply the power, and Goodyear management did not want to wait for the industrial load which would come on line from the Queenston plant, Goodyear signed a contract with the Toronto Power Company, which sold power for profit rather than cost./94 As indicated in Goodyear memoranda, "the cost of power under the Hydro [Commission] contract, is at present \$22.75 per H.P. per annum ... If 2300 H.P. were taken from the Toronto Power Company, the cost per H.P. per year, would be \$72.51."/95 Goodyear signed a contract "on the 28th of July, 1920, and under its terms, the Toronto Power Company agreed to supply and hold in reserve for the Goodyear Company, 3000 HP ("Firm Power") during 24 hours of every day for a period of five years from 1st January, 1921, to 31st December, 1925."/96 Two months later the contract for power was no longer needed by Goodyear's branch in Canada, as Carlisle's correspondence with the commission indicates.

"...as early as September 1920 I [Carlisle] took up with Mr. McDougall the matter of the contract with the Toronto Power Company, stating that owing to the depression and the financial position of The Goodyear

Tire & Rubber Co. of Akron, Ohio, with whom we had contracts for foreign business, we would not be in position to use the power for which we had contracted." "As you know, the American Goodyear became involved with losses of upwards of \$70,000,000.00, causing us a loss through the contracts we had with them for foreign business of somewhat over \$5,000,000.00. This loss made our company insolvent, and it was necessary to refinance and reorganize."/97

He argued that for these reasons "the Goodyear Company was in no position to take the additional power specified in the contract with the Toronto Power Company."/98 The value of the legal and collectible contract, "a sum of \$360,000.00 ... was scheduled as one of the assets of the Toronto Power Company, which the Hydro-Electric Power Commission was negotiating to purchase."/99 The compromise acceptable to the Goodyear Company was to suspend its contract with the Toronto Power Company and obtain power rate of "\$29.27 per H.P. per annum" from 1921 to 1926 (the Toronto Power Company rate had been \$72.51 per hp per year) from the commission./100

What I demonstrate is that when an agency of the state tries to provide productive inputs for manufacturing in small towns, for foreign-directed branch plants, and for staple production, serious co-ordination problems emerge. Supplying such varied paths of industrial growth, which are disintegrated due to US foreign ownership, often result in power surplus capacities. Whether surplus capacities should be used in Canada, rather than exported to the United States, was a contentious issue a decade earlier.

ALLOWING EXPORTS: "CANADA SHOULD NEVER AGAIN EXPORT FIRM POWER"

Whether Ontario's surplus electricity would be exported or used like a staple was decided after the repatriation crisis of US exports (1917-18). At the time, Canada was not successful in reclaiming its electricity as national industrial energy. As mentioned earlier, the lesson learned, temporarily, was "power exported is power lost."

Like other resources in Canada at the turn of the century, Ontario's electricity was considered an exportable resource. Since the 1880s, industries developed on the US side of Niagara Falls, and the provincial and federal governments permitted exports to the US industrial market by American private utilities. Starting with the Hydro-Electric Commission of Ontario in 1903, manufacturers began resisting exports at the provincial level. But what events brought about rethinking hydro power's use as tradeable continental staple to its use as industrial energy for Canada?

Dal Grauer, in his study of the history of exports, highlights four key events at the federal level that contributed to a change in the legitimization of exports: (1) the threat of Canadian water power being absorbed by the United States led to the passing, in 1907, of An Act to Regulate the Exportation of Electric Power and Certain Liquids and Gases; (2) in 1909, moves to divert more water power from the Canadian side of the International Boundary led to the Laurier government setting up the National

Commission of Conservation under Minister of the Interior Sir Clifford Sifton; (3) the reaction to the New York state Public Service Commission's interpretation of an export application by the Privy Council in 1914 that the "time has long since passed" for the Dominion of Canada to "forbid" "exportation;" and (4) when Canada needed electricity in 1917-18 for war production, the Power Comptroller found that export commitments and industrial demands had absorbed existing capacity. Further, the numerous debates between 1925 and 1937 supported the view of the Power Comptroller Sir Henry Dayton that "power exported is power lost."/101 These events need more elaboration.

The reason the Ontario government was tempted to commit a portion of its water resources for export was to obtain tax revenue. The Canadian subsidiary power companies first obtained the licences and then made export contracts with their US parent utilities for up to a century (and, thereafter, financed the Niagara power plants). For example, Grauer indicates, "the Ontario Power Company in 1904, envisaged the export of 45,000 horsepower of electrical energy to the United States for a period of 99 years." Out of concern that these sites would not be available for future need, Grauer found that, "An Act to Regulate the Exportation of Electric Power and Certain Liquids and Gases," enacted on 27 April 1907, was essentially restrictive in character. Not only electricity but also international power lines came under this federal legislation. Every licence needed a

government permit; diversion, through export, was not permanent; and licences were revocable when needed by purchasers in Canada after approval by the governor in council./102

In 1909, the Niagara Falls diversions resulted in the setting up of the National Commission of Conservation under Minister of the Interior Sir Clifford Sifton. His commission reported that "should water power be exported to the United States, the vested interests which it would create there would prevent its subsequent withdrawal to meet future needs of Canadian industries."/103 He read the US interpretation of the permanence of Canadian exports correctly. The New York state Public Service Commission, in 1914, wrote that, when "affecting so important a subject as the means of continuing great industries [the] time has long since passed when governments proceed ruthlessly from pure national rashness or anger to destroy the settled accepted commercial relations."/104 This interpretation "raised a storm in Ottawa," and the Privy Council sent the Canadian ambassador in Washington to the "interests concerned" to remind them of Canada's 1907 Exportation Act, particularly of the stipulations that exports are "revocable," valid for only one year, and that industries outside of Canada have no rights to permanent diversion of this energy resource./105

Table 2.2 shows that, despite restrictive legislation since 1907, exports from Ontario to the United States rose steadily until 1914, when they levelled off but stayed high during 1917-19. Federal and provincial governments practiced

selective neglect and, thereby, allowed firm exports.

"Having allowed export agreements to be made ... they were unable to repatriate firm power exported ... Their administration, both at the provincial and federal levels, however,

TABLE 2.2
Annual Quantity of Electricity Exported to the United States, 1908-20
(GW.h)

Year	From Ontario	From Québec	From other provinces	Total exports
1908	113	--	--	113
1909	358	--	1	359
1910	474	--	1	475
1911	536	--	2	538
1912	536	--	2	538
1913	656	--	6	662
1914	746	--	27	773
1915	605	29	22	656
1916	647	359	16	1,022
1917	779	429	17	1,225
1918	730	381	16	1,127
1919	731	396	16	1,143
1920	643	283	24	950

Sources: 1908-10, Canada, Department of Inland Revenue, Publications in Dominion Bureau of Statistics Library; 1911-20, Canada Year Book. (cited by Dal Grauer, 1961:257)

was found to be wanting."/106 The federal government's inability to enforce repatriation of electricity through legislation became absolutely clear during the war.

Grauer maintains that "the real explosion, if it can be described as such, was heard in 1917."/107 It occurred at a time when Canadians most needed electricity, when up to 80 per cent of the power in the Niagara area was used for war manufacturing, and when power needed to be rationed by the power comptroller. When the Imperial Munitions Board consulted the Niagara Falls hydro electricity producers, it

"found that export commitments, together with the already inflated demands of industrial and other consumers in Canada, had absorbed practically all of their existing capacity."/108 Adam Beck described the situation in the following way:

Industries either had their power cut off, or reduced to a point which entailed great financial losses; in many cases almost complete paralysis of business was experienced. At this period the Hydro Electric Power Commission was supplying power for the operation of over 360 plants manufacturing munitions and war supplies, and these plants were using over 80 per cent of the entire power supply in the Niagara district."/109

Further:

One can hardly find fault with our neighbours to the south for desiring to have such a valuable commodity to aid in building up their industries and communities, but it is scarcely to be expected that Ontario citizens can be induced to part with a commodity so essential to their own necessities and welfare./110

Subsequent to the 1917-18 power deprivation experience it became clear to utility executives, industrialists, and residential customers that "power exported is power lost." As a result of the inability to repatriate as much electricity as was needed by the Ontario and federal governments, leading politicians all "spoke to much the same effect, namely, that Canada should never again export firm power."/111 In 1929, Prime Minister W.L. Mackenzie summarized the rethinking about the use of hydro-electricity in Canada since the turn of the century. "Public opinion in Canada ... is insistent that such power...shall be utilized within the Dominion to stimulate Canadian industry and develop the natural resources."/112 The experience of the

Niagara Falls power export trap conditioned the perception of electricity as industrial energy but did not lead to a comprehensive national energy or industrial policy.

CONCLUSION

Since the 1880s, the state dealt with some of the structural problems in Canada's industrial development through infrastructure-building, tariffs, and inviting in already developed industrial firms from the United States. As part of this strategy, hydro developers were invited into the country to hasten industrial expansion. The installation of a power plant immediately downstream on the US side of the Niagara Falls in 1881, the breakthrough in long-distance transmission, and the increasing use of electric motors in manufacturing since the 1870s offered profitable ways of generating power for industry. Some Ontarians thought that private hydro development for maximum profit would yield the best industrialization results; others claimed that power at cost, not profit, would best advance industrial development and accumulation.

From 1887 to 1901, American hydro utilities, building power plants for US industries at Niagara Falls, NY, and Buffalo, acquired exclusive water power rights on the Canadian side and incorporated them as the Canadian Niagara Power Company, while its American parent, the Niagara Falls Power Company, supplied eighty industrial customers by 1904. The Ontario government withdrew its monopoly rights when it stalled Canadian plant construction and industrial develop-

ment until 1901. All licence holders, including the Ontario Power Company and the Electrical Development Company, had built their plants to supply the US industrial and Toronto market by about 1906. The private power companies' failure to transmit power to the small manufacturers in southwestern Ontario towns gave rise to the formation of the publicly-owned Ontario Power Commission. It belatedly began bridging the transmission gap, so that small manufacturers could convert their factories from American-coal fueled steam engines to industrial electric motors by 1910.

Although American hydro power developers were no longer invited to set up their plants at Niagara, they had been installing US and European technology in US and Canadian plants at Niagara Falls since the 1880s. By 1901, General Electric, Westinghouse, and European manufacturers were the chosen suppliers of prime moving equipment in Canadian plants. This early technology transfer, along with takeovers of Canadian firms, stifled the development of Canadian electrical equipment manufacture. Some new electro-process branch plants (carbide, abrasive, chemical, and silver-plating industries) came to Niagara Falls, ON. The expansion of the electrical infrastructure and repatriated power from Niagara primarily served the ongoing industrial development in small manufacturing, US branch plants, and forest staple production. Trying to fit its Ontario infrastructure expansion to these three development paths for industrial growth disintegrated through

"industrialization by invitation" and resulted in severe planning problems. These problems were aggravated by having allowed exports.

The federal government, in charge of export policy, reversed its view that power surpluses could be treated like other exported raw materials or semi-processed material, and began insisting that they should constitute a national industrial input. The threat of having its water powers absorbed by US industry resulted in the 1907 Exportation Act, which was unable to repatriate power needed for Canadian war industries between 1917-18. As a result of these repatriation difficulties, a new "consensus" underpinned policy for the next fifty years: "power exported is power lost," and power "shall be utilized within the Dominion to stimulate Canadian industry and develop natural resources" (King 1929).

How can this course of events be interpreted? I have argued, since development of Niagara Falls power was used by private firms and the state for two purposes, (1) as a continentalist venture to provide power for export to New York state and (2) to provide power for industrial development in Ontario, this delayed serving existing and new dependent industrial development in Ontario and led to continuing difficulties concerning the repatriation of exported energy.

Despite such difficulties, Canada's political elite did not learn enough from the Ontario experience to develop the

required federal/provincial resource policies during the subsequent decades. As Nelles points out, to make renewable hydro-electric energy a national industrial input and to use it for the diversified manufacturing of natural resources requires "manufacturing conditions" provincially co-ordinated at the federal level, that is, a national energy and industrial policy./113 In the absence of a national industrial policy and in light of the renewed permission to export (through Sharp's 1963 federal power policy) from gigantic northern hydro plants, financed in part with US portfolio capital, members of the Québec political élite and their utility planners followed their own "nationalistic" and continental hydro-industrial development strategies.

- 1 James Mavor, professor of political economy at the University of Toronto, argued for the development of Niagara power by the private sector and for US exports if local manufacturers are not willing to match the US price. James Mavor, 1925, *Niagara in Politics: A Critical Account of the Ontario Hydro-Electric Commission*, 17.
- 2 Merril Denison, n.d., *Niagara's Pioneers*, 17-20.
- 3 The American Institute of Electrical Engineers, 1904, *The Niagara Falls Electrical Handbook*.
- 4 Ibid., 81-4.
- 5 *Official Report of the Ontario Power Commission*, dated 28 March 1906, 16.
- 6 Adam Beck, *Conservation*, pp. 19-20; cited by K.C. Dewar, "State Ownership in Canada: Origins of Ontario Hydro," 251-2.
- 7 K.C. Dewar, "State Ownership in Canada: Origins of Ontario Hydro," 1975, 228; from the *Snider Papers*, Petition to the Hon. G.W. Ross re Niagara Power (undated).
- 8 K.C. Dewar, "State Ownership in Canada: Origins of Ontario Hydro," 231, footnote 52.
- 9 From Claus Offe's idea that since input commodities are too costly, require taking risks, or are destined for exclusive use, the result is "the failure of some capitalists to produce input commodities on which the accumulation of other capitalists depends." Claus Offe,

- 1975, "The Theory of the Capitalist State and the Problem of Policy Formulation," 130.
- 10 H.V. Nelles, *The Politics of Development*, 33-4, 227.
- 11 Ibid., 33-4.
- 12 "The Canadian Niagara Power Company was incorporated by an Act of the Legislature of the Province of Ontario in the year 1892"; the agreement with the Commissioners for the Queen Victoria Niagara Falls Park was dated, 7 April 1892. The American Institute of Electrical Engineers, *The Niagara Falls Electrical Handbook*, 163.
- 13 Nelles defines water power ownership: "The water, simply by virtue of passing over private property, was not itself private property; it could be used only in passage" (footnote 9). "By retaining title to waterpower in the hands of the crown and by leasing waterpower privileges instead of selling them outright, the state could demand both a revenue from the industry and prompt performance of construction agreements." H.V. Nelles, *The Politics of Development*, 7, 38.
- 14 The American Institute of Electrical Engineers, *The Niagara Falls Electrical Handbook*, 76-7.
- 15 Merrill Denison, *Niagara's Pioneers*, 28. (see Appendix II, Table II.2, for Buffalo industrial customers.)
- 16 H.V. Nelles, *The Politics of Development*, 223.
- 17 Ibid., 225.
- 18 Ibid., 225.
- 19 Dal Grauer, "The Export of Electricity from Canada," 250, footnote 3.
- 20 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 86, 88.
- 21 Dal Grauer, "The Export of Electricity from Canada," 250.
- 22 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 94. Wallace Clement, *The Canadian Corporate Elite*, 79.
- 23 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 91, 111.
- 24 The American Institute of Electrical Engineers, *The Niagara Falls Electrical Handbook*, 93.
- 25 H.V. Nelles, *The Politics of Development*, 227. Dal Grauer, "The Export of Electricity from Canada," 250, footnote 3.
- 26 Dal Grauer, "The Export of Electricity from Canada," 250.
- 27 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 110.
- 28 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 111-12.
- 29 The American Institute of Electrical Engineers, *The*

- Niagara Falls Electrical Handbook, 169-70.
- 30 H.V. Nelles, *The Politics of Development*, 227-8. Dal Grauer, "The Export of Electricity from Canada," 250.
- 31 Nelles gives an extensive account of the syndicate's stockwatering habits of floating South American and Caribbean utilities and the public animosity toward its electrical operations. H.V. Nelles, *The Politics of Development*, 228-37.
- 32 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 118-19.
- 33 Ibid., 119.
- 34 Ibid., 115, 121.
- 35 H.V. Nelles, *The Politics of Development*, 285-6.
- 36 Ibid., 325.
- 37 At that time, "the Ontario Power Company had the right to develop 180,000 h.p. Of this, it had installed 52,000 h.p. and exported 35,000 h.p. to the United States. The Electrical Development Company had the right to develop 125,000 h.p. It was then producing 42,800 h.p. and exporting 10,000 h.p. The Canadian Niagara Power Company enjoyed the right to develop 100,000 h.p. on the Canadian side. Its plants were capable of producing 46,000 h.p., all of which was being exported." Dal Grauer, "The Export of Electricity from Canada," 250, footnote 3.
- 38 H.V. Nelles, *The Politics of Development*, 35.
- 39 Ibid., 237.
- 40 Ibid., 242.
- 41 Ibid., 244.
- 42 Ibid., 245.
- 43 Ibid., 245-6.
- 44 Ibid., 263.
- 45 Ibid., 288, 271, 287. Grauer indicates that "on April 12, 1917, all the assets in Canada of the Ontario Power Company were purchased by the Hydro Electric Power Commission of Ontario." Dal Grauer, "The Export of Electricity from Canada," 250.
- 46 H.V. Nelles, *The Politics of Development*, 301.
- 47 Clement found that at the time "industrialization was undertaken by smaller Canadian entrepreneurs and already developed firms from the United States." Wallace Clement, 1975, *The Canadian Corporate Elite*, 66.
- 48 R.T. Naylor, *The History of Canadian Business 1897-1914*, I, 38.
- 49 Ibid., I, 152-4.
- 50 R.T. Naylor, *The History of Canadian Business 1897-1914*, II, 150.
- 51 Ibid., II, 61
- 52 Clement indicates the history of Canadian General Electric as "having three features common among manufacturing industries at the turn of the century; consolidation by a financier (Nicholls), technological dependence of a U.S. company, and eventual takeover by

- the U.S. parent to integrate the branch into its worldwide operations." Wallace Clement, 1977, *Continental Corporate Power*, 53.
- 53 R.T. Naylor, *The History of Canadian Business 1897-1914*, II, 238.
 - 54 Earlier in the nineteenth century, water wheels were used to rotate shafts and pulleys and mechanical machinery inside grist and paper mills, but, by the 1880s, turbines (metal water wheel fastened horizontally) rotated vertical shafts and generators inside separate power plants, which supplied the mills.
 - 55 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 87.
 - 56 The American Institute of Electrical Engineers, *The Niagara Falls Electrical Handbook*, 163-4.
 - 57 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 87. Dales observed that the excellence of the final installation of the Niagara Falls Power Company was due to "the best of both European and American engineering talent. Swiss firms were chosen to design the turbines." John H. Dales, *Hydroelectricity and Industrial Development -- Quebec 1898- 1940*, 19.
 - 58 The American Institute of Electrical Engineers, *The Niagara Falls Electrical Handbook*, 175.
 - 59 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 117.
 - 60 The American Institute of Electrical Engineers, *The Niagara Falls Electrical Handbook*, 187.
 - 61 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 118.
 - 62 H.V. Nelles, *The Politics of Development*, 293-4.
 - 63 Between 1900 and 1986 Ontario has bought all its large hydro turbines, a total of 60, from Canadian General Electric and nearly all its generators, a total of 55, from Canadian Westinghouse with the exception of 7 from Western Electric (see Appendices II and VII, Tables II.4 and VII.1). Source: Statistics Canada, *Electric Power Statistics*, cat. 57-206, vol. 3, (inventory of prime movers and electrical generating equipment).
 - 64 "Meeting betw. Canadian Manufacturers Association and the Hydro-Electric Power Commission on May 4, 1920," 19, (Toronto: Ontario Hydro Archives, Archival Folder #7, File: Adam Beck General, (1920-22)). Belfield found that "paradoxically, [Ontario] Hydro was a uniquely Canadian institution, but the institution rested upon an international and evolving technology." Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 141-2.

- 1935," 141-2.
- 65 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 143-4.
- 66 Official Report of the Ontario Power Commission, dated 28 March 1906, 16.
- 67 The American Institute of Electrical Engineers, The Niagara Falls Electrical Handbook, 143-4.
- 68 Dal Grauer, "The Export of Electricity from Canada," 250.
- 69 Niagara Falls, Canada, 81.
- 70 Ibid., 83.
- 71 Ibid., 83.
- 72 Ibid., 84.
- 73 Municipal representatives aimed to use electricity as part of their "industrialization by invitation" strategy: "Mr. Lyon, in moving the resolution asking the Government to erect a plant for the transmission of Niagara power to the municipalities, spoke of the somewhat unsuccessful experience so far in trying to get manufacturers to locate in Guelph, now argued that ... cheap power must be the basis of their industries." (Beck, Guelph speech, Guelph Daily Mercury, 17 March 1906).
- 74 "Corporate Relations Municipal Customers General, Municipal and Industrial Customer Tabulation" (Toronto: Ontario Hydro Archives, file OR-150, 1922).
- 75 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 123.
- 76 Official Report of the Ontario Power Commission, dated 28 March 1906, 29 (Toronto: Ontario Hydro Archives, Beck Papers, file: ORR-104.11-11).
- 77 Hydro-Electric Commission, addressed to the Hon. Adam Beck, chairman. First line of report reads: "survey was made of the district North of Guelph to Warton, Owen Sound, and Collingwood," dated 29 August 1911, signed chief engineer, 18-19. (Toronto: Ontario Hydro Archives, archival folder #3 Sir Adam Beck, General (1911)) See Appendix II, Table II.6.
- 78 Ibid., 3-5.
- 79 Ibid., 7.
- 80 H.V. Nelles, The Politics of Development, 108.
- 81 Mines, Annual Report, 1894, 8-9. Cited by H.V. Nelles, The Politics of Development, 146.
- 82 Often, by pointing to financial support of the state by capital, the relationship between the is seen as unproblematic. Similarly, in instrumental positions on the relationship between the state and capital, the production co-ordination problems between capital and the state are overlooked. For instance, surplus infrastructure such as ghost towns, with rail and road unused, is a typical Canadian phenomenon.

- 83 Mark Fram, 1980, *Ontario Hydro Ontario Heritage*, 27 and photo captions.
- 84 Merrill Denison, 1960, *The People's Power*, 118.
- 85 *Errors and Misrepresentations made by The Hydro-Electric Inquiry Commission (Known as the Gregory Commission) Respecting the Publicly Owned and Operated Hydro-Electric Power Undertaking of Municipalities in the Province of Ontario*. Toronto-Ontario, 1925, 31 (Toronto: Ontario Hydro Archives, archival folder #292)
- 86 Nelles describes the members and influence of the Timber Ring: "Between 1911 and 1920 no one cut anything in the northwestern part of the province without first doing business with Col. J.A. Little or some member of what came to be known as 'the old Tory Timber Ring.' The colonel's associates were Gen. Don Hogarth, provincial organizer of the Conservative party, banker, mining promoter, and timber speculator; W.H. Russel, a young Detroit lawyer turned pulpwood exporter; and J.J. Carrick, a former mayor of Port Arthur, Conservative MP, MPP, real estate promoter, and mining speculator." H.V. Nelles, *The Politics of Development*, 376-7.
- 87 *Errors and Misrepresentations made by The Hydro-Electric Inquiry Commission (Known as the Gregory Commission) Respecting the Publicly Owned and Operated Hydro-Electric Power Undertaking of Municipalities in the Province of Ontario*. Toronto-Ontario, 1925, 31. (Toronto: Ontario Hydro Archives, archival folder #292).
- 88 *Ibid.*, 31.
- 89 Notes of the meeting between members of the Canadian Manufacturers' Association and the Hydro-Electric Power Commission, 4 May 1920, 4-6 (Toronto: Ontario Hydro Archives, archival folder #7, Adam Beck General (1920-2)).
- 90 *Ibid.*, 6-7.
- 91 *Ibid.*, 4-6.
- 92 *Ibid.*, 17-18.
- 93 *Ibid.*, 21.
- 94 "Memorandum Respecting the Contracts of the Goodyear Tire & Rubber Company of Canada. Limited. with the Hydro Electric Commission and the Toronto Power Company. For the Supply of Electric Power to its Factory at New Toronto. Ontario," 4, covering letter of memorandum from C.H. Carlisle, vice-president and general manager, to Lt. Col. Hon. D. Carmichael, Parliament Bldg., Toronto, 9 February 1922; attached are letters from Carlisle to Beck (8 May 1922) and to Fleming (General Manager of Toronto Power Co., 5 July 1922); Toronto Power Company Contract with Goodyear Tire and Rubber Goods Company of Canada, 28 July 1920 (Toronto: Archives of Ontario, Collection Id. RG 35 1-4 file 1922 Go-Gy-11).
- 95 *Ibid.*
- 96 *Ibid.*, 2.

- 97 Correspondence between Lt. Col. Hon. D. Carmichael, commissioner of the Hydro-Electric Power Commission of Ontario and C.H. Carlisle, 23 October 1922 (Toronto: Archives of Ontario, collection Id. RG 35 1-4 File 1922 Go-Gy-11).
- 98 Goodyear Memorandum, 2.
- 99 Correspondence, Carmichael/Carlisle, 23 October 1922.
- 100 Goodyear Memorandum, 4.
- 101 Dal Grauer, "The Export of Electricity from Canada," 249-61.
- 102 Dal Grauer, "The Export of Electricity from Canada," 249. National Energy Board, *Regulations of Electricity Exports: Report of an Inquiry By a Panel of the National Energy Board Following Hearing in November and December 1986*, 5.
- 103 Commission of Conservation, *Water Powers of Canada* (Ottawa: Mortimer Co. Ltd., 1911). Cited by Dal Grauer, "The Export of Electricity from Canada," 251.
- 104 Arthur V. White, *Memorandum Respecting Exportation of Electricity*, Commission of Conservation, 5 May 1914, 13; cited by Dal Grauer, "The Export of Electricity from Canada," 252, 255, footnote 7.
- 105 Dal Grauer, "The Export of Electricity from Canada," 255.
- 106 Ibid., 251.
- 107 Ibid., 256.
- 108 Dal Grauer, "The Export of Electricity from Canada," 256.
- 109 *Murray Report on Electric Utilities, Refutation of Unjust Statements*, "The Allied War Needs as a Governing Factor," Toronto, 1922, 34 (Toronto: Ontario Hydro Archives, archival folder 7, Adam Beck General (1920-2)).
- 110 Beck correspondence with T.J. Hannigan, Secretary, Ontario Municipal Electrical Association, Guelph, and S.R.A. Clement, Secretary, Association of Municipal Electrical Utilities, Toronto, dated, 23 June 1925, 3, 4 (Toronto: Ontario Hydro Archives, Archival Folder #8, Sir Adam Beck, General Correspondence (1923-5)).
- 111 Dal Grauer, "The Export of Electricity from Canada," 260.
- 112 Rt. Hon. W.L. Mackenzie King, House of Commons, *Official Report of Debates*, 1929, 415. Dal Grauer, "The Export of Electricity from Canada," 262.
- 113 H.V. Nelles, *The Politics of Development*, 105. While Ontario applied manufacturing conditions to pulpwood at the turn of the century, "in Quebec vested interests and the church ... confounded attempts to regulate sawlog and pulpwood exports for another decade."

CHAPTER 3
QUEBEC: TAKING NORTHERN POWER (CHURCHILL FALLS AND JAMES BAY) OUT OF CONFEDERATION FOR CONTINENTAL INTEGRATION

INTRODUCTION

In Ontario, the dynamic period of hydro expansion and industrial development began in 1903, when, at Niagara Falls, US power companies built powerhouses and supplied the power to US industries. Ontario manufacturers resisted, and the government gradually repatriated power so that the province would remain the "workshop of the nation." In Québec, fifty years later, when francophones believed in l'électricité [le] clef qui nous rendra maîtres chez nous, René Lévesque, as minister of natural resources, nationalized Québec's remaining private utilities. The objectives of nationalization included encouraging industrialization, developing power plants in the south (Outardes and Manicouagan 1963-71), and integrating the power system within Québec. The northern system expansion began with the annexation of Churchill Falls and the first phase of James Bay (both occurring in 1971). Robert Bourassa, premier of Québec and the driving force behind James Bay, proclaimed, in 1973:

The James Bay development will be the cornerstone of Quebec's new economy and its place in the Canadian Confederation and in North America./1

Bourassa believed that Québec's place in North America would be assured by allowing joint use of its northern James Bay power with the United States.

Figure 3.1 Hydro-Quebec's Main System Features 1989

Source: National Energy Board of Canada. Reasons for Decision, Hydro-Québec, EH-3-89, August 1990, 50.

To make his point, he published the US vision of James Schlesinger, who drafted the US national energy policy (1977-9):

No higher pragmatism can be imagined than the joint use -- for benefit of both the American and Canadian economies -- of this unutilized renewable [northern Quebec hydro] resource./2

These proclamations raise several questions: How is hydro development in general, and in James Bay in particular, related to Québec's new economy? Does the size of this cornerstone fit into the new Québec economy, or does the James Bay complex of plants exceed the power needs of Québec? Should energy from northern plants, surplus to Québec's needs, be available within the Canadian Confederation or within an increasing continental grid integration?

The answer advanced in this chapter is that, as part of such hydro developments, Québec's politicians and planners took the energy out of Confederation and put it into North American integration. This was done while using hydro to reproduce, with some exceptions, the old type of Québec economy through staple processing and dependent industrialization. To substantiate this claim, the following aspects of the relation between hydro and industrial development will be addressed:

- the findings on hydro nationalization
- manufacturers' use of fresh supplies of northern power
- the international invitations to industrialists
- the "unexpected" surpluses and their availability as continental staple rather than as national industrial input

STATE INTERVENTIONS

Québeckers initially relied on private enterprises (primarily owned by anglophones) for the development of their water power resources. As private utilities insufficiently served the economic needs of Québec, the provincial governments (since 1944) intervened more and more in the production of hydro-electricity in order to advance industrial growth and continentalism.

I will argue that the nature of these state interventions changed from southern interventions (e.g., Montreal, 1944; Shawinigan, 1963), which remedied the inability of private utilities to provide sufficient industrial infrastructure and adequate francophone participation, to northern interventions (Churchill Falls, 1969; James Bay, 1971), which took power out of Confederation and redirected it into continental integration. While the major thrust of Lesage's and Levesque's policy response (in the early 1960s) to private hydro development shortcomings was confined to within the boundaries of Québec (i.e., to nationalize private hydro, integrate southern networks into a provincial system, and integrate industrial development), the Bourassa government's plans became continental. Its choice (starting in 1971) was to conquer the North, and in so doing, strive for energy autonomy from Canada, to integrate with US utility networks, and to supply industrial energy and manufacturing inputs for the New England states and New York. First, I will indicate private corporate failures and state

interventions on behalf of expanding the southern Quebec network, and then, I will demonstrate how the Québec government's northern expansions became increasingly continentalist.

FIRST STATE INTERVENTION (1944)

The general failures of private utilities had to do with: unfairness in pricing to the general public and urban industries, the lack of interest in rural electrification (requiring risk investments in transmission and plants), and allowing anglophones to remain dominant in the hydro industry. An inquiry commission headed by Ernest Lapointe in the late 1930s, which studied these shortcomings, influenced the southern phase of direct state interventions.^{/3} In part as the outcome of this commission, the Québec government decided to start its intervention in Montreal.

The problem generated by the Montreal Light, Heat and Power Company and its subsidiaries in the provision of electricity were numerous: its contentious pricing policies in Montreal; its high industrial rates, which had delayed conversion from steam energy to electric motors in manufactures; its insufficient investment in plants on the St. Lawrence and the lower Ottawa River, which acted as a restraining force on industrial development; and its failure to abide by government regulations since the mid-1930s.^{/4} As a result, on 15 April 1944, the Commission Hydro-Electrique du Québec (Hydro-Québec) took over the Montreal Light, Heat and Power Company. According to Article 22, the

provincial (rather than international) mandate of Hydro-Québec was to provide power at the lowest rate compatible with sound financial management for municipalities, for industrial and commercial enterprises, and for the residents of Québec./5 However, after twenty years, the remaining private hydro utilities, by focusing too much on profitability, had done little to fill the hydro infrastructure gaps and to allow more francophone participation in executive decision-making. As during the 1944 intervention, the newspapers revealed that to francophones "les grandes entreprises d'électricité symbolisant la domination économique des anglophones au Québec."/6

STATE INTERVENTION IN 1963: "L'électricité: clef qui nous rendra maîtres chez nous."

As a response to these problems, and in order to provide an infrastructure adequate for continued industrial growth and francophone opportunity within Québec, the second southern intervention in the production of hydro-electricity became part of the Quiet Revolution. The headline in *La Press* on 1 October 1962, during the provincial election campaign, affirmed that the provision of electricity was seen as key to Québec's autonomy: "L'électricité: clef qui nous rendra MAÎTRES chez nous."/7 Lesage, the premier of Québec, saw the state as the most efficient instrument of economic liberation that Quebecers possessed./8

By February 1962 in public speeches René Lévesque pointed to the failures of the remaining power companies and

proposed government solutions./9 Power companies had not co-ordinated their investments and had not integrated the use of their power plants but, instead, operated them to suit the private interests of each corporation. As a result, they duplicated transmission lines and administrative costs. To remedy this problem he proposed: "Il est nécessaire d'unifier le moyens de production et de distribution d'énergie hydroélectrique;" and he added, "il est souhaitable d'intégrer les divers réseaux à celui d'Hydro-Québec."/10 Despite millions in subsidies, the private utilities had not sufficiently equalized prices and had failed to provide industrial energy to strengthen economic development in many regions of Québec. Levesque proposed that "il faut, de toute urgence, fournir l'énergie à meilleur coût aux régions de l'Abitibi, de la Gaspésie et du Bas-Saint-Laurent."/11 This would result in eliminating an industrial development handicap for these regions./12 Francophone opportunity within upper anglophone management, despite their unquestioned qualifications, constituted the third major failure of the remaining private utilities./13 Therefore, he suggested francophone equality as part of this intervention: "les Canadiens française étant économiquement faibles, il appartient au gouvernement du Québec d'adopter une politique qui favorise le progrès des Canadiens français sans pour autant défavoriser les anglophones."/14 To put this policy into effect and to take over the means of gener-

ation and distribution of electricity, capital had to be raised.

Early in 1963, in order to finance the Hydro-Québec purchase of the common stocks of the seven private power companies, the corporation sold twenty-five year bonds at 5 per cent interest for \$300 million on the American market./15 On 30 April 1963, Hydro-Québec took over private companies such as the Shawinigan Water and Power Co., the Compagnie Québec Power, Southern Canada Power Company, the Gatineau Power Co., the Compagnie de Pouvoir du Bas-Saint-Laurent, the Compagnie Electrique du Saguenay, the Northern Quebec Power Company, and other smaller companies./16

Hydro-Québec started an extensive expansion program. The nine power plants already under the control of Hydro-Québec amounted to a capacity of 3,675 MW, and the nationalization of the private utilities added 41 power plants, with 6,224 MW capacity in 1963./17 During the 1960s, Hydro-Québec started the Manic-Outardes complex, which, by 1978, furnished a total of 5,517 MW./18 The Manic 2 powerhouse, 16 km from Baie Comeau, started producing power in 1965, and by the end of November, the 735 kV transmission line (the first in the world to carry such voltage) carried power from Manicouagan via Lévis to Montreal./19 While these extra plants were added, negotiations were under way to integrate Churchill Falls.

While the southern interventions (1944, 1963) were government responses to the failure of private utilities to

provide sufficient industrial infrastructure and francophone equality within Québec; the northern interventions became part of Québec government strategy to reject a national power network and become a regional energy and resource supplier to the United States.

NORTHERN INTERVENTIONS: CHURCHILL FALLS (1969) AND JAMES BAY (1971)

How did the northern interventions become part of the Québec government's strategy to reject a national grid and become a staple supplier for the United States? First, in 1962, the Québec government denied permission to the British North America Company (Brinco) to transmit Labrador electricity across Québec in order to supply the national power grid. Then, in 1969, Hydro-Québec bought nearly all of the Churchill Falls power in order to attract industries and to export the surplus to New York state. For the second northern expansion, the installation of three dams on the La Grande River in the James Bay region starting in 1971, the Québec government copied the organizational structure of Brinco. Robert Bourassa, the premier of Québec, saw his "conquest of the North" as necessary for supplying energy and other resources to enhance industrial development in southern Québec and to reverse the de-industrialization of the New England states. Québec's ally in the "conquest of the North" was Brinco.

Brinco, a British-based company developing Newfoundland water resources from its Montreal offices instead of from St. John's, had received extensive mineral, forestry, and

water power resource rights in Labrador and on the island of Newfoundland in 1953. Brinco incorporated each resource development venture separately. The rights to develop Churchill Falls became the Churchill Falls (Labrador) Corporation, and the rights to Labrador resource exploration ventures became the British Newfoundland Exploration Limited (Brinex). To start a water resource development, Brinco always first sold the power, then used the power contract to raise the capital and, thereafter, developed the site. Following this practice, and being blocked from transmitting power to other provinces, Brinco's Churchill Falls (Labrador) Corporation sold power to Hydro-Québec, then raised the capital in New York and, thereafter, built the project. By 1972, 5,225 MW became part of the Québec power system./20 Some power was used for consumption inside Québec, but large quantities were exported to the northeastern United States.

Similar to Brinco's approach, the Bourassa government inaugurated the James Bay Development Company and the James Bay Energy Company to promote industrial development and to build dams./21 In this way, the government continued what started with the integration of Churchill Falls: "the conquest of northern Quebec."/22 According to Article 41 of Bill 50, approved by the l'Assemblée Nationale du Québec, on 14 July 1971, the JBDC was granted all remaining public rights to mining, hydraulic resources, forests, hunting, fishing, agriculture, colonization, and tourism within the

James Bay region./23 The JBDC became the government's "management agency to develop the James Bay territory."/24 It was funded with "\$100 million capital underwritten by the province" and co-operated with SEBJ (the James Bay Energy Corporation/Société d'énergie de la Baie James)./25

In Bourassa's words, "the development of the area's hydroelectric resources was entrusted to the James Bay Energy Corporation" (SEBJ, the Société d'énergie de la Baie James) on 21 December 1971. Hydro-Québec initially thought the project premature, but then, "on January 21, 1972, Hydro-Québec agreed to underwrite 70 million shares of SEBJ, stock totaling \$700 million, or 70 percent of SEBJ's authorized capital."/26 In this way, Hydro-Québec had a major influence over the building of dams, powerhouses, and transmission construction. Discussing the financing with David Rockefeller of New York, "Premier Bourassa had already warned Ottawa not to impose any measures which would restrict in any way job-creating investments from south of the border."/27

The SEBJ was responsible for designing the dams; it decided to flood the valley of the La Grande River. The largest dam is LG 2, which is located 117.5 km upstream from the James Bay Delta of the La Grande River. La Grande Phase 1, which included the generating stations of LG2, LG3, and LG4, cost nearly \$15 billion in total for an installed capacity of just over 10,000 megawatts, which meant that the northern expansions would double Québec's power capacity./28

Bourassa openly planned that the James Bay power and resources benefit the US North East, which was under threat of de-industrialization because of the loss of industries to the southern United States./29

Le Nord-Est américain a connu au cours de la dernière décennie une perte de poids relatif dans l'économie des Etats-Unis. Un grand nombre d'industries se sont relocalisées dans le Sud des Etats-Unis, qu'on appelle parfois le "croissant de soleil." ...

...le déclin du Nord-Est américain nuit au commerce extérieur du Québec, puisqu'il s'agit de notre principal partenaire commercial parmi les régions américaines. Par ailleurs, il apparaît que les entreprises du Sud des Etats-Unis ont une faible propension à importer du Québec que les entreprises du Nord-Est américain, essentiellement en raison des coûts de transport. Par exemple, les entreprises d'Arizona achèteront leur bois, papier, aluminium et amiante en Colombie-Britannique plutôt qu'au Québec, alors que la situation inverse prévaut pour les entreprises fonctionnant près de l'Etat de New York.

Nous voyons donc qu'il est dans l'intérêt direct des Québécois d'aider les Américains de la Nouvelle-Angleterre à renforcer leur économie. Rappelons que l'électricité du Québec est vendue à 80-85% du coût de l'énergie de remplacement dans la région acheteuse.../30

The thrust from developing electricity as an industrial input within the boundaries of Québec, so typical of the Quiet Revolution of the 1960s and of Lévesque's policy, changed as Bourassa returned to the "predominant pattern of Canadian economic history." On the one hand, he planned to treat James Bay hydro-electric energy as an attraction to foreign industrial firms, so that they would use it to transform the natural resources in James Bay; on the other hand, he planned using it as an energy staple to support manufacturing in the New England states./31 The semi-trans-

formed resources, he argued, would be used in the same manufactures. Borrowing from the Brinco model, his government approved the James Bay Development Company.

LINKAGES TO INDUSTRY: "L'ACHAT CHEZ NOUS"

Was it possible for Bourassa and his government to build a "new" economy based on adding large hydro projects? Or was the best they could hope for from expanding the southern and northern electricity network and other resource development a repeat of dependent industrialization and staple-led growth? Would the development of such large projects as Churchill Falls and James Bay bring new supply industries, and would resource industries use northern energy to diversify their production? To determine whether hydro development was used to generate new economic activities, it is best to examine the hydro-related backward and forward linkages. In Québec, state corporations such as Hydro-Québec and the James Bay Energy Corporation played a "nationalistic" role in industrial development. The choices made by Hydro-Québec and the James Bay Energy Corporation in the procurement of equipment for new hydro plants largely determined the nature of backward linkages. Both corporations had some success in increasing local hydro-equipment manufacture. However, since they relied on a strategy of import substitution and the solicitation of foreign firms for the establishment of these industries, they helped to continue Québec's dependent industrialization. To determine whether or not the development of southern and northern

hydro plants had a diversified forward linkage effect, it is best to examine the use of the new electricity by manufacturers in Québec.

BACKWARD LINKAGES

Two questions need to be raised: Were backward linkages captured in Québec? What choices were made to capture them? Between 1965 and 1970, when Hydro-Québec and the James Bay Energy Company followed the government's "achat chez nous" strategy (reinforced by "manufacturing conditions"), manufacturing in electrical equipment grew. This was because Québec's 1970-80 public sector market for electric equipment was assured by southern and northern hydro expansions. Especially, the growth of turbine and generator manufacturing and the manufacture of a variety of electrical equipment became established in Québec (e.g., as transformers, insulators, and aluminium conductors). This, however, had not always been the case.

For the first large hydro projects, technology was simply imported by private utilities. The prime moving equipment (turbines and generators), installed by 1905 in the first power plant at Shawinigan Falls, was manufactured in Switzerland, the United States, and England./32 The American Niagara Falls Power Company, through the exchange of engineering staff with the Shawinigan Water and Power Company (owned by American immigrant entrepreneurs), was instrumental in transferring General Electric and Westinghouse technology to Québec./33 Since the year 1911,

Canadian General Electric supplied 107 of Québec's generators, and its Québec subsidiary, Dominion Engineering Works in Montreal, supplied 134 of Québec's turbines. The second largest supplier of generators was US-owned Canadian Westinghouse, with 82 generators, and the second largest supplier of turbines was US-owned Canadian Allis-Chalmers, with 32 turbines (see Appendix III, Table III.1). The domination of these companies was weakened by the more nationalistic procurement approaches taken by Hydro-Québec and the James Bay Energy Corporation.

Only with the imposition of an "achat chez nous" policy by the Québec government, and the imposition of a Québec manufacturing requirement by the mid-1960s, was the manufacturing of turbines and generators within Québec strengthened. Lesage's political strategy meant that the "achat chez nous" policy would be accompanied by a "nouveaux maîtres chez nous" strategy (a largely import substitution strategy for the manufacture of goods for the public hydro market). In this way, the government of Québec and Hydro-Québec proceeded to encourage an electrical equipment industry. Jean-Paul Gignac, Hydro-Québec commissioner from 1962-9, was the principal advocate of a Québec manufacturing commitment being part of hydro equipment procurement.³⁴ His efforts in establishing backward linkages, reliant on technological know-how elsewhere, are evident in the way he proceeded to advance l'Institut recherche en électricité du Québec (IREQ).

Subsequent to touring Sweden, France, Great Britain, and the United States, Jean-Paul Gignac and others prepared the background work for establishing l'Institut recherche en électricité du Québec (IREQ). One of its tasks was to test the 735 kV high-tension transmission line components and other electrical apparatus. The research laboratory co-operated, particularly, with ASEA, the Swedish electrical equipment manufacturer, in testing and research. The federal government granted a \$17 million loan, and the Institute was inaugurated on 29 September 1970; by 1979 it employed 105 researchers and carried out 800 research projects./35 Although the commercial success of IREQ's discoveries has been slow, Bourassa insists that there will be a repetition of the success of Datagram, a company that fabricates and markets transmission equipment developed by IREQ./36

For executives in Hydro-Québec, it was a conscious strategy to advance investment by hydro-electric manufacturing firms between 1965 and 1970./37 Jean Bernier, general secretary of Hydro-Québec, indicated the reason that Québec, and not other provinces, developed a hydro equipment industry was that companies such as Canadian General Electric, Marine Industries, and so on, were aware that after the Manicouagan River development much more hydro-electric equipment was needed for the Churchill Falls and the James Bay plants (with a potential of 20,000 megawatts),/38 because turbine and generator manufacturers counted on a

long-term market of up to 60 turbines and generator units./39

The James Bay Energy Corporation, primarily directed by Hydro-Québec, was responsible for the power installations at James Bay and, therefore, was instrumental in the formation of backward linkages. Of the \$3,662 million spent on James Bay, La Grande Phase 1, 46 per cent or \$1,669 million was spent on goods and services in Québec (see Appendix III, Table III.3). It is not unusual that mechanical equipment such as water gates, turbines, and generating equipment, represent between 40 to 50 per cent of hydro-electrical plants./40 For example, the James Bay Energy Corporations spent \$276 million on the turbines for two powerhouses, La Grande 2 (LG 2) and La Grande 3 (LG 3). Tracing the selection and manufacture of generating equipment is important, not only because large sums of capital would stay in the province and because such equipment constitutes the key components in each plant, but also because such a retrace allows an insight into how backward linkages are formed as a social process.

The James Bay Energy Corporation restricted its selection of turbine and generator manufacturers to those companies with facilities in Québec, which could design, fabricate, and install such equipment. For example, Marine Industries (MIL), Dominion Engineering Works (DEW), and Canadian General Electric (CGE) (see Table 3.1, Appendix III, Table III.2) became the chosen suppliers (after a restricted

tendering process) for the turbines and generators to be installed at the La Grande 2 (LG2), the largest James Bay powerhouse, with 5,328 MW capacity.

Le 11 février 1974, la Société d'Energie de la Baie James émettait un appel d'offres restreint, transmis sur invitation, pour la conception, la fabrication, le transport et l'installation de seize groupes turbo-alternateur devant équiper la centrale LG 2.

Les companies invitées: - Les Ateliers d'ingénierie Dominion Ltée
- Marine Industrie Ltée
- Compagnie Générale Electrique du Canada Ltée
devant l'ampleur des travaux à réaliser, se constituèrent en consortium dénommé "Le Consortium La Grande"./41

The Consortium La Grande did, after revisions of the fabrication plan, obtain the contract from the James Bay Energy Corporation (Société d'Energie de la Baie James) on 20 May 1977 for a revisable sum of \$153,838,400, of which \$29,516,000 was for the installation cost of the 454,000 hp (336 MW) Francis turbines and the generators. The James Bay Energy Corporation's (SEBJ) reasons for selecting the consortium were similar to those of the Brinco subsidiary, the Churchill Falls (Labrador) Power Corporation of ten years earlier (see Chapter 4). First, its representatives argued, the technical sophistication required would only be available at the provincial level through the formation of a consortium, and, second, that the installation process would save time./42

Similarly, for the LG 3 powerhouse (2,304 MW), less than half the capacity of LG 2, the James Bay Energy Corporation purchased turbines and generators from a Québec-based

consortium consisting of Dominion Engineering and Marine Industries. On 31 March 1977, the contract for the ten turbine-generator units at the LG 3 powerhouse at James Bay was awarded by the SEBJ to a Québec consortium, Le Consortium LG 3. "Le Consortium LG 3 se composait des firmes Marine Industrie Limitée, responsable de la fourniture des alternateurs, et Les Ateliers d'Ingenierie Dominion Limitée, responsable de la fourniture des turbines;" two units were later added for a contract price total of \$122,246,755./43 All nine generators and turbines in the LG 4 powerhouse were purchased from Marine Industries and were installed from 1984 to 1986 (Table 3.1)./44

Table 3.1
Hydro Plants Inventory of Prime Mover and Electric Generating Equipment at James Bay Phase 1, Powerhouses 2, 3, and 4, La Grande River, Québec

	Capacity Megawatts of Plant -----	Year(s) of Turbine Installations & Manufacturer -----	Year(s) of Generator Installations & Manufacturer -----
L G 2	5 328	1979-81 DEW, MIL	1979-81 CGE, ASM
L G 3	2 304	1982-4 DEW	1982-4 MIL
L G 4	2 651	1984-6 MIL	1984-6 MIL

Note: DEW = Dominion Engineering Works; MIL = Marine Industries Ltd.; CGE = Canadian General Electric; ASM = Alstom Savoisine, Marine Industries

Source: Statistics Canada, cat. 57-206, 31 December, 1986

This course of action allowed Marine Industries, formerly a ship-building company, to develop into a hydro-equipment manufacturer. Between 1970 and 1986, Marine Industries installed 28 turbines and 38 generators in the

larger Québec powerhouses: Manic 3, Manic 5, Outardes 2, and the powerhouses on the La Grande River, LG 2, LG 3, and LG 4, James Bay phase 1./45 (see Appendix III, Table III.1) Through this policy of "achat chez nous" by Hydro-Québec and the James Bay Development Company, backward linkages were both forward and strengthened. Dominion Engineering strengthened its manufacturing, and Marine Industries established new facilities for turbine and generator manufacturing. Not only was the prime mover and electric generating equipment increasingly produced in Québec, but other energy equipment supply companies set up operations during the 1970s in anticipation of further hydro expansions.

OTHER EQUIPMENT/46

Hydro-Quebec, having a less developed supply industry to rely on and certainly influenced by a more nationalistic definition of its role in industrial development, was more active in encouraging industry to locate in the Province./47

The following electrical equipment manufacturers "set up their operations in Québec to take advantage of the Hydro-Québec market."/48 Firms that have specialized in the production of goods required by Hydro-Québec are:/49

- BBC Brown Boveri Canada,
with parent in Switzerland *heavy electrical equipment
- Cable Phillips *electrical cables and wires
- Alcan Products of Canada " " "
- Cegelec Industries Inc. *insulators and circuit breakers
(France)
- Canadian General Electric " "
- Montel " "
- ASEA Electric Ltd. (Sweden) *high-power transformers/50

Although Ontario and Québec had developed their hydro systems for eighty years, foreign dependency in this sector continued. Since both Hydro-Québec and the James Bay Energy Corporation relied on foreign technology and foreign firms, the backward linkages from hydro facility development were dependently developed. For example, Faucher and Fitzgibbons found, similar to bonusing 100 years ago, that "some firms were lured in with the promise of guaranteed markets (for a twenty-year period in the case of ASEA), and/or preferential pricing along with other advantages (in the form of government loans, subsidies, and fiscal incentives)."/51 By 1979, of forty major hydro-technology firms, half were foreign subsidiaries./52 Many of them remained technologically dependent on parent firms. Canadian Westinghouse (US-owned) and the Canadian General Electric subsidiary, Dominion Engineering Works (reliant on its US parent for its direction), are, and continue to be, dominant supply companies for Hydro-Québec and the James Bay Energy Corporation. Marine Industries, owned by the governments of Québec (65 per cent) and France (35 per cent), which uses a "French technology (bought from Neyrpic a subsidiary of the Alsthom group)," is also dominant./53

Furthermore, the "achat chez nous" policy and procurement strategy in hydro equipment had lost its effect by about 1970. A case study by the Centre de recherche en développement industriel et technologique (CREDIT) shows that "even with the massive investment realized in the

seventies, the industrial structure of the electrical equipment industry in Québec, has not changed a great deal."/54 After extensive studies, both Jorge Niosi and Phillippe Faucher found that "the value of the goods and services purchased in Québec [had] not increased since 1971."/55

Relying on branch plants of multinational corporations to carry out electrical equipment manufacture for specific markets does not mean that such plants are allowed to export their goods./56 Niosi tested the ability of 150 companies to export hydro-electric technology. He found that some Canadian-owned companies which produced hydro equipment, and which were not necessarily suppliers of Canadian hydro utilities, were interested in exporting. Yet, foreign-owned branch plants, in the same industry, had no export mandate and would not even bid on Canadian-engineered hydro projects in Third World and other countries. The exception is Dominion Engineering Works. Although owned by General Electric, it retained its world product mandate./57

So far, it has been documented that the development of new hydro complexes by state corporations led to the formation of backward linkages within Québec. But have forward linkages been developed? In other words, has the "cheap" industrial energy from these southern and northern complexes been used by manufacturers to diversify their production and to bring about the "new" Québec economy?

FORWARD LINKAGES

Hydro-Québec, upon its 1963 nationalization, was hailed as the cornerstone of the new Québec economy. Hydro-electricity, it was believed by many during the 1960s, would be the base for the development of secondary industries.

One way to evaluate whether or not the southern and northern hydro projects had a forward linkage effect is to examine whether or not the energy from the new large plants was used by manufacturers in a whole new variety of industries. Within the 1962 to 1984 hydro system expansion period, an examination of the years after new supplies of power were available, and how manufacturers used them, is particularly important. Whether manufacturers put the new southern and northern sources of energy to new uses can be assessed through an examination of Hydro-Québec's own industrial contract information and by referring to manufacturers' use of electricity as reported to Statistics Canada.

Before moving from the impact on industrial development of the southern and northern projects, it is necessary to look at a few examples of typical capacities used by Québec Hydro in supplying its large customers. It takes many large customers and industries to absorb the capacity of a plant such as Churchill Falls, the largest hydro site in Canada (5,429 MW). One large customer of Hydro-Québec, Laval University, requires 9.5 to 10 MW; another, the Montreal Metro, requires about 29 MW to 70 MW; energy-intensive industries, such as pulp mills, require about 40 MW, and aluminium

plants require about 100 MW. When examining the industrial use of electricity, the reports of manufacturers to Statistic Canada and the industrial contract records of Hydro-Québec indicate two trends: (1) since the 1960s, approximately 80 per cent of manufacturers were using the new supplies of electricity to operate the same type of industries, and (2) in spite of an active strategy of "industrialization by invitation," manufacturers did not need the power from Hydro-Québec's new northern plants.

SOUTHERN EXPANSION: FORWARD LINKAGES (1960S)

As part of the expansion in the south, five power plants were added on the Manicouagan and Outardes rivers (Manic 1,2,5; and Outardes 4,5; total of 3880 MW) between 1963 and 1971. The new energy from the southern plants, which was to provide the entrepreneurial spark for more economic independence during the Quiet Revolution, was used less to produce pulp and paper, chemicals, and primary metals during 1973 than it had been in 1962. In 1962, 83 per cent of manufacturing electricity was used to produce those products. The "buy-Québec" policy, in part, contributed to the reduction of electricity use for semi-processing goods to 75 per cent in 1973 (see Table 3.2). Some of the electricity used by the new hydro supply industries, which set up their operations before the 1970s, accounts for the corresponding increase in electricity used in areas other than semi-processing.

NORTHERN EXPANSION: FORWARD LINKAGES (1970S)

In 1968, Hydro-Québec insisted that more power for secondary industrial development was required. The utility argued that the Churchill plant integration was "necessary for the economic development of Québec and particularly for that of secondary industry."/58

Table 3.2
Consumption of Purchased Fuel and Electricity by
Manufacturing Industries in Québec
1962-84
GW.h

Three major consumers of electricity as a percentage of the total consumption in manufacturing

Year	Pulp & Paper	Chemic.	Primary Metals	Manufact. % Total	%
1962	9,219	1,698	3,677	17,656	83
63	8,105	1,740	3,864	16,979	81
64	8,301	1,884	4,501	18,264	80
65	8,299	1,999	4,530	18,712	79
66	8,440	2,115	4,881	19,679	78
67	7,978	2,200	5,201	19,872	77
68	8,379	2,196	5,751	21,110	77
69	9,092	2,326	6,933	23,343	79
1970	9,264	2,228	6,381	23,322	77
71	9,301	2,369	5,848	23,074	76
72	10,276	2,312	6,054	24,504	76
73	10,720	2,590	6,694	26,549	75
74	11,588	2,647	7,830	28,475	77
--	--	--	--	--	--
76	12,168	2,796	6,295	27,967	76
77	12,107	2,654	7,121	28,693	76
78	13,413	2,886	8,027	31,976	76
79	13,450	3,037	8,578	33,261	75
1980	14,148	3,451	10,184	36,126	77
81	15,237	--	10,277	37,532	--
82	14,468	3,591	8,787	34,580	78
83	16,211	3,498	8,862	36,510	78
84	20,946	3,732	8,996	42,277	80

Source: Statistics Canada, cat. 57-206, Consumption of Purchased Fuel and Electricity: By Manufacturing, Mining and Electrical Power Industries, 1962-1974. Cat. 57-208, 1975-84.

After the annexation of Churchill Falls, however, little changed in terms of industrial diversification.

In 1976, five years after Churchill Falls delivered the first power, the same type of primary manufacturing and staples industries were still the major purchasers. Use in pulp and paper, chemicals, and primary metals declined by 2 per cent, however, this group still purchased 76 per cent of the electricity indicated as the "manufacturing" sector (see Table 3.2). Since traditional industries continued to consume the same proportions, secondary industry did not grow stronger.

And even in these traditional sectors, the demand for fresh Labrador electricity was sparse. Considering that the average pulp mill requires 40 MW of power, Hydro-Québec's industrial contract statistics show that the pulp and paper sector only needed an extra 18 MW from 1973 to 1976 (see Table 3.3). At the end of the same three-year period, the chemical industry (with an average consumption of 15 MW per customer) required 25 MW more, and the electro-metallurgical industry (with an average consumption of 60 MW per customer) required 100 MW less of the Churchill Falls power. Power requirements also dropped in the textile industry from 57 to 46 MW, and in general manufacturing it dropped from 177 to 111 MW. By 1976, five years after the first generator at Churchill produced a fresh load of power, Hydro-Québec had not developed a new secondary industry or expanded its traditional industrial electricity market. This occurred in

spite of efforts by Crown corporation officials to actively entice industrialists from around the world to Québec.

Table 3.3
Hydro-Québec
Les Grandes Secteur Industriels
marchés canadiens
1971 et 1974

Secteur industriels	(contrat de plus de 3 MW)*			(contrat de plus de 5 MW)*		
	---- 1973 ----			--- dec. 1976 ---		
	No.	MW	GWh	No.	MW	GWh
Pâtes et papiers	30	1,053	7,144	28	1,071	7,956
Electrometallurgie	16	951	6,567	15	851	6,012
Electrochimie	11	166	1,263	8	191	1,474
Mines métalliques	19	222	1,373	11	200	1,577
Mines non métalliques	7	108	675	6	104	633
Fer et acier	16	292	1,096	16	330	1,158
Pétrole	7	116	861	7	132	961
Ciment	8	85	538	6	76	427
Textiles	11	57	359	6	46	251
Manuf. générales	36	177	1,018	14	111	629
Total		3,227	20,894		3,112	21,078
Municipalités	19	268	1,279	15	473	2,005
Divers	40	270	1,615	21(sic)21		1,406
Total		3,765	23,788		3,606	24,489

Sources: NEB Applications, Hydro-Québec; October 1974, exh. 1, p. 39; and October 1977, exh. 1, p. 42.

