

The Political Economy of Canadian Hydro-Electricity: Between Old “Provincial Hydros” and Neoliberal Regional Energy Regimes ¹

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Thinking of hydro as a staple is a little like assuming that a whale is a big fish. They share great similarities, but also possess significant differences. Hydro, thought of as “water power” is a resource that has been important for Canada’s economic and social development, and hydro mega-projects themselves also have many “staples like” features. Once water power was used to run grist mills and motor machinery. But since the late nineteenth century the term ‘hydro’ usually referred to the water power as renewable resource used to generate electricity, one of the most important modern forms of energy. Indeed, Canadians often interchange the words hydro and electricity. But neither water nor hydroelectricity is produced primarily for export markets, though energy can be a significant part of the value of other resources and manufactured items heading for export. For these reasons, Dales (1957) considered hydro a “quasi staple.”

Hydroelectric systems are prone to the classic staples problem of excess capacity. Additionally, economic rents and linkages integral to staples analysis are also extraordinarily important to hydro. Simply put, the high costs of hydro mega-projects and infrastructure means that utilities experience inordinately high financial costs while market demand is still low—and conversely can make significant returns when markets grow to utilize the full capacity of a system. To address this problem, electricity producers, were at the forefront of making economic strategies that cultivate energy consumption.

Hydroelectric technology is quite efficient, though it necessitates significant change and management of the sociosphere. Dams, reservoirs, river diversions, control works and the mitigative engineering that goes with them are all are one aspect of hydroelectricity’s ecological footprint. Another is the complex network of transmission and distribution lines connecting production to point of use. Electricity networks are not like a train or pipeline in which a particular resource is shipped from point A to point B. Rather a network or grid is actually a balancing act in which managers balance the energy at one point with the loss of energy at other points. Since electricity can not be stored (except in the form of water reservoirs or alternative fuels), grids need constant management to meet daily and seasonal peaks and troughs of demand.

These structural characteristics of hydroelectric systems were translated into thinking of them as highly politicized natural monopolies. We shall see below that these systems have changed over time, as they have been governed by three succeeding policy regimes, a formative mixed regime, postwar provincial hydros and megaprojects regime and lastly an emerging sustainability/regionalization regime.

The Origins of Electricity Generation and Transmission in Canada to 1945

Canada’s formative hydro paradigm was geared towards producing energy for industry and urban modernization. Indeed, according to John Dales, H. V. Nelles and Christopher Armstrong, the leading historians in this field, the “story” surrounding the formative electrical energy policy regimes was the struggle over the control and use of

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hydro from the late 19th century through to the second world war. The result was a mixed regime of private and public, primarily municipal utilities, save in the case of Ontario. Decisions on public ownership during this period depended, among other things, on the ideology of government elites, characteristics of public power movements, the strength and cohesiveness of utility capital, the fiscal resources of governments, intergovernmental relations and the relative resource scarcity. (Dales 1957; Nelles 1974, Armstrong 1981; Armstrong and Nelles 1983.1986).

The first major electricity networks were defined by urban regions, and as hydro resources were developed these networks were also involved in regional industrialization. In Quebec the abundance of hydro resources led utilities to advance the industrial development of hydro rich regions such as the Saguenay (Dales 1957). In more remote regions, industrial producers emerged that developed hydro resources for local mines, pulp and paper and later, aluminum smelting. The end result was a fragmented set of electricity networks. The operating assumption was regional network self reliance—meaning that each network stood on its own or that the relationships between them were ad hoc rather than systemic.

The ecological footprint of early hydro regimes was concentrated on rivers (and their associated drainage systems) that were close to the urban populations. Some of them, such as the Niagara, Winnipeg and Ottawa Rivers, were part of international and interprovincial boundaries and drainage basins. Remote hydro resources could not be exploited for urban networks because long distance transmission technologies were relatively inefficient. Initially hydro investments were ad hoc, but with time the planning and conservation regimes played a larger role in determining the most rational and efficient use of resources, and thus capital. Provincial governments played a key role in shaping these conservation strategies through a licencing procedure. While the rights to hydro resources were first sold as private property, over time provincial governments instituted a rentier regime by claiming ownership of these resources and then licencing their use in return for a form of royalty. Investment was sequenced through the timing and terms of licences.

Canada and the United States established an enduring process for binational resource conservation and dispute resolution. The 1909 Canada-United States Boundary Waters Treaty established the International Joint Commission (IJC), itself a framework to provide equal rights in boundary water resources and a consensual binational process for settling disputes. The IJC then provided the framework to establish conservation boards to ensure the equitable sharing of hydro resources for Niagara Falls (the lynchpin of early Ontario energy policy), the Lake of the Woods, Rainy and Winnipeg River System (central to the Manitoba energy strategy). In time the IJC process spread to all boundary waters.

Ottawa did not have the same success in shaping interprovincial conservation regimes or a national electricity policy. Christopher Armstrong (1981) details how during this whole period the constitutional jurisdiction of hydro was ambiguous, leaving the determination of federal and provincial roles more to the play of politics than the constitution. Though provinces generally claimed ownership of resources and crown lands, hydro resources were not enumerated in the constitutional division of powers. Ottawa had clear responsibilities for fisheries and navigation, even in inland waters, and also powers to regulate international and interprovincial trade. Ottawa, as well, managed the water resources of the three prairie provinces until 1930. But the waning years of the National Policy were also a nadir of federal power. Indeed, when Prime Minister Mackenzie King's Liberal government attempted to outline a federal role in hydro (aside from the then federal control over resources in the prairie provinces), Liberal MPs from both Québec and Ontario, as well as their respective provincial

governments, opposed the initiative. Even a constitutional reference did not clarify the issues or set out a clear federal-provincial division of tasks in the field.

Eventually, Ottawa's national electricity policy centred on protecting hydro for domestic markets by discouraging long term exports. Ottawa did not have the political power to establish interprovincial water conservation agreements or regulate interprovincial trade in electricity. Nor could it bring Ontario and Quebec together with the US Government for agreement on how to develop the hydro capacity of the Saint Lawrence River. Protecting hydro for the domestic market really meant protecting it for provincial purposes. Hydro regimes were effectively centred in provincial capitals. Even in the prairie provinces, federal hydro planning and licencing would need the consent of the junior provinces. Interprovincial electricity trade policy became a matter of voluntary agreements or contracts between provinces.

