

**Short Circuit:
Ontario's Electrical Utilities, Northern Ontario, and the Metabolic Rift, 1906-1998**

by

Brandon J. Cordeiro

A Thesis Submitted to
the Faculty of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of
Master of Arts

Department of History
Lakehead University

August 2017

ABSTRACT

The theory of the metabolic rift offers historians and ecologists alike a new means of exploring the relationship between humans, nature, and capital. Based on the works of Karl Marx, the theory of the metabolic rift argues that environmental degradation in the twentieth-century corresponds with the growth and intensification of industrial capitalism. Marx attributed capitalism's ecological damage to the inability of industry to maintain its metabolic rate with nature. What develops are what Marx calls "irreparable rifts" to both humans and nature. Increased appropriable land, new technologies, and new forms of appropriating crisis into new modes of production are the sole means in which the capitalist system can overcome these rifts. While such techniques mend the metabolic rifts of industry, they often make new rifts in other sections of the capitalist substructure. What develops is a series of rifts and shifts which continuously shape the social, economic, and environmental relations between humans, nature, and capital.

The social and economic rifts are most apparent through the unequal exchange of energy, capital, and resources between the hinterland and the metropolis. In the metropolis' pursuit for greater wealth, it takes control of the hinterland's vast resources and redistributes its energies towards the metropolis. When metabolic rifts occur, they are most often felt in the hinterland, as the metropolis attempts to maintain social, economic, and environmental degradation to the periphery. These rifts are not only a component to developing the resource-based economies of the hinterland but are imperative to maintaining the hinterland-metropolis relationship which has solidified the Canadian experience.

By analyzing the creation of HEPSCO/Ontario Hydro through the Marxist theory of the metabolic rift, it is evident that the Crown Corporation established the province's power grid on an unequal exchange of resources, capital, and energy between the Northern Ontario and Southern Ontario. As new economic and environmental rifts challenged the metabolic rate of HEPSCO/Ontario Hydro's power grid, the Commission adapted to mend the metabolic rifts of its monopoly. HEPSCO/Ontario Hydro's transition from hydro-electric power to nuclear power signified the finite limitations of the natural world, and reflected the abilities of capital and technology to mend the environmental rifts of the utilities industry. Not only does the history of HEPSCO/Ontario Hydro demonstrate the rifts and shifts of twentieth-century industrialization, but it exemplifies the social, economic, and environmental challenges to development in Northern Ontario.

ACKNOWLEDGEMENTS

First and foremost, I owe my complete gratitude to the professors, scholars, and colleagues who have supported this project since the beginning. The professional and pedagogical skills I have attained while studying under the Department of History at Lakehead University are invaluable and will serve me for the rest of my life. Most importantly, I would like to thank Michel S. Beaulieu, whose endless guidance, patience, and insight has helped me through this project. His deep knowledge of Canadian History and Canadian Socialism continues to amaze me, and I am grateful to have studied under him. Thank you for both challenging me and motivating me to be the best historian and writer I can be. I am forever indebted to you.

Others I would like to thank include Ronald Harpelle, Palavi Das, Steven Jobbit, David Ratz, and Nathan Hatton, of whom have offered to meet with me, spent time with me reviewing grant applications and papers, and whom provided me with continuous professional development and advice throughout the last two years. Your dedication to student success is what makes the Lakehead University Department of History so special to me.

I would also like to thank my colleagues whom I have studied with for the last two years. The various discussions, debates, and ideas shared amongst us not only stimulated new perspectives of history, but provided me some of the ideas for this project. Specifically, I would like to thank Jenna Kirker, who also pursued her thesis with me. Her understanding of Canadian History and feminist perspectives of Canadian socialism is undeniable, and I am excited to continue to watch her grow as a historian, as a professional, and as a colleague. Thank you for challenging me, for supporting me, and for being a great cubical-mate. I look forward to working with you again in the future.

Finally, I would like to thank my friends and family for their endless love and support. Most importantly, I would like to thank my parents, Bonnie and Joe, whom have always pushed me to strive for excellence. Even at the most challenging of times, their love and support continuously helped me through this process, and I am grateful for all they have done. I would also like to thank my siblings, Brittany and Moe, whom kept me light-hearted through this project with many laughs and many episodes of *Jeopardy*. Without their love and support, this study would not have been possible.

TABLE OF CONTENTS

Abstract		i
Acknowledgements		ii
Introduction		1
Chapter 1	The Empire Business: Hydro-Electricity and the Creation of HEPSCO, 1906-1932	25
Chapter 2	Cascading Crises: The Economic and Environmental Rifts of Hydro Electricity, 1932-1968.	52
Chapter 3	Ontario Hydro's CANDU Attitude: Nuclear Power in Ontario, 1963-1977	79
Chapter 5	"We'll be the only place in North America that glows in the dark": Nuclear Waste and Northern Ontario, 1977-1998	103
Conclusion		132
Bibliography		148

Introduction

In the twentieth century, the creation of new electrical-generating technologies became synonymous with social and economic progress and affected the historical development of Ontario both internally and externally.¹ The ‘thrilling prospects’ of hydro-electric power ushered in a new era of economic strength and stability never seen in Ontario and set in motion the province’s role as Canada’s economic and manufacturing centre.² Industrial development, both in the manufacturing industries in Southern Ontario and the resource-extraction industries in Northern Ontario, depended on electricity for production.³ The development of hydro-electricity, and later nuclear energy, solidified the province’s ability to provide electricity to both industrial and residential customers and to continue to grow Ontario’s industrial sectors. Through the establishment of the Hydro-Electric Power Commission of Ontario in 1906 (HEPCO, later renamed Ontario Hydro), the province created one of the most technically advanced power utilities in North America and served as the structural framework for public utilities in the

¹ Ronald Babin, *The Nuclear Power Game* (Montreal: Black Rose Books, 1985), 19.

² Robert Bothwell, *A Short History of Ontario* (Edmonton, AB: Hurtig Publishers, 1986), 92.

³ There are several excellent sources of the political and economic histories of Ontario. These works note the importance of Ontario’s electrical grid in providing the province the electricity needed to grow its industries. For example, see Ian M. Drummond, *Progress Without Planning: The Economic History of Ontario from Confederation to the Second World War* (Toronto: University of Toronto Press, 1987); Ian M. Drummond, “CHR Dialogue: Ontario’s Industrial Revolution, 1967-1941,” *Canadian Historical Review* 69, no. 3 (1988): 283-314; John Ibbitson, *Loyal No More: Ontario’s Struggle for a Separate Destiny* (Toronto: Harper Collins, 2001); and Randall White, *Ontario 1610-1985: A Political and Economic History* (Toronto: Dundurn Press, 1985). For more information about the economic and industrial histories of Northern Ontario, see H.V. Nelles, *The Politics of Development: Forests, Mines, and Hydro-Electric Power in Ontario, 1849-1941* (Montreal and Kingston: McGill-Queens University Press, 1970, 2005); W. Robert Wightman and Nancy M. Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800 to the 1990s* (Toronto: University of Toronto Press, 1997); and Michel S. Beaulieu, “A Historic Overview of Policies Affecting Non-Aboriginal Development in Northwestern Ontario, 1900-1990,” in *Governance in Northern Ontario: Economic Development and Policy Making*, ed. Charles Conteh and Bob Segsworth (Toronto: University of Toronto Press, 2013), 94-114.

twentieth century.⁴ The history of electricity in Ontario is a narrative of the capabilities of technology and capital to provide power to the masses.

While the history of HEPCO/Ontario Hydro provides us ample understanding of the developments of industry in the province, the study of electrical utilities reflects the greater social, political, and economic challenges of the twentieth century. Most notably, historians have done well to examine the political and economic histories of Ontario Hydro and the province's electrical utilities.⁵ The development of HEPCO/Ontario Hydro as a large-scale public enterprise reflected greater institutionalization of technocratic structure. Increased focus on long-term planning, engineering, and scientific management practices contributed to HEPCO/Ontario Hydro's dominance in the twentieth century. Successive governments, both provincially and federally, viewed the development of hydro-electricity and nuclear energy as paths towards progress, modernity, and self-sufficiency. The transition to nuclear energy and the partnership between Ontario Hydro and Atomic Energy of Canada Limited (AECL) served to solidify what Ian McKay calls the 'superstructures' needed to complete the 'Canada project' and the vision of the post-war-liberal state. McKay's 'Liberal Order Framework' has been adopted by many

⁴ For the purpose of this thesis, both the terms "HEPCO" and "Ontario Hydro" are used to reference the Hydro Electric Power Commission of Ontario. Intermittently, the term "the Commission" are also used to describe either HEPCO or Ontario Hydro. All attempts have been made to use HEPCO to describe the Commission between 1906 and 1973 and Ontario Hydro to describe the Commission from 1973 to 1999.

⁵ For political and economic histories of HEPCO/Ontario Hydro, see Merrill Denison, *The People's Power* (Toronto: McClelland & Stewart, 1960); Keith R. Fleming, *Power at Cost: Ontario Hydro and Rural Electrification, 1911-1958* (Montreal and Kingston: McGill-Queen's University Press, 1992); Kenneth C. Dewar, "Private Electrical utilities and Municipal Ownership in Ontario, 1891-1990," *Urban History Review/Revue d'Histoire Urbaine* 12, no. 1 (June/Juin 1983): 29-38; Neil B. Freeman, *The Politics of Power: Ontario Hydro and Its Government, 1906-1995* (Toronto: University of Toronto Press, 1996); James Hull, "A Gigantic Engineering Organization: Ontario Hydro and Technical Standards for Canadian Industry, 1917-1958," *Ontario History* 93, no. 2 (Autumn 2001): 179-200. H.V. Nelles, *The Politics of Development*; and H.V. Nelles, "Public Ownership of Electrical Utilities in Manitoba and Ontario, 1906-1930," *Canadian Historical Review* 57, no. 4 (December 1976): 461-484. For a concise biography of HEPCO's first Commissioner, see William Rothwell Plewman, *Adam Beck and the Ontario Hydro* (Toronto: Ryerson Press, 1947). For an extended history of energy and power generation in Canada, see Karl Froschauer, *White Gold: Hydroelectric Power in Canada* (Vancouver: UBC Press, 1999) and R.W. Sandwell, ed., *Powering Up Canada: The History of Power, Fuel, and Energy from 1600* (Montreal and Kingston: McGill-Queen's University Press, 2016).

historians as the framework for exploring Canada's history as a liberal project. As McKay argues, the category 'Canada' should "denote a historically specific project of rule" in which coercion and consent are used by the dominant interests to maintain their political and economic hegemony.⁶ Politicians and technocrats promoted low-cost power as a means of providing Ontario with an economic advantage in industrial markets and as a way of attracting new economic growth. As Ronald J. Daniels argues, Ontario Hydro's public monopoly relied on an aggressive strategy of endless growth, vertical integration, and high-risk investments.⁷ Moreover, Neil B. Freeman's *The Politics of Power* argues that HEPSCO's "institutionalized ambivalence" not only provided the Commission greater freedom from political intrusion but facilitated its role as "a crucial instrument for promoting industrial growth."⁸

Other works have explored greater dimensions of the impacts of Ontario Hydro and the AECL's electrical monopoly.⁹ Paul McKay's book *Electric Empire* argues that while Ontario Hydro had developed into an impressive institution, it was "a juggernaut that is simply out of control."¹⁰ Although Ontario Hydro's ability to grow unchecked by the provincial government allowed the Crown Corporation to grow exponentially, this same freedom served to be their

⁶ See Ian McKay, "The Liberal Order Framework: A Prospectus for a Reconnaissance of Canadian History," *Canadian Historical Review* 81 (2000): 617–645.

⁷ Ronald J. Daniels, ed., *Ontario Hydro at the Millennium: Has Monopoly's Moment Passed?* (Montreal and Kingston: McGill-Queen's University Press, 1996), 1-5.

⁸ Freeman, *The Politics of Power*, 6-8.

⁹ See, Christopher Armstrong and H.V. Nelles, *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930* (Philadelphia: Temple University Press, 1986); Ian Baines et. al, "The Monopoly Game: Ontario Hydro," in *Days of Reckoning*, ed. John Wood (Toronto: Breakout Education, Dundurn Press, 2003), 66-78; Ronald J. Daniels, *Ontario Hydro at the Millennium*; Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro* (Toronto: Between the Lines, 1983); Lawrence Solomon, *Power at What Cost? Why Ontario Hydro is Out of Control and What Needs to be Done About It* (Toronto: Energy Probe, 1984); and Jamie Swift and Keith Stewart, *Hydro: The Decline and Fall of Ontario's Electric Empire* (Toronto: Between the Lines, 2004); For the impacts of hydro-electric development in Northern Ontario, see Jean Manore, *Cross-Currents: Hydroelectricity and the Engineering of Northern Ontario* (Waterloo, ON: Wilfrid Laurier University Press, 1999); and Daniel Macfarlane and Peter Kitay, "Hydraulic Imperialism: Hydroelectric Development and Treaty 9 in the Abitibi Region," *American Review of Canadian Studies*, 46, no. 3 (2016): 380-397.

¹⁰ McKay, *Electric Empire*, 40.

downfall. The dissolution of Ontario Hydro in 1998 not only broke up the province's electrical monopoly but solidified the new era of free-market politics in Ontario. As Jamie Swift and Keith Stewart argue, Ontario Hydro's demise in the 1990s was a product of "contending political and economic forces" coupled with growing concerns of environmental degradation.¹¹ The history of Ontario Hydro is consequently an example of the greater impacts of industrial monopolies on both humans and nature. While such top-down history examines the establishment of Ontario Hydro and the AECL's dominance in the power industry, such works neglect the social and environmental ramifications of Ontario Hydro's monopoly.

The history of Ontario's electrical grid resultantly provides environmental historians a narrative to explore the ecological impacts of monopoly capitalism. For over fifty years, historians, ecologists, and sociologists have explored the impacts of the developing ecological crisis of the twentieth century. A growing body of literature has explored the environmental history of Canada.¹² Laurel Sefton MacDowell argues that Canadian environmental history concerns the narratives of resource development and its implementations on shaping social and environmental health in Canada.¹³ While such issues reflect those found within transnational contexts of industry and the environment, MacDowell argues that one cannot explore Canadian

¹¹ Keith Stewart Jamie Swift, *Hydro: The Decline and Fall of Ontario's Electric Empire*, 5-6.

¹² Most notably, see David Freeland Duke, ed., *Canadian Environmental History: Essential Readings* (Toronto: Canadian Scholars' Press, 2006); Thomas R. Dunlap, *Nature and the English Diaspora: Environment and History in the United States, Canada, Australia, and New Zealand* (Cambridge, UK: Cambridge University Press, 1999); and Neil S. Forkey, *Canadians and the Natural Environment to the Twenty-First Century* (Toronto: University of Toronto Press, 2012). See also Chad Garfield and Pam Garfield, ed., *Consuming Canada: Readings in Environmental History* (Toronto: Copp Clark Limited, 1995); Tina Loo, *States of Nature: Conserving Canada's Wildlife in the Twentieth Century* (Vancouver: UBC Press, 2011); Laurel Sefton MacDowell, *An Environmental History of Canada* (Vancouver: UBC Press, 2012); Katrin MacPhee, "Canadian Working-Class Environmentalism, 1965-1985," *Labour/Le Travail* 74 (Fall 2014): 3-4; Andrea Olive, *The Canadian Environment in Political Context* (Toronto: University of Toronto Press, 2015). See also Naomi Klein, *This Changes Everything Capitalism vs the Climate* (Toronto: Vintage Canada, 2014); and L. Anders Sandberg and Sverker Sörlén, ed., *Sustainability, The Challenge: People, Power, and the Environment* (Montreal: Black Rose Books, 1998).

¹³ MacDowell, *An Environmental History of Canada*, 188.

environmental historiography without understanding the impacts of hinterland-metropolis relations.¹⁴ Neil S. Forkey argues that at the core of Canadian environmental history is the dichotomous relationship between the need to exploit the country's natural resources and the need to protect them.¹⁵ These two needs are shaped by greater "temporal, demographic, social, economic, political, and cultural forces" which shape and reshape "microenvironments" that make up the physical landscape of Canada.¹⁶ While Canadian history has always noted the importance of the environment in the context of the Canadian experience, environmental history as a discipline continues to establish itself within the historical framework of Canada.

Since the publication of Rachel Carson's *Silent Spring* in 1962 and the emergence of the New History in the 1970s, the school of environmental history has grown to further understand the impacts of industrial capitalism on society and nature.¹⁷ As Chad Gaffield and Pam Gaffield state, the development of the "new social history" provided historians with a "renewed appreciation of the importance of context."¹⁸ The transition from top-down histories and towards establishing an environmental lens fostered the study of environmental history in Canada. Donald Worster argues that environmental history is an attempt to re-order the narratives that have traditionally been neglected by the old history. Environmental historians reject the notion that "the human experience has been exempt from natural constraints" and that human agency has not contributed to reshaping our natural environments.¹⁹ Katrin MacPhee suggests that while bourgeois conceptions of environmentalism have become the hegemonic in studies of

¹⁴ MacDowell, *An Environmental History of Canada*, 188.

¹⁵ Forkey, *Canadians and the Natural Environment*, 4.

¹⁶ Ibid.

¹⁷ Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962).

¹⁸ Garfield and Garfield, *Consuming Canada*, 3

¹⁹ Donald Worster, "Doing Environmental History" in *Consuming Canada: Readings in Environmental History*, ed. Chad Gaffield and Pam Gaffield (Toronto: Copp Clark Limited, 1995), 17.

environmentalism, Canada's environmental historiography is entrenched in an understanding of the struggles between society and nature. Canada's structure as a resource economy has created a situation in which workers and environmentalist clash over policy regulation, industrial growth, and economic degradation, especially in the late twentieth century when the country was solidifying its position within post-war society.²⁰

Issues such as climate change, pollution, and the depletion of natural resources have also become central to the studies of both history and the environment and have developed as the antithesis of the modern Anthropocene.²¹ Chemist Paul Crutzen popularized the term Anthropocene. The Anthropocene is the period starting around the late-eighteenth century in which the earth has seen rapidly developing changes to its climate and ecology, with human agency as the driving factor of this environmental change. Such an environmental phenomenon represents what Will Steffen, John R. McNeil, and Paul Crutzen describe as "a profound shift in the relationship between humans and the rest of nature." The ecological laws of nature no longer bind humans; society and technology have evolved in such a manner that allows humans the ability to control nature in ways unforeseen in the history of the world. The Industrial Revolution marked the end of the Holocene and set humanity on a course where society prioritizes "the development of the human enterprise" above the principles of nature. The furthering and development of new industries, energy sources, and technologies has contributed to humanity's ecological footprint, and has helped shape the modern ecological crisis of the present age.