* Note that that the categorization of the contracts was changed from 3 MW to 5MW; so some of the smaller contracts are not included in the 1976 data

FORWARD LINKAGES BY INVITATION (19708)

As the James Bay Energy Corporation solicited foreign firms to establish branch plants for the manufacture of hydro equipment, its partner, the James Bay Development Corporation (JBDC, est. 14 July 1971), "was empowered to: create subsidiaries, share projects with government or paragovernmental associates, and enter into partnership with private companies" to develop other industrial ventures./59

JBDC formed associations with foreign partners and funded joint mining exploration programs. In creating corporate liaisons and partnerships with private companies, the JBDC did not rely on Quebecers or stay on the American continent but visited mining and industrial firms in Europe and Japan.

Fred Ernst, one of the five administrators of JBDC, had his first class trip to Europe for the Fall of 1973 approved "aux fins de rencontrer les dirigeants des entreprises minière qui sont intéressés à participer au développement minier de la région de la Baie James."/60 Making the James Bay natural resources available to outside investors in the hope that non-Quebeckers would build the province's industrial base is also evident from Ernst's trip with government industrial promoters. The JBDC executive approved that "M. Fred H. Ernst, à accepter l'offre du Conseil Général de l'Industrie du Québec de participer à un voyage au Japon vers la fin du mois de mars 1974 aux fins de donner des conférences aux hommes d'affaires japonais qui sont intéressés par le project hydroélectrique et l'aménagement régional de la Baie James."/61 Not only the vice-president of the administrative council of JBDC but also the president, Charles Boulva, as a representative of JBDC, invited industrialists from outside Québec. He met during the 6-10 April with le Commissariat à l'Energie Atomique in Paris to discuss the installation of a uranium enrichment plant in Québec. Because of this uranium matter, Boulva accompanied the premier of Québec to Paris on his official visit from 1-

7 December 1974./62 In addition to overseas investors, mining firms from the United States and Toronto were encouraged to start mining explorations in the James Bay area.

These strategies to invite more foreign participation come at a time when foreign ownership was already high in Québec. Soon after the project was launched, by the mid-1970s, the James Bay Development Corporation was associated with 26 private companies in 18 mining exploration programs and conducted 9 others by itself./63 Although gaining more economic autonomy by Quebeckers was often discussed, the majority of the James Bay Development Corporation's partners were either English-Canadian or foreign enterprises (i.e., Eldorado, Brinco, Cominco, et al.)/64 By 1974, for instance, the "distribution of control in Québec manufacturing" was estimated by Raynauld, the chairman of the Economic Council of Canada, as "French Canadian 15.4%, English Canadian 42.8%, and foreign 41.8%."/65 In line with an old bonusing practice, already wealthy industries were still receiving special subsidies. Many of the mining exploration programs, for instance, were funded by the James Bay Development Corporation.

Falconbridge received \$30,000 (22 March 1974), and Noranda-Casa Berardi was allocated \$25,000 (17 October 1974) as part of joint exploration ventures. Similar support for forest feasibility studies was given to those planning forest complexes and sawmills./66 The minutes of a monthly meeting on 25 April 1974, with five of the administrators

(Boulva, Ernst, Cliche, Macdonald) present, approved the following expenditures:

\$31,500	Cominco and Pan Continental Mining - joint uranium research in the James Bay (1974)
\$16,500	Urangesellschaft - similar joint exploration venture
\$40,000	Inco and Uranerzbergbau - joint mining research/67

Mining and forest exploration in the southern James Bay area, comprising the watersheds of the Nottaway, Broadback, and Rupert rivers, had been made accessible by the road serving the hydro projects on the La Grande River./68 Fournier estimated, that, between 1971 and 1975, \$337.7 million in industrial development investment, which is not directly related to the hydro project, has been carried out./69

The James Bay Development Corporation tried to use the hydro project, the infrastructure, the resources, and state subsidies as part of its strategy of "industrialization by invitation" during the 1970s. However, an examination of Hydro-Québec's industrial contract statistics from the 1980s reveal that this strategy failed to create new forward linkages.

NORTHERN EXPANSION: FORWARD LINKAGES (1980s)

Only slightly smaller than Churchill Falls, the La Grande 2 powerhouse, the second largest hydro station in Canada (5,328 MW) started delivering power from the James Bay region in 1979. The La Grande 3 powerhouse (2302 MW) started generating in 1982, and La Grande 4 (2,651 MW)

started in 1984./70 Were these enormous new capacities from the James Bay region put to new uses in Québec?

Statistics Canada records show that they were put to old uses. Manufacturers operating pulp and paper, chemical, and primary metals industries still consumed 80 per cent of all the electricity used in manufacturing in 1984 (see Table 3.2). These reports by manufacturers to Statistics Canada are also supported by Hydro-Québec's own industrial contract statistics.

Hydro-Québec's industrial customers (over 5 MW consumption) show that a concentration of industries in the same three sectors (Chimie, Pates et Papiers, and Métaux) used 84 per cent (in 1981), and 85 per cent (in 1984) of the total electricity consumed by its industrial customers (see Table 3.4)./71 From 1981 to 1984, Hydro-Québec signed contracts with only three additional pulp and paper mills for a total of 34 contracts, and one extra chemical plant signed for a total of 17 chemical industry contracts. In the primary metal category, one contract less meant Hydro-Québec held 21 contracts in this industrial sector (see Table 3.4). Counting on abundant energy as a base and relying on others to implant industries and to foster industrial growth is certainly a flawed strategy, as will be shown below, and resulted in substantial provincial power surpluses.

By the 1980s, despite joint venture subsidies, promotional trips abroad, and the provision of 2,500 MW of James

Bay power in order to implant industries, the need for power in the mining sector declined.

Table 3.4
Hydro-Québec
Les Grandes Secteur Industriels
marchés canadiens
1981 et 1984

Secteur industriels	(contrat de plus de 5 MW)			(contrat de plus de 5 MW)		
	---- 1981 ----			--- dec. 1984 ---		
	No.	MW	GWh	No.	MW	GWh

Exploitation minière						
-Mines de fer	5	210	1,489	5	217	1,236
-Aut. mines métalliq.	8	121	742	8	61	396
-Mines non métalliq.	9	127	676	7	91	420
Industries manufact.						
-Aliments et boissons	6	30	170	6	30	178
-Chimie	16	347	2,484	17	370	2,743
-Ciment	4	51	272	5	70	395
-Divers	11	87	457	14	115	604
-Equipment de transp.	9	74	371	9	62	351
-Métaux						
. Fonte de affinage	4	522	4,077	5	569	4,059
. Sidérurgie	14	579	3,147	14	477	2,724
. Autres	4	27	141	2	16	91
-Minéraux non metall.	6	94	805	4	78	600
-Pâtes et papiers	31	1,215	8,830	34	1,424	9,825
-Pétrole et charbon	7	139	1,056	5	126	953
-Textiles	8	53	320	9	57	339
Total industries manufact.		3,218	22,130		3,394	22,862
Municipalités	19	452	282	16	532	2,583
Services						
-Assurances, com- merce et immobilier	8	61	381	10	78	455
-Administration, protection civile et activités socio-cult.	12	97	595	14	108	650
-Communications et transport	20	179	1,000	22	202	1,063

Source: (N&B) Demande a ONE Hydro-Quebec, exhibit B-2, vol. 1.1, decembre 1982, exhibit B-3, juillet 1985:3de3

While in 1981 a total of 22 mining contracts (Exploitation minière) required 458 MW (210+121+127), by 1984 Hydro-Québec indicated it had only 20, requiring 369 MW (217+61+91) (see Table 3.4). One possible explanation why more development did not take place as a result of James Bay is supplied by one of Hydro-Québec's industrial development officers. He was concerned that speculating foreign investors might lock up somewhat higher priced resources in Canada, including those in the James Bay region; and that when Third World supply areas became unstable, then they could access their Canadian resources./72 Not only manufacturers' reports and Hydro-Québec industrial contracts indicate the continued use of electricity for semi-processing of resources, but a government study concluded the same thing.

An analysis of "electricity as a factor in the industrial development of Quebec," released in 1980 by the government of Québec, equally supports these findings. It concluded that about half of Québec's electricity was used by industry, and that 85 per cent of the industrial total was used by four sectors.

La consommation d'électricité dans le secteur industriel représente la moitié de l'électricité consommée au Québec en 1977. L'essentiel de cette consommation industrielle est le fait de quatre groupes industriels (85% du total): le papier et les produits connexes, la première transformation des métaux, les produits minéraux non métalliques et les produits chimiques./73

So far only the manufacturers in the pulp and paper, chemicals, and primary metals sector, which make up nearly 80 per cent of the industrial users, have been examined.

But what needs to be dealt with are the remaining 20 per cent of manufacturers who consume 554 MW (equivalent to one generator at Churchill Falls) as industrial energy. In 1984, manufacturers in the non-metallic mineral sector purchased about 3 per cent of the manufacturing market (glass, cement, lime, abrasives), the textile and clothing industry about 3 per cent, the food and beverage industry also about 3 per cent, the petroleum and coal products industries about 2 per cent, and wood industries (sawmills; sash, door and other millwork, etc.) about 2 per cent. That leaves less than 7 per cent that would be considered secondary manufacturing (other than food and textiles) such as the transportation equipment industry, machinery industry, electrical products industries, et al. For secondary industries the availability of electricity is important, but is not a major factor in deciding to set up a plant. And the strategy to build a "new" economy based on large power users becomes increasingly risky.

The lack of integration of companies in Québec (the lack of "Canadianizing" their operation) becomes evident when it is compared with the integration of corporations within the US economy. While energy-intensive industries in the United States ship 90 per cent of their end products to other productive sectors, only 38 per cent do the same in Québec.⁷⁴ Not only are heavy-energy users poorly integrated, they increasingly dictate energy prices. During the 1970s, Hydro-Québec still set the price for its industrial

power, but by the late 1980s, foreign corporations had been able to link their hydro bill to the world price of aluminium. Hydro-Québec set the price with the Canadian Reynolds Metal Company for a contract (Contract: #4,407-75) over the period of 1974-9 for 102 to 108 MW power at \$7.36 (1979) kW per month; this amounted to \$9.5 million per year at full capacity./75 During the late 1980s, Hydro-Québec changed its pricing policy for Norsk Hydro and for Reynolds, where corporate efficiency and world price determine its revenue. "Comme l'Aluminerie de Bécancour (ABI) [investor: Norsk Hydro, \$500 million] - où une expansion de 550 M\$ sera bientôt mise en chantier ... - Reynolds [for its \$500 expansion] a obtenu d'Hydro-Québec un contrat d'approvisionnement d'électricité dont le tarif est lié aux cours mondiaux de l'aluminium et la rentabilité de l'usine de Baie-Comeau."/76 Many firms in the energy-intensive sector have been actively solicited by the Québec government's "industrialization by invitation" strategy and have contributed to the level of foreign ownership in Québec.

In summary, the Québec government and Hydro-Québec were more successful in starting new manufacturing activities when insisting on "manufacturing commitments" for their supplies, than they were in getting manufacturers to use the electricity from Canada's largest new generating stations so that they could revolutionize their old type of industries. When Hydro-Québec and the James Bay Energy Corporation followed the "achat chez nous" strategy, new hydro equipment

manufacturing did develop during the 1960s. Since both state corporations relied on import substitution and foreign firms to strengthen, or set up, new hydro-equipment industries, this backward linkage formation, at best, continued Québec's reliance on foreign technology and foreign entrepreneurs.

Manufacturers in Québec put new power to old uses. While Hydro-Québec added Canada's largest new hydro generating stations at Churchill Falls and at the La Grande River river sites in James Bay to its power system, about 80 per cent of the power purchased by manufacturers was used in the same "old" staples and semi-manufactured goods industries: pulp and paper, chemicals, and primary metals. The hydro infrastructure expansion was also combined by the James Bay Development Corporation with a strategy, historic in Québec, of "industrialization by invitation." Yet, in spite of this strategy, Québec manufacturers did not need the power from Hydro-Québec's new northern plants. This means, that, at best, the northern plants have been built ahead of their need in the province; at worst they have been built for export rather than industrial use within Québec.

OVERDEVELOPMENT: PREDICTED SHORTAGES FOR INDUSTRY AND "UNPLANNED" SURPLUSES FOR EXPORT

While during the 1960s Québec's hydro planners directed the installation of an infrastructure to suit the province's nationalist economic strategy, during the 1970s they added northern projects that enlarged the hydro infrastructure beyond provincial needs. Two phenomena contributed to the

provincial power surplus: (1) the government strategy to use electricity for provincial secondary industrial development did not coincide with the interests of invited owners, and (2) the assumption that in case the plants are built too early, or built too large, exporting the surplus power is supported by federal policy.

Table 3.5
Northern Hydro Expansion 1971-84

Name of Plant	Rated Capacity (MW)	Year of Initial Operation
Churchill Falls	5,429	1971
James Bay:		
La Grande 2	5,328	1979
La Grande 3	2,302	1982
La Grande 4	2,651	1984
Total	15,710	
Québec Total	27,258	1983
Source: Canada, Energy, Mines and Resources, Electric Power in Canada 1988, 30-2		

Part of the mandate of Hydro-Québec was to supply the "industrial or commercial" undertakings of the province of Québec./77 What is remarkable for the growth of Québec's hydro infrastructure is that, having a provincial mandate only, it more than doubled the size of its hydro system between 1971 and 1984 (see Table 3.5). And since the building of hydro projects was combined with the strategy of "industrialization by invitation," the unpredictability of such an industrial development approach became evident when government officials forecast an industrial power shortage before projects were launched and admitted "unplanned"

surpluses (beyond normal phase-in periods of large power plants) after they were installed.

THE POST-CHURCHILL FALLS SURPLUS

During the mid-1960s, Hydro-Québec and government officials argued that unless the Churchill Falls plant was integrated into the Québec system, shortages would develop; moreover, the power was needed for industry in general and secondary industry in particular. However, once the Churchill energy was supplied to the Québec system by 1974, Hydro-Québec did not need the additional power for its old or new industrial customers. Its industrial customers consumed virtually the same amount in 1973 (20,894 GW.h), one year before all the generators were connected, as they did in 1976 (21,078 GW.h), two years after the fresh supply of electricity became available (see Table 3.3). Hydro-Québec had expected an industrial expansion based on abundant Churchill Falls electricity. Since this did not take place, part of the plant's power generating capability became surplus to provincial needs. Mark Zanis, a sociologist from McGill University, questioned the planning practices of Hydro-Québec, especially the contradiction between shortage predictions and surplus realities.

As far back as the Churchill Falls deal in 1966, there was talk about shortages in Québec. In fact at that time, there was mention of a shortage in 1971, and here we are again in 1974, and we have heard about James Bay, there is going to be a shortage, and, suddenly, we just wind up with surpluses. It's either poor planning on the part of Hydro Quebec or that these things are deliberately created./78

Table 3.6
Hydro-Québec Power Surplus
1977-84
(MW)
Month of October*

1977	1978	1979	1980	1981	1982	1983	1984
----	----	----	----	----	----	----	----
3,342	2,205	2,311	2,773	2,982	3,356	3,195	3,506

Source: National Energy Board Report to the Governor in Council: In the Matter of an Application under the National Energy Board Act of Quebec Hydro-Electric Commission, September 1976, Appendix 6

* October is the most critical month of export periods in most years when capacities are needed in the United States and Canada

However, Hydro-Québec officials denied both poor planning or deliberate planning for export with statements such as "nous ne créons pas délibérément des excédents d'énergie."/79

Yet, by 1976, Hydro-Québec confirmed that generating capacities equivalent to more than half of the Churchill Falls powerhouse were not needed, even during crucial periods in the fall (Table 3.6).

THE POST-JAMES BAY SURPLUS

While the James Bay projects were developed, the same pattern occurred: shortage predictions before the scheme was launched and surplus reality once it was completed.

Bourassa predicted that, if James Bay was not built by 1985, the power deficit would be 15,000 MW, and he questioned whether Quebeckers "would want the wood-burning stove and the oil lamps restored in order to cope with these [power deficit] problems."/80 He was "convinced" that "besides ensuring firm supplies to existing industries," the James

Bay expansion was needed for "the establishment of new industries."/81 In 1981, Robert Bourassa indicated that about 2,500 MW from James Bay was allowed for the "implantation" of new industries.

Un cinquième de la puissance et près du tiers de l'énergie de la Baie James se trouvent implicitement réservés à la croissance de la demande dans le secteur industriel. Il y a donc un bloc de 2 500 MW dédié aux implantations industrielles./82

After the three hydro stations, La Grande 2, 3, and 4, from the James Bay complex were connected to the provincial system, the new industries needed a capacity of 176 MW, not 2,500 MW./83 Instead of being attracted to Québec's fresh supply of electricity, industrial investors stayed away. The lack of success in "implantations" of industry left Québec with an over-powered industrial support system.

Table 3.7
Hydro-Quebec Surplus
1984-90
(MW)
(March)

1984	1985	1986	1987	1988	1989	1990
-----	-----	-----	-----	-----	-----	-----
4,683	4,849	5,114	6,136	5,556	4,781	4,049
(July)						
1984	1985	1986	1987	1988	1989	1990
-----	-----	-----	-----	-----	-----	-----
10,328	10,936	11,692	12,580	12,345	11,957	11,634

Source: National Energy Board, Reasons for Decision: In the Matter of an Application Under the National Energy Board Act of Hydro-Québec, January 1984, Appendices: VI and VII.

The provincial post-James Bay surplus capacity was even higher than the provision for industry and pointed to the fact that Québec, since the northern expansions, had devel-

oped electricity not as a provincial industrial input but for export. Simply stated, during the summer all the James Bay plants (10,287 MW) were surplus to Québec's needs, and during the winter half the plants were surplus to Québec's needs (Table 3.7).

So far two of the three phases in Québec's power development have been discussed. In the first, southern plants were built to serve a more nationalistic economy within Québec; in the second, one half of the northern plants were built to serve Québec, the other half to serve the short-term export market; in the third, proposed by Bourassa, northern plants are "pre-built" to eventually serve Québec, but primarily to serve continental markets.

This latter use requires rethinking the concept of hydro power as a staple rather than an industrial input within the province. Conceptualized as a staple, the power from river sites, once extracted in powerhouses, can be traded across political boundaries to a manufacturing centre. This is the basis of Bourassa's continentalist version of northern hydro development - provincial surplus energy is deliberately created for export.

Bourassa's continentalist pre-building strategy, with its primary emphasis on long-term export, treats the power extracted from rivers as an energy staple. As the Churchill Falls and James Bay plants doubled the electricity generating power of Québec, his 1985 water power dream, of an additional 30,000 MW of Power from the North scheme would double

Québec's hydro power output, turn most northern rivers into slow-flowing canals or stagnant reservoirs, and double the number of power lines crossing Québec from north to south./84

The 30,000 MW of Power from the North include different regions of Québec, such as (1) the second phase of the La Grande River and additional plants (10,000); (2) rivers south of the La Grande River, namely the Nottaway, Broadback, and Rupert (8,000 MW); and (3) "the Quebec North Shore region, possibly including waterways in Labrador as well" (4,000 MW). Further, "strictly within Quebec" he sees the possibility of an additional 8,000 MW./85

For instance, Bourassa proposes pre-building the plants in two regions (the rivers south of the La Grande and the North Shore, including Labrador (12,000 MW)) to produce intermittent energy staples before they are repatriated as industrial energy to Québec. This continental scheme includes the following steps: making power deals with utilities in the northeastern United States, then obtaining a licence from the National Energy Board; raising \$25 billion in portfolio capital; building the hydro projects in northern Québec and Labrador; exporting the power for about twenty-five years; and, thereafter, repatriating the use of the plant, if necessary. Since this is only one of Bourassa's greater hydro dreams, the question of how Québec used its northern surplus plants remains.

Since the federal government is responsible for inter-provincial and international trade of natural resources, including energy, it could direct such surpluses to serve national (interprovincial) needs. For instance, the surplus energy from Churchill Falls and James Bay could replace expensive and non-renewable fossil fuel (oil, gas, coal) generation of electricity with renewable surplus hydro energy from Québec. To evaluate the federal role in inter-provincial versus continental use of Québec's power surpluses, the actions by the National Energy Board need to be examined.

DIRECTING SURPLUSES

As documented above, Hydro-Québec had overbuilt its system. The post-Churchill Falls (total: 5,225 MW) surplus was about to be half the entire plant capacity during 1977-84. The post-James Bay complex (total: 10,287 MW) was entirely surplus during the summer, and about half of its plants were surplus to Québec's needs during the winter.

The Québec government and Hydro-Québec had a choice as to whether they would give priority to using these surpluses to strengthen Québec's interprovincial integration within a Canadian national grid (i.e., negotiating with neighbouring provincial utilities), or whether they would apply to the National Energy Board to legitimate using and producing provincial surpluses for integration with US utility grids.

While its export links have strengthened, its inter-provincial trade fluctuates, in part because Hydro-Québec

cancelled firm exports to provinces since its 1974 National Energy Board application. Hydro-Québec has exported electricity over its increasingly more powerful transmission lines with the United States. While about 20 per cent of all of Québec's total generated power originates from Labrador, 9 per cent of its total power was exported to the U.S. in 1986 (12,674 GW.h) and 8 per cent during 1988 (11,863 GW.h) (see Table 3.8).

Table 3.8
Provincial Electricity
Generation and Exports 1986, 1988
(GW.h)

Year	Generation	Imports from		Exports to	
Province		Provinces	U.S.	Provinces	U.S.
1986					
Quebec	148,260	30,712*	35	14,496	12,674
1988					
Quebec	149,005	31,079*	86	4,979	11,863

Source: Canada. Energy, Mines and Resources. *Electric Power in Canada 1986*, Table 4.2, p. 16; *Electric Power in Canada 1988*, Table 3.3, 20

*Primarily from Churchill Falls, 1986 = 30,695; 1988 = 30,727

Since 1974, two years after Québec received the first Churchill Falls power, fourteen Hydro Québec export licence applications have been processed and granted by the National Energy Board (see Appendix III, Table III.5).⁸⁶ One such hearing and licencing process in the post-Churchill period, and another from the post-James Bay surplus period, will reveal how Québec's politicians and planners took the energy out of Confederation and put it into North American integration.

If plant surpluses are to be used as *national industrial input*, an interprovincial (even national) power grid is needed, surplus energy needs to be interprovincially shared, and exports need to be blocked. On the other hand, if plant surpluses are to become *provincial continental staples*, US interconnections are required, and no authority over interprovincial sharing can be enforced. In both licence hearings examined, the National Energy Board has largely ignored the use of surpluses as *national industrial input* and has asymmetrically legitimated surpluses to be used as *provincial continental staples*. Two key institutions, the Québec government and Hydro-Québec, were instrumental in turning the power that was surplus to provincial needs into a continental staple.

Hydro-Québec, as an institutional "nationalist" force within Québec, did not give priority (even during the mid-1970s oil crisis) to using plants, which provided power surplus to Québec needs, for strengthening the Canadian grid. Instead, Québec government leaders and Hydro-Québec officials took actions and made decisions, which, in effect, blocked the development of a Canadian national grid, undermined the interprovincial surplus use within the boundaries of Canada, and ignored the use of surplus electricity as a national industrial energy.

POST-CHURCHILL FALLS SURPLUS

As part of the annexation of Churchill Falls, Québec first denied Newfoundland permission to transport Labrador

electricity across its territory. Then Hydro-Québec signed a "diversity power" contract with the Power Authority of New York, offered the US contract as an entire take-it-or-leave-it package to some neighbouring provinces, interpreted the unsuitability of the US contract to the provinces as proof that the power was surplus to Canadian needs (a regulatory requirement), and, finally, applied for and received a licence to export power. Before the export process is examined in more detail, the blocking of the transport of Labrador electricity to Ontario needs to be addressed.

Jean Lesage, the premier of Québec, blocked the formation of a national power grid by refusing to take part in the federal government's national power network meetings during 1962. He claimed that hydro-electric transmission was a provincial matter, and, that the development of electricity come under provincial jurisdiction.^{/87} In addition, the Québec government refused to allow transmission of Churchill Falls electricity across its territory from Labrador to Ontario during the mid-1960s.^{/88} This landlocking of the Labrador resource allowed Hydro-Québec to buy the Churchill Falls energy from Brinco's Churchill Falls (Labrador) Corporation. It bought the electricity from Newfoundland, one of the poorest provinces of Canada, at about 2.5 mills per kWh for sixty-five years, in part for resale to neighbouring utilities.

Once all the generators at Churchill Falls were able to produce surplus electricity for the Québec system, Hydro-

Québec signed the "diversity power" contract with the Power Authority of the State of New York (PASNY) on 29 March 1974 in Montreal, and, thereby, undermined the potentially beneficial national use of Québec's electricity by other provinces at the height of the mid-seventies oil crisis./89 The electricity sold was labelled as "diversity power," which was "defined as power exchanged or made available in order to benefit from the diversity between two peak loads [peak power demand periods]. In this case, the diversity is seasonal and is between the annual peak loads of the two systems, the Québec peak occurring in the winter [e.g., heating] and that in southern New York in the summer [air conditioning]."/90 Since virtually no power is imported from New York (see Appendix III, Table III.4), the more likely reason for the US to import Québec power was the scrapping of "a nuclear project" in New York "because of financing, siting and environmental problems."/91

The delivery of "diversity power" was similar to the delivery of Ontario's Niagara Falls power from US plants across the river by private US companies. This time, the Beauharnois plant, on the St. Lawrence River outside Montreal (part of the 1944 nationalization), was disconnected from the Québec system and linked with the US grid by the publicly-owned Hydro-Québec. Labrador power would be delivered under more unstable conditions (icing, storms, and therefore, technical problem on the transmission line) to Montreal, and Montreal power would be exported, with less

risk, to the United States. Churchill Falls power at 2.8 mill kW.h (already under-priced, equal to \$.0028 kWh) was brought to Montreal, and Montreal power at 0.7 mill per kW.h (equal to \$.0007 per kW.h), was exported to the United States./92 A summary of the key features of the "diversity power" contract (with some National Energy Board amendments) shows more unusual arrangements favouring continental integration:

Export for 17 years:

- 800 MW of power (and more in the future) from the Beauharnois plant near Montreal to Utica, New York (via Massena)
- Up to 3,000 GWh per year of energy for five export years from 1 June 1977 to 31 December 1981 and renewable for a term of 13 years to no "later than 31 October 1991./93

"Free" power line in 17 years for the Power Authority of the State of New York:

- Within the length of the contract, the difference between the low price of 0.7 mill per kW.h [incremental costs only, no capital costs were charged] and the price in the US market is to pay for "155 miles of 765 kV transmission line composed of 21 miles (\$48.7 mill.) from the Canadian border to Massena and 134 miles (\$226 million) from Massena to Marcy substation near Utica," NY./94

Before any export is allowed, National Energy Board regulations require that it be tested to determine whether or not it is surplus to Canadian needs. To demonstrate this surplus, utilities are required to offer surplus energy to neighbouring utilities. The question is, what did Québec offer to its neighbours, and how did they react to its "diversity power" contract? What Hydro-Québec announced was that formerly firm electricity contracts with its Canadian neighbours were no longer renewed or tailored to their needs

and that surpluses (from Québec power plants) would at best be offered as US-tailored package contracts./95

New Brunswick declined the offer, but neither Ontario nor Newfoundland were even offered the US package contract./96 The minister of energy for Ontario "contended that Ontario Hydro had not been offered the proposed export quantities and that therefore those quantities could not be found surplus to Canadian requirements."/97 Furthermore, the Ontario Ministry of Energy argued that "the power transfer possible over the line [to Utica, NY] could reduce incentive to expand regional and national interconnections in Canada, particularly in relation to the Province of Ontario."/98 And the minister added that it may, "by the early 1980s, be unable to meet the needs of its customers in the Province of Ontario."/99 The National Energy Board, in its report, chided Ontario for requesting an offer: "Ontario could itself have made a bid for the power but it did not."/100

Also neglected by Québec, the attorney general of Newfoundland asked "why the diversity power had not been offered to Newfoundland." Hydro-Québec replied that "there is no interconnection with the island of Newfoundland and that, because of this, Newfoundland would presumably have no use for the power."/101 Provincial government and utility officials opposed the export, but what did officials from industry have to say?

As indicated above, industries in Québec showed little interest in using the fresh supplies of power to set up additional industries. The Association of Major Power Consumers from Ontario, however, argued that "surplus hydraulic energy be kept in Canada and utilized to displace energy generated by fossil fuels," (oil, coal, gas, nuclear) and "urged the establishment of an Eastern Canada Power Pool."/102 The major power users opposed integrating with the eastern US power pool (co-operating utilities within US states) and, instead, favoured utilities in eastern provinces forming utility pools within Canada.

Now the question becomes, did the National Energy Board legitimate using the post-Churchill surplus to advance Hydro-Québec's integration of the Beauharnois plant in Montreal with US power grids? The answer is yes. The National Energy Board approved the "diversity power" export contract between Hydro-Québec and the Power Authority of New York, with minor modifications. It approved the low price of 0.7 mill/kWh for power, the "free" power line for the US utility connecting the Montreal plant to the US grid, and the export of energy for up to seventeen years./103

As a matter of routine, the board ahistorically evaluates each application on its own merit, primarily within a narrow scope of public and national interest, that is, it verifies Canadian surplus and price in the Canadian interprovincial market and in the US market. The board instructed Hydro-Québec to offer the "diversity power"

export contract to Newfoundland and Ontario. Since "no Canadian requirement [had] been established for this type of [US-tailored] sale," the Board reasoned that the power was surplus to Canadian needs. Hydro-Québec "disconnected" the board's interprovincial price criterion, which is that "export price shall not be less than the price to Canadians for equivalent service." The board argued that, since "Hydro-Québec does not propose selling firm power to neighbouring provinces in the future, it did not or could not provide up-to-date comparisons" as to whether 0.7 mill per kW.h for its export price is less than the price offered to Canadians./104 The price in the local US market fitted National Energy Board regulations because the Québec export carried the amortization costs of the US power line.

But why would the National Energy Board allow such a sale to proceed? One reason points to the expectation that once transmission lines were interconnected with the United States, they would "undoubtedly have potential for future additional benefits."/105 This relates directly to Mitchell Sharp's national/continental power policy statement of 8 October 1963 in the House of Commons, which encouraged "power exports and interconnections between Canadian and United States Power Systems where such induce early development of Canadian power resources."/106 The National Energy Board approved interconnection with the US for the sake of "future additional benefits," which were to be gained from the early development of power plants "encouraged" (in part

to obtain more US portfolio capital) by the federal government. A "free" power line to a US utility would open the possibility for future exports.

So far, the post-Churchill Falls surplus and subsequent export during the 1970s have been discussed. But would Hydro-Québec isolate more plants due to the James Bay surplus and connect them to the US utilities during the 1980s?

POST-JAMES BAY SURPLUS

As indicated above, since 1984 about half of the three James Bay hydro stations (total: 10,287 MW) were surplus during the winter and all of them were surplus during the summer./107 By the mid-1980s, Hydro-Québec was even less interested than before in the possibility of strengthening interprovincial Canadian power system connections. In fact, Québec's utility continued to make export contracts with US utilities and no longer offered the US package sales to neighbouring Canadian provinces.

One such export sale, the "1985 New England Utility" (NEU) sale, became a challenge to the authority of the National Energy Board. Hydro-Québec made the NEU export contract based on its mounting James Bay surplus (although this was not the first US sale due to the James Bay surplus)./108 This firm export contract (not interruptible for Canadian needs) was signed between the NEU and Hydro-Québec in October 1985 and involved disconnecting some of the generators in the largest powerhouse in Québec and link-

ing them by separate transmission facilities directly into the United States./109

It was "to export up to 9,000 GW.h annually (enough to operate 30 pulp mills for one year), 70,000 GW.h in total, of firm energy to the New England Utilities for a period of from 10 to 14 years beginning 1 September 1990 and ending 31 August 2004."/110

Generators at LG 2 (James Bay, La Grande River powerhouse # 2) would be isolated from the Hydro-Québec system and would feed directly to Sandy Point in New England ... This scheme would effectively isolate 2,000 MW of exports from the system./111

During the 1970s, Hydro-Québec still offered (often after being requested to do so by the National Energy Board) such package contracts to neighbouring provinces. In 1985, the utility ignored any other provincial electricity needs or requirements to offer export electricity; in fact, "Hydro-Québec failed to make such offers to its neighbouring utilities in Ontario, New Brunswick and Newfoundland."/112 This failure to offer its surplus to other provinces was part of Hydro-Québec's strategy to erode federal authority over interprovincial electricity trade. Whether or not such offers were made determined, according to the board, whether or not the export was surplus to Canadian needs.

It was Hydro-Québec's position that surplus should be tested only within the market boundaries of each provincial utility (whether a surplus was needed within Canadian national boundaries was irrelevant).

The Board's surplus test should only be applied in the narrow sense of the requirement of Hydro-Québec's own domestic customers plus its firm commitments to supply other utilities or systems./113

In this context, Hydro-Québec should be allowed to export without offering its surplus to neighbouring provinces. Thus, in "May 1987 the Board denied the application [based on the '1985 NEU export deal'] because Hydro-Québec had not provided sufficient evidence to demonstrate that the electricity it proposed to export was surplus to reasonably foreseeable Canadian requirements, and that the export price was not less than the price to Canadians for equivalent service."/114 The board also rejected Hydro-Québec's understanding of the "national" intent of the National Energy Board Act./115

The board considered the suggestion that the application could be "cured" if Hydro-Québec offered the surplus electricity to neighbouring provinces, even if the price and surplus conditions were not fully met./116 Hydro-Québec offered the "1985 NEU export deal" to the neighbouring provinces, but, predictably, neighbouring Canadian utilities could not match "all the conditions or elements of the export deal" with the U.S. utility./117 The board found, for instance, that the Newfoundland & Labrador Hydro requirements "would be substantially different than the terms and conditions provided for under the export contract."/118 The board continued to "disagree with Hydro-Québec's position that the offer must be on exactly the same terms and conditions as provided under the export contract" but approved a licence with minor variations from the NEU export contract, on 22 January 1988./119 In such ways, the

National Energy Board allowed Hydro-Québec to continentalize its expansion program.

CONCLUSION

Québec writers, such as René Durocher, claimed that during the Quiet Revolution in Québec "the government's most spectacular accomplishment in economics was the nationalization of private electricity companies, an idea that was promoted in 1962 by René Lévesque, minister of natural resources." Some of the objectives of the nationalization and formation of Hydro-Québec included "integrating the system," "encouraging industrialization," and "guaranteeing economic benefits for the Quebec economy through a buy-Quebec policy."/120

Since one of the objectives of nationalization was to encourage industrialization, had the private utilities not shown sufficient interest to advance industrial development in Québec? The Montreal Light, Heat and Power Company failed to produce electricity in the right quantities and at the right price for industry - this became a factor in its nationalization in 1944 and in the formation of Hydro-Québec. The private utilities outside of Montreal, including the Shawinigan Water and Power Company, pursued individual profitable relationships with industry and failed to provide electricity for industrial development in rural areas, such as the Bas-Saint-Laurent, Abitibi, and the Gaspésie./121 This shortcoming of private utilities, among others, contributed to the nationalization of the remaining

southern networks and their integration into Hydro-Québec. The aims of the "conquest of the North" (annexation of Churchill Falls in 1969 and development of James Bay in 1971) went beyond the industrial needs of Québec but were planned, primarily, to increasingly accommodate the US national energy policy of "sharing" the benefits from Québec's renewable hydro-electric energy resources./122

The intervention by the state in the building of southern and northern hydro complexes (Manicouagan-Outardes, Churchill Falls, and La Grande in the James Bay region) and the insistence upon a buy-Québec policy by Hydro-Québec executives and the James Bay Energy Company did result in strengthening the state-owned and private turbine and generator industry (e.g., Marine Industries, Dominion Engineering Works) as well as in the establishment of more branch plants catering to hydro-electric supply industries (e.g., ASEA Electric (Sweden), Brown Boveri (Switzerland), Canadian General (USA) etc.). The procurement policy and expansion program had an impact on establishing plants primarily before 1970, that is, before the major northern expansions. In this way, backward linkages, reliant on technology and foreign firms, continued dependent industrialism despite the experience of seventy years of hydro-electric installations and the philosophy of "maitres chez nous."

What kind of industrial development has been encouraged by the cheap electricity made available from hydro system expansions since the Quiet Revolution? A similar dependence

on "industrialization by invitation" was continued by developing forward linkages, which used electricity as an industrial input. The James Bay Development Corporation relied on the funding of joint exploration studies with wealthy mining firms from other parts of Canada, the US, Europe, and Japan as well as on numerous trips abroad to external invitations to new industrial "masters." So, then, what was the impact of the availability of cheap industrial electricity from southern and northern expansion on the nature of industrial development? The results show that about 80 per cent of the electricity in Québec between 1962 and 1984 was used to process pulp and paper, primary metals, and chemicals. The concentration of electricity use within these three industrial sectors remained virtually unchanged.

Was the state able to add the right number of plants (e.g., the additions of Churchill Falls and James Bay plants) to match the needs of industries expected to arrive in Québec? Although the urgent need for Québec's industries was stressed when the Churchill Falls contract was signed, and although Bourassa warned of the dangers of "an energy deficit in Québec" of 15,000 MW without James Bay, industry in Québec did not need such enormous expansion. By 1976 Hydro-Québec had a surplus larger than half the capacity of Churchill Falls; by 1984, this surplus was more than 11,000 MW during the summer and, during the winter, it was about 5,000 MW (the entire capacity of Churchill Falls). The surpluses were due, in part, to expected industries not consum-

ing the loads forecast and, in part, to the fact that part of the capacity of northern projects was built for an unreliable market in the de-industrializing northeastern US.

Did Hydro-Québec chose to give priority to the Canadian national interest, so that power surpluses, temporary or long-term, arising from the "unpredictable" industrial developments in Québec served to strengthen the Canadian national grid? The Québec government's and Hydro-Québec's actions regarding whether to use surplus power to strengthen the Canadian national grid or to use it as a staple and to integrate with the US networks were consistent (e.g., landlocking Labrador electricity and bringing it to Montreal, connecting the Beauharnois (Montreal) plant to Utica via "free" transmission, connecting its largest La Grande 2 directly to Sandy Point in New England): Québec continually took "the energy out of Confederation and put it into continental integration."

Québec's political élite initially planned to gain increased energy autonomy from Canada and to obtain US rent from its hydro resources (\$248 million in 1988, see Table 7.4); moreover such exports were also initial steps towards Bourassa's bigger plans for a \$25 billion and a \$100 billion water project.¹²³ The former constitutes the "Power from the North" scheme of doubling Québec's electricity capacity, that is, developing power plants amounting to 30,000 MW capacity in northern Québec and Labrador primarily for US export. This would be part of realizing Hydro-Québec's

3

PM-1 3 1/2"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

(57,337 mill. barrels equivalent; or U.S.\$1,095 billion)
 "substantially larger energy values [almost all hydro-electric] than Canada's total proven oil and gas reserves [23,704 mill. barrels] as well as the combined proven oil and gas reserves of the ten largest United States energy companies [48,369 mill. barrels; or \$463.6 billion]."/124
 Once developed, these energy values would be realized, and the \$100 billion project, the "GRAND Canal Concept" or "Recycled Water from the North" plan, could proceed./125 In this scheme, water, once passed through James Bay turbines, would be dyked in James Bay and flushed as "fresh" water through the Great Lakes and (along one of many canals) via the "revitalized Mississippi" into the Gulf of Mexico (solving pollution problems along the way)./126

NOTES

- 1 Robert Bourassa, 1973, James Bay, 69.
- 2 James Schlesinger, 1985, "Foreword," *Power from the North*, Robert Bourassa, ix-x.
- 3 Alain Chanlat, 1984, *Gestion et Culture d'Entreprise*, 41; cited by Parenteau, "Hydro-Québec: Les relations entre l'état et son entreprise," 7.
- 4 Roland Parenteau, "Hydro-Québec: Les relations entre l'état et son entreprise," 7-9. John Dales, *Hydroelectricity and Industrial Development - Quebec 1898-1940*.
- 5 André Bolduc et al., 1979, *Québec un siècle d'électricité*, 232.
- 6 Roland Parenteau, "Hydro-Québec: Les relations entre l'état et son entreprise," 7.
- 7 André Bolduc et al., *Québec un siècle d'électricité*, 260, 268.
- 8 Ibid., 268-9.
- 9 The elements of the expansion policy were delivered by Lévesque on 12 February 1962. André Bolduc et al., *Québec un siècle d'électricité*, 264-5.
- 10 Ibid.,
- 11 André Bolduc et al., *Québec un siècle d'électricité*,

265.

- 12 On 15 December 1961, Michel Bélanger, director of planning in the Ministry of Natural Resources, revealed to the Conseil d'orientation économique, which advised the Lesage government on economic matters, "mais on éliminera ainsi un handicap au développement industriel des régions démunies de sources d'énergie d'importance." René Lévesque, Québec's minister of natural resources, during la semaine nationale de l'électricité, on 12 February 1962, pointed to the shortcomings of the private power companies while speaking to 500 representatives from the electrical industry. Michel Bélanger, Lévesque's planning director, indicated that the power supply was needed in those regions not thought profitable by hydro corporations. André Bolduc et al., Québec un siècle d'électricité, 264-5.
- 13 André Bolduc et al., Québec un siècle d'électricité, 268.
- 14 Of course private hydro companies tried to resist nationalization such as the Shawinigan Water and Power Company. They raised questions about who actually would be the masters. "Dans leur désir d'être 'maîtres chez eux', les francophones ne risquent-ils pas d'entendre une vaste bureaucratie que ferait de l'Etat le véritable maître?" André Bolduc et al., Québec un siècle d'électricité, 268.
- 15 André Bolduc et al., Québec un siècle d'électricité, 282.
- 16 Ibid., 280, 283.
- 17 Ibid., 287.
- 18 Manicouagan and Outardes rivers, Manic 2, Manic 3, Manic, Manic 5 (1,292 MW), Outardes 3 and Outardes 4. André Bolduc et al., Québec un siècle d'électricité, 300.
- 19 The Manic-Outardes complex furnished a total of 5,517 MW, of which the 25 generators of the 4 powerhouses at Manicouagan totaled 3,675 MW by 1976; and the three powerhouses on the Outardes River had a capacity of 1,842 MW by 1978. André Bolduc et al., Québec un siècle d'électricité 307-11.
- 20 As a result of the Churchill Falls contract, Bourassa states that, "the Manicouagan Outardes power development was stopped; and the Outardes II and Manic III projects were postponed by five years." Robert Bourassa, 1985, Power from the North, 87.
- 21 Helen Lajambe indicates the similarities between la Société d'énergie and La Société Churchill Falls. Hélène Connord-Lajambe, 1977, "Coûts et externalités de l'aménagement hydroélectrique de la baie James."
- 22 Robert Bourassa, James Bay, 10.
- 23 The SDBJ had only five executive administrators (Pierre Nadeau, Fred Ernst, Roland Giroux, Raymond Primeau, and Lucien Cliche), who started their first meeting in the Hydro-Québec building at 75 West Dorchester on 13 September 1971 in the presence of Premier Robert Bourassa. The money for JBDC was raised by issuing

- shares which were bought by the Québec minister of finance. In other words, public money was used to subsidize participation of foreign industry. *Procès-Verbal d'une Conseil d'Administration de la Société de Développement de la Baie James*, 13 September 1971, 28 October 1971 (Montreal: Centre d'Archives Hydro-Québec). Robert Bourassa, *James Bay*, 71.
- 25 Robert Bourassa, *Power from the North*, 20-1.
 - 26 "The first subsidiary set up was the James Bay Energy Corporation. The partner is the Québec Hydro-Electric Commission (Quebec Hydro), which holds a minimum of 51 per cent of the Energy Corporations's shares." Robert Bourassa, *James Bay*, 71. The James Bay Development Corporation subsequently came under the control of Hydro-Québec, which, itself, by the mid-seventies, had revenues of \$900 million, assets of \$7 billion, and a labour force of 16,000 employees. Pierre Fournier, *Les sociétés d'Etat et les objectifs économiques du Québec: une évaluation préliminaire*, 92. Robert Bourassa, *Power from the North*, 21.
 - 27 Derek Hill and John Kalbfleisch, "Bourassa, Rockefeller discuss James Bay." *The Gazette*. Montreal, Friday, 10 March 1972, 155.
 - 28 Robert Bourassa, *Power from the North*, 91.
 - 29 *Ibid.*, 84-5.
 - 30 *Ibid.*, 84-5.
 - 31 John H. Dales, *Hydroelectricity and Industrial Development -- Quebec 1898-1940*, 183.
 - 32 Dales gives a more detailed description of generating equipment in the plant: "At that time the plant had three Francis turbines of 6000 h.p. each. The first two were built by I.P. Morris Co. of Philadelphia; the third, with movable guide vanes, was the product of Escher Wyss and Co. of Zurich, Switzerland. The first two generators were Westinghouse machines, the third had been built in London, England." John H. Dales, *Hydroelectricity and Industrial Development - Quebec 1898-1940*, 231.
 - 33 Blake R. Belfield, "The Niagara Frontier: The Evolution of Electric Power System in New York and Ontario, 1880-1935," 144.
 - 34 André Bolduc et al., *Québec un siècle d'électricité*, 327.
 - 35 *Ibid.*, 316-21.
 - 36 Robert Bourassa, 1985, *Le Défi Technologique*, 138-9.
 - 37 Niosi, Jorge and Phillippe Faucher, 1986, "Public Enterprises Procurements and Industrial Development: The Case of Hydro-Québec," 10.
 - 38 Jean Bernier, Secrétaire général, Hydro-Québec, telephone interview, 10 August 1989.
 - 39 Jean Bernier, Secrétaire général, Hydro-Québec, 10 August 1989.
 - 40 Phillippe Faucher, 1988, "Procurement by State-Owned Enterprises: Potential and Limits For Industrial

- Development," 19.
- 41 Société d'Energie de la Baie James, "Rapport Historique Aménagement LG2 Central Souterraine: Montage et Installation des Turbines - Alternateurs, 1CD-410-01-011, Entrepreneur: 'Le Consortium La Grande,'" n.d., 1, (Montreal: Centre d'Archives Hydro-Québec).
 - 42 Ibid.
 - 43 Société d'Energie de la Baie James, "Rapport Historique Contrat #1TA-400-01-001, Montage des Groupes de Turbine-Alternateur, LG 3." Prepare par Pierre Giroux, Taignlim Khy, Gérald Morneau, n.d. (Montreal: Centre d'Archives Hydro-Québec).
 - 44 Marine Industries was also building ships for Poland which brought the company to near bankruptcy during 1978. Lévesque stressed that with building generating equipment for James Bay, during the last 10 to 15 years, the company was on a much surer footing. "Conférence de Presse de M. René Lévesque." Le mardi 12 décembre 1978 (Once heures quarante-deux minutes), (Sainte-Foy: Archives nationales du Québec).
 - 45 Statistic Canada, cat. 57-206 Electric power statistics, vol. III, "Inventory of prime mover and electric generating equipment as of December 31, 1986."
 - 46 The formation of some other hydro-equipment related backward linkages has been analyzed by Credit (Centre de recherche en développement industriel et technologique) in Montreal. Credit is part of the Université du Québec à Montréal.
 - 47 Phillippe Faucher and Kevin Fitzgibbons, "The Political Economy of Electrical Power Generation," 24-5.
 - 48 Ibid., 10.
 - 49 Phillippe Faucher and Kevin Fitzgibbons, 1990, "The Political Economy of Electrical Power Generation," 10. Jorge Niosi and Phillippe Faucher, "Public Enterprises Procurements and Industrial Development," 10. Phillippe Faucher, "Procurement by State-Owned Enterprises," 19.
 - 50 Phillippe Faucher and Kevin Fitzgibbons, "The Political Economy of Electrical Power Generation," 10.
 - 51 Ibid., 10.
 - 52 Jorge Niosi and Phillippe Faucher, "Public Enterprises Procurements and Industrial Development," 15.
 - 53 Phillippe Faucher, "Procurement by State-Owned Enterprises," 19.
 - 54 Jorge Niosi and Phillippe Faucher, "Public Enterprises Procurements and Industrial Development," 15.
 - 55 Ibid., 10.
 - 56 Glen Williams, *Not for Export: Toward a Political Economy of Canada's Arrested Industrialization*.
 - 57 Interview with Jorge Niosi, 21 March 1989, at the Centre de recherche en développement industriel et technologiques (CREDIT) in Montreal.
 - 58 Québec. Government of Québec. Approval requested by Hydro-Québec from the Lieutenant-Governor in Council to grant approval, in the "resolution of June 3, 1968," of

- its intention to sign the Churchill Falls power contract (Ottawa: National Archives of Canada, Churchill Falls (Labrador) Corporation, MG II 73, vol. 58, file 11).
- 59 Robert Bourassa, James Bay, 71
 - 60 Procès-Verbal d'une Conseil d'Administration de la Société de Développement de la Baie James, 16 August 1973 (Montreal: Centre d'Archives Hydro-Québec).
 - 61 Procès-Verbal d'une Conseil d'Administration de la Société de Développement de la Baie James, 13 December 1973 (Montreal: Centre d'Archives Hydro-Québec).
 - 62 Procès-Verbal d'une Conseil d'Administration de la Société de Développement de la Baie James, 25 April 1974; 29 November 1974; and 13 December 1974 (Montreal: Centre d'Archives Hydro-Québec).
 - 63 Pierre Fournier, 1979, *Les sociétés d'Etat et les objectifs économiques du Québec: une évaluation préliminaire*, 102.
 - 64 Ibid., 102.
 - 65 André Raynauld, *La Propriété des entreprises au Québec* (Montreal: Les Presses de l'Université de Montréal, 1974), 60; cited by Pierre Fournier, *The Quebec Establishment*, 27, 37.
 - 66 Procès-Verbal d'une Conseil d'Administration de la Société de Développement de la Baie James, 1971-6. Robert Bourassa, James Bay, 78-9.
 - 67 Procès-Verbal d'une Conseil d'Administration de la Société de Développement de la Baie James, 25 April 1974 (Montreal: Centre d'Archives Hydro-Québec).
 - 68 Robert Bourassa, James Bay, 37. The provincial government's industrialization policies, even during the time of the nationalistic Quiet Revolution, "did not discourage the penetration of American firms" rather such policies encouraged it. John H. Bradbury, "State Corporations and Resource Based Development in Quebec, Canada: 1960-1980," 50.
 - 69 Ibid.
 - 70 Canada, Energy, Mines and Resources, *Electric Power in Canada 1988*, 32.
 - 71 Total (1981) GWh of "Industries manufact." = 22,130 GWh; Addition of Chimie, Fonte de affinage, Sidérurgie, and Pâtes et papiers = 18,538; 84 per cent in 1981. Total (1984) GWh of "Industries manufact." = 22,862 GWh; addition of Chimie, Fonte de affinage, Sidérurgie, and Pâtes et papiers = 19,351; 85 per cent in 1984. Demande a ONE Hydro-Québec, exhibit B-2, vol. 1.1, decembre 1 1982, exhibit B-3, juillet 1985:3de3 (Ottawa: Library of the National Energy Board).
 - 72 Interview with an industrial development representative at Hydro-Québec, on 25 July 1989, at 75 boul. René Lévesque, Montréal.
 - 73 "Les grands consommateurs se classent ainsi: 1) métaux primaires (non ferreux), 2) produits chimiques industriels, 3) pâtes e papiers, 4) fer et acier primaires...." Québec, Direction Générale de l'Energie,

- L'Electricité, Facteur de Développement Industriel au Québec*, 25, 67. A report used within Hydro-Québec also indicates that a new supply of energy is less and less a factor for industries in selecting their location. "Il semble que la présence locale de sources d'énergie soit en France de moins en moins facteur de localisation industrielle." Ministère de l'Industrie et du Commerce, L. Marechal, *L'Energie au Québec et son influence sur la localisation des entreprises manufacturières*, 95.
- 74 Québec, Direction Générale de l'Energie, *L'Electricité, Facteur de Développement Industriel au Québec*, 137.
 - 75 Canadian Reynolds Metal Company Ltd., Contract #4407-75, date: 10-1-75. Documents: Conseil Exécutif, Autres Documents, Hydro Québec Articles 159 et 160 for the period 1969-76 0,66m, Instrument de Recherche 300034. (Sainte-Foy: Archives nationales du Québec).
 - 76 Québec, Commission de la construction du Québec, *Les Affaires*, Saturday, 25 March 1989, 35.
 - 77 The mandate of Hydro-Québec states that "the object of the [Québec Hydro-Electric] Commission shall be to supply power to the municipalities, industrial or commercial undertakings and citizens of this Province at the lowest rates consistent with sound financial administration." Québec. Chapter 86, Hydro-Québec Act. R.S. 1941, c. 98A, s. 3;8 Geo. VI, c. 22, s.1. *L'Imprimeur de la reine ROCH LEFEBVRE* Queen's Printer 1964.
 - 78 Canada, NEB, "Hydro-Québec," Hearings Transcript, 27 November 1974, 125 (Ottawa: Library of the National Energy Board).
 - 79 Ibid., 105.
 - 80 Robert Bourassa, *James Bay*, 16.
 - 81 Robert Bourassa, *James Bay*, 16.
 - 82 Robert Bourassa, 1981, *Deux Fois La Baie James*, 90.
 - 83 The difference between the total industrial manufacturing power needed between 1981 and 1984 is the difference between 3,218 MW each 3394 MW, which amounts to 176 MW (see Table 3.4).
 - 84 Robert Bourassa, *Power from the North*, 115.
 - 85 Robert Bourassa, *Power from the North*, 78, 80. Hydro-Québec Development Plan 1984-6 (September 1983); cited by Bourassa, 92. Hydro-Québec. *Hydro-Québec Development Plan 1988-1990, Horizon 1997*, 83.
 - 86 The National Energy Board has issued "Reasons for Decisions" on Hydro-Québec licence applications during the following month: December 1974, September 1976, November 1977, July 1978, August 1980, September 1983, January 1984, August 1984, January 1985, June 1985, July 1985, November 1985, May 1987, and February 1988.
 - 87 Letter from Jean Lesage to John Diefenbaker, prime minister of Canada, 8 February 1962, in which he declined Québec's participation in the national power network discussions. Source: Sessional Paper No. 199. Canada. Department of the Secretary of State, Friday, 16

- February 1962. Canada. Unpublished Sessional Paper, 24th Parliament, Session 5, vol. 912-919 #81-238, 1962; Papers 199 and 1,990.
- 88 During 1965, when Lesage, Québec's premier, was "asked if he would give Brinco a right-of-way for the power ... he replied, 'very emphatically,' that he would never agree to that." Philip Smith, *Brinco: The Story of Churchill Fall*, 204.
- 89 Canada, National Energy Board (NEB), *Report to Governor in Council: Québec Hydro-Electric Commission*, September 1976, 5.
- 90 *Ibid.*, 3.
- 91 *Ibid.*, 24.
- 92 The "first 5 years, 2.77734 mill per kilowatthour" was the base paid for power from the "Power Contract between Québec Hydro-Electric Commission and Churchill Falls (Labrador) Corporation Limited, May 12, 1989," 16. Hydro-Québec licence application, 24-5 September 1985, Ordonnance EH-1-85, exhibit #B-4 (Ottawa: National Energy Board Library). "The applicant pointed out that the incremental cost of generating the energy for export would be only 0.7 mill/kWh." Canada, NEB, *Report to Governor in Council: Quebec Hydro-Electric Commission*, September 1976, 20-21.
- 93 *Ibid.*, 5, 83.
- 94 *Ibid.*, 20-22. The Association of Major Power Consumers of Ontario pointed out that the Power Authority of the State of New York's power line, built for this and future Québec exports to the US, was to be written off in seventeen years. Canada, NEB, *Report to Governor in Council: Quebec Hydro-Electric Commission*, September 1976, 46.
- 95 Canada, NEB, *Report to Governor in Council: Quebec Hydro-Electric Commission*, September 1976, 22.
- 96 *Ibid.*, 19.
- 97 *Ibid.*, 41.
- 98 *Ibid.*, 42.
- 99 *Ibid.*, 43-4.
- 100 *Ibid.*, 55.
- 101 *Ibid.*, 45.
- 102 *Ibid.*, 46.
- 103 The delivered price in "Pleasant Valley in south-eastern part of New York State includes the price payable to Hydro-Québec plus transmission costs. This total is estimated to be 19.94 mills/kWh" (p. 22). "Generating costs in Canada @ 0.7 mill/kWh" (p. 20). "100 per cent of the cost of the 765 kV facilities would be charged to the delivered price of 800 MW of Canadian power" (p. 23) *Ibid.*, 80, 83, 20-3.
- 104 *Ibid.*, 60.
- 105 *Ibid.*, 80.
- 106 House of Commons Debates, First Session - 23rd Parliament, vol. IV, 1963, 8 October 1963, 3,301.

- 107 Canada, NEB, Reasons for Decision: Hydro-Québec, January 1984, Appendices: VI, VII.
- 108 Canada, NEB, Reasons for Decision: Hydro-Québec, January 1984, 5.
- 109 Canada, NEB, Reasons for Decision: Hydro-Québec, for Export to the New-England Utilities, May 1987, 3.
- 110 Ibid., 3.
- 111 Canada, NEB, Reasons for Decision Hydro-Québec, for Exports to the New England Utilities, February 1988, 23.
- 112 Ibid., 1.
- 113 Canada, NEB, Reasons for Decision: Hydro-Québec, for Export to the New-England Utilities, May 1987, 8, 12.
- 114 Canada, NEB, Reasons for Decision Hydro-Québec, for Exports to the New England Utilities, February 1988, 1.
- 115 Canada, NEB, Reasons for Decision: Hydro-Québec, for Export to the New-England Utilities, May 1987, 11.
- 116 Ibid., 20.
- 117 Ibid., 14-5.
- 118 Canada, NEB, Reasons for Decision Hydro-Québec, for Exports to the New England Utilities, February 1988, 37.
- 119 Ibid., 37, 40.
- 120 Canadian Encyclopedia, 1813.
- 121 André Bolduc et al., Québec un siècle d'électricité, 265.
- 122 Robert Bourassa, Power from the North, ix.
- 123 Ibid., 92, 153.
- 124 Ibid., 77-8, Table 5-1, 81. The evaluation of the size of Québec's energy resources is an excerpt from the investment banking firm of Kidder, Peabody & Co., Inc., report cited by Bourassa.
- 125 Ibid., 133-55.
- 126 Ibid.