Provincial hydro regimes did, however, have substantial economic impact. Electricity networks spread throughout urban Canada and a "cheap power policy" was used to fuel industrialization, social and technological modernization. Peter Wylie (1990) estimates that the technological adaptation and restructuring of Canadian manufacturing during the 1900-1929 period led to an over five fold increase in production and to significant decreases (up to 15 percent) in manufacturing costs (Wylie 1990). Certainly, the 1929-39 depression and subsequent world war acted as "perturbations" that substantially affected the development of the formative energy paradigm. The only complete failure of a hydro utility during the period, for example, occurred in Manitoba when the collapse of key industrial markets forced Winnipeg Electric, the Nesbitt-Thomson affiliate and the province's major private utility, into "financial reorganization" (Netherton 1993).

John Dales (1957) chronicled the efforts of the five regional Québec monopolies to foster industrialization, and came to the conclusion that the unfettered monopolies had stifled the economic development of the province. At issue were the high rates that weakly regulated monopolies charged urban domestic consumers, as opposed to the cheap commercial and industrial rates offered business, a defacto tax that Dales considered a drag on the economy. The regulatory issue was important because although Canadian political culture was more accepting of regulation than that of the United States, the actual form of regulation was generally not particularly effective (Currie 1946; Dupré and Party 1998). Dales was also critical of the complacency of the Montréal monopoly's with respect to Saint Lawrence hydro resources, energy Dales thought would have substantially aided in the development of the region. Research suggests similar problems on the Prairies where the lack of surplus power in Manitoba during the war hindered war-related industrialization and economic development (Netherton 1993). Indeed, during the war all provinces would be under pressure to renew investment in electrical energy infrastructure.

Lastly, these formative regimes institutionalised social inequality, particularly between rural and urban society. The latter had the population density that made their inclusion within electrical networks economically viable for public and private utilities. But the low density of rural populations and especially the lack of agricultural income on the Prairies during the 1930s made rural electrification conventionally impossible.

The Development of Provincial Hydro Monopolies and Their Decline 1946-1990

After facing depression and war effort exigencies, when public leadership thought of postwar energy needs, they began to see the role of the state in more systematic and social terms than previously. The new overall policy objective was not the pursuit of and control over electrification, but to ensure that sufficient investment

could be made to meet postwar needs, and to ensure equity among the various fragmented electrical networks. The emerging energy policy paradigm conformed to Keynesian-welfare state principles, or the Canadian technocratic variety (Campbell 1957) in that it necessitated a massive state assisted investment program for electrical energy and, at the same time, the systematic continuation of promotional rates. This broader “cheap power” policy subsidized and facilitated the mass production and consumption of electrical goods, a system of production and economic regulation often termed ‘Fordism’. So began the era of ‘mega-projects’ and ‘provincial hydros’.

Focussing on Canada’s ‘permeable’ Fordism (Jenson 1989, 1990, 1993) has important consequences for the analysis of Canada’s postwar energy strategy and the role hydroelectricity played in it. A.W. Currie’s (1946) postwar review of Canadian utility regulation makes the point. In Ontario (the province with the most developed electricity market), the cost of appliances, not the cost of electricity, had become the impediment to the continued electrification of society. The viable corporate strategy for utilities, therefore, was to help cultivate the mass consumption of appliances. It was not uncommon, for example, for public utilities to subsidize the cost of purchasing electric stoves, refrigerators and washing machines. In rural electrification programs utilities could even offer prospective customers a whole set of appliances in special five year financial packages (Netherton 1993). Eventually, popular utility demonstration programs, such as “live better electrically” were witness to the convergence of electricity policy to that of the mass production and consumption of electrical wares—from the energy guzzling big appliances to the transformation of “hand tools” into “power tools”. 2

Once set in motion, the combination of cheap power and permeable Fordism, given continued economic growth, produced pressures that produced a “provincial hydros” and “mega-projects” regime. With annual growth of energy demand between six and seven percent, utilities looked at doubling their capacity each decade. Accordingly provincial utilities commenced massive coal, nuclear and hydro investment programs—stretching provincial financial capacity to its limits.

The new public ownership model resembled the postwar British model of nationalized utility (Murphy 1952) or, if you will, the diffusion to other provinces of a modernized version of the Ontario Hydro model—a vertically integrated state-owned company that produced, transmitted and sometimes distributed electricity. Both the scale of the projected capital investments and the level of long-term risk associated with them necessitated substantive public involvement. Provincial governments stepped in to plan and implement these investments. Why the provincial state? Private utility capital lost its leading role in the first regime. There was no politically cohesive grouping of private utility capital to redefine the paradigm to include its long-term needs and the general thrust of creating provincial or public hydros’ had broad political support. Private capital could not be the instrument to carry out an expanded program of investment, reorganize networks to eliminate inequities and at the same time, push the cheap power policy to its very limits. 3

The ‘provincial hydros’ dominated the new policy regime. Equipped with easy access to financial markets (as provincial governments guaranteed their bonds) they turned the regime into an investment machine. Indeed, during the boom in public energy investment, the many hydro utilities had annual investment expenditures that rivalled that of the provincial governments that owned them. A second source of authority for the utilities in the policy regime was simply that they had monopoly over the technical expertise needed to manage the design and construction of the new energy systems. In particular, new developments in transmission technology were instrumental in incorporating remote hydro resources as sources for urban Canada’s energy needs. When a federal policy initiative to create a national grid failed, Ottawa outlined a 1962 National

Power Policy that reversed the traditional domestic market protection by encouraging a 'prebuild strategy' in which provinces would develop large scale northern hydro projects for export so that they would be ready for Canadian demand as it occurred.

Regime development occurred in stages. The provinces of Manitoba, Québec and British Columbia, as well as the new province of Newfoundland and Labrador became more concerned with planning and implementing long-term hydroelectric development strategies. This included taking over and integrating the fragmented local networks and integrating them in wider provincial network and gradually investing in electricity generation capacity. A second stage saw the major hydro provinces place existing private hydro producers under public ownership (Blais 1979, Froschauer 1999). There were exceptions. The private monopoly on the Island of Newfoundland kept its monopoly, perhaps due to the fiscal and financial weakness of the former colony. A second major exception was that for the most part provincial governments did not take over the private industrial producers and in the case of Aluminum producers, allowed an expansion of private hydro development for industrial purposes, often isolated from the emerging provincial networks.