²⁰ MacPhee, "Canadian Working-Class Environmentalism, 123-125, 127.

²¹ For more on the concept of the modern Anthropocene, see Paul J. Crutzen, "Geology of mankind: The Anthropocene," *Nature* 415, no. 6867 (2002): 23; Libby Robin and Will Steffen, "History for the Anthropocene," *History Compass* 5, no. 5 (2007): 197-222; Will Steffen, Paul J. Crutzen and John R. McNeill, "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature," *Ambio: A Journal of the Human Environment* 36, no. 8 (2007): 614-621; Will Steffen, Jaques Grinevald, Paul Crutzen, and John R. McNeil, "The Anthropocene: Conceptual and Historical Perspectives," *Philosophical Transactions - The Royal Society A* 369 (2011): 847-848; and Paul Sweezy, "Capitalism and the Environment," *Monthly Review* 56, no. 5 (2004): 92.

The expansion of both hydro-electric power and later nuclear power in Ontario has only further aggravated the ecological footprint of society since the Industrial Revolution. The abilities of Ontario's financial sector to use the province's natural resources to generate power represented society's complete domination of nature. As G. Bruce Doern, Arslan Dorman, and Robert Morrison state, such a transition of technology reflected the greater influences of the "changing ideas, institutions, and interests" at the provincial, federal, and international levels.²² Technical innovation and greater institutionalization of economic management allowed HEPCO to expand its hydro-electric projects across the province. In the post-war era, ideological shifts towards large-scale industrial systems and a centralization of power solidified Ontario's entrance into the nuclear age.

A growing number of works are also beginning to examine the development of nuclear power in Canada.²³ Doern stresses that historians and environmentalists cannot divorce Canada's nuclear energy from greater discussions of industry, science and technology, energy, foreign

²² G. Bruce Doern, Arslan Dorman, and Robert Morrison, ed., "Introduction," in *Canada's Nuclear Energy Policy: Changing Ideas, Institutions, and Interests* (Toronto: University of Toronto Press, 2001), 4-11.

²³ A growing body of works has explored the political and economic history of nuclear power in Canada. Most notably, see Atomic Energy of Canada Limited, *Canada Enters the Nuclear Age: A Technical History of Atomic Energy of Canada Limited* (Montreal and Kingston: McGill-Queen's University Press, 1997); Robert Bothwell, *Nucleus: The History of Atomic Energy of Canada Limited* (Toronto: University of Toronto Press, 1988); and Wilfred Eggleston, *Canada's Nuclear Story* (Toronto: Clark Irwin Publishers, 1965). For environmental issues and the anti-nuclear movement see Ronald Babin, *The Nuclear Power Game* (Montreal: Black Rose Books, 1985); David H. Martin, *Exporting Disaster: The Cost of Selling CANDU Reactors* (Ottawa: Campaign For Nuclear Phaseout, 1996); Michael D. Mehta, *Risky Business: Nuclear Power and Public Protest in Canada* (Lanham, MD: Lexington Books, 2005); Gordon H. E. Sims, *The Anti-Nuclear Game* (Ottawa: University of Ottawa Press, 1990); and Ralph D. Torrie, *Half Life: Nuclear Power and Future Society, A Research Report Prepared Under the Direction of the Ontario Coalition for Nuclear Responsibility* (Ottawa: Infoearth, 1977). For more on public policy and the Canadian nuclear industry, see G. Bruce G. Doern, Arslan Dorman, and Robert Morrison, ed., *Canada's Nuclear Energy Policy: Changing Ideas, Institutions, and Interests*, (Toronto: University of Toronto Press, 2001); Bruce Doern and Robert Morrison, ed., *Canada's Nuclear Crossroads: Steps to a Viable Nuclear Energy Industry* (Toronto: C.D. Howe Institute, 2009) and Ron Finch, *Exporting Danger: A History of the Canadian Nuclear Energy Export Program* (Montreal: Black Rose Books, 1986). For issues regarding nuclear waste management in Canada, see Darrin Durant and Genevieve Fuji Johnson, ed., *Nuclear Waste Management in Canada: Critical issues, Critical Perspectives* (Vancouver: UBC Press, 2009); and Genevieve Fuji Johnson, *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada* (Toronto: University of Toronto Press, 2008).

affairs policy, and environmentalism.²⁴ Ronald Babin argues that Ontario Hydro and the AECL's nuclear energy program served to further aggravate the social and ecological crises of the twentieth century. In *The Nuclear Power Game*, Babin explains that the anti-nuclear movement evolved out of the peace movement and the ecological movement of the 1960s and 1970s as a response to the government's interests in developing the industry without public consent.²⁵ Michael D. Mehta states that Canada's nuclear energy program has hidden behind regulations which sought to exclude the public from any discussion of the social, economic, and environmental ramifications of nuclear energy.²⁶ The creation of long-lived-radioactive waste materials in every stage of the nuclear-fuel cycle further complicated society's relationship with nature. As Genevieve Fuji Johnsons argue, the issue of nuclear waste in Canada exemplifies the pressing ethical challenges of nuclear power and the paradoxical relationship between industry and the environment.²⁷ The environmental rifts created first by hydro-electric power and later nuclear power have only further complicated the relationship between society, nature, and capital.²⁸

While the works of Paul McKay, Ronald Babin, Jamie Swift, and Keith Stewart have done well to expose the social, economic, and environmental issues pertaining to Ontario Hydro and the AECL's empire, the impact of monopoly capitalism on shaping the relationship between the hinterland and the metropolis leaves much to be desired. Harold Innis' staple theory, the

²⁴ G. Bruce Doren, Arslan Dorman, and Robert Morrison, "Precarious Opportunity: Canada's Changing Nuclear Energy Policies and Institutional Choices," in *Canada's Nuclear Energy Policy: Changing Ideas, Institutions, and Interests*, ed. G. Bruce Doren, (Toronto: University of Toronto Press, 2001), 3-4.

²⁵ Ronald Babin, *The Nuclear Power Game*, 156-158.

²⁶ Michael D. Mehta, "Regulating Nuclear Power: The Mismanagement of Public consultation in Canada," in *In the Chamber of Risks: Understanding risk Controversies*, ed. William Leiss (Montreal and Kingston: McGill-Queen's University Press, 2001), 102.

²⁷ Genevieve Fuji Johnson, *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada* (Toronto: University of Toronto Press, 2008), 3-4.

²⁸ Ronald Babin, *The Nuclear Power Game*, 42.

basis for *The Fur Trade in Canada*, suggests that the country's economic history is structured on the continuous exchange of capital and resources between the hinterland and the metropolis. In the pursuit of greater resource wealth, the metropolis seeks to gain greater and greater political and economic control over the hinterland, the result of which establishes an unequal exchange of social, economic, political, and environmental stability between core and periphery. As a result, the hinterland enters a social relation with the metropolis in which the metropolis draws the hinterland into the production of a single staple industry.²⁹ J.M.S. Careless further established the theories of hinterland-metropolis relations with his 1979 article "Metropolis and Region."³⁰ As Careless argues, Canada's hinterland offered the metropolis the natural resources needed for production. As Canada's industrial sectors grew, so too did the political and cultural identity of the hinterland region.³¹ Although the hinterland-metropolis relationship represents what Careless argues as "contrasting or even antithetical states of human existence," the relationship was not only imperative to solidifying the nation-state but helped foster the development of Canada's staple industries.³² While our understanding of the complex relationship between the hinterland and the metropolis continues to unfold, such a theory has nevertheless become a fundamental pillar of Canadian historiography.

Such themes of industry, development and hinterland-metropolis relations have been an essential component of the history and identity of Northern Ontario. Nelles argues that Northern Ontario's development was "a joint public and private venture, a provincial equivalent to the

²⁹ See Harold A. Innis, *The Fur Trade in Canada: An Introduction to Canadian Economic History* (Toronto: University of Toronto Press, 1930, 2001).

³⁰ J.M.S. Careless, "Metropolis and Region: The Interplay between City and Region in Canadian History before 1914," *Urban History Review* 78, no. 3 (1979): 99-118.

³¹ Careless, "Metropolis and Region," 99.

³² *Ibid.*, 100-101.

opening of the West.”³³ Although the region has played a prominent role in the economic and political development of both the province of Ontario and the country, historians have often disputed the geographical boundaries of Northern Ontario.

Morris Zaslow’s work suggests most historians are likely to define Northern Ontario as the region that extends “north and west of the line of the Ottawa-Mattawa-French Rivers and the upper Great Lakes to the outer limits of the province.”³⁴ The region consists largely of the province’s area which is covered by the Canadian Shield, and composes nearly ninety per cent of Ontario’s total land area.³⁵ Matt Bray and Ernest Epp conclude that although Northern Ontario’s 85 million hectares comprises an area larger than the majority of most countries in the world, the region has historically played a subordinate role to the development of Southern Ontario.³⁶ Michel S. Beaulieu states that the term Northern Ontario has been defined in numerous ways to meet the political and economic needs of those living in the “north” and in the “south.”³⁷ Historians have often divided Northern Ontario into two distinct regions – Northeastern Ontario and Northwestern Ontario (the latter consisting of area north and west of Lake Superior, and west of Hudson Bay and James Bay).³⁸ Although both constitute “the north,” Geoffrey Weller further notes that Northwestern Ontario and Northeastern Ontario each have their own distinct social, political, and economic identities which are exemplified in the history of Northern

³³ Nelles, *The Politics of Development*, 109.

³⁴ See Morris Zaslow, “Does Northern Ontario Possess a Regional Identity,” *Laurentian University Review* 5, no. 4 (September 1973): 9-20.

³⁵ Geoffrey R. Weller, “The Environment and Resource Development: The Case of Northern Ontario,” paper prepared for the annual meeting of the Canadian Political Science Association, (Saskatoon, Saskatchewan, May 30, 1979), 1, The Northern Studies Resource Centre, Lakehead University.

³⁶ Matt Bray and A. Ernest Epp, ed., “Introduction,” in *A Vast and Magnificent Land: An Illustrative History of Northern Ontario* (Thunder Bay and Sudbury: Lakehead University and Laurentian University, 1984), 1.

³⁷ Michel S. Beaulieu, “A Historic Overview of Policies Affecting Non-Aboriginal Development in Northwestern Ontario, 1900-1990,” 94-95.

³⁸ *Ibid.*

Ontario.³⁹ Michel S. Beaulieu and Chris Southcott note that while Northern Ontario has no official political definition, it is very much a distinct political and cultural region for those people who live there.⁴⁰

Historians have explored in great detail the social and economic challenges of northern development and industrialization.⁴¹ Such a historiography not only encompasses the development of resource industries in Northern Ontario,⁴² but also the historical relations between Indigenous communities and industry in the North.⁴³ Nelles' *The Politics of*

³⁹ Weller, "The Environment and Resource Development," 3-4

⁴⁰ Michel S. Beaulieu and Chris Southcott, *North of Superior: An illustrated history of Northwestern Ontario*, (Toronto: James Lorimer & Co, 2010), 7.

⁴¹ The historiography of Northern Ontario provides a vast understanding of the social, political, economic, and environmental histories of the province's hinterland. Most notably, A. Ernest Epp's "Northern Ontario: History and Historiography," is an essential source for historians looking at the history of Northern Ontario. See A. Ernest Epp, "Northern Ontario: History and Historiography," in *The Historiography of the Provincial Norths*, ed. Ken Coates and William Morrison (Thunder Bay: Centre for Northern Studies, 1996), 136-139. For a general history of Northern Ontario, see Kerry M. Abel, *Changing Places: History, Community, and Identity in Northeastern Ontario* (Montreal and Kingston: McGill-Queen's University Press, 2006); Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario*; Matt Bray and A. Ernest Epp, ed., *A Vast and Magnificent Land: An Illustrative History of Northern Ontario*. For general economic and industrial histories of Northern Ontario, see Elizabeth Arthur, "Beyond Superior: Ontario's New-Found Land," in *Patterns of the Past: Interpreting Ontario's History*, ed. Roger Hall, William Westfall, and Laurel Sefton MacDowell (Toronto: Dundurn Press, 1988); Beaulieu, "A Historic Overview of Policies Affecting Non-Aboriginal Development in Northwestern Ontario," 94-114; H.V. Nelles, *The Politics of Development*; and W. Robert Wightman and Nancy M. Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800 to the 1990s* (Toronto: University of Toronto Press, 1997).

⁴² There are various works pertaining to resource extraction in Northern Ontario. For forestry and the pulp and paper industries see, among others, Elinor Barr, "Lumbering in the Pigeon River Watershed," *Thunder Bay Historical Museum Society Papers & Records IV* (1976): 3-9; J.P. Bertrand, *Timber Wolves: Greed and Corruption in Northwestern Ontario's Timber Industry* (Thunder Bay: Thunder Bay Historical Museum Society, 1997); James Hull, "Research at Abitibi Power and Paper," *Ontario History LXXIX*, no. 2 (June 1987): 163-179; and Mark Kuhlberg, *In the Power of the Government: The Rise and Fall of Newsprint in Ontario, 1894-1932* (Toronto: University of Toronto, 2015). For works pertaining to mining activities in the region, see Matt Bray and Ashley Thomson, ed., *At the End of the Shift: Mines and Single-Industry Towns in Northern Ontario* (Toronto: Dundurn Press, 1992); Catharine Dixon, *The Power and the Promise: The Elliot Lake Story* (Elliot Lake: Gillidix Publications, 1996); Anne-Marie Mawhiney and Jane Pitblado, ed., *Boom Town Blues: Elliot Lake: Collapse and Revival in a Single-Industry Communities* (Toronto: Dundurn Press, 1999); and Gilbert Stelter, "Community Development in Toronto's Commercial Empire: The Industrial Towns of the Nickel Belt, 1883-1931," *Laurentian University Review* 6 (June 1974): 3-53.

⁴³ The history of Indigenous relations with government and industry are also imperative to Northern Ontario's historiography. Most notably, see John Long, *Treaty No. 9: Making the Agreement to Share the Land in Far Northern Ontario in 1905* (Montreal and Kingston: McGill-Queen's University Press, 2010). See also Richard H. Bartlett, "Mineral Rights on Indian Reserves," *Canadian Journal of Native Studies* 3, no. 2 (1983): 245-275; Matt Bray and Ashley Thomson, ed., *Temagami: A Debate on Wilderness* (Toronto: Dundurn Press, 1990); Bruce W. Hodgins and Jamie Benidickson, *The Temagami Experience: Recreation, Resources, and Aboriginal Rights in the*

Development argues that the Metropolis' penetration into the hinterland 'exposed' Northern Ontario to the 'energies' of Toronto's business community; Advancements in technology and greater improvements in power production brought Northern Ontario under the dominance of the south, and developed in response to what Nelles calls "the techniques, facilities, and in a sense, the energies to finance resource industries."⁴⁴ J.M.S. Careless further stresses that in the twentieth century, the metropolis of Southern Ontario attained "control of the huge mineral resource area of Northern Ontario, so that the successive opulent suburbs of Toronto spell out a veritable progression of northern mining booms."⁴⁵

By exploring the development of Ontario Hydro and the AECL through the lenses of the hinterland-metropolis relationship, what we find is that Northern Ontario has historically played pivotal role in the establishment of Ontario's electrical utilities.⁴⁶ Jean L Manore's *Cross-Currents* was the first monograph to specifically explore the social, economic, and environmental impacts of hydro-electric power in Northern Ontario. Her work argues that the establishment of Ontario's electrical grid has relied on the vast resources of the province's hinterland. Keith R. Fleming's exploration of rural electrification in Ontario found that while providing power to the hinterland was an end-goal of HEPCO, the decisions made by the Commission were moreover based on the needs of developing a "complex electrical generating

Northern Ontario Wilderness (Toronto: University of Toronto Press, 1989); Daniel Macfarlane and Peter Kitay, "Hydraulic Imperialism"; Jean L. Manore, *Cross-Currents*; and Jean L Manore, "Treaty #3 and the Interactions of Landscape and Memory in the Rainy River and Lake of the Woods Area," *Journal of Canadian Studies* 50, no. 1 (Winter 2016): 100-128. Serpent River First Nation has also published a monograph of oral histories pertaining to the nuclear industry. See Anabel Dwyer, Keith Lewis, and Lorraine Rekmans ed, *This Is My Homeland: Stories of The Effects of Nuclear Industries by People of The Serpent River First Nation and The North Shore of Lake Huron* (Cutler, ON: Serpent River First Nation, 2003).

⁴⁴ H.V. Nelles, *The Politics of Development*, 118.

⁴⁵ J.M.S. Careless, "Limited Identities in Canada," *Canadian Historical Review* 50, no.1 (March 1969): 6.

⁴⁶ Several works explore the development of hydro-electricity in Northern Ontario. See Jean L. Manore, *Cross-Currents*; F. Brent Scollie, "The Creation of the Port Arthur Street Railway 1890-95," *Thunder Bay Historical Museum Society Papers and Records* 18 (1990): 40-58; and Robert Robson, "Ontario Hydro Colonies: A Study of Frontier Settlements," *Laurentian University Review* 17, no. 2 (February 1985): 113-139.

and transmission network” capable of satisfying the needs of the industrial metropolis.⁴⁷ More recently, Daniel Macfarlane and Peter Kitay argue that development of hydro-electricity on the Abitibi River in Northeastern Ontario developed in an “imperialist power dynamic” where hinterland waterways were “forcibly and tangibly altered to become features of hydro-electric infrastructure.” Furthermore, treaty-making, industrialization, and hydro-electric development rested on the provincial and federal governments process of ‘hydraulic imperialism.’⁴⁸ The development of hydro-electric dams across Northern Ontario not only had effects on reshaping the physical landscapes of the hinterland but subjugated northern communities to new social and environmental crises, the result of which fostered a continued imbalance between the hinterland and metropolis.⁴⁹

While ecologists and environmental historians have explored the ecological crises of the twentieth century, there has been neglect in the field of research to explain how society arrived at such an outcome. To understand the current social and ecological crises, historians must reconsider the relationships between humans, nature, and capitalism. The intensification of environmental degradation in the twentieth century corresponds with growth and development of capitalism.⁵⁰ Moreover, the expansion of monopoly capitalism restructured the relationship between hinterland and metropolis. As Paul Sweezy explains, capitalism as a mainstream process is “one that never stands still, one that is forever changing, adopting new and discarding old

⁴⁷ Keith R Fleming, *Power at Cost: Ontario Hydro and Rural Electrification, 1911-1958* (Montreal and Kingston: McGill-Queen’s University Press, 1992),4-5

⁴⁸ Manore, *Cross-Currents*, 1-5.

⁴⁹ Macfarlane and Kitay, “Hydraulic Imperialism,” 381-383.