CHAPTER 4

NEWFOUNDLAND: THE CHURCHILL POWER TRAP

Fortunately Premier Smallwood had the imagination and audacity to enlist Winston Churchill's support as the first step towards persuading the Rothschilds to form a syndicate to launch a costly and risk-ridden venture into the unknown. That was in 1953./1

What the Churchill energy will add to Canadian industrial output is immense to a degree beyond calculation./2

For out of the great enterprise will flow an annual output equal to 40,000 [actually 30,000] million kilowatt hours of energy. That is very nearly the equivalent of the total production of electricity in Ontario in 1965 from all sources. It is a prodigious achievement./3

INTRODUCTION

Would a consortium of British banking and industrial firms, invited by Joseph Smallwood, the premier of Newfoundland, develop power at Churchill Falls (in Labrador) and take on the risk of starting new industries? The Brinco (British Newfoundland Corporation) consortium took on neither the risk of developing new industries nor did it "launch a costly and risk-ridden venture into the unknown." Similar to the American power companies at Niagara Falls, which ignored Ontario industry and sought established consumers in the United States, Brinco, while developing Churchill Falls, took little interest in the growth of new local industries and sold the power to "large financially-secure consumers."/4 The Brinco group of companies, from their Montreal offices, patterned their development for maximum profit (at low risk) strategy in the following way:

Figure 4.1 Newfoundland and Labrador, Churchill Falls, and Baie d'Espoir

Source: Science Council of Canada. 43 Meeting Science Council of Canada. "Visits to Churchill Falls Hydro Electric Development." 2-5 October 1973, cover page

first they sold the power and part of the equity only to large and financially secure consumers, then they raised the additional capital in Canada and in New York, and, thereafter, they built the plant. Thus, at Churchill Falls, the largest and best power site in Canada (5,429 MW and built for less than \$1 billion), Brinco sold the power and \$125 million in financing to Hydro-Québec, borrowed \$840 million from New York, and built the project./5 Since the British consortium continued this strategy of alienating Labrador power from potential industrial development in the province, the Newfoundland government bought back its water resources in 1974.

How, then, did the development of Churchill Falls fit into Canada's industrial development outside of the province? Did the Churchill energy "add to Canadian industrial output" to a degree which is "beyond calculation," as a news report at the time claimed? The electricity from Labrador was not available to most of Canada's industry, since Québec disallowed its transport. Québec not only refused Labrador power transmission, its also used the annexation of Churchill Falls power (over the sixty-five-year life of the plant) to strengthen its hydro supply industries and to start electricity exports. Ever since Québec added Churchill Falls to its system, Newfoundland has attempted to repatriate some of its electricity.

Did the federal government's energy board help Newfoundland and enforce the interprovincial energy trade

regulations? It did not - the National Energy Board avoided enforcement of interprovincial trade. This concurred with the federal government's national/continental power policy, which allowed the National Energy Board to refuse repatriation of Labrador power (unlike Niagara Falls power) and to support the continuation of exports for the joint benefit of Québec and the United States.

When the Churchill Falls project was launched, in the late sixties, its purpose (i.e., allowing exports from Québec) was hidden by claims that it constituted a provincial and national prerequisite of modernization and progress. As Brinco's president told his St. John's audience in 1968: the "prerequisite of all modern life and industry is power," and, therefore, "the country or the province that has this natural gift in this modern age cannot fail but to progress."/6 Premier Smallwood lent support to this myth of power and industrial progress. He invited to Newfoundland and Labrador industries such as a liner board complex, petro-chemical plants, chocolate bar factories, rubber plants, and battery manufacturing./7 The industrial and economic development use of Labrador resources, including water power, was clearly spelled out in the principle agreement between the government of Newfoundland and Brinco. It states that the purpose of this agreed-to neo-colonial resource concession is "to promote the industrial and economic development of Newfoundland and Labrador."/8

It is the aim of this chapter to lift the veil of industrial optimism and to expose hydro development as a failed agent in Newfoundland's "re-industrialization." It will be documented that the Churchill Falls project was made to serve continentalism and that Newfoundland's "industrialization by invitation" catered to private and government interests. The outcomes were: the strengthening of supply industries in Québec, the continuation of staple production in Newfoundland, the generation of surplus energy for Québec, and US exports.

STATE INTERVENTION

Like other provincial governments, Newfoundland left economic and industrial development, including hydro, to the private sector. Especially in resource regions such as Labrador, the Newfoundland government, under Smallwood, initially relied on British financiers and industrialists to combine the development of hydro and other resources, but subsequently, Frank Moore's Conservative government bought back Newfoundland's water resources.

Premier Smallwood first invited the British Newfoundland Corporation (Brinco), a consortium of British banking and industrial firms (including N.M. Rothschild), and then granted it rights to natural resources and to hydro power development. This neo-colonial charter company approach to development turned into a failure because: (1) the invitation to Brinco by the government of Newfoundland began the loss of decision-making power over hydro projects; (2)

Brinco picked the best hydro sites and developed them as capitalist ventures separate from other resources, making large power contracts with wealthy customers; (3) when Brinco continued this practice beyond the Hydro-Québec contract, while leaving the unprofitable electrical network expansions on the island to the government, Newfoundland bought back its remaining water resources.

INVITING BRINCO

In 1952, indicating a resistance to becoming solely dependent on the United States for developing Newfoundland's extractive industries, Premier Smallwood told the British prime minister, Sir Winston Churchill, that Newfoundlanders would prefer a return to a stronger link with Britain. "He told Churchill it was American capital that was beginning to exploit Labrador's iron ore; but the people of Newfoundland had a tremendous pride in their British roots and did not want to see their province virtually annexed by United States investment. He mentioned the East India Company and the Hudson's Bay Company as historic models for what he had in mind."/9 After informing Sir Winston Churchill of his ideas, Smallwood gave the financiers, Anthony Rothschild and his nephew Edward Rothschild, the sales pitch. He offered them the minerals, forests, and water resources of Labrador and Newfoundland./10

Several multinational corporations joined to form Brinco, with the backing of the Newfoundland government.

At first, seven United Kingdom banking and industrial firms formed Brinco./11 Companies such as N.M. Rothschild and Sons, the Anglo-American Corporation of South Africa, the Anglo-Newfoundland Development Corporation, Bowater Corporation of North America, Frobisher Limited, the English Electric Company, and the Rio Tinto Company joined to form Brinco in this development venture./12 Brinco, essentially, was a consortium of private companies and was expected to explore and develop Newfoundland with government backing./13 In 1953, the Newfoundland government allocated timber, mineral, oil, and gas concessions over 77,000 square miles, which included the Churchill Falls and all the hydro sites on the rivers and watersheds.

The Brinco Agreement gave Brinco an option exercisable at any time within 20 years from May 21, 1953 to take an exclusive right and concession to harness and make use of all of the rivers and watersheds in Newfoundland and Labrador including the Churchill River and to be vested with all hydro-electric and hydraulic right to the same./14

One of the hydro sites was on the Island, three key sites were in Labrador: On the Island of Newfoundland, it was the Baie d'Espoir site; in Labrador, it was the Scott Falls and Thomas Falls (Twin Falls) site on the Unknown River, twelve miles from Churchill Falls, the spectacular Churchill Falls (formerly Hamilton Falls) site, and the Lower Churchill Falls (Gull Island) site, about 130 miles downstream from the Churchill Falls - all were handed over for private development.

SELLING THE POWER, RAISING THE CAPITAL, DEVELOPING THE SITE

Brinco, being a multinational corporation, used the most profitable route to extracting power from its water power resources. Immigrant hydro entrepreneurs at the turn of the century usually financed the plant, built it, and then invited industrial customers. Brinco took no such risks regarding maintaining expensive unused plants: first it sold the power, then it raised the capital, and thereafter, it developed the sites. It sold the power from the smaller sites to existing staple-producing industries in the province, and built Churchill Falls, primarily, for customers outside the province. Should Brinco find out after the initial survey of site and customers, that the individually incorporated site was not profitable, it failed to proceed and sold the site back to the government.

As in other provinces, private power corporations, particularly foreign-owned firms, had no plans to subsidize the less profitable inter-industrial or rural provision of electricity with their lucrative hydro sites - these less profitable tasks were left up to the state. During the early 1960s, the problem of electrical supply on the island of Newfoundland was threefold: lack of rural electricity, three isolated electrical systems, and a transmission gap on its southern power site on Baie d'Espoir. The three isolated power systems (total of 300 MW) on the island needed integration; Bowater Power Company (133 MW) supplied the Bowater Pulp and Paper Mill and other industries near

Corner Brook, Price (Nfdl.) (50 MW) supplied its pulp and paper mill, and the private Newfoundland Light & Power Co. (177 MW) supplied the domestic, commercial, and small power consumers in the remaining urban and rural areas./15 Large rural areas of the island were without electricity, and the Baie d'Espoir site, owned by Brinco, was to be developed to provide that missing energy. Brinco incorporated the Baie d'Espoir site as Southern Newfoundland Power and Development. First it went to sell the power and raised some capital by forming partnerships with the largest pulp and paper companies, Bowater and Anglo-Newfoundland, which control more than half of the island's productive forests./16 But Brinco, true to its no-risk development pattern, wanted another large customer with capital before starting the Baie d'Espoir plant. Brinco's president considered only "profitable" rather than "philanthropic" rural electrification. When neither Brinco nor the wealthy pulp and paper firms wanted to bridge the \$24 million power line gap to Baie d'Espoir, Brinco sold Southern to the government's Newfoundland and Labrador Power Commission for its engineering and survey fees (\$476,918) and tradeoffs in Labrador./17 When Stage I of Bay d'Espoir "was completed in 1967 at a cost of \$87 million, \$20 million of which was an outright grant from the Atlantic Development Board and \$4 million a low interest loan from the same source," the government's Newfoundland Hydro and Power Commission brought the power to the pulp and paper industry and helped so that "more than 99

per cent of the island's people had access to electric power," by 1972./18

For returning the water rights on the island of Newfoundland to the government, Brinco was granted a ninety-nine-year lease on the water power in the drainage basin of the Churchill River (in central Labrador) in 1961./19 This included the Churchill Falls and the lower Churchill River site./20 The largest and most profitable site (then known as Hamilton Falls) had been incorporated in 1958 by Brinco to become the Churchill Falls (Labrador) Corporation (CFLCo). Its mandate was to develop the drainage basin of the Upper Churchill River into a reservoir and to develop the powerhouse at Churchill Falls./21 The development of the largest hydro site in Canada was preceded by another Brinco project in Labrador.

In 1960, Brinco started with Twin Falls, the site twelve miles upstream from Churchill Falls. Again, it followed its maximum profit strategy of first selling the power, then raising the capital, and, thereafter, developing the site. Its representatives approached the two American mining companies operating iron ore mines in Labrador. Brinco asked "the Iron Ore Company and Wabush [Iron Company] to enter into a 'take-or-pay' contract, meaning that they would pay for all the energy they contracted to take whether or not they actually used it."/22 The Twin Falls hydro power site was incorporated as the Twin Falls Power Corporation (Twinco) and was to develop the two Falls on the

Unknown River, a tributary upstream from Churchill Falls. This project could be financed in New York by Metropolitan Life only once the capital providers were satisfied that Twin Falls would sell enough electricity to make a profit. Financing of \$22 1/2 million was obtained from Metropolitan Life and \$2 1/2 million from Brinco and each of the two iron ore companies./23 Since the money was raised, the development of the site could proceed, and by 1962 the Twin Falls project delivered its first power./24 The plant only functioned long enough to electricity for the iron ore industry as well as to provide power for the construction of the Churchill Falls projects. Once Churchill Falls was complete, the local industry was to be supplied from Churchill Falls, and Twin Falls became a control structure for water management.

Despite more than seventy years of building hydro projects in Canada and having access to experienced local engineering companies, Brinco brought in companies such as Bechtel Construction of San Francisco, and retained Canadian experts and engineers only as subservient partners (e.g., the Québec engineer Don McParland, president of CFLCo, and the H.A. Acres Company, of Niagara Falls)./25 Bechtel and Acres were asked by Brinco to form joint ventures; Acres was responsible for design and engineering and Bechtel for construction management. In their offices outside of Newfoundland and Labrador, Brinco and its group of companies, most at 1980 Sherbrooke Street West in Montreal, nego-

tiated supply contracts, power contracts, and financial arrangements with Hydro-Québec (also in Montreal). As Premier Smallwood's "chosen instrument," Brinco took over control of development within Labrador and directed hydro development from Québec rather than Newfoundland.

Brinco followed its practice of selling the power, raising the capital, and then developing even at its largest site. Brinco's CFLCo first sold the power from Churchill Falls after prolonged negotiations with Hydro-Québec, and a letter of intent was signed in 1966; underground work at the site began in 1967./26 The power contract between the CFLCo and Hydro-Québec, 12 May 1969, showed that most of the 5,225 MW plant was deemed surplus to Newfoundland's need. Outside of this contract, only a 230 MW capacity provision for the Iron Ore and Wabush companies and only 300 MW for future industrial use in Labrador and Newfoundland were allowed./27 As in other ventures, Brinco drew its key customer into financing Churchill Falls before starting work on the site. Hydro-Québec purchased \$125 million worth of equity and mortgage bonds. Brinco memoranda indicate that, in 1969, an "\$840 million" debt "was arranged with the United States and Canadian financial institutions and banks; the total project cost was \$946 million."/28 Brinco had taken no risk; it used Québec's credit, the financing amounted to \$965 million, and the total project cost near the time of completion was estimated at \$946 million (\$19 million below the financing raised). And speeding up the construction time

meant that the plant would earn money on the earliest possible date, that is within a period of five years (1967-72). Following the installation of the new 735 kV transmission line, the first power was delivered, in 1972, into the Québec power system.

Brinco was ready to start the next hydro scheme. The Lower Churchill site (also called Gull Island) is located about 130 miles downstream from Churchill Falls and has less than half its potential power (2,300 MW). Brinco tried again to sell the power, raise the capital, and develop the site. Brinco looked for another customer: it argued that "a large, financially-secure consumer of power is required as party to any Gull (Lower Churchill) power contract in order to achieve the same types of support which occurred with Churchill Falls. At present, the only foreseeable customer that might satisfy these requirements is Hydro-Quebec."/29 This time the government of Newfoundland intervened.

BRINCO TAKEOVER

So far, as demonstrated, the government allocated the natural resources, including water power licences for 99 years, to private capital so that industry and the economy of the province would be developed in the most profitable way. The failure of capital, particularly foreign capital, to provide the less profitable (infrastructural) inputs, seen as necessary for a variety of industries, led to state intervention in order to supply such inputs. Brinco left infrastructure gaps (rural and industrial), alienated power

from other natural resources through exports, and planned to continue this piecemeal approach to hydro development in the future.

Instead of allowing Brinco to continue exploiting each site for maximum profit and at virtually no risk, on 28 March 1974, Frank Moores (Newfoundland's premier) "told the House that the province and the company had reached 'an amicable negotiated position' under which the province would buy the Churchill Falls company and all Brinco's remaining water rights in Labrador for \$160 million."/30 "The resources of Newfoundland are the property of our people," the premier said, "it follows that control over these resources must rest with the people's government."/31 His government "intended to establish a comprehensively planned approach to the development of the province and its resources."/32 And, he added, "indeed we are of the firm opinion that government ownership of Brinco is a necessary and fundamental step toward ensuring that this province will continue to be able to attract private enterprise in the future."/33 Although the government's reliance on foreign private firms in hydro development had been a failure, it planned to continue its "industrialization by invitation" strategy in other sectors of the economy./34

The development of Churchill Falls by the state and private capital followed the pattern typical of provincial hydro development in its pre-nationalization phases. During such phases, the state allocates the power sites together

with other resources for industrial development to large private (and often foreign) corporations. As private capital fails to provide the necessary productive inputs for a variety of industries, the state intervenes.

So far, it has been shown how Brinco provided hydro power for "large, financially secure consumers of power" as its strategy for industrial development. What remains unexamined is how the installation of its hydro plants led to a growth of supply industries and how the new industrial energy and income (i.e., rent) from hydro exports led to more industrial activity in Newfoundland and Labrador.

LINKAGES TO INDUSTRY (BACKWARD, FORWARD, AND FISCAL)

Did Brinco make hydro equipment and general procurement choices which favoured the growth of local hydro supply industries in Newfoundland for the \$946 million Churchill Falls project? And once the water from the falls generated electricity, how was it used with respect to industrial energy? How successful was the strategy of using anticipated revenue from Churchill Falls to subsidize industrial energy and, thus, to attract secondary industries to the island?

The Newfoundland government and Brinco continued to rely on foreign ownership and foreign technology in the formation of potential backward, forward, and fiscal linkages: (1) The Brinco group of companies subordinated Newfoundland's interest in developing supply industries while strengthening Québec's backward linkage formation in

the development of hydro technology industries; (2) in Labrador, Brinco used the new power from Churchill Falls to serve the existing iron ore industry, which only pelletized the ore for shipment to the US market; and (3) on the island of Newfoundland, the fiscal benefits of reduced electricity rates, at best, allowed expansions in the existing forestry, chemical products, and fish processing sectors.

By first examining backward linkages, forward linkages, and, then, fiscal linkages related to Churchill Falls, the dependent nature of industrial (manufacturing) development and the reality that staple-led growth is not overcome by adding large hydro projects can be demonstrated./35

BACKWARD LINKAGE: STRENGTHENING QUEBEC'S MANUFACTURING

Brinco favoured Québec's interests in the development of the Churchill Falls site. It allowed Hydro-Québec to impose a "nationalistic" manufacturing condition in order to capture backward linkages. In this way, Newfoundland's participation in the growth of supply industries was subordinated. The Brinco group of companies made manufacturing decisions about manufacturing content in their offices in Montreal, not far from those of Hydro-Québec. Hydro-Québec's strategy had been the imposition of its local "buy-Québec" manufacturing condition as part of becoming the "financially-secure" consumer in general and a party to the Churchill Falls power contract in particular.

This power contract went beyond the normal price and duration of service clauses; it gave preference to Québec in

several areas. The power contract of 12 May 1969 stipulates only second preference to Canadian manufacturers (those outside of Québec, including Newfoundland - the owner of Churchills Falls) and first preference for materials, services, and equipment for Québec (the customer). Prior preference for manufacturing turbines and generators for Québec was singled out.

20.1 Preference concerning Quebec Equipment, Services and Personnel

CFLCo (Churchill Falls (Labrador) Corporation) will, in the procurement of materials, services and equipment and in the employment of personnel, extend or cause to be extended by its contractor, sub-contractors and agents preference to Quebec labour, personnel and services and to materials and equipment manufactured in Quebec.

20.2 Preference to other Canadian manufacturers

In the purchase of items of equipment, such as turbines, generators, transformers and the like, CFLCo will, subject to the prior preference stipulated in Section 20.1, give the next preference to other Canadian manufacturers./36

In this way, Québec's procurement position was strengthened, while Newfoundland's was subordinated. Supplies from Newfoundland accounted for only 2 per cent of the total cost of the Churchill project./37 While explaining the breakdown of the 2 per cent of total purchases in 1971 four years after the start of the project, Brinco's general manager, Roy Legge, argued that "Newfoundland has benefited also from a preference clause, written into all Churchill Falls contracts, favouring materials manufactured or distributed and serviced in the Province." He claimed the following:

Purchases from Newfoundland manufacturers and suppliers for the Churchill Falls project have been considerable. Alcan's Stephenville plant supplied 4,714 miles of aluminum conductor worth 11 million dollars.... North Star Cement of Corner Brook have supplied 97,686 tons of cement worth 2.5 million dollars. Newfoundland Steel Company has supplied tons of rebar worth 2.3 million dollars./38

In isolation, Mr. Legge's figure of \$11 million for aluminium conductors and millions for reinforcing bars and cement from Newfoundland may be impressive, but it does not amount to more than \$19 million when all direct purchases are added together - even when inflated with purchases of such items as beer, paint, and margarine (see Appendix IV, Table IV.1). All in all, the \$19 million worth of purchases from Newfoundland amounted to 2 per cent of the total \$946 million in project costs (see Appendix IV, Table IV.2).

On the other hand, "approximately 75 percent of all equipment, materials and supplies" originated at "least as far west as Montreal."/39 For example, more than two-thirds of the manufacture of ten turbines and generators, valued at \$50 million, was carried out in Québec./40 An examination of the negotiations concerning manufacturing locations and other issues, which surfaced while the \$50 million turbine and generator contract for Churchill Falls was finalized, will show just how choices regarding strengthening supply industries were made by Hydro-Québec and the Brinco group.

GENERATORS AND TURBINES FOR CHURCHILL FALLS

Criteria such as financial, quality, and quantity aspects of turbine and generator selection continued to be

important, but, during the mid-1960s manufacturing in Québec and control over manufacturing became major issues. English Electric, although a founding member of Brinco and a supplier of turbines for the smaller Twin Falls project, found that manufacturing its turbines in Netherton, England, was no longer acceptable, given Québec's nationalist manufacturing conditions. Therefore, instead of English Electric, Marine Industries became a partner with Canadian General Electric and its Québec subsidiary, Dominion Engineering Works, in the Churchill Falls (Machinery) Consortium. Marine Industries had just started manufacturing turbines for the Hydro-Québec Manic project on the Outardes River north of Baie Comeau in the mid-sixties. Owned 65 per cent by the Québec government and 35 per cent by the French government, "the company had established a department to build equipment for the Manic project under the licence to a French company, Neyrpic, part of the internationally known Alsthom group."/41

English Electric's loss of the contract to Marine Industries did not come without warning. Mr. Winters, representing Brinco, told Mr. Lazlo, of English Electric: "you would have to demonstrate that water-wheels [turbines] produced in Netherton [England] would have significant economic advantages over water-wheels produced here in Canada"/42 A misunderstanding about where the equipment would be manufactured had arisen in the mid-sixties. It led to a clash between Winters and J.P. Gignac, a friend of René

Levesque and a representative of Hydro-Québec, "when he got the impression (mistakenly, as it turned out) that Winters planned to order the generating equipment from English Electric. Québec firms, he protested, were well able to build generators and turbines and they would do so if he had any say in the matter."/43 This generating equipment, required in the large, cavernous powerhouse at Churchill Falls, consisted of some of the most powerful then in existence.

On 9 June 1967, the \$50 million turbine and generator contract was reviewed in a meeting between CFLCo Acres Canada, Bechtel, and the Churchill Falls (Machinery) consortium. Their main concern was with the Québec manufacturing content of the generating equipment. They reviewed such concerns as, "How much of this equipment will be manufactured in the Province of Québec - what percentage?" and looked for answers to the question, "If this is not over 90%, what are the items being manufactured outside the Province - why?"/44 J.E. Pontbriand, representing the Québec government's Marine Industries, indicated that turbines and generators would, largely, be manufactured in Sorel, Québec. J.D. Lewis, representing Canadian General Electric and Dominion Engineering Works, also confirmed that most of the manufacture of turbines and 50 per cent of its generators would be done in Québec: the rest would be built in Peterborough, Ontario. Don McParland, of Churchill Falls (Labrador) Corporation, made it known - particularly to Canadian General Electric - that if they could not manufac-

ture some components, they would have to give their reasons. On 28 June 1967, a new turbine and generator letter of intent was signed./45

On 30 June 1967, the Churchill Falls (Labrador) Corporation summarized its adherence to Hydro-Québec's stipulation of prior preference obtained by Québec and Canada in manufacturing the ten turbines and generators for Churchill Falls: "Over 90 per cent of the equipment would be manufactured in Canada," and, within Canada, "more than 75 per cent ... will be manufactured directly in the Province of Quebec."/46

The contract followed the letter of intent and was awarded to the Churchill Falls (Machinery) Consortium of Montreal./47 Rushing the project, in part to keep the \$189 million in interest costs of the project low and to achieve early profits from generation, tenders of other turbine and generator manufacturers were restricted and a consortium was formed. It consisted of Marine Industries Limited (MIL), Canadian General Electric Company Limited (CGE), the latter's subsidiary, Dominion Engineering Works Limited (DEW). These companies, manufacturing in Québec, installed their equipment in Newfoundland and Labrador power houses between 1967-74, at Baie d'Espoir between 1967-70, and at Churchill Falls between 1971-4 (see Table 4.1). In technical considerations, CFLCo remained dependent on Acres Canadian Bechtel; Acres was more experienced with manufacturers on this continent than with overseas firms producing similar

equipment - but by joining with Bechtel, the ultimate approval of Canadian equipment rested with Bechtel in San Francisco./48

Table 4.1
Turbines and Generators installed in Newfoundland at
Baie d'Espoir and Churchill Falls
1967-85

	Capacity Kilowatts of Plant	Year(s) of Turbine Installation & Manufacture	Year(s) of Generator Installations & Manufacture
NEWFOUNDLAND (1967-85)			
Newfoundland & Labrador Hydro			
Baie d'Espoir	613 000	1967-70 CAC, 77 DEW	1967-77 CGE
Cat Arm	143 450	1985 DB	
Churchill Falls (Labrador) Corp. Churchill Falls	5 428 500 (5 225 000 Hydro-Québec est.)	1971-4 DEW,MIL	1971-4 CGE,MIL

DEW = Dominion Engineering Works; CGE = Canadian General Electric; MIL = Marine Industries Ltd./49

Source: Statistics Canada, cat. 57-206, 31 December 1986

Developing backward linkages in Newfoundland was secondary to creating them in Québec. About 75 per cent of supplies originated in Montreal and further west, while only 2 per cent of the purchases of the total cost of the project originated in Newfoundland. Québec was able to insist on strengthening backward linkages; for example, the manufacture of key components such as generators and turbines. Once all the equipment was installed and the power of the falls

generated electricity, was the electricity used by manufacturers and industrialists to start new manufacturing activities?

FORWARD LINKAGES

In most provinces, forward linkages are usually arranged through "industrialization by invitation" programs attracting industrialist from manufacturing centres. However, when firms that are using natural resources and cheap power to produce staples are integrated with manufacturing centres through ownership or transfer of staples, they are unlikely to use the cheap power for new manufacturing activities. In other words, their cheap power and resource-allocating IBI programs continue staple-centred growth. Adding hydro projects such as Churchill Falls, which provides plenty of cheap power (at 2.5 mills), did little to diversify manufacturing; rather, Labrador's additional power was used to continue staple-based growth.

The examination of Brinco's and the Newfoundland government's courses of action regarding the use of electricity as industrial energy to advance forward linkages shows that, despite adding large power plants, staples processing continued in the province as a whole and, particularly, in mining and forestry: (1) In Labrador, the multinational Brinco, by building only for large "financially-secure" consumers brought no new customers to Labrador but helped the expansion of existing mining operations; and (2), on the island of Newfoundland, the government used the

"future rents" from Churchill Falls (similar to a credit on an Alberta-like Heritage Fund) as a fiscal linkage to provide cheap power for hosting invited forest products industries.

LABRADOR

Brinco's development of hydro projects failed to start new industries in Labrador. To explain its lack of industrial development, Brinco claimed that "the markets at the time were not in Labrador and many attempts to develop a local load [industrial electricity market] failed."/50 To develop its own resource prospects over 77,000 square miles, Brinco's wholly-owned subsidiary, the British Newfoundland Exploration (Brinex), served as its exploration corporation. It developed no new industries, except for one copper mine at Whales Back, which it planned to close in 1972. Brinco's notes on Brinex reveal this lack of new development:

During the nineteen years following 1953, Brinex has carried out extensive exploration work within Labrador and Newfoundland. In addition to the 1953 grant, Brinex was given rights to a further area in the upper Churchill River area; other Labrador areas, under Statutory Agreement, and oil and gas rights on the west coast of Newfoundland. The area for which rights were given totaled 77,000 square miles of which to date [approx. 1972], through surrenders, has been reduced to 47,000 square miles under Statutory Agreement expiring 1980, and 9600 square miles in oil and gas concessions expiring 1979.

With the exception of copper deposits on the Island, at Whales Back, discovered in 1961, of which mining commenced in 1964 and will be closed out in June 1972, the efforts of Brinex have located occurrences of minerals or deposits such as uranium discovered in 1956 which, for one reason or another, have not been feasible to develop./51

Rather than taking risks in building plants and transforming northern resources in an entrepreneurial fashion, as is often expected from the private sector, Brinco sold electricity to the "large, financially-secure" iron ore mining companies, which could become partners and extend financial support for new plants. For example, its executives went to the United States to sell the power, first, to the Iron Ore Company and Wabush Iron Company. Although originally Canadian, by 1959 both firms were owned, primarily, by steel manufacturers in the United States and, were managed in Cleveland by holding companies; Wabush by the Pickands Mather Company and Iron Ore by Hollinger-Hanna interests./52 Bill Southam and Victor Smith negotiated financing (one-third equity each of \$7.5 million) in the Twin Falls Power Corporation (owner of the Twin Falls hydro project) and attempted to gain a fair return price for the power for each shareholder./53 What is remarkable is how representatives of British and American firms continentalized the use of Labrador resources. They assumed that they could decide to export Labrador's power to New York and/or have rights to resources without limits.

In a letter, dated 12 December 1959 (in response to Mr. Humphrey of Hollinger Hanna who was trying to claim rights to Churchill Falls and was planning to export power to New York), Smallwood tried to clarify resource rights as well as the relationship between Brinco and its industrial customer.

To me the situation is very clear. You have the right to take iron ore out of the Province. Others have rights to the same. The British Newfoundland Corporation has, among other things, the right to develop the hydro resources of Labrador. The Government of Newfoundland regards you and other mining concession holders basically as miners of iron ore. The British Newfoundland Corporation are the chosen instrument of Newfoundland for the development of the hydro resources of Labrador. The position is that the Government see your relationship to the British Newfoundland Corporation as that of a possible customer./54

Smallwood's letter reveals the selfish proprietary interests of foreign firms and their willingness to separate hydro resources from Canadian resource development for the benefits of US development. The low-cost industrial electricity consumed in Labrador is largely used for the minimal processing of manufacturing inputs which are to be used in the United States. For instance, the minerals from Iron Ore's open-pit mines at Carol Lake, near Labrador City, are first processed in a concentrator (which separates rock particles from iron grains until reaching about 66 per cent iron content) and then shipped to a pelletizing plant (which converts the concentrate to one-half inch round balls for furnace reduction) in Labrador City. The Wabush Iron Company, in contrast, set up its \$50 million pelletizing plant at Sept-Iles./55 Since Newfoundland was not effective in enforcing manufacturing commitments from the mining industry, some of Labrador's iron ore was pelletized in this Québec resource shipping port./56

FISCAL LINKAGES ON THE ISLAND OF NEWFOUNDLAND

In the absence of the transmission of Churchill Falls power to the island (i.e., the lack of physical linkage),

the government of Newfoundland attempted to advance industrial development by way of fiscal linkage./57 In this strategy, the anticipated rent expected from the CFLCo's power contract with Hydro-Québec was used to discount industrial electricity outside the reach of Churchill Falls transmission.

Such discounts were based on the assumption that low-cost electricity would attract secondary industries to the Newfoundland. Such assumptions were contradicted by statistics, which indicated the minor role low-priced electricity plays in secondary manufacturing. The 1966 Report of the Royal Commission on Electrical Energy indicates that this fact was already known in the 1950s, before the launching of large projects such as the Churchill Falls. The commission report reveals that, since for most finished goods industries electricity amounts to less than 0.5 per cent of the total cost of production, low cost plays a minor role in attracting industry; while for semi-finished goods production, where electricity constitutes 4 to 8 per cent of production cost, low-cost electricity is a more significant factor (see Appendix IV, Table IV.3)./58 One year later, a second commission warned that such low-cost power may not be put to the best uses. In 1967, the Newfoundland government's Royal Commission on the Economic State and Prospects of Newfoundland and Labrador warned that the low-cost power, i.e., 2.5 mill per kW.h (subsidized with revenues from

Churchill Falls) for new industry, was too generous and may be inappropriately utilized.

The Commission is concerned that such incentives do not run away with themselves. The fact that the forecast revenues from the sale of Churchill Falls power might be used to subsidize power prices on the island does not necessarily mean this revenue is being best utilized./59

In Newfoundland's advertising to attract industry, potential corporate customers were invited and told that "two major developments, Baie d'Espoir in Newfoundland and Churchill Falls in Labrador will produce power at tide water at 2.5 mills for substantial blocks."/60 But cheap electricity alone did not attract industry - natural resource rights and financial support was required. In one case, the government needed to add "virgin forests" and loan guarantees, before John Doyle (developer of the Wabush Iron Company and longtime ally of Smallwood) started with the Melville Lake, Labrador, chipping operations which supplies the Stephenville pulp and linerboard plant (a paper substance used for boxes and other packaging). Doyle's \$125 million undertaking also required a loan guarantee for the \$53 million required for the bond debt in this project./61 This is only one example from the forestry sector, but for what have Newfoundland's manufacturers in general used these new supplies of power?

The Baie d'Espoir plant (613 MW) came into operation in 1967 and added more generating capacity until 1977; the Churchill Falls generating station started supplying power in 1971 and operated at full capacity by 1974. Manufac-

turers' reports of electricity use from the 1970s should indicate whether or not they put these new supplies to uses in new secondary industries.

Before the plant additions, consumption statistics by manufacturers were available only for the Atlantic region, which included Newfoundland. Of those who reported their electricity purchases in the Atlantic provinces, wood, pulp and paper, and chemical industries constituted 79-84 per cent of all manufacturing industries between 1962 and 1974, before the period of major hydro network expansions.⁶² Did these industries constitute a smaller portion of manufacturing use as secondary industries developed?

TABLE 4.2
Major Consumption of Electricity by the Manufacturing
Industries in Newfoundland 1975-8
(GW.h)

Manufacturing Categories						
Year	Wood Ind.	Pulp & Paper	Chemic. & Ch. Prod.	Total 3 Categ.	Total 20 Categ.	%
1975	6	816*	149	971	1,130	86
1976	6	966	370	1,342	1,468	91
1977	4	-	529	-	1,460	-
1978	6	1,050	648	1,704	1,883	90

Source: Statistics Canada, "Consumption of purchased fuel and Electricity by the Manufacturing, Mining, and Electrical Power Industries," cat. 57-208, 1975-84. Only three complete years were reported during this period.

* Statistics from category 2710.

Two forest-based industries and their chemical suppliers constituted an even larger percentage of total consump-

tion by manufacturing industries in Newfoundland than in the Atlantic provinces as a whole. In Newfoundland, these "manufacturers" also became a larger proportion of all industries consuming electricity - resource-based industrial use actually intensified.

TABLE 4.3
Consumption of Electricity by Fish Products and Food & Beverage Industry in Newfoundland 1975-1978 (GW.h)

Manufacturing Categories					
Year	Total 20 Categ.	Fish Prod.	% Tot.	Food & Bev.	% Tot.
1975	1,130	48.8	4	71.8	6
1976	1,467	56.1	4	80.1	5
1978	1,883	83.7	4	113.5	6

Source: Statistics Canada, "Consumption of purchased fuel and Electricity by the Manufacturing, Mining, and Electrical Power Industries," Catalogue 57-208, 1975-1984, only three complete years of reporting during this period.

In 1975, the wood, pulp and paper, and chemical manufacturers consumed 86 per cent, in 1976 they consumed 91 per cent, and in 1978 they consumed 90 per cent of the electricity purchased by all manufacturing industries in Newfoundland (see Table 4.5). After low-cost industrial power became available, it was used in the same kind of industries. The use in the pulp and paper sector increased from 810 (GW.h) to 1,050 (GW.h) during the 1975 to 1978 period (see Table 4.2).

Some of the remaining manufacturers, consuming a smaller percentage of the total, are fish processing (about

4 per cent) and produce food and beverages (about 6 per cent) (see Table 4.3). The additional hydro projects did not change the concentration of use, as nearly 90 per cent of the manufacturing electricity is used in the forest-based and chemical supply sector.

The pulp and paper industries, being the major consumers, have certainly profited from low electricity rates. For example, pulp and paper industries in Newfoundland consumed 966 (GW.h) and paid \$6.6 million in 1976. Two years later they consumed more, 1,050 (GW.h), and paid less than \$6 million for this larger consumption (see Tables 4.2 and 4.4).

TABLE 4.4
Major Consumption of Electricity by the Manufacturing
Industries in Newfoundland 1975-78
(\$1,000)

Manufacturing Categories						
Year	Wood Ind.	Pulp & Paper	Chemical & Ch. Prod.	Total 3 Categ.	Total 20 Categ.	%
1975	138	5,821	1,139	7,098	10,564	65
1976	176	6,601	1,689	8,466	11,790	72
1977	139	---	1,777	---	10,684	--
1978	178	5,964	1,854	7,996	12,815	62

Source: Statistics Canada, "Consumption of purchased fuel and Electricity by the Manufacturing, Mining, and Electrical Power Industries," cat. 57-208, 1975-84. Only three complete years were reported during this period.

Although forest product and chemical industries consumed nearly 90 per cent of manufacturing electricity, they paid only 66 per cent of the total manufacturing bill (averages

from Table 4.2 and 4.4). No major hydro-related forward linkages, whether fiscal or physical, formed on the island of Newfoundland or in Labrador due the installation of hydro power plants. Brinco sold its electricity only to "large, financially secure consumers," such as Hydro-Québec and existing US mining firms. It did not develop new industries. In the mining industry, the ore was only pelletized, and no further processing took place. Secondary industry was not attracted, despite subsidized industrial energy. Therefore, despite the addition of hydro plants, forward linkages remained primarily resource-based.

DEPENDENT LINKAGES

By 1968, the control of the \$946 million Churchill Falls project, that is, the control of Brinco itself, was held by British and US firms. Rio Tinto-Zinc Corporation Ltd. of London and Bethlehem Steel Corporation, Pa., formed a Canadian holding company that owned about 50 per cent of the stock in British Newfoundland Corp. Ltd. of Montreal. Brinco held about 70 per cent of the shares of Churchill Falls, with Hydro-Québec and the Newfoundland Government owning the balance./63

Decision-makers in Newfoundland and Québec governments as well as their chosen development firms have remained profoundly reliant upon foreign technology and ownership in their selection of support for the formation of backward linkages (such as in the formation of hydro-equipment industries). The manufacturing preference granted by CFLCo to

Québec via the Churchill Falls power contract shifted the manufacture of turbines from England to Québec.

The English Electric Company, although having been a founding member of Brinco, had no manufacturing facilities for turbines in Québec and, therefore, had to yield to Marine Industries (of Sorel, Québec) and Dominion Engineering Works, both with turbine manufacturing facilities in Québec. While Marine Industries relied on French technology, Dominion Engineering Works (of Montreal) relied more on the technology of its parent, the General Electric Company in the United States. Marine Industries Ltd. is owned 35 per cent by the French government and 65 per cent by the government of Québec./64 Marine Industries, since the Manicouagan River hydro projects, produced hydro-electric equipment under a licencing arrangement with the French company, Neyrpic, was was part of the French Alsthom Group./65 In turbine and generator manufacturing, the continuing transfer of technology and linkages to ownership have retained colonial, continental, and cultural dimensions.

Since the "buy-Québec" policy became an integral part of the Churchill Falls project, General Electric was put on the defensive and had to give reasons as to why it was manufacturing generator parts at Peterborough, Ontario, rather than at Lachine, near Montreal. While relying on foreign ownership and technology, Québec's insistence on "nationalistic" manufacturing conditions did strengthen its backward linkages from this northern hydro project.

To strengthen forward linkages, the provincial governments and Brinco continued their reliance on "industrialization by invitation" approaches aided by cheap power. For example, part of this strategy included: allocation of the people's resources to foreign developers, reliance on foreign capital, extension of government financial assistance, and subsidization of electricity rates. By using this strategy, their choices helped to continue dependence on foreign ownership and technology in the formation of forward linkages. Taking this approach resulted in truncated forward linkages, which brought little change from staple-centred growth (pulp and paper, mining) within the private sector.

This continued dependency is evident in mining and forestry. The Iron Ore Company and the Wabush Iron Company became US-owned and were directed from holding companies in Cleveland. The Melville Lake and Stephenville pulp and packaging material (linerboard) complex, using Labrador forests and subsidized electricity, constitutes a similar case. The Stephenville and Lake Melville Labrador pulp and paper complex involves ten major firms, which co-signed this forest product venture with the Newfoundland government in 1968. Their role in financing, marketing, and manufacturing the required equipment illustrates the continuation of government-invited dependence in the formation of "new" forward linkages./66

Officials of Lazards, Greyhound and the Newfoundland government (arrangers of the financing of the

linerboard complex) were represented at the signing ceremonies Friday.

Also on hand were officials of Walmsley (Bury) Ltd., of the United Kingdom, who will build the 350 inch wide linerboard machine, one of the largest in the world. The machine will be 900 ft. long and capable of producing 1,000 tons of linerboard daily.

Two 80,000 ton multi-purpose bulk cargo ships are to be built by Harland and Wolff of Belfast, Ireland. To be delivered in December 1970, they will transport wood chips from Labrador to the mill.

Construction of the structures and installation of machinery will be done by McAlpine of Newfoundland Ltd., and Sir Robert McAlpine and Sons Ltd. of England.

Other firms taking part in the signing of documents Friday were W. Heinzel and Co. of Austria, paper manufacturers and linerboard marketing agents in Europe; G.T.R. Campbell London Co. of Montreal, naval architects; Javelin Bulkcarriers of London, ship owners, a subsidiary of Canadian Javelin Ltd.; and E. and B. Cowan of Montreal, pulp and paper consultants, designers of the Melville project.

In charge of the complex will be H.Y. Charbonnier, executive vice-president and general manager of the company./67

In 1968, more than 100 years after Canada's initial industrialization, Newfoundland's technological and economic dependence in the formation of forward linkages continues in the form of: the building of the linerboard machinery by an English company, the building of bulk cargo ships by an Irish company, the construction of buildings and the installation of machinery by an English Company; marketing agents from Austria; naval architects from London; and/or the designers of the Melville project in Montreal.

To briefly summarize: Brinco's building of Churchill Falls had little effect on industrial development in Newfoundland. The company built Churchill Falls primarily for use outside the province. Its group of companies subordinated Newfoundland interest in developing supply indus-

tries while primarily strengthening Quebec's backward linkages into hydro technology. In Labrador, hydro served as an input to strengthen existing forward linkages to mining, and, on the island of Newfoundland, fiscal linkages promoted forestry and chemical production. The government and Brinco continued to opt for foreign ownership and technology in backward, forward, and fiscal linkages. In this way, much autonomy over the development of industries was lost.

This loss of autonomy also extended over electricity surplus to Labrador's needs. Churchill Falls was developed beyond the needs of Newfoundland, therefore, CFLCo executives advocated "the sale to Quebec of essentially all of the output from the Churchill Falls Power Development which is surplus to the needs of Newfoundland."/68

SURPLUS POWER PLANNING

Crown ownership allows a provincial government to choose who develops resources, but, when it continues to invite external control, it loses part of its autonomy. Inviting foreign firms to carry out hydro development means that the province loses some planning autonomy over the quantity and purpose of electricity production. When foreign firms produce for export, a loss of political autonomy over use within the province is almost always involved. This occurred at Niagara Falls, when US power corporations attained control over the development of plants and exported their output. This reoccurred, in a similar fashion, at Churchill Falls, when Brinco and its group of companies

attained control over the development of the Churchill hydro project and exported the output to Québec. Both cases involved the loss of political authority once the electricity crossed political boundaries.

Brinco was the outcome of the Smallwood government's "industrialization by invitation" strategy. Brinco's decisions about Newfoundland hydro development were made in Montreal, Québec, not St. John's, Newfoundland. Similar to American utilities planning in Buffalo to export Canadian power from Niagara Falls, Brinco, in Montreal, planned to export Labrador power from Churchill Falls. As a result, the Newfoundland government lost its ability to plan hydro policy within its province in several ways: it lost the power to make decisions over the export of Churchill Falls electricity; it lost the right to repatriate electricity for industrial needs, with minor exception, for sixty-five years; and it risked the loss of ownership of Churchill Falls facilities, should the Labrador boundary dispute be settled in Québec's favour.

The Newfoundland government lost decision-making power over the export of Churchill Falls electricity when Brinco appropriated the right to export without the government being aware of it. The original concession to Brinco prohibited export without government permission, but a legal clause, added when the provincial water rights licence was granted to CFLCo, allowed exports without government permission.⁶⁹ The Brinco agreement stated that "the export of

power without the consent of the government was prohibited."/70 The lease act, passed on 13 May 1961, allowed Brinco's Churchill Falls (Labrador) Corporation "the right to transmit and export power without the qualification of consent but subject to a proviso that Newfoundland consumers would be given priority upon the request of the Government."/71 This clause constituted a loss over export rights by the government of Newfoundland to a foreign private corporation.

The water rights lease states that Newfoundland consumers would be given priority once the government requests electricity; however, the Newfoundland government lost the right to repatriate electricity, with a small exception, for sixty-five years. The power contract between the Quebec Hydro-Electric Commission (Hydro-Québec) and the Churchill Falls (Labrador) Corporation, dated 12 May 1969, allowed virtually the entire capacity of 5,429 MW (allowing for 230 MW to replace Twin Falls and 300 MW for recaptured use in Labrador) to be used by Hydro-Québec. The contract provided a declining rate of less than 3 mills per kilowatt hour (2.7 to 2.4 plus adjustments) for forty years and for an automatic renewal of another twenty-five years at about 2.4 mills./72 This is unlike the successful recapture of power exported to the United States at Niagara Falls by Ontario in the first decade of the twentieth century.

The power exported to Québec from Churchill Falls cannot be recaptured until the year 2037./73 The controversy

began when the Newfoundland government asked to buy power from Churchill Falls in order to meet its estimated industrial growth needs. The government's utility, Newfoundland and Labrador Hydro, requested 800 MW of power to be delivered by 1 October 1983 from Churchill Falls./74 The Newfoundland Supreme Court Judgment concluded: "There is a wide gap between what the Government really seeks and what it can get. For example, no matter how much energy it requests, it can receive no more than is surplus to the present commitment for sale of CFLCo plus whatever of the 300 MW recapture allowance."/75 The 300 MW are too uneconomic to transmit to the island of Newfoundland./76 In this way, one of the poorest provinces of Canada, by inviting foreign corporations to develop Labrador, allowed usurpation of its export rights and recapture claims for sixty-five years.

As part of the private contract between Brinco and Hydro-Québec, Newfoundland risked the loss of ownership of Churchill Falls facilities should the Labrador boundary dispute be settled in Québec's favour. Unlike the Niagara Falls case, where the political boundary was defined, the province of Québec contested whether Labrador watersheds actually belonged to Newfoundland. Québec's Premier Duplessis, for instance, wondered if "the Hamilton River [Churchill R.] was in Newfoundland at all."/77 This continuing conflict over provincial jurisdiction of territorial

and resource ownership had historical roots and came before the British Privy Council in 1926.

The question it had finally been agreed should be considered was: "What is the location and definition of the boundary between Canada and Newfoundland in the Labrador Peninsula under the Statutes, Order-in-Council and Proclamations?"

...
On March 1, 1927, the Privy Council ruled in favour of Newfoundland./78

The British Privy Council decision, which supported Newfoundland's claim of ownership of the Labrador coast as well as inland watersheds, was never fully recognized by Québec. In the power contract, therefore, the issue was circumvented by allowing for the possibility that Québec actually owns part or all of the Churchill Falls facilities on either side of the "Delivery Point." The power contract stipulates that "any facilities of the Plant which may at any time be found to be located on the Québec side of the Delivery Point shall be and are hereby acknowledged always to have been the property of, and to have been purchased for the account of, Hydro-Québec."/79 Thus, the risk of loss of ownership of Churchill Falls facilities remains.

In this way, a hydro-electric resource, thought surplus, was alienated from use within Labrador or Newfoundland. Crown ownership initially allowed the government a measure of control, yet, relying on "industrialization by invitation" for hydro resource development resulted in the loss of decision-making over power exports, the risk of plant ownership loss, and loss over surplus power recapture. Foreign ownership, however, is only a partial explanation,

because these outcomes also involve interprovincial trade of electricity and are, therefore, also federal issues. For instance, how does the National Energy Board deal with questions concerning interprovincial trade of Labrador electricity? What did Québec and Newfoundland expect the National Energy Board's role to be?

DIRECTING SURPLUSES

Newfoundland understood the National Energy Board's mandate was to encourage interconnection between systems in Canada and to restrict access to foreign markets, whereas Québec understood the board's role to be one of encouraging interconnections with the United States and opening access to the American market./80

Exports must be restricted in order to retain electricity as a national industrial input. The Newfoundland government's position was that Parliament passed the National Energy Board Act "to restrict access to foreign markets in the energy sector."/81 During the 1986 National Energy Board hearings, Mr. Mercer, representing Newfoundland and Labrador Hydro, argued that priority must be given to a Canadian electricity market without internal political boundaries.

We have repeated throughout our evidence that theme, that we must look at Canada first, we must look at Canada as if it is a single market, as if it is not divided by provincial boundaries when we are attempting to establish where there is Canadian need./82

And from the Borden Royal Commission Report which preceded the formation of the National Energy Board, Mercer illus-

trated that the the NEB Act arose, in part, out of concern over energy for industrial use within the boundaries of Canada. He gave the following Borden Report excerpt during the December 1986 hearings:

It is advisable to encourage, where possible, the development in Canada of processing industries relating to energy and sources of energy as opposed to making such benefits available outside of Canada./83

He added that permission to export should be withheld if the granting of a licence would "interfere" with "energy requirements of those parts of Canada within economic reach of the producing province." Further, if "provincial government objectives" are "at variance with national objectives," then the provincial "producer's revenue objective would first have to be reconciled with the national objective."/84 When national transmission of electricity is involved, it means that interprovincial power network integration is most important.

Since the 1960s, the government of Newfoundland supported the integration of Churchill Falls into the national power grid and proposed to develop the remaining power sites in Labrador in order to supply the national power grid during the 1974 Energy Conference./85 At the same time, the Québec government has done the opposite; it has been, since the 1960s, consistent in its blocking of the Churchill Falls integration into a national power grid.

During 1965, when Lesage, Québec's premier, was "asked if he would give Brinco a right-of-way for the power ... he replied, 'very emphatically,' that he would never agree to

that."/86 He told reporters: "it was 'an absolute condition' for continued negotiations that Hydro-Québec buy all the power. 'Never under any conditions' he repeated, 'will we let others build a transmission line across Quebec ... and never will we agree to simply rent out the transmission facilities.'"/87 As a result, Québec virtually landlocked Labrador's surplus electric power. Two years later, in March 1967, Brinco's subsidiary "Churchill Falls (Labrador) Hydro and Hydro-Quebec agreed that the power would be delivered into the Quebec grid" by Hydro-Québec's 735 kilovolts transmission line and not by right-of-way or by a rented transmission line into the national grid./88 Twenty years later the issue remains unresolved.

Despite having interprovincial jurisdiction, the board has largely ignored the national grid. In 1983, an amendment to the act gave the NEB interprovincial jurisdiction over "any facility to be constructed and operated for the purpose of transmitting power from a place in a province to a place in Canada outside that province;" yet, the board admitted in 1987 that "to date this section of the Act has not been used."/89 During 1986, Newfoundland still had to argue that since gas and oil pipelines are allowed to cross provinces within Canada, the same practice should apply to electricity. It argued that "energy, in forms other than electricity, (such as gas and oil) moves between producing and consuming provinces under federal jurisdiction derived from Section 92 (10) of the British North America Act. The

establishment of a National Power Grid would extend this principle to electricity."/90 By 1986, no transmission agreement existed between Québec and Newfoundland. The board not only ignores the national power network, but it does not exercise its interprovincial jurisdiction.

Hydro-Québec shows little interest in sharing its surpluses with Newfoundland, and the NEB does little about it. The board does not, as Hydro-Québec's legal representative told the representative of CFLCo in 1986, exercise its jurisdiction over interprovincial electrical transmission lines./91 Newfoundland and Québec have "extremely uneven" bargaining positions, because Hydro-Québec treats its transmission facilities as sovereign. The National Energy Board reinforces this sovereignty by not insisting that electricity be treated like other forms of energy, either via the shipping across provinces or via rented or owned transmission lines./92 Québec is not prepared to deal with questions of interprovincial transmission within the National Energy Board Act even for future hydro plants in Labrador. It insists that it will negotiate only with individual utilities, treating interprovincial energy transactions as commercial transactions between nations, whether it be the New England states or the provinces of Canada, Québec proposes to treat them simply as external markets./93 Newfoundland, without help from Ottawa, and in the absence of the enforcement of a national energy policy, continues to be shut out by Québec's "power sovereignty" over its trans-

mission capability from the Ontario and Maritime grid, as well as temporary export to the United States./94

The board, in general, allowed Hydro-Québec to treat its electricity surplus, including that from Churchill Falls, as a continental staple, although Hydro-Québec's 1944 mandate is limited to "produc[ing] and distribut[ing] electricity in the province" of Québec. The letter of intent securing the power contract for Churchill Falls stressed that "power is necessary for the economic development of Quebec and particularly for that of secondary industry," and "it is necessary to foster by all possible means the industrial potential of Quebec."/95 Soon after Churchill Falls delivered electricity, Hydro-Québec proceeded to export power to the United States. While the Churchill Falls generators were installed between 1971-4, Hydro-Québec signed a power contract with the Power Authority of the State in New York on 28 November 1973, which included the construction of a 765 kV international power line capable of carrying the equivalent of half of Churchill Falls power by the 1980s (2300 MW)./96 The National Energy Board's rationale for the interconnection was given as "mutual assistance in emergencies" and "purchase and sale of surplus capacity and energy."/97 Among other export licence hearings, in the Fall of 1983, Hydro-Québec came before the board to request "power of up to 2699 MW for the period 1984 to 1999" for export to New York./98 At this time Newfoundland intervened at the hearings.

Newfoundland and Labrador Hydro applied to the National Energy Board to repatriate "up to 1200 MW of power" of Québec's planned export and to block the export hearings./99 The board allowed the hearings and dismissed Newfoundland's request, in part because there "[was] no requirement in the [NEB] Act that that an offer [of the export] be made."/100 The board granted Québec's export licence in 1984, contending that it was in the public interest./101 The board not only dismissed the request to block exports, but its practices excluded Newfoundland in other ways.

Through its actions, the board, in general, allowed Québec to use its surplus power as a continental staple. Yet, to achieve additional autonomy from the board, Hydro-Québec recently went beyond the already weak export regulations by proposing to define surplus as "undeveloped hydro resources," rather than as existing surplus capacity due to overbuilt hydro plants.

Mais le surplus pour nous à Hydro-Québec, ça a différentes notions. Nous avons 40 000 mégawatts de ressources non développées... Cette notion de surplus m'apparaît comme très différentes dans l'esprit de différentes personnes./102

This redefinition of surplus (is the opposite of the idea of surplus as national industrial input to surplus) as sequentially exploitable rivers power of 40,000 MW extracted for the US market is a return to 1890s hydro development as staple extraction (at Niagara) for the now declining US manufacturing center./103

In summary, in 1971, Churchill Falls delivered its first power sold to Québec Hydro for sixty-five years. The difference between the hydro development in Labrador and that of other provinces is that its northern renewable power became trapped within the Québec hydro network. Therefore, the government of Newfoundland tried to repatriate a portion of Churchill Falls electricity, first at the provincial, then at the federal level, and has done so since 1973. The board not only dismissed the electricity repatriation efforts by the Newfoundland government but also failed to exercise its interprovincial jurisdiction. Québec's interests during the board hearings revealed its wish for growing energy sovereignty and a strictly commercial relationship with other Canadian provinces. Its plan is simply to strive to use renewable northern Canadian energy resources for the "joint economic benefit" of the United States and Québec./104

CONCLUSION

The government of Newfoundland granted the British Newfoundland Corporation extensive rights to timber, mineral, and water resources. It first sold the power to "large, financially-secure consumers," then raised the capital, and, thereafter, developed the hydro sites. In the case of Churchill Falls, it sold the power for sixty-five years, to Hydro-Québec, raised the capital (\$965 million), and built the project (5,225 MW). In 1974, the Newfoundland government bought back its water resources, so that Brinco

could not continue exploiting the best hydro sites for joint benefit of its shareholders and of Québec.

What kind of industrial linkages were strengthened or captured as part of the Churchill expansions? The Brinco group of companies strengthened Québec's supply industries, while subordinating Newfoundland's potential of capturing backward linkages. Hydro-Québec added "buy-Québec" clauses to the Churchill Falls power contract. This allowed the substitution of English hydro equipment manufacture with French technology in Québec. In Labrador, Brinco used the new power from Churchill Falls to serve the continentally integrated iron ore industry. It only pelletized the ore - it did not use the new supply of electricity for secondary manufacturing. On the island of Newfoundland, the reduced electricity rates resulted in 90 per cent of the manufacturing electricity being consumed in forest, chemical, and fish processing industries. The government and Brinco continued to rely on foreign ownership and foreign technology, while using hydro as an agent in the formation of backward, forward, and fiscal linkages.

As Niagara Falls, the government allowed electricity production for export by foreign firms. This involved a loss of political autonomy over its electricity use within the province and within Canada. By leaving hydro development up to Brinco, the Newfoundland government lost its ability to comprehensively plan hydro policy for at least sixty-five years. It lost: "the right to transmit or export

power" from Churchill Falls, its recapture allowance stayed at 300 MW of 5,225 MW, and it was not able to secure ownership of Churchill Falls facilities. Furthermore, the Labrador boundary dispute remains unresolved.

Interprovincial trade of electricity is a federal responsibility. However, the national/continental power policy, administered by the National Energy Board, led Newfoundland to claim that its intent was national, while Québec insisted that it was continental. Newfoundland supported the idea that its provincial surplus should be available to Canada as a single market (without provincial boundaries), while Québec supported energy sovereignty, with its surplus being available for the continental market./105 The Board dismissed the energy repatriation efforts by Newfoundland but supported exports and building transmission lines to the south. In the case of Newfoundland, its strategy of requesting the use of Labrador surplus electricity as national industrial input was subordinated by allowing electricity to be used as a provincial continental staple.

When the Newfoundland government relied on Brinco to build the major Churchill Falls plant for the growth of new industries, the outcome was minor industrial development, continued staple production, and Labrador surplus electricity (appropriated by Québec) for continental use.

NOTES

- 1 Newspaper clippings, unless otherwise noted, are from the clip file of the Churchill Falls (Labrador)

- Corporation Limited (CFLCo) (Ottawa: National Archives, MG 28 III 73, Vol. 1, files 12-19). "The Case for Brinco," *The Daily News*, 3 July 1968.
- 2 Ibid.
 - 3 Ibid.
 - 4 "Brinco in Newfoundland: A Summary," confidential memorandum by Brinco, approx. date 1972 (Ottawa: National Archives, CFLCo, document location: MG 28 III 73, vol. 1, file 7).
 - 5 Ibid.
 - 6 *Evening Telegram*, 19 January 1968.
 - 7 "Ray Guy," *Evening Telegram*, 28 August 1968.
 - 8 This goal is written into the Preamble of Brinco's Principal Agreement. Philip Smith, *Brinco*, 86.
 - 9 Philip Smith, *Brinco*, 9.
 - 10 Ibid., 12-13.
 - 11 McParland, president of CFLCo, "Brinco and the Churchill Falls Development," Speech to the Canadian Club of Toronto, 23 January 1967 (Ottawa: National Archives of Canada, Ottawa, MG 28, III 73).
 - 12 Philip Smith, *Brinco*, 17-23.
 - 13 Ibid., 9.
 - 14 "The first Act relating to the Upper Churchill is an Act cited as the Government-British Newfoundland Corporation Limited-N.M. Rothschild & Sons (Confirmation of Agreement) Act 1953 (the 'Brinco Act'). This act, as its name implies, approved the execution and delivery of an agreement (the 'Brinco Agreement') between the Lieutenant-Governor in Council (the 'Government') and N.M. Rothschild & Sons who had brought about the incorporation of Brinco." "Judgment of Goodridge, J." 6 July 1982. Supreme Court of Canada, 1976 NO. 812, Attorney General versus CFLCo, 4-5.
 - 15 Newfoundland, The Newfoundland & Labrador Power Commission, "Submission to the Government of the Province of Newfoundland and Labrador: The Electrical Power and Energy Requirements of the Island of Newfoundland 1965-1985," 6.
 - 16 "The companies are Bowater Newfoundland Pulp and Paper Mills Ltd. a British subsidiary and Price Pulp and Paper Mills Ltd. They control more than half of the 8,380,000 productive acres in the province on 99-year leases granted 50 years ago. ... Bowater holds the biggest slice of the province's forests - 3,105,000 acres - while Price controls 2,108,500 acres. Another 3,029,500 acres of forest land on the island - all that the Crown holds - has been promised to proposed operators of a third newsprint mill long sought for Come-By-Chance." *Toronto Daily Star*, 15 February 1968.
 - 17 Philip Smith, *Brinco*, 198-9. *Charlottetown Patriot*, Prince Edward Island, 21 December 1967.
 - 18 Ibid., 198-9.
 - 19 W. Gillies Ross, "Power on Hamilton River, Labrador," 78.