In provinces without an abundance of energy or that relied on a mixture of fuels and technologies (hydro, thermal generation from coal, petroleum, natural gas and later nuclear power) such as Ontario, Nova Scotia, New Brunswick, and Saskatchewan, the provincial energy policy regimes were variations of the universal postwar model, retaining their provincial boundaries and assumptions of provincial self reliance. Prince Edward Island, like Newfoundland, kept a local private monopoly and Alberta maintained the regionally based mixed system developed in the formative paradigm.

The closed nature of electrical energy policy regimes invited considerable confrontation from social and environmental interests opposed to or negatively affected by hydro mega-projects. Of these, confrontation with Aboriginal peoples became the most pressing constraint on energy strategies. Aboriginal peoples displaced by reservoirs, river diversions and other changes to the sociosphere attributable to hydro mega-projects were the one societal group targeted to pay most directly for energy strategies designed to benefit the majority. Protracted contestation emerged between First Nations and provincial governments over energy policies and regimes of compensation and mitigation. Initially, Aboriginal communities were authoritatively "relocated." In the early 1970s the James Bay Cree used the judiciary to force Premier Robert Bourassa's Liberal Government to negotiate a comprehensive settlement of their claims during construction of the James Bay Hydro project. A similar "negotiating" with a bulldozer in the back yard process occurred in Manitoba, resulting in the signing, in 1978 of the Northern Flood Agreement (Waldram 1988). In these processes Aboriginal political movements and allies in Churches, the new left, nationalist and environmental groups, used domestic political and legal resources to open a crack in the notoriously closed and powerful hydro regimes.

The representation environmental objectives in the policy regime was less immediately successful. Environmental impact assessments would emerge slowly and diffuse into provincial decision-making unevenly, but would concern a wider range of issues than provincial energy strategies had heretofore considered. New environmental policy initiatives emerged as clearer legislative mandates and new regulatory regimes were put in place in major Canadian provinces (Jaccard, Nyboer and Makinen 1991). Policy makers moved away from thinking about new energy supplies to thinking about the gains from better use of resources. Vertically integrated utilities experimented with new policy concepts such as Integrated Resource Planning, and Demand Side Management (DSM) programs. For example, "Power Smart" and other conservation and energy efficiency programs initiated policies ranging from subsidizing improvements in

housing technology, to the creation of energy efficiency standards for public lighting, electrical appliances and electronic components.

In the 1980s utilities also experimented by seeding the use of more environmentally benign “green” technologies and encouraging non utility industrial producers of electricity, as well as small producers of electricity from more expensive alternative technologies, what is generally now termed an “independent power producer” (IPP), to sell to major utilities. The policy logic was that seeding small amounts of alternative supply technologies into the supply at uneconomic prices would eventually lead to a significant diversity of supply. The policy assumed that continually increasing energy prices would assure that the new energy supplies would eventually be economically viable. Eventually, natural gas producers, relying upon a new and significantly more efficient and small scale combined cycle turbine technology, used provisions of the US legislation to gain a foothold in the electricity market, a process that took the pressure off utilities to pursue mega-projects.

The concept of sustainable development eventually replaced the Keynesian concept of abundant low cost energy, therefore linking competitive market efficiency and long-term environmental protection. Energy policy would change to meet post-industrial and global exigencies.

The Sustainability/Regionalization Regime Post 1990

During the 1980s economists and sociologists argued that the provincial hydro regime had lost its way. For economists such as Jean Thomas Bernard and R.D Cairns (1987) the inability of publically owned utilities to set prices at marginal costs meant that these regimes could not collect or redistribute rents efficiently while other economists, as well as sociologists and historians, argued that the regime was out of control. (Cairns and Heyes 1993; Hargrove 1994; Mackay 1983; Tritschler 1979; Young 1982)

By the 1990s, Canadian economists openly questioned the older paradigmatic assumptions. For example, Mark Jaccard (1995) argued the case for change by asking whether electricity ought still be considered an important public good, whether it's production and distribution were natural monopolies and whether vertically integrated public utilities were an appropriate agent to carry out public objectives. In concluding the negative for each question, the case for complete change to the existing model was made. A related criticism was that public ownership of utilities led to overinvestment and economic waste, potentially the most important critique because it connected utility investment with the sustainable development and environmental policy objectives that emerged during the last decade. Glen P. Jenkins opened up a national debate on public ownership by arguing that the financial and tax advantages given to provincially owned public utilities created distortions and massive economic waste of the capital used to invest in them, a waste that ranged up to 60% of the cost of Canadian electricity (Jenkins 1985). Though economists criticized his method, the extent of the distortion and alternative remedies, and defended the potential of provincially owned utilities as instruments to capture rents from hydro resources, no economist defended the paradigm at it was. (Bernard and Cairns 1987; Jenkins 1987; Spiro 1987)

What Jaccard and others argued for was the implementation of a new market based model, similar to that developed in the United Kingdom, in which utilities were broken down into separate producers, system (grid) operators, and distributors and integrated by a legislated market. Many initiatives put in place to change the existing system were hotly contested. (Cohen 2001; Cohen 2002; Dewees 2002; Dunksy and Raphals 1998; Plourde 2002) For example, Premier Clyde Wells attempted to privatize Newfoundland and Labrador Hydro in 1994 as a means of forcing a renegotiation of the

Churchill Falls Power Contract, but backed down in face of mobilized opposition. The Ontario government began utility market reform with a White Paper and the 1998 Energy Competition Act that would deintegrate and privatize the highly indebted crisis ridden formally provincial Hydro. The older nuclear facilities were mothballed and after a damning assessment of Ontario Hydro's nuclear management performance, one of three nuclear complexes was leased to a British transnational energy firm. In 2002, after several years of open contestation the government came to the brink of privatization just as the new system began to operate. However, at the eleventh hour an anti-privatization coalition launched a successful legal challenge to the privatization legislation. Faced with prospects of remaking the privatization coalition, the Ontario government withdrew the initiative. The "market system" would be state owned (Swift and Stewart 2005).

Though older provincial hydros have been broken up to conform to the new model and there has been limited privatization of new supply, only one provincial hydro (Nova Scotia Power) has been privatized. Even in Alberta, Canada's most "extreme" market experiment, there was no privatization of major generating utilities, and the new market includes both major municipal utilities, as well as IPPs, clearly a mixed system. Both jurisdictions that have gone to full market integration have also corrected initially volatile markets with forms of rebates, contract alternatives or other interventions to correct market failure. Hence, Doern and Gattinger label it a "managed" competition which seeks to establish workable systems, not unfettered markets (Doern and Gattinger 2003).