⁵⁰ Jason W. Moore, “Transcending the Metabolic Rift: A Theory of Crises in the Capitalist World-Ecology,” *The Journal of Peasant Studies* 38, no.1 (January 2011): 4.

methods of production and distribution opening up new territories, subjecting to its purposes societies too weak to protect themselves.”⁵¹

One of the most elaborate theories to develop in Marxist ecology is the theory of metabolic rift. For Marx, the relationship between humans, nature, and capital can be most simplified as a transfer of energy and material between agents. Marx used the term “stoffwechsel” [metabolism] to explain the labour process. As Marx explains in *Capital Vol. I*, all commodities, whatever they may be, are the results of the process between matter and labour.⁵² Labour is simply a process in which both society and nature participate, and in which humans, in their own quest for accumulation, “starts, regulates, and controls the material reactions” between themselves and nature.⁵³ Such pursuit for capital accumulation, however, leads to what Marx describes as an ‘irreparable rift’ in the natural metabolism between humans and nature. In other words, the social metabolism of capitalism, through its own structures, is “inherently anti-ecological,” as capitalism must subordinate the natural social metabolism in its pursuit of more capital.⁵⁴

The history of power-generating technologies since the Industrial Revolution provides an excellent avenue for exploring the ecological crisis of capitalism. The developments of coal power, hydroelectricity, and nuclear energy have all both mended and created new environmental challenges which have shaped the social relations between humans, nature, and capital. By re-evaluating the ecological crisis of hydro-electric and nuclear technologies as not only an ecological crisis but also as a crisis of capitalism, it becomes apparent how we have

⁵¹ Paul Sweezy, “Capitalism and the Environment,” *Monthly Review* 56, no. 5 (2004): 92.

⁵² Karl Marx, *Capital: Volume I* (Moscow: Progress Publishers, 1867, 2015) 127.

⁵³ Marx, *Capital: Volume I*, 127.

⁵⁴ John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift: Capitalism’s War on the Earth* (New York: Monthly Review Press, 2010), 74.

arrived at the present state of economic and environmental inequality between Northern Ontario and Southern Ontario. Such an ideological shift has been most apparent in Marxists thought, which has led this new discussion on the relationship between humans, nature, and capital.

Historiographical interpretations have often seen the works of Karl Marx as both lacking ecological concern and adding no value to the school of environmental history.⁵⁵ Although scholars acknowledge Marx's contribution's the fields of historical and economic thought, they find his views regarding ecology to be either minute or not found at all. Furthermore, environmental historiography views Marx's theories regarding alienation and value theory as failing to properly account for nature, and in turn, having heavily promoted what John Bellamy Foster calls a "Promethean (pro-technological, anti-ecological) viewpoint."⁵⁶ Labour, value theory, and the class struggle led the focus of Marxist studies for the greater half of the last one-hundred years and served as the underpinning of twentieth-century socialist thought. In recent years though, the growing school of Marxist ecology has rapidly developed as one of the most dynamic new schools of socialist and ecological thought. These new ideas regarding Marxist ecology aim to ask how capitalism shapes nature-society relationships.⁵⁷ By re-evaluating the works of Marx through an environmental lens, historians, sociologists, and environmentalists have begun to understand Marx's importance in understanding the relationship between humans, nature, and capital.

While Marx's contributions to ecological thought are apparent in his work, he himself never coined the term metabolic rift. John Bellamy Foster's "Marx's Theory of Metabolic Rift" was the first work to argue that the implementation of Marxian frameworks could in fact offer

⁵⁵ John Bellamy Foster, *Marx's Ecology Materialism and Nature* (New York: Monthly Review Press, 2000), 8-9.

⁵⁶ Foster, *Marx's Ecology Materialism and Nature*, 9.

⁵⁷ Moore, "Transcending the Metabolic Rift," 4.

insight into capitalism's impacts on modern ecological crises.⁵⁸ The 'Oregon School' of Marxist Ecology, which the works of John Bellamy Foster, Brett Clark, and Richard York founded, champions the theory of metabolic rift. Foster argues that ecologically, capitalism operates globally under a particular social metabolism which generates a rift in the natural metabolic relationship between humans and nature.⁵⁹ The natural metabolism between society and nature is stressed by the metabolism of intensive large-scale industry and agriculture, as capitalism is dependent inherently on the furthering of "ecological exploitation and ecological unequal exchange" between the core and periphery.⁶⁰ The unequal exchange between the hinterland and metropolis occurs not only through economic means, but continues through the exploitation of lands, resources, and labour for accumulating more wealth.⁶¹

While the Oregon School has led the discussion on Marxist ecology, others have contributed to furthering the theory of the metabolic rift.⁶² Jason W. Moore argues that Foster's theory does not go far enough to explain capitalism's effects on the environment. Whereas the Oregon School proposes environmental degradation as consequence of the capitalist mode of production, Moore argues environmental degradation to be a component of capitalism. As Moore states, capitalism does not act upon nature, but rather, capitalism develops through nature. More importantly, Moore argues that "capitalism does not have an ecological regime; it is an ecological regime."⁶³ As an ecological regime, capitalism systematically reconfigures all lands and people in its grasp, exhausts local wealth (both resources and labour), and funnels capital

⁵⁸ See John Bellamy Foster, "Marx's Theory of Metabolic Rift: Classical Foundations for Environmental Sociology," *American Journal of Sociology* 105, no. 2 (September 1999): 366–405.

⁵⁹ Brett Clark, and John Bellamy Foster, "Marx's Theory of Metabolic Rift: Unequal Exchange and the Guano/Nitrates Trade," *International Journal of Comparative Sociology* 50, no. 3-4 (2009): 313.

⁶⁰ Foster, "Marx's Theory of Metabolic Rift," 380.

⁶¹ Clark and Foster, "Marx's Theory of Metabolic Rift," 312.

⁶² Ibid.

⁶³ Moore, "Transcending the Metabolic Rift," 2.

wealth and accumulation towards the metropolis.⁶⁴ Furthermore, whereas Foster and the Oregon School see the division of town and country as producing the metabolic rift, Moore sees this division as the metabolic rift.⁶⁵ Moore argues that there needs to be a move beyond seeing the environment as an objective component of life.⁶⁶

When explored through the Marxists theory of the metabolic rift, Ontario's electrical utilities provides an example of how monopoly capitalism navigates, consolidates, and overcomes social and ecological rifts created through its own growth. The historical narrative of Ontario's electrical utilities shows the physical limitations of nature in maintaining the pace of HEPCO/Ontario Hydro's development. Furthermore, the Crown Corporation's history shows how monopolistic implementations of capital and technology not only create social, economic, and environmental rifts within the capitalist structure, but also how monopolies maintain economic hegemony while navigating these rifts. The social and environmental rifts created in the development of Ontario's electrical grid were not an effect of Ontario Hydro and the AECL's monopoly in the province, but rather, a component necessary to maintaining their dominance in the industry. Moreover, the history of electricity in Ontario offers another example of the unequal exchange between the hinterland and the metropolis.

Since the creation of HEPCO, Northern Ontario has played a pivotal role in the province's vision of a domestically-powered electrical grid. The hinterland was imperative to both the expansion of hydro-electric power across the province and to the development of

⁶⁴ Jason W. Moore, "Silver, Ecology, and the Origins of the Modern World, 1450-1640," in *Rethinking Environmental History: World-System History and Global Environmental Change*, ed. Alf Hornborg and J.R. McNeill (New York: AltaMira Press, 2007), 130.

⁶⁵ Moore, "Transcending the Metabolic Rift," 7-10.

⁶⁶ Moore prefers using the word *Oikeios* to explain "the creative, historical, and dialectical relation between, and always within, human and extra human natures." See "Moore, "Transcending the Metabolic Rift."

Ontario's nuclear energy program. Yet, while the hinterland's role was necessary to providing the province with power, such a role came at a large environmental cost to Northern Ontario. The history of the Ontario's electrical utilities reaffirms the social, economic, and environmental inequalities embedded in history and identity of Northern Ontario. Such a narrative not only shows how space and place have influenced the hinterland-metropolis relationship but further exemplifies the complex relationship between society, nature, and capital.

Under capitalism, nature, land, and resources are no longer seen as material items which can contribute to bettering a human's life; the development of ownership of property and the means of production meant a revision of society's connection to the earth. Capitalists appropriate land for a single usage, whether it is to extract its resources, to build a factory, or to house workers. Through this appropriation, the multiple usages of land may be disregarded in the pursuit of capital, which diminishes the overall production value of the land in favour of a single production purpose. Once given economic purpose, industry uses land to produce, extract, and collect for the capitalist mode of production.

The most obvious attribute of the metabolic rift comes through the environmental damage caused by industry. Capitalism continuously challenges nature to keep pace with its metabolic rate. The pursuit of wealth forces the capitalist to exhaust the gifts of nature, until visible environmental degradation is apparent. For Marx, the visible environmental damage of capitalism signifies the metabolic rift between humans, nature, and capital. The capitalist mode of production changed the relationship between humans, nature, and capital in two-fold. First, capitalism transferred the agrarian practices of feudal Europe into what Marx calls "a conscious

scientific application of agronomy.”⁶⁷ The application of science, technology, and industry on nature allows the capitalist to extract as much material, and therefore as much wealth, as possible from the landed property.⁶⁸ Second, Marx argues that capitalism propagates a conception of nature where human interactions and the ownership of property represented “nothing but a certain monetary tax that [the capitalist’s] monopoly permits him to extract.”⁶⁹

In a capitalist society, there are very few options for mending the metabolic rifts of nature. First, capitalism will attempt to mend the rift through technological change. Foster, Clark, and York state that “technology is not neutral, given that it embodies capitalist relations.”⁷⁰ The improving of sciences, technologies, and industrial equipment help mend the ecological rifts of industrialization by facilitating a greater exchange of energy between land and labour. Beyond technology, capitalism’s next option is to acquire more appropriable land. Since its inception, the growth of capitalism has always relied on the expansive and colonial practices of conquering new territories. The growing populations of urban centres and capitalism’s inherent hinterland-metropolis structure made the acquisition of new territory an imperative endeavour for capitalism’s survival. The environmental degradation created through industrial capitalism further stresses the need to grow. Alf Hornborg suggests that capitalism creates an unequal exchange of space, time, and energy between hinterland and metropolis, where core areas accumulate the industrial and material structures of the world system, while peripheries become impoverished centres of social and environmental degradation.⁷¹ Developing the hinterland not only expands the environmental degradation of industrial capitalism to new corners of the globe,

⁶⁷ Marx, *Capital III*, 754

⁶⁸ *Ibid.*, 744-745.

⁶⁹ *Ibid.*

⁷⁰ Foster, Clark, and York, *The Ecological Rift*, 81.

⁷¹ Alf Hornborg, “The Unequal Exchange of Time and Space: Toward a Non-Normative Ecological Theory of Exploitation,” *Journal of Ecological Anthropology* 7 (2003): 4-10.

but solidifies what Clark and Jorgensen call “the emergence of a global rift” as the decline of metropolis resources, the unequal exchange of energy and capital, the exploitation of hinterland/periphery environments, and the creation of monopolies and debt economies can all be traced to capitalism expansion and appropriation of new territory.⁷²

When examined under the lens of the metabolic rift, the history of Ontario’s electrical utilities offers much to examine regarding the social, economic, and environmental impacts of industrial capitalism and the hinterland-metropolis relationship. The implications of Ontario Hydro and AECL’s electrical monopoly not only influenced the social and economic development of Northern Ontario but had dramatic effects on reshaping the physical landscapes and waterscapes of the province’s hinterland. By examining the history of Ontario’s electrical utilities through both the structures of the metabolic rift and the hinterland-metropolis relationship, what unfolds is an attempt by Ontario Hydro, Atomic Energy of Canada Limited, and provincial and federal governments to maintain their monopoly on the power industry and maintain a structure in which Northern Ontario serves as both the starting point and ending point of the nuclear-fuel cycle.

To further examine Marx’s theory of the metabolic rift, this thesis will explore the history of Ontario’s electrical utilities in four chapters of study. Chapter One explores the creation of HEPCO and the early years of the Commission. Although hydro-electricity in the province initially developed as a private venture, the capabilities of hydro-electricity to provide power at low costs fostered a greater demand for public intervention. If Ontario was to take full advantage of the economic possibilities of hydro-electricity and domestic power, it needed to develop “the

⁷² Clark and Foster, “Ecological Imperialism and the Global Metabolic Rift,” 313.

social forms, the institutions, and organizations, to operate the technologies.”⁷³ Between 1906 and 1932, HEPSCO expanded greatly to meet the demands of growing industry in the province. Under the populist banner of “hydro at cost,” HEPSCO sought to provide the province with the electricity needed to support its varying industries. The development of hydro-electric power corresponds with the greater development of resource industries in Northern Ontario, as HEPSCO’s survival rested on growth which emphasized greater industrialization in the province.

Chapter two explores the period between 1932 and 1963 and examines the social, economic, and environmental rifts of hydro-electric power. By the 1930s, HEPSCO was a monolith of technical industrialism. Although new issues began to challenge the stability of HEPSCO’s electric empire, their ability to vertically integrate all aspects of the power industry and to appropriate its supply of water ways in Northern Ontario attributed to the Commission’s expansion.⁷⁴ The Great Depression most notably impacted HEPSCO’s growth; the decline in industrial activity decreased power consumption across Ontario. The Great Depression not only shows the complexity of Ontario’s economic system, but highlights the challenges of the politics of development in the interwar period. Post-war expansion increased the demand for power in Ontario, while increased construction of hydro-electric dams continued to reshape the physical landscapes of Northern Ontario while reshaping the social structures of communities in the hinterland.⁷⁵ By the 1950s, HEPSCO projected that all water systems economically capable of developing hydro-electric power would be in use.⁷⁶ The physical limitations of nature to continue

⁷³ Bothwell, *A Short History of Ontario*, 92-93 and Armstrong and Nelles, *Monopoly’s Moment*, 12.

⁷⁴ Jamie Swift and Keith Stewart, *Hydro: The Decline and Fall of Ontario’s Electric Empire*, 162; and H.V. Nelles, *The Politics of Development*, 55-56.

⁷⁵ Macfarlane and Kitay, “Hydraulic Imperialism;” and Manore, *Cross Currents*. See also James B. Waldram, *As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada* (Winnipeg: University of Manitoba Press, 1988).

⁷⁶ Eggleston, *Canada’s Nuclear Story*, 307-308; Babin, *The Nuclear Power Game*, 43.

under the metabolism of HEPSCO's growth meant they needed new technologies to maintain their electrical monopoly. The transition to nuclear power and the successful launch of the HEPSCO and Atomic Energy Canada Limited (AECL) engineered Nuclear Power Demonstration (NPD) reactor in 1962 signified the abilities of capital and technology to mend the metabolic rifts of hydro-electricity, and solidified the continued importance of Northern Ontario to the province's electrical grid.

Chapter three examines the development of nuclear power in Ontario and the preliminary years of Ontario Hydro and the AECL's partnership. Between 1963 and 1977, Ontario Hydro, the AECL, and provincial and federal legislatures began an aggressive transition towards building the province's nuclear energy program.⁷⁷ Ontario's nuclear program exemplified the technological advancements of modern society and the centralization of technocratic institutionalization. What unfolded was an attempt by both Ontario Hydro and the AECL to fully develop its nuclear-power grid while developing the external components of the nuclear industry both nationally and internationally.⁷⁸ Although Ontario Hydro and the AECL succeeded in implementing nuclear energy in the province, the nuclear program did not develop without new social, economic, political, and environmental discourse. Concerns regarding the safety and security of nuclear reactors challenged the industry's ability to garner public support.⁷⁹ The ecological impacts of the uranium industry at the front-end of the nuclear fuel cycle made Northern Ontario question their confidence in nuclear power. While expanding the nuclear program in Ontario offered communities long-term economic stability in the nuclear industry,

⁷⁷ Paul McKay, *Electric Empire*, 29-30.

⁷⁸ Mez Lutz and G. Bruce Doern, "Nuclear Energy in German and Canada: Divergent Regulatory Policy and Governance Path," in *Governing the Energy Challenge: Canada and Germany in a Multi-Level Regional and Global Context*, ed. Burkard Eberlein and G. Bruce Doern, (Toronto: University of Toronto Press, 2009), 123.

⁷⁹ Babin, *The Nuclear Power Game*, 19.

such projects came at a cost of greater ecological degradation to the hinterland. The findings of the Royal Commission on Electric Power Planning solidified the decision of Ontario Hydro and its future power planning in the late 1970s.⁸⁰

Finally, chapter four explores between 1977 and 1998, and examines the new environmental rifts of the nuclear industry and the issue of nuclear waste. The issue of nuclear waste developed as the single greatest threat to the further expansion of nuclear power in Ontario.⁸¹ Years of nuclear power generation had created thousands of tonnes of long-lived irradiated fuel spent from power reactors. Under the guidance of the Hare Report, Ontario Hydro, the AECL, and provincial and federal governments sought quickly to find a community willing to begin testing for the purposes of burying nuclear waste in a deep geological depository. As the country's leading consumer of nuclear power, the Hare Report recommended that Ontario host Canada's first nuclear waste repository. Once again, the province's vast hinterland and placement on the Precambrian Shield made Northern Ontario the most viable solution for waste management. Although Northern Ontario received none of the benefits of nuclear power, political and economic interests expected the hinterland to bear the costs of the metropolis' power generation.⁸² What develops is an attempt by Ontario Hydro, the AECL, and provincial and federal legislatures to maintain its electrical monopoly while mending the environmental rifts of nuclear power through the continued social and environmental degradation of Northern Ontario.

⁸⁰ See see Royal Commission on Electric Power Planning, *A Race Against Time: Interim Report on Nuclear Power in Ontario*, (Toronto: Queen's Printer, 1978).

⁸¹ Genevieve Fuji Johnson, *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada* (Toronto: University of Toronto Press, 2008), 21-23.

⁸² Matt Bray and Ashley Thomson, *At the End of the Shift*, 143; David J. Bercuson, J.L. Granatstein, and William R. Young, *Sacred Trust? Brian Mulroney and the Conservative Party in Power* (Toronto: Doubleday Canada, 1986), 170; and Robert Bothwell, Ian Drummond, and John English, *Canada since 1945: Power, Politics and Provincialism* (Toronto: University of Toronto, 1981, 2001), 440-445.

By analyzing the creation of HEPSCO/Ontario Hydro through the Marxist theory of the metabolic rift, it is evident that the Crown Corporation established the province's power grid on an unequal exchange of resources, capital, and energy between the hinterland and metropolis. As new economic and environmental rifts challenged the metabolic rate of HEPSCO/Ontario Hydro's power grid, the Commission adapted to mend the metabolic rifts of its monopoly.