- 20 "Brinco in Newfoundland: A Summary," National Archives, CFLCo.
- 21 By 1967, the "company was owned 72% by BRINCO, with 17% of the shares held by Hydro-Quebec. The balance was held by the Newfoundland Department of Resources and by Rio Algom Mines, each with approximately 5% of the shares," Finding Aid No. 1515, prepared by David Fraser, 1984, p. iii (Ottawa: National Archives, CFLCo , MG 28, III 73). McParland, Speech, 23 January 1967.
- 22 Philip Smith, Brinco, 109.
- 23 Ibid., 106, 114.
- 24 Generating capacity was added until 1969; Fraser, CFLCo, Finding Aid, Nat. Archives, 1984, iii.
- 25 H.G. Acres and Company, of Niagara Falls, and the Bechtel Corporation of San Francisco, started a joint venture in 1963 and became Acres Canadian Bechtel of Churchill Falls. Acres was to look after the design and engineering, Bechtel was to manage construction. "Canadian Bechtel had managed the construction of the Iron Ore Company's mining operation in Labrador." Philip Smith, Brinco, 164-5.
- 26 "Brinco in Newfoundland: A Summary," National Archives, CFLCo.
- 27 Ibid.
- 28 The total construction costs are from: CFLCo, "Churchill Falls Power Project: Project Management Concepts," Montreal, February 1971:F1 (Ottawa: National Archives, MG28 III 73 vol. 1); The finance figures are from the "Brinco in Newfoundland: A Summary," National Archives, CFLCo.
- 29 "Brinco in Newfoundland: A Summary." National Archives, CFLCo.
- 30 Philip Smith, Brinco, 376.
- 31 Ibid. 375.
- 32 Ibid.
- 33 Ibid.
- 34 Ibid.
- 35 Albert O. Hirschman, "A Generalized Linkage Approach to Development, with Special Reference to Staples." Mel Watkins, "The Political Economy of Growth." Jorge Niosi and Phillipe. "Public Enterprises Procurements and Industrial Development: the Case of Hydro-Quebec."
- 36 Hydro-Québec, "Power Contract between Quebec Hydro-Electric Commission and Churchill Falls (Labrador) Corporation Limited, May 12, 1969," 27.
- 37 "Brinco in Newfoundland: A Summary." National Archives, CFLCo.
- 38 "Remarks by Roy C. Legge, General Manager - Head Office Brinco Limited, At the 59th Annual Convention of the General Accountants Association of Canada, Friday, July 7, 1972," 12 (Ottawa: National Archives, MG 28, III 73, vol. 1, file 7).
- 39 "The Churchill Falls Power Development its Transport and Transportation Information System." This report

- contains portions of papers by H.L. Snyder, R.D. Boivin, P.A.T. Keeping, J.S. Howard, J.A. Harrower, and T.W. Kierans, 1 (Ottawa: National Archives, MG 28, III, 73, vol.1, file 9).
- 40 CFLCo News Service, 30 June 1967 (Ottawa: National Archives, CFLCo, MG 28, III 73, vol. 59, file 7).
- 41 Philip Smith, Brinco, 341-2.
- 42 Ibid.
- 43 Ibid., 231.
- 44 Represented at this 9 June 1967 CFLCo turbine and generator meeting were: Churchill Falls Labrador Corporation by D.J. McParland, chairman, and D. Wermenlinger; Acres Canada Bechtel by F.E. Ressegieu, T.A. Lazier, and J.G.S. Thomson; and the Churchill Falls (Machinery) Consortium by J.D. Lewis, H.S. Lunan, and J.E. Pontbriand. Confidential, Turbines and Generators, Minutes of a Meeting held at CFLCo Office, Friday, 9 June 1967 at 2:30 pm, (Ottawa: National Archives, CFLCo, MG 28, III 73, vol. 59, file 7).
- 45 On 28 June 1967, the new "Turbine and Generator letter of intent" was signed by Messrs. L.R. Douglas, vice president, and J.D. Lewis, who represented Canadian General Electric and Dominion Works; Messrs. J.E. Pontbriand and Jean Racine represented Marine Industries; Mr. H.S. Lunan was present as co-ordinator for the Consortium; ACB [Acres Canadian Bechtel] was represented by Messrs. Ressegieu, Lazier, and Gray Thomson; CFLCo was represented by Messrs. McParland and Manning (Ottawa: National Archives, CFLCo Manuscripts, MG 28, III 73, vol. 59, file 7).
- 46 Two days later was the press release, on 30 June 1967 (National Archives, CFLCo Manuscripts, MG 28, III 73, vol. 59, file 7; CFLCo News Service, 30 June 1967). (For transcribed press release see Appendix IV, Table IV.4.)
- 47 "Giant Powerhouse Start Soon," Montreal Star, 25 April 1968.
- 48 The Canadian manufacturers in Part One of the list are considered to be capable providing the equipment required for the project (see Appendix IV, Table IV.4). Letter signed for F.E. Ressegieu of ACB to Mr. McParland of Hamilton Falls Power Corporation, 6 November 1969 (Ottawa: National Archives, MG 28 III 73, vol. 54, file 4).
- 49 AW = Armstrong Withworth; NNS = Newport News Shipbuilding; BTH = British Thomson Houston; CAC = Canadian Allis - Chalmers; DB = Dominion Bridge.
- 50 "Brinco in Newfoundland: A Summary," CFLCo, National Archives.
- 51 Ibid.
- 52 Philip Smith, Brinco, 99.
- 53 Ibid. 103-106. "Brinco in Newfoundland: A Summary," CFLCo, National Archives.
- 54 Philip Smith, Brinco, 104.
- 55 Canada, Science Council of Canada, 43rd Meeting Science

- Council of Canada: Visits to Churchill Falls Hydro Electric Development & Iron Ore Company's Developments at Wabush City & Sept-Iles. 2-5 October 1973. Philip Smith, Brinco, 160.
- 56 Philip Smith, Brinco, 160.
- 57 Albert O. Hirschman, "A Generalized Linkage Approach to Development, with Special Reference to Staples," 66.
- 58 Figures were taken from "Highlights of Electric Power in Canada, prepared by Huet Massue, The Shawinigan Water and Power Company (1954). Government of Newfoundland and Labrador, Report of the Royal Commission on Electric Energy, February 1966, 61-2.
- 59 Newfoundland, Government of Newfoundland, 1967, Report on the Royal Commission on the Economic State and Prospects of Newfoundland and Labrador, 277-8.
- 60 "A New Industrial Horizon presented by Newfoundland," Daily Commercial News & Building Record, 27 March 1968.
- 61 From several newspaper sources: "A New Industrial Horizon presented by Newfoundland," Daily Commercial News & Building Record, 27 March 1968; The Daily News, St. John's, Newfoundland, 30 December 1967; Martin, The Telegram, Toronto, 20 January 1968; Patrick Fellows, "All Newfie Really Needs is an Economic Miracle," Toronto Star, 31 May 1968.
- 62 The GW.h consumption figures for wood industries, paper and allied industries, and chemical and chemical products industries were added. For example, for 1973, (GW.h) $108 + 3,663 + 1,102 = 4873$; the total for the twenty major manufacturing categories was 5,814; the percentage of three industries constituting 84 per cent of consumption is attributed to these three industries. "Consumption of Purchased Fuel and Electricity: By the Manufacturing, Mining and Electrical Power Industries 1962-1974" (Ottawa: Statistics Canada, cat. 57-506).
- 63 "Churchill Control by Britain, U.S." Electrical Business, 26 August 1968.
- 64 Statistics Canada. Industrial Organization and Finance. Division Corporations and Labour Unions Returns Act. April 1988.
- 65 Philip Smith, Brinco, 342. Statistics Canada, Corporations and Labour Unions Returns Act, April 1988.
- 66 Cabinet Room of the Confederation Building, 7 June 1968. Representing governmental interests were the Hon. L.R. Curtis, president of the council, and Premier J.R. Smallwood. One of the invited officials of industrial firms was John C. Doyle, president of Melville Pulp and Paper Limited, a subsidiary of Canadian Javelin Ltd., signed one of the basic documents covering the Stephenville and Lake Melville, Labrador, pulp and paper complex. Patrick Fellows; in "All Newfie Really needs is an Economic Miracle," Toronto Star, 31 May 1968.
- 67 "Agreements are signed," St. John's Evening Telegram, 11 June 1968.

- 68 McParland, Speech, 23 January 1967.
- 69 Judgment of Goodridge, J., 6 July 1982, 11-12.
- 70 Permitting exports would have gone beyond the Brinco agreement - "basically an exploration agreement," clause 9(5), Judgment of Goodridge, J., 6 July 1982, 9.
- 71 Brinco assigned all water power rights at Churchill Falls (formerly called Hamilton Falls) to its subsidiary, Hamilton Falls Power Corporation, the Hamilton Falls Corporation (Lease) Act, passed on 13 May 1961, which later authorized CFLCo's rights to the falls. Judgment of Goodridge, J. 6 July 1982, 9.
- 72 "Power Contract between Quebec Hydro-Electric Commission and Churchill Falls (Labrador) Corporation Limited, May 12, 1989." Hydro-Québec licence application, 24-25 September 1985, ordonnance EH-1-85, exhibit B-4. (Ottawa: National Energy Board Library).
- 73 Repatriation was not possible despite CFLCo being two-thirds owned by the government of Newfoundland. Judgment of Goodridge, J., 6 July 1982, 22.
- 74 By Order-in-Council dated 6 August 1976, the government requested, via the Supreme Court, that the Churchill Falls (Labrador) Corporation supply its new parent company.
- 75 Judgment of Goodridge, J., 6 July 1982, 376-8.
- 76 Newfoundland, Government of Newfoundland, *Report on the Royal Commission on the Economic State and Prospects of Newfoundland and Labrador*, 279.
- 77 Philip Smith, *Brinco*, 62.
- 78 The territory and resources of Labrador upon arrival of Europeans, had changed hands between the French and English several times. Philip Smith, *Brinco*, 132.
- 79 "Power Contract between Quebec Hydro-Electric Commission and Churchill Falls (Labrador) Corporation Limited, May 12, 1989," article 7.1, Delivery Point, Hydro-Québec licence application, 24-25 September 1985, ordonnance EH-1-85, exhibit B-4 (Ottawa: National Energy Board Library).
- 80 Government of Canada, Mitchell Sharp, minister of Trade and Commerce, House of Commons Session 1963, p. 3,301.
- 81 Canada, National Energy Board, hearing transcript, *The Regulation of Electricity Exports*, vol. 4-4, 876 (Ottawa: National Energy Board Library, November-December 1986).
- 82 Ibid. 884-87.
- 83 Ibid.
- 84 Ibid.
- 85 The Newfoundland government proposed that it could develop a further 6,000 MW of power (larger by 500 MW than Churchill Falls) in Labrador to supply to the national power grid, Government of Newfoundland and Labrador, "Position on A National Power Grid: Province of Newfoundland," 1974.
- 86 Philip Smith, *Brinco*, 204.
- 87 Ibid., 217.

- 83 Ibid., 262.
- 89 National Energy Board, "The Regulation of Electricity Exports: Report of an Inquiry," 8.
- 90 Government of Newfoundland, "Position on A National Power Grid: Province of Newfoundland," 2.
- 91 Canada, National Energy Board, "National Energy Board Act and the Regulations," Hearing Transcript, 24 November 1986, 161-5 (Ottawa: National Energy Board Library).
- 92 Canada, NEB, "Act and Regulations," Hearing Transcript, 24 November 1986, 137 (Ottawa: National Energy Board Library).
- 93 Ibid.
- 94 For instance, when Clarke (representing Newfoundland) probed further during 1986 NEB hearings: "Can you think of any other kinds of obstacles to having a wheeling arrangement [renting a transmission line capacity from Hydro-Québec] with the Lower Churchill?" Guevremont (representing Hydro-Québec) replied: "Cette question contient je ne sais pas combien de pièges, et je ne saurais répondre à une question aussi piégée." Québec took a position of "total absence of federal regulation in the case of the transportation of electricity." NEB, Act and Regulations, Hearing, 24 November 1986, 144, 161-5 (Ottawa: National Energy Board Library).
- 95 Québec, Order in Council No. 1760, Québec, 6 October 1966. The letter of intent approved by Order in Council was "concerning the request made by Quebec Hydro-Electric Commission regarding a power contract" with the Churchill Falls (Labrador) Corporation Limited (Ottawa: National Archives, MG III 73, vol. 15, file 19). Canada, NEB, Reasons for Decision: Hydro-Quebec, January 1984."
- 96 Canada, NEB, Report to the Governor in Council: In the Matter of an Application under the National Energy Board Act of Quebec Hydro-Electric Commission, September 1976, 5. The transmission line capability was obtained from Energy, Mines and Resources Canada, "Table 7.3, Major Interconnections between Canada and the United States," Electric Power in Canada 1988, 52.
- 97 Hydro-Québec provided estimates of its future power surpluses, and, in 1976, they were projected to increase from 3,342 MW in 1977 to 5,224 MW in 1992 (entire capacity of Churchill Falls) and up to 10,733 MW for 1998. Report of Application by Quebec Hydro-Electric Commission, Sept. 1976, NEB, Appendix 5.
- 98 Canada, NEB, Reasons for Decision: Hydro-Quebec, January 1984, 7.
- 99 Ibid., 1.
- 100 Ibid., 91.
- 101 Ibid., 40.
- 102 Canada, NEB, Hearing Transcript, The Regulation of Electricity Exports, 24 Nov. 1986, Jacques Guevremont, executive vice president of external markets, Hydro-Québec, 191-2 (Ottawa: National Energy Board

Library).

103 Ibid.

104 James Schlesinger: "No higher pragmatism can be imagined than the joint use -- for the benefit of both the American and Canadian economies -- of this unutilized and renewable resource [hydro power from the north]," "Foreword," *Power from the North*, Robert Bourassa, ix.

105 Canada, National Energy Board, Hearing Transcript, *The Regulation of Electricity Exports*, vol. 4-4, 876 (Ottawa: National Energy Board Library, November-December 1986), 884-7.

CHAPTER 5

MANITOBA: NELSON RIVER POWER FOR INDUSTRY IN THE WEST OR THE MID-CONTINENT

The objective of the February 15, 1966 (federal/provincial) Agreement was to facilitate development of the potential natural resource of the Nelson and Churchill Rivers (in Manitoba) into a major supply of low-cost hydro-electric energy. The achievement of this objective would in turn meet provincial and national objectives in the field of economic and industrial development. The supply of low-cost electrical energy would help the development of southern Manitoba, and would be a major potential export to other provinces and to the United States./1

INTRODUCTION

So far, hydro expansion programs in Ontario, Newfoundland, and Québec have been examined. This chapter constitutes the transition to western Canada, where the two provinces with the largest hydro-based energy production are Manitoba and British Columbia.

Manitoba used two rivers which contained a sufficient number of rapids and water falls to drive generating equipment. The southern inflow to Lake Winnipeg, the Winnipeg River, and its northern outflow, the Nelson River, contained numerous undeveloped power sites. Although, initially, private owners became licence holders of water powers, by 1914, the Manitoba government stopped alienating public water powers and reappropriated those not yet developed. After the 1950s, when the Winnipeg River was completely harnessed, Manitoba Hydro built the first Nelson River plant (the Kelsey generating station) for the International Nickel Company in 1961. To increase industrial development within

Figure 5.1 Manitoba Hydro Main System Features 1984

Source: National Energy Board. *Reasons for Decision, Manitoba Hydro*, February 1985, 33

Manitoba and to make its east/west transmission the first major link in the national power grid, the federal government agreed to build the power line between the Nelson River and southern Manitoba. Manitoba Hydro became responsible for diverting part of the Churchill River into the Nelson River and for developing the Kettle, Long Spruce, and Limestone sites (see Figure 5.1). Despite public statements by provincial and federal officials that energy provision would bring secondary industries and the Nelson energy would be the first major link of the national energy grid, both objectives failed. Manitoba's hydro development-based "industrialization by invitation" strategy failed as industrial energy demand became "unpredictable," and manufacturers in Manitoba used low-cost electricity primarily for staple production, and the "unplanned" provincial surplus was exported to US mid-continental utilities.^{/2} While interprovincial integration has weakened, US exports have increased tenfold since 1976.

This chapter is an analysis of how Manitoba Hydro and the provincial and federal governments used the Nelson River expansion to bring industrialization (by invitation) and to advance mid-continental network integration. The outcome of the Nelson project-related dependent industrial development and staple processing as well as the continental, rather than the national, use of the Nelson River energy surplus will be examined in more detail.

STATE INTERVENTION

In Manitoba, hydro-electric power was provided by private, municipal, or provincial enterprise. The first choice of the Manitoba government was to leave hydro development to the private sector, but, as the private owners of water power sites no longer provided conditions for economic growth, the provincial government integrated hydro development within the public sector. Under what conditions, then, did Manitoba start providing electricity as public enterprise? Earlier in this century, governments (municipal or provincial) intervened directly to supply power when the profitability of business (accumulation process) was threatened: (1) when private power companies took excess profits which threatened the profitability of a variety of industries and businesses, and (2) when no capitalist entrepreneur came forward to take on rural electrification outside of Winnipeg./3 While the earlier role of government interventions was to fill infrastructural gaps left by private business, since the 1960s, power plants have been built for expected needs outside the province. This becomes evident in the objectives the Manitoba and the Federal governments had agreed to respecting the development of the Nelson River: the integration of northern hydro energy for industrial development at the national and provincial level, the establishment of Manitoba as the major link in the national power grid, and the exportation of power to other provinces and to the United States. In this way Manitoba

hydro development became a test case for the federal electricity policy.

At the turn of the century, the Manitoba government granted franchises for power production on the Winnipeg River (130 km northeast of Winnipeg) to private and later municipal utilities. The private Winnipeg Electric Company owned the best sites and supplied the lucrative Winnipeg market./4 It had started its operations "in 1892 as the Winnipeg Electric Railway Company and by 1906 the utility had a monopoly on the transit service, electric light, power, and gas distribution in the Winnipeg area."/5 The private utility appropriated and developed three hydro plants on the Winnipeg River (the Pinawa, the Seven Sisters, and Great Falls). The power rates charged by the private monopoly were unacceptable to businessmen in Winnipeg: "if Winnipeg could obtain energy at cost, they convinced themselves, it would quickly rival cities of the east as a manufacturing centre."/6 To check the private monopoly, the municipally-owned City of Winnipeg Hydro Electric System (City Hydro) was established in 1906 and owned Point du Bois and Slave Falls on the Winnipeg River./7 Winnipeg was not the only city where overpriced electricity hurt the profitability of a variety of industries.

Brandon, for instance, had electricity production under private ownership (see Appendix V, Table V.1)./8 In 1916, the Brandon Electric rates (e.g., "10 cents per KWHr" in 1916 (remember that Québec exported power to the US for

.07 cents per kW.h in 1976)) brought not only "much complaint from power users" but also hindered small firms in converting their production facilities from steam to electric machinery./9 Some of the Brandon industries used steam to supplement their use of electric motor energy because the private utility's electric power rates were high. Others were not running their operations at full capacity because of high rates. The Myers report, for example, concluded that "the Electric Company is standing in its own light by not making reasonable power rates."/10 Its own overcharging reduced its own market and failed to provide the energy at a cost needed by industries.

Some smaller communities west of Winnipeg were even worse off. No private entrepreneur came forward to bring electricity from the large, more reliable, hydro sites to Brandon and other communities. Unlike Winnipeg, the smaller towns in southern Manitoba relied on small and often costly private and municipal power systems. Before the First World War, electric power in Manitoba was replacing steam in railway maintenance yards, grain elevators, flour mills, planing mills, stone crushing plants, sash and door factories, and bakeries./11

Private utilities, including the US-owned Middle West Utilities Co. of Chicago, had, by 1916, tried to determine whether rural electrification could be carried out as a profit-making venture by purchasing power from the City of Winnipeg Hydro Electric System, taking over smaller rural

power plants and utilities, and transmitting power via Portage La Prairie to Brandon and to smaller communities such as Neepawa./12 The Middle West Utilities Co. of Chicago had subcontracted the survey to the L.E. Myers Co., whose staff carried out the field work. Its feasibility report covered the lighting and industrial power needs of more than fifty small towns and concluded that the possible profits were hardly worth the effort of transmitting power from Winnipeg to Portage La Prairie, Brandon, Minnedosa, Souris, and many other smaller towns in Manitoba.

"This report fully covers all the territory embraced in Mr. Chamberlain's plan [to distribute power in southern Manitoba], and shows a net balance from operation of but \$37,738.00, hardly sufficient to warrant the undertaking."/13

This rural and smaller urban electrification survey reveals that when private entrepreneurs do not find conditions profitable, and, thus are content to have smaller communities and cities without electricity, the provincial government often becomes more directly involved. This direct involvement started when members of the Manitoba government found that some hydro sites had not been put to proper use.

By 1914, the Manitoba government started reclaiming those water rights which were held for private gain (without development), so that they would be available for public development. A report by R.A. Robson, public utilities commissioner to the Honorable J.H. Howden, attorney-general of Manitoba, 3 February 1913, recommended that no further water power rights be granted and that undeveloped sites be reap-

propriated./14 Once again in control of hydro sites, the government set up a public commission to provide the missing rural electricity.

[By 1919, the] Manitoba Power Commission [MPC] came into existence with the Electric Power Transmission Act passed by the provincial government to 'generate, purchase, transmit, and distribute electrical energy' throughout rural Manitoba. Under the Act, any municipality, many of which operated small and costly independent power systems, could apply for service through the Minister of Public Works. MPC initially contracted to purchase the power from the City of Winnipeg, and later from the Winnipeg Electric Company./15

However, this was not the only intervention which helped to change the production of hydro-electricity from a private to a state enterprise. In 1949, the provincial government established a second provincial organization, the Manitoba Hydro-Electric Board, to co-ordinate the future hydro expansion policy between the private Winnipeg Electric Company, the municipal City Hydro, and the provincial Manitoba Power Commission. By 1952, the provincial government authorized the acquisition of the the Winnipeg Electric Company by the Manitoba Hydro-Electric Board./16

The board and the Manitoba Power Commission became Manitoba Hydro on 1 April 1961. While Manitoba Hydro's responsibility extended over the hydro installation in the suburbs and the rest of the province, City Hydro remained responsible for Winnipeg. The mandate of Manitoba Hydro, as set out in the Manitoba Hydro Act of 31 March 1961 was confined to the supply of power adequate for use within the boundaries of the province.

The intent, purpose, and object of this Act is to provide for the continuance of a supply of power adequate for the needs of the province, and to promote economy and efficiency in the generation, distribution, supply and use of power./17

As the transmission capability due to technological innovation improved long-distance transmission, "the principal interest" of the Manitoba power planners "lay in the tremendous hydro-electric potential of the Nelson River system further north."/18

The Nelson River constitutes the outflow of Lake Winnipeg, and while it flows northward into Hudson Bay, it drops significantly at eleven sites, thus allowing for power development. In the development of the Nelson River, Lake Winnipeg serves as a water storage reservoir, which is replenished by the Winnipeg River and the Saskatchewan River (see Figure 5.1). Not only could Winnipeg Lake be regulated (by the Jenpeg control and generating structure), but the outflow of Southern Indian Lake (the Churchill River) could be controlled so that its flow would back up into the Rat and Burntwood rivers to add extra water power for driving turbines at the lower Nelson plants (the Kettle, the Long Spruce, and Limestone generating stations). Only five of the eleven potential power sites of the Nelson River were built or under construction by the late 1980s.

The Kelsey Generating Station, the first on the Nelson, has a capacity of 224 MW, with a potential of 240 MW extension; it was "opened in 1960 originally to supply International Nickel's mining and smelting operations at Thompson,"

as will be discussed in more detail below./19 The next four Nelson plants were developed according to a scheme originating from the federal/provincial agreement to make Manitoba's east/west transmission lines the "one major link" in Prime Minister Diefenbaker's national power grid.

NELSON RIVER: A TEST CASE FOR THE "NATIONAL" POWER POLICY

At the Premiers' Conference of 6 August 1962 in Victoria, Manitoba's premier, Duff Roblin, supported the development of the Nelson River in order to supply power for Diefenbaker's national power grid. Roblin pointed out to his fellow premiers that, although Manitoba already had interprovincial electricity linkages with "Saskatchewan, based on coal" and with "Ontario, based on hydro," developing the power sites on the Nelson River needed more than interprovincial co-operation. He argued that the Nelson River integration into the national power grid "is beyond our resources to handle by ourselves" and, therefore, "we in Manitoba need the federal financial and technical contributions."/20

We are definitely interested in the concept of a NATIONAL GRID. We do not visualize it springing into existence from Atlantic to Pacific overnight. We think the first step is to develop and maintain one major link, and, if it works to the satisfaction of all concerned, we could develop it across the country./21 (emphasis mine)

After the initial agreement with the federal government (18 February 1963) to study making Manitoba the first "major link" in the national grid, the defeat of Diefenbaker's Conservative government meant that a new Liberal government

would increasingly emphasize the mid-continental link./22 After several years of study, the federal and provincial governments as well as Manitoba Hydro came up with a second agreement (15 February 1966) to develop the "hydro-electric potential of the Nelson River system." This scheme went beyond the "needs of the province" in three ways: (1) by helping supply, develop, and maintain one major link of the national grid, (2) by exporting to the the US mid-continental grid, and (3) by building for industries not yet in the province.

The objective of the February 15, 1966 Agreement was to facilitate development of the potential natural resource of the Nelson and Churchill Rivers into a major supply of low-cost hydro-electric energy. The achievement of this objective would in turn meet provincial and national objectives in the field of economic and industrial development. The supply of low-cost electrical energy would help the development of southern Manitoba, and would be major potential export to other provinces and to the United States./23

Both parties agreed that "Canada" would "design, construct and place in service, at Canada's expense, the required transmission facilities" by 30 November 1971. Atomic Energy of Canada was assigned to act as the federal government's agent in the construction of the line. The Kettle Generating Station would be connected to Winnipeg with power lines able to carry most of the Nelson electricity, which constituted a "total capacity of approximately 3,200 Megawatts."/24 The transmission line, 555 miles long and costing \$175 million, would be rented from Canada starting on 1 April 1972; "the rental charge is designed to repay Canada in full over a 50-year period." Furthermore, it was

agreed that "Manitoba" was "to design, construct and place in service, at Manitoba's expense, generating facilities on the Nelson River."/25 While the federal government installed the power line, Manitoba was responsible for the installation of the power plants.

During the 1970s, Manitoba Hydro added the Kettle Generating Station (1,272 MW), the Long Spruce Generating Station (980 MW), the Jenpeg control structure and power plant (126 MW), and, further, the Limestone project (1,330 MW) was started. This system expansion certainly went beyond the needs of the province not only in terms of providing an interprovincial national supply of northern power for the US mid-continental grid and US export but also in terms of building plants for "imaginary" industrial firms which were to establish their manufactures in the province.

In summary, it was demonstrated that Manitoba initially preferred to have the private sector develop hydro. As no private entrepreneurs came forward to provide rural and less profitable power in communities west of Winnipeg, the Manitoba government intervened. Starting in 1963, the federal and provincial governments agreed that Manitoba Hydro develop the Nelson River projects, which expanded generating capacity beyond Manitoba's provincial requirements. Under Diefenbaker's influence, the rationale for early development of the Nelson River plants was that they would supply the "one major test link" in the national power grid; under Sharp's influence, the Nelson River plants were to be devel-

oped early in order to strengthen the mid-continental energy axis. Ottawa's deputy minister of energy and hydro planners in Manitoba also expected that the low-cost electricity from the Nelson would meet provincial and national objectives in the field of industrial development. What effect did the new supplies of electricity from the Nelson have on industrial development within the province and within the nation?

LINKAGES TO INDUSTRY

Did backward and forward linkages develop? What was the nature of such linkages? An examination of the industrial development related to the Nelson River projects (Jenpeg, Long Spruce, and Limestone) shows continued dependence (on entrepreneurs and technology) in the formation of backward and forward linkages. The provincial utility depended on hydro equipment and manufacturing firms from outside the province. During the 1970s, Manitoba Hydro's insistence on Manitoba content led to partially capturing local manufacturing linkages from Ontario and Québec. By the 1980s, this condition of "Manitoba content," which had shifted some manufacturing westward from the Golden Triangle, was circumvented by vague industrial offset provisions. As an examination of forward linkages will show, Manitoba's electricity continues to be used primarily in staple- or semi-manufactured goods production rather than in diverse manufacturing, despite the abundance of natural resources and industrial energy from the Nelson River.

BACKWARD LINKAGES

Were backward linkages captured? Since 1923, Canadian General Electric (CGE, Ontario) has supplied thirty-three generators for hydro plants in Manitoba, and its subsidiary, Dominion Engineering Works (DEW, Québec) has supplied thirty-eight turbines (see Table 5.1). During the 1970s, Mitsui (Japan) supplied twelve generators, and the Leningrad Metal Works (from the former USSR) supplied six turbines and six generators (see Table 5.1). To capture the contract, Energomachexort of the USSR offered the six 28 MW turbine-generator sets at \$15.6 million, while the nearest Canadian bid was \$27.6 million./26 This, in part, explains Manitoba's importation of generating equipment from the former USSR to aid in the Nelson River power production for International Nickel Company's processing of US strategic cold war materials./27

Table 5.1
Turbines and Generators Installed in Manitoba
by Various Manufacturers from
1900-86

Equipment Manufacturers	# of Main Turbines Installed	# of Main Generators Installed
AC Allis Chalmers.....	1	
CAC Canadian Allis - Chalmers.....	1	
CGE Canadian General Electric.....		33
DEW Dominion Engineering Works....	38	
JI John Inglis.....	3	
LMW Leningrad Metal Works.....	6	6
MTS Mitsui.....		12
SMS S. Morgan Smith.....	2	

Source: Statistics Canada, cat. 57-206, 31 December 1986

While the Kelsey plant (built for the International Nickel Company) generated power with Canadian General Electric and Dominion Engineering Works equipment which had been installed between 1960-72, the Mitsui (MITS) generators were installed at the Kettle Rapids plant between 1970-4, and the Leningrad Metal Works (LMW) equipment was installed in the Jenpeg control structure and generating station between 1977-9 (see Table 5.2).

When Manitoba Hydro returned, in the late 1970s, to installing generating equipment manufactured in Canada for the Long Spruce and Limestone generating plants, the utility insisted on "Manitoba content." As a result, Manitoba captured some component manufacture from central Canada.

Table 5.2
Turbines and Generators Installed in Generating Station over
100 MW by year of Installation and Manufacturer
1923 - 1985

	Capacity Kilowatts of Plant	Year(s) of Turbine Installations & Manufacturer	Year(s) of Generator Installations Manufacturer
MANITOBA (1923-85)			

Manitoba Hydro			
Great Falls	132 000	1923-8 DEW,SMS	1923-8 CGE
Seven Sisters	150 000	1931, '49-52AC, DEW,SMS	1931-52 CGE
Kelsey	236 250	1960-72 DEW	1960-72 CGE
Grand Rapids	437 000	1965, '68 JI,CAC	1965-8 CGE
Kettle Rapids	1 224 000	1970-4 DEW	1970-4 MITS
Long Spruce	980 000	1977-9 DEW	1977-9 CGE
Jenpeg	186 000	1977-9 LMW	1977-9 LMW
Limestone	1 280 000	1985- CGE	1985- CGE

Source: Statistics Canada, cat. 57-206, 31 December 1986

The venture to capture local manufacturing was called "The Pas Machinery Manufacturing Project." The object was to use the Bertram machinery plant, in The Pas, "to manufacture an appropriate mix of parts of hydraulic turbines, hydro generators and hydraulic gates for Long Spruce and Upper Limestone hydro projects."/28

The initial investment difference between manufacturing in The Pas and in Winnipeg, that is, the accumulated deficit of \$12.5 million over a 7 3/4 year project period, was estimated, in the Bertram study, to stem from: "lower production efficiency, higher northern wage rates including overtime, training programs, personnel turnover, relocation costs, start-up costs and the higher servicing costs due to plant location." Of the work force of 140 needed to build turbine, generator, and gate components, "40 could be recruited and trained locally," with the balance brought in from Winnipeg, "other Canadian industrial centers and possibly Europe." In addition, the study group foresaw jurisdictional problems between various unions, a shortage of steel, and, the necessity of building 75 to 100 houses, at \$3 to \$3.5 million for the new workforce. Given the higher cost of manufacture in The Pas, due to the costs of establishing a skilled labour force, Winnipeg was selected as the site of manufacture./29

Considering these conclusions drawn by the Bertram Study Group, on 13 December 1973, Manitoba Hydro and its chairman, L.A. Bateman, informed Edward Schreyer (premier of

Manitoba), Max Drouin (president and general manager, Dominion Engineering Works Limited in Montreal), and Paul McConnel (manager, Large Motor and Generator Products Section, Canadian General Electric Limited in Peterborough, Ontario) the following resolution:

Manitoba Hydro does not wish to acquire any interest in the Bertram plant or to participate, directly or indirectly, in any scheme for the development of the facilities of the plant for the manufacture of hydraulic turbines, generators, and related equipment.

That Manitoba Hydro continues to encourage local companies to develop their existing and proven facilities in order to be able to manufacture a growing amount of Manitoba Hydro's heavy equipment requirements in Winnipeg, where there is an established pool of skilled workers./30

Manitoba Hydro, although directly involved in the production of electricity, did not expand its direct involvement into the manufacture of equipment; this was to be left to the private sector. In its indirect efforts to achieve Manitoba manufacturing content, Manitoba Hydro claimed that this content increased for the two largest projects on the Nelson River. While the utility claimed that the Long Spruce project reached a Manitoba manufacturing content "level of 50 to 55 per cent," for the \$1.73 billion Limestone project, approached "90 per cent."/31

LIMESTONE

The claim that 90 per cent of the \$1.73 billion Limestone project is Manitoba content needs further examination./32 Although wages, construction costs, interest, and so on, make up a large part of total project costs, 90 per cent content indicates that substantial backward linkages

(most having to do with mechanical equipment manufacture) would have been established since the Long Spruce project. For example, the US-owned Canadian General Electric Company Limited of Toronto was awarded a \$100 million contract to supply Limestone's ten turbines and generators./33 The mechanical gates and cranes were manufactured by Dominion Bridge, in Winnipeg, and by Ecolaire, in The Pas./34

Ecolaire, of Kitchener, Ontario, gave Manitoba Hydro a three price bid: the first assumed that everything would be manufactured in Kitchener, the second ensured that part would be manufactured in Manitoba, and the third - the most expensive - ensured that all parts would be manufactured in Manitoba. The second option carried a premium of \$600,000 for partial manufacture in Manitoba. Ecolaire set up a manufacturing plant in The Pas, but after the gates were complete, this type of local manufacture was no longer continued. As the sr. economic consultant in the Economic Analysis Department at Manitoba Hydro, E.R. Kristjanson, indicated, such extra premiums paid for manufacturing in northern Manitoba were unlikely to be repeated./35 In addition to manufacturing mechanical gates for the Limestone project, the subcontracting by General Electric and the circumvention by industrial offset agreements made up the claim of high Manitoba content.

Canadian General Electric subcontracted some mechanical components. For instance, Canadian Anglo Machine & Iron Works manufactured the ten generator frames (17 m in diame-

ter, 1.5 m high, and weighing 90,720 kg) and other "turbine requirements on a subcontract basis for General Electric of Canada."/36 But this leaves a lot of unspecified Manitoba content./37 The Manitoba Energy Authority offers a partial answer, as does the fact that Manitoba manufacturing content was circumvented with industrial offset agreements.

The Manitoba Energy Authority predicted that an industrial benefits agreement with Canadian General Electric, in lieu of the Limestone turbines and generators not having been manufactured in Manitoba, "[would] provide an estimated \$150 million in long term direct and indirect economic benefits to Manitoba."/38 The details still had to be worked out. In its 1985 annual report, the CGE industrial offset agreement was hailed as "one of the year's major achievements."/39 Besides the \$100,000 research grant to the Manitoba Microelectronics Centre and the Manitoba High Voltage Direct Current Research Centre, and the \$10 million investment in viable operations in Manitoba, other offsets were mentioned. For example, sourcing a minimum of 15 per cent of turbine and generator labour components in Manitoba, creating 100 new jobs in Manitoba's high technology industry, and providing \$2 million to stimulate northern Native business. Added up, the benefits indicated by the Energy Authority Annual Report neither amount to \$150 million nor do they convincingly make up for the increase from 50 per cent to 90 per cent Manitoba content in the last two Nelson River projects./40 In effect, the creation of productive

linkages (activities) directly related to the Limestone project (i.e., the "Manitoba content" of the project) has been circumvented.

To sum up, the formation of backward linkages has been attempted in The Pas and Winnipeg, and some manufacturing benefits and offset benefits have been gained from branch plants established in central Canada (such as Canadian General Electric). Given the reality of trying to develop manufacturing industries, Manitoba has done better than British Columbia and Newfoundland in making an effort to capture some of the manufacturing and in attempting to involve Manitoba suppliers, including those in the North./41 So far, industrialization related to hydro development has been examined as backward linkages. Such backwardly linked industries are not the only ones expected to benefit from hydro-electric development, but forward linkages, based on the availability of abundant and low priced hydro-electric power, are expected to form a basis upon which new diversified industries develop.

FORWARD LINKAGES

The claim made by many utility managers, including Marc Eliesen, chairperson of Manitoba Hydro, that abundant electricity attracts new manufacturing, may have been valid at the turn of the century at Niagara Falls and at Shawinigan Falls (in Québec) but can no longer be sustained, especially in light of Manitoba Hydro's own findings of hydro-related

Industrial development failures. Nevertheless, in 1987

Eliesen claimed:

Manitoba's abundant low priced hydro-electric resources are offering a sound basis on which to attract new industries to the province, particularly those which rely significantly on electricity in their manufacturing and processing activities./42

He added that this hydro and new investment would bring the delayed transition to a diversified economy: "Low cost electricity supply maintains and attracts new investment to the province, helping to encourage a stable, diversified economy."/43 Such claims can no longer be sustained, because adding the Nelson River plants at (Kettle Rapids (1,224 MW) by 1974 and Long Spruce (980 MW) and Jenpeg (186 MW) by 1979 has not diversified the economy nor have many new industrial enterprises which have been added. Reviewing the previous two decades, the "Manitoba Hydro System Load Forecast 1983/84 to 2003/04" document reveals that "a few large customers located in Manitoba between 1962 and 1975," yet, it states, "there have been no major customers added in recent years and the growth of industrial electric use has been very low."/44

This supports the claim advanced for the Manitoba case that an examination of hydro-related industrial development, conceptualized and pursued as forward linkages, will show that Manitoba's manufacturers continue to use electricity primarily for traditional staple- or semi-manufactured goods production rather than for diverse manufacturing, in spite

of the abundance of natural resources and industrial energy from the Nelson River.

Manitoba Hydro categorizes manufacturers within the industrial category of electricity consumers. As indicated by Table 5.3, by 1975, "in the industrial category the main consumption was by primary resource industries such as mining, pulp and paper, chemicals, steel and oil refining."/45 Railways and pipelines were included in the

Table 5.3
Manitoba Hydro Industrial Contracts with Major Customers,
Their Capacity and Energy Demand 1975

	Number of Major Customers	Estimated Peak Power (MW)	Energy (GWh)	Energy as a Percent of Total Industrial
Manitoba Hydro Industry				
Mining	3	209	1,488	34
M.H. Pipelines	1	78	442	10
M.H. Paper	2	42	330	7
M.H. Chemical	2	43	254	6
M.H. Steel	3	51	179	4
M.H. Oil Refin.	2	19	110	3
M.H. Railways	2	10	34	1
Remaining M.H. Industrial	4,557		1,201	27
Winnipeg Hydro Industrial	4,011		341	8
Total Industrial	8,583		4,379	100

Source: Manitoba Hydro, NEB Application, exhibit 3, 1975, 11 category of main industrial consumers. The distribution of the industrial load served by Manitoba Hydro shows that all three mining customers use 34 per cent of the industrial load, and that fifteen major industrial customers consumed

65 per cent of Manitoba Hydro's total industrial energy (see Table 5.3).

Table 5.4
The 15 Largest Industrial Customers of Manitoba Hydro
in Order of Consumption 1989

1. International Nickel Co.
2. Hudson Bay Mining & Smelting
3. Interprovincial Pipeline Ltd.
4. Abitibi Manitoba Paper
5. Manitoba Rolling Mills
6. Simplot Chemical Co.
7. REPAP
8. Hudson Bay Mining & Smelting - Ruttan lake
9. Can. Occ. Petroleum Inc.
10. University of Manitoba
11. Griffin Steel
12. CNR - Transcona
13. Metro Pumping Stn. - Bergen Cut Off
14. Carnation Foods
15. Hudson Bay Mining & Smelting - Name

Source: John F. Funnel, general counsel and secretary, Manitoba Industrial Customers ranked from largest (89 03 31). Interview in the offices of Manitoba Hydro, Winnipeg, 23 August 1989. For the fifty largest customers, see Appendix 5, Table V.2

What type of firms are major industrial consumers?

Among the fifteen major industrial customers by the end of the 1980s were: in mining, the International Nickel Co. and three operations of Hudson Bay Mining & Smelting; in pulp and paper, Abitibi Manitoba Paper and REPAP; in chemicals, Simplot Chemical Co.; in steel, the Griffin Steel and Manitoba Rolling Mills; in railways, the Canadian National Railway, Transcona; in food and beverages, Carnation Food; and in other categories, University of Manitoba, and the Metro Pumping Station (see Table 5.4 for the fifty largest customers; see Appendix V, Table V.2).

Not only the 15 largest consumers but all of Manitoba's manufacturers reporting their electricity consumption to Statistics Canada show that they constitute, with the exception of food and beverages, the staple-based or semi-processing sectors (which have not diversified since the 1970s). These "manufacturing" firms processing primary metals, pulp and paper, food and beverages, and chemical products consumed 82 per cent of the purchased electricity in Manitoba in 1975 and 81 per cent in 1984 (see Table 5.5). There is little evidence that the availability of abundant Nelson River electricity attracted new investment to the province or helped to "encourage a stable, diversified economy." As Table 5.5 indicates, from 1975-84, consumption in the primary metal sector declined (from 1,308 to 1,162 GW.h), consumption in the pulp and paper sector stayed the same (364 to 371 GW.h), food and beverage showed little change (244 to 233 GW.h), and the chemical sector increased (from 145 to 288 GW.h). The total consumption in the manufacturing sector remained virtually the same, 2,482 to 2,530 GW.h, between the mid-seventies and mid-eighties (see Table 5.5). Except for the food and beverage sector, Manitoba's manufacturers continue to use electricity primarily in traditional staple- or semi-manufactured goods production rather than for diverse manufacturing, in spite of the abundance of natural resources and industrial energy from the Nelson River. A good example of a customer classified in manufacturing categories and using electricity for military-

Industrial staple production is the largest customer among the primary metal producers, the International Nickel Company (Inco), of Thomson, Manitoba.

Table 5.5
Consumption of Electricity by Manufacturers of Primary Metals, Pulp and Paper, Food and Beverages, and Chemical Products in Manitoba 1975-84
(GW.h)

Manufacturing Industries							
Year	Primary Metal	Pulp & Paper	Food & Bev.	Chemic. Prod.	Total 4 Sect.	Total Manuf.	%
1975	1,308	364	224	145	2,041	2,482	82
1976	1,143	378	250	162	1,933	2,401	81
1977	1,192	342	256	274	2,064	2,555	81
1978	1,129	394	267	329	2,119	2,647	80
1979	1,059	---	285	252	--	2,567	--
1980	1,022	404	271	246	1,943	2,541	76
1981	1,181	400	260	241	2,082	2,631	79
1982	956	340	257	247	1,800	2,289	79
1983	940	341	228	324	1,833	2,320	79
1984	1,162	371	233	288	2,054	2,530	81

Source: Statistics Canada, Manufacturing and Primary Industries Division, "Consumption of Purchased Fuel and Electricity," 1975-84, cat. 57-208.

For Inco, Manitoba Hydro's largest industrial customer since 1961, the Kelsey plant (on the Nelson River) may have been, initially a "major consideration" in setting up its mining, smelting, and refining operation in Thompson. Afterwards, however, while Manitoba Hydro added more plants, Inco used less electricity.^{/46} During the Vietnam War, the Kelsey plant's capacity was augmented by two more generators, between 1969 and 1972 to 224 MW.^{/47} During this period, Manitoba Hydro found that "Inco grew rapidly from 1968 to 1971 and has declined since so that 1982 use [of electricity] was only half that recorded in 1971."^{/48} As

Clarke-Jones found, nickel is used for military equipment manufacture and became part of the US program of stockpiling strategic resources during the Cold War./49 In other words, Manitoba Hydro built a power plant, Inco was granted "off-standard contracts," which contributed to the fact that in "sales to the mining industry ... Manitoba Hydro did not even recover the interest and depreciation charges" - all for processing Cold-War-inflated nickel demand./50 The multinational Inco remained a staple producer and reduced its operation while Manitoba Hydro added Nelson River plants and provided extra industrial capacity.

Had it not been for the expansion of the Hudson Bay Mining and Smelting Company, which became a major customer of Manitoba Hydro in April of 1981, the primary metal consumption would have declined further, despite the increase in generating capacity on the Nelson River./51 With respect to industrial electricity rates, John F. Funnell, general counsel and secretary of Manitoba Hydro, claimed that they were standard, except for some mining companies which have "off-standard contracts," (Inco and Hudson Bay Mining and Smelting), which, he predicted, would pay standard rates upon contract renewal./52

DEPENDENT LINKAGES

To overcome persistent problems of industrial diversification, since the 1960s development officers and the premier of Manitoba have sought different advice and tried different approaches to attract industries. Usually, utili-

ties themselves had industrial promotion departments. Unlike utilities in other provinces, Manitoba Hydro did not solicit industrial customers - this was left to departments within the Manitoba government. During the 1960s, the Department of Industry, Trade, and Commerce based its decisions on advice contained in industrial development studies carried out by US consultants./53 During the 1970s oil crisis, premier Edward Schreyer pursued a type of regional manufacturing reciprocity: the attempt to use Manitoba's low-cost renewable energy (in competition with expensive fossil fuels) to attract industry to western Canada from Ontario and Québec. And during the 1980s, officials in the Manitoba Energy Authority have attempted, through joint studies with industry and through international travel, to invite industrial firms, already established elsewhere, to Manitoba./54

Before embarking on industrial promotion during the 1960s, the Department of Industry delegated two industrial development studies, one advocating US-style community boosterism and incentive packages to wealthy firms, the other speculating about potential industries and proposing incentives to target industries, such as the pulp and paper industry, in order to enhance the "impact of Nelson River Electric Power on Industrial Development in Manitoba." The 1962 industrial development study, entitled "Community Development as Factor in Industrial Growth in Manitoba," was not based on an inventory of existing skills and industries

within Manitoba communities but on an extrapolation of US community experience which, in turn, was superimposed on interview data gathered from community leaders. Since it found the community could not sell itself, it recommended community salesmen be trained and lavish incentives be offered to industry, regardless of whether or not the community was poor - in other words it recommended private "industrialization by invitation" at substantial public expense./55

In June 1966, another study, more focused on the potential of the Nelson River hydro-electric power, relied on the Arthur D. Little, Inc., of Cambridge, Massachusetts, for "an Assessment of the Impact of Nelson River Electric Power on Industrial Development in Manitoba."/56 The consultants predicted that "low-cost electric power in Manitoba will be attractive to firms in the silicon carbide, chlorine and caustic soda, nickel and pulp and paper industries."/57 Although the linkage between pulp, paper, and power has been well known in Canada since the turn of the century, the Department of Industry's consultant, Arthur D. Little, Inc., reported that, in 1966, "increased availability of low-cost power will offer important opportunities for expansion" in the pulp and paper industry.

In this industry [pulp and paper] there is probably considerably more flexibility in regard to rates and power contract terms than in the other target industries examined. The flexibility stems from the broad range of manufacturing possibilities available to an investor and THE ABILITY OF THE MANITOBA GOVERNMENT TO INFLUENCE THE ATTRACTIVENESS OF A MANITOBA LOCATION BY ITS POLICY IN RELATION TO STUMPAGE CHARGES, RENTS AND

THE PROVISION OF ACCESS ROADS AND OTHER FACILITIES. POWER RATE AND SUPPLY CONTRACT TERMS should be determined in the light of all the circumstances surrounding specific proposals and careful regard paid to the situation prevailing in competitive regions. (emphasis mine)./58

Following the advice of Arthur D. Little Inc., its representative, James Zeigler, became one decision-maker in the process to advance loan monies from the Manitoba Development Fund to the developer of the The Pas complex, Dr. Kasser. To provide the power, in 1968 two new transmission lines (230 kV and 155 kV) connected The Pas in time for the start of this "integrated pulp and paper project"/59 Dr. Kasser had been invited to northern Manitoba by an advertisement placed by an industrial development officer.

For 20 years Rex E. Grose, a senior provincial civil servant, had struggled to recruit some entrepreneurs to design and construct a viable pulp and paper mill that would utilize the spindly conifers of Manitoba's precambrian forest. The problems that faced such a venture were many and obvious but the solutions were not. The full resources of the [Duff] Roblin administration were pledged to assist such a venture if the right person could be found in 1965 in Dr. Alexander Kasser. [His] determination to obtain not less than 100% financing of the project with public funds without letting the providers of such funds become fully aware of the full extent of the assistance [the government] provided./60

Subsequently, the project was operated by Manitoba Forestry Resources Ltd., a Crown corporation, "and Dr. Kasser was in Austria fighting extradition to Canada for his allegedly criminal conduct."/61 In this case, the "new investment" in the pulp and paper industry did not come to Manitoba from a foreign industrialist, but from the Manitoba taxpayers. The "new industry" developed because the avail-

ability of the northern forests was an attractive resource, and low-cost power was an added bonus.

When requested to indicate some examples of industries that were attracted to northern Manitoba because of the Nelson River expansion during August 1989, two industrial development officers of the Manitoba Power Authority indicated that, so far, the availability of additional power in the North had attracted two pulp mills and Inco. Both officers agreed that the mills and Inco had come to the North primarily for the forest and mineral resource rather than for the electricity./62

The key political figure, Premier Edward Schreyer, responded to the 1970s oil crisis with lower-cost renewable hydro energy to provide "reciprocity" in manufacturing. His policy of cheap electricity for manufacturers from central Canada or elsewhere implied that entrepreneurs needed to be invited in, despite Manitoba having one million inhabitants.

MANUFACTURING "RECIPROCITY"

Schreyer tried to merge provincial energy policy with Canadian regional industrial policy. The reciprocal consideration Schreyer advocated was "reasonable [oil] prices to [the] East," increasing replacement of non-renewable fossil fuel power with water power generation within Canada, and a "more balanced industry to [the] West," in return for lower energy prices in and from the West./63 As he put it publicly: "I believe in reciprocity as my remarks at the conference confirm [the First Ministers Conference on

Energy, Ottawa, 22 January 1974], but we haven't had that when you look at the size of Western Canadian manufacturing."/64 This reciprocity strategy had little impact, since manufacturers persist in using industrial electricity in primary metal, pulp and paper, and chemical processing since 1975 (see Table 5.5).

ATTEMPTED DIVERSIFICATION

The 1981 Energy Authority Act made the Manitoba Energy Authority responsible for export and import of electricity. An 1986 amendment to the act allowed the Manitoba Energy Authority to pursue energy-intensive development.

Part of the mandate of the Manitoba Energy Authority is to encourage the use of Manitoba's hydro-electric power to strengthen and diversify the province's industrial base. An increased emphasis has been placed on informing the international business community of the advantages of Manitoba's hydro-electric power for energy intensive industries. Attracting energy intensive industries to Manitoba will increasingly become a priority of the Manitoba Energy Authority./65

To carry out its mandate, the Energy Authority publishes high-gloss, printed information brochures about the already diversified nature of Manitoba's economy. The officers of the authority travel to countries in Europe and Asia promoting Manitoba's energy-advantage./66 Since 1987, "the Authority has met with corporate representatives from Europe, Asia and other parts of North America to examine potential developments in these areas."/67 The energy-intensive industries they identify include "fertilizer manufacturers, chemical processor, pulp, paper and lumber operators, food and beverage companies, foundries and metal cast-

ing plants;" and they foresee for the future that "since Manitoba still has the potential to almost triple its generating capacity, the number of energy-intensive industries in the province is bound to increase in the years ahead."/68 Since 1982, the Manitoba Energy Authority has not reported any energy-intensive industries that have come to Manitoba because of its low-priced hydro-electric power. By 1988, the authority signed industrial "cooperation agreements" with "a number of Japanese and Korean financial institutions, trading companies and manufacturing firms." And "promotional research and commercial activities" have been pursued with Japanese, European, and American silicon firms./69 The authority indicated that, from time to time "several aluminum companies have expressed an interest in building multi-million dollar smelters in the province."/70 However, the profit-making strategies of non-Manitoba corporations do not coincide with Manitoba's regional industrial development goals.

For example, "in December, 1984, Alcoa [the Aluminium Company of America] decided to withdraw from the [\$2 million] study, citing as reasons a poor international market in aluminium and changes in its corporate priorities."/71 This was despite the fact that on 28 March 1984 they "agreed to undertake a Joint Study" with Manitoba of the engineering, economic, and environmental aspects of an aluminium smelter, and Manitoba was "prepared to participate in the funding of and the results from the project through

the Manitoba Energy Authority."/72 Ron W. Pritchard, Director of the Energy Policy Branch of Manitoba Energy Mines and Resources, stated that Alcoa used the Manitoba negotiations as a lever to gain a better deal from Québec. In addition, a "gag order" exists concerning the Manitoba Alcoa negotiations over the \$700 million smelter./73 This is one case in which the regional development goals of provincial governments do not coincide with the profit interests of foreign industrial corporations.

Not only between regions, but within Manitoba itself, the profit-maximization goals of the International Nickel Company, the largest industrial customer of Manitoba Hydro, do not coincide with Manitoba's effort to develop a provincial hydro grid. Maxwell, the chief engineer of Inco, in his brief to the Commission of Inquiry into Manitoba Hydro, indicated that differences existed between the interests of invited industrialists and the provincial government's regional goal of integrating the Manitoba power grid. Maxwell indicated Inco's lack of support for regional infrastructural development: "Rates for northern Manitoba users should not include the cost associated with transmission of power to southern Manitoba and should also recognize the benefit to the system of base load close to northern hydro generation, the latter now being 60% of Hydro's total generation. This will be a strong inducement for northern development and reduce total provincial hydro costs and rates over the longer term."/74

4

PM-1 3 1/2" x 4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

In summary, the claim advanced was that an examination of hydro-related industrial development, conceptualized as forward linkages, shows that Manitoba's manufacturers continue to use electricity primarily in traditional staple- or semi-manufactured goods production rather than for diverse manufacturing, in spite of the abundance of natural resources and industrial energy from the Nelson River. A few large energy-intensive industries came to Manitoba between 1962 and 1975, but no major industrial customers, other than Hudson Bay Mining and Smelting have been added during the 1980s. Manufacturers' reports to Statistics Canada show that they are using industrial hydro-electricity primarily for staple- or semi-manufactured goods production. They predominate in four sectors: primary metals, pulp and paper, food and beverages, and chemical products, which consumed 82 per cent of the purchased electricity in Manitoba in 1975 and 81 per cent in 1984. This indicates that providing abundant electricity as an industrial input does not diversify a staple economy but helps to expand it. And when the organization of forward linkages is made reliant on foreign industrial firms economic dependence continues (Inco, The Pas forest complex, etc.). With respect to the formation of backward linkages, it has been demonstrated that Manitoba Hydro was dependent on hydro equipment and manufacturing firms from outside the province (CGE from Ontario DEW from Montreal, Mitsui from Japan, and Leningrad Metal Works from Russia).

The dependent nature of backward linkages (the development of temporary mechanical component manufacture) in Manitoba was evident in industrial development related to the Nelson River projects (Jenpeg, Long Spruce, and Limestone) and in the continuation of staple-based growth (such as primary metal, pulp and paper, and chemical industries), even while more hydro-electric plants were developed on northern rivers. In addition, in 1985, Manitoba Hydro awarded the \$236 million Limestone general contract to a consortium known as Bechtel-Kumagai, headed by Kumagai-Gumi Ltd. of Tokyo and the Toronto-based Canadian subsidiary of the Bechtel Group Inc. of San Francisco./75 If things continue in this fashion, Manitoba contractors will hardly develop beyond the subcontractor and temporary component manufacturing stage.

SURPLUS: UNPREDICTABILITY AND ACCELERATION

Between 1966, when an agreement was entered into between Manitoba and Canada providing for development of the potential of the Nelson-Churchill Rivers system, and 1979 the generating capacity installed by Hydro has increased from 1016 megawatts (MW) to 3678 MW. During this same period the provincial demand for electrical energy increased from a peak load of 960 MW in 1965/66 to 2419 MW in 1978/79 ... In addition Hydro has constructed interprovincial and international transmission facilities which, as of May, 1980 will provide a combined nominal capacity for export of some 2000 MW or for import of some 1400 MW. Generating plant, major transmission lines and associated facilities at March 31, 1979 represented an investment of approximately \$2.6 billion./76

What becomes evident in Manitoba is a problematic hydro expansion logic (Nelson River) reliant on dependent industrialism (in the formation of forward linkages) and counting

on continental energy regionalism. The problematic outcome of relying on "industrialization by invitation" for economic growth and counting on temporary power exports is the inability to appropriately plan hydro infrastructures (surplus capacity, timing).

Manitoba had serious difficulties in forecasting its industrial market requirements. On the one hand, Manitoba Hydro tried to plan for industrial growth and foreign industry being attracted by its promotions, on the other hand many industrial loads were volatile and different to predict (Inco, Interprovincial Pipelines). Manitoba's forecasting problems and surplus infrastructure is, in part, an outcome of its reliance on foreign industry. However, this is not the only source of planning problems. The other concerns having been a test case for a changing federal electricity policy. The Nelson River plants were, first, to be developed for the national power grid and, then, were to serve exports to the US mid-continental power network. Manitoba's overbuilt hydro system stems, to a large degree from such changing and uncertain objectives.