The introduction of markets in provincial regimes, however, did spur the growth of private energy capital, the largest being TransAlta, based in Alberta. TransAlta claims control over 10,000 MW of coal, hydro and alternatives in Canada, the United States and Australia, giving it about twice the capacity of Manitoba Hydro. Fortis, the owners of Newfoundland's second largest utility, has also grown to become a major private utility holding company, owning major regulated distribution utilities in Newfoundland and Labrador, the provincial monopoly in Prince Edward Island (Maritime Electric), and through the 2004 purchase of Aquila Canada Networks, major distribution assets in Alberta (former TransAlta distribution system) and British Columbia (former West Kootenay Power). Fortis also owns transmission and generation assets in New York, Belize and Grand Cayman. Emera has taken a broader convergence expansion, owning Nova Scotia Power, a small hydro based utility in Maine, Sable Island Gas, regional pipelines and a regional heating fuel company.⁴ Most of Canada's provincial utility sector has been, by definition, confined to provinces—and did not grow in league with the new energy system—save Hydro Quebec. Hydro Quebec has invested in hydro and natural gas energy assets in the United States, Brazil and Latin America to become a major regional player as well as the world's third largest hydro producer.

Interprovincial as well as international trade barriers have decreased and trade is increasingly characterized by short term market contacts rather than long term commitments. In many cases, it is now difficult to use the term "provincial" utility at all. Even provincially owned generation companies, like BC Hydro, can become as committed to out of province regional markets as they are to traditional provincial markets. The new regime has also weakened Quebec Hydro's monopsony powers over Churchill Falls Power. As a result the Governments of Newfoundland and Labrador, Quebec and Ontario are negotiating the construction of an east-west grid to develop and transmit Labrador power to needy markets. Also, Ontario and Manitoba have restarted negotiations about the development of Nelson hydroelectricity for Ontario Markets. Called, the Clean Energy Transfer Initiative, it differs from all previous concepts and negotiations in that it presupposes the establishment of an East-West Grid.

The Future: Canada-United States Policy Integration as a Policy Driver in the New Regime

An important part of the postwar hydro policy centred on the economics of functional integration of cross border regions. During the 1950s Ottawa worked with the US government and the provinces of Ontario and Quebec to make an agreement on Saint Lawrence River hydro development—in parcel with an emerging pact on the construction of an international Seaway system extending Canada's inland ocean ports from Montréal to Lake Superior's Thunder Bay. Also, through IJC processes Ottawa coordinated the negotiation of the Columbia River Treaty, and agreement whereby stabilization of the Columbia's tributaries in Canada by means of dams and reservoirs allowed for greater power development in the lower Columbia and, eventually, the Peace River. (Swainson 1979) The IJC process also led to conservation regimes on the Saint John's River and the sharing of the costs of New Brunswick's diesel electric generating capacity with the state of Maine.

The functional integration between Canada and the United States also tackled the problem of reliability. In 1965 a major ice storm in Québec tripped a prolonged blackout throughout North Eastern North America. Three years later, the United States response was to set up a voluntary non profit corporation, National Electric Reliability Council (NERC), to promote, educate, assess and monitor system reliability issues. To aid in this process, NERC set up a system of regional reliability councils through the United States, collections of systems that evolved into regional groups of cooperating utilities. These groups became institutional stepping stones for Canadian utilities seeking greater continental market and reliability integration.

The NEB rose to become the central regulator of international electricity trade and international transmission facilities. To allay the traditional nationalist concerns, NEB regulation confined exports to energy surplus to domestic needs and, as well, placed time limitations on export licences. Thus, unlike the Canadian petroleum sector, Canadian electricity did not take an overall staples export structure. Total exports to the US were less than seven percent of total Canadian production, and US exports only reached a quarter of one percent of US production.

By the 1970s, electricity trade and interconnections in many provinces represented an equitable functional integration in which benefits were shared by all participants (Perlgit 1978). In the Maritimes, New Brunswick Hydro had one small interconnection with the state of Maine—and would continue agreements sharing capacity with interconnected US utilities for the period. The Ontario network became functionally integrated with those of New York and Michigan as their interconnected grids saw power flow clockwise around Lakes Ontario and Erie.⁵ Ottawa did not allow Ontario to export nuclear-electricity and eventually placed an environmental charge on coal generated electricity exports.

Slightly different trading relationships emerged in several of the large hydro-electricity provinces. The proliferation of small international interconnections that characterized the formative paradigm in Quebec had been eliminated, and instead, Hydro Quebec built large capacity interconnections with the Power Authority of the State of New York (PASNY), exporting energy in a form of seasonal diversity exchange to offset costs of financing the James Bay development.⁶ Similarly, new international connections between Manitoba and Minnesota reflected a prebuild export strategy for energy flowing from Manitoba Hydro's Nelson River power corridor. Though Manitoba's export strategy was also based upon seasonal differences in energy demand with its US partners, early years of export saw great quantities of 'surplus' energy simply dumped on the export

market (Netherton 1993). British Columbia developed several interconnections with Bonneville Power Authority (BPA), the US federally owned utility, itself based on the Ontario Hydro model, that was charged with developing the hydro potential of the Columbia. Domestic opposition to a second large “ Site C” dam on the Peace River, stopped BC from fostering a pure staples export relationship with the US, although the provincial utility did become an effective opportunistic trader on the regional market.

This pattern was to change, however with neoliberal trade and regulatory policies. After concluding the Canada-United States Free Trade Agreement (FTA), the Canadian government established a new electricity policy in which National Energy Board export regulations were changed to conform to the terms of the new trade regime. The older security of supply and price protection regulations were replaced by concerns for third party effects, environmental standards and fair market access by other potential Canadian customers. Though the NEB still would not regulate interprovincial electricity trade or interconnections, it signalled that it would consider objections from other provinces before agreeing to any new international power lines (Canada. Energy Mines and Resources Canada 1988). These provisions were a significant step in eroding provincial autarky and facilitating interprovincial integration because they constrained provincial autonomy and ensured that provincial utilities had to share their planning with others.