HEPSCO/Ontario Hydro's transition from hydro-electric power to nuclear power signified the finite limitations of the natural world, and reflected the abilities of capital and technology to mend the environmental rifts of the utilities industry. Not only does the history of HEPSCO/Ontario Hydro demonstrate the rifts and shifts of twentieth-century industrialization, but it exemplifies the social, economic, and environmental challenges to development in Northern Ontario.

Chapter 1

The Empire Business: Hydro-Electricity and the Creation of HEPCO, 1906-1932

Until the end of the nineteenth century, Ontario was reliant on imported coal and oil to create energy.¹ Although a costly undertaking, the development of hydro-electricity allowed Ontario to become an industrial powerhouse in the twentieth century, as such a technology offered the province the infrastructure needed to become Canada's largest manufacturing centre. The development of hydro-electric power not only provided a new source of energy but represented what *The Globe* called society's continuous struggle "for the possession of power – not the mere animal power of political rule, but the actual subjection of the forces of nature."² As H.V. Nelles states, Ontario's electricity endeavors provided both the capitalist and engineers of the province a new arena in which they could subjugate the 'raw and wild' elements of the hinterland.³

Between 1906 and 1932, the Hydro Electric Power Commission of Ontario (HEPCO) sought not only to gain full control of the province's electrical infrastructure but also provide 'power at cost' to both residential and industrial customers. Through greater government intervention, HEPCO worked with municipalities to transfer power infrastructure from the private to the public sector and to establish a public monopoly in Ontario. HEPCO's entrance into Northern Ontario also attributed to its dominance in the early twentieth century. The province's hinterland played a crucial role in the Commission's ability to monopolize the utility. While the Hydro Commission reaped the benefits of their electricity empire, northern

¹ R.W. Sandwell, *Powering Up Canada: The History of Power, Fuel, and Energy from 1600* (Montreal and Kingston: McGill-Queen's University Press, 2016), 17-18.

² Saturday special, "POWER, LIGHT & HEAT EDITION: The Electrical Empire," *The Globe*, August 5, 1905.

³ H.V. Nelles, *The Politics of Development: Forests, Mines, and Hydro-Electric Power in Ontario, 1849-1941* (Montreal and Kingston: McGill-Queen's University Press, 1970), 219-220.

communities continued to be reshaped by political and economic decisions made thousands of kilometers away from them. These decisions not only shaped the economic cycles of development in the north, but also reshaped the ecological landscapes and waterscapes of the hinterland. Water diversions and flooding from new hydro-electric projects affected many communities in Northern Ontario. Most affected were Indigenous communities in Treaty No. 9, whose traditional trap lines and agricultural lands were flooded in the pursuit of hydro-electric power. The first thirty years of hydro-electricity in Ontario not only illustrates the political and economic challenges to public utilities but highlights the environmental barriers to industrial development in Northern Ontario.

By the end of the nineteenth century, it was clear to the Ontario government that a decision needed to be made regarding their energy needs. Since Confederation, the Province of Ontario had grown both its economic and industrial bases. Shifting political and economic policies, both provincially and nationally, helped strengthen Ontario's economic position. In Southern Ontario, public investments in the industrial and manufacturing sectors helped Toronto become Canada's financial centre.⁴ Ian Drummond states that changing patterns of work, greater economic development, and increased educational practices provided Ontario the socio-economic structures needed to strengthen the province's role in the Dominion.⁵

In Northern Ontario, reductions to U.S. tariffs on Canadian resources aided development. New technologies also gave resource industries and capital the ability to develop 'New Ontario' in an unforeseen manner. Once seen as a barren hinterland, the vast resources Northern Ontario

⁴ W. Robert Wightman and Nancy M. Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800 to the 1990s* (Toronto: University of Toronto Press, 1997), 103.

⁵ Ian M. Drummond, *Progress Without Planning: The Economic History of Ontario from Confederation to the Second World War* (Toronto: University of Toronto Press, 1987), 19.

presented the province with what Nelles calls the ‘manufacturing conditions’ needed to grow Ontario’s economy and set a new precedent between private and public development in the province.⁶ The development of railways and concession roads in Northern Ontario exposed the hinterland to the abilities of the province’s industrial sectors and began a new era of northern development. Greater investments in forestry and mining at the end of the nineteenth century reinvigorated interest and development of the province’s hinterland.⁷ Mining booms at Silver Islet in Northwestern Ontario and in the Sudbury and Algoma regions in Northeastern Ontario generated a new-found interest in developing the north’s resource-extraction industries.⁸ Changes in paper production in the 1880s and 1890s not only created greater demand in America for Canadian pulpwood, but triggered the intensive development of Northern Ontario’s forestry, paper, and pulp industries.⁹ Such new interest in Northern Ontario at the turn of the century meant a new-found political and economic interest in developing and maintaining Ontario’s northern-resource industries.

New technologies also facilitated greater industrial development in Southern Ontario and helped further resource extraction industries in Northern Ontario.¹⁰ Technological advances not only provided the province with the technical mechanisms for development in the metropolis but also lessened the need for agricultural labour power in rural Ontario.¹¹ Between 1870 and 1910, industry in Southern Ontario grew from 23.6 per cent of the provincial total output to over 44 per

⁶ Nelles, *The Politics of Development*, 51.

⁷ Ibid.

⁸ Wightman and Wightman, *The Land Between*, 118. See also C.M. Wallace, “Communities in the Northern Ontario Frontier,” in *At the End of the Shift: Mines and Single-Industry Towns in Northern Ontario*, ed. Matt Bray and Ashley Thomson (Toronto: Dundurn Press, 1992), 5-8.

⁹ See Mark Kuhlberg, *In the Power of the Government: The Rise and Fall of Newsprint in Ontario, 1894-1932* (Toronto: University of Toronto Press, 2015), 34-35; J.P. Bertrand, *Timber Wolves: Greed and Corruption in Northwestern Ontario’s Timber Industry* (Thunder Bay: Thunder Bay Historical Museum Society, 1997), 74-75; and Wightman and Wightman, *The Land Between*, 129-135.

¹⁰ Wightman and Wightman, *The Land Between*, 103-104.

¹¹ Drummond, *Progress Without Planning*, 13.

cent.¹² Industrial and manufacturing growth in the province stimulated increased migration to Southern Ontario's five largest cities: London, Hamilton, Toronto, Kingston, and Ottawa. Toronto's population alone increased from 50,000 people at Confederation to well over 200,000 people by the turn of the century.¹³ The shift towards Ontario's metropolis was imperative to the province's economic and industrial growth in the twentieth century.

While Ontario enjoyed much economic and industrial growth in the 1880s and 1890s, the province's reliance on imported energy hindered its economic potential.¹⁴ Lack of coal deposits meant Ontario relied on imported coal and oil for energy. Nearly all the coal used in Ontario at the turn of the century came from the United States, as Canadian coal mines in Nova Scotia and British Columbia were simply too far from Ontario's market to be economically feasible.¹⁵ Ontario's reliance on such commodities was an issue in two aspects. First, since Ontario did not have a domestic supply of either coal nor oil, the province would continue to be subservient to the free market to support their energy needs.¹⁶ In an 1899 address to the Royal Society of Canada, for example, civil engineer T. C. Keefer stated that Ontario's endless supply of "white coal" from its lakes and rivers had the ability to free the province from its "servitude to American industry and its bondage to American coal."¹⁷ As new technologies were improving the transmission of power over longer distances, hydro-electricity became both an economically

¹² Drummond, *Progress Without Planning*, 167.

¹³ See Peter Baskerville, *Sites of Power: A Concise History of Ontario* (Don Mills, ON: Oxford University Press, 2005), 138-139; Drummond, *Progress Without Planning*, 22, 167; and Randall White, *Ontario 1610-1985: A Political and Economic History* (Toronto: Dundurn Press, 1985), 153.

¹⁴ Merrill Denison, *The People's Power* (Toronto: McClelland & Stewart, 1960), 27.

¹⁵ Sandwell, *Powering Up Canada*, 229

¹⁶ For example, in 1902 a strike by the United Mine Workers of America in Pennsylvania caused mass shortages for the North American market. The Province of Ontario, like many, were affected by this disruption in production. Such an example provides the challenges to Ontario's reliance on coal for energy at the turn of the twentieth century. See Perry K. Blatz, *Democratic Miners: Work and Labor Relations in the Anthracite Coal Industry, 1875-1925*, (Albany, N.Y.: State University of New York Press, 1994).

¹⁷ Nelles, *The Politics of Development*, 216.

profitable and less environmentally damaging option to coal.¹⁸ Such technologies allowed both private and public capital to further develop the province's northern hinterland, as its endless lakes and rivers provided power for both communities and resource-extraction industries to flourish. Growing vested interest in hydro-electric technology, coupled with water resources "as vast as the entire soft coal deposits of Pennsylvania," made hydro-electricity a veritable option for the province.¹⁹

More challenging for the Ontario government was whether private or public capital should control the electrical industry. Hydro-electric utilities were initially a private venture. As a new technology, electrical utilities provided private capital the opportunity to fund a new industry. By the turn of the twentieth century, the provincial government was continuously contracting hydro-electric projects to fewer and fewer interests. The control of utilities by private capital was highly contested by growing ideologies of civic populism.²⁰ As Christopher Armstrong and H.V. Nelles explain, civic populism was a political movement "against inadequate service by arbitrary, self-serving monopolies from which a small elite grew conspicuously rich."²¹ Poor service, high utility rates, and limited agency against private utility monopolies created growing antagonism towards the "new era in which large corporations would dominate economic life."²² Much like the telephone industry, municipalities needed to organize against monopoly interests in the electricity industry because of the little leverage municipalities

¹⁸ Neil B. Freeman, *The Politics of Power: Ontario Hydro and Its Government, 1906-1995* (Toronto: University of Toronto Press, 1996), 10-11.

¹⁹ Quoted by Hector Charlesworth, *The Canadian Scene* (Toronto: The Macmillan Company of Canada, 1927), 208. Charlesworth notes that the development and implementation of HEPCO was "one of the most stupendous economic events that has come to pass within the present century."

²⁰ Freeman, *The Politics of Power*, 11; Christopher Armstrong and H.V. Nelles, *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930* (Philadelphia: Temple University Press, 1986), 154. See also Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro* (Toronto: Between the Lines, 1983), 17-18.

²¹ Armstrong and Nelles, *Monopoly's Moment*, 141.

²² *Ibid.*

held against private capital.²³ R.W Sandwell states that civic populists championed state intervention to avoid capitalist exploitation and to liberate the technological capabilities of electrification.²⁴ Civic populism was a social development which sought to reverse the proliferation of utility monopolies “through local control and municipal freedom” and to hamper the ability of industries to be vertically integrated.²⁵ Although private capital dominated the hydro-electric industry, municipally were establishing themselves within the power industry. Across the province, municipal institutions began to restructure the utility sector, either through greater regulation or through greater public ownership.²⁶ In fact, a select committee of the provincial legislature found that by 1903, over 126 municipalities in Ontario had some form of municipally owned utilities.²⁷

Civic boosters did not limit the municipal ownership movement to Southern Ontario. Collectively known as the Lakehead, the neighbouring municipalities of Port Arthur and Fort William in Northwestern Ontario both understood the important role electricity played in the development of the modern city.²⁸ As Steven High argues, prior to the First World War, no city in North America took greater strides towards municipal ownership of utility services than Port Arthur.²⁹ The municipality took control of the Port Arthur Water, Light and Power Company and the Port Arthur Street Railway in 1895. Port Arthur was in the vanguard of the municipalities

²³ For more on civic populism influence on the telephone industry, see Robert MacDougall, *The People's Network: The Political Economy of the Telephone in the Gilded Age* (Philadelphia: University of Pennsylvania Press, 2013) and Jean-Guy Rens, *The Invisible Empire: A History of the Telecommunications Industry in Canada, 1846-1956* (Montreal and Kingston: McGill-Queen's University Press, 2001).

²⁴ Sandwell, *Powering Up Canada*, 257.

²⁵ Freeman, *The Politics of Power*, 12, and 14-18.

²⁶ Armstrong and Nelles, *Monopoly's Moment*, 142.

²⁷ Nelles, *The Politics of Development*, 222.

²⁸ David Leo Black, *Northern Lights: A History of Thunder Bay Hydro* (MA Thesis, Lakehead University, 1994), 1-2.

²⁹ Steven High, “Planting the Municipal Ownership Idea in Port Arthur, 1875–1914,” *Urban History Review* 21, no. 39 (October 1997): 3.

which understood electricity's potential.³⁰ *Canadian Electrical News* praised the Port Arthur Electric Railway for being "the only street railway in [North] America that is owned and operated by the town" and referred to the company as "an interesting experiment in municipal undertakings."³¹ Port Arthur began receiving electricity in June of 1888, when Woodside Brothers Foundry began generating power from a steam-engine.³² The utilities movement began in Port Arthur when the Port Arthur Water Power and Light Co. secured power rights on the Current River. The town of Fort William established the Board of Water and Light consecutively in 1897, and began receiving steam-powered electricity in 1898.³³ The municipality later took control of the Electric Railway, Light, and Telephone Commission in 1903.³⁴ Thorold J. Tronrud argues that civic boosters and municipal leaders promoted electrical infrastructure and 'power at cost' as a luxury of the modern city which catered to growing Port Arthur's population, especially under its economic contentions with its sister-city Fort William.³⁵ Municipal ownership was justified on the basis that it brought economic benefit to the community and not to private interests.³⁶ The municipal ownership movement was a phenomenon which sought to provide utilities at cost and to dismantle the economic influence of monopoly capitalism.

³⁰ A.W.H. Taber, *Electricity and Fort William: The History and Development of Electricity in the City of Fort William* (Fort William: The Hydro Electric Commission of Fort William, 1967), 3.

³¹ See "Port Arthur Electric Railway," *Canadian Electrical News and Steam Engineering Journal* 4, no. 7 (July 1894): 82. See also Black, *Northern Lights*, 6; and Kenneth C. Dewar, "Private Electrical Utilities and Municipal Ownership in Ontario, 1891-1900," *Urban History Review* 12, no. 1 (1983): 30.

³² Joseph D. Winterburn, "The Woodside Generator, Port Arthur's First Electric Light System," *Papers & Records of the Thunder Bay Historical Museum Society* 7 (1979): 6.

³³ "The Port Arthur Public Utilities Commission", Joe Winterburn/Port Arthur Electric Light System Fonds, Series G 10/1, Thunder Bay Historical Museum Society Archives.

³⁴ See Ralph B. Chandler, *A History of the Port Arthur Public Utilities Commission* (Port Arthur: The Port Arthur Public Utilities Commission, 1967), 2-3; and Joseph Mauro, *Thunder Bay: A History* (Thunder Bay: Lehto Printers Limited, 1981), 209 and 212.

³⁵ See Chandler, *A History of the Port Arthur PUC*, 3; and Taber, *Electricity and Fort William*, 3-7. For more on civic boosterism at the Lakehead, see Thorold J. Tronrud, *Guardians of Progress: Boosters & Boosterism in Thunder Bay, 1870-1914* (Thunder Bay: Thunder Bay Historical Museum Society, 1993), 33.

³⁶ F.B. Scollie, "Port Arthur Street Railway," *Thunder Bay Papers & Records* 18 (1990): 57.

In February of 1903, the public power movement made its greatest strides, as municipal representatives from across the province met in Berlin (now Kitchener), Ontario to establish a platform for publicly-controlled electrical utilities. The “Berlin Convention” signified what the *Toronto World* called “the sign of the awakening,” that is, the populist revolt against monopoly capitalism and the consolidation of public control and regulation.³⁷ Whether they feared the premise of private regulation in a monopolized industry, or the greater fear of an American takeover of hydro-electric power (especially in the Great Lakes Region), it is evident that Ontario politicians, industrialists, and citizens demanded greater control of utilities.³⁸

While the Ross government preferred that private capital develop the province’s electrical infrastructure, public opinion in Ontario swayed in favour of provincial control of hydro utilities. Such a probing issue not only became the downfall of George Ross’ Liberal government in 1905, but also propelled the creation of Hydro-Electric Power Commission of Ontario (HEPCO). As Peter Baskerville argues, the election of James P. Whitney and his Conservative government carried with it an ‘openly pro-business and pro-development’ government, which pushed for a “monopoly in the interests of consumers – among whom, of course, would be capitalists using provincially controlled hydro production to operate their enterprises.”³⁹ Whitney came to power on the platform of reducing electoral abuses, reducing patronage, and de-privatizing the power industry. Angry capitalists in the province sought to attack Whitney’s vision of ‘public power,’ arguing such a program would devalue Ontario’s

³⁷ Quoted in the *Toronto World*, February 18, 1903. See also Armstrong and Nelles, *Monopoly’s Moment*, 155.

³⁸ E.H. Biggar, *Hydro-Electric Development in Ontario: A History of Water-Power Administration Under the Hydro-Electric Power Commission of Ontario* (Toronto, Biggar Press, 1920), 45-43; Reginald P. Bolton, *An Expensive Experiment: The Hydro-Electric Power Commission of Ontario* (New York The Baker & Taylor Co., 1913), 239-264; Nelles, *The Politics of Development*, 241-4; and Freeman, *The Politics of Power*, 11.

³⁹ Baskerville, *Sites of Power*, 174-175.

credit rating and their position within the British money market.⁴⁰ Nevertheless, the new Premier defended the notion that the waterpower of Niagara Falls “should be free as air, not only to the monopolist and friend of government as it used to be, but every citizen, under proper conditions, should be free to utilize the powers that the Almighty has given to the province.”⁴¹ Through state-owned power, Ontario’s petit bourgeoisie could focus on further growing the province’s manufacturing industry instead of focusing on vertical integration of all aspects of production.⁴²

HEPCO’s creation came to be one of the defining programs of the Whitney government. Such an undertaking was part of the new government’s approach to administration where economic reform accompanied a new-found faith in science and technology. This transition ushered in an era of state reliance in “the specialized scientific advice in the running of its affairs.”⁴³ To complete this venture, Whitney elevated MPP Adam Beck to provincial cabinet as a Minister without Portfolio. Beck believed that the government had a two-fold interest in hydro-electric power. Not only did the province seek to profit off water power resources, but hydro-electricity had the potential to influence commercial development of the province through ‘the furnishing of cheap power.’⁴⁴

In 1906, the province established the Hydro-Electric Power Commission of Ontario, and Premier Whitney instated Adam Beck as HEPCO’s first commissioner. Beck stated to *The Globe* that his task was to “build up a policy which will commend itself to the people of the

⁴⁰ Charles W. Humphries, *Hones Enough to Be Bold’: The Life and Times of Sir James Pliny Whitney* (Toronto: University of Toronto Press, 1985), 152 and 154-155.

⁴¹ Whitney is quoted by *The Toronto Globe*, April 20, 1905.