DEMAND FORECASTING

Manitoba Hydro planners relied on historical industrial growth, precedents which included the few large customers who had come during the 1960s. For example, in 1969, Manitoba expected a special new electricity demand for mining in the North, which was to increase to 1,300 GW.h by 1976 (double the existing mining requirement in Manitoba); this

never materialized (see Table 5.5, primary metals).⁷⁷ The Commission of Inquiry into Manitoba Hydro found that energy growth rates dropped drastically from 7.4 per cent before the mid-1970s to 1.6 per cent between 1974 and 1977.⁷⁸ Despite these general drops in consumption, Manitoba Hydro had great faith that industrial demand would continue to grow. Its energy planners found industrial demand highly unpredictable. Accurately predicting demand from the mid-1970s to the mid-1980s posed serious difficulties for Manitoba Hydro.

Table 5.6
Estimated and Actual
Annual Firm Energy Supplied
In Canada from the Manitoba System 1977-86
(GWh)

Year	Estimated			Actual	
	(1) Commercial	(2) Industrial	(3) Ind. & Comm.	(4) Power* (Ind. & Comm. Serv.)	Diff. (3) (4) %
1978/79	1,671	5,855	7,526	5,328	-29
1979/80	1,847	6,311	8,158	5,585	-32
1980/81	2,020	6,739	8,759	5,587	-36
1981/82	2,223	7,224	9,447	6,068	-36
1982/83	2,441	7,740	10,181	5,726	-44
1983/84	2,704	8,313	11,017	6,263	-43
1984/85	2,880	8,853	11,733	6,590	-44
1985/86	3,067	9,429	12,496	6,677	-47
1986/87	3,266	10,042	13,308	7,133	-46

Source: Manitoba Hydro, Application to the National Energy Board, Vol. 1, exhibit 3, 1975, 9; and Manitoba Hydro Annual Reports, 1986 and 1989

* "Power, General Service and Misc." is the category used in Manitoba Hydro Annual Reports, which is a summary of energy sold in areas other than the Residential and Farm category and includes Industrial and Commercial sales (see Appendix V, Table V.3).

A comparison of the estimated commercial and industrial use prediction with the amount actually consumed reveals that in the years from 1978 to 1986, actual consumption was 29 to 47 per cent below the industrial and commercial prediction (see Table 5.6). About half of the expected new commercial and industrial demand, anticipated as the new plants on the Nelson River neared completion, did not materialize.

SIX LARGEST CUSTOMERS (1982)

An examination of the six largest industrial customers of Manitoba Hydro (Inco, Hudson Bay Mining and Smelting, Interprovincial Pipelines, Abitibi, and Simplot) shows that their industrial loads requirements were very difficult to predict during 1982 and did not increase by expected 7.3 per cent.

In the mining and smelting category, sales were down 44 GW.h to 1,506 GW.h, "the majority of sales were to Inco and Hudson's Bay Mining and Smelting, followed by Sheritt Gordon ... If HBM&S had not been added as a new customer on April 1, 1981, the decline in sales would have been even larger."/79 Manitoba Hydro feared that a shut-down of the zinc tank house at HBM&S for one to two months would reduce electric requirements by 40 per cent./80 "Inco grew rapidly from 1968 to 1971 and has declined since so that 1982 use was only half that recorded in 1971."/81 Manitoba Rolling Mills, the third largest consumer, also kept the utility's forecasters guessing; "it was estimated that this industry

[would] recover 25 GWh in 1983, 30 GWh in 1984, grow 8 GWh in 1985, 20 GWh in 1986 and 7 GWh per year thereafter."/82

The other major industrial customers provided similar unstable electricity requirements. Those of the Interprovincial Pipelines were particularly "volatile" in terms of increases and decreases. "Interprovincial Pipelines showed an average annual increase of 38.6% from 1969 to 1973 and then an average annual decrease of 23.9 from 1973-1976."/83 The rise and fall of annual industrial electricity requirements depends on the "continuation of oil swapping where Western Canada Oil goes to the USA in exchange for American owned offshore oil," and future consumption needs placed on tar sands developments./84

The paper and allied industries declined during 1982 by 51.7 GW.h to 313 GW.h (the consumption of two medium-sized pulp mills). The reasons for this drop advanced by the utility are: "the market for paper products continues to be very soft and cheaper newsprint from the southern USA sources [short regrowth season of pulpable wood] has been coming into the market."/85 Abitibi and Manfor (Manitoba Forest Products) were looking to further reduce their energy requirement./86 Shut-downs and volatile pulp demand add to the the difficulties of meeting actual energy requirements.

Among the chemical products industries, "Simplot fertilizer company completed a major expansion in the spring of 1982 and increased energy use by 30% in 1982."/87 And Manitoba Hydro forecast the Hooker Chemical parent firm

(Occidental Petroleum) annual use to recover and to be stable. All in all, consumption in the chemical products industry was up "23.8 GWh to 248 GWh" (for 1982)./88

Predicting the energy use and planning the appropriately-sized hydro infrastructure was complicated, since the six major industrial customers were dependent on the US markets and energy use changes were subject to changing corporate directives from outside Manitoba.

In 1975, Manitoba Hydro had "decided to proceed with the Limestone Generating Station." Construction work was well on the way, including building a "permanent townsite at Sundance," when the project was halted, "pending clarification of the continuing decline in the rate of growth in demand for power in Manitoba, and investigations of additional export opportunities."/89 Manitoba Hydro had to revise its building program for the Limestone project./90 The utility decided that the "mothballing" of the Limestone project was necessary. Such an "unplanned" surplus plant was shown to be determined, in part, by the inability to properly forecast industrial load in a dependently developed staple-producing economy. However, another part of the problematic of overbuilding Manitoba's hydro-electric infrastructure is due to counting on the ability to export should the demand not materialize within the province.

OVERBUILDING

The Commission of Inquiry into Manitoba Hydro (Final Report, December 1979) found that Manitoba's hydro infras-

structure was built beyond the needs of the province and the country. Among other concerns, the commission reviewed the decision-making process that led to planning for "temporary" mid-continental exports. The decision to accelerate the development of the Nelson River projects, including Limestone, had been made despite a suppressed 1973 report that recommended project cutbacks.

ACCELERATION OR CUTBACKS

The recommendations by Eric Kierans and Marc Eliesen to cut back on extra hydro projects and to focus on provincial and national hydro-electric needs were ignored./91 On the contrary, the Schreyer and Bateman plan of accelerating Nelson River projects for national and US needs informed the decision to proceed with Limestone in 1975. The Schreyer government had set up the Manitoba Hydro Task Force to study the acceleration of the Nelson River projects for long-term exports.

Its purpose was to examine and advise Government about several important issues including the financing and speeding up of the Lower Nelson development and pricing and the current negotiations with [the US] Northern States Power on arrangements for the long term export of power from the major Lower Nelson plants, given priority by the Board [of Manitoba Hydro] on June 14, 1972./92

Although the government expected that the task force would agree with the planning priorities of the Kierans-Eliesen Addendum recommended otherwise./93 With respect to financing, Kierans and Eliesen recommended that, since the utility's net worth position was only 5 per cent (of total assets of \$932 million in 1972), it should properly price

industrial (Inco) and export sales to build up at least "20 percent of assets."/94 They had urged, in 1973, "that financial resources, scarce in Manitoba as anywhere else, are ... not [to be] squandered in the premature building of dams, that will serve provincial needs until 1995."/95 Instead of speeding up the Nelson dams, they recommended "a cutback in the existing pace of investment and capital construction," (\$2 billion expansion) since "rising energy exports during the rest of the seventies indicate that capacity exceeds the needs and rate of growth of Manitoba."/96 Instead of the 1,000 MW export, they recommended "cancellation of further discussion with N.S.P. [Northern States Power Company] on the acceleration proposal." Instead of encouraging Manitoba Hydro's north/south interconnection planning, they insisted that "Manitoba initiate discussion with Ontario and Saskatchewan, initially on a first Minister or Ministerial level, leading to joint efforts to use most efficiently existing sources of energy."/97 The Manitoba Hydro Task Force Report, issued in 1973, was not tabled in the Manitoba legislature until three years later on 10 May 1976.

In the intervening years, Premier Schreyer and Hydro chairman L.A. Bateman appealed to Donald S. Macdonald, federal minister of Energy, Mines and Resources during 1973 and 1974, for joint financing (the federal government had financed the transmission line) of the northern expansion. Schreyer argued, in a letter to Macdonald (28 May 1973),

that the two 1,000 MW projects (Kettle and Limestone) should be advanced because "Canada as a whole" requires this "substitution of energy" from non-renewable oil to renewable hydro-electric energy. He recommended that Manitoba Hydro and Energy Ministry officials "meet as early in December [1973] as possible to consider possible acceleration of Nelson River downstream development and the financing arrangements [\$500 million federal funds] related to such an undertaking."/98

While Macdonald understood that Schreyer meant to pressure for an acceleration of sales into two markets, that is, the "substitution of hydro generated electricity (from the lower Nelson) for fossil energy in both the domestic and export markets;" Schreyer may have meant only the domestic exports into neighbouring provinces (whereas the Manitoba Hydro chairman certainly favoured export to the United States)./99 As Macdonald repeats the chairman's understanding:

Mr. Bateman outlined Manitoba's interest in arranging major high-capacity interconnections with Northern States Power Company of Minnesota, recognizing that such a facility offers attractions to Manitoba Hydro relating to systems reliability and economy exchanges of energy, apart from the concept of long-term sales of hydro sourced energy./100

These "building for export" discussions and correspondence concerning the acceleration of northern development for US export occurred in the months leading up to the First Ministers' Conference on Energy in Ottawa, on 22 January 1974. And the impending "oil shortage" was used by some

hydro planners as a rationale to build extra hydro plants for domestic use. In his opening statement, Prime Minister Pierre Elliot Trudeau, gave credibility to oil company forecasts by claiming, in 1974, that Canadian oil reserves would last "for not more than a dozen years."/101 With no oil reserves by 1986, Canada would have had to replace some of this loss with hydro power. However, he referred to the fact that a continental energy compromise had been worked out twelve years earlier (about 1962), which would make repatriation difficult; he said: "we could not, as a good neighbour, suddenly cut off our exports to the United States."/102

Rather than cutting exports and starting repatriation, the solution became to continue exports and to advance energy exploration. In Trudeau's words, "coupled with our exports to the United States, there could be full development of our conventional oil resources."/103 Manitoba Hydro saw in this an opportunity not only to displace fossil-fuel energy (oil, coal) with hydro energy in neighbouring provinces but to replace US fossil fuelled plants with power from an accelerated and fully developed Nelson River hydro complex. In this plan, the valuable renewable hydro generation is simply integrated into the Mid-Continental Area Power Pool, since its energy production is 72 per cent coal-based, with the remainder based on nuclear, gas, oil, and hydro./104

As noted above, the Limestone project was "mothballed" by 1978, however, it was restarted in the early 1980s and built to displace fossil fuelled generation in the United States. By the mid-1980s, with Prime Minister Mulroney's continental integration plans contending the Liberal national/continental approach in energy policy, Manitoba started building solely for export. In 1985, the Limestone project on the Nelson River received the go-ahead. The project was contingent upon the National Energy Board's approval of the exportation of power to Northern States Power of Minneapolis.

To summarize, Manitoba Hydro's "unplanned" surplus problems (such as the Limestone "mothballing") were rooted in its inability to adequately forecast industrial requirements. Manitoba Hydro built the Nelson River plants in the hope that their energy capacity would be absorbed by industries coming into the province - but industrial expansions and new industrial markets failed to materialize. The existing resource-based industries showed particularly volatile demand changes (e.g., Interprovincial Pipelines). Additional factors which contributed to building too many plants on the Nelson River included the misinformation spread by oil companies during the mid-1970s and the support by politicians and planners at the federal, provincial, and Crown-corporate level for the continentalist approach to utilizing precious water resources. Marc Eliesen's and Eric Kierans's warnings about staying within Canadian financial

means and energy requirements were ignored in favour of the continental approach to hydro planning.

LEGITIMATION OF SURPLUS AS STAPLE

The objectives of the "Canada-Manitoba Agreement on the Development of the Hydro-Electric Potential of the Nelson River" (1966) stated that the "low-cost hydro-electric energy" from the Nelson River would meet "national objectives in the field of economic and industrial development" and "would be a major potential export to other provinces and to the United States."/105 This raises the question, how was the surplus energy from the Nelson River plants used to serve national objectives in industrial development? Did the federal government readily allow the exports to the United States? In dealing with Manitoba's surplus energy, the National Energy Board has largely ignored the use of the province's excess electricity as *national industrial input* and has legitimated that energy be developed as *provincial continental staples*.

SURPLUS AS NATIONAL INDUSTRIAL INPUT

As indicated above, Kierans recommended the cancellation of export negotiations with US utilities and advocated interprovincial negotiations to most efficiently use the "existing sources of energy."/106 Premier Schreyer publicly advocated the need for the national energy grid as part of industrial development reciprocity within Canada./107 During the National Energy Conference on 22 January 1974, he asked for an inclusion of industrialization within a

national energy policy. For such purposes, he proposed a National Energy Planning Board that would base its judgment on more social and less commercial considerations.

Manitoba submitted that there are national goals which must be included in consideration of Canadian energy requirements and the level of our energy exports. The Hon. A. Gillispie, Minister of Industry, Trade and Commerce stated our national industrial policy last summer saying that one objective is to develop an efficient processing and manufacturing industry. In referring to resource development, he said, 'increased processing of our natural resources prior to export, would yield significant direct benefits to all Canadians.' Surely this must be incorporated in our energy policy./108

The Board [National Energy Planning Board] should ensure that goals or ideals of national energy development are continually being described and articulated for the benefits of all Canadians. In this way the planning board would discuss policy with broad social and regional considerations rather than focusing mainly on commercial considerations [as done by the National Energy Board]./109

Schreyer's public pronouncements concerning going beyond the narrow commercial considerations of the National Energy Board and the need for an industrial and energy policy integration in 1974 did not keep Manitoba Hydro from applying for exports. By 1976, Manitoba Hydro had applied for and was granted "three licences for ... export" and was permitted to build a new "international power line."/110 Although exports started in the 1970s, the 1976 licence set the precedent for future Nelson River power exports. From then on, Manitoba increasingly used its surplus hydro energy as a provincially developed continental staple.

VIEWS FOR AND AGAINST MID-CONTINENTAL INTEGRATION

Some Manitobans were for the building of north/south transmission lines and exports from the Nelson River plants. One export-supporting group was the Manitoba Federation of Labour. With a membership of 80,000 working people, it supported the 1976 application to build a 230 kV international power line for the export of electricity. Its representative "suggested that export sales should proceed without delay."/111 Another supporter of exports from Canada was the importer, the Minnesota Power & Light Company. Even though electricity was to help develop Canadian industry, the Minnesota Power & Light Company (MP&L) argued, in Winnipeg (during hearings on 13 September 1976), that it needed the Manitoba electricity for developing US industry.

The witness from MP&L testified that his company needed the 100 MW export, starting 1 November 1976, because of the major increase in the Taconite mining load (the mining consumption was to increase from 285 MW to 590 MW) in its Northern Range Division. "While the total power supply is adequate under normal conditions, the failure of a 350 MW generating unit [MP&L's] would result in a marked capacity deficiency, with consequent financial losses to MP&L customers. Hence for security reasons the line from Manitoba is needed as soon as possible."/112 The Progressive Conservative Party of Manitoba "urged the Board to encourage the development of a national grid. It also supported the export of power and energy that was truly surplus to the

needs of Manitoba."/113 The Conservative Party thought that it could supply a national network as well as export to the United States.

Many other groups opposed mid-continental electricity integration. The Association of Major Power Consumers in Ontario (AMPCO) argued that: (1) the Manitoba surplus should be used to substitute "fossil fuels in adjacent provinces," that (2) since the Nelson River transmission system is federally financed, "other Canadians should benefit" from Manitoba's surplus, and (3) that, in 1974, the minister of Energy, Mines and Resources stated that "Federal Government assistance to develop stronger regional interconnections is available."/114

The Manitoba Environmental Council opposed the export; it feared the "adverse planning, environmental, economic, and social ramification[s]" and "that the application [was] only the first stage of a program which [would] result in the export of up to 1,000 MW of firm power ... and additional ... international power lines."/115 The Interchurch Task Force on Northern Flooding "urged that the export should not be permitted until all matters pertaining to the acquisition of Indian reserve lands for this project have been resolved."/116 The minister of Energy for Ontario cautioned the National Energy Board "to ensure that Canada could repatriate power upon the termination of an export licence."(emphasis mine)/117

All views opposing exports were subordinated to the primary consideration, namely, that the Canadian national interest would be damaged if Manitoba Hydro's export contract obligations (agreed upon before the hearings with US utility compliance clauses) were not met. For instance, in his *Reasons for Decision* (September 1976), which favored the export, Robert A. Steed highlighted the penalty clause and breach of contract as major detriments. If the international power line were not in place by "1 November 1976 ... approximately \$200,000 per month" would be charged to Manitoba Hydro; and he felt that honouring the "transaction agreement between MP&L and Manitoba Hydro" was of key national interest.

Account must be taken of the substantial economic cost to the Province of Manitoba of delay in completing the international connection and, most importantly, the probable detrimental effects to Canadians generally and to public utilities in particular of failure on the part of Manitoba Hydro, for whatever reason, to meet its contractual obligations with United States utilities. This latter is truly a matter of national interest which could have undesirable ramifications in the future for areas and people in Canada beyond the borders of Manitoba./118

Among other reasons was "that Manitoba Hydro would be able to purchase energy from Northern States Power ... thus a delay in building the line would not cause anybody in Canada to go short of power this winter."/119 The argument of winter/summer peak electricity demand differences was a favourite argument in support of continental integration. The purchases during the ten years show that it was primarily a Canadian export - not an exchange. The "Sold" and

"Purchase" figures indicate that only during 1977 and 1978 could one speak of an exchange; in the other years Manitoba exported to, rather than purchased from, the United States (see Table 5.7).

Table 5.7
Energy Purchased and Energy Sold from the Integrated System
of Manitoba Hydro and Winnipeg Hydro 1977-86
(GW.h)

Energy Pur- chased	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
Ont.	0	0	0	0	0	0	0	0	21	0
Sask.	93	61	64	71	179	15	1	1	5	3
USA	17	20	7	43	297	203	0	4	721	528

Energy Sold	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
Ont.	917	795	1153	850	1089	1616	1787	1439	773	1582
Sask.	222	233	269	231	342	968	1378	530	364	408
USA	6153	4739	5409	6533	3150	3299	3966	3718	1004	534

Extraprovincial (Ontario + Saskatchewan + U.S.A.) Revenues
(in millions of dollars)

Rev- enues	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
\$mill.	113	103	106	105	72	82	96	82	35	17

Source: Manitoba Hydro-Electric Board: 38th Annual Report
For the Year Ended March 31, 1986. Manitoba Hydro, pp. F14-
F15

Since 1976, export to the United States has steadily increased from 534 GW.h in 1977 to 6,153 GW.h in 1986 (see Table 5.7). When compared with the total reported electricity purchased by all manufacturers in Manitoba, which was 2,530 GW.h (see Table 5.5), it can be seen that more than double that amount was exported to the United States. Manitoba sales to Saskatchewan and Ontario have steadily

declined, and sales to the US have increased more than tenfold since 1976 (see Table 5.7). As part of continentalization, the interprovincial or national sales have declined; the north/south sales have increased.

NELSON SURPLUS AS A CONTINENTAL STAPLE

In step with the development of the Nelson River sites, exports have increased since 1970, and Manitoba Hydro, with the support of the provincial and federal governments, has strengthened its US transmission lines so that they can carry 1,325 MW (the capacity of the Limestone plant), while the interprovincial power lines have much less capacity (by 1988, with Ontario, they amounted to 260 MW and, with Saskatchewan, 500 MW)./120

Manitoba, like Québec, is now extracting its northern river power strictly for export. The Limestone project received the go-ahead in 1985 and is now entirely dedicated to export.

In January [1985], the Premier of Manitoba announced that Manitoba Hydro would call for tenders on the general civil contract for the Limestone Generating Station. The contract was contingent upon Manitoba hydro obtaining approval from the National Energy Board to export power to Northern States Power of Minneapolis./121

In March 1985, the National Energy Board approved the export for a twelve-year period. When the Limestone generating station starts generating power, Manitoba Hydro can export 500 MW/3405 GW.h per consecutive twelve months from 1 May 1993 to 30 April 2005./122 By 1987, Manitoba Hydro held "eight export licences." Those approved since 1980 are firm

exports (generators are dedicated to US export) and most expire in 1992./123

The over-building of Manitoba's Hydro system is substantial. For 1993-4 it is estimated to be 1,509 MW./124 Whenever hydro facilities exist before their electricity is ready to be sold to the United States, the National Energy Board considers them as "temporary" exports and, therefore, capital cost allowances for plants are not charged to US consumers.

The National Energy Board has virtually ignored views opposing the transport of electricity to the United States and favouring Canadian system integration; instead, it has fostered the tenfold shipment of energy to the United States (1977-86). It did so by permitting Manitoba Hydro's building of international power lines, granting export licences, and approving the Limestone plant solely for export. Surplus electricity from the Nelson River was not restricted to serve national industrial goals but served, instead, to benefit mid-continental US utilities.

CONCLUSION

In capitalist economies, the production of energy can be carried out by government or by private enterprise. The initial question raised in this chapter is whether Manitobans organized the development and distribution of hydro power as provincial, municipal, or private corporations. Until 1914, the Manitoba government granted water power franchises (e.g., numerous waterfalls on the Winnipeg River)

for private and municipal development. While in Manitoba's major city, Winnipeg's City-Hydro kept the excess profits of the Winnipeg Electric Company in check, and no private entrepreneur found that enough profits could be made from supplying smaller towns west of Winnipeg. Therefore, by 1919, the provincial government started rural distribution of hydro power. As the larger southern power sites were developed by the late 1950s, the provincial government set up the provincial Manitoba Hydro and soon launched its premature expansion into the Nelson River region.

By 1966, the federal and Manitoba government agreed, that while Manitoba Hydro would build the Nelson River plants, the Canadian government would build and finance the transmission line from the Nelson in southern Manitoba. Some of the abstract future uses (i.e., no profit was assured) of this power were thought to be: (1) to develop Manitoba's interprovincial transmission lines as "one major link" - the first test case - in the national power network, (2) to allow exports and distribution to the US mid-continental electricity grid, and (3) to merge Manitoba's provincial energy policy with an industrial policy which relied on industrial firms from outside the province to set up their operations in Manitoba.

Industrial development related to the Nelson River projects (Jenpeg, Long Spruce, and Limestone) shows continued dependence (on entrepreneurs and technology) in the formation of backward and forward linkages. What kind of

backward linkages have been captured? Although Manitoba Hydro also imported Japanese and Russian generating equipment during the early 1970s, it subsequently required Manitoba manufacturing content in the generating equipment it purchased from the US-owned Canadian General Electric. This resulted in having hydro-mechanical components manufactured in The Pas and in Winnipeg. While Manitoba Hydro and energy authority claims that the Limestone project constituted 90 per cent Manitoba content (double that of previous projects), the direct, productive linkages (increased hydro component manufacture) were circumvented by allowing Canadian General Electric to substitute related "industrial" activities. Some backward linkages in hydro-mechanical component manufacturing were strengthened during the 1970s, subsequently, however, this process was partially reversed.

Were forward linkages captured as a result of the Nelson River expansion? Despite efforts to use low-cost power and natural resources as a basis for dependently developing secondary industries, the efforts of the Department of Industry Trade and Commerce during the 1960s, Premier Schreyer's energy substitution and Canadian manufacturing reciprocity during the 1970s oil crisis, and the Manitoba Energy Authority's joint investment invitations to firms already established in other countries, "manufacturers" (predominantly in four sectors; primary metals, pulp and paper, food, and beverages) and chemical products have consumed close to 82 per cent of industrial

electricity since the Lower Nelson plants came into service during the 1970s. This indicates that providing abundant electricity as an industrial input did not diversify Manitoba's staple-based economy but, at best, expanded it.

How did the hydro infrastructure become overbuilt (1,500 MW by 1992), and why did such a large provincial energy surplus develop? Since only a few large energy-intensive industries came to Manitoba between 1962 and 1975, and no major industrial customers (other than the Hudson Bay Mining and Smelting expansion) have been added during the subsequent decade, the abstract, diversified industrial market did not develop. Many of Manitoba Hydro's planning problems were rooted in its dependent approach to industrial and energy development (e.g., Alcoa used the Manitoba joint study to obtain a better energy deal elsewhere, a foreign pulp and paper developer used Manitoba funds only, the Kelsey plant was overbuilt to serve the fictitious Cold War demand of Inco, and the volatile demands of Interprovincial Pipelines was reliant on the continental oil swapp). In addition, the misleading predictions by Canadian oil companies contributed to the acceleration of building the Nelson River plants. Another major factor contributing to the surplus was the decision by Manitoba Hydro planners, Manitoba premiers, and federal ministers that, instead of confining hydro power use to becoming a national industrial (input as suggested by the Kierans-Eliesen Addendum in

1973), the Nelson River should also serve the US mid-continental power network.

Therefore, instead of becoming the keystone province within the national network (i.e., the successful first major link in developing a national grid, as envisioned by Premier Roblin in 1961), Manitoba's provincial surplus was deliberately developed by planners and politicians for export - a process legitimated by the National Energy Board. As a result, the exports to US mid-continental utilities increased tenfold (except during the drought conditions in 1988-9), while interprovincial energy weakened since the completion of the Lower Nelson River plants. The US interconnection and exports were supported by the Manitoba Federation of Labour (80,000 members), both during the building of the 230 kV international power line in 1976 and when its representative at the National Energy Board Hearings "suggested that export sales should proceed without delay."/125 In addition, the Western Grid (Alberta, Saskatchewan, and Manitoba) failure in 1980 advanced mid-continental integration because "the shift in capital expenditures as a result of the Western Electric Power Grid would mean large increases in employment and income for Manitoba and a moderate reduction of employment and income in Saskatchewan and Alberta."/126 Manitoba's neighbours did not approve.

NOTES

- 1 Canada, assistant deputy minister (energy development) of Energy, Mines and Resources. G.M. MacNapp, chairman of Review Committee, "First Annual Report of Federal-Provincial Nelson River Review Committee, Canada - Manitoba Agreement, Development of Hydroelectric Potential of the Nelson River, March 31, 1970," 6 (Winnipeg: Provincial Archives of Manitoba, reference, 550.1).
- 2 This terms is modified from the term "unplanned oversupply" used by Gatt-fly, 1981, *Power to Choose*, Toronto: Between the Lines, 66-7.
- 3 Adaptation from Claus Offe's conceptualization of nationalization in *Strukturprobleme des kapitalistischen Staates*, 54.
- 4 The city of Winnipeg manager, J.G. Glassco, noted that the private sector had acquired the more lucrative plants. As paraphrased by the Myers survey: "the privately owned plant in Winnipeg had very much the best of the situation there; indeed, [Glassco] felt it would continue to have it until its franchise expired." The L. E. Myers Co., Construction and Management of Public Utilities, prepared a "plan for distributing power over a portion of Manitoba," on behalf of Mr. Samuel Insull, President, Middle West Utilities Co., Chicago, Illinois, 12 July 1916, 2 (Winnipeg: Provincial Archives of Manitoba, RG 22, box 6).
- 5 Manitoba Hydro, 1989, "Formation of Manitoba Hydro."
- 6 H.V. Nelles, "Public Ownership of Electrical Utilities in Manitoba and Ontario, 1906-30," 465.
- 7 Manitoba Hydro, "Formation of Manitoba Hydro."
- 8 "The Brandon Electric Light Co. Ltd. is the only power producer. There is some uncertainty as to the ownership of the property. It was originally owned by Judge Walker of Winnipeg and Messrs. Geo. Patterson, who is the Manager, and E. L. Christie of Brandon, Manitoba. [possible co-ownership with Abbott-Eaton Co.] "The L.E. Myers Co. Survey," 12 July 1916, 16-18 (Winnipeg: Provincial Archives of Manitoba, RG 22, box 6).
- 9 "The Brandon Creamery & Supply Co. has 25 H.p. connected and uses steam power in its plant as much as possible owing to the high power rate charged. It also has a 50 H.p. motor for its refrigerating plant but does not use the motor for the same reason. An 85 H.p. producer gas unit has been used for the compressor but at present natural ice is used. As much as \$500.00 per month has been paid for power when running the motor driven compressor. At present the daily use is only about 15 K.W. hours and for this the electric company charges 10

- cents net per K.W. Hr." "The L.E. Myers Co. Survey," 17. (Winnipeg: Provincial Archives of Manitoba, RG, 22 box 6).
- 10 "For instance the City is now about to buy a 500 H.p. pump to meet its increased demand and will probably install steam power, instead of electricity, which it would use if given a reasonable rate. The City's coal bill now runs from \$17,000 to \$20,000 per year for pumping only." "The L.E. Myers Co. Survey," 12 July 1916, 14 (Winnipeg: Provincial Archives of Manitoba, RG 22, box 6).
 - 11 Ibid., 23.
 - 12 Ibid.
 - 13 Ibid., 50.
 - 14 "The powers of the Winnipeg River, described in the report of the Water Power Branch, in Manitoba, are as follows: (1) The Winnipeg Elec. Railway Company, Pinawa Channel. (2) City of Winnipeg, Point du Bois. (3) Slave Falls. (4) Seven Sisters. (5) McArthur Falls. (6) Grand Bonnet (combined with Little Bonnet). (7) Pine Falls (combined with Silver Falls). It would seem that at some past time rights regarding certain of these remaining powers were obtained by private interests." A Report by R.A. Robson, public utilities commissioner to the Honorable J.H. Howden, attorney-general of Manitoba, Winnipeg, 3 February 1913, 3 (Winnipeg: Provincial Archives of Manitoba, RG 22, box 6).
 - 15 Manitoba Hydro, 1986, *A History of Hydro-Electric Power in Manitoba*, 8. "The Formation of Manitoba Hydro."
 - 16 Manitoba Hydro, "The Formation of Manitoba Hydro."
 - 17 Manitoba Hydro. "What is Manitoba Hydro?"
 - 18 Ibid.,
 - 19 Manitoba Hydro. "What is Manitoba Hydro?"
 - 20 Duff Roblin, at the Provincial Premier's Conference, Victoria, British Columbia, 6 and 7 August 1962. Proceedings, 6 August 1962, 163-4 (Victoria: Legislative Library, CAN ZC 1962).
 - 21 Ibid.
 - 22 The Liberal government's minister of Trade and Commerce, Mitchell Sharp, on 8 October 1963 (House of Commons statement), revised the national grid to a two concept national/continental power network scheme.
 - 23 Canada, assistant deputy minister (energy development) of Energy, Mines and Resources. G.M. MacNapp, chairman of Review Committee, "First Annual Report of Federal-Provincial Nelson River Review Committee, Canada - Manitoba Agreement Development of Hydroelectric Potential of the Nelson River, March 31, 1970," 6 (Winnipeg: Provincial Archives of Manitoba, 550.1).
 - 24 While all the generators in Manitoba produced only 1,794 MW in 1970, a 2,300 MW transmission capability was installed, which would allow the transport of 80 per cent of the 4,000 MW estimated from Nelson plants. "First Annual Report of Federal-Provincial Nelson River

- Review Committee, March 31, 1970," 6 (Winnipeg: Provincial Archives of Manitoba, 550.1).
- 25 "First Annual Report of Federal-Provincial Nelson River Review Committee, March 31, 1970," 6-7 (Winnipeg: Provincial Archives of Manitoba, 550.1).
- 26 Because this was a control structure regulating the Nelson River as outflow from Lake Winnipeg, special turbines and generators were needed. L.A. Bateman, chairman of Manitoba Hydro, "The Nelson River - An Energy Source," paper presented at the 89th Annual Congress of the Engineering Institute of Canada, Winnipeg, Manitoba, 30 September to 3 October, 1975, 9,
- 11 The prices are discussed, and warnings about the Leningrad manufacturer's history of inability to meet delivery dates and manufacturing standards are given. Manitoba, Tritschler, 1979, *Commission of Inquiry Report*, 156, 455-6.
- 27 Melissa Clark-Jones, *A Staple State*.
- 28 "On January 8, 1971, the Manitoba Government announced that it had obtained a court order placing the four companies of the Churchill Forest Industries complex at The Pas, Manitoba, into receivership. One of the four companies was James Bertram & Sons (Canada) Limited which had been responsible for the so-called Bertram machinery plant in the complex ... The Department of Industry and Commerce ... suggested to Manitoba Hydro the possibility of manufacturing hydraulic turbines and associated equipment in the plant for the proposed Lower Nelson River developments." *The Pas Machinery Manufacturing Project: Report of the Bertram Study Group*, 3-1.
- 29 Ibid., 2-1 to 2-3.
- 30 Letter from L.A. Bateman, chairman and chief executive officer, Manitoba Hydro, addressed to W.R.C. Blundel, executive vice-president, Apparatus and Heavy Machinery, Business Division, Canadian General Electric Company Limited, Montreal, 17 December 1973. Included as Appendix 4 *The Pas Machinery Manufacturing Project*. A related document is Dominion Engineering Works Ltd., "Proposal for a Joint Agreement for the operation of the Bertram Plant at The Pas, Manitoba, for the Manufacture and Supply of Hydraulic Turbine Components: Manitoba Hydro Specification number 896 Long Spruce Generating Station / Dominion Engineering."
- 31 Manitoba Hydro, *The Manitoba Hydro-Electric Board 36th Annual Report for the Year ended March 31, 1987*, 12.
- 32 Manitoba Hydro, *A History of Hydro-Electric Power in Manitoba*, 25 and "Supplement."
- 33 Manitoba Hydro, *Annual Report 1986*, 12.
- 34 Manitoba Hydro, *A History of Hydro-Electric Power in Manitoba*, 25 and "Supplement." *Annual Report 1987*, 11-12.

- 35 Interview with E.R. (Ruth) Kristjanson, sr. economic consultant, Economic Analysis Department, Manitoba Hydro, Winnipeg, 24 August 1989.
- 36 Peter Mauermann, general manager, Canadian Anglo Machine & Iron Works, cited in *Hydro Gram*, 1989.
- 37 Manitoba, Manitoba Energy Authority, *Annual Report*, 1985, 15.
- 38 Manitoba, Manitoba Energy Authority, *Annual Report*, 1984.
- 39 In industrial offset agreements the purchaser invites the tenderer to propose activities producing economic benefits to Manitoba that are not directly related to the work on hydro projects. For example, activities such as employment, research and development, transfer of technology, business investment, and starting affirmative action ventures for target groups (i.e., northern Native populations). "Instructions to Tenderers," Specification No. 1950, 6-7 (Winnipeg: Manitoba Hydro).
- 40 Manitoba, Manitoba Energy Authority, *Annual Report*, 1985, 15.
- 41 For example "a 'Manitoba business' is a business which is registered to do business in the Province of Manitoba, and the firm, or its principals, maintains in Manitoba on a continuous basis, the facilities, equipment and staff necessary to perform the work required, or to manufacture, or assemble, or supply, the work." Al Kazima, "Manitoba Business Involvement" (Winnipeg: Manitoba Hydro, August 1989).
- 42 Manitoba Hydro, Marc Eliesen, "Chairperson's Message," *Annual Report*, 1987, 6.
- 43 Ibid.
- 44 Manitoba Hydro, *Manitoba Hydro System Load Forecast 1983/84 to 2003/04*, 36.
- 45 Canada, National Energy Board (NEB), *Report to the Governor in Council: In the Matter of the Application under The National Energy Board Act of The Manitoba Hydro-Electric Board*, March 1976.
- 46 B.E. Maxfield, chief engineer, Inco Metals Company, Thompson Manitoba, 30 November 1978, a brief to the Tritschler Commission of Inquiry into Manitoba Hydro. Winnipeg, Legislative Library. Manitoba Hydro, *A History of Hydro-Electric Power in Manitoba*, 14.
- 47 Ibid.
- 48 B.E. Maxfield, chief engineer, Inco Metals Company, Thompson, Manitoba, 30 November 1978. A brief addressed to the Honourable G.E. Tritschler, commissioner of the Commission of Inquiry into Manitoba Hydro. (Winnipeg: Legislative Library).
- 49 Clark-Jones found that the Paley Report singled out the 'strategic' nature of nickel "being what the American military termed 'a true war metal.'" It became part of the stockpile program between 1956-61. The demand for Inco's nickel was artificial. "Production diversification had preceded to its logical (profitable)

- extreme in Canada with exploitation of both Sudbury and Manitoba ores on the basis of the artificially induced levels of high demand." Melissa Clark-Jones, *A Staple State*, 122, 142, 152.
- 50 Tritschler, *Commission Report*, 224, 227. Interview with John F. Funnel, Q.C., general counsel and secretary, in his office at Manitoba Hydro, 23 August 1989. He mentioned "off-standard contracts" with the mining industry, which would be standardized upon renewal.
- 51 Manitoba Hydro-Electric Board. *Manitoba Hydro System Load Forecast 1983/84 to 2003/04*, 42.
- 52 Interview with John F. Funnel, Q.C., general counsel and secretary, in his office at Manitoba Hydro, 23 August 1989.
- 53 John E.G. Giesbrecht, the librarian of the Business Resource Centre, Manitoba's Department of Industry, Trade and Tourism, informed me that only the most current business resource material is kept in the library, and it is unlikely that 1970s industrial promotion documentation was kept.
- 54 I was made aware of the aluminium industry studies during an interview with Ron W. Pritchard, Director, Energy Policy Branch, Manitoba Energy and Mines, Winnipeg, in his office on Graham Ave., 24 August 1989.
- 55 Manitoba, Committee on Manitoba's Economic Future, confidential document. "Community Development as a Factor in Industrial Growth in Manitoba," Bruce W. Macy and Donald L. Vogelsang, Midwest Research Institute, Final Report, 1 June 1962 (Winnipeg: Provincial Archives of Manitoba, RG6 D1)
- 56 Arthur D. Little, Inc., "An Assessment of the Impact of Nelson River Electric Power on Industrial Development in Manitoba," 2.
- 57 Ibid., 28.
- 58 Ibid., 41.
- 59 Ibid. Also see *Forced Growth*, chapter 6.
- 60 Walter C. Newman, *What Happened When Dr. Kasser Came to Northern Manitoba*, 1.
- 61 Ibid.
- 62 Interview with Garry R.S. Hastings, executive officer industrial development and corporate secretary, and Henryk Mardarski, information access officer, in the Lombard Ave. offices of the Manitoba Energy Authority, Winnipeg, 21 August 1989.
- 63 Edward Schreyer, premier of Manitoba, "Address to Canadian Electrical Week," 14 February 1974 (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 64 Ibid.
- 65 Marc Eliesen, chairperson and executive director, Manitoba Energy Authority: *Annual Report 1985/86*, 4.
- 66 Interview with Garry R.S. Hastings, executive officer, industrial development and corporate secretary, and Henryk Mardarski, information access officer, in the

- Lombard Ave. offices of the Manitoba Energy Authority, Winnipeg, 21 August 1989.
- 67 Manitoba, Manitoba Energy Authority, Annual Report, 1987, 17.
- 68 Manitoba, Manitoba Energy Authority, Annual Report 1986, 14-15.
- 69 Manitoba, Manitoba Energy Authority, Annual Report, 1988.
- 70 Manitoba, Manitoba Energy Authority, Annual Report, 1986, 14-15.
- 71 Manitoba, Manitoba Energy Authority, Annual Report, 1985.
- 72 Ibid.
- 73 Another aluminium company, Alcan, asked for part-ownership of the Limestone plant in return for locating in Manitoba; to the Pawley government, this was an unacceptable demand. Interview with Ron. W. Pritchard, 24 August 1989, the Offices of Manitoba Energy Mines and Resources, in Winnipeg.
- 74 B.E. Maxfield, chief engineer, Thompson Manitoba, 30 November 1978, a brief, 3.
- 75 Manitoba Hydro, Annual Report, 1986, 12.
- 76 Manitoba, Tritschler, 1979, Commission Report, 5.
- 77 Canada, National Energy Board, Export Application, Exhibit C, 1969, 9.
- 78 Manitoba, Tritschler, Commission Report, 337, 338.
- 79 "HBM&S have been undertaking a capital expenditure program to update the Flin Flon smelter particularly the zinc casting plant and zinc roaster precipitators, but further improvements are on hold pending an improvement in markets and a review of their impact on the environment." Manitoba, Manitoba Hydro, Manitoba Hydro System Load Forecast 1983/84 to 2003/04, 37, 42.
- 80 Ibid., 42.
- 81 Ibid., 41.
- 82 Ibid., 51.
- 83 Ibid., 48.
- 84 Ibid.
- 85 Ibid., 47.
- 86 Ibid.
- 87 Ibid., 51.
- 88 Ibid.
- 89 Manitoba, Tritschler, Commission Report, 42.
- 90 In 1977 Manitoba Hydro estimated it would have a surplus capacity of 742 MW in 1986; when the 500 MW dedicated for export to the Northern States Power Company, are added then the resulting 1,242 MW means the Limestone project was built beyond provincial needs. Canada, National Energy Board Reasons for Decision: In the Matter of an Application under the National Energy Board Act of The Manitoba Hydro-Electric Board, July 1977, Appendix 4. Ottawa: National Energy Board.
- 91 In December, 1972, Premier Schreyer established an Internal Task Force on Hydro matters, consisting of:

- L.A. Bateman, hydro chairman; J.S. Anderson, deputy minister of Finance and Hydro; H.L. Briggs, of Ottawa, a consulting engineer; Eric W. Kierans, then a professor with the Department of Economics at McGill University; and Marc Eliesen, then secretary of the Planning Secretariat of the Manitoba Cabinet. A related work, Eric Kierans, *Report on Natural Resources Policy in Manitoba*. Winnipeg: Queen's Printer, 1973.
- 92 Manitoba, Manitoba Hydro Task Force, "Report on Examination of a Proposal for the Long Term Export of 1000 MW to Northern States Power Company," (1976 Sessional Paper # 100 1973. The Task Force's report (which became Sessional Paper No. 94 in May, 1976), was submitted December 1973. Cited by Manitoba, Tritschler, *Commission Report*, 223.
- 93 Manitoba, Tritschler, *Commission Report*, 227.
- 94 Kierans recommended "that government review all long-term contracts with heavy power users and insist on examining all future long-term contracts before they are signed by Hydro." Cited by Manitoba, Tritschler, *Commission Report*, 224, 227.
- 95 Manitoba, Manitoba Hydro Task Force, "Report on Examination of a Proposal for the Long Term Export of 1000 MW," Manitoba, Tritschler, *Commission Report*, 226.
- 96 The \$2 billion expansion figure is from Manitoba, Tritschler, *Commission Report*, 224.
- 97 Manitoba Hydro Task Force. "Report on Examination of a Proposal for the Long Term Export of 1000 MW." Addendum - Comments by E. Kierans on Hydro Task Force, Manitoba, Tritschler, *Commission Report*, 227.
- 98 Letter from Edward Schreyer, premier of Manitoba, to Donald S. Macdonald, minister of Energy, Mines and Resources, 28 November 1973. (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 99 Messrs. Bateman, Fraser, and Aaranson of Manitoba Hydro met in Winnipeg with Messrs. MacNabb and Humphrys of the Ministry of Energy, Mines and Resources to discuss the acceleration of "at least two sites on the lower Nelson." Letter from Donald S. Macdonald, minister of Energy, Mines and Resources, to Edward Schreyer, premier of Manitoba, 7 January 1974. (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 100 Letter from Donald S. Macdonald, minister of Energy, Mines and Resources, to Edward Schreyer, premier of Manitoba, 7 January 1974. (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 101 As he explained: "About half our oil serves Canada west of the Ottawa Valley, and about half is exported to the United States. We replace that half by imports from various parts of the world including Venezuela and the Middle East." Office of the Prime Minister, press release, 22 January 1974, "Opening Statement by the Prime Minister of Canada at First Ministers' Conference

- on Energy, Ottawa, January 22, 1974," 4. (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 102 Ibid.
- 103 Office of the Prime Minister, press release, 22 January 1974, "Opening Statement," 5. The federal energy minister advocated a return to strengthening the national electricity network and referred to the \$235 million Nelson transmission system as an example of national cooperation. Donald S. MacDonald "Energy Policy statement," First Ministers' Conference on Energy, Ottawa, 22-3 January 1974 (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 104 Mid-Continental Area Power Pool, "Paths of Power: Discussion Guide," pamphlet. Minneapolis: Mid-Continental Area Power Pool.
- 105 Canada, assistant deputy minister (Energy Development) of Energy Mines and Resources, and Chairman of Review Committee, G.M. MacNapp, "First Annual Report of Federal-Provincial Nelson River Review Committee, March 31, 1970," 6.
- 106 Kierans-Eliesen Addendum, cited by Manitoba, Tritschler, Commission Report, 226.
- 107 He also welcomed recent "federal statement by Donald Macdonald to re-analyze the advantages of a closer connection between provincial utilities," advocated additional facilities "be planned on a larger scale," and proposed to avoid provincial competition for capital to build "\$10 billion" projects - some already began (tar sands, Arctic oil, James Bay, Manitoba Hydro and others). He also emphasized that Winnipeg expertise acquired from the Nelson River transmission line could "make a major contribution to the development of a national grid." The way to begin, he suggested, was "by close interconnection between four Western provinces." Address to the Canadian Electrical Week," Edward Schreyer, premier of Manitoba, 14 February 1974, 9 (Winnipeg: Provincial Archives of Manitoba, Schreyer Papers).
- 108 Premier Ed Schreyer, "Opening Remarks for the First Ministers Conference on Energy Ottawa, January 22, 1974," 7 (Winnipeg: Provincial Archives of Manitoba)
- 109 Ibid., 22-23.
- 110 Canada, NEB, National Energy Board Reasons for Decision: Hydro-Electric Board, September 1976, 1.
- 111 Canada, NEB, NEB Report, Manitoba Hydro, March 1976, 56, 57.
- 112 Canada, NEB, NEB Reasons for Decision, Manitoba Hydro, Sept. 1976, 4.
- 113 Canada. NEB, NEB Report, Manitoba Hydro, March 1976, 55.
- 114 Ibid., 47.
- 115 Ibid., 48
- 116 Ibid., 55.
- 117 Ibid., 48, 59.
- 118 Ibid., 10.

- 119 Ibid., 11.
- 120 Canada, Energy, Mines and Resources Canada, *Electric Power in Canada 1988*, 50, 52.
- 121 Manitoba Hydro, *A History of Hydro-Electric Power in Manitoba*, 25.
- 122 Canada, *NEB Reasons for Decision, Manitoba Hydro*, August 1987, 18. (Licence No. E1-170)
- 123 Ibid., 17-18.
- 124 Ibid., 10-11.
- 125 Canada, NEB, *NEB Report, Manitoba Hydro*, March 1976, 56-7.
- 126 Steering Committee, *Western Electric Power Grid Study Agreement, Western Electric Power Grid*, vol. I, executive summary, 5. Source: Energy Policy Branch of Energy, Mines and Resources, Manitoba. I was made aware of the "job issue" related to the Western Grid by Ron W. Pritchard, director of the Energy Policy Branch of Energy, Mines and Resources, Manitoba, in an interview in his Winnipeg office, 24 August 1989.

CHAPTER 6

BRITISH COLUMBIA: PEACE RIVER POWER FOR STAPLES AND THE CONTINENTAL POWER TRAP

British Columbia, traversed by three distinct mountain ranges and with, on the whole, a high rate of precipitation, has many mountain rivers which offer opportunity for power development and consequent secondary industrial growth./1

INTRODUCTION

Since the 1940s, and, particularly, since the 1960s, members of British Columbia's political elite and their appointed utility managers have claimed that hydro development, for example on the Peace River, would constitute the leading sector in the transformation of British Columbia's resource-based economy. They announced that industrial developers and investors in manufacturing plants would be invited into British Columbia to use the plentiful hydro power resources, forest resources, and minerals to develop secondary industries and provide employment for British Columbians. Decision-makers in government would need only allocate such valuable resources, in some instances whole watersheds, to developers of international stature, and they, in turn, would carry out the necessary industrial transformation for British Columbians. One of the most blatant examples of this assumption is the allocation of mineral and forestry rights to the Swedish developer Axel Wenner-Gren (in November 1956) in northern British Columbia, which was defined as the "watershed of the Peace River and tributaries above Hudson Hope," plus the "Watershed of the Kitcheka River" and a partial watershed of the Parsnip

Figure 6.1 British Columbia Main System Features 1989

Source: B.C. Hydro. Corporate Business Plan for the Period 1989-1992. Financial Planning Department, 1989, 9

River./2 Such industrial promoters promised to establish their production facilities and to provide infrastructures. Industrial corporations neither kept their industrial development commitments nor their loyalty to British Columbians, particularly during the economic downturn in the early 1980s.

Political leaders acknowledged that the building of large plants in the interior could lead to some temporary surplus electricity, but such surpluses, it was proclaimed, could be sold, either into the national energy network or to "power-hungry" California.

B.C. Hydro, in its role as a Crown corporate development company during the 1960s, could be used by the provincial government to conceal the economic instability typical of staple producing regions. At the time of building dams on the Peace and Columbia rivers (during the 1960s and 1970s), superlative attributes of "largest single development," "biggest," "mightiest in the world" fitted with a cultural period when houses, boats, appliances, and cars grew bigger every year. Images of successful industrial developments (such as monumental dams, underground powerhouses, generators, turbines, and push-button consoles in powerhouse control rooms) were impressive. These images were embellished with futuristic metric statistics, for example, the W.A.C. Bennett Dam, on the Peace River, was described as 2,000 m long and 183 m high, 850 m at the base and 9 m thick at the top; the G.M. Shrum Generating Station,

built inside the bedrock of Portage Mountain, is 272 m long, 20 m wide and 47 m high; and the Williston Lake Reservoir covers an area of 164,600 ha (mostly drowned forest).^{/3} The former chairman of Ontario Hydro, Sir Adam Beck, identified the thought behind such gigantic hydro-electric projects earlier this century: "Nothing is too big for us. Nothing is too expensive."^{/4} In addition, mega-dams give the appearance of an already existing industry, which naturally produces hydro-electric generating equipment and electrical instrumentation. The idea of the existence of a secondary industry, or at least the link to an impending formation of consumer goods manufacturing, appears very logical. Such hydro-electric engineering accomplishments gave support to the optimistic accounts of an impending British Columbia industrial transformation.

This chapter questions behind such optimistic accounts by examining some problematic aspects of British Columbia's hydro-related industrial development: (1) the change in the way the British Columbia government intervened (i.e., from allocating water powers and other resources to producing electricity from re-appropriated water power resources); (2) the continuing importation of hydro-electric technology and the continuing invitation of industrial developers to use cheap power and natural resources; (3) the industrial energy surplus resulting partly from the unkept promises of industrial corporations and partly from hydro plants having been built too early for intermittent energy continentalism; and

(4) the federal political legitimation of this process by not confining hydro-electrical benefits to within the boundaries of Canada but, instead, allowing electricity exports (which fit within the government's economic agenda of building continentally integrated provinces)./5

These problems raise a number of questions: What led to the government takeover of private hydro companies in British Columbia, which was, after all, known as a "free enterprise" province? What is the nature of the industrial development that is advanced by invited industrial entrepreneurs? Why is there such a poor fit between plant size and the industrial market? And why does the federal government allow exports to industries in the United States when it has clearly stated that it wants to use cheap hydro-electricity to attract industries to Canada?

The following is advanced as a general answer: since British Columbia's hydro expansions were required to serve the government's "industrialization by invitation" strategy and its provincial continentalism, only temporary dependent industrial development took place, staple processing continued, and the provincial power surplus became a stand-by staple for continental use. Four points support this proposition.

First, the failure of narrowly profit-oriented utilities in British Columbia (such as B.C. Electric) to provide the less profitable inputs, necessary for continued capitalist industrial expansion, influenced the nature of govern-

ment intervention. The nature of this intervention changed whereby subsequent to the allocation of natural resources, the government increasingly directed the production of electricity for existing and expected industrial firms.

Second, despite the takeover of hydro utilities in order to advance industrial expansion, the kind of economic growth associated with hydro expansion brought few backward linkages, and the use of electricity, as an industrial input, did not overcome British Columbia's staple-centred growth. This is the case, in part, because of the government chose to establish backward and forward linkages, through the use of an "industrialization by invitation" strategy that fostered dependent development (through import of technology and industrial developers).

Third, since, upon inviting external economic ownership, production and planning for industrial expansion was largely determined by forces outside British Columbia, much of the knowledge necessary to plan and build the electric infrastructure for industry was denied to the province. This may be seen in the unwillingness of invited industrialists to share provincial development goals. Foreign firms' lack of regional loyalty to development goals contributed substantially to British Columbia's "unplanned" surplus of electrical capacity. The surplus was also due to exports being allowed as part of finishing northern projects before they are needed within the province.

Fourth, if an insufficient number of industrial developers are attracted to the province and the pre-building of large dams is encouraged by the federal government, then large energy surpluses result. The development of British Columbia's "unplanned" surplus development was legitimized by the federal government's national/continental power policy. The National Energy Board hearings were used to "democratically" legitimate this policy in two ways: (1) by the disposition of British Columbia's surplus industrial electricity by exporting it to the United States, and (2) by the integration of British Columbia's transmission grid into the US Northwest power dispatching control centres, wherein British Columbia's electricity is treated primarily as a stand-by staple.

First, British Columbia's increased role in the production of hydro-electricity and the choices that the government and firms made to advance industrial development need to be examined point by point. To start with, the question of what led to the government takeover of private hydro companies in British Columbia, known as a "free enterprise" province, needs to be addressed.

STATE INTERVENTION

Within "free enterprise" systems, the failure of private utility companies to provide the less profitable but necessary production inputs, often results in a change in provincial state intervention, whereby, in addition to the allocation of natural resources, the government increasingly

directs the building of capital projects and provides the needed productive input. This is what occurred in British Columbia. Along with many smaller utilities, one private and two government-owned utilities were highly influential in shaping the relationship between hydro development and industrial development throughout this century. The foreign-owned B.C. Electric (est. 1926) served, primarily, the industrial and other lucrative urban markets in Greater Vancouver and Victoria; this private utility was not less interested in taking the risk of supplying rural industrial loads. The government-owned B.C. Power Commission (est. 1945) needed to supply less profitable rural and more remote industrial customers on Vancouver Island and in the Interior. When the privately-owned B.C. Electric refused to take the risk of buying future Peace River power from the Wenner-Gren Company, the government expropriated it and took over control of the Peace River dam project.⁶ B.C. Hydro (est. 1961) followed the general trend of pre-building its projects before they were needed by industry - a continuation of the Power Commission's promotion of an industrial market in the Interior and in northern British Columbia.

B.C. ELECTRIC

Some of the rights to the best water power sites near Vancouver, such as Stave Falls, the outflow of Alouette Lake and Stave Lake (64 km east of Vancouver), and the Bridge River sites (about 250 km north of Vancouver), were initially acquired by the Western Power Company and the

Bridge River Company and then taken over by the English-owned B.C. Electric Power and & Gas Company (B.C. Electric). It obtained the water rights and built the Alouette project to supply the growing industries./7

On September 25, 1925, after receiving the results of the Bridge River survey, the "B.C. Electric" bought the shares of a company which had been formed thirteen years previously, the Bridge River Power Company Limited. On this Company's incorporation in 1912, it has secured development rights on the Bridge River but had constructed no works during the intervening period of thirteen years. "B.C. Electric" now bought out the shares of the old Bridge River Company, and transferred them a few months later to its new subsidiary, the British Columbia Electric Power & Gas Company Limited./8

Initially, the development of hydro projects and the industrial use of electricity was promoted under private ownership. A mining and smelting company north of Vancouver became one of the first industrial customers of B.C. Electric.

Among all the lighting and power contracts then being entered into between the Company and all manner of commercial and industrial enterprises, none was so important in 1923 as the contract made with the Britannia Mining and Smelting Company at Britannia Beach, on Howe Sound. A 34,000 volt high tension transmission line was built from North Vancouver to transmit 4,500 [3.4 MW] to 6,000 horsepower [4.5 MW]. On the one single contract alone an expenditure of \$150,000 was necessary in order to deliver power to a sub-station built by the Britannia company on its own property./9

B.C. Electric's hydro plants and industrial customers were not only to the north but also to the east of Vancouver. Subsequent to acquiring the Alouette Lake power sites, B.C. Electric's industrial market expanded with the growth in the lumber industry, the furniture industry, and the fishing industry. Grain elevators were not only using elec-

tric motors on the Prairies but also in Vancouver harbour. "One of the principal new contracts of 1924 involved the supplying of power to operate Vancouver Harbour Commissioners Elevators Nos. 1 and 2 - forming between them one of the biggest and fastest grain elevator blocks in the world."/10

Dal Grauer was one of the key promoters of the industrial use of electricity within B.C. Electric./11 In 1945, while Grauer was executive vice-president, an Industrial Development Department was set up - "its job being to foster industrial growth" and to "assist in the conversion of wartime industries back to peace time production."/12 Under the slogan: "Business is Moving to B.C.," an advertising campaign was used to promote industrial growth - a campaign "which was to be talked of the world over."/13 Newspaper advertisements in eastern North America and England stressed the opportunities of B.C. Electric's energy and British Columbia's "vast natural resources" for the development of "secondary industries."

By the end of 1945, 594 enquiries had been received as a result of the Industrial Development Department's campaign, and new industrial consumers were planning an annual production of over \$12,000,000 with annual payrolls of \$3,440,000./14

Such inquiries by "new industrial customers" were used in planning the appropriate size and timing for new hydro plants. The necessity to invite industrial developers (right after the Second World War) from eastern Canada, the United States, and England is typical of the desire to overcome what Naylor claims is the stultification of industrial

entrepreneurs. Such invitations had become a way to import settlers or absentee industrial bourgeoisie and thereby, to continue the dependent industrialism which had existed since the time British Columbia's society was developed, in Williams' terms, as a lesser region of the British empire./15 However, in the twentieth century, with new transportation and communications possibilities, industries could be run by multinational corporations, and industrialists no longer needed to live near their production facilities.

While B.C. Electric focused on the service of large industrial customers and the lucrative markets of Greater Vancouver and the lower Vancouver Island, the government-owned British Columbia Power Commission took over small power utilities in rural and remote staple industry areas./16 As Gordon Shrum, who later supervised the co-operation between the private B.C. Electric and the public Power Commission, recalls that the Commission was responsible for power generation and distribution to places throughout the province that B.C. Electric did not already serve. Thus, the B.C. Electric had all the lucrative installations around the major population centres, while the power commission was left with the expensive and unprofitable task of serving outlying communities./17 The establishment of the Power Commission in 1945 constituted the first of the two major provincial government interventions in the production of hydro-electricity in order to advance industrial expan-

sion; the formation of the B.C. Hydro and Power Authority constituted the second such intervention.

THE B.C. POWER COMMISSION

The B.C. Power Commission, a provincial Crown corporate utility, came into existence on 17 April 1945 as a result of the "Electric Power Act."/¹⁸ This was an act to improve the availability and supply of electrical power in most regions of the province. To carry out this task, it empowered the government to expropriate any power site or generating plant in order to supply the needed power.