The FTA did not open up floodgates of electricity trade between Canadian provincial and US utility networks because the US regime, unlike its Canadian counterpart, was much more fragmented and replete with domestic trade barriers. Historically, energy trade within the US was blocked because utilities were not obliged to “wheel” or transport a third party’s energy along its utility lines. Traditionally Canadian exporters had considered this wheeling problem as the major obstacle to developing long term diversity exchanges with southern US networks.

In 1992, a new US Energy Policy emerged that was founded on the assumption of internal market failure; that the US had a great deal of electricity production capacity, but that it was inefficient and energy was not well distributed. In contrast to the Canadian case, the US federal government has expansive powers over interstate as well as international trade, and has a long history of using federal powers to macro manage the electrical energy sector. The US Federal Energy Regulatory Commission (FERC) is the major federal energy authority. The new policy authorized FERC to embark upon a bold initiative to establish competitive markets for the supply, transmission and distribution of electricity throughout the United States. The United States was to be organized into a set of Regional Trading Groups (RTGs), later named Regional Trading Organizations, or RTOs. RTOs are defined as a “functioning voluntary organization (of transmission owners, transmission users and other entities approved by FERC) to efficiently coordinate transmission planning and expansion, operation, and use on a regional and inter-regional basis,” in other words, interconnected regional electricity networks (National Energy Board 2005).

Four initial FERC regulatory orders and policies had significant extraterritorial impact on Canadian exporters. In 1996 FERC authored Order 888, commonly known as the “open access” or “reciprocity” provision. This ordered utilities wanting to have access to US markets to allow access of US utilities to their markets. Each utility could therefore outline a series of consistent market prices for the use of its transmission system. These open access transmission tariffs (OATT) are the costs that the utility would charge others for wheeling (transporting) their energy. The condition of open access meant a utility that wanted to trade in the US could not bar other utilities access to its own system.

Along with 888 was Order No. 889 demanding that the utilities had to use the same time sharing data system (creating a market for electricity depends giving instantaneous price signals using the advanced levels of information technology.) In 1997, in response the wave of mergers and acquisitions that came with deregulation, FERC issued Order No 592, a policy that attempted to ensure that corporate mergers and restructuring did not thwart the intent to establish competitive markets. Finally, in December 1999, FERC issued Order No. 2000, asking that all utilities wanting to trade in US markets to apply to join a RTO. FERC could not directly apply this condition to Canadian utilities since they were not under its direct legal authority, although, interconnected Canadian utilities had to weigh costs of entry and exclusion.

By 2000 several different models of the new energy regime had emerged in the United States, but the most symbolic new starts, such as California and its Enron-related energy debacle, were costly failures (Jaccard 2002; Woo, Lloyd and Tishler 2003). Energy policy debate turned toward establishing a “standard market design” (SMD) that would guide utilities in forming the market rules within newly formed RTGs. In July, 2002, FERC issued a notification that it would make rules concerning a standard market design. This was followed in 2003 with a white paper and a consultation process (FERC 2003). However, at time of writing, FERC has not finished this process and significant opposition to the FERC model has developed in the south as well in California.

Predictably, all Canadian utilities with US interconnections were fairly quick, with some regulatory challenges, to minimally meet FERC reciprocity demands by organizational restructuring and adoption of OATTs.⁷ However, at time of writing no Canadian utility had joined an RTO, though there has been western Canadian participation in RTO formation. In order to protect its regional market access, Manitoba worked out an “external participant” coordination agreement with the Midwest Independent System Operator, (MISO) a fully market based RTO. British Columbia, as well, been involved in the negotiations concerning GridWest, the RTO for the Pacific Northwest—although no decisions have been made on the final form of the provincial participation. Other western Canadian stakeholders are looking primarily for ways to increase the transmission infrastructure for electricity from Alberta through BC onto the California market. Emera, the parent company of Nova Scotia Power, and a minority participant in the New Brunswick and New England energy markets has expressed interests in greater New England - Maritime Provinces energy integration. Nova Scotia Power is now making minimal open access tariffs and is interested in a new jointly-owned transmission line from Nova Scotia through New Brunswick to Maine.

The emergence of FERC as a supranational regulator also coincides with the increasing reliability problems associated with increased trade. The issue came to a head with an August 2003 blackout, caused when a regional US electrical system experienced a set of problems that caused a series of cascading power failures, eventually putting 50 million Canadian and Americans in the dark. A binational report into the incident recommends replacing NERC with a new Electrical Reliability Organization with the authority to enforce standards on utilities.

Conclusions: The Quasi-Staples Status of Hydro-electricity and Post-Staples Analysis

The “quasi-staples” status of hydro has to be reflected in any summation of its “post-staples” trajectory. Staples analysis has always focussed on the creation and redistribution of economic rents, technological change, and trade issues. Each of these features has been prominent in each of the three regimes of hydro-electricity described above.

In the formative period, the key rent-related issues were the distribution of rents to subsidize industrialization and urban electrification. In the second, mature staples, period, rents were distributed through “cheap rates” to subsidize and facilitate the development of mass production and mass consumption. In the third, post-staples, period rents and linkages are oriented towards sustainable development. Hence ‘smart’ consumption has replaced ‘mass’ consumption and “demand side management” has replaced the “cheap power” policy.

As far as technology is concerned, in the first period electricity was made with the most readily available resource—primarily, but not exclusively hydro. The second period ushered in the era of ‘big’ technologies and projects, increasingly larger hydro projects, nuclear reactors and coal thermal plants—with all the attendant political, social and environmental agenda particular to each. In the third period, we find that electrical energy regimes have far greater choice in technologies. There are a series of benign and/or sustainable technologies that are and can be further developed for energy production; such as wind farms, photovoltaic and small scale hydro. Natural gas has also entered into the generation technologies with the efficient ‘combined cycle gas turbine.’ Current energy policy planners in Ontario, for example, have the choice between revamping older coal plants, buying new hydroelectricity from Labrador and Manitoba, reinvesting in a revamped nuclear technology and investing in natural gas combined cycle turbine technology.