⁴² Baskerville, *Sites of Power*, 174-175.

⁴³ Ibid.

⁴⁴ Adam Beck, *The Public Interest in the Niagara Falls Power Supply* (Toronto: King’s Printing, 1905), 24-25. See also William Rothwell Plewman, *Adam Beck and the Ontario Hydro* (Toronto: Ryerson Press, 1947), 158; Freeman, *The Politics of Power*, 31; Denison, *The People’s Power*, 46; McKay, *Electric Empire*, 18-19; and Keith R. Fleming, *Power at Cost: Ontario Hydro and Rural Electrification, 1911-1958* (Montreal and Kingston: McGill-Queen’s University Press, 1992), 9.

Province.”⁴⁵ The objective of HEPCO was to build provincial infrastructure and transmit power to municipalities where it would be converted for industrial and residential use. Almost immediately, Beck commissioned a comprehensive survey of the province’s developed and undeveloped waterways, and divided the province into five districts.⁴⁶ At a moment where investments in northern mining, forestry, and pulp and paper manufacturing fostered greater interest in New Ontario, “Beck understood the importance of developing a provincial system of dams, generators, and transistor lines that could help create new industries, revolutionize logistics, and initiate the massive extraction of northern resources.”⁴⁷

In its first twenty years of existence, HEPCO greatly expanded its power and control over the province’s electrical utilities. Initial contracts between HEPCO and the Ontario Power Company in 1910 negotiated the development of 100,000 horsepower of electrical power.⁴⁸ By 1914, the company was receiving 77,000 horsepower of its initial purchase, and by 1915 HEPCO had reached their energy cap with the Ontario Power Company.⁴⁹ Further contracts were negotiated between HEPCO and Canadian Niagara Power Company and the Toronto Power Company to purchase 75,000 more horsepower.⁵⁰ Such demand had not only expanded the industry, but provided HEPCO the profits needed to begin phasing out private capital from the industry. In 1917, HEPCO purchased the Ontario Power Company, and later the Toronto Power company in 1920, acquisitions that increased HEPCOs capacity to 356,000 horsepower.⁵¹ In

⁴⁵ Nelles, *The Politics of Development*, 258. For Adam Beck’s Speech, see *The Globe*, May 10, 1905.

⁴⁶ Freeman, *The Politics of Power*, 31-32; Dennison, *The People’s Power*, 47-48.

⁴⁷ Nelles, *The Politics of Development*, 259.

⁴⁸ Hydro-Electric Power Commission of Ontario, *Address by Sir Adam Beck at the Public Ownership Conference* (Toronto, 1923). See also Dennison, *The People’s Power*, 120-122 and Fleming, *Power at Cost*, 8-9.

⁴⁹ HEPCO, *Address by Sir Adam Beck*, 3. See also Drummond, *Progress Without Planning*, 146-147.

⁵⁰ HEPCO, *Address by Sir Adam Beck*, 3.

⁵¹ James Hull, “A Gigantic Engineering Organization: Ontario Hydro and Technical Standards for Canadian Industry, 1917-1958,” *Ontario History* 93, no. 2 (Autumn 2001): 179.

1922, HEPCO commissioned the Queenston-Chippewa project (later renamed Sir Adam Beck Hydro-Electric Generating Stations), which became the largest engineering project in the world since the completion of the Panama Canal. By 1923, HEPCO was distributing 650,000 horsepower and was operating 22 water projects which, when fully developed, produced over 1,000,000 horse power.⁵²

HEPCO can attribute its rapid expansion in its first twenty years to the Commission's investment in technological advancement and standardization. As James Hull argues, HEPCO's ability to operate at a "state-of-the-art level technically and with growing economic as well as political clout" played an imminent role in shaping the technical standards of various industries across North America.⁵³ By the 1920s, as industries were entering the 'golden age' of technical and engineering standards, HEPCO's had already established a plethora of standardization techniques across its various substructures.⁵⁴ HEPCO's commitment to standardization reflected the Commission's ideological shifts towards greater institutionalization of technocratic and scientific management practices.

In many respects, Ontario's move to hydro-electricity became the catalyst to its growth as Canada's manufacturing hub. Between 1901 and 1911, manufacturing output grew by nearly 172 per cent, while urban populations and the manufacturing sector grew by over 40 per cent.⁵⁵ Such growth was the greatest increase for any decade prior to the Second World War.⁵⁶ In Northern Ontario, the need for resources in the wake of the First World War stimulated industrial growth.

⁵² HEPCO, *Address by Sir Adam Beck*, 3-4.

⁵³ Dennison, *The People's Power*, 121. See also Hull, "A Gigantic Engineering Organization," 179-182.

⁵⁴ Hull, "A Gigantic Engineering Organization," 179-182. For information on the 'golden age' of technical and engineering standards, see Albert L. Batik, *The Engineering Standard: A Most Useful Tool* (Ashland, OH: Book Master/ El Rancho, 1992), 10-11.

⁵⁵ Baskerville, *Sites of Power*, 158.

⁵⁶ *Ibid.*

Most notably, iron, steel, and nickel production increased rapidly to meet manufacturing demands.⁵⁷ If Ontario had entered the age of technocracy, Beck's HEPCO, and his army of surveyors, engineers, and scientists, were a symbol of the influence of science and regulation on Ontario's economy.⁵⁸ Financial interests in Southern Ontario believed the public ownership movement was a harbinger to tapping into the north's resources; hydro-electric power was to be crucial to this venture, as it offered a means to solidifying capital's dominance over Ontario's hinterland.⁵⁹

Up until the twentieth century, providing cheap energy to Northern Ontario was both a challenging and expensive task left best to private capital. While Northern Ontario provided a bounty of resources waiting to be extracted, its physical landscape and climate made industrialization a daunting task. Nevertheless, the surveyors, engineers, and managers of HEPCO understood the potential in developing northern power projects. What unfolded was a series of political and economic decisions which not only allowed for an expansive growth of northern development, but which also reshaped social and political relations between Ontario and its hinterland.⁶⁰ As A. Ernest Epp states, "nothing demonstrated more clearly the primacy of economic development over aesthetic enjoyment in Northern Ontario than the harnessing of waterfalls to generate hydro-electric power."⁶¹

The creation of HEPCO came at a time of great political shift in northern politics. Amidst the creation of the Hydro Commission, the expansion of industry and the negotiation of treaty

⁵⁷ Drummond, *Progress Without Planning*, 149.

⁵⁸ Robert Bothwell, *A Short History of Ontario* (Edmonton: Hurtig Publishers, 1986), 106-107.

⁵⁹ Jean Manore, *Cross-Currents: Hydroelectricity and the Engineering of Northern Ontario* (Waterloo, ON: Wilfrid Laurier University Press, 1999), 21; and Wallace, "Communities in the Northern Ontario Frontier," in *At the End of the Shift*, 8.

⁶⁰ Wightman and Wightman, *The Land Between*, 187.

⁶¹ A. Ernest Epp, "Northern Ontario: History and Historiography," in *The Historiography of the Provincial Norths*, ed. Ken Coates and William Morrison (Thunder Bay: Centre for Northern Studies, 1996), 136-139.

rights were the two main interests which shaped the physical and political landscape of the North. At the turn of the century, a process of self-reflection entangled the province, as proponents of free-trade liberalization sought to dismantle government tariffs and regulations, while those opposed to reciprocity argued free-trade as an extension of American exploitation of Canadian resources. Instead, as H.V. Nelles argues, Ontario looked inwards for economic stability, as the unusable landscape of Northern Ontario was now ‘New Ontario.’⁶² Through intensive re-exploration and reappraisal of Ontario’s hinterland, and through the implication of new technologies, the politicians and the capitalists of the province created the “manufacturing conditions” needed to imperialize the northern hinterland.⁶³ Northern communities also began to see hydro-electricity as a window to future expansion and as a means of closing the gap between Northern and Southern Ontario. Nevertheless, their opportunity remained subservient to needs of the metropolis, as the financial powers of Toronto controlled the development of the north. As a public utility, HEPCO’s ability to regulate both politics and industry came to be the company’s most valuable asset. Although HEPCO was a hybrid of a government department, public utility, and municipal cooperative, the public utility needed to work with other industries to ensure continuous growth.

While Northern Ontario was experiencing an economic boom at the turn of the twentieth century, and although HEPCO received authority to develop hydro-electric power in the north in 1906, the Hydro Commission hesitated to develop its own infrastructure, and rather, allowed resource industries and private capital to lead hydro-electric projects in the north. Such a position differed from HEPCO’s operating standards in Southern Ontario, where the Commission sought

⁶² In *The Politics of Development*, Nelles writes that William H. Hearst, the MPP for Sault Ste. Marie, told the provincial legislature in 1911 that reciprocity “would result only in an outright American robbery of our resources.” See Nelles, *The Politics of Development*, 49-51.

⁶³ Nelles, *The Politics of Development*, 51.

aggressively to take control of all hydro infrastructure.⁶⁴ Parts of Northern Ontario had electricity before to the creation of the Hydro-Commission. Many of these projects were private enterprises, as the initial costs and challenges faced in building generating stations the north served to be too great for HEPCO.⁶⁵ Rather, HEPCO found the best practice was through the takeover of existing private generating stations and through the distribution of generated power.

Such was the case at the Lakehead in the 1900s. Port Arthur completed construction on one of the first municipally owned hydro-electric projects in Ontario in 1901.⁶⁶ When the Current River dam breached in 1908, power shortages forced the city into contracts with HEPCO. Initially, Port Arthur was in negotiations with the Kaministiquia Power Company to create a new line towards the city. Not only did the proposed agreement offer Port Arthur a solution to their issue, but also helped secure the power needed to entice new industries to the city. Port Arthur's inability to provide power at cost persuaded many industries to settle in Fort William. Between 1901 and 1911, Fort William's population rose by 12,800, while Port Arthur only grew by 8000.⁶⁷ Fort William's harnessing of the Kaministiquia River attributed to much of this growth. As the Port Arthur *Daily News* reported in 1909, "while not publicly expressed, the feeling is pretty generally entertained in Fort William that the next year is going to be a notable one in Port Arthur's history."⁶⁸

⁶⁴ Robert Robson, "Ontario Hydro Colonies: A Study of Frontier Settlements," *Laurentian University Review* 17, no. 2 (1985): 114.

⁶⁵ Manore, *Cross-Currents*, 45.

⁶⁶ See David Leo Black, "Trying Times: Hydro-Electric Power at the Lakehead During the Great Depression," Thunder Bay Historical Museum Society *Papers & Records* 22 (1994): 40. See also Denison, *The People's Power*, 122.

⁶⁷ Reginald P. Bolton's chapter on HEPCO's involvement in Port Arthur provides a detailed account of the events leading to the Commission's development in Northwestern Ontario. See Bolton, *An Expensive Experiment*, 239-264.

⁶⁸ Wightman and Wightman, *The Land Between*, 187; and Bolton, *An Expensive Experiment*, 243. See also "Kam Power Extensions for Port Arthur's Needs," *Port Arthur Daily News*, September 28, 1909.

While both parties committed to the agreement, HEPCO refused to ratify the contract and compelled municipal leaders to enter into an agreement with the Commission instead.⁶⁹ Contracts between HEPCO and the Corporation of the City of Port Arthur began in September of 1909. Under the negotiated terms, HEPCO was to receive ‘high tension’ power from the Kaministiquia Power Company. HEPCO would then send the power to Port Arthur, where the tension was ‘stepped down’ for consumer usage. The city agreed to pay \$17 for 1000 horsepower and as low as \$15 for all usage up to 5000 horsepower. The contracts further obligated the city “to take electric power exclusively from the Commission” during the length of the agreement.⁷⁰ HEPCO ironically promoted its intrusion into the Port Arthur and Fort William power markets as a means of breaking up the monopolization of power at the Lakehead.⁷¹ After two years of surveying and engineering, HEPCO began delivering power to the City of Port Arthur. The events at the Lakehead show the changing relationships between HEPCO and municipal governments and the growing interest in developing northern industries.

The burgeoning new industries of ‘New Ontario’ ushered in a new a new era of economic prosperity for ‘the empire,’ and none of this could be possible without the power created by northern hydro-electric projects. While Northern Ontario’s forestry boom was ending by the outbreak of the First World War, demand for paper and pulp helped the industry grow exponentially in the 1910s and 1920s. The dissolution of trade tariffs with the United States and greater demand for newsprint allowed the paper and pulp industry to dominate the northern

⁶⁹ Wightman and Wightman, *The Land Between*, 187; and Denison, *The People’s Power*, 122.

⁷⁰ The Hydro Electric Commission of Fort William, *Electricity and Fort William*, 31. See also *Port Arthur Daily News*, September 25, 1909; and Copy of Contract between the Kaministiquia Power Company and the Hydro-Electric Power Commission of Ontario, 1909, Port Arthur Treasurer’s Reports, Series 34, Port Arthur City Clerk’s Agreement Files, Thunder Bay City Archives.

⁷¹ Black, *Northern Lights*, 33.

economy. Amendments to the Timber Act in 1918 stipulating that mining claims no longer carried timber rights further promoted the industry in Northern Ontario.

In Northwestern Ontario, the demand for pulpwood grew from 112,000 cords in 1914-15 to over 523,000 cords in 1923, or nearly fifty per-cent of Ontario's output.⁷² In Northeastern Ontario, the Conservative government sought to use the paper and pulp industry as a means of populating the northern clay belt and developing new concession stands in the Algoma region. Mining activity continued to be a main industry in Northern Ontario, as the region remained the nation's leading metal producer. While much of the province's mining industry focused on the northeastern centres of Sudbury, Cobalt, Porcupine, and Kirkland Lake, activity and land speculation in the Thunder Bay region and Northwestern Ontario continued into the 1920s.⁷³ The industrial applications of hydro-electricity on Northern Ontario's mining and paper and pulp industries were the catalyst to northern development and urbanization.

As industrial development grew, so too did the demand for power grow in the north. In many cases, industries took it upon themselves to build and generate hydro-electric power. Paper and pulp companies were at the forefront of hydro-electric development. In Northeastern Ontario, Spanish River Pulp and Paper Company, the Mattagami Pulp, Spruce Falls Power and Paper Company (Kimberly Clark), and Abitibi Power and Paper Company built their own plants to meet the needs of production.⁷⁴ In Northwestern Ontario, the Kenora Paper Mills Company, which was owned by E.W. Backus, was obliged to construct the hydro-power needed for

⁷² Wightman and Wightman, *The Land Between*, 177 and 179; and Bertrand, *Timber Wolves*, 50.

⁷³ Kuhlberg, *In the Power of the Government*, 127-128.

⁷⁴ *Ibid.*, 48; and Wightman and Wightman, *The Land Between*, 190-193.

production.⁷⁵ Mining companies also invested in hydro-electric infrastructure. In the early 1920s, Hollinger Mining Company, the Dome, McIntyre Mines, the Lakeshore, and Wright-Hargreaves Mines built a hydro-electric facility at Island Falls, to support the expansion of hydro-electric systems and helped build Northeastern Ontario's generating capacities.⁷⁶

When new paper and pulp mills in Port Arthur and Fort William demanded greater power, the twin cities entered into a joint agreement with HEPCO for more power. By the mid 1910s, the Hydro Commission had control of the Thunder Bay System, and was continuing to develop generating sites, as mining and forestry intensified the need for power in Northwestern Ontario.⁷⁷ If HEPCO was to maintain its control of electrical utilities in Northwestern Ontario, it needed to build a hydro-electric generating station capable of satisfying the needs of mining and pulp and paper industries. In 1916, HEPCO began its survey of potential hydro-electric sites in the area. The Commission explored the option of further developing Kakabeka Falls, as well as the potential of developing a new dam at Dog Lake.⁷⁸ HEPCO eventually focused their energy on the Nipigon River. Surveys performed by the Commission found that Cameron Falls and Alexander Landing, a water system 200 kilometres from the Lakehead on the Nipigon River, offered the best potential site for two new dams. HEPCO began construction in 1918 and completed the project two years later.⁷⁹ The power contracts signed between the Kaministiquia Power Company and HEPCO were to expire in 1920, and the Commission was using the full capacity of the contracted power. Citizens and business owners in both Port Arthur and Fort

⁷⁵ Kuhlberg, *In the Power of the Government*, 48 and Mark Kuhlberg, "Eyes Wide Open": E. W. Backus and The Pitfalls of Investing in Ontario's Pulp and Paper Industry, 1902-1932," *Journal of the Canadian Historical Association* 16, no. 1 (2005): 208.

⁷⁶ Manore, *Cross-Currents*, 39.

⁷⁷ Black, "Trying Times," 40.

⁷⁸ Denison, *The People's Power*, 122.

⁷⁹ Taber, *Electricity and Fort William*, 31-33

William waited anxiously for HEPCO to complete a new project, as economic prosperity and northern development depended on adequate power supplies.⁸⁰ On December 20, 1920, the Kaministiquia power contracts expired, and the Cameron Falls Generating Station began providing power to HEPCO's Thunder Bay System.⁸¹ The completion of the Cameron Falls Generating Station was HEPCO's first venture in public ownership in Northern Ontario and the beginning of the Commissions relationship with communities in Northern Ontario.⁸²

HEPCO's entrance into Northern Ontario also created new environmental challenges for the provincial government, as the physical demands of hydro-electric power meant the government needed to manage the hinterland's resources accordingly. With limited lands and resources, the government was in a "zero-sum game," as they had to navigate how to properly allocate resources for concession stands, mining rights, and power contracts.⁸³ Jean L. Manore further stresses that hydro-electric power development took place within the greater contexts of competition for resources, environmental constraints, and political agendas of northern development.⁸⁴ In Northeastern Ontario, both Spanish River Pulp and Paper and Abitibi Pulp and Paper wanted to expand their operations, but investors demanded pulp limits be guaranteed by the government. In Northwestern Ontario, the burgeoning pulp mills in Port Arthur and Fort William remained watchful to see that adequate pulp concessions were granted to allow further

⁸⁰ Correspondence between A.H. Dennis and A. McNaughton regarding Kaministiquia Power-HEPCO Contracts, March 10, 1919, Kaministiquia Power Co., Limited – Misc. Fonds, Series B 48/4, Thunder Bay Historical Museum Society Archives.

⁸¹ Black, *Northern Lights*, 73. HEPCO began using the term 'Thunder Bay System' in 1919 to describe its operations in Port Arthur, Fort William, and the surrounding areas along the head of Lake Superior. See *Annual Report of the Hydro-Electric Power Commission of Ontario, 1919* (Toronto: King's Printer 1920).

⁸² Denison, *The People's Power*, 122.

⁸³ As Kuhlberg states, "allocating forest tracts and hydro powers is a contest in which there are ultimately winners and losers; in the vernacular of the political scientist, this is the classic "zero-sum game." See Kuhlberg, *In the Power of the Government*, 7-8.