Swainson (1979) indicates that as many small utilities were taken over, the Power Commission's capacity increased from 14,700 to 324,735 KW (14.7 to 325 MW) between March 1948 and March 1958. While the West and East Kootenay Power companies served the South Okanagan and the East Kootenays, the B.C. Power Commission continued to expand on Vancouver Island and in central British Columbia./¹⁹

VANCOUVER ISLAND

The Power Commission began setting low rates for pulp mills, mines, and other bulk users while absorbing the costs for plant installation and operation. It added extra plants, such as the John Hart Dam near Nanaimo, to serve the high demand by the pulp and paper industry on Vancouver Island./²⁰ In fact, many mills gave up generating their own electricity because it was cheaper for them to buy it from the government. By 1956, the Power Commission developed rural electrification and industrial markets, mostly forest-

based industries, on Vancouver Island and promoted the expansion of such industries in the central Interior of the province.

In the southern Interior of British Columbia, the Power Commission's Whatshan Dam development was promoted as an industrial magnet in 1951 together with the nearby forest resources. The assumption that once a fresh supply of power and resources were available, industrial use would just naturally follows.

A \$75,000,000 industry using Whatshan power and the forest resources of the Arrow Lakes sharply pointed [to] the contention that power, wherever it is developed and made available at reasonable cost, would be utilized by industry for the advantage of the country as a whole./21

This was not an isolated incident. During 1956, C.W. Nash, the Power Commission's director of electrical load development, thought that the pulp and paper companies were desirable large users of electricity. He wrote, in his promotional study *Pulp and Paper Opportunities in Central British Columbia*, that the central Interior was ready to develop because it "contained the elements of timber, power, water, and transportation to support the profitable operation of the pulp and paper industry." In line with the government's preference for large companies, he reasoned that the resources of the smaller mills could be combined and additional forest licences granted for pulp production. The wastes of the 450 small mills operating around Prince George and the 160 small mills near Quesnel would support a 300-ton unbleached kraft pulp mill. And should there be any

need for additional timber licences, "the Provincial Government is anxious to grant a license in this area to pulp and paper interests." To clinch his argument, he spelled out how private corporations would gain advantages while the public Power Commission underwrote the necessary costs and risks:

The construction and maintenance of hydro projects by the Commission is to the advantage of private enterprise. When this is done, the private company will realize, through the Commission, the advantage of low interest rates, low depreciation rates, and non-liability for corporation income tax. Also the fact that the company's investment is held to a minimum is an added advantage.

...it is suggested that potential power is a tremendous asset that can be developed for industry into low cost electrical energy. This can be done and will be done. When? Depends on industry./22

As a result of such subservience the costs to industrial customers dropped, while the operating costs of the Power Commission climbed./23 As they did not agree on the energy requirements of western markets, the relationship between the Power Commission and B.C. Electric was not always co-operative. For this reason W.A.C. Bennett appointed Gordon Shrum, a physicist from the University of British Columbia, as chairman of the B.C. Energy Board, with a mandate to enforce co-operation between the two utilities./24 "The board's first assignment grew out of Bennett's vision of developing the north country and his consequent involvement with Axel Wanner-Gren, a Swedish millionaire industrialist."/25 His involvement in northern British Columbia concessions compares to a smaller version

of what occurred regarding the Brinco concessions in Labrador.

In November 1956, the government had reserved mineral and forestry rights in several watersheds for the Wenner-Gren group. They included the "watershed of the Peace River and tributaries above Hudson Hope" plus the "watershed of the Kitchika River" and the partial watershed of the Parsnip River. These rights were conditional upon making timber surveys, railway surveys, and a "survey [of] the water sources of the proposed area of development with the object of hydro development."/26 "The Wenner-Gren group posted a \$500,000 bond and were to be given timber and mineral rights over about 40,000 square miles of northern B.C. if they proceeded."/27 The group's proposal also included building infrastructures, such as a railroad and a German monorail to tap these resources./28 Newspaper coverage indicated public anger at the large give-aways. Such "controversy increased when Wenner-Gren announced his intention to build a massive dam on the Peace River, and the government announced that it had granted water rights as well as timber and mineral rights in exchange for this construction."/29 Wenner-Gren incorporated his forest holdings as Alexandra Forest Holdings and Alexandra Forest Industries. These holdings were close to the reservoir created behind the planned dam, which Shrum had identified as key for timber transport purposes./30

Alexandra obtained a tree sale harvest licence in the Finlay Public Sustained Yield Unit in 1964 (on the

promise of constructing a pulp mill in the region) and further cutting rights the following year in the Peace River drainage system.

In 1965, the B.C. government provided a free grant of land to [the] B.C. Railway for an industrial park on the southeast shores of the proposed Peace reservoir. This was subsequently sold to Alexandra Forest Industries and Finlay Forest Industries at nominal fees for construction of their saw- and pulpmills. The railway completed a spur line into the region in 1966. Alexandra built [a] 180 million-metre capacity sawmill there in the same year.

In 1967, BCFP [B.C. Forest Products] bought out Alexandra and its timber holdings. At that time BCFP was dominated by the Argus Corporation, headed by E.P. Taylor, together with the Mead Corporation of the United States, Brunswick of the United States (itself owned 50 per cent by Mead and 50 per cent by Scott Paper), and Noranda Mines./31

This meant that B.C. Forest Products, not owned by a settler industrialist but by distant corporate shareholders "obtained extensive timber holdings throughout the Mackenzie district in northwestern B.C., together with the mills - since much expanded - at Mackenzie."/32 As will be seen below, hydro development became separated from the development of forest product facilities. B.C. Forest Products did not use hydro-electricity to process its forest resource but generated its own power. It used the hydro reservoir only for log transport. Although water and forest resources were combined when allocated to Wenner Gren, each was developed separately with the government providing the infrastructure. Part of the reason for this was that the government itself bought back the Peace water power sites for public development. However, whether to proceed with the Peace as well as the Columbia River development (in south-central British

Columbia) required the formulation of a more comprehensive policy.

Shrum, the chairman of the British Columbia Energy Board (1961), together with the government of British Columbia, developed policies for the Peace River as part of the two river policy.

TWO RIVER POLICY

Gordon Shrum, in his *Report on the Columbia and Peace Power Projects* (1961), argued that the solution to stagnant development, particularly in the northern part of the province, was to build the Peace River project./33 He pointed to the following benefits:

The Peace River project is in a region of low economic development ... The reservoir area will act as an inland waterway which will open up the Trench area for timber removal, [and] mineral exploration ... it is felt by the Board that an early start on either project [the Columbia or Peace] will provide the Province with a much-needed economic stimulus and contribute to curbing unemployment./34

The perception of the problem concerned the intervention needed to build extra infrastructure, to provide construction employment, and to stimulate the transformation to secondary industry. Increasingly, the government not only allocated productive inputs (natural resources) but produced some of them - one of them being electricity. Such productive inputs were a necessity, because within "free enterprise" systems such as British Columbia's, infrastructural input gaps remained. The government assumed that northern British Columbia's energy infrastructure would provide the appropriate impetus for the diversification of

the resource-based economy. To acquire the planning and operating skills necessary for hydro development as well as a market for the Peace River power (i.e., Vancouver and Victoria), the provincial government integrated the B.C. Electric Company into the state. This integration constituted the second direct government intervention in the production of hydro-electricity.

B.C. HYDRO

The British Columbia legislature met on 1 August 1961 and gave unanimous approval to the Power Development Act./35 The act provided for the acquisition of the B.C. Electric Company and the Peace Power Power Development Company by the province of British Columbia./36 However, the re-appropriation of the water power sites, allocated as part of a hydro-linked and resource based industrial strategy to the Wenner-Gren group, was not a smooth process.

Since the result of the Wenner-Gren group's "mineral exploration were discouraging ... they concentrated on the hydro-electric power prospects ... They did not find many good sites until they got through the mountains onto the plateau. They located one near Hudson Hope./37

The market for the Peace River could be absorbed only by B.C. Electric, but Dal Grauer, its chairman, would not cooperate.

Premier Bennett, who very much wanted the Peace project to proceed, was in a major struggle at the time with the federal government, which wanted to develop the power potential of the Columbia River. This would be an easier project because there were ready markets, not only in B.C. but also south of the border, financial assistance would be forthcoming from the Bonneville Power Authority in the United States. These points were strongly pressed by Davie Fulton, the federal minister

of justice and Prime Minister John Diefenbaker's spokesman on Columbia development ... Bennett objected, however, that if the Columbia went ahead, it would kill the Peace and, with it, his hopes for developing the north./38

The public mind began to perceive that the Columbia development was cheap and the Peace expensive. But with creative accounting arguments, Shrum showed that lower interest rates to the public sector made it advantageous to develop the Peace River under government control. Shrum's B.C. Energy Board did not decide on either project but stated, that if publicly financed, the Peace River dam was estimated to be 1/10 of a mill (\$.0001) cheaper than the Columbia developments./39 When B.C. Electric refused to commit itself to buying Peace River power for an uncertain market, "the government expropriated the company and took over control of the dam project."/40

Having developed the two river policy, Premier W.A.C. Bennett chose Gordon M. Shrum to become the chairman of the board of B.C. Electric. An issue of \$100 million parity bonds at 5 per cent were sold by the government to buy the B.C. Power Corporation (parent company of B.C. Electric) common shares for \$38./41 Major shareholders, "led by Power Corporation of Canada," received first \$172 million, followed by another \$25 million./42 The Sun (5 August 1961) wrote, optimistically: "By taking over the whole electric works, lock stock and barrel, Premier Bennett's government has done more than reverse its earlier mistake in the Wenner-Gren franchise."/43 Although the newspaper articles

may have reflected the mood of some British Columbians, substantial opposition to the intervention (the take-over of B.C. Electric) by the government came from some of the business community. For example, Howard T. Mitchell, newly elected national vice-president of the Canadian Chamber of Commerce, perceived such a move to be a socialist plot and to be illegitimate in a "free enterprise" system, as he told the chamber on 21 September 1961:

"You see a still-dazed British Columbian publicly on view trying to collect his thoughts after discovering that his beloved free-enterprise province, without even a vote to favor such a course, has arrived at the position of being the most highly-socialized society in Canada, clearly well in the lead of socialistically backslid Saskatchewan in this respect." He ticked off the things that disturbed him: the government was the biggest employer, ran its own railway, a giant power system, a transit system, bought and sold natural gas, controlled the operating policies of forestry and mining companies to a crucial degree, and could punish and reward by patronage on a scale previously unknown in Canada. "And remember," he said, "all this has happened in a decade in the name of free enterprise."/44

Mitchell did not see that the "free-enterprise" corporations themselves needed an allocation process to stave off the chaotic scramble for resources and only the narrow, profit-minded development goals that would have occurred. Furthermore, he failed to mention the generous allocation of resources that were extended to the private sector as well as the underwriting of a substantial portion of the electricity generating cost for industries. Mitchell's perspective on the takeover is in contrast to that of the government. Government decision-makers perceived the need for increased intervention in order to build capital projects as

well as to produce the industrial energy inputs necessary to its industrial expansion policy.

Initially, because the B.C. Electric Company and other private power companies failed to provide the needed rural industrial electricity, the British Columbia government established the B.C. Power Commission. At a later date, B.C. Electric was unwilling to take the risk of buying power from the north. As a result, the government nationalized the B.C. Electric Company. "In January 1962, Premier Bennett announced that he was going to amalgamate the B.C. Power Commission and the B.C. Electric Company."/45 As a public utility, B.C. Hydro almost immediately embarked on hydro projects and gave some purchase preference to British Columbia supply industries. In this way, the government constituted a public market and local manufacturing content requirements led to the establishment of backward linkages.

BACKWARD LINKAGES TO ASIA AND RUSSIA

Hardly any backward linkages were formed in British Columbia as part of an accelerated power project boom between the 1960s and 1980s. For example, B.C. Hydro either imported generators from central Canada or from abroad. Once they were installed, the new loads of electricity were not used to diversify product manufacturing (from industrial staple production to finished goods manufacturing).

In an economy such as British Columbia's, with so many productive linkage gaps, decision-makers in the provincial government and its utility managers, spending the public's

money on capital projects, could have included (as did Québec), stronger local manufacturing conditions as part of their technical equipment procurement. This would have fostered backward linkages. Further, they could have chosen entrepreneurs who would have respected the public wishes that Crown-owned natural resources be processed according to manufacturing conditions which would yield maximum forward linkages (in terms of finished goods production activities) rather than sending semi-processed goods to manufacturing countries elsewhere.

An examination of the influence of hydro-electricity on the nature of forward-linked production reveals that the mere availability of cheap electricity and cheap resources is insufficient to transform a staples-based economy into a more diverse manufacturing economy. If the government selects industrial developers, it also needs to choose developers which are interested in enhancing manufacturing activities. For example, the government's preference for large pulp and paper firms, which already conduct manufacturing outside of British Columbia, proved a poor choice for industrial developer. When, at the same time small firms, such as sawmills, are encouraged to sell their timber rights to such companies, the chance of developing wood manufacturing activities from within the province is stifled. To examine the productive linkages potentially affected by hydro development, I will first turn to the question of whether or not many new facilities producing hydro technol-

ogy (or backward linkages) developed. It becomes evident that old hydro technology industries were not strengthened, that new technology-producing companies lasted only until the mid-1980s, and that the hydro-electric infrastructure expansion continued.

Despite having built many dams on the Columbia, Peace, Kootenay, and Pend Oreille rivers from the 1930s to the 1980s, B.C. Hydro's vision of advancing local manufacturing by imposing a nationalistic hydro-mechanical manufacturing condition on suppliers (did Québec) was largely absent. Until the 1960s, such equipment was bought from branch plants in central Canada, but during the 60s and 70s turbines, generators, and other electrical gear were imported primarily from Japan, Russia, Europe and the United States (see Tables, 6.1, 6.2).

Once B.C. Hydro had blocked the flow of the Peace River with one of the world's largest earthfill dams, and the powerhouse was tunnelled into the rock of the adjoining mountain, the utility imported the prime moving technology from outside the country. The generators and turbines in the two power plants on the Peace River, the G.M. Shrum powerhouse (2,416 MW) and, further downstream, the Peace Canyon powerhouse (500 MW), came primarily from Japan and Russia. During the completion of the G.M. Shrum powerhouse between 1968-80, the turbines were built by Mitsubishi, Toshiba, and Fuji; the generators by Canadian General Electric, Toshiba, and Fuji.

Table 6.1
Imported Generators, Turbines, and Electrical Gear used in
British Columbia Hydro-Electric Projects by
Manufacturers or Company of Origin
1968-80

SITE	EQUIPMENT	(No.) & COMPANY
Portage Mountain Bennett Dam, G. Shrum Gen. Station (years: 1968-80)	Generators Turbines	(5) CGE (3) Toshiba (2) Fuji (5) Fuji (3) Toshiba (2) Fuji
Peace Canyon Dam (Site 1) (year: 1980)	Generators Turbines	(4) Mitsubishi (4) Leningradsky Metallichesky Zavod (Emec Trading Ltd.) Leningrad Metal Works

Source: B.C. Hydro, Quality Control & Inspection Department,
21 July 1986

At the Peace Canyon site all turbines installed in 1980 came from the Leningrad Metal Works and all generators were manufactured by Mitsubishi (see Tables, 6.1, 6.2).

B.C. Hydro installed turbines and generator from outside the province, except for six turbines at the Bridge River plants between 1948 and 1957 and two during 1959-60 - all from Vancouver Iron Works. Canadian General Electric supplied seventeen generators, and its subsidiary, Dominion Engineering Works manufactured turbines. The other major prime moving equipment manufacturer, American-owned Canadian Westinghouse manufactured twenty-nine generators.

In their summary of imports, Faucher and Fitzgibbons found that, in British Columbia, "100 percent of ... the turbines and 60 percent of the major generators purchased between 1968 and 1985 were direct imports.

Table 6.2
Turbines and Generators Installed in Generating Station
over 100 MW by Year of Installation and Manufacturer
in British Columbia 1930-84

	Capacity Kilowatts of Plant	Year(s) of Turbine Installations & Manufacturer	Year(s) of Generator Installations & Manufacturer
B.C. Hydro			
Ruskin	105 600	1930-50 DEW	1930-50 CWES
John Hart	120 000	1948-53 DEW	1948-53 CWES
Bridge R. #1	180 000	1948-54 VIW	1948-54 CWES
Cheakamus	140 000	1957 VIW	1957 CWES
Bridge R. #2	248 000	1959-60 VEW, NEYC	1959-60 CWES
G. Shrum	2 416 000	1968-80 MITI, TOBA, FUJI	1968-80 CGE, TOBA, FUJI
Jordan R.	150 000	1971 --	1971 MITI
Mica	1 736 000	1976-7 HITA, LMW	1976-7 CGE
Seven Mile	607 500	1979-80 MITI	1979-80 HITA
Kootenay C.	529 200	1975-6 MITI	1975-6 CGE
Peace Cany.	700 000	1980 LMW	1980 MITI
Revelstoke	1 843 000	1984 FUJI	1984 FUJI
Alcan Smelters & Chemical (B.C.)			
Kemano	812 800	1954-67 CAC, PW, DEW	1954-67 CGE, CWES, EE
Cominco (B.C.)			
Brilliant	108 800	1944-68 DEW	1944-68 CWES
Waneta	292 500	1954-66 DEW, CAC	1944-66 CWES, CGE

Source: Statistics Canada, cat. 57-206, 31 December 1986
Note: Corporate Acronyms are Spelled out in Table 6.3

Of these suppliers, 90 percent were Japanese firms (Fuji, Hitachi, Toshiba, and Mitsubishi). Leningrad Metal Works (USSR) supplied turbines at Peace Canyon and half of the turbines at Mica, with Hitachi supplying the other half. The only major Canadian supplier was CGE which built

generators at G. M. Shrum, Kootenay and Mica."/46 As Table 6.3 shows, B.C. Hydro increased its purchase of Japanese and Russian manufactured equipment instead of buying equipment manufactured in American branch plants in Ontario and Québec by Westinghouse and General Electric.

The establishment of backward linked production facilities was minor and temporary. B.C. Hydro allowed a 10 per cent preference provision for tenders (under \$100,000) from British Columbia, and a 5 per cent preference for Canadian tenders.

Table 6.3
Turbines and Generators Installed in British Columbia by
Various Manufacturers in Power Stations larger than
100 MW from
1930-84

Equipment Manufacturers	# of Main Turbines Installed	# of Main Generators Installed
CAC Canadian Allis-Chalmers.....	2	
CGE Canadian General Electric.....		17
CWES Canadian Westinghouse.....		29
DEW Dominion Engineering Works....	20	
EE English Electric.....		2
FUJI FUJI.....	6	6
HITA Hitachi Ltd.....	2	3
LMW Leningrad Metal Works.....	6	
MITI Mitsubishi.....	12	5
NEYC Neypric.....	2	
PWW Pelton Water Wheel.....	3	
TOBA Toshiba.....	3	3
VEW Vancouver Engineering Works...	2	
VIW Vancouver Iron Works.....	6	

Source: Statistics Canada, cat. 57-206, 31 December 1986

As part of a general increase in hydro equipment trade with Asian countries, a contract in the mid-1980s for transmission tower steel was awarded to Korea. At times,

custom steel fabricating work has been awarded to some local Lower Mainland (Vancouver area) companies, such as Canron Ltd., Western Bridge Division, and Ebco Industries Ltd., and small cranes (less than 25-50 tons) were built by manufacturers such as Norelco Industries Ltd. in Surrey. Control panel housings were manufactured in the Lower Mainland by Westinghouse and Federal Pioneer, and printed circuit boards and battery chargers were made locally. Yet, when all items manufactured in B.C. are added up, Stephen Tang, the senior electrical equipment inspection engineer (of B.C. Hydro's Quality Control & Inspection Department) estimated that: "less than five percent of all mechanical and electrical equipment used at dams in British Columbia originates from British Columbia." He confirmed, that despite decades of building hydro-electric dams in British Columbia, no long-term local spin-off industries in communities near the dam sites have developed.

B.C. Hydro's own Research and Development Department develops little new technology; primarily, it lends operational support to cases of mechanical or electrical failure, evaluates products used in B.C. Hydro installations, and provides suggestions for improving existing equipment. Although the department occasionally develops technology for which it obtains patents, the impact on the development of mechanical or electrical gear in the province is small.

Even hydro equipment substitution manufacture has been weak, although, given the procurement history of British

Columbia, it has not been "associated with highly politicized economic nationalism favouring local industry over imports."/47 Even the preferential margins for local bids did not increase the British Columbia manufacturing content of its hydro installations above 5 per cent./48 Since the completion of the Revelstoke Dam in 1984 (Tables 6.2, 6.5), no further dams have been built; as a result, many local manufacturers supplying B.C. Hydro went bankrupt. With the inroads made by Japanese hydro equipment imports into western Canadian powerhouses, Westinghouse closed its branch plant in Ontario.

One would assume that the British Columbia government, having become the owner of an electrical utility, would have, through procurement practices, strengthened turbine manufacture (such as that carried out at Vancouver Iron Works from 1940-60). A market surely could have been found to supply the many power sites being developed in the Canadian and US valleys of the Rocky Mountains. However, the sourcing from the Vancouver manufacturer did not continue; rather, B.C. Hydro procurement practices brought only temporary hydro-technological backward linkages. The B.C. government proclaimed industrial expansions but showed little interest in building up provincial manufacturing by exercising a measure of economic nationalism, as did Hydro-Québec. Rather than building up local manufacturing and technical skill, since the 1930s British Columbia has become dependent on equipment from central Canadian branch plants,

and, since the 1960s, the province has increased its dependence on imported turbines and generators from Japan and Russia.

Since hydro-electric development was proclaimed by many as an industrial expansion force but did not bring about a major hydro technology industry, did the abundance and use of hydro-electricity transform British Columbia's staple-centred growth and become, in Adam Beck's words, the "life blood of manufacturing"? Even when this strategy was combined with the move to the Interior (with its generous allocation of natural resources and its access to to Peace River reservoir as a means of transport), staple-processing continued. My subsequent findings indicate that inviting large companies to use cheap power sources did not transform British Columbia's staple-centred growth.

FORWARD LINKAGES: POWER INFRASTRUCTURE FOR STAPLES

The major manufacturers use B.C. Hydro's electricity as industrial energy to produce wood products, pulp and paper, and chemicals to supply pulp mills. Despite twenty years of hydro projects on the Columbia River (dams: Duncan, 1967; Kinleyside, 1968; Mica, 1972; Revelstoke, 1985, etc.) and on the Peace River (dams: W.A.C. Bennett, 1968, and Peace Canyon, 1980) and plenty of cheap industrial electricity, British Columbians and the corporate owners from outside the province used this refined form of energy to continue a resource-based economy. Whether this type of economic growth is overcome with the addition of electricity can be

measured by examining whether the industrial structure of purchasers within the province has changed since the 1960s.

TABLE 6.4
Manufacturing Industry in British Columbia (1975-83)
B.C., Yukon and Northwest Territories (1962-74)
Largest Purchasers of Electricity
(GW.h)

Manufacturing Categories						
Year	Wood Ind.	Pulp & Paper	Chemic. & Ch. Prod.	Total 3 Categ.	Total 20 Categ.	%
1962	469	1,411	1,315	3,195	3,808	84
1963	521	1,362	1,336	3,219	3,866	83
1964	520	1,536	1,497	3,553	4,105*	86
1965	596	2,023	1,601	4,220	4,950	85
1966	667	2,435	1,908	5,010	5,830	86
1967	734	2,743	1,919	5,396	6,288	86
1968	773	3,020	2,100	5,893	6,852	86
1969	875	3,395	2,080	6,350	7,381	86
1970	936	4,093	2,013	7,042	8,105	87
1971	1,091	3,702	2,158	6,951	8,093	86
1972	1,245	4,248	1,188	6,681	7,857	85
1973	1,466	3,705	1,374	6,545	7,794	84
1974	1,410	3,561	1,362	6,333	7,564	84
1975!	1,404	3,319	884	5,607	6,910	81
1976	1,648	4,317	1,634	7,599	8,900	85
1977	1,868	4,339	1,416	7,623	8,916*	85
1978	1,982	4,492	1,464	7,938	9,372	85
1979	2,059	4,947	1,497	8,503	10,008	85
1980	2,061	4,801	1,575	8,437	10,042	84
1981	1,840	4,216	1,420	7,476	9,076	82
1982	1,776	4,453	1,202	7,431	8,964	83
1983	1,979	5,056	1,270	8,305	9,780	85

Source: Statistics Canada, Manufacturing and Primary Industries Division, "Consumption of Purchased Fuel and Electricity 1962-1974," cat. 57-206, the data for this period include B.C., Yukon, and Northwest Territories; ! The period of 1975-83 originates from cat. 57-208, which is for B.C. purchases only.

*The totals for the twenty manufacturing categories had to be adjusted for the reporting of high anomalous purchases (1964-75) in the Primary Metals Industry. The anomaly is likely due to Cominco reporting the purchase of power from its own utility, West Kootenay Power & Light. Therefore, the total was adjusted by allowing only 200 (GW.h) for the primary metals industry.

Statistics Canada uses a more comprehensive classification of twenty manufacturing industries, which includes the manufacture of consumer goods. To assess the use of electricity in manufacturing, the four major industrial manufacturing categories are examined./49

The failed industrial transformation to secondary industries is evident in aggregated statistics as well as in select cases from the energy intensive sectors of the wood, pulp, chemical, and mineral industries.

Out of the twenty manufacturing industries categorized by Statistics Canada, three - wood industries, paper and allied industries, and chemical and chemical products industries - purchase, on the average, 85 per cent of the total electricity used in manufacturing in British Columbia. The historical review of the purchase statistics of the three major industrial sectors for the hydro expansion period from 1962 to 1983 indicates that the variation of purchases, as a percentage of the total manufacturing, has stayed within 81 per cent to 86 per cent (see Table 6.4). A more detailed account of actual industrial sales by B.C. Hydro in 1985 and 1986 is shown in Table VI.1 in Appendix VI (for proportional composition of transmission (industrial/commercial) rate sales, see Appendix VI, Tables VI.2). Products from these industries are primarily semi-processed (e.g., pulp, chemicals) and used for interplant transfer for more sophisti-

cated manufacturing activities elsewhere. The development pattern of these predominant industrial users of hydro-electricity needs a closer examination.

FOREST PRODUCT INDUSTRIES

Since the 1940s, in the forest industry, three developmental trends became evident in British Columbia: a sequential exploitation of coastal forest resources and, therefore, the increased move to the interior of the province and, at the same time, a shift from a sawmill economy to a pulp mill economy and the absorption of smaller sawmill holdings by large pulp and paper companies.

T.D. Buchanan, a B.C. Hydro economist, was aware of the shift from one species of tree to another. He interpreted these changes with reference to the Sloan Report (1957). He claimed that "the Coast zone will move away from an integrated forest economy producing saw logs, peeler logs and pulp logs towards one in which the production of pulp logs will predominate."/50 This would bring a change in the kind of production: "the Coast zone itself is moving from the age of fir" (sawmill economy) to "the age of hemlock" (pulp economy). From 1946 to 1963, the pulp industry's consumption of Coast log production increased from 12 per cent to 22 per cent. Since then, the number of trees consumed by pulp mills increased throughout the province. With the support of the Social Credit government, large pulp mill companies "purchased small sawmills to obtain their harvesting rights and reduce competition for the resources";

thereafter followed the "construction of lumber and pulp mills in combined operations in central locations"; at the same time the number of sawmills decreased from over 2000 in the 1950s to 330 in 1978./51 These developments in the Interior were accompanied by a government supported concentration of ownership and required the installation of additional infrastructures.

Some infrastructures had already been in place in northern British Columbia by the late 1950s infrastructures such as: the Alaska Highway; some developed oil and gas fields; the Westcoast Transmission pipeline, extending from the Peace River area to the U.S. border (1957); and the B.C. Railway extension, built in 1958 (to Peace River, Chetwynd, Fort St. John, and Dawson Creek). To continue the addition of infrastructure and to improve the North's future, hydro-power pioneers in the government and in the private sector planned to develop world's the biggest earth-fill power-dam. One of those pioneers, Dr. Gordon Shrum, set his "progressive ideas" in contrast to those of Alexander Mackenzie (who travelled upstream on the Peace River in 1793). Shrum reflected: "Mackenzie wrote in this journal about the foaming river but it is doubtful that he had any idea of the important role that power would one day play in the development of British Columbia."/52 What was that role of hydro-electric power in the forest, mineral, and chemical industries? Shrum foresaw a developmental role for hydro-electric power in the forest industry as well as its promis-

ing collateral benefits from the reservoirs themselves. He pointed to the timber removal and possible mineral exploration made accessible via the reservoir, and how the reservoir itself would become a natural transport infrastructure to remove formerly inaccessible timber./53

Two forest companies (in part originating from the former Wenner-Gren holdings in the Peace River area), Finlay Forest Industries and British Columbia Forest Products, took advantage of this possibility to extract its wood supply for pulp production and sawmilling. Twenty-five years after Shrum indicated the storage lake's transport potential, the manager of Finlay Forest Industries in Mackenzie (an instant forest company town of 6500 near Williston Lake) stressed the importance of towing log booms across the hydro reservoir: "If it [the reservoir] was to go dry it would be quite a crisis around here."/54 Finlay Forest Industries operates one sawmill and one energy-intensive groundwood pulp mill (the pulp is shipped to the Crofton mill in B.C., Japan, India, and Mexico). The company is the largest bulk power customer of B.C. Hydro electricity in the Central Interior Division (actual consumption 239 GW.h in 1981-2, expected consumption 330 GW.h in 1982-3)./55 In 1964, it obtained extensive timber licenses in the Trench (in the Peace River region) and used the reservoir's water surface (provided by B.C. Hydro), rather than expensive logging roads, to transport the logs (in the summer by log boom or barge, in the winter by ice bridge) to its mills. The

transportation distances from the timber supply to the mills were about 75 and 100 miles across the water surface, and, by 1989, they encompassed the full length of the lake. In addition, logging roads were built to the timber in higher elevations in order to truck the logs to the lake. The reservoir became an important transportation infrastructure for both Finlay Forest Products and British Columbia Forest Products, the latter owning 43.7 per cent of Finlay's shares./56

British Columbia Forest Products used the reservoir in much the same way. It transported 1.7 million cubic metres of timber by water per year - its entire 1986 cut. In the summer, the timber was transported by booming and towing; in the winter, by low level bridge (across the reservoir), ice bridge, or ice-breaking barge. From the forest resource, it produced kraft pulp and dimensional lumber in its three saw mills (the lumber is sold to the U.S. railway market). Although this company used the reservoir for transport, it did not use B.C. Hydro's electricity. Instead of using the Peace River power as a primary source of energy, it self-generated 80-90 per cent of its power from hog fuel (usually wood residue such as sawdust, shavings, bark, etc. generated from processing raw timber) and it strove towards energy self-sufficiency. The answer given by a spokesperson in the corporate communications department of B.C. Forest Products, when asked whether building the dam and providing the reservoir made any difference to the forest industry, was that it

probably "speeded up the process" of tapping the forest resource in the Peace River area.

Both companies agreed that the increased accessibility to the forest resource made a difference to the development of the town of Mackenzie. Its instant development was analyzed by Marchak, in *Green Gold*, in terms of class structure and population transience. Its inhabitants are employed in producing, primarily, forest staples, since both companies are still "looking at" the development of a secondary paper production industry.⁵⁷ Pulp and dimensional lumber have continued to be the end products made from the lumber arriving at the shores of B.C. Hydro's artificial lake. They are processed by self-generated electricity (through the use of hog fuel) and the electricity from the head of the lake - the W.A.C. Bennett Dam (built across the Peace River). B.C. Hydro has played a dual role; as a provider of infrastructure and as a provider of power for the forest processing industry.

CHEMICAL INDUSTRIES

To produce kraft pulp, chemical ingredients such as sodium sulphate, caustic soda, chlorine, and other chemicals are needed. The producers of these chemicals are among the four major purchasers of B.C. Hydro's electricity. In a recent report prepared for B.C. Hydro's Corporate Economist Office by DBA Consulting Limited, the relationship between the forecast of purchases in the chemical industry was directly correlated with the pulp and paper industry.

"Nearly all of the purchased electricity used in B.C.'s chemical industry is used to make products for use in the forestry industry and, in particular in the pulp and paper industry."/58 One such chemical company has two plants in southern British Columbia.

Hooker Chemicals, a subsidiary of Occidental Petroleum, has chemical plants in Nanaimo and in North Vancouver. By 1974, its North Vancouver production had quadrupled for chlorine and caustic soda. The Nanaimo plant supplies most of its production to the adjacent McMillan Bloedel pulp mill. "Over 90% of production of the two B.C. plants is sold as bleaching chemicals to major pulp mill companies in B.C."/59 The electricity purchase history of the chemical industry can be seen in Appendix VI, Table VI.2.

PRIMARY METALS

In the late fifties, political statements about the development of the Peace River were a puzzle to experts, since the Peace River Power Development Co. and the provincial government had claimed: "Much of the power will be used at site by industry 'flocking' in."/60 To assess the possibilities of primary metal industries using power at site, B.C. Hydro's Industrial Development Department prepared a study of "Power Intensive Industries for Peace River at Site Power" (13 August 1963). Its findings were that "it is very doubtful that any of the power intensive industries studied (e.g., aluminium, heavy water, silicon carbide, zirconium, titanium, hydrogen peroxide, ammonia, etc.) can be induced

to take 'at site' Peace power in blocks of 10 MW or more, if a saving of only two mills is offered by the Authority over rates [of 4 mills] applicable at tidewater. It is generally cheaper to move power from Portage Mountain (the site of the Gordon Shrum powerhouse next to the W.A.C. Bennett dam built across the Peace River) to Vancouver than to move materials twice that distance."/61

In case of aluminum, Ivan Bloch and Associates of Portland, Oregon, prepared a detailed study for the B.C. Electric Co. Ltd. in 1961 in which it was concluded that in order to attract new aluminum producers to B.C. it would be necessary to offer 2 1/2 mill power at tidewater, and concessions such as tax holiday [sic] and subsidized sites. Power would have to be given away free at Portage Mountain if a saving in power cost had to be used to offset extra transportation costs resulting from a site at Portage Mountain./62

The low cost of on site power and subsidized rail transportation would not be enough to attract aluminium and other metal smelters to the Peace River area. Although consideration of population, the location of the resource, transportation, and the availability of low-cost power are of importance to primary metal industries, those controlling such industries often prefer to own their own power sites and generating facilities.

Taylor noted that "the availability of large-scale, low-cost hydro-electric power motivated the establishment of the aluminium smelter at Kitimat" and Cominco's "development of the large smelting and refining complex at Trail."/63 Both the Aluminium Company of Canada (Alcan) in Kitimat and the Consolidated Mining and Smelting Company (Cominco) in Trail own their hydro-electric generating

facilities. Alcan's Kemano project generated electricity since 1955, and Cominco has bought out all but one plant belonging to the West Kootenay and Light Company in 1947./64 Both Cominco and Alcan have dominated the smelting industry in British Columbia.

The Alcan smelter has no demand for B.C. Hydro-supplied electricity, because such vertically integrated companies supply their energy needs by means of "industry-owned generation" (see Appendix Table VI.3, VI.4). In addition, "Alcan has the water rights to the Nechako and Nanika Rivers until 1999, and additional KWh would be available each year if these rivers are developed for hydro power."/65 Besides having secured the right to further development of hydro power, Alcan has located its aluminium smelter near tide water in Kitimat. To power its smelting operation, the company had (by 1954) integrated its power supply with the Kemano project and the supply of bauxite in Jamaica. Its 1954 annual report indicates that the company shipped its bauxite from Jamaica to Kitimat, processed the bauxite and alumina, with the use of Kemano power, into aluminium ingots, and shipped these out for manufacturing elsewhere./66 In keeping with company tradition, Alcan picks the most suitable sites and owns its hydro-electric projects (dams, powerhouses). Since electricity is such a large component of aluminium production, Alcan can ship its natural resource to the smelter and can ship its staples (such as aluminium ingots) out off Kitimat via tide water.

Cominco, the other primary metal manufacturer, owned its hydro-electric facilities (Waneta, Corra Linn and others). Some facilities were directly owned by Cominco, others were held by its subsidiary, West Kootenay Power and Light. Cominco first sold all its hydro-electric assets to its utility, West Kootenay Power and Light, during the mid-1980s, and has since sold West Kootenay to a US-owned power company. Similar to Alcan, Cominco did not require B.C. Hydro's power to produce its various grades of lead, gold, silver, bismuth, and idium or to process its phosphate and sulfate./67

As seen so far, energy-intensive industrial users, whether they generate their own electricity or buy from B.C. Hydro, show little interest in developing secondary industry. Such select cases within industrial sectors support the statistical findings that staple-centred growth simply continues.

In B.C.'s government publications, this type of growth is misleadingly referred to as "manufacturing." However, one clarification of the terms gets closer to defining it in terms of the production of industrial staples: "production primarily destined for the wholesale market, for interplant transfer, or to order for industrial users, rather than direct sale to domestic consumers."/68

Out of the twenty manufacturing industries categorized by Statistics Canada, three - wood industries, paper and allied industries, and chemical and chemical products indus-

tries - purchase, on the average, 85 per cent of the total electricity used in manufacturing in British Columbia (see Table 6.4). Products from these industries are primarily semi-processed and are used for interplant transfer for more sophisticated manufacturing activities.

The combination of good manufacturing conditions and cheap energy did little to create diversity based on natural resource extraction: the condition that wood was to be manufactured within British Columbia has existed since 1891; British Columbia's New Democratic Party government, during the mid-1970s, attempted to impose manufacturing conditions on mineral extraction; and cheap hydro-electricity was added, during the 1960s, to enhance manufacture. In spite of all this, little has changed with respect to staple-centred growth in British Columbia./69

DEPENDENT LINKAGES: PROVINCIAL STATE CHOICES

In part due to its colonial traditions, the British Columbia government became locked into pursuing an economic expansion strategy of "industrialization by invitation." In particular, large, preferably multinational corporations were invited to set up production facilities. Yet many of these foreign companies did not come for the hydro-electricity but for the resources, and those who are vertically integrated have little or no interest in establishing secondary industries. Unlike Brinco (which first sold the power, raised the money, and built the project), B.C. Hydro raised the money, built the project (according to the

requests by industry), and then sold the power to the industrial market. The recurrent idea informing the planning process was that "hydro must keep pace with anticipated industrial development" and prepare to be a low-cost supplier of electricity to manufacturing./70

John Raybould, the author of "Paper for the World," published by B.C. Hydro, was most impressed with increasing the energy-intensive production capacity of pulp mills directed by foreign corporations.

The list of major world companies now operating here, or with mills planned or being built, is impressive. Among these companies are the Reed Group of England, Svenska Cellulosa of Sweden, Unso Gutzeit of Finland, Feldmuehl of Germany, East Asiatic of Denmark, Weyerhaeuser and Mead of the U.S., and Mitsubishi and Honshu of Japan.

All the new pulp mills in B.C. will have an initial operating capacity ranging from 250,000 - 350,000 tons per year. Each mill represents a capital investment from \$50 million to \$100 million. [original emphasis] [The author of the article continues with an industrial invitation reminder:] B.C. Hydro's Industrial Development Department, through such industry studies, helps to show and remind the business community both in Canada and abroad of the unique opportunities existing in B.C. for expanding or establishing distribution facilities and manufacturing plants to serve resource industries./71

But was it electricity or natural resources that attracted industries to British Columbia? A study by B.C. Hydro's Industrial Development Department, *Power Intensive Industries for Peace River at-Site Power*, concluded that "resource industries such as pulp and paper mills, processors of local minerals, etc., will locate in the area primarily because of the resource and not primarily because of low cost power."/72 Products from resource industries

are also primarily traded with manufacturing countries. The government's own publication *British Columbia Facts and Statistics* (1956, 1964, 1983) indicates that wood products are largely shipped to the United States, the United Kingdom, Europe and Japan (in 1956, 71 per cent US, 17 per cent UK; in 1964, 70 per cent US, 12 per cent UK; and, in 1983, 57 per cent U.S., 16.6 per cent EEC, Japan 14 per cent). The pursuit of state policies that favour large corporations directing staples production from outside the province has implications for the diversification of forest products and secondary industry. The competition from the manufacture of B.C. finished products would not be, as B.C. Hydro economist T.D. Buchanan suggested, in the interest of vertically integrated companies which manufacture their own finished products elsewhere. The combination of foreign ownership in pulp supply and foreign trade policy, according to Buchanan, has implications for diversification.

Foreign trade policies have hindered the development of a diversified forest products export industry in B.C. Recent announcements of new "captive pulp" capacities are a manifestation of these policies. The pulp customer has every reason to resist B.C. competition in overseas markets for his finished product. He is in a strong position to do so because he already controls, in part, his B.C. source of supply./73

Despite the results of various feasibility assessments which yielded few, if any, potential consumers of large volumes of electricity in the mining and smelting industry, promoters in B.C. Hydro's Industrial Development Department saw their role as that of encouraging new investment and enterprise./74 This was done by way of providing "detailed

information on the mining industry" and "offering confidential service without obligation to industrialists seeking information on plant sites in the Greater Vancouver area."/75 During the 1970s, part of the Industrial Development Department was absorbed into the Properties Division. This Division developed industrial land along B.C. Hydro railway and other strategic locations in order to sell it to industrial users. The primary purpose of these land banking operations was to promote the use of industrial hydro-electricity and the B.C. Hydro railway system./76

The colonial exploitation of forests and industrialization by foreign staples producers has a long tradition within staples-dependent British Columbia. During the 1980s, the soliciting of foreign investment included the availability of financial assistance for travel (\$2000 grants and help while in B.C.) to those firms and associations whose "products or services contain significant British Columbia content." The Ministry of Industry and Small Business Development extended special assistance to those who wanted to sell their firms to a company which might want to vertically integrate its operation in British Columbia./77 The fast consumption of timber by forest companies required that the workers, hired to process the timber, adjust to changes caused by the processing of a sequence of trees whose quality was declining. The province not only allocated forest resources, but, through its strategy of continuing "industrialization by invitation," it

helped impose foreign dependency on the economy. Little in the sequential exploitation pattern has changed; this process continues in British Columbia's northern resource areas.

The hope held by economic nationalists was that that the provision of industrial energy would reverse Canada's history of economic dependence. The decisions by utility managers and the political élite to pre-build hydro projects and then to invite industries did not reverse, but continued, this dependence. In contrast to people who develop their manufacturing facilities from within, many British Columbians, for most of this century, had an underlying colonial assumption. Provided the right conditions, they could continue relying on outside owners to install "their" manufacturing facilities for them.

SURPLUS: RESULT OF A CONTRADICTORY DEVELOPMENT PATTERN

The result of using an "industrialization by invitation" strategy for developing new, additional, or the same productive activities is that key decision-making knowledge concerning expansions and corporate strategy is integrated into other economies and held outside the province. For instance, since production planning information is dependent on outside economic forces, foreign corporations, and invited industries, much of the knowledge necessary to build industrial infrastructures under such unpredictable expansion conditions is denied to the province (as during the 1970s oil crisis, for example). Frequently, the result is

an "unplanned surplus" of hydro-electric facilities, which arises from the following contradiction: on the one hand, the state attempts to plan an economy using electricity and its related infrastructure for attracting industries; on the other hand, foreign-controlled industrial corporations thwart this process.

While the developmental strategy of "industrialization by invitation" (covered by such economic buzz words as "foreign investment") continued during the 1960s, 1970s, and 1980s, extra load allowances were made for the production facilities that were promised by invited industrialists. The British Columbia Energy Board (a Social Credit government advisory committee), in its forecast report, *Electric Power Requirements* (to 1990), refers to this practice of extra allowances:

[In 1961] a large allowance was added to the base provincial forecast for new power intensive loads coming into the province. There was no attempt made in 1961 to allocate the new load to any particular area.

[In 1970] substantial allowances were made for industrial loads in individual E.S.A.'s [Electric Service Areas, B.C. is divided into 18 such areas] over and above those already included in B.C. Hydro, Alcan, and Cominco projections./78

By the early 1980s, when the "unplanned surplus" (the equivalent of the entire capacity of the \$2 billion Revelstoke Dam (1,843 MW)) became evident, former B.C. Hydro chairman Robert Bonner said:

Hydro was merely responding to what its corporate customers thought they would need. He said those industries could not have forecast plant closings and the general slump in the economy that resulted in a drop in the demand of electricity./79

Norman Olson, the president of British Columbia Hydro and Power Authority, acknowledged, in a similar response, the lack of demand for power from the \$2 billion Revelstoke Dam. He explained that "the earlier forecast was based at least in part on firm inquiries [i.e., commitments] from companies wishing to set up or expand their businesses and their use of electricity in British Columbia. He asked rhetorically: 'Where are they now?'/80

The lack of promised industrial consumption and subsequent non-purchase was advanced by both the chairman and the former president of B.C. Hydro as a cause of the "unplanned surplus." This issue became a major focus at the B.C. Utility Commission Hearings.

J.R. Brassington, in charge of B.C. Hydro's Special Power Contracts Department, which has dealt with bulk inquiries since 1970, presented tables concerning thirty-four companies. All were planning to expand their existing operations or start new accounts. To verify these tables, R. Overstall, a geologist and researcher on behalf of the Society for the Promotion of Environmental Conservation (SPEC), independently surveyed the inquiring companies. Both Overstall and Brassington concurred on many of their findings, because the companies reduced their requirements within a four-month period (October 1981 to February 1982). During these surveys, plans for establishing new industrial plants or expansions of existing facilities had either been

cancelled or were reduced by the following Canadian and foreign controlled companies:

Ferro-Silicon Smelter: Sumitomo/SKW Canada Ltd., Mitsubishi Canada Ltd., Mitsui & Co. (Canada) Ltd.; Coal Mining Expansion: Fording Coal Ltd., B.P. Canada Ltd., Petro-Canada Coal Division; Lead and Zinc: Cyprus Anvil Mining Corporation; Stikine & Schaft Creek Copper: Teck Corporation, Kennco Exploration; Pulp and Paper: Eurocan Pulp & Paper Ltd., Canadian Cellulose Company Ltd., Doman Industries Ltd, and for pulp mill Chemicals: Canadian Occidental Petroleum./81

There is no evidence that they were held responsible for not purchasing the electricity for which they had made firm inquiries. R. Overstall, from the Society for the Promotion of Environmental Conservation, checked 85 per cent of the capacity (1,349 MW) of the companies that B.C. Hydro had indicated as inquiries (requests) by the companies, but found that 49 per cent (equivalent to 667 MW) no longer needed the power./82 Upon revising and reconfirming them with potential industrial customers, B.C. Hydro found that its estimates were less than half the original forecast.

The preceding discussion indicates the inability of the province to plan and produce the appropriate size of its hydro-electric infrastructure when based on planning information extended by industry. Corporations in the major sectors of British Columbia's staples-centred economy deny B.C. Hydro, the Ministry of Energy, and the government the power to comprehensively plan for future industrial consumption. The major contradiction between planning for private industry and the inability to supply adequate planning information to private industry were brought forward in the

conclusions of the B.C. Utilities Commission. The commission came to the following conclusions with respect to development policy in British Columbia:

The evidence showed clearly that a major difficulty Hydro faces in developing load [consumption] growth forecasts and hence system plans is in estimating the future new industrial loads. On the one hand, Hydro feels obliged to make provisions for such loads so that electricity supply does not constrain new economic development. On the other hand, since these loads are not committed, it is not clear to what extent they should be taken into account since new facilities might be built in anticipation of loads that never materialize.

This problem relates directly to provincial industrial policy and the extent to which the province wishes to encourage the development of electricity-intensive industry and to gear Hydro's planning to accommodate such development whenever it occurs./83

The commission pointed to B.C. Hydro's practice of pre-building its plants to fit the government's policy of using industrial energy as a way of attracting industrial companies to the province. During the 1980s, generating capacity equivalent to the largest dam on the Peace River, the W.A.C. Bennett Dam, constituted a reserve surplus to British Columbia's electricity needs and was ready for export to other parts of Canada or the United States.

Although the total capacity figures include 322 MW for thermal generation, the surplus figures show that the power system is overbuilt by nearly 22 per cent. To put the monumental size of these figures into perspective, it helps to recall that the W.A.C. Bennett Dam, the largest dam on the Peace River, has a capacity of 2,725 MW - smaller than the reserve and surplus combined for 1984, which was 3,409 MW, (see Table 6.5).

Table 6.5
B.C. Hydro's Estimate of Capacity and Surplus
at the Time of Peak Load on the Export Grid
(MW)
1984-90

	1984-5	85-6	86-7	87-8	88-9	89-90
CAPACITY TOTAL	9,769	9,769	9,769	9,769	9,769	9,769
RESERVES AND SURPLUS	3,409	2,909	2,699	2,549	2,309	2,109
SURPLUS	2,139	2,159	1,974	1,874	1,584	1,384

Source: National Energy Board Reasons For Decisions: In the Matter of the Application Under the National Energy Board Act of British Columbia Hydro and Power Authority, July 1984, Appendix 4, p. 25, NEB Library, Ottawa

Considering the surplus of 2,139 MW by itself, it constitutes nearly 80 per cent of the Bennett Dam capacity. This implies that by 1984, under peak demand conditions, 80 per cent of the capacity of the largest dam in the B.C. Hydro system was surplus. It is also noteworthy that B.C. Hydro planned to add no new plants until 1990, as its total capacity of 9,769 MW is remained the same (Table 6.5).

But projects as large as the Peace River and Columbia were foreseen, in the early 1960s, to have surplus energy (over and above the expected industrial market), which could either be exported to the "energy-hungry" Californians or transmitted, via the east/west national power grid, to Alberta or central Canada. Transmitted from west to east, low-cost energy could provide a national advantage through savings on plant installations and provide an industrial

development advantage. However, not Canadian integration but continentalism remained the stronger force.

DIRECTING SURPLUSES

The strengthening of British Columbia's north/south energy axis began four months after Mitchell Sharp, minister of Trade and Commerce, revised the national power policy to allow for exports (8 October 1963). According to his revision, provincial surplus energy from large projects could either be used within Canada as a *national industrial input* or developed and exported to the United States as a *provincial continental staple*.

British Columbia did not develop its surplus of northern low-cost power for Alberta or the national power grid during the 1960s and 1970s. The Saskatchewan/Alberta transmission gap existed until the late 1980s, and the B.C./Alberta transmission line (500 kV) was only interconnected during 1986./84 The Alberta connection bends into a southward direction in south/central British Columbia and crosses the international border near Selkirk (see Map, Figure 6.1), therefore allowing not only for an exchange of power between the two provinces but also for export of Alberta power to the United States./85

Since the early 1960s, planners, politicians, and utility managers in British Columbia thought that any surplus power from Peace River plants could certainly satisfy the "power hunger" of California. With this in mind, B.C. Hydro built larger projects, installed international power lines,

applied to receive export permits, and failed to sell firm power to Los Angeles.

To understand how British Columbia became caught in a continental power trap, a review of several aspects of what contributed to this unexpected outcome is required: the export-dependent nature of British Columbia's two river policy, the National Energy Board's role in legitimizing the provincial overbuilding of its hydro system, and the reasons why the US Pacific Northwest is not interested in British Columbia's low-cost power. One of the utility managers, key to the Peace River development, and author of the crucial report providing the policy for hydro development on the Columbia and Peace River, is Gordon Shrum.

Gordon Shrum was in charge of building the Peace River project during the 1960s, both while developing the policy as chairman of the British Columbia Energy Board and, while the project was built, as chairman of B.C. Hydro.⁷⁸ He knew that even if the Peace River plants could be phased into service over a number of years, a "very large market outside the Province" would have to be found for the power. One market, the Pacific Northwest of the United States, did not need power for at least a decade. The other market, California, posed transmission access difficulties. Nevertheless, B.C. Hydro built the northern project largely for export. The *Report on the Columbia and Peace Power Projects* by the British Columbia Energy Board (31 July 1961), a key document for proceeding with the B.C. Electric takeover,

clearly identifies the export-dependent nature of the two river policy.

Dependence upon Export of Power

Since the minimum efficient development of either the Peace [River] or the Columbia [River] will provide more power than British Columbia can absorb in the initial years of the project, our consultants have pointed out that it is not possible to start the two concurrently or even phase them without finding a very large market outside the Province for power which British Columbia cannot currently absorb. The low cost of thermal power in Alberta makes development of a market there uncertain; therefore, the only possibility lies in the Pacific Northwest or California. Since economic conditions in Canada and the balance of payments with the United States could be greatly improved by the export of power, there is a case for developing both projects more or less simultaneously. ...The Pacific Northwest areas of the United States may not require substantial amounts of power from other areas until the early years of 1970, but that an immediate market for the large blocks of firm power might be arranged in California./87

The two river policy also pointed to precedents regarding selling power across international boundaries.

According to Trygve Lie, the chairman of Norway's National Energy Council: "With foreign loans more power could be developed and the extra could be exported until the loans have been repaid."/88 This can lead to overinvestments of portfolio capital in public infrastructure, and not all public utility planners or regulators were in accord. H.F. Angus, the chairman of the Public Utilities Commission, disassociated himself from the preference for public power from the Peace River, since "it takes no account of the contingent risk to the taxpayer attaching to an investment of this character, a risk so clearly evidenced in the history of our publicly owned railways."/89 Angus was not

the only one questioning the wisdom of starting the Peace River project for export.

Gordon Bell, the Victoria Times business editor, in his article "'Power Hunger' Claims for U.S. Misleading" (12 August 1961), raised the question as to whether California and the Pacific Northwest really needed to import electricity from British Columbia. He found that it was the political reasoning of the Kennedy Administration which favoured public power projects, often without enough attention to their economic rationale. He claimed that the notion of "power hunger" has more to do with politics than economics./90 He probed further:

Is it not possible that any power 'vacuum' - fictitious or real - will be filled by the U.S. public power [the Bonneville Power Authority], leaving no room for import of foreign power?

Certainly it seems doubtful that the Interior Secretary and his cohorts have done all their propagandizing on the need for power for the benefit of B.C.

Mr. Udall is pushing hard for a multi-million dollar western U.S. grid system./91

Whether the market was assured or not, three years after, and well before electricity was generated at the Peace River plant (the Gordon Shrum Generating Station), B.C. Hydro applied for permits from the National Energy Board to install an oversized power line to the United States. During 1973, the utility repeated the process for a second international power line.

February 1964, the National Energy Board gave a licence to B.C. Hydro to build a 500 kV international power line./92

April 1973, B.C. Hydro was granted permission to replace an old transmission line and install a second international, higher capacity, 500 kV line./93

The two international power lines are capable of carrying up to 4,300 MW, equivalent to the power of the two largest power plants in British Columbia (the Gordon M. Shrum, 2,416 MW; Revelstoke powerhouse, 1,843 MW). To make such installations legitimate, the federal National Energy Board gave standard reasons for approving the country's most powerful interconnections with the United States (e.g., the emergency service capability between B.C. Hydro and the Bonneville Power Authority; the fact that the cost of building a second power line from the Peace River could be put off; and "standby service and ... interchange of energy")./94 An interconnection with Alberta could have provided similar benefits. But, as indicated by the Shrum report, exports were more important than was emergency service.

Having one high capacity transmission line in place by the mid-1960s and another by the mid-1970s, B.C. Hydro started export licence and renewal applications. They were approved in 1970, 1975, 1980, and 1984. As B.C. Hydro's surplus grew, so did the size of the allowable export permits.

By 1975 the National Energy Board treated B.C. Hydro's surplus export as a beneficial commercial venture. This time, the rationale for the surplus was blamed on hydrological problems (i.e., the relative unpredictability of the Peace River's stream flow and storage characteristics). The board argued that exports would allow collecting some

revenue rather than spilling extra water over the dams in high flow periods./95 In December 1979, B.C. Hydro was before the board again to renew its export licences until 1984./96 With each application, the volumes of energy requested for export grew. During July of 1984, the board renewed the B.C. Hydro licence again by allowing 15,000 GW.h for six years from 1984-90, along with a new licence for energy of up to 2,000 MW, and 6,000 GW.h until 1988./97

The increasing size and numbers of exports made British Columbians suspicious that B.C. Hydro might be exceeding its provincial mandate and be building for export. Yet the utility refused to admit that it was exceeding its provincial mandate. As the National Energy Board members summarized the utility's argument: "B.C. Hydro has clearly stated that its generation planning is based solely on its domestic load [consumption]"/98

The denial by B.C. Hydro that it over-built or was operating for export came to be challenged by some intervenors at the board's licence hearings in 1980. Others opposed the board's practice of allowing utilities to set export prices which did not include the capital costs of projects. Following its federal continentalist integration imperative in its decision-making, the board would only consider evidence which impacted on the export price (representing the "key" Canadian national interest).

The Board stated that it would hear evidence to establish whether the generating system of B.C. Hydro had been constructed, or was being constructed, or would be operated in a different manner to meet export

sales as opposed to domestic load within the period of the licences applied for. Only if the evidence established that such was the case would the Board hear any evidence to quantify additional costs in Canada attributable to the exports./99

The practice of building beyond the needs of the province, the impact of building for export, and pricing all became contentious issues at the 1980 hearings. For instance, "the NDP [the New Democratic Party] contended that B.C. Hydro has no mandate from the people of British Columbia to construct facilities for export." Furthermore, "the evidence of over-expansion of the B.C. Hydro system is provided by the amount of capacity reserve, which it stated to be excessive." The party argued that exports should include other expenses. It should be priced to recover capital costs of new generation and transmission facilities, indirect costs borne by government, revenues foregone by displacement of industrial activity, and social and environmental costs./100

The Communist Party urged the board to deny the application for export licence renewal and modification, since it constituted "a new policy referred to as a 'continental energy policy.'"/101 And a group of industrial consumers, the Council of Forest Industries, "expressed concern about the security of electrical supply for its members."/102 The Federation of British Columbia Naturalists "submitted that the price of all electric power should include some allowance for fixed costs and social and environmental costs ... It would be unwise to commit that surplus for export

because it might engender dependence of the American customer upon Canadian supply."/103

The United Fishermen and Allied Workers' Union questioned the utility's ability to plan. It argued that "B.C. Hydro had a poor record for accuracy of forecasting loads and presented its own calculation to show that [the] Revelstoke [dam on the Columbia River] will not be needed during the licence period ... The Fishermen were opposed to any building of facilities for export, but if any are built the cost should be fully recovered in the export price."/104 Since, in the reasons for decisions, only information which had direct bearing on the particular licence was considered, the overbuilding history of utilities or other concerns have had no bearing on whether or not exports are approved.

In support of their export licence decision, a member of the National Energy Board reasoned, in support of B.C. Hydro:

[That the Board] accepts the Applicant's contention that the denial of licences to export surplus power would decrease revenues and increase the cost of power to domestic consumers with no offsetting benefit.

Several intervenors expressed concern that the construction of generating facilities causes damage to the environment and they questioned the policies adopted by B.C. Hydro in planning to meet the domestic demand./105

Sharp's 1963 policy encouraged provinces to build beyond domestic demand for export. Therefore, it is not surprising the "the National Energy Board Act does not confer jurisdiction upon the Board to regulate the generation planning practices of a provincial utility and the manner in

which that utility operates its generating system in order to meet its domestic load."/106 This lack of authority by the federal government over energy planning at the national level allowed the utility to build for export and "eventual" domestic use. In contradiction to Gordon Shrum's 1961 indication that the Peace River project required an export market, the National Energy Board supported the claims by B.C. Hydro, in 1980, that it planned for domestic use and not for export.