Trade networks have also changed. In the first period fragmented set of networks had fixed borders—and the largest were defined by urban regions. The utilities that controlled these networks competed to extend their control over relatively remote resources and urban populations. The lack of systemic integration of networks led to inefficiencies. In the second period, networks were reorganized into provincial grids, and in a process fraught with contestation, provincial hydro networks extended their reach into northern peripheries. Long term international trade and limited interprovincial trade relations developed—all conditioned by an implicit assumptions of network self reliance. Currently, the nature of electricity grids began to change substantially. Increasingly provincial grids are being integrated into interconnected North American regional networks regulated by the US FERC. Additionally, due to a neoliberal reordering, electricity networks are more complex and also significantly more open. 8

The third regime, however, is not yet stable. While advocates for change sought a neoliberal revolution, they ended up with an uncertain system of managed competition and increasingly transnational regional electricity grids. Privatization has not generally taken place, and provincial governments are carefully seeking ways to legitimate the new regime. Sustainable development interests began the paradigm with an implicit alliance with neoliberal forces, but have ended up somewhat disenchanted by new regime’s poor performance on the environmental issues. Aboriginal peoples are now invited to become partners in mega projects—though it is still uncertain what this new status will mean. The evolving regime is highly influenced by the supranational role the US government has played in structuring continental markets. As a result, the politics of production are now more firmly linked with politics of consumption. Electrical energy policy is increasingly a North American game. While this sector may not have been a ‘full’ staple in the past, it has shared the form and agenda of a mature staple, and more recently, as this regime has consolidated, a post staple.

References

- Armstrong, C. (1981). *The Politics of Federalism: Ontario's Relations with the Federal Government, 1867-1942*. Toronto, University of Toronto Press.
- Armstrong, C. and H. V. Nelles (1983). "Contrasting Development of the Hydro Electric Industry in the Montreal and Toronto Regions, 1900-1930." *Journal of Canadian Studies* 18(1): 5-27.
- Armstrong, C. and H. V. Nelles (1986). *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930*. Philadelphia, Temple University Press.
- Averyt, W. F. (1991). "Quebec's Electricity Exports." *Revue de L'Energie* 428(fevrier-mars): 199-213.
- Averyt, W. F. (1992). *Canada-U.S. Electricity Trade and Environmental Politics*. Orono, ME, Canadian-American Center University of Maine.
- Bernard, J.-T. (1982). "La Rente Des Ressources Naturelles." *Canadian Public Policy* 8(3): 297-9.
- Bernard, J.-T. (1982). "L'exportation D'électricité Par le Quebec." *Canadian Public Policy* 8(3): 321-333.
- Bernard, J.-T. (1989). "A Ricardian Theory of Hydroelectric Power Development: Some Canadian Evidence." *Canadian Journal of Economics* 22(2): 328-339.
- Bernard, J.-T. and R. D. Cairns (1987). "On Public Utility Pricing and Forgone Economic Benefits." *Canadian Journal of Economics* 20(1): 152-163.
- Bernard, J.-T., S. Gordon and J. Tremblay (1997). "Electricity Prices and Elections in Quebec." *Canadian Journal of Economics* 30(3): 505-525.
- Bernstein, S. and B. Cashore (2000). "Globalization, Four Paths of Internationalization and Domestic Policy Change: The Case of Ecoforestry in British Columbia, Canada." *Canadian Journal of Political Science* 33(1): 67-99.
- Bijker, W. E., T. P. Hughes and T. J. Pinch, Eds. (1989). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, Mass., MIT Press.
- Blais, A. a. P. F. (1979). "Review of Jobin, Les Enjeux Économiques." *Canadian Journal of Political Science* 12: 809-815.
- Bothwell, R. (1988). *Nucleus: The History of Atomic Energy of Canada Limited*. Toronto, University of Toronto Press.
- Cairns, R. D. and A. G. Heyes (1993). "Why Do We Price Electricity the Way We Do? Canadian Policy in the Light of Political-Economic Theories of Governmental Behaviour." *Canadian Public Administration* 36(2): 153-174.
- Campbell, J. L. (1989). *Nuclear Power and the Contradictions of US Policy*. Ithaca, Cornell.
- Canada and U.S.-Canada Power System Outage Task Force (2004). *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations*. Ottawa and Washington; DC, The Task Force.
- Canada. Department of Energy Mines and Resources and United States. Department of Energy (1978). *Electricity Exchanges*. Ottawa, Department of Supply and Services.
- Canada. Dept. of Energy Mines and Resources. (1973). *An Energy Policy for Canada, Phase I*. Ottawa, Information Canada.
- Canada. Energy Mines and Resources Canada (1988). *Canadian Electricity Policy*. Ottawa, Energy Mines and Resources.
- Canada. Energy Mines and Resources Canada. (1988). *Energy and Canadians into the 21st Century: A Report on the Energy Options Process*. Ottawa, Energy Mines and Resources Canada.

- Canada. National Energy Board (1992). *Inter-Utility Trade Review: Transmission Access and Wheeling*, National Energy Board.
- Canadian Electrical Association (2004). *The Integrated North American Electricity Market: A Bi-National Model for Securing a Reliable Supply of Electricity*. Montreal, Canadian Electrical Association.
- Clement, W. (1977). *Continental Corporate Power: Economic Elite Linkages between Canada and the United States*. Toronto, McClelland and Stewart.
- Cohen, M. G. (2001). *From Public Good to Private Exploitation: Gats and the Restructuring of Canadian Electrical Utilities*. Orono, ME, Canadian-American Center.
- Coleman, W. D., G. D. Skogstad and M. M. Atkinson (1996). "Paradigm Shifts and Policy Networks: Cumulative Change in Agriculture." *Journal of Public Policy* 16(1).
- Courchene, T. J. (1992). *Rearrangements: The Courchene Papers*. Oakville, Ont., Mosaic Press.
- Currie, A. W. (1946). "Rate Control on Canadian Public Utilities." *The Canadian Journal of Economics and Political Science* 12(2): 148-158.
- Dafoe, J. W. (1936). "Public Utilities and Administrative Boards." *Canadian Journal of Economics and Political Science*: 317-330.
- Dales, J. (1957). *Hydroelectricity and Industrialization--Quebec, 1898-1940*. Cambridge, Cambridge University Press.
- Davis, J. and Royal Commission on Canada's Economic Prospects. (1957). *Canadian Energy Prospects*. Hull, E. Cloutier Queen's Printer.
- DeVaul, D., T. Keating and R. J. Sugarman (1984). *Trading in Power: The Potential for Canadian Electricity Exchange*. Washington D.C, Northeast-Midwest Institute--Canadian Institute of International Affairs.
- Deweese, D. N. (2002). Electricity Restructuring in Canada. A Paper for Presentation at the CRUISE Conference: Canadian Energy Policy in the Sustainable Development Age, Ottawa, October 18, 2002.
- Doern, G. B. (2002). Seven Key Policy Issues and Challenges: Canadian Energy Policy in the Sustainable Development Era. A Paper Prepared for the CRUISE Conference on Canadian Energy Policy in the Sustainable Development Era, October 17-18, 2002. Carleton University, Ottawa.
- Doern, G. B. and M. Gattinger (2003). *Power Switch: Energy Regulatory Governance in the Twenty-First Century*. Toronto, University of Toronto Press.
- Dunksy, P. and P. Raphals (1998). Challenges for Effective Competition in Large Hydro-Dominated Markets: The Case of Quebec. *Deregulation of Electric Utilities*. G. Zaccour. Boston ; London, Kluwer Academic: 101-117.
- Dupré, R. and M. Party (1998). Hydro-Electricity and the State in Quebec and Ontario: Two Different Historical Paths. *Deregulation of Electric Utilities*. G. Zaccour. Boston ; London, Kluwer Academic: 119-147.
- Duquette, M., K. Fitzgibbons and E. Gauthier (1992). *Énergie Et Fédéralisme Au Canada*. Montréal, Presses de l'Université de Montréal.
- Economic Council of Canada. (1985). *Connections: An Energy Strategy for the Future*. Ottawa, The Council; Supply and Services Canada.
- Energy Information Office. US Department of Energy. (1997). *Electricity Reform Abroad and U.S. Investment*. 2005.
- Froschauer, K. (1999). *White Gold: Hydroelectric Power in Canada*. Vancouver, UBC Press.
- Hira, A. (2003). *Political Economy of Energy in the Southern Cone*. Westport, Conn., Praeger.