⁸⁴ Manore, *Cross-Currents*, 8.

expansion in the region.⁸⁵ By the end of 1922, pressures from the pulp industry demanded the Drury government create policies which allowed for pulp limits in HEPCO's "Nipigon Power Zone."⁸⁶ Unfortunately for mills in Thunder Bay, the proposed pulp limits were defeated in parliament after growing controversy over the Drury government's handling of pulp and timber rights in Northwestern Ontario.⁸⁷ The addition of hydro-electric capabilities to the province's management of natural resources restructured the environmental demands of land management, as the intrinsic relationship between industry and electricity depended on equitable distribution of resources.

The politics of hydro-electricity also shaped relations between the government and Indigenous peoples. While northern development meant a veritable growth of Ontario's economy, such progress came at social and cultural costs to Indigenous communities. Several works have looked at the impacts of hydro-electricity on shaping Indigenous communities in the north.⁸⁸ Daniel Macfarlane and Peter Kitay argue that "the wider process of environmental and political change related to hydro-electric development" helped implement a form of hydraulic imperialism in Northern Ontario. Ontario's capitalists and politicians understood the hinterland's lakes and rivers to be 'depopulated spaces' which formed the basis of Ontario's economy. Such progress involved a division in the appropriation of land usage. The interests of capital and industry almost always trumped the traditional usages of the land, such as hunting, trapping, and fishing. These boundaries were shaped and reshaped through the implementation of treaties.⁸⁹

⁸⁵ Nelles, *The Politics of Development*, 389-390.

⁸⁶ See Kuhlberg, *In the Power of the Government*, 174-175.

⁸⁷ Ibid.

⁸⁸ See, for example, Daniel Macfarlane and Peter Kitay, "Hydraulic Imperialism: Hydroelectric Development and Treaty 9 in the Abitibi Region," *American Review of Canadian Studies*, 46, no. 3 (2016): 380-397; and Manore, *Cross-Currents*. See also James B. Waldram, *As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada* (Winnipeg: University of Manitoba Press, 1988).

⁸⁹ Macfarlane and Kitay, "Hydraulic Imperialism," 388.

The signing of Treaty No. 9, for example, was a gift for the Ontario government, as it provided the province its first opportunity to negotiate land and resource claims with its Indigenous peoples. Between 1905 and 1906, the federal government, the Ontario government, and Indigenous communities of Northern Ontario signed Treaty No. 9.⁹⁰ As John S. Long explains, treaty making was not ‘an act of benevolence’ bestowed upon Indigenous communities, but rather, they were ‘shrewd investments’ developed by provincial and federal governments to maintain the potentiality of future land, hydro-electric, and natural resource projects.⁹¹ Before the treaty could be ratified, last-minute negotiations resulted in amendments regarding Indigenous’ rights to location and establishment of reservations. Not only did these amendments allow the government access to over two thirds of Treaty No. 9’s waterscape, but the agreement also specified that the government not include sites with a potential of over 500 horsepower of power in the boundaries of the Treaty.⁹² On two of the largest river systems in Northeastern Ontario, the Abitibi and the Mattagami, water rights were completely given to private enterprises for the development of hydro-electricity. Abitibi Pulp and Paper began generating power on the Abitibi River in 1915 to meet the needs of its paper mill at Iroquois Falls. In 1923, Northern Canada Power began generating station on the Mattagami River to meet the growing needs of Hollinger Consolidated, the Dome, and McIntyre Mines.⁹³

⁹⁰ Treaty No. 9 was the first treaty negotiated in part by a provincial government. See Baskerville, *Sites of Power*, 158.

⁹¹ John Long, *Treaty No. 9: Making the Agreement to Share the Land in Far Northern Ontario in 1905* (Montreal and Kingston: McGill-Queen’s University Press, 2010), 48.

⁹² “Agreement Between the Government of Canada and the Government of Ontario,” July 3, 1905. As Jean L. Manore notes, “the government of Ontario added that clause, with the intention of ensuring it would retain the future revenues of accruing from any water power development to be established in the area covered by Treaty # 9.” See Manore, *Cross-Currents*, 177 and Long, *Treaty No. 9*, 62-63.

⁹³ Kerry M. Abel, *Changing Places: History, Community, and Identity in Northeastern Ontario* (Montreal and Kingston: McGill-Queen’s University Press, 2006), 61 and 282 and Manore, *Cross-Currents*, 39.

Intensive, large-scale-hydro-electric projects not only disrupted the traditional hunting and burial grounds of Indigenous communities, but also came to reshape the physical landscapes of the northern hinterland. Flooding became a new environmental issue for Indigenous communities to endure. In Northeastern Ontario, the completion of the Abitibi Power generating station at Iroquois Falls in 1914 caused flooding of areas as far as thirty kilometers from the site. Rising water levels affected many Indigenous communities, as Abitibi's hydro project disturbed their traditional rice fields, hunting grounds, and river systems. Tensions between northern communities and Abitibi continued to grow, as a second flood ensued the following year. In 1915, the chief of the Abitibi Band made an official complaint to Indian Affairs and demanded compensation for flooding to eight-square kilometres of reservation land. The only compensation offered to Indigenous communities was a settlement of 25 cents per acre of land.⁹⁴ At the Mattagami River, mining developments in Timmins, Kirkland Lake, and Porcupine created a greater demand for power. In 1921, Northern Canada Power applied to the Ontario Department of Lands and Forests for permission to raise water levels on Lake Kenogamisee. Industrial and mining booms in Northeastern Ontario demanded more power as well. While raising the water levels on Lake Kenogamisee insured sufficient power supplies for the region, such a decision would lead to flooding of the Mattagami Indian Reserve. Undoubtedly, the demands of Indigenous communities in the protection of traditional lands and cultural practices meant very little to the mining, forestry, and hydro-electric interests of the province. In the opinion of Albert Grigg, deputy minister of Lands, Forestry, and Mines, if the economic benefits of flooding

⁹⁴ Abel, *Changing Places*, 282. See also Manore, *Cross-Currents*, 56; Long, *Treaty No. 9*, 255; and Macfarlane and Kitay, "Hydraulic Imperialism," 389.

outweighed the social and ecological damage it created, there was no reason why the government should not grant such a request.⁹⁵

Such dramatic rises in water levels not only changed the physical landscape patterns of the northern river systems, but also reshaped the social contracts of the northern economy. As Jean L. Manore argues, northern development was just as much a process of ‘civilizing’ Indigenous communities as it was a process of ‘civilizing the land.’ The flooding of hunting, trapping, and fishing lands not only destroyed the traditional facets of indigenous culture, but forced Indigenous communities to sell their labour power to the mines, mills, and railways of Northern Ontario.⁹⁶ The relations between indigenous communities and the hydro-electric industry reflected the greater interest and control of northern resources and development.

In the 1920s, the province continued to pour vast capital sums into Northern Ontario. HEPCO built a series of new projects to meet the growing demands of the mining, forestry, and pulp industries. As Premier Howard G. Ferguson asserted to an audience of supporters in November 1923, “this government must see to it that if we are in the power business we have power to sell.”⁹⁷ While the north greatly needed power, the challenge came in where to find it. The lakes and rivers that seemed to be endless in Ontario were now becoming more and more scarce. Although there remained an untapped reservoir of ‘white gold’ in Northern Ontario, many remained out of HEPCO’s technical and economic grasps.⁹⁸ Nevertheless, HEPCO

⁹⁵ Correspondence between Albert Grigg and Alexander Fasken, Northern Canada Power, March 18, 1921. See Manore, *Cross-Currents*, 51-53.

⁹⁶ Manore, *Cross-Currents*, 56. As Macfarlane and Kitay also argue: “in [a] dramatic—almost poetic—fashion, the historic site of the original French fort built by Chevalier de Troyes in 1686 on the southern shore of Lake Abitibi was submerged by the rising waterline, thereby burying the fur trade economy of the past beneath a rising modern industry based on hydroelectricity.” See Macfarlane and Kitay, “Hydraulic Imperialism,” 389.

⁹⁷ “Ontario Will Work if Ottawa Sleeps on Power Program,” *The Globe*, November 1, 1923.

⁹⁸ Denison, *The People’s Power*, 172 and Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario* (Toronto: James Lorimer and Company, 2010), 92.

continued to establish in areas where they could build profitable projects; Virgin Falls (1926), Ear Falls (1929), and Alexander Falls (1930) projects solidified the power needs of these northern industries. By 1930, HEPCO's advancements into the northern hinterland had reached a capacity of over 218,000 kilowatts; the Thunder Bay System, the Northern Ontario System, the Nipissing District, the Sudbury District, and the Patricia District made up large portion of the province's electrical infrastructure.⁹⁹ Such growth not only allowed traditional northern industries to thrive, but also helped in the development of new ones. As *Northern Miner* wrote, "without the cheap Hydro-Electric power with which Sudbury has been blessed, the difficulties of the nickel industry might have been harder to overcome than they were."¹⁰⁰

By the time of Beck's death in 1925, two-thirds of Ontario's population and 249 municipalities had connected to the power grid, while the Hydro-Electric Power Commission of Ontario's capital investments reached approximately \$200 million. The appointment of Charles A. Magrath as Beck's successor meant a continuation of HEPCO's unbridled enthusiasm, as the roaring twenties brought with it industrial growth and economic prosperity. Taylorism and the development of 'scientific management' reshaped North American industrial capitalism, as these ideas transferred industrial control from the workers to the managers. Both Magrath and the Premier G. Howard Ferguson were strong advocates of scientific management and sought to use these new techniques to continue the expansion of its electrical empire. As Magrath stated in his 1928 Commission Report, "the endeavor of the Commission is not the concentration of industry

⁹⁹ See Frank Rasky, *Industry in the Wilderness: The People, the Buildings, the Machines – Heritage in Northwestern Ontario* (Toronto: Dundurn Press Limited, 1983), 84-87; Wightman and Wightman, *The Land Between*, 247; and *Annual Report of the Hydro-Electric Power Commission of Ontario, 1930* (Toronto: King's Printer 1931), 81-89.

¹⁰⁰ "Cheap Hydro-Electric Power Assisted Sudbury Development," *Northern Miner*, September 11, 1930.

at a few large power sites, but rather the broader policy of making as widespread a distribution of electrical energy as is economically possible.”¹⁰¹

As large as Ontario’s electrical infrastructure was, Magrath still feared the possibility of Ontario not being able to meet the needs of growing industry, especially in Southern Ontario. Power shortages could not only hinder current production, but would also hinder new industries from moving into the province.¹⁰² In his first few months as head of the Commission, Magrath worked diligently to receive the support from government needed to expand HEPCO’s power capacities. Although Magrath believed it was impossible for both private and public interests to occupy the power industry, negotiations with Abitibi Pulp and Paper Company saw HEPCO purchase power from the Ontario Power Service Company (the subsidiary of Abitibi Pulp and Paper leading the project).¹⁰³ Under the negotiated terms, if the Ontario Power Service Company funded the \$23 million project, HEPCO would in-turn supply the fifty kilometres of transmission lines needed to supply the Sudbury region with power.¹⁰⁴ In 1929, HEPCO finalized negotiations with the Ontario Power Service Generators, and construction on the 100,000-horsepower generating station began in the spring of 1930.¹⁰⁵ As Premier Ferguson stated to *Northern Miner*, “nothing will be allowed to stand in the way of the Hydro’s expansion in Northern Ontario.” Unfortunately for the Ontario government and HEPCO, troubles developed in 1932 when

¹⁰¹ C.A Magrath’s report to the Hydro Commission, *Annual Report of the Hydro-Electric Power Commission of Ontario, 1928* (Toronto: King’s Printer 1929), 20.

¹⁰² Letter, Magrath to Premier G.H Ferguson, February 20, 1929, General Correspondence of the Honourable J.R. Cook 1923-1929, RG 35, Series 2, Box 21, file 1929-8, Archive of Ontario.

¹⁰³ Nelles, *The Politics of Development*, 469 and Robson, “Ontario Hydro Colonies,” 125-126.

¹⁰⁴ “Ontario Hydro’s Huge Purchase from Abitibi Subsidiary,” *Pulp and Paper Magazine* 29 (May 1930): 595 and “Work Will Start on Abitibi Project in Next Few Days: Contract is Awarded for Building of Dam and Power House Completion in 1932,” *The Globe*, August 16, 1930. See also Manore, *Cross-Currents*, 77-78.

¹⁰⁵ “Abitibi Canyon and Rapids,” *Pulp and Paper Magazine* 29 (May 1930): 620 and “Topics of the Markets: Abitibi and Hydro Complete Negotiations for Power Purchase,” *The Globe*, April 12, 1930. See also Denison, *The People’s Power*, 179.

economic downturn forced Abitibi Pulp and Paper Company to file for bankruptcy.¹⁰⁶ In August 1932, the Ontario government signed an agreement to take control of the Abitibi Canyon project from the Ontario Power Service Company.¹⁰⁷ As mayor J.W. Richardson of North Bay stated to *The Globe* in 1932, the Abitibi Canyon Generating Station was an unnecessary and expensive lesson in private-public development and was a project which should have been fully developed by HEPCO in the first place.¹⁰⁸

While ensconced in heavy controversy, the completion of the Abitibi Canyon project was a momentous achievement for HEPCO. Not only did the project stand as a testament to Hydro's engineering ingenuity, but it also solidified Southern Ontario's grasp of the hinterland. If anything, Hydro's entrance into the north was the precursor to the expansive development of northern industries. The northern boom of the 1920s not only signified a newly discovered strength of Ontario's economy, but it also reshaped the politics of hinterland-metropolis relations. Technical advancements, further capital investments, and the development of scientific management techniques allowed industry to penetrate deeper and deeper into Northern Ontario. These achievements could not have occurred without the utilization of hydro-electric power. HEPCO's unfathomable expansion in the 1920s perpetuated the growth of Ontario's industrial sector; the ability of Hydro's planning and engineering not only prolonged the need for continuous power growth, but promoted greater use of the utility throughout the province.

The Hydro-Electric Power Commission's first twenty-five years shares much in the history of Ontario's growth in the early twentieth century. The fears of monopoly capitalism,

¹⁰⁶ "Ontario to Acquire Abitibi Canyon Project," *Pulp and Paper Magazine* 33 (July 1932): 243.

¹⁰⁷ See "Terms of Abitibi Agreement," *Pulp and Paper Magazine* 33 (August 1932): 300.

¹⁰⁸ See "Government May Be Sole Supplier of Power in Mining country," *Northern Miner* 1 May 1930 and "Bitter Criticism Of 'Canyon' Offer Comes from North: North Bay Mayor Says Project Always Unnecessary Sacrifice of Money," *The Globe*, July 27, 1932. See also McKay, *Electric Empire*, 28-29.

especially under the guise of new developments in Northern Ontario, gave rise to new ideologies of public ownership and civic populism. The establishment of HEPCO in 1906 signified a new vision of public and private development and the importance of regulating a utility as important as electricity. As E.B. Biggar noted in 1920, “no one will claim that the working of the Commission has been perfect... but its achievements cannot now be questioned, and they challenge in comparison with privately owned public-service corporations either on the grounds of efficiency or economy of administration.”¹⁰⁹ HEPCO’s ability to construct, regulate, and standardize hydro-electric power in Ontario helped stabilize the economic dominance of Southern Ontario’s industrial belt.

HEPCO did not limit its capabilities to Southern Ontario. If the northern economy was alive and well, hydro-electricity was its lifeline. New technologies and changes to provincial and federal regulations at the turn of the century fostered Northern Ontario’s role in the provincial economy. The growth of the mining, forestry, and the pulp and paper industries created a new-found interest in northern development, none of which could have occurred without adequate power supplies from Northern Ontario’s water systems. The penetration of the financial energies of the province began to flow into Northern Ontario as quickly as power flowed out. Adam Beck’s vision of an electrified Ontario not only became the foundation of the provincial economy, but it also allowed for the appropriation of the pre-Cambrian Shield.¹¹⁰

More importantly, the establishment of HEPCO and the development of its hydro-electric system altered the metabolic rate of industry in Ontario. The shift to hydro-electric technologies at the end of the nineteenth century not only mended the environmental and economic rifts

¹⁰⁹ Biggar, *Hydro-Electric Development in Ontario*, 3-4.

¹¹⁰ *Ibid.*, 169-171.

caused by coal-powered generation, but offered HEPCO a means of using its domestic resources to generate power. With an endless supply of water systems in Ontario's hinterland, HEPCO now controlled the metabolic rate at which the power industry in Ontario would grow. Although hydro-electricity mended the metabolic rifts of coal power, it also created new rifts in the substructure. Hydro-electric technologies benefited the growth and stabilization of Northern Ontario's resource economy, but such development came at a cost to traditional northern culture. The development of hydro-electric stations in Northern Ontario also affected Indigenous culture and lifestyle. Restrictions to land-use and location, as well as ecological shifts to the environment due to flooding, challenged the abilities of indigenous communities to live sustainably outside of Ontario's economy. Politicians and industrialists understood the impacts hydro-electricity on reshaping northern environments but such ecological shifts were a cost of development. While the managers and engineers of HEPCO touted boastfully the magnificence of their hydro-electric grid, new economic, political, and environmental rifts sought to challenge the stability of their electric empire.

Chapter 2

Cascading Crises: The Economic and Environmental Rifts of Hydro Electricity, 1932-1963

Although the Hydro-Electric Power Commission of Ontario developed into one of the most technically advanced utility systems of the early-twentieth century, between 1932 and 1963, new social, economic, and environmental rifts challenged HEPCO's progress. The Great Depression was the first major contention to HEPCO's survival in the inter-war period. The metabolic rate of growth and consumption which HEPCO had enjoyed for twenty-five years was now in jeopardy, as industrial and manufacturing output began to stagnate across the province. The economic downturn of the 1930s not only forced greater stress on Ontario's burgeoning industrial economy but brought the issues of private versus public ownership once again into the political debate. Politicians who opposed the growing agency of HEPCO demanded a "Hydro Clean Up" and sought to increase the checks and balances of HEPCO's growing monopoly. The Depression's impacts on economic and industrial activity in the province had greater impacts on HEPCO's stability and was a valuable lesson in the economic rifts of monopoly capitalism.

Although HEPCO survived the economic rifts of the Depression, new environmental rifts challenged the Commission's industrial metabolism in the 1940s and 1950s. The onset of the Second World War and the mobilization of industries on the home front created new demands for hydro-electric power in Ontario. When the war finished, secondary industries which emerged out of war-time production offered the Hydro-Electric Power Commission of Ontario new customers in the province's industrial sector. HEPCO's growth in this period allowed the Commission to develop all Northern Ontario's waterways which could be economically constructed; HEPCO had created a metabolic rift which outward expansion could no longer mend. The physical limitations of hydro-electric capabilities in the province meant HEPCO

needed new technologies to maintain its dominance in the utilities industry. HEPCO's investment in nuclear technologies and their partnership with Atomic Energy of Canada Limited (AECL) not only mended the economic and environmental rifts of hydro-electric power but allowed the Commission to maintain its monopoly over Ontario's power grid.