B.C. Hydro has clearly stated that its generation planning is based solely on its [provincial] domestic load. Its method of forecasting that load [demand] has been the subject of extensive cross-examination in these proceedings. The Board notes that the forecasting of energy demand has been difficult over the past few years due to events on the domestic and international scenes. It appears to the Board that the load forecasts of B.C. Hydro which were made at the time of decisions were taken to add generation to their system are quite high when compared to actual experience.

Under critical [water] conditions... all projects including Revelstoke must be on stream during the period under consideration to meet domestic load.

Therefore, it is the decision of the Board that B.C. Hydro has not constructed, is not constructing, and is not operating its system differently because of exports./107

Unlike other provinces which had signed export agreements with US utilities before building their projects, B.C. Hydro built its plants first, in part for "power hungry" California, and then sought export contracts. Shrum predicted that the northwestern United States would be in a shortage position by the 1970s, but by the 1980s, the public and private US utilities remained overbuilt.

In the meantime, the US Pacific Northwest has become a competitor for sales to California. The federal Bonneville

Power Authority itself has a surplus of power. In its publication, Issue Alert "Selling South: BPA Seeks Ways of Marketing Surplus Power to the Pacific Southwest," it reveals a history of surplus power which is still increasing. Two decades ago, BPA made long-term surplus capacity sales contracts with California - these contracts were due for renewal in 1987 and 1988. Until the mid 1980s, BPA was trying to negotiate contracts with California.

BPA would sell up to 2,000 megawatts of surplus capacity for the 20-year term, and would sell firm energy (based on forecasted BPA surpluses) on a rolling five-year basis. Currently it looks as though 1,000 megawatts of surplus firm energy might be available for the first five years./108

The development of possible U.S. Northwest surpluses were largely ignored by the British Columbia government and by B.C. Hydro.

Table 6.6
British Columbia Electricity Imports and Exports

	Year	Total Capacity Generation	Interprov. Trade Net Exports	United States Trade Net Exports	Revenue*
		(MW) (GW.h)	(GW.h)	(GW.h)	(\$ mill.)
		12,497			
British Columbia	1988	60,942	-855	7,719	111**
	1987		-189	12,322	
	1986		64	1,429	
	1985		32	10,119	
	1984		36	6,721	

Source: Canada. Energy, Mines and Resources. *Electric Power in Canada 1988*, Ottawa: Minister of Supply and Services, 1989, 77, 78, 20, 30, 80

* Revenue from exports includes public and private utilities
 ** \$10 million is revenue from exports by Cominco Ltd.; the remainder \$101 million accrued to B.C. Hydro

The development of a "surplus conflict" put additional strain on the access and inter-linkage to California. Although the inter-linkage problem has a twenty-five year history, B.C. Hydro's surplus export continues to occupy a "backseat to access."/109 In 1986, B.C. Hydro was excluded from the export of firm electricity. As shown in Table 6.6, the exports from British Columbia continued to remain volatile, varying from 2 to 21 per cent per cent (1,429 to 12,322 GW.h of total of 60,942 GW.h) of British Columbia's total generation.

The access to the California market is restricted to extra-regional utilities; this relegates B.C. Hydro's electricity to stand-by staple status. The US federal authority's access policy states:

BPA will not provide Assured Delivery to extraregional utilities.

BPA may, by contract, provide extraregional utilities limited access to Intertie Capacity. Such access, however, would be conditioned on such utilities' participation in the Pacific Northwest's coordinated planning and operation to a greater extent than in the past or agreement to provide other appropriate consideration of value to the Pacific Northwest. [Oregon, Washington, Idaho, a portion of Nevada, Utah, and Wyoming]/110

The access to California's market has been uncertain throughout the 1980s. The Bonneville Power Authority, the U.S federal agency owning the key transmission line to California, gives national preference to its US utilities over British Columbia's public utility and, therefore, allows only stand-by access to the California market. The utility has laid off thousands of engineering employees and

is no longer the premier development company of British Columbia. During the early 1980s, it became an operating company (maintaining existing power plants and electricity distribution) rather than a development company building hydro projects. Thus, lack of access to the US market and having a surplus capacity has brought an end to hydro power development being approached like the development of other staples in British Columbia. The British Columbia government has since stopped its capacity pre-building program for temporary export and has announced the renegotiation of the energy benefits accrued to the United States from the Columbia River Treaty.

CONCLUSION

British Columbia's state hydro expansions did not overcome resource-based growth. The industrial stagnation after the major exploitation of the coastal forest and water resources and the desire to attract industries into the remaining northern resource areas (such as the Peace River area) contributed to increasing hydro development and electrical production under the state-owned B.C. Hydro.

Directors of B.C. Hydro, in their efforts to advance industrial expansion in the province or in Canada, have not fostered backward linkages. They have selected core electricity production components, such as turbines and generators, from manufactures outside the province, and have made little effort to reverse B.C.'s technological dependence. The government and B.C. Hydro continued inviting in foreign

industrial corporations, hoping that they would create forward linkages by using industrial energy. Hydro-related infrastructure provided access to natural resources via reservoirs for the invited large industrial customers such as pulp mills. Large energy-intensive pulp and paper mills owned outside of British Columbia were favoured over the many small B.C.-owned and operated sawmills. The hoped for hydro-related economic diversification did not take place in British Columbia.

During the expanding phase of B.C. Hydro's infrastructure, three major industries, wood industries (sawmills), paper and allied industries (pulp and low grade paper), and chemical and chemical products industries (suppliers of pulp mills) constituted between 81 to 86 per cent of the Crown corporation's manufacturing industry sales from 1961 to 1983. The provision of cheap and plentiful hydro-electricity did not overcome British Columbia's staple-centred growth, and the "industrialization by invitation" strategy used by the government and the utility continued external control of the economic growth process within the process.

Planners, experts, politicians, and industrial development officers within B.C. Hydro, the provincial government, and industry have shaped the hydro-electric infrastructure of British Columbia. Despite stated efforts to plan the hydro-system, an "unplanned surplus" became apparent. Evidence was presented which indicates that the following contributed to this surplus: the unreliability of the indus-

trial customers' commitments to expand their staples production, B.C. Hydro's inability to predict markets for industrial consumption, the treatment of electricity as a staple (exportable energy product), industrial optimism associated with big projects, and the absence of a clear government industrial policy direction.

National Energy Board hearings legitimated building too many B.C. Hydro dams and powerhouses by allowing exports by default, in spite of many popular counter positions. In the case of British Columbia, the board showed a clear bias for western U.S./Canadian integration of British Columbia's electrical grid in order to supplement its utility revenue. British Columbia did not give the use of its provincial surplus a national priority, rather, being misled by California's "power hunger," its surplus became trapped as a continental stand-by staple.

If dams are built solely for export, the price for electricity, the number of jobs, the interest rates, and export conditions (transmission line access) will be determined in the United States. Pursuing such a policy, the province either intensifies its dependency or becomes continentally power-trapped.

NOTES

- 1 T.L. Sturgess and R.W. Bonner, Department of Industrial Development, Trade, and Commerce, Bureau of Economics and Statistics, Government of British Columbia, *British Columbia Facts and Statistics*, vol. X, 1956, 25-6. R.W. Bonner later became chairman of B.C. Hydro. In the same publication, the "Manufacturing" section's opening

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PM-1 3½"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

- paragraph started, for seven consecutive years (1956-62), with the same claim: "Secondary industries are rapidly accounting for a large portion of British Columbia's total production values."
- 2 "Text of Wenner Gren Memorandum of Intent," *Western Business and Industry*, 71-2.
 - 3 B.C. Hydro, W.A.C. Bennett Dam & G.M. Shrum Generating Station: Peace River Power, a 4-page pamphlet.
 - 4 Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro*, 15.
 - 5 Some of the findings in this chapter have been part of my MA thesis, 1986, "B.C. Hydro Is a Major Institutional Force in Extending and Intensifying Staples Dependence."
 - 6 Patricia Marchak, *Green Gold*, 308.
 - 7 Cecil Maiden, *Lighted Journey*, 102-3.
 - 8 *Ibid.*, 109
 - 9 *Ibid.*, 98
 - 10 *Ibid.*, 102-3.
 - 11 Dal Grauer was a political economist who taught social science at the University of Toronto and was retained to "act as an expert on social welfare, social insurance, housing and labour legislation for the Rowell-Sirois Commission - the Royal Commission on Dominion-Provincial relations. He became the general secretary of "B.C. Electric ... which gave him charge of the Public Utilities Commission Data, and of the rate and wage hearings." Cecil Maiden, *Lighted Journey*, 156.
 - 12 *Ibid.*, 160.
 - 13 *Ibid.*
 - 14 *Ibid.*
 - 15 Glen Williams, "Canada in the International Political Economy," 116.
 - 16 The B.C. Rural Electrification Committee, *Progress Report*, 19-20; Mary D. Taylor, cited by Taylor "Development of the Electricity Industry in British Columbia," 1965, 89, 170.
 - 17 Gordon Shrum, et al., *Gordon Shrum*, 74-5.
 - 18 B.C. Government, "Electric Power: An Act to Provide for Improving the Availability and Supply of Electrical Power," chapter 27, 45.
 - 19 Neil Swainson, *Conflict over the Columbia*, 33.
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 - 22 C.W. Nash, and H.L. Briggs, *British Columbia Power Commission Pulp and paper Opportunities in Central British Columbia*, June 1956, 1, 14-17.
 - 23 B.C. Power Commission *Journal*, *Progress*, (Aug. 1957): 7, 8.
 - 24 Gordon Shrum, et al., *Gordon Shrum*, 77.
 - 25 *Ibid.*, 78.

- 26 "Text of Wenner Gren Memorandum of Intent," *Western Business and Industry*, vol. 31, March 1957, 71-2.
- 27 Gordon Shrum, et al. *Gordon Shrum*, 1986, 78.
- 28 *Ibid.*, 78.
- 29 *Ibid.*, 308.
- 30 Gordon Shrum, et al., *Gordon Shrum*, 76-80.
- 31 Patricia Marchak, *Green Gold*, 309.
- 32 *Ibid.*, 100.
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- 34 B.C. Power Commission, Gordon M. Shrum, *Report on the Columbia and Peace Power Projects*, 28.
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- 36 R. Worley, *The Wonderful World of W.A.C. Bennett*, 233.
- 37 Gordon Shrum, et al., 79.
- 38 *Ibid.*, 79.
- 39 *Ibid.*, 79-82.
- 40 Marchak, *Green Gold*, 308.
- 41 Worley, 234-5.
- 42 Gordon Shrum, et al., 85.
- 43 R. Worley, *The Wonderful World of W.A.C. Bennett*, 235.
- 44 Paddy Sherman, *Bennett*, 255.
- 45 Gordon Shrum, et al, *Gordon Shrum*, 86.
- 46 Philippe Faucher, et al., "Political Economy of Electrical Power Generation," 11-12.
- 47 *Ibid.*, 24-5.
- 48 *Ibid.*, 3.
- 49 The 1970 Revision of the Standard Industrial Classification includes: 1. Food and Beverage Industries, 2. Tobacco Products Industries, 3. Rubber and Plastic Products Industries, 4. Leather Industries, 5. Textile Industries, 6. Knitting Mills, 7. Clothing Industries, 8. Wood Industries, 9. Furniture and Fixture Industries, 10. Paper and Allied Industries, 11. Printing and Publishing Industries, 12. Primary Metal Industries, 13. Metal Fabricating Industries, 14. Machinery Industries, 15. Transportation Equipment Industries, 16. Electrical Products Industries, 17. Non-Metallic Mineral Products Industries, 18. Petroleum and Coal Products Industries, 19. Chemical and Chemical Products Industries, and 20. Miscellaneous Manufacturing Industries. *Statistics Canada, Consumption of Purchased Fuel and Electricity*, cat. 57-208, 1982, 62-8.
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- 55 B.C. Hydro, Table 1, "Bulk Power," exhibit 97, B.C. Utilities Commission, Site C Hearings, 10 February 1982, sheet 2 of 4.
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- 66 Alcan Aluminium Ltd., Annual Report 1953-4.
- 67 The Financial Post Corporation, Cominco Ltd., 4.
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- 72 B.C. Hydro, Industrial Development Department, 1964, *Power Intensive Industries for Peace River at - Site Power*.
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- 75 J.C. Dawson, Industrial Development Department, B.C. Hydro, "Introduction," *The Mining Industry of British Columbia and the Yukon*.
- 76 John R. Bodnar, industrial development officer indicated that this is the extent of Hydro's present industrial development. Informal interview (6 May 1986).
- 77 The program was called "Incoming Buyers" and is described as follows: 1. Designed to assist firms in attracting potential buyers from outside the province. Often bringing potential purchasers to view a plant is a valuable sales tool for the firm concerned. 2. Financial support offered consists of return economy excursion air fare for the potential buyer, to a maximum of \$2,000. 3. The ministry retains the right to encourage and assist the prospective purchaser in visiting as many local companies as is deemed appropriate. Ministry of Industry and Small Business Development, "Incoming Buyers," *Program Directory*, 10.
- 78 British Columbia Energy Board (an Advisory Committee on the Power Market), 1971, *Electric Power Requirements: in British Columbia Projection to 1990*, 11.
- 79 Russel Kelly, "B.C. Has Too Much Dam Power," 14 February 14 1984, photocopied article.
- 80 Albert Sigurdson, "B.C. Hydro foresees further cuts in capital projects as growth slows," *Globe and Mail* 26 September 1983, B1.
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- 82 B.C. Utilities Commission (BCUC) Site C Hearings, 10 February 1982, Fort St. John, Mr. Overstall, vol. 26, 4,339.
- 83 BCUC, Site C Report, 300.
- 84 The smaller interconnection between Alberta and previous sales to Calgary Power Ltd. and the larger interconnection with the Kanelek Transmission Company are described in various NEB reports or reasons for decision. National Energy Board, Report, B.C. Hydro, January, 1970, 10. NEB, Report, B.C. Hydro, June 1975, 13. NEB, Report, B.C. Hydro, June 1980, 16. NEB, Report, B.C. Hydro, July 1984, 7.
- 85 Ken Epp, British Columbia Power Exchange Corporation, a subsidiary of B.C. Hydro, 10 February 1992.

- 86 The initial function of the British Columbia Energy Board was to enforce cooperation between the B.C. Power Commission (rural public utility) and B.C. Electric (urban utility) in British Columbia. Gordon Shrum, et al., *Gordon Shrum*, 77.
- 87 B.C. Energy Board, Gordon Shrum, *Report on the Columbia and Peace Projects*, 28-30.
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- 89 H.F. Angus, "Statement by the Chairman of the Public Utilities Commission," *Report on the Columbia and Peace Projects*, 30.
- 90 Gordon Bell, *Victoria Times*, "'Power Hunger' Claims for U.S. Misleading?" 12 August 1961.
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- 93 In addition to the 4,300 MW, the two 230 kV lines allow 300 and 400 MW, respectively (total 5,000 MW); B.C.'s entire hydro-electric and thermal system capacity was 9,769 MW. Canada, Energy, Mines and Resources, *Electric Power in Canada 1988*, 52.
- 94 NEB, *Report*, February 1964, 6, 11. NEB, *Report*, April 1973, 14.
- 95 B.C. Hydro data submitted and reported by the National Energy Board in 1975, as surplus power (in MW) during the 1970s under maximum flow conditions were expected to be:
1974-5	75-6	76-7	77-8	78-9
153	430	878	1,135	467
- NEB, *Report*, B.C. Hydro, June 1975, 7.
- 96 This licence included firm power (capacity) of 2,000 MW, energy not exceeding 3,000 Gwh per year, and up to 10,000 GWh per year of interruptible energy. Reserves and surpluses of capacity in MW in years: 2,358 in 1979-80; 3,285 in 1980-1; 2,805 in 1981; 2,295 in 1982-3; 2,135 in 1983; and 2,615 in 1983-4. Surplus once the reserve was deducted: 1,158 in 79-80; 2,065 in 80-1; 1,605 in 1981-2; 1,095 in 1982-3; 935 in 1983; 1,215 in 1983-4. NEB, *Report*, March 1980, Appendix 3, page 1 of 1.
- 97 The Reserve and Surplus in MW in years: 3,409 in 1984-5; 2,909 in 1985-6; 2,699 in 1986-7; 2,549 in 1987-8; 2,309 in 1988-9; 2,109 in 1989-90. Surplus was 2,139 in 1984-5; 2,159 in 1985-6; 1,974 in 1986-7; 1,874 in 1987-8; 1,584 in 1988-9; 1,384 in 1989-90; NEB, *Report*, July 1984, Appendix 4, p. 25.
- 98 NEB, *Report*, March 1980, Appendix 7, p. 1 of 1.
- 99 National Energy Board, *Reasons for Decision*, March 1980, 10.
- 100 Ibid., 2.
- 101 Ibid., 25.
- 102 Ibid.
- 103 Ibid., 25-6.
- 104 Ibid., 32.

- 105 Ibid., 37.
- 106 Ibid., Appendix 6, 1 of 4.
- 107 Ibid., Appendix 7, 1 of 1.
- 108 U.S. Department of Energy, Bonneville Power Administration, Issue Alert "Selling South: BPA Seeks Ways of Marketing Surplus Power to the Pacific Southwest." Source: B.C. Utilities Commission, file 14, no date (possibly early 1980s).
- 109 Brian Lewis, business reporter for the Vancouver Sun, on CBC AM Radio, 12:50 h, 3 September 1985.
- 110 U.S. Department of Energy, Bonneville Power Administration, Near Term Intertie Access Policy, 1 June 1985, 10. A copy of this policy was obtained from the B.C. Utilities Commission, exhibit 21, hearing 4, entered by B.C. Hydro on 9 January 1986.

CHAPTER 7

CONCLUSION AND SUMMARY OF EVIDENCE FROM FIVE PROVINCIAL CASES

At the outset of this thesis, the proposition by John Dales that hydro-electric development has been a powerful agent in the promotion of Canada's twentieth century industrial revolution was brought into question. Dales argued that in situations in which power companies developed their own industrial markets and transmitted their surplus to industries in the neighbouring province, hydro-electric development was a powerful agent in the transition from a natural resource-based economy to a more diversified self-reliant economy./1

The findings of the five provincial cases examined above indicate that power companies and provincial governments (through state intervention) tried to create an industrial market by inviting industries into their respective provinces and by planning to use hydro-electricity to bring about a diversification of provincial resource-based economies. This resulted in, at best, a form of dependent industrial development (as backward linked supply industries) and a continuation of the use of new supplies of hydro-electricity to expand a resource-based economy. Contrary to Dales's projections, provincial surplus electricity was not made available as a force to inter-provincially strengthen Canada's industrial expansion, increase self-reliance, and, thereby, lead to "Canada's

twentieth century industrial revolution." Instead, the federal government legitimized export-dependent hydro-electric development rather than giving priority to interprovincial power surplus sharing and a national grid.

The five cases examined support the conclusion that, in situations in which the Canadian state and private firms use hydro infrastructure expansions to serve both continentalism and industrialization (by invitation), then, at best, they foster dependent industrialization and staple processing, and, at worst, they overbuild the infrastructure in order to generate provincial surplus energy for continental, rather than national, integration.

A summary of findings of provincial hydro developments will highlight the similarities and variations in the provincial cases, in particular:

- how they became subject to state intervention;
- whether they fostered industrial development (as backward and forward linkages);
- what contributed to provincial surplus capacities;
- how continental versus national use of the power surpluses became legitimate.

STATE INTERVENTION

Did provincial governments and private firms develop large power sources to advance industrial development? Both private entrepreneurs and provincial governments (as public entrepreneurs) took on the development of large water power sources. For instance, Niagara Falls and Churchill Falls were privately developed, whereas the James Bay sites and the Nelson River were developed by public utilities. In general, governments initially relied on private hydro

entrepreneurs; however, when they failed to provide power for the less lucrative industrial market in smaller towns and rural areas, or failed to take the risk of building dams in advance of demand, the provinces took over the development, production, and supply of hydro-electric power. Since the 1880s, in all provinces under study, such changes in ownership and control from private to public sector took place after the state had initially leased or sold water powers for development in the private sector (see Table 7.1).

The provincial government in Ontario started providing Ontario's rural industrial energy in 1906. In the other provinces, such state interventions started in the 1940s, with rural and remote industrial service being performed by public hydro commissions, but the full provincial takeovers occurred, except for Newfoundland (1974), during the early 1960s (see Table 7.1). About the same time, the federal government encouraged the development of large northern water power sources in order to draw US portfolio capital into the provinces and to interconnect power networks between provinces and the United States.

The governments of Ontario, Québec, and Newfoundland leased water power for (foreign or Canadian) capitalist development. And when private utilities either sought extra profits or left infrastructural gaps for industry, those most affected by such failures exerted pressure on the government to intervene and provide public power.

Table 7.1

**Government Takeovers
of Hydro-Electric Power Production**

	Private Allocation of Key Sites	Public Takeover	Name of Organization
	(Year)	(Year)	
Ontario	1887 (Niagara F.)	1906	Ontario Power Commission Ontario Hydro
Québec	1885 (Shawinigan)	1944 1963	Quebec Hydro-Electric Commission Hydro-Québec
Newfoundland	1953 (Churchill)	1974	Churchill Falls (Labrador) Corporation / Government of Newfoundland
Manitoba	1897 (Winnipeg R.)	1919 1961	Manitoba Power Commission Manitoba Hydro
British Columbia	1956 (Peace R.)	1945 1961	B.C. Power Commission B.C. Hydro

Sources: Statistics Canada, Manufacturing and Primary Industries Division, Consumption of Purchased Fuel and Electricity 1962-1974, cat. 57-206; the period 1975-83 originates from cat. 57-208. Chapters 2 to 6 above

At Niagara Falls, Ontario, two US owners speculated by holding the power monopoly for fourteen years (1887 to 1901) and slowed down the transition from steam to electrical manufacturing for small-town Ontario manufacturers. Once the generating plants were built, all three private companies (including one Toronto company) preferred exporting most power to US industries, leaving transmission gaps between towns and factories. Southern Ontario manufacturers pressured the government to set up the public Ontario Power Commission (1906), demanded the rerouting of Niagara power

so it would no longer flow to Buffalo but to Berlin (now Kitchener), and asked for power at cost.

In Québec, the government sold or leased hydro sites to private anglophone and US owners (1887). When the Montreal Light, Heat and Power Company, owned by anglophones, "restrained" industrial development through high rates, lack of plant investment, and defiance of regulations (1935 to 1944), the Commission Hydro-Electrique du Québec (Hydro-Québec) nationalized it in 1944./2 In 1963, Hydro-Québec took over the rest of the power companies; they had little interest in providing low-cost industrial electricity to l'Abitibi, Gaspésie and Bas-Saint-Laurent, and they failed to provide equal opportunity to francophones. The government's subsequent conquest of northern hydro and resources (Churchill Falls and James Bay) was to bring industrial development, which was less dependent on Canadian anglophones, by advancing continental energy and resource integration with the eastern United States. The northern power from Labrador was sold to Hydro-Québec by a British consortium of companies.

During 1953, the Newfoundland government granted all remaining hydro rights, including those of the Churchill River, to the private British Newfoundland Corporation./3 Brinco took few risks; it sold the power at low cost (from Churchill Falls to Hydro-Québec for 65 years), raised US portfolio capital by using Québec's credit, developed the site, left infrastructural gaps (rural and industrial) in

the province, and planned to continue alienating hydro energy from Labrador resources by selling it to Québec (for US export). Twenty-one years after granting the rights to Brinco for a \$1 1/4 million five-year improvement commitment, the Newfoundland government bought back its remaining water rights for \$160 million in 1974./4

In each one of these cases, private firms, then public utilities, have taken on the development of large power sources in order to advance industrial development and continental integration. The failure by private capital to provide power in regions within Ontario, Québec, and Newfoundland shows similar limitations with regard to capitalist hydro development. The specific social (diverse ownership interests) and economic situations under which provincial governments started becoming producers of electricity differed due to regional variation in industrial development.

At Niagara Falls, Ontario, the US and Canadian hydro plant owners found exports to the US industrial and urban market more profitable than the emerging southern Ontario manufacturing market. Small-town manufacturers opposed such exports and solicited the Ontario government to organize energy repatriation. In the first decade this century, Ontario visualized remaining Canada's electrically-energized workshop, while blocking the continental energy axis. Québec used hydro development, sixty years later, to gain a measure of economic autonomy from Anglo-Canada. In this

case, the francophonization of hydro development and the strengthened continental energy axis made for a different social and economic background for public hydro than that of Ontario.

While Ontario and Québec governments had sufficient credit to raise portfolio capital for public hydro developments, Newfoundland relied on the private Brinco consortium as its "instrument" to develop Churchill Falls, raise capital, and bring in new industries. The British development company, like the US utilities at Niagara Falls, developed power for profitable export from Labrador. To avoid additional exports to Québec, and in order to retain water power for future industrial development in Newfoundland, the government reappropriated its water power. In this case, the behaviour of the US iron ore corporations in Labrador, strong social colonial ties, recent entry into Canadian Confederation, and less economic leverage set a different stage for private concession and public buy out.

Have state interventions in western Canada followed a similar pattern? Did the provincial governments in Manitoba and British Columbia, initially, grant water power licences to capitalist entrepreneurs and, subsequently, take over the development, production, and supply of hydro-electric power? The beginnings of state intervention in the production of hydro-electric power in the western provinces followed a similar pattern to that of Québec and Ontario. First, the granting of licences, then, as private entrepreneurs failed

to provide electricity for industrial expansion outside lucrative urban areas such as Winnipeg or Vancouver, the government intervened more and more in order to provide the less profitable energy inputs. Until the government stopped privatizing hydro sites in 1914, Winnipeg's private utility acquired the best sites on the Winnipeg River; the less lucrative sites went to Winnipeg's municipal utility. By 1919, three years after the Meyers Co. of Chicago found the power supply west of Winnipeg insufficiently profitable, the public Manitoba Power Commission filled the infrastructural gap. With the private Winnipeg utility having been taken over in 1961, Manitoba agreed to develop more sites in the North. The Nelson River was to become not only a supply source (via the federally installed power line) for industry in southern Manitoba but also for the "one major link" in Diefenbaker's national power network. By 1966, Sharp's national/continental policy allowed Manitoba to strengthen its mid-continental energy axis.

In British Columbia, the Bridge River Company first secured water development rights in 1912, then the private B.C. Electric (est. 1926) acquired them. It supplied the lucrative industrial and urban markets (Victoria and Vancouver) while the public B.C. Power Commission (est. 1945) supplied remote industries and rural customers throughout the province. When the private B.C. Electric refused the risk of buying the future Peace River power from the private Wenner-Gren Company, the B.C. government took over both in

order to proceed with the Peace River project. B.C. Hydro (est. 1961) accelerated the development of the Peace and Columbia River plants. Hydro stations on both rivers were expected to serve domestic industrialism and western continentalism, for example, supplying energy intensive forest products industries in British Columbia, opening two continental transmission axes, allowing for US regulation of the Columbia River reservoirs (so extra spring water flows would not be spilled over US dams), and by planned exports to "power-hungry" California.

In both cases, government intervention in the production of power in British Columbia and Manitoba started outside the lucrative urban markets not provided for by the private utilities and then accelerated into developing large sites on the Peace and Nelson rivers. While the Peace River plants were to serve British Columbia's future industrial market and the California market, the Nelson River plants were expected to serve the national grid, the mid-continental grid, and industrial development in Manitoba. Not all hydro expansions took place at the same time, and, therefore, provincial leaders would have had opportunities to learn, from history, about unexpected outcomes when hydro was left to private developers.

Had the political elite learned from the negative outcomes of private hydro development at Niagara Falls? They had not. Both Newfoundland and British Columbia licensed major northern water power resources to foreign

owners, with the assumption that they would develop them in order to advance industry within the respective provinces. In 1953, Newfoundland granted all undeveloped water power in Labrador and on the island, including Churchill Falls - the best and largest site in Canada - to Brinco, and, in 1956, British Columbia licensed the watershed containing the Peace River to Wenner-Gren. Instead of using the power to develop industries within the provinces, private owners sold Niagara Falls power to US industry and Churchill Falls power to Québec, and the Peace River site was reappropriated by the B.C. government for lack of a power customer.

In these cases, the provincial governments increased their interventions in power production with at least two objectives, to provide the infrastructure for profitable industry and to build for exports to the United States.

INDUSTRIAL DEVELOPMENT: BACKWARD AND FORWARD LINKAGES

Throughout this century, utility managers, politicians, and planners argued that the development of hydro-electric resources is a sound basis upon which to build a diversified economy. The local manufacture of equipment for large powerhouses and distribution systems would be part of this diversification. Once such hydro stations generated abundant electricity, it was seen as the catalyst that had been missing in the transformation of regional staple economies.

However, when the state and private hydro development companies take a continentalist approach and rely on resource firms (such as the Iron Ore Company of Canada) with

links to US manufacturing centres, the use of electricity in the transformation of natural resources into finished products is very unlikely. In such cases, the new supplies of electricity will, at best, be used for staple or other semi-manufactured goods production. Similarly, when utility planners and politicians rely on substitute-manufacture by foreign firms of formerly imported equipment, they continue dependent industrial development.

Did utility executives and politicians start and continue a dependent industrialization process, akin to Williams' import substitution industrialization, and capture backward linkages from hydro installations? A historical trace of the selection of generating equipment shows that they did. This happened in southern Ontario and Québec, while the other provinces received their equipment from central Canadian branch plants or from abroad.

By 1904, through the technology transfer of generating equipment by foreign and domestic utilities, the roots for technological dependence in Canada's hydro-mechanical industry had taken hold. In Ontario, three private power companies and the public Ontario Power Commission relied upon US (General Electric, Westinghouse) and European generating technology at Niagara Falls. The initial choices over such technology for Canadian plants were made in the United States, not in Canada. The Canadian Niagara Power Company copied, with minor modifications, its US parent's generating stations. Within a few years, Frederic Nicholls, the prin-

cial executive in the Toronto-based Electrical Development Company and head of Canadian General Electric, installed CGE equipment in the Toronto company's Niagara plant and closely copied the installations of the US-owned plants.

Québec showed a similar beginning. By 1905, the US immigrant owners of the Shawinigan Power Company installed US and European generating equipment. Later, the US-owned Dominion Engineering Works in Montreal manufactured the turbines, and Canadian Westinghouse supplied the majority of generators for the next sixty years (see Appendix VII, Table VII.1). However, during the 1960s, in anticipation of large northern hydro projects, Hydro-Québec and state managers adhered to a "buy-Québec" policy, which included the manufacture of hydro equipment in Québec. The procurement policy and hydro expansion program had the effect of strengthening hydro-mechanical manufacturing in Québec, primarily before 1970. Similar to Ontario, new backward linkages were captured, yet, they remained reliant on foreign technology and foreign firms (French, US, and Swedish). In this way, a dependent industrialism continued, hidden by the philosophy of "maîtres chez nous."

Outside of Ontario and Québec, only Manitoba's effort to capture backward linkages was a (temporary) success. Newfoundland's potential participation in the growth of supply industries was subordinated to Québec's stronger economic nationalism. Québec's "nationalistic" manufacturing condition became part of the Churchill Falls power contract.

While Manitoba Hydro relied for much of its generating equipment on central Canada, Japan, and Russia (during the 1970s), the utility insisted upon local manufacture by the US-owned Canadian General Electric (see Table 5.2). Thus Manitoba Hydro influenced, temporarily, the manufacture of hydro-mechanical components in Winnipeg and in The Pas. This process was partially reversed through industrial offset agreements with CGE during the 1980s. Utility executives in British Columbia selected core electricity production components, such as turbines and generators, from manufacturers outside the province (central Canada, Russia, Japan) and made few effort to reverse B.C.'s technological dependence (see Appendix VII, Table VII.1).

Between 1900 and 1986, the US-owned Canadian Allis - Chalmers and Dominion Engineering Works, the British English Electric, and Marine Industries (owned by the French and Québec governments and using French technology) supplied the majority of turbines in Canada (see Appendix VII, Table VII.1). The US branch plants of Canadian General Electric and Canadian Westinghouse, and Marine Industries, supplied most of the generators in Canada./5 Since the 1960s, British Columbia and Manitoba have also purchased Japanese and Russian generating equipment. Provincial politicians and utility executives relied on foreign firms and technology to advance the centralized formation of backward linkages. In this way, they fostered dependent industrialization.

Clement argues that the centralized structure (finance, manufacturing) in Canada became set with the installation of the railway and with the National Policy, and the outcome was dependent industrialization in central Canada and staple production outside of southern Ontario and Québec.⁶ Gaining industries from the nineteenth century railway spin-off industries and the earlier availability of public power gave Ontario an initial advantage over the rest of Canada in regard to maintaining its manufacturing strength. The examination of the electrical equipment industry showed that it remained located in the centre (Ontario and Québec). Once the generating equipment produced power in the centre and in the regions, it was used by various industries.

Initially, some electro-processing industries (chemical, silver plating) were attracted by the availability of power at Niagara Falls. Once long-distance transmission brought Niagara power to southwestern Ontario towns (1910-20), indigenous, small-town manufacturers could finally convert from steam to electricity, and both new and old US branch plants applied for Ontario's cheaper public power. Fifty years later, Canadians expected that manufacturers would use electricity and diversify the nature of production.

Did the increased investment and tripling of generating capacity since the 1960s (see Table 7.2) spark a new industrial entrepreneurialism whereby industrialists used the

fresh loads of electricity to start new productive activities (i.e., to create forward linkage effects)?

Table 7.2
Generating Capacity in Five Provinces Installed between
1960-88
(MW)

	1960	1970	1980	1985	1988
Ontario	7,109	13,700	25,796	29,932	32,995
Québec	8,920	14,047	20,531	26,991	27,258
Nfld.	314	1,248	7,195	7,316	7,426
Manitoba	1,043	1,794	4,142	4,142	4,125
B.C.	2,963	5,473	10,525	12,451	12,497

Source: Electric Power Statistics, vol. II, Statistics Canada, cat. 57-202, cited by *Electric Power in Canada 1988*, Energy, Mines and Resources, 30

Has the development of additional power resources helped to transform regional staple producing economies? The expected transformation did not materialize. State-directed hydro expansions did not bring an industrial transformation to secondary industries in Québec, Newfoundland, Manitoba, and British Columbia. This is evident in the use manufacturers made of the new supplies of power. After power became available from the new plants, about 80 per cent of it was used to produce staples and semi-manufactured products in four provinces examined. By way of contrast, Ontario retained its relative diversity, with the automobile (transportation equipment) industries being the third largest power consumer group (see Table 7.3).

In Québec, despite the addition of southern and northern hydro plants (Churchill, James Bay), since the 1960s "cheap" industrial electricity was purchased by the traditional primary manufacturing and staples industries (see Table 7.3). About 80 per cent of Québec's electricity continued to be used in primary manufacturing or in staple-based production between 1962 and 1984. In part, this concentration of use in pulp and paper, chemical, and primary metal industries is due to the Québec government's history of strengthening its eastern continental resource supply axis. Despite the efforts of the James Bay Development Corporation's travel of the world, in order to invite in new "industrial masters," foreign entrepreneurs did not respond to new power plant installations as expected./7

No major hydro-related forward linkages, whether fiscal or physical, formed in Newfoundland as a result of installing hydro power plants. Brinco sold its electricity only to existing US iron mining customers (one pelletized the ore in Labrador, the other in Québec, before shipping it to the United States). Brinco did not bring new industries, with the exception of a short-lived mining venture, to Labrador. An attempt to create hydro-related fiscal linkages (i.e., rent income from Churchill Falls used to supply cheap industrial power on the island) made little difference to staple-based production; three sectors, wood, pulp and paper, and chemical industries, made up 89 per cent of manufacturing consumption between 1975-78, despite the installa-

tion of Churchill Falls, the largest hydro plant in Canada, by 1974.

Table 7.3

Type of Manufacturers Who Constitute About 80 per cent of the Total Consumption by Manufacturing Industries during Key Historical Periods
1962-84

Province	Time Period	Manufacture Type	Ave. % of Total Manuf.
Ontario	1963-82	Pulp & Paper Primary Metals Transport. Equip. Chemical Prod. Food & Bev. Non-Met. Minerals Petr. & Coal Prod.	81
Québec	1962-84	Pulp & Paper Chemical Prod. Primary Metals	78
Newfoundland	1975-8	Pulp & Paper Chemical Prod. Wood Ind.	89
Manitoba	1975-84	Primary Metal Pulp & Paper Food & Bev. Chem. Prod.	80
British Columbia	1962-83	Pulp & Paper Chemical Prod. Wood Ind.	85

Source: Composition from tables containing Statistics Canada consumption data in chapters above, cat. 57-506, 57-208

Little evidence of diversification due to the installation of large power projects is evident in the western provinces. A few large energy-intensive industries came to Manitoba between 1962 and 1975 (Inco, for example), but Manitoba Hydro has been unable to add major industrial customers, other than Hudson Bay Mining and Smelting, during

the 1980s. Between 1975-84, manufacturers continued to report using 80 per cent of industrial electricity in four sectors: those producing primary metals, pulp and paper, food and beverages, and chemical products (see Table 7.3). The same use pattern appears in British Columbia; twenty years of hydro projects on the Columbia River and on the Peace River, and plenty of cheap industrial electricity, have not brought the promised hydro-induced industrial transformation. To the contrary, "manufacturers" in three sectors, pulp and paper, chemical products, and wood, purchased 85 per cent of the total electricity used in manufacturing between 1962-83 (see Table 7.3). This was the case even though industrial development officers and politicians in Manitoba and British Columbia actively invited foreign firms to commence with forward linkages into manufacturing.

In Québec, Newfoundland, Manitoba, and British Columbia, the industrial energy produced by the large new hydro stations was used for pulp and paper, chemical, primary metal, and wood products. Virtually no diversification in manufacturing use, except for food and beverage production, is reported by "manufacturers" in these provinces.

To obtain maximum industrial spin-off from the large hydro schemes, the provinces not only invited in import substituting supply industries but also sought foreign direct investment from established manufacturing centres.

Such investments were often made in order to produce staples for the continental and other external markets. When such firms do not "Canadianize" their operations, as did many entrepreneurial immigrants, diversification fails, and, at best, dependent industrialization (branch plants) and staple production continues. In the expectation that regional infrastructures were needed for an abstract group of industrialists (not yet in the province) and for continental needs, politicians and utility executives made decisions which led to overbuilding the infrastructure.

PROVINCIAL SURPLUS

Suggestions of deliberate early building and oversizing of plants to "encourage exports and interconnection" with the "United States Power System," as stated by Mitchell Sharp in 1963, were fiercely denied by provincial utility officials./8 Bill Best, vice president of Electrical Operations in B.C. Hydro, when asked whether Hydro was building for export, vehemently denied it:

Our load [demand] forecasts, on which planning for our system is based, do not include any provision for supply for export. The construction and scheduling of additional generating facilities is based entirely on servicing forecast requirements in this province [British Columbia] ... the National Energy Board of Canada ruled in support of our contention that we have planned and constructed our system only for domestic needs./9

Because most provincial hydro utilities had mandates to build only for provincial requirements and not for US export, accusations of building for export were denied (with references to domestic needs decades from now) when ques-

tions by the public were raised./10 However, premiers such as Robert Bourassa clearly knew that the United States' national energy policy included the continental integration of renewable hydro-electricity surpluses from large northern power sources./11

By 1987, for example, the federal Department of Energy, Mines and Resources reported surplus capacity percentages for Ontario as 30 per cent, Québec as 21 per cent, Newfoundland as 79 per cent, Manitoba as 18 per (despite drought conditions that year), and British Columbia as 43 per cent./12 The rationale advanced in this thesis is that two factors contribute to such costly surplus capacities: 1) Canadian hydro power sources are put into service as part of energy continentalism, and 2) "industrialization by invitation" programs have largely unpredictable outcomes. Both of these factors contributed to the acceleration of building hydro projects.

Did the planned acceleration of hydro projects match expected industrial use, or did a provincial electricity surplus develop due to failed industrial development and reliance on exports? Unlike the US power companies (at Niagara) in the late nineteenth century, which built hydro plants to suit their "industrial tenants" (who needed to locate within the limits of power transmission), provincial utilities worked under much less predictable conditions. During the twentieth century, provincial utilities needed to match the size and timing of their hydro projects with

industrial growth patterns which had disintegrated into domestic manufacturing, branch plant manufacture, and staple production. When linkages (i.e., expected industrial expansions based on branch plant manufacture and additional staple production) did not materialize, the gap between state provision of productive inputs and unpredictable private capital needs (particularly in periods of crisis) showed up as industrial energy surplus.

The needs of domestic manufacturers were easier to predict than externally directed industries, as Ontario Hydro's 1911 power survey indicates. Some staple and branch plant demands were less predictable; for example in the 1920s, the Ontario Hydro-Electric Power Commission's (Ontario Hydro) building of hydro facilities for the pulp and paper interests, and, conversely, the unreliability of interests such as Carrick (expected to need 19 to 22 MW in Port Arthur and Fort William) meant surplus capacity and revenue loss for public utilities. Another example is the attempt by a US branch plant manager to have "power at cost" turned off in small Ontario towns and redirected to Goodyear's tire plant. The branch plant cancelled the contract two months later, due to a directive from its US parent. Furthermore, allowing foreign ownership in the hydro-electric industry itself, as at Niagara Falls, meant that the Ontario government lost, for years, the ability to use this power for Ontario industry.

Fifty years later, Hydro-Québec and the political leaders of Québec had mounting difficulties in predicting industrial demand and were not always able to rely on export markets. Initially, they insisted that all of the Churchill Falls and James Bay power would be needed for industry. First, Hydro-Québec predicted industrial shortages at the time of signing the Churchill Falls contract; then after the plant was connected to its system, half of the plant was available to produce for export. In a similar manner, Bourassa predicted a shortfall without the James Bay plants, yet, by 1984, Hydro-Québec reported that half the plants were not needed during the winter and that all plants were available for export during the summer. This was due both to Hydro-Québec's inability to forecast the outcome of "industrialization by invitation" strategies (2,500 MW were reserved for industrial "implantation") and to the building of oversized plants so that Québec could become l'Alberta de l'Est through strengthening its New England energy axis. The cancellation of \$32 billion in future contracts by eastern US utilities underscores the unreliable nature of such ventures./13

Provincial Crown ownership, initially, allowed the government of Newfoundland a measure of control, yet inviting Brinco to develop hydro resources resulted in the loss of decision-making over power exports, plant ownership, and power recapture. Its ability to plan hydro development comprehensively for at least sixty-five years was compro-

mised. In addition, Newfoundland lost "the right to transmit or export power" from Churchill Falls, its recapture allowance stays at 300 MW of the total plant (5,225 MW), and it was not able to secure ownership of the Churchill Falls facilities (because the Labrador boundary dispute with Québec was left open in the power contract).

Many of Manitoba Hydro's planning problems were rooted in its dependent approach to industrial and energy development. For instance: the aluminium company, Alcoa, used the Manitoba joint study to obtain a better energy deal elsewhere; the Kelsey generating station on the Nelson River was too large to only serve the International Nickel Company's politically created Cold War demand; and the demands of Interprovincial Pipelines are volatile because its energy consumption is reliant on the timing of Canada's continental oil swap. Furthermore, the misleading predictions by oil companies during the 1970s "oil crisis" contributed to the acceleration of the building of Nelson River plants. The outcome was that, by 1975, the Limestone project was approved and, by 1978, it was "mothballed." Further, the agreement between Manitoba Hydro planners, Manitoba premiers, and federal ministers that the future Nelson River hydro stations should also serve the US mid-continental power network contributed to the provincial surplus. By 1985, rather than being built to serve domestic needs and some exports, the Limestone project received a

National Energy Board export licence and was being built by the provincial utility solely for export.

In British Columbia, the provincial surplus showed a direct link to staple industries, many of them foreign-directed and invited in during the 1960s and 1970s. B.C. Hydro built the Revelstoke dam (\$2 billion) based on inquiries by industrial customers. The Society for the Promotion of Environmental Conservation checked 85 per cent of the capacity (1,349 MW) of the companies that B.C. Hydro had indicated as inquiries (requests) by the companies, but found that 49 per cent of them (equivalent to 667 MW) did no longer need the requested power./14 This meant that the entire power plant was surplus. The problematic reliance on industry forecasts and the assumption of a "power-hungry" California also led to the decision to develop large northern sites. Further, the surplus capacities of US utilities in the Pacific Northwest and the restriction by the US federal Bonneville Power Authority on British Columbian power imports added to B.C. Hydro's capacity surplus in the 1980s.

The inability to rely on continental energy axes for exports, particularly since the loss of production clout by the United States, contributed to the surplus capacities which provincial utilities received from prematurely built power plants. Another problem stemmed from relying on dependent industrialization for energy demand. Using an "industrialization by invitation" strategy for developing

new, the same, or additional productive activities based on hydro and resources meant that key decision-making knowledge about expansions and corporate strategy become integrated into other economies and ended up being held outside the province. The worst aspect of relying on foreign industrial firms was that, when provincial utilities planned and built plants for them and they could and did cancel their commitments. Such outcomes contributed to the increase of provincial surplus capacities.

CONTINENTAL VERSUS NATIONAL USE

Did the federal government legitimize provincial surplus for use as a national industrial input or as a provincially produced continental staple?

The US owners of the Niagara Falls' plants simply claimed that the power was surplus to Canadian needs and exported it like a staple. In 1903, the resistance to this practice by small manufacturers and municipal officials started shaping the rethinking about the use of power resources for export. Only after finding Canadian legislation ineffective with respect to repatriating exported power (such as during the 1917-18 industrial war effort) was a new "consensus" reached which underpinned policy for the next fifty years. This consensus maintained that "power exported is power lost," and that power "shall be utilized within the Dominion to stimulate Canadian industry and develop natural resources."/15

Similarly, the initial thinking that pervaded hydro policy during the Quiet Revolution of the 1960s wanted to confine electricity used for industrial expansion to Québec. Later, Québec integrated northern plants, so that they could also serve exports. In 1962, Premier Lesage boycotted the national power network negotiations in Ottawa and blocked Labrador electricity from crossing Québec, thereby leaving an eastern gap in the national power grid. In this way, the Québec government undermined the interprovincial use of energy surpluses. Neither subsequent government leaders nor Hydro-Québec used the post-Churchill Falls surplus or the post-James Bay surplus to strengthen the national grid. While disallowing any transmission rights to Canadian provinces, it allowed the Power Authority of the State of New York exclusive transmission from its Beauharnois plant near Montreal and sold the power at a low enough price to pay for the US utility's transmission line./16 Exclusive transmission and generation was also extended across Québec's continental energy axis to the New England Utility from its La Grande 2 powerhouse at James Bay. Unlike Québec, which, since the mid-seventies, has used its surplus energy as a continental staple, Newfoundland advocated the use of surplus energy for national industries.

The National Energy Board hearings involving Newfoundland confirm that the Canadian government gave the impression of having a national/continental power policy, which led some provinces to assume that the National Energy

Board's role was nationalist, rather than continentalist, in making decisions about provincial surplus energy. Subsequent to the Churchill Falls contract with Hydro-Québec and anticipating future hydro development in Labrador, Newfoundland advocated its Labrador surplus be available to Canada as a single market without provincial boundaries. It stressed that electricity should be used for industries in Canada as "opposed to making such benefits available outside Canada," and that the national objective should have priority over the provincial objective in export questions. The National Energy Board did not exercise its interprovincial jurisdiction and dismissed Newfoundland's request to stop Québec exports and to repatriate 1,200 MW (less than one quarter of the power of Churchill Falls). Moreover, the board did not support Newfoundland's argument that movement between producing and consuming provinces, guaranteed by the British North America Act and applying to gas and oil pipelines, should also apply to electricity transport across Québec./17 While Newfoundland lobbied for national use of its surplus energy from Labrador, Manitoba had the strengthening of its mid-continental energy axis in mind.

Despite public pronouncements of a need for a national energy and industrial policy by Manitoba's premier, Manitoba Hydro, by 1976, had applied and was granted licences for the export of power over its two international power lines./18 Instead of becoming the first major link in developing the national grid, as envisioned by Premier Roblin in 1962,

Manitoba's planners and politicians deliberately developed a provincial surplus for export during the 1970s.

Table 7.4
Provincial Electricity Generating Capacity, Interprovincial Trade, and US Export Revenue in Five Provinces 1984-88

		Total Capacity Year Generation	Interprov. Trade Net Exports	United States Trade Net Exports	Exporter Revenue
		(MW) (GW.h)	(GW.h)	(GW.h)	(\$ mill.)
Ontario		32,955			
	1988	142,743	-2,762	4,828	171*
	1987		-6,978	6,384	
	1986		-8,005	6,264	
	1985		-9,588	8,862	
	1984		-8,238	10,457	
Québec		27,258			
	1988	149,005	-26,100	11,777	246
	1987		-17,645	16,401	
	1986		-16,216	12,639	
	1985		-17,387	9,578	
	1984		-24,437	11,242	
Newfoundland		7,426			
	1988	41,150	30,727	--	--
	1987		30,393	--	
	1986		30,695	--	
	1985		31,837	--	
	1984		36,043	--	
Manitoba		4,125			
	1988	16,308	782	-1,341	20
	1987		1,091	2,949	
	1986		859	6,977	
	1985		1,286	5,615	
	1984		1,264	5,014	
British Columbia		12,497			
	1988	60,942	-855	7,719	111**
	1987		-189	12,322	
	1986		-64	1,429	
	1985		32	10,119	
	1984		36	6,721	

Source: Canada, Energy, Mines and Resources, Electric Power in Canada 1988, Ottawa: Minister of Supply and Services, 1989, 20, 30, 77, 78, 80

* Revenue from exports includes public and private utilities

** \$10 million is revenue from exports by Cominco Ltd.; the remainder \$101 million accrued to B.C. Hydro

As a result, the exports to the US mid-continental utilities increased tenfold (except during the drought conditions in 1988-9), while interprovincial energy weakened since the completion of the Lower Nelson River plants. Manitoba was not alone in the West. British Columbia's planners also assumed that the provincial surplus could be sold southward, to the Pacific Northwest.

B.C. Hydro strengthened its north/south linkage immediately following Sharp's continentalist revision of the national power network plan. In 1964, B.C. Hydro received a licence to build its second international power line./19 By the mid-seventies, British Columbia strengthened its US transmission capacity to 4,300 MW (equivalent to carrying Manitoba's entire plant capacity)./20 With transmission lines in place, export licence and renewal applications followed and were approved in 1970, 1975, 1980, and 1984. Since 1984, its exports to the US have been very volatile (see Table 7.4). The gatekeeper to the US Pacific Northwest and California is the US federal Bonneville Power Authority. It owns the key federally financed transmission line and gives national preference to US utilities in supplying the US market. British Columbia's surplus power became a standby staple with uncertain revenues. In this way, British Columbia became, more than any other province, stuck in the continental power trap. It has an overdeveloped resource, no easy market access, and interest to pay on

capital investment for often non-revenue-generating surplus capacity.

The 1988 export levels are a clear indication that hydro-electric power should not be primarily conceptualized as a staple. For instance, Québec has the capacity to generate 149,005 GW.h, of which 8 per cent (or 11,777 GW.h) was exported to the United States for \$246 million; Ontario has a capacity to generate 142,743 GW.h, from which 3 per cent (or 4,828 GW.h) was exported for \$171 million (Table 7.4). The analysis of hydro development as a new staple (energy export) industry is appropriate, because exports constitute less than 10 per cent of provincial capacities and because up to half of provincial hydro energy is used by industry in Canada. Sharp's 1963 national/continental power policy allowed the provinces (except Newfoundland) the possibility of following either a continental or a national path with regard to interconnecting its hydro plants. The capacity to carry power from plants in an east/west or north/south direction gives a measure of strength to each axis.

The hydro-electric networks, unlike the railway, became, primarily, a continentally integrated (100 international transmission lines) and, only secondarily, an interprovincially integrated network (35 major provincial power lines; until 1988 no link between Alberta and Saskatchewan existed) owned and under the jurisdiction of provincial governments./21 The north/south linkages have

become four-times stronger than the east/west linkages. When comparing the total ability to transport electricity between provinces and US states, the capacity to export to the US is four times what it is to export to neighbouring provinces./22 British Columbia has the highest capacity transmission lines (4,300 MW) and is the most power-trapped. Building a balkanized infrastructure, which separates energy from its application to natural resources, could not have been possible without being hidden by the myth that hydro development results in industrialization.

Hydro power development in Canada was enhanced with politically propagated myths of technological progress. The political elite and utility executives in charge of hydro policy conveyed images of technological progress (in their Annual Reports, for example) which covered the reality that hydro has - if the same approaches continue - little influence in transforming a staples economy.

Images of largely imported technology and features of the dams are touted by utility publications as symbols of successful provincial industrial development (such as circuit breaker galleries, penstocks, spillways, hydraulic gates, underground powerhouses, generators, turbines, push-button consoles in powerhouse control rooms, transmission lines, and monumental dams). At the time of building these dams (during the 1960s and 1970s), superlative labels, such as "largest single development," "biggest," and "mightiest in the world," fitted with a cultural period in which

houses, boats, appliances, and cars grew bigger every year. Further, mega-dams give the appearance of an already existing mechanical and electrical industry. Thus, the inability to overcome staple-based growth is hidden by transformation myths and imagery, so that the idea of the existence of a secondary industry - or at least the link to an impending formation of consumer goods manufacturing - appears logical.

In the last century, as part of installing their national railways, Canadians have developed an economy with dependently developed manufacturing industries within central Canada (southern Ontario and southern Québec) and staple industries outside of the centre. During the twentieth century, Canadians have created a balkanized north/south power grid crossing the national railway at several energy axes, while the dependently developed centre de-industrializes, and staples industries and hydro developments move farther north.

CONTRIBUTION TO KNOWLEDGE

The derivation of a suitable analytical and explanatory framework (taken from the new Canadian political economy and other compatible sources) for five provincial hydro expansions in two historical periods (1900-30, 1960-86) in their provincial, national, and continental contexts constitutes the theoretical contribution of this thesis. To highlight some of these contributions, the question of how the Innis classics, the new political economy, and my approach differ

from each other in dealing with hydro-related development conceptions of state intervention, industrial linkages, overdevelopment, and "national" infrastructure formation needs to be raised.

For Innis, the public control and ownership of Niagara Falls water power was simply the outcome of previous political decisions:

The control of water power has been placed by the British North America Act, and later decisions of the Privy Council, under the provinces. Consequently, the development of government ownership in relation to hydro-electric power has been undertaken by the provinces./23

Once available, Innis had no doubt that the provision of hydro power would be a powerful agent in the development of manufacturing linkages. For Innis, even "the problems consequent to a decline in the mining towns and to the exhaustion of resources will in part be solved by a shift in the use of power in these industries to manufactures."/24 He thought that "the dangers of over-expansion [had] been avoided through a strong, healthy criticism and effective checks in the form of commissions of investigation appointed by the government."/25 In relation to water power development, Innis appears to have subscribed to the popular notions of the 1930s.

Unlike Innis' conception, the approach I take is to explain state intervention with reference to Claus Offe's "criterion of non-profitability."/26 Namely, that state intervention in the production of hydro-electricity results, primarily, from the failure by private capital to provide

unprofitable but necessary hydro-electricity for private accumulation in a variety of industries./27 Others working within the new political economy approach, including Nelles, interpret hydro utility takeovers as outcomes of historically unique class fraction cleavages between industrial capital and other interests. Conceptualizing the process of Canada's problematic formation of industrial capital has been of interest to several other new political economists, and, as a result, they have developed a variety of concepts (already discussed in Chapter 1 above).

Specifically, it is the new political economists probing relations between natural resources and industrialization and those "focusing on foreign ownership" who have developed such concepts./28 For instance, Mel Watkins' conception allows for the specification of "backward," "forward," and "fiscal" linkages from resources to industries; Glen Williams' concept of "import substitution industrialization" is suitable for analyzing dependent development within home markets; Nelles' "manufacturing conditions" are useful in assessing the degree of regulatory power over processing of natural resources that is held by provincial governments; and Naylor's conception of "industrialization by invitation," along with Faucher and Fitzgibbons' work on "nationalistic" procurement practices by provincial governments allow further spatial refinements of development analyses.

To enhance their utility, these concepts were linked to provide the method of inquiry for the five provincial cases under study. For example, the development of turbine industries were specified as backward linkages established by demanding the substitution of imports within local manufactures. Infrastructure-based and resource-based forward and fiscal linkages were conceived as dependently developed "industrialization by invitation" strategies (e.g., pulp and paper companies invited to use the "cheap" power).

While offering useful conceptions to specify industrial linkages, the new political economy has not probed deeply enough into the overdevelopment of infrastructures (e.g., railways, ghost towns, power systems). As discussed in Chapter 1, from this perspective, the roots of overbuilding are either explained as a costly "mania" (Gordon Laxer), as representative of overinvestment of foreign portfolio capital (Naylor), or as due to lack of expertise (Nelles)./29 The approach I take is to argue (with reference to Offe) that the state's planning becomes uncoordinated when it tries to match infrastructure (say, size and timing) with industrial growth which has disintegrated into domestic manufacturing, branch plant manufacture, and staple production due to having invited in external relations of economic control (e.g., the Ontario case above). Moreover, overdevelopment needed to be examined in order to determine whether or not it stemmed from building provincial infrastructures beyond public mandates in order

to serve an "uncertain" continental market. In addition, there were at least three aspects to hydro-related development ideology: the "export mentality" (as identified by Watkins) of provincial and federal members of the political elite, the belief that the availability of new hydro energy attracts industry (power is transmitted to industry instead), and the "power-hunger" of the United States, which contributed to decisions resulting in the overbuilding of hydro infrastructures.

Within the political economy tradition, the National Policy is widely used as an analytical and explanatory construct for interpreting Canadian centralized industrialization. However, the National Policy construct dates industrial development and proves limited when examining current (provincial/federal) infrastructure installations outside of central Canada. For example, Hugh Aitken overlooked the significance of provincial boundaries and expected that the all-Canadian railway and tariff-induced industrial development would be repeated, with "cheap Canadian industrial power," as a national input./30 In the case of hydro infrastructure expansions, production, design, and operating decisions are made in the provinces, while the export of energy and interprovincial trade decisions are made (or avoided) by the federal government. Without analytical attention to political decision-making over resource-based production within and across provincial political boundaries (e.g., the Labrador, Churchill Falls

problem), insights into ownership and control conflicts (as part of the National Policy formation process) are lost. I have argued, with Hughes, that linkages across political boundaries (provincial and international), especially when complex resource and infrastructure ownership relations and controls are involved, are not likely to result in a "unified national infrastructure." Given the choices by Canada's political elite, the "national" power grid, as conceived by Canadian engineers, failed.

If the national grid had been put into service by the mid-1970s, the Ingledow Group's report estimated that the benefits of implementing a National Power Network over the provincial networks would save \$644 million annually over a thirty-year period (1970-99).^{/31} Such benefits would be derived, they pointed out to federal politicians and planners from across the nation, from low-cost power sources (e.g., Churchill, Peace, Nelson) available through interconnected provincial power systems within Canada (replacing coal as fuel, and resulting in the possible avoidance of nuclear power plants). As pointed out by John Diefenbaker, "interprovincial connection and arrangements would make possible substantial economies in reserve and in capital requirements."^{/32}

The implications of the failure of a "national" energy grid from Vancouver to Corner Brook are social, financial, and environmental. One impact of the "national" grid failure is the unreliability of exports over continental inter-

connections. For example, since B.C. Hydro found itself shut out of any regular access to the California market, and having an entire dam (Revelstoke, \$2 billion) as surplus capacity, it changed from being a plant (and industrial) "development" company to a plant "operating" company. This brought massive layoffs. Since dam-building stopped, the number of employees at B.C. Hydro has declined by 5,593 (from 12,195 in 1980 to 6,602 by 1986)./33 In all of Canada, given the long-term debt of \$67 billion in 1988 (total of all major electric utilities in Canada), the average interest payments of \$7.4 billion (11 per cent in 1988), and low relative export income of \$881 million, Canadians are bearing all capital (with minor exceptions) and four-fifths of the interest costs./34

The implications of the failed "national" power grid are not only social and financial but also environmental. As a result of such infrastructure expansions, two major development-related groups became re-established or even polarized: those with development interests and those impacted by development./35 The institutional and academic responses to tensions between capitalist development practices and oppositional forces (Native Canadians, the environmental movement) were environmental and social impact assessments.