- Hoberg, G. and E. Morawski (1997). "Policy Change through Sector Intersection: Forest and Aboriginal Policy in Clayoquot Sound." *Canadian Public Administration* 40(3): 387-414.
- Hoven, A. v. d. and K. Froschauer (2004). "Limiting Regional Electricity Sector Integration and Market Reform: The Cases of France in the Eu and Canada in the Nafta Region." *Comparative Political Studies* 37(9): 1079-1103.
- Howlett, M., A. Netherton and M. Ramesh (1999). *The Political Economy of Canada: An Introduction*. Don Mills, Ont., Oxford University Press Canada.
- Howse, R. and G. Heckman (1996). The Regulation of Trade in Electricity: A Canadian Perspective. *Ontario Hydro at the Millennium: Has Monopoly's Moment Passed*. R. J. Daniels. Montreal, McGill-Queen's University Press: 103-155.
- Hughes, T. P. (1983). *Networks of Power: Electrification in Western Society, 1880-1930*. Baltimore, Johns Hopkins University Press.
- Jaccard, M. (1995). "Oscillating Currents: The Changing Rationale for Government Intervention in the Electricity Industry." *Energy Policy* 23(7): 572-592.
- Jaccard, M., J. Nyboer and T. Makinen (1991). "Managing Instead of Building: B.C. Hydro's Role in the 1990s." *BC Studies* 91-92(Winter): 98-226.
- Jaccard, M., N. Rivers and M. Horne (2004). "The Morning after, Optimal Greenhouse Gas Policies for Canada's Kyoto Obligations and Beyond." C.D. Howe Institute Commentary 35.
- Jacobson, C. D. (2000). *Ties That Bind: Economic and Political Dilemmas of Urban Utility Networks, 1800-1990*. Pittsburgh, University of Pittsburgh Press.
- Jenkins, G. P. (1985). "Public Utility Finance and Economic Waste." *Canadian Journal of Economics* 18(3): 484-498.
- Jenkins, G. P. (1987). "Public Utility Finance and Pricing: A Reply." *Canadian Journal of Economics* 20(1): 172-176.
- Jenson, J. (1989). "Different' but Not 'Exceptional': Canada's Permeable Fordism." *Canadian Review of Sociology and Anthropology* 26(1): 69-94.
- Jenson, J. (1990). "Different' but Not 'Exceptional': The Feminism of Permeable Fordism." *New Left Review* 184(December).
- Jenson, J. (1993). All the World's a Stage: Ideas, Spaces and Times in Canadian Political Economy. *Production, Space, Identity: Political Economy Faces the 21st Century*. J. Jenson, R. Mahon and M. A. Bienefeld. Toronto, Canadian Scholars' Press: 123-171.
- Kessides, I. N. and World Bank (2004). *Reforming Infrastructure: Privatization, Regulation, and Competition*. Washington, DC New York, NY, World Bank Oxford University Press.
- Laundry, R. (1984). "L'hydro-Électricité Du Québec: Produire Pour Consumer Ou Produire Pour Exporter?" *Revue Études internationales* XV(1): 95-119.
- Macdonald, D. and The Advisory Committee on Competition in Ontario's Electricity System (1996). *Final Report: A Framework for Competition*. Toronto.
- Mackay, P. (1983). *Electric Empire: The Inside Story of Ontario Hydro*. Toronto, A Project of the Ontario Public Interest Research Group, Between the Lines Press.
- Manibog, F. R. (2003). *Power for Development: A Review of the World Bank Group's Experience with Private Participation in the Electricity Sector*. Washington, DC, World Bank.
- Manitoba Hydro. Manitoba Hydro Task Force (1973, 1976). *Report on Examination of a Proposal for Long Term Exports of 1000mw to Northern States Power Company*. Winnipeg, Sessional Paper No. 94.
- Murphy, M. E. (1952). "Nationalization of British Industry." *The Canadian Journal of Economics and Political Science* 18(2): 146-162.