Just as the turbines of the Abitibi Canyon Project were about to commence generating power, Ontario faced the hardships of the Great Depression. Northern Ontario also grappled with new economic challenges from the global financial crisis. Declining manufacturing output and greater trade barriers on natural resources in the United States meant less demand for Northern Ontario's various resource industries.¹ Beyond gold mining, which continued unharmed through the Depression, unemployment rose dramatically in nearly all northern-resource communities.²

In Northwestern Ontario, downturns in the grain industries and the pulp and paper industries meant hundreds of unemployed workers at the Lakehead, as gross value in local production fell nearly 70 per cent between 1929 and 1933.³ The collapse of the grain industry in Port Arthur and Fort William triggered the beginning of mass unemployment. Slumping global markets caused annual grain shipping figures at the Lakehead to plummet from 556 million bushels in 1928 to 293 million bushels the following year.⁴ The paper and pulp industry, Northern Ontario's most prominent industry of the 1920s, also faced economic hardships. In Fort William, between 200 and 250 workers lost their jobs when Fort William Paper Mill ceased

¹ Robert Wightman and Nancy M. Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800 to the 1990s* (Toronto: University of Toronto Press, 1997), 215.

² As the *Northern Miner* reported in September of 1930, "industry is flat and unemployment runs high, but not in Northern Ontario's mining camps." See *Northern Miner*, September 25, 1930.

³ See Michel S. Beaulieu, *Labour at the Lakehead: Ethnicity, Socialism, and Politics, 1900-1935* (Vancouver: UBC Press, 2011), 153; Thorold J. Tronrud, "Building the Industrial City," in *Thunder Bay – From Rivalry to Unity*, ed. Thorold J. Tronrud and A. Ernest Epp (Thunder Bay: Thunder Bay Historical Museum Society, 1995), 114.

⁴ *Ibid.*

operation in January 1931.⁵ As Joseph Mauro states, armies of unemployed workers went aimlessly between cities in search of work, while lines at job sites and relief offices spanned “from locked front gate to eternity.”⁶ Elsewhere in Northwestern Ontario, paper mills at International Falls, Fort Frances, and Kenora fell into receivership, and later closed. Mills in Kenora and Fort Frances remained closed until provincial intervention helped production resume at about 40 percent of the mills capacity in 1931.⁷

In Northeastern Ontario, two-thirds of the men in Sudbury were unemployed in the summer of 1931. Before the Depression, nickel and copper production were at record levels in Sudbury. Employment at International Nickel (INCO), for example, dropped from just under 9,000 employees in February 1930 to about 2,000 employees in July 1932.⁸ While mining communities such as Sudbury and Timmins felt the effects of the Depression, the worst of its impacts spared these mining communities.⁹ The pulp and paper industry in Northeastern Ontario suffered much of the same challenges as in the Northwest. Nearly half the mills in Espanola and Sturgeon Falls closed completely, while newer and more efficient mills owned by Abitibi Pulp and Paper ran at minimal capacity while operating under receivership.¹⁰ Although the northern

⁵ Plant Shutdown Causing Concern at Head of Lakes: Deputation Coming to Queen's Park to Ask for Action Depression Is Blamed,” *The Globe*, January 12, 1931 and “Ft. William Seeks Unemployment Aid,” *The Globe*, January 16, 1931. See also Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario* (Toronto: James Lorimer and Company, 2010), 88.

⁶ See Joseph Mauro, *Thunder Bay: A History* (Thunder Bay, ON: Lehto Printers Limited, 1981), 315.

⁷ See Fort Frances *Times*, January 31, 1929; Kenora *Miner*, February 22, 1933; and Fort William *Times Journal*, April 6, 1931. See also Wightman and Wightman, *The Land Between*, 231-232.

⁸ C.M. Wallace, “The 1930s,” in *Sudbury: Rail Town to Regional Capital* ed., C.M. Wallace and Ashley Thomson (Toronto: Dundurn Press, 1996), 144.

⁹ Matt Bray and Ashley Thomson, “Introduction,” in *At the End of the Shift: Mines and Single Industry Towns in Northern Ontario* (Toronto: Dundurn Press, 1992) ix-x.

¹⁰ H.V. Nelles, *The Politics of Development: Forests, Mines, and Hydro-Electric Power in Ontario, 1849-1941* (Montreal and Kingston: McGill-Queen's University Press, 1970), 449; and Mark Kuhlberg, *In the Power of Government: The Rise and Fall of Newsprint in Ontario, 1894-1932* (Toronto: University of Toronto Press, 2015)

resource economy recovered, Northern Ontario felt the impacts of the Depression well into the 1940s.

The Depression also greatly impacted Southern Ontario, as factories and industries that thrived in the roaring twenties now faced economic turmoil.¹¹ Declining exports to the United States and Great Britain signalled the onset of greater economic isolation and disparity.¹² Between 1929 and 1932, overall provincial employment fell by 32 per cent.¹³ In the same period, manufacturing output in Southern Ontario's industrial sectors fell by nearly 37 per cent.¹⁴ While the province's economy experienced gross loss across all manufacturing industries, some sectors felt the impacts of the Depression more than others. Between 1929 and 1933, for example, home appliance manufacturing output fell between 42 and 87 per cent respectively, while the value of Ontario's automotive industry fell by 46 per cent.¹⁵ Such downturn forced nearly half a million people in Ontario to depend on government support by 1933.¹⁶ As Ian M. Drummond argues, the progress and success of Ontario's economic strength in the 1920s had all but collapsed with the onset of the Great Depression.¹⁷

¹¹ For a detailed examination of economic and industrial downturn in the Depression era, see Ian M. Drummond, *Progress Without Planning: The Economic History of Ontario from Confederation to the Second World War* (Toronto: University of Toronto Press, 1987), 156-165.

¹² In June of 1930, the United States signed the Smoot-Hawley Tariff Act into law. This law raised American tariffs on over 20,000 imported goods to stimulate internal growth. In March 1932, the United Kingdom passed the Import Tariff Act, which imposed new tariffs on imported foods and raw materials. The British Empire Economic Conference of 1932, also known as the Ottawa Conference, was later established to negotiate limited tariffs between the United Kingdom and its commonwealth nations. For more on protectionism amidst the Depression era, see Douglas A. Irwin, *Peddling Protectionism: Smoot-Hawley and the Great Depression* (Princeton, NJ: University of Princeton Press, 2015); and Barry Eichengreen and Douglas A. Irwin, "Trade blocs, currency blocs and the reorientation of world trade in the 1930s," *Journal of International Economics* 38, no. 1-2 (February 1995): 1-24.

¹³ See Laurel Sefton MacDowell, "Relief Camp Workers in Ontario during the Great Depression of the 1930s," *Canadian Historical Review* 76, no. 2 (1995): 205.

¹⁴ Drummond, *Progress Without Planning*, 158-159.

¹⁵ *Ibid.*

¹⁶ Robert Bothwell, *A Short History of Ontario* (Edmonton: Hurtig Publishers, 1986), 134.

¹⁷ Drummond, *Progress Without Planning*, 158-159.

Decreases in rural and northern consumption also hindered HEPCO's ability to grow through the Depression. Rural Ontario farming faced many of the same challenges as northern-resource industries, as economic limitations were a barrier to growing power usage. As Keith R. Fleming states, rural communities and small hamlets simply could not fund the infrastructure needed to join HEPCO's grid. The onset of the Great Depression only further stressed the financial limitations of Ontario's rural population.¹⁸ With large surpluses of power, HEPCO not only needed existing customers to purchase more power, but they also needed to find new customers in rural and Northern Ontario.¹⁹ HEPCO held several programs and promotions through the depression to attract new residential and industrial customers in the North. In 1930, the provincial government enacted the Rural Power District Loans Act to subsidise up to \$1,000 per customer for installing electric infrastructure and extending power lines across rural Ontario. Other promotions included stove, refrigerator, and water heater campaigns which HEPCO hoped could attract more customers and more power consumption.²⁰ These programs had success in attracting new customers in Northern Ontario. In Port Arthur, for example, the percentage of households with electrical ranges grew by nearly 20 per cent between 1931 and 1941.²¹ HEPCO's promotions during the Depression era were an indispensable tool to the Commission as it sought any means to maintain its profits.

HEPCO's economic stability was just as impacted by the Great Depression as other industries in Ontario. As the lifeline of production, decreases in Ontario's manufacturing production meant decreases in power consumption, and moreover, decreases in HEPCO's

¹⁸ Keith R. Fleming, *Power at Cost: Ontario Hydro and Rural Electrification, 1911-1958* (Montreal and Kingston: McGill-Queen's University Press, 1992), 154.

¹⁹ *Ibid.*

²⁰ David Leo Black, *Northern Lights: A History of Thunder Bay Hydro* (MA Thesis, Lakehead University, 1994), 84.

²¹ *Ibid.*, 85.

profits. By 1932, nearly thirty per-cent of the engines in Toronto turned off.²² HEPCO's consumption in Northern Ontario was also decreasing. HEPCO's 1931 Annual Report stated that in Northwestern Ontario, for example, the power load on the Thunder Bay System fell off considerably, as grain elevators and pulp and paper mills in Port Arthur and Fort William began closing.²³ For the first time in HEPCO's twenty-five year history, the Commission found itself with surpluses of power for which there was no demand.²⁴ While the engineers and the technocrats of HEPCO had expected a relative increase of consumption by eleven per cent per year, such figures did not manifest. In Northeastern Ontario, HEPCO also experienced declining profits, as the Commission was still obligated to purchase 100,000 horsepower from the Ontario Power Service Company on the Abitibi Canyon.²⁵ Contracts made with private-power generators in Quebec in 1926 to purchase block power created further criticism of HEPCO, as the Commission struggled to sell its own power during the Depression.²⁶ The Depression was the first event to not only challenge Hydro's myth of an endless demand of power but helped curb the corporation's growing agency.²⁷

The resignation of Premier Ferguson in 1930 and HEPCO Commissioner Charles Magrath in 1931 offered new hopes for the future of Ontario's public electric utilities, but the appointment of George S. Henry as Ontario's Premier, and successively, the appointment of Hon. J. R. Cook to succeed Magrath as HEPCO Commissioner, did little to change the political

²² H.V. Nelles, *The Politics of Development: Forests, Mines, and Hydro-Electric Power in Ontario, 1849-1941* (Montreal and Kingston: McGill-Queen's University Press, 1970), 468-469.

²³ *Annual Report of the Hydro-Electric Power Commission of Ontario, 1931* (Toronto: King's Printer 1932), xi and 5-7.

²⁴ Merrill Denison, *The People's Power* (Toronto: McClelland & Stewart, 1960), 192-193.

²⁵ *Ibid.* See also Nelles, *The Politics of Development*, 470.

²⁶ For more on the power agreements between Ontario and Quebec, see Nelles, *The Politics of Development*, 466-481.

²⁷ See Neil B. Freeman, *The Politics of Power: Ontario Hydro and Its Government, 1906-1995* (Toronto: University of Toronto Press, 1996), 68-69 and Denison, *The People's Power*, 189-190.

and economic strategies of Ontario Hydro. Between 1932 and 1935, HEPCO carried a deficit of nearly \$12.5 million, while the electrical-utilities industry continued to slump.²⁸ In 1933, the Ontario Power Service Company collapsed, causing HEPCO to take over the company at a cost of \$18 million.²⁹ Instead of simply being under contract to purchase 100,000 horse-power of electricity from the Abitibi Canyon, HEPCO now owned the complete operation while having no market to sell power too. As Magrath wrote to Premier Ferguson in 1930, “public ownership in the electric power field will always differ from private ownership in one main feature, that is the former must always have ample supplies of power available, and must be prepared to go further than a private corporation could be reasonably called upon to attempt in meeting a demand for power.”³⁰

Although the Commission’s policy of continuous growth helped expand HEPCO’s dominance of the power industry, it also served as the Commission’s greatest challenge when the province’s factories came to a halt. Greater economic stresses from the depression and greater political scandal developing from within HEPCO brought the questions of private versus public ownership back into political debate. Critics of HEPCO, such as Liberal Party leader Mitch Hepburn, questioned the decision to purchase the private power company outright. Later that year, new revelations found that Premier Henry and other prominent officials owned interest in Ontario Power Service’s bonds, information which Hepburn used to champion his message of a “Hydro Clean Up.”³¹ As pressure grew from the opposition, Premier Henry opted to establish a

²⁸ Denison, *The Peoples Power*, 194.

²⁹ Nelles, *The Politics of Development*, 470.

³⁰ “Magrath to Ferguson, March 11, 1929,” Correspondence, Howard Ferguson Fonds, series F 8, Archives of Ontario.

³¹ G.S. Henry, “The Abitibi Canyon Development, Reasons for its Acquisition by the Province,” Speech in the Legislature, April 5, 1933, Mitchell F. Hepburn fonds, series F 10, Archives of Ontario. See also Nelles, *The Politics of Development*, 470-471 and John T. Saywell, *Just Call me Mitch: The Life of Mitchel F. Hepburn* (Toronto: University of Toronto Press, 1991), 98-99.

Royal Commission to inquire into the speculations stemming from Hydro's Abitibi and Quebec deals.³²

Although rural expansion did not compare with pre-Depression era growth, HEPCO built over 3000 kilometres of transmission lines and added over 15,000 new customers to its rural grid between 1931 and 1933.³³ Northern development also remained a priority for HEPCO. To ensure greater control and development over the provinces northern hinterland, the 1933 legislature amended the Power Commission Act to give Ontario Hydro full access to build works in any of the territories of the province. Such included Kenora, Rainy River, Thunder Bay, Cochrane, Algoma, Temiskaming, Sudbury, Nipissing, and Manitoulin Island. The act further stipulated that hydro rates remain fixed in all its power systems (excluding Kenora, Rainy River, and Thunder Bay Systems) and remained fixed regardless of the actual costs of production.³⁴ Such an amendment aimed at stimulating mining in the north, while providing Ontario Hydro with customers who would begin to use vast quantities of power again.

While the Henry government and HEPCO sought to win back public support with such policy changes, the issues of hydro-electricity remained a cornerstone issue of the 1934 provincial election. The election of Liberal Mitchel Hepburn allowed for sweeping changes to both the government and Ontario Hydro's operations. Hepburn had led the campaign against HEPCO in the early years of the Depression and was one of the most vocal opponents to the Commission's political and economic agency. Hepburn's campaign slogan of a "Hydro Clean Up" championed the need to rid HEPCO of the technocracy and institutionalism which served to

³² Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro* (Toronto: Between the Lines, 1983), 28-29 and Nelles, *The Politics of Development*, 473.

³³ See Denison, *The Peoples Power*, 194-195 and Fleming, *Power at Cost*, 156.

³⁴ Ontario Legislature XXIII King George V 18th Legislature, *Statutes of the Province of Ontario, 1933* (Toronto: King's Printer, 1933), 127-128. See also Denison, *The Peoples Power*, 194-195.

only benefit those within the Commission.³⁵ In retaliation to attacks, HEPCO published a series of pamphlets which attempted to discredit the position of Hepburn's Liberal Opposition.³⁶

HEPCO's pamphlets reiterated that "the integrity of the Hydro undertaking and its administration is unassailable upon any bona fide basis" and implied that many of the Liberal government's claims were based rather on furthering private interests in the utilities industry.³⁷ Nevertheless, the 1934 election allowed Premier Hepburn to begin the purging of many high-ranking HEPCO officials, including its Commissioner J.R. Cooke.

Although Hepburn wanted to control HEPCO's growth, construction on new hydro projects continued throughout Northern Ontario. In Northwestern Ontario, a smaller project was under construction at Rat Rapids (40 kilometers south of Pickle Lake) to meet the demands of mining in the District of Patricia.³⁸ In Northeastern Ontario, the Commission completed a second generator at the Abitibi Canyon in 1934, while power stations were in construction at Kirkland Lake to supply the Matachewan area. HEPCO also built a new transformer at Smooth Rock Falls to supply the Abitibi Power and Paper Company with secondary power.³⁹ The momentum of the mining boom of the mid-1930s signified the need for more power.

While growing interest in the nickel industry in the Sudbury Region and gold mining near Kirkland Lake provided the northeast an opportunity to reinvigorate its economy, like all prospective northern developments, such projects needed to ensure that financial and industrial

³⁵ Nelles, *The Politics of Development*, 473.

³⁶ See Hydro-Electric Power Commission, *Misleading Assertions that have been made relating to the Power Situation in the Province of Ontario Examined and Corrected* (Toronto: HEPCO, 1933); Hydro-Electric Power Commission, *Misleading Assertions that have been made relating to the Power Situation in the Province of Ontario Have Not Been Withdrawn* (Toronto: HEPCO, 1933); and Hydro-Electric Power Commission, *Paid for Propaganda: Who Instigates Attacks on Hydro* (Toronto: HEPCO, 1934).

³⁷ Hydro-Electric Power Commission, *Paid for Propaganda*, 4, 5-9. See also McKay, *Electric Empire*, 29; Nelles, *The Politics of Development*, 476-477; and Freeman, *The Politics of Power*, 72.

³⁸ McKay, *Electric Empire*, 29.

³⁹ *Annual Report of the Hydro-Electric Power Commission of Ontario, 1934* (Toronto: King's Printer 1935), xvi-xv.

infrastructure supported its growth. As the *Northern Miner* printed in 1936, HEPCO “could not go into the mining country and deal with it as they would the old, long, established industrial areas of Southern Ontario.”⁴⁰ If HEPCO wanted to take full control of the northern power grid, it needed to equip itself with the mentalities of development in the north. HEPCO’s use of planning and scientific management meant projects were based on economic feasibility rather than on the needs of the mining community and its sporadic boom-bust cycles. Such structure coupled with the fact that both the Ontario government and HEPCO’s focus was on internally restructuring the Crown Corporation to overcome its economic and political issues – not to create new ones. Although the Hepburn government wanted to cancel the Quebec power contracts, such a decision did not unfold. Beyond the illegality of what Hepburn proposed, the province was beginning to need power again.