La Rusic, in his social impact assessment, documents the impact of the river regime changes and the subsequent James Bay Agreement./36 In addition to wildlife harvesting

losses, he describes how negotiating from a subordinate position produces a consultant-dependent, legalistic, and confrontational response to government-sponsored northern development./37 La Rusic's social impact assessment is a post-impact evaluation, whereas Richardson takes a definite stand in opposition to water development projects which disregard the rights of Native people and which insufficiently study the ecology before proceeding./38

The Cree, in the case of the James Bay hydroelectric development project, were, initially, treated as part of the environment that simply needed to be rearranged - they were an afterthought. That Bourassa was more concerned with the Québec and New England power markets than with the Native population was shown by his neglect to inform them about the James Bay project until after it had been announced./39 Such disregard and wasteful expansion beyond Canadian needs, despite resistance by Native peoples, make hydro overdevelopment, in Williams' words, "part of the eco-hostile basis of continental capitalism."/40

The owners of hydro power (through provincial Crown ownership) are the people of Canada - only through their resistance can this process be reversed.

NOTES

- 1 John Dales, *Hydro-Electricity and Industrial Development - Quebec 1898 - 1940*, 182, 184, 264 (footnote 1).
- 2 Roland Parenteau, "Hydro-Québec: Les relations entre l'état et son entreprise," 7-9. John H. Dales, "Montreal Light and Power Company, 1915-1940," *Hydroelectricity and Industrial Development -- Quebec 1898-1940*.
- 3 "The first Act relating to the Upper Churchill is an act

cited as the Government-British Newfoundland Corporation Limited-N.M. Rothschild & Sons (Confirmation of Agreement) Act 1953 (the 'Brinco Act'). This act, as its name implies, approved the execution and delivery of an agreement (the 'Brinco Agreement') between the Lieutenant-Governor in Council (the 'Government') and N.M. Rothschild & Sons, who had brought about the incorporation of Brinco." Judgment of Goodridge, J. 6 July 1982. Supreme Court of Canada, 1976 No. 812, Attorney General versus Churchill Falls (Labrador) Corporation, 4-5.

- 4 Philip Smith, *Brinco*, 376.
- 5 Canada, Statistics Canada, Industrial Organization and Finance Division, Corporations and Labour Unions Returns Act, cat. 61-517, April 1988.
- 6 Wallace Clement, "Regionalism as Uneven Development: Class and Region in Canada."
- 7 The "Monthly economic bulletin of the Québec Department of Industry and Commerce September 1975," first indicates that "James Bay" is a "\$12 billion project" and then claims: "One of the world's largest projects in the '70's, the development of the James Bay region will be the cornerstone of Québec's economic growth in the post-1980s era." Robert Bourassa, *James Bay*, 71.
- 8 Mitchell Sharp, House of Commons (Ottawa), 8 October 1963, Session 1963, 3,300.
- 9 Reprint from the 16 May 1980 issue of B.C. Hydro's employee newspaper, *Intercom*.
- 10 For similar denials of creating surpluses for export, see the National Energy Board, *Hydro-Québec Hearing Transcript* November 17, 1974, 105, 125.
- 11 James Schlesinger, "Foreword," in Robert Bourassa, *Power from the North*, ix-x.
- 12 Energy, Mines and Resources. *Electric Power in Canada 1988*, 34.
- 13 By April 1992, two major contracts Hydro-Québec counted on for its further James Bay expansion, the \$15 billion Maine contract and the \$17 billion New York contract, fell apart. *Ottawa Citizen*, "Hydro-Quebec may cut back," 28 March 1989. *Vancouver Sun*, "Lost Contract a Blow for Bourassa," by Peter Maser and Ian Austen, 2 April 1992.
- 14 British Columbia Utilities Commission, *Site C Hearings*, 10 February 1982, Fort St. John, Mr. Overstall, vol. 26, 4,339.
- 15 Dal Grauer, "The Export of Electricity from Canada," cited statement by Mackenzie King, 1929.
- 16 Canada, National Energy Board (NEB), *Report to Governor in Council: Quebec Hydro-Electric Commission*, September 1976, 5.
- 17 Canada, NEB, *Reasons for Decision, Hydro-Québec*, January 1984, 1. See Chapter 3 above.
- 18 Canada, NEB, *Reasons for Decision, Manitoba Hydro-Electric Board*, September 1976, 1.
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- 26 Claus Offe, *Strukturprobleme des kapitalistischen Staates*, 54.
- 27 Claus Offe, "Tauschverhältnis und Politische Steuerung: Zur Aktualität des Legitimationsproblems," 54.
- 28 Neil Bradford and Glen Williams, "What Went Wrong? Explaining Canadian Industrialization," 61, 56.
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- 30 Hugh Aitken, "Defensive Expansionism: The State and Economic Growth in Canada," 220.
- 31 T. Ingledow, "National Power Network Stage II Assessment: Volume I," 21.
- 32 John Diefenbaker, prime minister, letter dated 17 January 1962, sent to all provincial premiers. It was an invitational letter to the premiers for a conference in Ottawa, where they, accompanied by their technical experts, could "discuss with Federal Ministers the basic problems associated with the development and transmission of electric power within Canada." Unpublished Sessional Papers, 24th Parliament, Session 5.
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APPENDIX I

Figure 2.1 Diagram of Hydro-Electric Generating Station with Turbine and Generator Detail

Source: The Canadian Encyclopedia, Edmonton: Hurtig
1988, 680

A P P E N D I X II

Table II.1
The Niagara Falls Power Company List of Short-Distance
Industrial Customers

NIAGARA FALLS, NY		
Name	Max. Power H.P.	Trans- mission Dist. Miles
The Pittsburg Reduction Company	8,000	0.46
The Carborundum Company	5,000	0.38
Union Carbide Company	15,000	2.
Niagara Electro-Chemical Company	2,000	0.75
Niagara Falls Lighting Company	1,000	0.14
International Railway Company	1,500	..
The Niagara Falls Water Works Company, hydraulic power	300	
International Paper Company, hydraulic power	8,000	..
Castner Electrolytic Alkali Company	7,000	0.85
Niagara Development Company	100	1.23
Oldbury Electro-Chemical Company	1,500	2.18
Electrical Lead Reduction Company	500	0.19
International Acheson Graphite Co	1,000	0.28
Acetyvone Manufacturing Company	50	0.95
Roberts Chemical Company	500	1.90
Francis Hook and Eye and Fastener Co.	15	0.47
Norton Emery Wheel Company	650	0.95
The Natural Food Company	1,500	0.66
Romapo Iron Works	500	1.70
By-Products Paper Company	500	0.19
The Composite Board Company	200	0.34
Atmospheric Products Company	50	0.47
NIAGARA FALLS, ONTARIO		
A.C. Douglas, contractor	400	3.
M.P. Davis, contractor	300	3.7
A.C. Jenckes, contractor	200	3.5
The Carborundum Company	200	3.6
Niagara, St. Catherines and Toronto Ry	500	3.8
Lighting Company	500	3.4

"The Figures given are for maximum power used in each case. Since the maximum in the various plants does not occur at the same time, the resultant maximum at the power house is somewhat less than their sum. At present it amounts to about 75,000 e.h.p."

Source: The Niagara Falls Electrical Handbook, 1904, 81-6

Table II.2
Niagara Falls Power Company List of Long-Distance
Industrial Customers

Name	Max. Power H.P.	Trans- mission Dist. Miles
TONAWANDA		
International Railway Company	1,500	
Tonawanda Board and Paper Company	1,200	15
Buffalo Bolt Company	160	14
Phillip Houck Milling Company	142	14
F.J. Alliger Company	107	15
Adamite Abrasive Company	50	14.5
Orient Manufacturing Company	20	14
Felton School	22	14
LOCKPORT		
Lockport Lighting Company	500	25
International Railway Company	1,000	26
OLCOTT		
International Railway Company	1,000	39
BUFFALO		
Buffalo Railway Company	7,000	27
Buffalo General Electric Company	6,000	27.6
The Charles G. Curtiss Company	125	25.5
McKinnon Dash Company	100	24.4
Pratt & Letchworth	233	24.5
W.W. Oliver Manufacturing Company	15	24.7
Acme Steel and Malleable Iron Works	50	24.8
N.Y. Car Wheel Works	200	24.3
National Battery Company	90	26.3
Standard Plaster Company	100	25.5
Great Northern Elevator Company	900	29.5
Buffalo Dry Dock Company	133	30
Electric Grain Elevator	200	30.7
Barcalo and Boll Manufacturing Co	60	30
Schoellkopf & Company	50	30
Iron Elevator and Transfer Company	165	30
Great Eastern Elevator	900	30
Sidney Shepard & Co	100	30
J.I. Prentiss & Co	30	29
Edward Elsworth & Co	150	30
American Agricultural Chemical	125	32
Jacob Dold Packing Company	100	32.5
Empire Bridge Company	90	33
Buffalo Elevating Company	950	29
John Kam Malting Company	225	24.3

TABLE II.2 cont'd
Niagara Falls Power Company List of Long-Distance
Industrial Customers

Name	Max. Power H.P.	Trans- mission Dist. Miles
BUFFALO (Continued)		
American Brake Shoe and Foundry Co.	40	33.2
Buffalo Cereal Company	375	30.3
Taylor Signal Company	65	25.5
Snow Steam Pump Works	150	33.3
Wood & Brooks Company	100	24.4
U.S. Rubber Reclaiming Works	995	31.7
American Radiator Company	200	24
Cumpson-Prentis Coffee Company	30	29.1
Duffy Brothers & Nellis	50	33.5
Buffalo Foundry Company	240	35.1
H.O. Mills	255	29.3
Jewett Manufacturing Company	30	24.8
Buffalo Pitts Company	187	35.5
Buffalo Break Beam Company	30	25
Buffalo Dental Manufacturing Company	20	35.5
Keystone Manufacturing Company	25	24.8
R.L. Ginsburgh & Sons	33	34
Buffalo Weaving and Belting Company	65	25.5
H.W. Dopp & Co	10	25
Frontier Iron Works	15	25
The Crosby Company	50	33
Lackawanna Steel Company	70	29.4
West Manufacturing Company	40	28
Buffalo Gasoline Motor Works	20	25
Pratt & Lambert	10	24.5
Wegner Machine Company	40	29
Spencer Kellogg Company	500	29.2
Hygiene Food Company	300	32.3
Collins Baking Company	50	33.2
George Urban Milling Company	450	34.5
Niagara Mill and Elevator Company	100	26
D.L. & W.R.R. Shops	150	34.5
Ryder Belt and Cordage Company	65	24.7
United States Headlight Company	40	26
George E. Laverack Building	100	28.2
Buffalo Structural Steel Company	30	26
J.N. Adam & Co	100	28.2
Genesee Hotel	100	28.1

"The Figures given are for maximum power used in each case. Since the maximum in the various plants does not occur at the same time, the resultant maximum at the power house is somewhat less than their sum. At present it amounts to about 75,000 e.h.p."

Source: The Niagara Falls Electrical Handbook, 1904, 81-6

Table II.3
 Hydro Plants with a Generating Capacity of 100 MW or more
 and Inventory of Prime Mover and Electric Generating
 Equipment
 Installed in Ontario
 1905-30

	Capacity Kilowatts of Plant	Year(s) of Turbine * Installations & Manufacturer*	Year(s) of Generator ** Installations & Manufacturer
ONTARIO (1905-30)			
Ontario Hydro			
Ontario Power Sir Adam Beck #1	101 484 528 000	1905-13 JMV, WSM 1921-4 WSM, DEW CRMP	1905-13 WE, CGE 1922-86 CWES, CGE

Source: Statistics Canada, cat. 57-206, 31 December 1986

* Turbine Manufacturers: J.M. Voith (JMV), Welman Seaver Morgan (WSM), Dominion Engineering Works (DEW), W.M. Cramp (CRMP)

** Generator Manufacturers: Western Electric (WE), Canadian General Electric (CGE), Canadian Westinghouse (CWES)

Table II.4
Hydro Plants with a Generating Capacity of 100 MW or more
and Inventory of Prime Mover and Electric Generating
Equipment Installed in Ontario
1905-71

	Capacity Kilowatts of Plant	Year(s) of Turbine Installations & Manufacturer	Year(s) of Generator Installations & Manufacturer
ONTARIO (1905-71)			
Ontario Hydro			
Ontario Power	101,484	1905-13 JMV, WSM	1905-13 WE, CGE
Sir Adam Beck #1	528,000	1921-4 WSM, DEW, CRMP	1922-86 CWES, CGE
Abitibi Canyon	328,500	1933, '76 CAC, DEW	1933-79 CGE
Barrett Chute	172,000	1942-68 CAC	1942-68 CGE
Decew Falls #2	128,000	1943-7 JMV	1954-5 CGE
Stewartville	174,000	1948-69 CAC	1948-69 CGE
Chenau	136,000	1950-1 DEW	1950-1 CGE
Des Joachims	400,000	1950-1 DEW	1950-1 CWES
Pine Portage	143,000	1950, '54 CAC, SMS	1950-4 CWES
Otto Holden	216,000	1952-3 CAC, JI	1952-3 CWES
Sir Adam Beck #2	1,288,000	1954-8 DEW	1954-8 CGE, CWES
Sir Adam Beck PGS	186,000	1957-8 EE	1957-8 CWES
Robert H Saunders	960,000	1958-9 EE	1958-9 CGE, CWES
Otter Rapids	184,000	1961-3 CAC	1961-3 CGE
Little Long	121,600	1963 EE	1963 CWES
Harmon	129,200	1965 EE	1965 CWES
Kipling	125,400	1966 DEW	1966 CWES
Mountain Chute	150,000	1967 EE	1967 CWES
Aubrey Falls	137,000	1969 DEW	1969 CGE
Wells	214,000	1970 DEW	1970 CGE
Lower Notch	240,000	1971 DEW	1971 CGE

Source: Statistics Canada, cat. 57-206, 31 December 1986

Table II.5
Industrial Power Applications (1922) in Ontario

An inventory of industrial power users, their application date, the product or business constituted in September 1920 (Source: Ontario Hydro Archives, file: OR-510, Corporate Relations, Municipal Customers. General. September 1922)

INDUSTRIAL POWER APPLICATIONS				
Municipality	Name of Customer	Date of Appl.	Product or Business	H.P. Applied for
LONDON	Ford Motor Co.	Feb. 1920		1,000
	C.S. Hyman	May 1919		200
	Murray Shoe Co.	do.		75
	London Box Co.	Nov. 1919		100
	H.C. Gillis	Jan. 1920		75
	Lawson & Jones	do.		30
	Canadian Electric Co.	do.		3
	W.E. Sounders	do.		3
	D.S. Perin & Co.	Sept. 1919		50
	Hall-Dent	Jan. 1920		6
	Middlesex Mills Co.	do.		25
	Canadian Overall	Jan. 1920		3
	Holeproof Hosiery Co.	Jan. 1919		150
	Ross Ltd.	Jan. 1920		12
	Advertiser Job	do		10
	Webster Constr.	Nov. 1919		25
	Lochlin Brick Y.	Jan. 1920		25
	Walkers Brick Yard	do		30
	Cawrse Brick Yard	do		25
	McOrenere Brick Yard	do		25
	Victor Amusement Co.	do		30
	London & Port Stanley Rlwy	Nov. 1919		500
	Railway			
				
	Raleigh Co.	Jan. 1920		50
	Republic Truck Co.	do		500
	Canada Oil Co.	Nov. 1919		20
	Loew's Theatre	Aug. 1919		25
	Allen's Theatre	Aug. 1919		25
	Hyatt Bros.	Feb. 1920		10
	Beatty Bros.	do		50

Table II.5 (continued)
Industrial Power Applications (1922) in Ontario

LONDON (cont'd)

Carling Brewing & Malting Co.	Feb. 1920		10
London Paper Box	Feb. 1920		3
London Shoddy Mills	do		25
Henry & Colerick	do		5
I X L Spice	do		10
Dextle & Willetts	do		7
W. Peltet	do		10
L'Air Liquide Soc.	Aug.		150
The Nut Krust Co.	Feb. 1920		100

GUELPH

F.E. Partridge Rubber Co.	Aug. 28/19	Rubbers	100
Northern Rubber Co.	do	Rubbers	250
....			
Sterling Rubber Co.	do	Rubbers	25
Guelph Carpet & Worsted Spinning International	Nov. 3/19	Carpets	500
Malleable Iron Co.	do	Castings	200
Taylor Forbes	Nov. 26/19	Machinery	125

STRATFORD

Nut Crust Co.,	Jan. 1920	Bread	80
Can. Edison Appl.	Oct.	Elec. Appl.	300
Grosch Felt Works			35
Schellenberger			25

Table II.5 (continued)
Industrial Power Applications (1922) in Ontario

WOODSTOCK	Woodstock Wagon & Mfg. Co.	Nov. 5/19		125
	Hay and Co. Ltd.	Dec. 6/19		150
	Jas. Stewart Mfg.	Jan. 1/20		25
	Thomas Organ Co.	do		15
	Canada Furniture Ltd.	Jan. 20/20		100
	Peerless Cereal Mills	Nov. 1919		20
	Bain Wagon Co.	July 1919		75
	Warren & Sons	Nov. 1919		30
	Brunswick Products	Aug. 1919		200
	Carn Piano Co.	Jan. 1920		100
	Breithaupt Leather Co.	Nov. 1919		10
	Bean and Westlake	Dec. 1919		10
	Worsted Spinning Company	Apr. 1919		50
	Canadian Linderman Co.	Jan. 12/20		50
BRANTFORD	Robins & Meyers	Feb. 18/20	Motors	300
	Robins & Meyers	Aug. 15/19	Motors	300
	Hamm & Nott	Jan. 2/20	Kitchen	200
	Brantford Tin Smelting Co.	Sept. 1/19		300
	Brantford Oven & Rack Company	Oct. 1/19	Ovens	45
	Watrous Engine Works	Jan. 2/20	Engines	400

Source: Ontario Hydro Archives, file OR-510, Corporate Relations Municipal Customers General, Municipal and Industrial Customer Tabulation, circa September 1920

Table II.6
Ontario (1911) Hydro-Electric Power Commission Survey

The chief engineer of the Hydro-Electric Power Commission prepared a survey, submitted to Adam Beck 29 August 1911, of industrial and other uses of electrical power in order to consider the extension of transmission lines from Guelph to municipalities further north.

MOUNT FOREST. Population 1500 to 1800

They have a municipal electric light and water works plant....

Coal consumption 35 tons per month, three quarter lump, costs \$4.34 per ton, f.o.b. town. Town have approximately 1000 lights connected and sixty transformers in service ranging from 20 to 200 lights. The lighting plant operates from dark until 1 a.m. could use 75 H.P. Attached is Municipal Report for 1910.

Ernst Bros. (Threshing Machine Manufacturers).

Output 18 to 24 machines per year. Have 25 H.P. engine; burn wood altogether, costs \$ 2,00 per cord; use 200 cords per year; operate 10 hours a day. Could use 20 H.P. motor.

Woolen & Grist Mill.

Owned and operated by Mr. Murphy, utilizing two water powers on the South Saugeen River, owning all water rights. At one development is a 14 ft. head at which two 48" wheels and one 40" wheel is installed; the other development having 6ft. head and one 48" wheel. The above wheels are all Vulcan. As a standby for low water he has a 80 H.P. engine, which he states he uses about one month to six weeks in the year. No demand.

Mount Forest Casket Company.

Have a 60 H.P. Engine belt driven to shafting; burn refuse altogether. Operate about three days in the week; ten hours a day. No demand.

Table II.6
Ontario (1911) Hydro-Electric Power Commission Survey
cont'd

Mount Forest Carriage Company.

Have an 80 H.P. Engine; use refuse and coal. Could possibly use 40 H.P. motor capacity.

Mount Forest has had set backs from the industries settled there, for which bad management was advanced as a cause. However, up to the present no attempt has been made to improve the lighting or power situation in the town. TOTAL OF MOUNT FOREST POWER - 100.

HANOVER. Population 1500 to 1800

The Town have a Municipal Water Work system driven by one of 30 H.P. wheel operating from a water power development on the Saugeen. The majority of the industries here are wood-working and furniture factories, using waste or refuse and under boilers in various quantities. The largest plant (Knechtels) state they have sufficient refuse for all purposes.

The other factories can use power to advantage, the greatest power users being the Hanover Portland Cement Company, Mr. Knechtel, the manager, stating they could use 300 to 400 H.P. as their water power development is inadequate and unsatisfactory from which they suffer for two month or more by low water and for which they have a steam plant installed.

The Ball Furniture Company

State that they could use from 50 to 75 H.P. The present lighting of the Town is had through Herman Greitzner; operating a water power on the South Saugeen about two and a half miles from town. There are four wheels, three Barber and one Kennedy totaling 300 H.P. approximately. The head is 9 ft. Wheels are connected and 19 arc light from the town, deriving an income from the Town of \$600.00 per year. The load is from 36 to 38 amperes per phase in the winter time and about 20 amperes in the summer. This plant also supplies Carlsruhe & Neustadt with lighting. About 27 H.P. supplied in small motor capacity in the town; rates for lighting and power vary. Town lighting is from dark to 12 p.m. Considerable dissatisfaction was expressed by business men and citizens of price charged and unsatisfactory service given.

Table II.6
Ontario (1911) Hydro-Electric Power Commission Survey
cont'd

J. J. Spiesz. Furniture Factory.

Have a 125 H.P Goldie McCulloch Engine; burn refuse and coal. Coal Bill for 1910 was \$500.00. Could use 50 to 60 H.P. The amount of power Hanover could use has been based on 300 H.P.

{The report could also be integrated as an example of how the Commission designed its demand.}

MEAFORD.

The Georgian Bay Milling & Power Company operate water power on the Big Head River about a mile and a half from town. This Company have [sic] two power sites, another one about a mile below the above mentioned, and the oldest one at which they operate a flour mill.

...
The Georgian Bay Milling & Power Company have [sic] a perpetual franchise for the sale of [hydrol] electrical energy in the town, given them in 1905, and have an agreement with the Town for street lighting which expires in October 1913. They have no agreement for house lighting or any rate agreement covering same, operating with passive consent for the Town Council.

...
At present there is a by-law before the people to be voted on in a couple of weeks, information of which is briefly as follows:-

A 500,000 bushel elevator was built in Meadford some years ago by a Detroit firm. This has been leased and operated to Moore Brothers, or the Georgian Bay Milling & Power Company, who have operated the past two or three years. The Detroit firm who hold the Bonds in Trust have offered the Bonds to the Georgian Bay Milling & Power Company at a certain figure. They, in order to finance the scheme, are asking the town to loan them 16,500.00.

The Georgian BAY Light & Power Company already owe the Town \$6000.00, money advanced them for the present plant, which would mean a total indebtedness to the town of \$22,500.00.

Table II.6
Ontario (1911) Hydro-Electric Power Commission Survey
cont'd

This loan (\$16,500.00) is to cover a period of 15 years, to be paid back principal and interest. As security for the above Company offered the Town the electrical light and power plant. Another clause in the agreement is that the Town, at the expiration of the present agreement between the Company and the Town renew the lighting contract from year to year for a period of three years: furthermore stating that if Hydro-Electric or any other Company desire to operate in the Town they may do so by buying out the Georgian Bay Power plant; and that if in the three years following the expiration of their agreement with the Town in 1913 the Hydro-Electric come into town the Georgian Milling & Power Company agree to reduce their rates to meet theirs. Comment on the above clauses is unnecessary.

My interpretation of the by-law as given to the Mayor and Town Clerk was that the Town receives nothing for this loan the securities offered by the Georgian Bay Milling & Power Company would be only good as long as the Town further contracted with them for light and power in the town, and they were practically giving them a fifteen year extension of their franchise without any desirably conditions. The present rates were too high and in this agreement there was no reference at all a to the service, the rate, or in fact any protective clause whatsoever for the Town, and that this matter should receive their careful attention.

Mr. Albery, Town Clerk, was to mail us copy [sic] of the franchise and agreements etc; between the Georgian Bay Milling & Power Company and the Town.

The following are the industries of Meaford, giving the approximate demand if Hydro-Electric power were available:

The Meaford Canning Company.

Operate six or seven month in the year, 10 hours a day; burn three quarter lump, costs \$ 4.20 per ton. Could use 20 H.P. motor capacity.

The Meaford Wheelbarrow Company

Have two 150 H.P. Boilers, one 200 H.P. McEwan Engine: burn from 25 to 30 ton of coal per month, coal costs \$4.10 per ton. As they burn part refuse, and steam is required for kilns, benders etc., they could use 75 H.P. motor capacity.

Table II.6

Ontario (1911) Hydro-Electric Power Commission Survey
cont'd

The Meaford Manufacturing Company (Parlor & Dining Room Suites).

Have two 175 H.P. boilers, one 175 H.P. Engine (Wheelock) However, there is a market almost altogether edging slabs, etc. However, there is a market for this material, and they could under certain circumstances use 100 H.P.

Seaman, Kent & Company (Hardwood Flooring)

They have three coilers (sic) size 18 x 72 pounds steam pressure, and one 500 H.P. engine and two 50 H.P. engines. They operate waste or refuse altogether and for driving certain other machines could use from 30 to 40 H.P. only.

Charles Barber (Water Wheels).

They have a 25 H.P. engine; coal costs approximately \$400 per year. Could use H.P. motor capacity.

James Sparling (Planing Mill).

The have a 25 H.P. engine, burn about three cars of coal per year a cost of 4.25 per ton; burn in addition refuse. Could use 20 H.P. motor capacity.

Randall Woolen Mills.

Operating from water power on the Big Head River; Dam timber construction 11 ft. head, 50 to 75 H.P. ten months in the year. No demand.

W. A. Moore (Mantle Makers).

"Have a 75 H.P. boiler and a 40 H.P. engine; burn coal and refuse. Could use 25 H.P.

...

Georgian Bay Milling & Power Company.

Have two 24" Barber Water Wheels (possibly made by Barber above) operating under a 48 ft. head direct connected to 200 KW 2300 volt, 50 amp. A.T.B., C.G.E. generator, form B.

They have no power or motor load in town, supplying street and other lighting only. From information received they have approximately 5500 lamps connected, receiving a gross income of 10,000.00. This includes the town lighting.

I understand from Mr. Moore their maximum load somewhere near Christmas time was 250 to 300 H.P. while at the present season it is between 150 to 200 H.P.

Meaford's estimate for power has, therefore, been made on a 250 H.P. basis.

Source: Archival Folder 3, Sir Adam Beck, General (1911); power survey of towns and their industries for Adam Beck, 29 August 1911

A P P E N D I X I I I

Table III.1
Manufacturers of Turbines and Generators
Installed in Quebec hydro plants larger than 100 MW
(1911-86)

Equipment Manufacturers		# of Main Turbines Installed	# of Main Generators Installed
		Que	Que
AC	Allis Chalmers.....	13	
ASEA	ASEA.....		1
ASM	Alsthom Savoisine, Marine Ind.		8
CAC	Canadian Allis - Chalmers.....	32	
CGE	Canadian General Electric.....		107
CWES	Canadian Westinghouse.....		82
DEW	Dominion Engineering Works....	134	1
EE	English Electric.....	19	
GE	General Electric.....		10
IPM	I.P. Morris.....	27	
MIL	Marine Industries Ltd.....	28	38
MVIC	Metropolitain - Vickers.....		4
NEYC	Neypric.....	8	3
OERL	Oerlikon.....		1
SMS	S. Morgan Smith.....	10	
WEST	Westinghouse.....		1

Source: Statistics Canada, cat. 57-206, 31 December 1986

Table III.2
Installation Chronology of Turbines and Generators by Different
Manufacturers in Quebec Hydro Plants Larger than 100 MW
(1911 -86)

	Capacity Kilowatts of Plant	Year(s) of Turbine Installations & Manufacturer	Year(s) of Generator Installations & Manufacturer
QUEBEC (1911-86)			

Hydro Quebec			
Shawinigan #2	173,100	1911-29, '86 IPM, DEW	1911-29, '86 CWES, CGE, WEST, GE
Les Cedres	162,000	1914-24 IPM, WSM, DEW	1914-24 CGE
Grand-Mere	149,575	1915-22 IPM, '84, DEW	1915-22, '84 CWES
Chelsea	144,000	1927-39 DEW	1927-39 CWES
Paugan	229,475	1928-86 DEW	1928-86 CWES, CGE
apide Blanc	186,600	1934-43 IPM	1934-43 CWES
		1955-85 DEW	1955-85 ASEA, DEW
Beauharnois	1,639,060	1932-53 DEW, CAC	1932-86 CGE, OERL
		1959-61 EE	CWES
		1981-6 DEW	1981-6 GE
La Touque	220,000	1940-85 DEW	1940-85 CGE, GE
Trenche	297,000	1950-85 DEW	1950-85 CGE, GE
Bersimis #1	912,000	1956-9 EE, NEYC	1956-9 MVIC, CGE
Beaumont	243,000	1958-9 CAC	1958-9 CGE
Bersimis #2	655,000	1959-60 DEW	1959-60 CGE
Carillon	654,500	1962-4 DEW	1962-4 CGE
Manic #2	1,015,200	1965-7 DEW	1965-7 CGE
Manic #1	184,410	1966-7 CAC	1966-7 NEYC
Rapide des Iles	146,520	1966-73 DEW	1966-73 CWES
Premiere Chute	124,200	1968-75 DEW	1968-75 CWES
Outardes #4	632,000	1969 NEYC	1969 CGE
Outardes #3	756,200	1969 DEW	1969 CGE
Manic #5	1,292,000	1970-1 MIL	1970-1 MIL
La Gabelle	136,580	1970-5 DEW	1970-5 CWES
Manic #3	1,183,200	1975-6 DEW	1975-6 MIL
Outardes #2	453,900	1978 MIL	1978 MIL
L G 2 (La Grande)	5,328,000	1979-81 DEW, MIL	1979-81 CGE, ASM
L G 3	2,304,000	1982-4 DEW	1982-4 MIL
Shawinigan #3	171,900	1983-4 DEW	1983-4 CGE
L G 4	2,650,500	1984-6 MIL	1984-6 MIL

Source: Statistics Canada, cat. 57-206, 31 December 1986

Table III.3
Local Content of the La Grande Phase 1 Project

Outlays	Investment (millions \$) %		Quebec's share (millions \$) %		Local Content (millions \$) %	
Wages & Salaries	4,404	55	4,404	100	4,404	55
Good & Services	3,662	45	1,669	46	1,669	21
Total	8,066	100			6,073	76

Source: Hydro-Quebec, direction Recherche économique, "Les retombées économiques québécoises du compte de la Grande Phase 1", *Information-Cadres*, vol. 4, no. 11, novembre 1981, pp. 29 à 38./1

Table III.4
Provincial Electricity Imports and Exports
 (GW.h)

Province	Year	International Trade		
		Exports	Imports	Net Exports
Quebec	1983	10,128	8	10,120
	1984	11,250	8	11,242
	1985	9,581	3	9,578
	1986	12,674	35	12,639
	1987	16,401	-	16,401
	1988	11,863	86	11,777

Source: Canada, Energy, Mines and Resources, *Electric Power in Canada 1986*, table A5, p. 57; *Electric Power in Canada 1988*, table A5, p. 77

Table III.5
Canadian Electricity Exports by Exporter and Importer 1988

Exporter	Importer	Revenue (\$000)	Quantity (GW.h)
Hydro-Quebec	Boston Edison Co. (Mass.)	9,167	214
Hydro-Quebec	Montaup Electric Co (Mass.)	2,765	64
Hydro-Quebec	Citizens Utilities Co (Verm)	6,956	181
Hydro-Quebec	Vermont Joint Owners (Verm)	10,949	448
Hydro-Quebec	Verm. Dep't of Publ. Serv.	47,434	1,157
Hydro-Quebec	Vermont Marble Company	142	3
Hydro-Quebec	New England Power Pool	11,407	3,931
Hydro-Quebec	Niagara Mohawk Power Co. (New York)	38,562	1,339
Hydro-Quebec	New York Power Authority (New York)	118,249	4,525

Source: Canada, Energy, Mines and Resources, *Electric Power in Canada 1988*. p. 79

A P P E N D I X I V

Table IV.1

Purchases in Newfoundland by the Churchill Falls
(Labrador) Corporation by 1972

Company	Material	Total Quantities	Total Dollars
-----	-----	-----	-----
Nesco	Rebar	14,350 Tons	2,296,000
N.S. Cement Co.	Cement	97,686 Tons	2,410,560
Standard Mfg. Co.	Paint	19,700 Gallons	157,702
Nfld. Margarine Co	Margarine		138,625
Nfld. Brewers	Beer	358,428 Cases	1,376,363
Alcan (Cdn.) Prod.	Alum.Cond.	4,724 Miles	10,880,386

		Total	\$ 17,259,636

CFLCo Purchases through Manufacturers Newfoundland Agents			1,801,358

			\$ 19,060,994

Source: "Brinco in Newfoundland: A Summary," n.d., approx.
date late 1971, stamped Confidential, Churchill Falls
(Labrador) Corporation, National Archives, Ottawa, MG 28
III. vol. 1, file 7

Table IV.2
Costs of the Churchill Falls Project
by 1972
(\$ Millions)

The Churchill Falls (Labrador) Corporation in its report entitled "Churchill Falls Power Project: Project Management Concepts" issued in Montreal, February 1971, breaks down the \$946 million total cost for the project in the following way:

Funds Required	in Millions
Storage and Forebay	\$ 115
Power Plant and Generators	168
Switchyard and Transmission	100
Permanent Support Facilities	25
Temporary Facilities and Services	83
Management and Engineering	31

	\$ 522
Escalation	102
Contingency	41

Direct Construction Costs	\$ 665
Interest During Construction	189
Administration, Overhead and Miscellaneous	92

Total	\$ 946

Source: Churchill Falls (Labrador) Corporation Limited,
"Churchill Falls Power Project: Project Management
Concepts," Montreal, February 1971, Fl. National Archives,
Ottawa, MG28 III 73, vol. 1

Table IV.3
Electricity as a Percentage of Cost of Production (1966)

(Shows how little the link between industrialization and hydro development is understood, or how, in the 1960s, the industrial optimism allowed the ignoring of facts)

While electricity may not be the main factor in attracting industry to a specific location, a sufficient and dependable supply is essential.

For most industries, the cost of electricity is a very small item in the cost of producing. This is illustrated by the following tabulation, which gives, for a few industries, the proportion of the cost of electricity to the total cost of production in Canada:

	%
Agricultural Implements.....	0.29
Automobiles.....	0.09
Boots and Shoes.....	0.19
Cotton Yarn and Cloth.....	0.94
Clothing.....	0.15
Electric Apparatus and Supplies.....	0.34
Machinery.....	0.32
Petroleum Products.....	0.21
Rubber Goods.....	0.56
Slauthering and Meat Packing.....	0.12

For the following industries, the cost of electricity represents a higher proportion of the total cost of production:

	%
Abrasive Products.....	5.56
Acids, Alkalies and Salts.....	6.80
Artificial Ice.....	5.25
Cement.....	3.60
Compressed Gas.....	3.20
Fertilizer.....	2.03
Non-ferrous Smelting and Refining (Quebec)....	7.65
Primary Iron and Steel.....	4.04
Pulp and Paper (Quebec).....	3.83

(In the newsprint industry in eastern Canada, this figure is higher, amounting to 5% to 6%)

Woodenware.....2.02

The above figures are taken from "Highlights of Electric Power in Canada," prepared by Huet Massue, The Shawinigan Water and Power Company, 1954

Source: Report of the Royal Commission on Electric Energy. Government of Newfoundland and Labrador, February 1966, 61 62. Library of the National Energy Board, Ottawa.

Table IV.4
Turbine and Generator Contract,
Press Release Churchill Falls

FOR RELEASE A.M.'s, FRIDAY, JUNE 30, 1967

MONTREAL -- Churchill Falls (Labrador) Corporation Limited today announced a contract award with an estimated value of \$50 million for the supply of 10 turbines and generators, with related auxiliary equipment, for the hydro-electric project under way in Labrador.

The announcement was made by Donald J. McParland, president and chief executive officer of Churchill Falls, who stated that the machines would be about twice the size of any hydro equipment presently in operation or under manufacture on this continent, and that over 90 per cent of the equipment would be manufactured in Canada.

Manufacture and installation of the equipment will be carried out by a group of three Canadian companies comprising Canadian General Electric at Montreal; Dominion Engineering Works at Lachine, Que., and Marine Industries at Sorel, Que.

More than 75 per cent of the equipment will be manufactured directly in the Province of Quebec, with certain items such as excitation equipment and control boards being manufactured in Ontario. Procurement outside of Canada will be limited to main shaft forgings, certain specialty components for thrust bearings, and similar items not manufactured in Canada.

The 10 turbines, each designed to develop over 600,000 horsepower from the 1060 foot net head available, will be coupled to ten 200 RPM generators rate at 4,500,000 kilowatts output. The capacity of anyone of the generators would be sufficient to supply the entire power requirements of a modern city with a population of about 300,000 persons.

The height from the top of each generator to the heel of the turbine draft tube will be 90 feet, the height of a nine-story building. Combined weight of the rotating elements, consisting of the turbine runner, the connecting shaft and the generator rotor, will be in the order of 850 tons.

It is estimated that this contract will provide approximately seven million manhours of work for employees of the three companies and their suppliers. This is roughly equivalent to full time employment for between 500 and 700 men for a period of six years, and is typical of the impact which the Churchill Falls project will have on the economy of eastern Canada.

A P P E N D I X V

Table V.1
Electrical and Steam Power used by Business and
Manufacturing in Brandon, Manitoba,
during 1916

[Users in 1916]	(H.p.) electr. motor, steam
City of Brandon Street Railway	937
Street lighting	170
Water works	150
Maple Leaf Milling Co.	155 electr.
West Canada Milling Co.	75 electr. & st.
Provincial Insane Asylu	237 electr.
Prince Edward Hotel	77 electr.
Brandon Brewing Co.	11 electr. & st.
Empire Brewing Co.	50 electr.
Int. Harvester Corp.	30 electr.
E. L. Christie [book & paper store]	33 electr.
A. E. McKenzie [dept. store]	35 electr.
Crescent Creamery Co.	45 electr.
Stover Gas Engine Works	25 electr.
Manitoba Pump Co.	25 electr.
Brandon Creamery & Supply Co.	25 electr. & st.
Sixty smaller plants, stores, etc. where the connected load is less than 25 H.p. [ind. bus. & offices]	
Canadian Pacific Ry. Co.	446 electr.
Canadian Northern Ry. Co.	120 steam
Brandon Steam Laundry	100 steam
West Canada Milling Co.	35 electr. & st.
Small private steam and gasoline plants	
	235 --- 27 electr. -----
Total	
	3043

There is no question but that if a way could be found, a contract could be made for a minimum of 3,000 H.p. The rate discussed was \$35.00 per H.p. per year, giving a guaranteed annual gross income of \$105,000.00.

Source: L.E. Myers Co., Construction and Management of Public Utilities, "Plan for Distributing Power over a Portion of Manitoba," report prepared for Mr. Samuel Insull, president, Middle West Utilities Co., Chicago, Illinois, 12 July 1916, 16-18, Provincial Archives of Manitoba, RG 22 box 6

Table V.2
Manitoba Hydro's
50 Largest Industrial Customers (1989)

1. International Nickel Co.
2. Hudson Bay Mining & Smelting
3. Interprovincial Pipeline Ltd.
4. Abitibi Manitoba Paper
5. Manitoba Rolling Mills
6. Simplot Chemical Co.
7. REPAP
8. Hudson Bay Mining & Smelting - Ruttan lake
9. Can. Occ. Petroleum Inc.
10. University of Manitoba
11. Griffin Steel
12. CNR - Transcona
13. Metro Pumping Stn. - Bergen Cut Off
14. Carnation Foods
15. Hudson Bay Mining & Smelting - Namew
16. Bristol Aerospace
17. Atomic Energy - Pinawa
18. Union Carbide
19. Lafarge Canada
20. Pioneer Metals
21. St. Boniface General Hospital
22. Burns Foods Ltd.
23. Monarch Industries - Winkler
24. Versatile Farm Equipment
25. LMG Reliance
26. C.S.P. Foods - Altona
27. McCain Foods
28. Red River Comm College
29. Seagrams Calvert - Gimli
30. Inland Cement

TABLE VI.4
Provincial Summary
1945-65

Total Electricity Generated by Utility and Industry in British Columbia
(excludes exports, firm, and surplus)

Year	ENERGY (GW.h)		Industry's Own Generation				PEAK-MW B.C.
	Utilities	Industry Own Gen.	Total %Inc.	Alcan	Breakdown * Cominco	Other	
1945			3,277.1				545.5
			0.6				
1946			3,319.1				577.8
			5.2				
1947			3,491.2				593.3
			13.0				
1948			3,946.6				674.0
			9.9				
1949			4,335.6				792.9
			12.2				
1950			4,866.2				879.0
			5.7				
1951			5,143.3				942.1
			5.5				
1952			5,424.3				1,050.0
			12.9				
1953			6,122.2				1,151.3
			13.6				
1954			6,953.5				1,301.0
			22.1				
1955	3,899.2	4,588.8	8,488.0	1,370.8	2,172.9	1,045.1	1,502.7
			18.5				
1956	4,279.5	5,775.7	10,055.2	2,513.5	2,207.4	1,054.8	1,880.1
			11.9				
1957	4,843.1	6,404.8	11,247.9	3,365.1	2,117.7	922.0	1,872.6
			6.0				
1958	5,468.1	6,454.7	11,922.8	3,314.8	2,180.5	959.4	1,981.8
			5.1				
1959	6,089.9	6,440.3	12,530.2	3,164.2	2,167.3	1,108.8	2,085.0
			9.3				
1960	6,431.8	7,258.1	13,689.9	3,706.3	2,315.8	1,236.0	2,229.9
			-2.0				
1961	6,801.7	6,619.4	13,421.1	2,773.0	2,543.4	1,303.0	2,399.3
			10.1				
1962	7,352.5	7,427.9	14,780.4	3,496.8	2,631.3	1,299.8	2,423.7
			5.7				
1963	7,872.5	7,752.7	15,625.2	3,593.1	2,696.4	1,463.2	2,633.9
			10.6				
1964	8,706.7	8,570.3	17,277.0	4,071.0	2,764.0	1,735.3	2,974.7
			9.7				
1965	9,969.4	8,982.6	18,952.0	4,189.6	3,087.8	1,705.2	3,137.7

A P P E N D I X VI

TABLE VI.1
B.C. Hydro's Actual Electrical Sales for 1985-6 and Growth over
1984-5 by Standard Industrial Classification (SIC)
(Billed Basis)

	1985-6 (GWh)	1984-5 (GWh)	Growth %
Residential:	9,793	9,577	2.3
Commercial-Total	8,313	7,970	4.3
-Transp, Comm. & Ut	1,282	1,221	5.0
-Wholesale & Retail	1,918	1,805	6.3
-Finance, Ins, Real Es.	1,563	1,467	6.5
-Comm, Bus, Pers. Serv.	2,850	2,712	5.1
-Public Admin. & Def.	614	602	2.0
-Unclassified	86	163	-47.5
Industrial	13,568	13,221	2.6
(Excluding Marketing)			
-Metal Mines	1,930	2,170	-11.1
-Mineral Fuels	670	632	6.0
-Other Primary Ind.	229	189	21.2
-Food & Beverage Man.	364	345	5.5
-Wood Manuf.	1,871	1,751	6.9
-Paper & Allied Man.	5,791	5,477	5.7
-Primary Metal Man. (Smelting)	139	131	6.3
-Non-Metallic Min.	310	311	-0.3
-Petroleum & Coal	362	343	5.6
-Chemical & Chem. Man.	1,267	1,290	-1.8
-Other Manufact.	458	434	5.5
-Construction	176	148	18.9
Inter Utility	263	247	6.6
(New West & Can. Ut.)			
Firm Export			
(Point Roberts/Hyder)	14	14	1.4
Seattle City Light	134	0	
W.K.P. & L.	41	6	583.3
Domestic Marketing	1,011	446	126.7
-Metal Mines	230	34	576.5
-Paper & Allied	749	372	101.3
-Chem. & Chem. Prod.	31	40	-22.5
-Other	1	1	
Total Sales.....	33,138	31,481	5.3

Source: B.C. Hydro, Load Forecast Department, 6 May 1986

A P P E N D I X VI

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B.C. Hydro's Actual Electrical Sales for 1985-6 and Growth over
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-Other	1	1	
Total Sales.....	33,138	31,481	5.3

Source: B.C. Hydro, Load Forecast Department, 6 May 1986

TABLE VI.2 (continuation below)
 Composition of Transmission Rate Sales (Pulp and Paper,
 Wood Manufacturing, Chemical, Metal Mining, Mineral Fuels)
 Historic (1974-85) and Probable Projections (1985-95),
 Prepared 31 January 1986

	Pulp & Paper			Wood Manufacturing*			Chemicals		
	Avg No. Acc.	Energy Sales GW.h	% of Total	Avg No. Acc.	Energy Sales GW.h	% of Total	Avg No. Acc.	Energy Sales GW.h	% of Total
Historic									
1974-5	18	4,141	53.7	3	144	1.8	6	1,237	16.0
1975-6	18	3,398	49.9	3	129	1.9	6	975	14.3
1976-7	18	4,360	53.4	3	146	1.7	6	1,254	15.4
1977-8	18	4,336	51.1	3	154	1.8	6	1,349	15.9
1978-9	18	4,768	52.2	5	194	2.2	6	1,419	15.5
1979-80	18	4,693	50.9	6	205	2.2	6	1,372	14.9
1980-1	18	4,738	49.4	7	234	2.4	6	1,427	14.9
1981-2	20	4,271	45.7	7	223	2.5	6	1,241	13.3
1982-3	20	4,465	49.4	9	256	2.7	6	1,018	11.3
1983-4	20	4,604	49.7	9	293	3.1	6	986	10.6
1984-5	20	5,766	52.7	10	292	2.6	6	1,258	11.5
Avg. Annual Growth (%)									
10 Years									
74-5 to 84-5		3.4			7.3			0.2	
Projections									
1985-6	21	6,150	54.4	10	325	3.0	6	1,295	11.4
1986-7	21	6,625	53.9	13	370	3.0	7	1,370	11.1
1987-8	21	5,850	50.0	13	410	3.5	7	1,350	11.5
1988-9	22	6,125	49.5	13	410	3.4	7	1,385	11.2
1989-90	22	6,205	49.2	13	410	3.3	8	1,435	11.4
1990-1	22	6,205	47.2	13	410	3.1	8	1,555	11.8
1991-2	22	6,540	47.4	13	410	2.9	8	1,625	11.8
1992-3	22	6,815	47.4	13	410	2.8	8	1,695	11.8
1993-4	22	6,715	47.1	13	410	2.8	8	1,735	12.2
1994-5	22	6,990	47.4	13	410	2.8	8	1,775	12.0
1995-6	22	7,115	47.5	13	410	2.9	8	1,795	12.0
Avg. Annual Growth (%)									
11 Years									
84-5 to 95-6		1.9			3.1			3.3	
* Most Wood Manufacturing sales are in the general rate category									

Source: B.C.Hydro, Dep. of Marketing, Research and Planning

TABLE VI.2 continued
Composition of Transmission Rate Sales and (B.C. Hydro's
major customers) Historic (1974-85) and Probable
Projections (1985-95)
Prepared on 31 January 1986

	Metal Mining			Mineral Fuels			Other Industrials		
	Avg No.	Energy Sales Acc.	%of Total	Avg No.	Energy Sales Acc.	%of Total	Avg No.	Energy Sales Acc.	%of Total
Historic									
1974-5	11	1,695	22.0	2	199	2.6	4	278	3.6
1975-6	11	1,715	25.2	2	211	3.1	4	282	4.2
1976-7	11	1,786	21.9	2	165	2.0	5	317	3.9
1977-8	12	1,947	23.0	2	227	2.7	5	331	3.9
1978-9	12	1,963	21.5	2	265	2.9	6	377	4.1
1979-80	12	2,085	22.6	2	259	2.8	7	430	4.7
1980-1	14	2,264	23.6	2	302	3.1	8	423	4.4
1981-2	15	2,637	28.2	2	326	2.5	9	443	4.7
1982-3	13	2,340	25.9	3	294	3.3	10	452	5.0
1983-4	14	2,279	24.6	5	367	4.0	10	468	5.1
1984-5	13	2,169	19.8	6	619	5.7	10	506	4.6
Avg. Annual Growth (%) 10 Years									
74-5 to 84-5		2.5			12.0			6.2	
Projections									
1985-6	10	2,040	18.0	7	660	5.8	9	500	4.4
1986-7	11	2,325	18.9	8	745	6.1	9	505	4.1
1987-8	11	2,345	20.0	8	795	6.8	11	580	5.0
1988-9	12	2,340	18.9	8	805	6.5	11	920	7.4
1989-90	11	2,325	18.4	8	805	6.4	11	1,040	8.2
1990-1	12	2,585	19.7	9	825	6.3	11	1,140	8.7
1991-2	12	2,335	20.6	9	825	6.0	11	1,140	8.3
1992-3	12	2,995	20.8	10	855	5.9	12	1,190	8.3
1993-4	11	2,885	20.2	10	855	6.0	12	1,240	8.7
1994-5	11	2,885	19.6	10	860	5.8	15	1,390	9.4
1995-6	10	2,575	17.2	10	860	5.7	16	1,770	11.8
Avg. Annual Growth (%) 11 Years									
84-5 to 95-6		1.6			3.0			12.1	

Source: B.C. Hydro, Department of Marketing, Research and Planning

TABLE VI.2 continued
Composition of Transmission Rate Sales (Pulp and Paper,
Wood Manufacturing, Chemical, Metal Mining, Mineral Fuels, Commercial)
Historic (1974-85) and Probable Projections (1985-95),
Prepared 31 January 1986

Commercial				Total Sales	
Avg No. Accounts		Energy Sales % of GW.h Total		Avg No. Accounts	Energy Sales GW.h

Historic					
1974-5	1	20	.3	45	7,714
1975-6	2	96	1.4	46	6,808
1976-7	1	138	1.7	46	8,166
1977-8	1	135	1.6	47	8,479
1978-9	2	147	1.6	51	9,133
1979-80	3	173	1.9	54	9,217
1980-1	3	209	2.2	58	9,597
1981-2	3	198	2.1	62	9,339
1982-3	4	221	2.4	65	9,046
1983-4	7	267	2.9	71	9,264
1984-5	8	334	3.1	73	10,944
Avg. Annual Growth (%) 10 Years					
74-5 to 84-5	32.5	3.6			
Projections					
1985-6	8	345	3.0	71	11,315
1986-7	9	360	2.9	78	12,300
1987-8	11	375	3.2	82	11,705
1988-9	11	385	3.1	84	12,370
1989-90	11	395	3.1	84	12,615
1990-1	11	420	3.2	86	13,140
1991-2	11	420	3.0	86	13,795
1992-3	11	425	3.0	88	14,385
1993-4	11	425	3.0	87	14,265
1994-5	11	435	3.0	90	14,745
1995-6	11	440	2.9	90	14,965
Avg. Annual Growth (%) 11 Years					
84-5 to 95-6	2.5	2.9			

Source: B.C.Hydro, Department of Marketing, Research and Planning

TABLE VI.3
Increases in "Purchased" versus "Self-Generated" Electricity by
Industrial Sector (1965 and 1971)
(Thousands of KW.h)

Manufacturing Industry		1965	1971*
-----		----	----
-Wood	Purchased:	595,972	1,091,457
	Self-generated:	393,297	249,878
-Paper & Allied	Purchased:	2,023,077	3,702,397
	Self-generated:	1,094,774	1,585,324
-Chemical & Chem. Products	Purchased:	460,829	1,106,056
	Self-generated:	1,130,562	1,002,238
-Primary Metals	Purchased:	131,636	233,735
	Self-generated:	5,493,595	6,491,173

Source: B.C.Hydro, Acres Consulting Services Ltd., British Columbia Industrial Growth and Electricity Consumption, September, 1974, Table 2.2, p. 2-13, constructed from unpublished Statistics Canada data
 * B.C. Hydro's Department of Marketing and Planning has not compiled these comparisons for the 1980s

TABLE VI.4
Provincial Summary
1945-65

Total Electricity Generated by Utility and Industry in British Columbia
(excludes exports, firm, and surplus)

Year	ENERGY (GW.h)		Industry's Own Generation				PEAK-MW B.C.
	Utilities	Industry Own Gen.	Total %Inc.	Alcan	Breakdown * Cominco	Other	
1945			3,277.1				545.5
			0.6				
1946			3,319.1				577.8
			5.2				
1947			3,491.2				593.3
			13.0				
1948			3,946.6				674.0
			9.9				
1949			4,335.6				792.9
			12.2				
1950			4,866.2				879.0
			5.7				
1951			5,143.3				942.1
			5.5				
1952			5,424.3				1,050.0
			12.9				
1953			6,122.2				1,151.3
			13.6				
1954			6,953.5				1,301.0
			22.1				
1955	3,899.2	4,588.8	8,488.0	1,370.8	2,172.9	1,045.1	1,502.7
			18.5				
1956	4,279.5	5,775.7	10,055.2	2,513.5	2,207.4	1,054.8	1,880.1
			11.9				
1957	4,843.1	6,404.8	11,247.9	3,365.1	2,117.7	922.0	1,872.6
			6.0				
1958	5,468.1	6,454.7	11,922.8	3,314.8	2,180.5	959.4	1,981.8
			5.1				
1959	6,089.9	6,440.3	12,530.2	3,164.2	2,167.3	1,108.8	2,085.0
			9.3				
1960	6,431.8	7,258.1	13,689.9	3,706.3	2,315.8	1,236.0	2,229.9
			-2.0				
1961	6,801.7	6,619.4	13,421.1	2,773.0	2,543.4	1,303.0	2,399.3
			10.1				
1962	7,352.5	7,427.9	14,780.4	3,496.8	2,631.3	1,299.8	2,423.7
			5.7				
1963	7,872.5	7,752.7	15,625.2	3,593.1	2,696.4	1,463.2	2,633.9
			10.6				
1964	8,706.7	8,570.3	17,277.0	4,071.0	2,764.0	1,735.3	2,974.7
			9.7				
1965	9,969.4	8,982.6	18,952.0	4,189.6	3,087.8	1,705.2	3,137.7

TABLE VI.4, continuation
Provincial Summary
1966-1984
Total Electricity Generated by Utility and Industry in British Columbia
(excludes exports, firm, and surplus)

Year	ENERGY (KW.h millions)		Total %Inc.	Industry's Own Generation Breakdown *			PEAK -MW B.C.
	Utili- ties	Industry Own Gen.		Alcan	Cominco	Other	
1966	11,499.2	9,609.9	21,109.1 11.4	4,492.6	3,322.4	1,794.9	3,474.2
1967	12,640.5	9,994.9	22,635.4 7.2	4,892.6	3,193.1	1,909.2	3,781.1
1968	14,071.9	10,257.9	24,429.8 7.9	5,062.4	3,034.4	2,261.1	4,194.9
1969	15,580.9	11,024.7	26,605.6 8.9	5,550.5	3,096.3	2,377.9	4,340.5
1970	16,527.7	9,156.9	25,684.6 -3.5	3,741.8	3,206.1	2,209.0	4,548.0
1971	18,238.7	10,468.5	28,707.2 11.8	5,324.0	2,830.3	2,314.2	4,831.0
1972	20,700.0	10,100.0	30,800.0 7.3	5,400.0	3,000.0	1,700.0	
1973	23,300.0	9,900.0	33,200.0 7.8	5,700.0	2,080.0	2,120.0	
1974			34,000.0 2.4				
1975			33,300.0 -2.1				
1976			36,400.0 9.3				
1977			38,400.0 5.5				
1978			40,000.0 4.2				
1979			41,300.0 3.3				
1980			42,700.0 3.4				
1981			43,200.0 1.2				
1982			44,000.0 1.9				
1983			44,750.0 1.7				
1984			45,615.0 1.9				

Source: B.C. Hydro, Department of Marketing, Research and Planning. A handwritten note on the data sheet indicates that the data from 1972-82 are from Statistics Canada, cat. 57-204

* Excluding sales to utilities

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PM-1 3 1/2"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

A P P E N D I X VII

Table VII.1
Main Turbines and Main Generators (Installed in Hydro
Plants Larger than 100 MW) in Five Provinces from
1900-86

Equipment Manufacturers		# of Main Turbines Installed					# of Main Generators Installed				
		NF	PQ	ON	MB	BC	NF	PQ	ON	MB	B
CAC	Canadian Allis - Chalmers.....	6	32	22	1	2					
GE	General Electric.....						2	10			
CGE	Canadian General Electric.....						14	107	60	33	1
CWES	Canadian Westinghouse.....							82	55		2
DEW	Dominion Engineering Works....	6	134	49	38	20		1			
EE	English Electric.....		19	28							
FUJI	FUJI.....					6					
HITA	Hitachi Ltd.....					2					
LMW	Leningrad Metal Works.....				6	6				6	
MIL	Marine Industries Ltd.....	6	28				6	38			
MITI	Mitsubishi.....					12					
MITS	Mitsui.....									12	
MVIC	Metropolitain - Vickers.....							4			
NEYC	Neypric.....		8			2		3			
TOBA	Toshiba.....					3					
VIW	Vancouver Iron Works.....					6					
		NF	PQ	ON	MB	BC	NF	PQ	ON	MB	B

 Source: Statistics Canada, cat. 57-206, 31 December 1986

Table VII.2
Major Provincial and U.S. Transmission Interconnections

Province	Province Voltage (kV)	Design Capability (MW)	State Voltage (kV)	Design Capability (MW)
Ontario	Quebec	1,300	New York	
	4 x 230		1 x 230	470
	7 x 120		1 x 230	400
			2 x 230	600
			2 x 345	2,300
			2 x 69	132
			2 x 115	200
Quebec	Nfld.	5,225	New York	
	3 x 735		1 x 765	2,300
	N.B.	700	2 x 120	300
	2 x +-80 (DC)		Vermont	
	2 x 345	300	2 x 120	275
	2 x 230		New Hampshire	
			+- 450 (DC)	690
Manitoba	Ontario	260	North Dakota	
	2 x 230		1 x 230	150
	1 x 115		Minnesota	
			1 x 230	175
			Minnesota	
			1 x 500	1,000
B.C.	Alberta	800	Washington	
	1 x 500	100	1 x 230	300
	1 x 138		1 x 230	400
			2 x 500	4,300

Total		8,685		13,992

 Source: Canada. Energy Mines and Resources. Electric Power
 in Canada 1988, 47-8

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