- National Energy Board (2005). *Outlook for Electricity Markets 2005-2006: An Energy Market Assessment*. Calgary, National Energy Board Publication Office.
- Nelles, H. V. (1974). *The Politics of Development: Forests, Mines & Hydro-Electric Power in Ontario, 1849-1941*. Toronto, Macmillan.
- Netherton, A. (1993). *From Rentiership to Continental Modernization: Shifting Policy Paradigms of State Intervention in Hydro in Manitoba, 1922-1977*. Political Science. Ottawa, Carleton University.
- Pineau, P.-O., A. Hira and K. Froschauer (2004). "Measuring International Electricity Integration: A Comparative Study of the Power Systems under the Nordic Council, Mercosur, and Nafta." *Energy Policy* 32(13): 1457-1475.
- Plourde, A. (2002). *The Changing Nature of National and Continental Energy Markets*. O. Paper Prepared for Presentation at the CRUISE 2002 Conference on Canadian Energy Policy in the Sustainable Development Era, October 17-18, 2002.
- Rea, K. J. (1976). *Political Economy of Northern Development*. Ottawa, Information Canada.
- Richards, J. and L. Pratt (1979). *Prairie Capitalism: Power and Influence in the New West*. Toronto, McClelland and Stewart.
- Robinson, J. B. and C. A. Hooker (1987). *Future Imperfect: Energy Policy and Modeling in Canada Institutional Mandates and Constitutional Conflict*. *The Politics of Energy Forecasting*. T. Baumgartner and A. Midttun. Oxford, Clarendon Press: 211-239.
- Senate Standing Committee on Energy the Environment and Natural Resources (2005). *Sustainable Development: Its Time to Walk the Talk Second Interim Report*, Senate of Canada.
- Spiro, P. S. (1987). "Public Utility Finance and the Cost of Capital: Comments on Jenkins." *Canadian Journal of Economics* 20(1): 164-171.
- Swainson, N. A. (1979). *Conflict over the Columbia: The Canadian Background to an Historic Treaty*. Montreal, McGill-Queen's University Press.
- Swift, J. and K. Stewart (2005). "Union Power and the Charged Politics of Electricity in Ontario." *Just Labour* 5(Winter): 14-21.
- Toombs, R. (2004). *Canadian Energy Chronology: 1971-1980*, Canada, Natural Resources Canada.
- Toombs, R. (2004). *Canadian Energy Chronology: 1986-1990*, Canada, Natural Resources Canada.
- Tritschler, G. E. (1979). *Final Report of the Commission of Inquiry into Manitoba Hydro*. Winnipeg, Queen's Printer.
- U.S. Energy Information Administration (1996). *Privatization and the Genesis of the Multinational Power Company*. *Privatization and the Globalization of Energy Markets*. Washington, D.C: 37-56.
- United States. Department of Energy. Office of Policy Planning and Analysis. (1987). *Northern Lights: The Economic and Practical Potential of Imported Power from Canada*. Washington, D.C., U.S. Dept. of Energy, Office of Policy, Planning and Analysis.
- Waldram, J. B. (1988). *As Long as the Rivers Run : Hydroelectric Development and Native Communities in Western Canada*. Winnipeg, University of Manitoba Press.
- Williams, G. (1989). *Canada in the International Political Economy*. *The New Canadian Political Economy*. W. Clement and G. Williams. Montreal, McGill Queen's University Press: 116-137.
- Williams, J. C. (1998). *Getting Housewives the Electric Message: Gender and Energy Marketing in the Early Twentieth Century*. *His & Hers: Gender, Consumption,*

- and Technology*. R. Horowitz and A. Mohen. Charlottesville, Virginia, University of Virginia Press: 149-170.
- Wylie, P. J. (1990). "Indigenous Technological Adaptation in Canadian Manufacturing, 1900-1929." *Canadian Journal of Economics* 23(4): 856-872.
- Young, R. A. (1982). "Planning for Power: The New Brunswick Electric Power Commission in the 1950s." *Acadiensis* XII(1): 73-99.
- Zuker, R. C., G. P. Jenkins and Economic Council of Canada. (1984). *Blue Gold: Hydro-Electric Rent in Canada*. Ottawa, Minister of Supply and Services Canada.

ENDNOTES

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² Indeed, as the work of Joy Parr illustrates, domestic technology, particularly in the kitchen, as the intersection of market, state and domestic sphere, took on an extraordinary importance in postwar culture and design, economic policy, utility business incomes and mass manufacturers (Parr 1996, 1999, 2002; Williams 1998).

³ The provincial state rose to dominance over formerly private utility capital and of former municipal structures. So important was the idea of the primacy of states over capital that the Government of Manitoba was able to successfully rewrite the terms of the Natural Resources Transfer Agreements so that it could unilaterally change the historical resource claims of capital—a move that would substantially aid the ideologically conservative Liberal-Progressive Government in its leverage to take over the Nebitt-Thomson affiliate that dominated the provincial hydro sector, and also a quasi constitutional change that was justified in terms of provincial equality: if the Ontario Hydro-Electric Commission could use its power to break or change supply contracts as leverage to drive private and foreign capital out of the sector, then Manitoba could use powers to expropriate resource rights for the same purposes (Netherton 1993).

⁴ One interesting development, from a staples perspective, is the growth of Cameco and Bruce Power. During the mid 1990s the Harris government, effectively privatized Ontario Hydro's oldest nuclear facilities in the Bruce Peninsula, called the Bruce Power Complex. Four of the installation's eight reactors had been laid up by Ontario Hydro. The privatization took the form of a long-term lease to British firm, that for other reasons, shortly wanted out of its Canadian operations. The Canadian replacement was Bruce Power, a partnership between the Cameco, the Saskatchewan uranium supplier, Transcanada Pipelines and the two unions working at the Bruce Complex. Privatization has been a success, with substantially greater efficiency and power production from operating units and refurbishment of two older installations. Over time Cameco has increased its ownership. Cameco, therefore, emerges as both a staples supplier and a high technology consumer of its own product.

⁵ Additionally, there was a great deal of economy energy exchange with Michigan. Indeed, US auto interests worked out a set of US regulatory exceptions that allowed automakers unregulated access to Ontario electricity (Perlgut 1978).

⁶ Though Quebec would eventually develop more hydro capacity than any other province, it has primarily been for domestic as opposed to export markets (Laundry 1984).

⁷ In a useful recent comparison of international electricity trade, Pierre-Olivier Pineau, Hira and Froschauer, indicate that Canada and the United States have the most integrated electricity markets in the world. Though total Canadian exports vary, they do not exceed 9 percent of total generation while imports from the United States are less than one percent of US total generation. The significant fact is that capacity of international interconnections is about 17% of total Canadian generation capacity, implying that short-term trade remains an integral part of managing Canadian energy supply. The overall picture emerges of a complex regional integration, not a staples export relationship, nor a profound market dependence (Pineau, Hira and Froschauer 2004).

⁸ Older command and control networks oriented towards the transmission and distribution of energy from large mega-projects is giving away to the idea of a more open

grid, where utility consumers can also, through distributed generation, supply energy to the grid.