By 1937, HEPCO’s new chief engineering staff predicted future power shortages, as power usage continued to grow with industrial recovery.⁴¹ In Southern Ontario, the Commission faced shortages in the Niagara system, as manufacturing production returned to pre-Depression figures. Between 1933 and 1937, manufacturing output in the province rose by 71 per cent while employment grew by 43 per cent.⁴² In Northern Ontario, the recovery of resource industries gave way to increasing demands for power.⁴³ The pulp and paper industry began to see mills re-open at moderate capacity across Northern Ontario. In Northwestern Ontario, the mining industry revitalized the northern economy, as the industry catered to growing manufacturing output in Southern Ontario.⁴⁴ Although Premier Hepburn’s campaign was based on consolidating

⁴⁰ “Hydro Has Got to Pioneer,” *Northern Miner*, May 28, 1936.

⁴¹ For more on Premier Hepburn and the Quebec Contracts, see Freeman, *The Politics of Power*, 76-82; Saywell, ‘Just Call me Mitch,’ 198-205; and Nelles, *The Politics of Development*, 472-481.

⁴² Drummond, *Progress without Planning*, 160.

⁴³ Denison, *The People’s Power*, 215 and Nelles, *The Politics of Development*, 480-481.

⁴⁴ See Wightman and Wightman, *The Land Between*, 231-232 and 240-244.

HEPCO's power, market stabilization and growing power consumption benefitted HEPCO more than Hepburn.

The Great Depression provided Ontario Hydro with its first large challenge. Before the economic downturn, it seemed as if HEPCO had the potential for endless growth. As Ontario's demand for power grew and as the production of hydro-electric power became more technically managed, so too did HEPCO's influence within the provincial political spectrum. With such great autonomy and agency granted to the Commission, HEPCO was itself "a branch of the executive with delegated responsibility in all fields pertaining to the generating and distribution of hydro-electric power within the province."⁴⁵ Yet, the early 1930s showed how the imperial nature of Hydro's never-ending pursuit for growth was both its greatest asset and its greatest weakness.

Economic and political woes were not the only issue for HEPCO in the 1930s. Indigenous and non-Indigenous communities across Northern Ontario continued to face environmental challenges from the development of massive hydro projects on reserve lands. In Northeastern Ontario, dams built by the Northern Ontario Power Company (which HEPCO now owned out-right) in the 1920s continued to impact the Mattagami First Nation. Rising water levels caused significant damage to timber stands used by the community. The hydro-electric project also resulted in the flooding of the Little Lakes Portage Route, a passage used by various Indigenous communities.⁴⁶ Indigenous grievances always posed a challenge for power companies, as most often, the environmental and economic wants of Indigenous communities

⁴⁵ Nelles, *The Politics of Development*, 464.

⁴⁶ Jean Manore, *Cross-Currents: Hydroelectricity and the Engineering of Northern Ontario* (Waterloo, ON: Wilfrid Laurier University Press, 1999), 91-93 and John Long, *Treaty No. 9: Making the Agreement to Share the Land in Far Northern Ontario in 1905* (Montreal and Kingston: McGill-Queen's University Press, 2010), 255.

varied greatly from those of industry.⁴⁷ While companies compensated communities with new land, they did not attempt to protect the fisheries and trap lines that had both historical and cultural significance for Indigenous communities. Although the Ontario government compensated the Mattagami First Nation a total of \$3,500 in 1931 for the flooding created by hydro projects, HEPCO could not reimburse the community for the irreparable effects to their Indigenous economy.⁴⁸

One of the greatest achievements for HEPCO in the 1930s was the construction of the Long Lac Diversion, located just east of Lake Nipigon. The diversion took the Kenogami river, which flowed northward to the Albany River and into the Hudson Bay, and redirected it southwards to the Aguasabon River and into Terrace Bay on Lake Superior.⁴⁹ As Hydro's 1939 Annual Report explained, "the canal was designed and constructed for the transportation of pulpwood and to divert an annual average flow of about 1,100 cubic feet per second southerly to Lake Superior." Such a project allowed for greater generating power in the Niagara Region.⁵⁰ More significantly, the completion of the Long Lac Diversion symbolized Ontario's dominance of the hinterland. Such a feat of engineering not only exemplified the abilities of society over nature but represented the power of capital and technology to appropriate nature to its will. More importantly, the completion of the Long Lac Diversion signified the growing pressures of future

⁴⁷ Manore, *Cross-Currents*, 91-93.

⁴⁸ *Ibid.*

⁴⁹ Matthew Evenden, *Allied Power: Mobilizing Hydro-Electricity during Canada's Second World War* (Toronto: University of Toronto Press, 2015), 83.

⁵⁰ See *Annual Report of the Hydro-Electric Power Commission of Ontario, 1938* (Toronto: King's Printer 1939), 100-101; and *Annual Report of the Hydro-Electric Power Commission of Ontario, 1939* (Toronto: King's Printer, 1940), 68. See also Denison, *The Peoples Power*, 217; and Long, *Treaty No. 9*, 194.

planning and preparation for water and resource management, as more and more, HEPCO was establishing itself on every waterway in Northern Ontario.⁵¹

The booms and busts of the 1930s played a pivotal role in the expansion of HEPCO. Ten years of economic depression taught the technocrats and engineers of HEPCO the risks of growing too rapidly and the challenges of managing one of the largest state-operated power systems in the world. As mines and mills re-opened in the north, and as the factories began production in the south, hydro-electric power once again became a necessity for the success of Ontario's economy. Much of this economy continued to rely on northern development. The vast hydro-electric projects of the 1930s and the further installments of generating and transmission stations in Northern Ontario aligned with the intensification of the mining and paper and pulp industries in Northern Ontario. If HEPCO had learned anything from the Depression, it was the delicate relationship between the needs of industry and the growth of its electrical grid. These lessons proved to be valuable, as the commencement of the Second World War in 1939 created new demands for power across the province.

The outbreak of the Second World War solidified the demand for resources and industry in Ontario. As historian Donald Creighton explains, while the federal government was hesitant to begin preparing for the European conflict, the Ontario government sought quickly to transition to war-time production.⁵² As Canada was drawn into the Second World War, so too were investments in resource extraction and manufacturing. The advent of war not only renewed the demand for mining in Ontario but extended the industry greatly. Mining activity increased at Porcupine, Kirkland Lake, Matachewan, and Sudbury in Northeastern Ontario and Red Lake and

⁵¹ J.C Day and Frank Quinn, *Water Diversion and Export: Learning from Canadian Experience* (Waterloo: Canadian Association of Geographers Publication Series, 1992), 71.

⁵² See Donald Creighton, *The Forked Road: Canada 1939-1957* (Toronto: McClelland and Stewart, 1976), 10-14.

Pickle Lake in the northwest to meet the demands of industry.⁵³ As the country's manufacturing center, Ontario benefitted greatly from increased wartime spending.⁵⁴ If Ontario had entered the war on the home front, it was Northern Ontario that was keeping industries in production.

The Second World War also increased the need for domestic power and helped HEPCO further expand its hydro-electric capabilities. As Hydro's 1939 Annual Report stated, "towards the latter part of the year, before war was declared, it became increasingly evident that the recession of 1938 had passed and peaceful industry was making progress towards better times."⁵⁵ By September of 1939, HEPCO had taken preliminary steps to prepare itself in supporting the war effort on the home front. If anything, such progress could be seen most prominently in the North.

In Northern Ontario, the demand for war-time resources meant increased economic activity.⁵⁶ In Northwestern Ontario, the war effort created new economic prosperity at the Lakehead. The grain elevators, railways, and pulp and paper mills in Port Arthur and Fort William all experienced increased production, while new industries such as shipbuilding also helped strengthen the Lakehead's economy and increase demand for power in the region.⁵⁷ Two-hundred kilometers west of the Lakehead, the announcement of federal funding in developing Steep Rock Mines near Atikokan also meant more power was needed.⁵⁸ Steep Rock Limited earned the right to mine iron ore which would then be sent to the CNR ore dock in Port Arthur

⁵³ Joseph Schull, *Ontario Since 1867* (Toronto: McClelland and Stewart, 1978), 321.

⁵⁴ Drummond, *Progress without Planning*, 164.

⁵⁵ *HEPCO Annual Report, 1939*, v-vii.

⁵⁶ Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario* (Toronto: James Lorimer and Company, 2010), 97.

⁵⁷ A.W. Rasporich and Thorold J. Tronrud, "Class, Ethnicity, and Urban Competition," in *Thunder Bay – From Rivalry to Unity*, ed. Thorold J. Tronrud and A. Ernest Epp (Thunder Bay: Thunder Bay Historical Museum Society, 1995), 220.

⁵⁸ Wightman and Wightman, 259-260.

for shipping.⁵⁹ Both HEPCO and Steep Rock Mines Limited built lines from Steep Rock to the city of Port Arthur to supply the 7000-horsepower needed in the million-dollar project.⁶⁰

Northeastern Ontario also benefitted from war-time production, yet power consumption remained relatively the same. In some regions where gold production declined due to labour shortages, so too did power demands.⁶¹ However, mining of other metals such as iron and nickel continued to grow through this period, as the war effort was in constant need of such resources.⁶² In Sudbury, for example, INCO's labour force at the beginning of the Second World War reach nearly 11,000 employees.⁶³ The Second World War not only influenced development in Northern Ontario but ushered in a new era of industry in the province's hinterland.⁶⁴

Increased industrialization put greater stresses on HEPCO's power grid. If HEPCO was to ensure it had adequate power to supply its customers, the Commission needed to build new infrastructure and increase its water power on the existing system. HEPCO Engineers turned their attention to the Ogoki River in Northwestern Ontario as its best possible solution to curbing water and power shortages in the province. The Ogoki Diversion was not a new proposal. HEPCO had proposed developing a diversion on the Ogoki River as far back as 1925, yet political and economic tensions continuously inhibited the projects fruition.⁶⁵ The successful completion of the Long Lac diversion in 1939 provided HEPCO with the technical

⁵⁹ Rasporich and Tronrud, "Class, Ethnicity, and Urban Competition," 220.

⁶⁰ Wightman and Wightman, *The Land Between*. 259-260.

⁶¹ Jean Manore, *Cross-Currents*, 102.

⁶² Oiva Saarinen, "Creating a Sustainable Community: The Sudbury Case Study," in *At the End of the Shift: Mines and Single Industry Towns in Northern Ontario*, ed. Matt Bray and Ashley Thomson (Toronto: Dundurn Press, 1992), 169.

⁶³ C.M. Wallace, "The 1930s," *Sudbury*, 169.

⁶⁴ Michel S. Beaulieu, "A Historic Overview of Policies Affecting Non-Aboriginal Development in Northwestern Ontario, 1900-1990," in *Governance in Northern Ontario: Economic Development and Policy Making*, ed. Charles Conteh and Bob Segsworth (Toronto: University of Toronto Press, 2013), 98.

⁶⁵ See "Power Expansion Feasible at Nipigon," *The Globe*, December 11, 1925 and "Mighty Power Reserve," *The Globe*, July 21, 1932.

understandings needed to complete the much larger Ogoki project. Although the provincial and federal governments had requested the United States recognize Canadian rights to divert water from its northern water systems, it was not until 1940 that the United States accepted the proposal, as both countries now feared power shortages could hinder the war effort.⁶⁶

Construction began almost immediately, and crews of labourers worked through the winter to complete the project.⁶⁷ The Ogoki River diversion began construction in November 1940 and was designed to divert almost all waters from the Ogoki River above the Waboose Rapids of the Albany River and towards the Great Lakes System.⁶⁸ In July 1943, the Ogoki diversion project was completed and began operation. The diversion allowed for an increased water flow of 4,000 cubic feet per second, and helped increase horsepower along the Great Lakes through the Niagara Region.⁶⁹ Further north, the Ogoki Diversion made possible for an additional 90,000 horsepower on the Nipigon River and helped stabilize capacity in HEPCO's Thunder Bay System. The dam and reservoir built for the diversion was so large that the Ogoki River now linked formerly separated lakes.⁷⁰ Other hydro-electric projects followed the completion of the Ogoki River diversion project. The same year the diversion began operation, HEPCO finalized plans to develop a fourth unit at the Alexander generating station at Nipigon to generate an extra 20,000 horsepower in Northwestern Ontario.⁷¹ The increased water power on the Great Lakes allowed HEPCO to increase its power generating capabilities at the Pine Portage, Alexander, and

⁶⁶ J.C Day and Frank Quinn, *Water Diversion and Export*, 75.

⁶⁷ Matthew Evenden, *Allied Power: Mobilizing Hydro-Electricity during Canada's Second World War* (Toronto: University of Toronto Press, 2015), 83.

⁶⁸ See "Ontario to Proceed with Ogoki Project Called for by Pact: Diversion Plan," *The Globe and Mail*, October 15, 1940 and *Annual Report of the Hydro-Electric Power Commission of Ontario, 1943* (Toronto: King's Printer, 1944), 63-65.

⁶⁹ Evenden, *Allied Power*, 83-85.

⁷⁰ *Ibid.*

⁷¹ *HEPCO Annual Report, 1943*, vi-vii.

Cameron Falls generating stations.⁷² In 1945, HEPCO began its second phase of the Long Lac Diversion to meet greater demands for power in Northern Ontario.

The completion of the Long Lac and Ogoki Diversions reshaped the ecological and social landscapes of those living in the area. The two diversions raised the water levels of the complete Great Lakes water system between three and four inches respectively. Changes to the local fish populations, increased shore line erosion and flooding, and the intrusion of pulp logs to the rivers created new challenges for those living in Long Lac.⁷³ Such ecological changes had dramatic effects on the social and economic survival of the residents of the area, as outfitters, trappers, Indigenous Peoples, and recreationists of the area all competed for Long Lac's resources.⁷⁴ In contrast, the completion of the diversion and the Aguasabon Generating Station on Lake Superior solidified the power needed to develop a new pulp and paper mill in the region. In 1946, HEPCO negotiated terms with the Long Lac Pulp and Paper Company [later renamed Kimberly-Clark Forest Products] to provide power for its new mill along the Kenogami and Aguasabon River systems.⁷⁵ The following year, the provincial government granted Terrace Bay status as an Improvement District. Much like the other northern-company towns of the 1940s (such as Red Rock and Marathon), the development of Terrace Bay was as result of new pulp

⁷² *Annual Report of the Hydro-Electric Power Commission of Ontario, 1945* (Toronto: Queen's Printer, 1946), 28-29.

⁷³ For an exploration of the environmental and socio-economic effects of the Long Lac Diversion see J.C Day and Frank Quinn, *Water Diversion and Export*; and S.E. Peet and J.C. Day, "The Long Lake Diversion: An Environmental Evaluation," *Canadian Water Resources Journal* 5, no. 3 (1980): 34-48.

⁷⁴ Peet and Day, "The Long Lake Diversion," 36.

⁷⁵ Susan Campbell, "'White Gold' versus Aboriginal Rights," in *Blockades and Resistance: Studies in Actions of Peace and the Temagami Blockades of 1988-89*, ed. Bruce W. Hodgins and Ute Lischke (Waterloo: Wilfred Laurier University Press, 2012), 133.

and paper mills which established themselves in Northwestern Ontario and reflected the greater stability in resource industries at the end of the war.⁷⁶

There is no doubt that Second World War had dramatic changes on the social and economic structures of Ontario. The economic boom which followed Canada's entrance into the conflict not only strengthened Ontario's traditional industries but promoted the development of secondary industries. New chemical and manufacturing industries in the province meant more factories, more jobs, and more power to maintain production.⁷⁷ While HEPCO was eager to grow, they had learned much from the economic depression of the 1930s. HEPCO continued to build infrastructure throughout the province, but construction came only through absolute necessity. Through the 1940s, power demands were continuously at capacity of the total output of the province. In 1947, HEPCO reports made clear that power shortages still plagued the provincial grid, an issue which at times left industries with no power for days.⁷⁸ HEPCO stressed that "if too much electricity is demanded one day, the next day's power supply must suffer" and that both commercial and residential customers needed to avoid wasteful consumption.⁷⁹ In 1949, serious water shortages led HEPCO to enact restrictions on power consumption, a measure which had not been used since the end of the Second World War.⁸⁰ While HEPCO's electrical grid remained in a constant state of full-capacity, both power consumption and industrial growth were at an all-time high in Ontario, while HEPCO's profits also remained at record highs.

⁷⁶ Red Rock began as the company town for the workers of Brompton Pulp and Paper in 1944, while Marathon served as the planned community for the workers of Marathon Pulp. For more, see Wightman and Wightman, *The Land Between*, 291-292.

⁷⁷ See Creighton, *The Forked Road*, 118 and Drummond, *Progress without Planning*, 164-165.

⁷⁸ Hydro-Electric Power Commission of Ontario, *Hydro 1947 - A Brief Review of the Activities of the Hydro Electric Power Commission of Ontario during the Year 1947* (Toronto: HEPCO, 1948), 21.

⁷⁹ Ibid.

⁸⁰ Denison, *The Peoples Power*, 237.

In fifty short years, HEPCO's promethean experiment stretched to nearly every corner of the province. By 1956, HEPCO supplied electric power for 350 municipally-owned electrical utilities, twenty-nine rural municipalities, and served a total of 1,181,788 residential customers.⁸¹ The vested interests in the resource industries of the north and the manufacturing industries of the south both relied on HEPCO to provide the power needed to keep the wheels of the economy turning. The mines, mills, and shipping yards of Northern Ontario needed power, and the Hydro-Electric Power Commission of Ontario needed customers and a reason to grow. These industries not only reshaped the physical landscapes and waterscapes of the hinterland, but also reshaped the relations between northern communities their environment. HEPCO not only controlled the facets of production, but helped cement Northern Ontario into the greater economy, as hydro-electric power was as much a requirement of northern development as financial capital was.

Post-war expansion and population growth in the province also demanded greater electricity needs, as Ontario's population grew from 3.7 million to 5.4 million between 1941 and 1956.⁸² While HEPCO's empire was an impressive feat of technological and economic engineering, the Commission's engineering staff understood the future challenges to its growth. Engineers at HEPCO argued that by the 1960s all potential hydro-electric power sites in Ontario would be in use. HEPCO's engineers understood that if the Commission wanted to maintain its monopoly over Ontario's electrical utilities, it needed a new source of power to supplement the future needs of the province.⁸³ In 1956, HEPCO stated that with the completion of the Niagara

⁸¹ *Annual Report of the Hydro-Electric Power Commission of Ontario, 1956* (Toronto: Queen's Printer, 1957), 88-89.

⁸² As the Dominion Bureau of Statistics stated, higher birth rates and falling death rates resulted in the nearly 38 per cent growth of population in Ontario between 1941 and 1956. See Canada, Dominion Bureau of Statistics, *Census of Canada 1956 - Part I Analytical Report*, 1 (Ottawa: Queen's Printer, 1960), 1-1-2.

⁸³ See Ronald Babin, *The Nuclear Power Game* (Montreal: Black Rose Books, 1985), 70-71 and Wilfred Eggleston, *Canada's Nuclear Story* (Toronto: Clark, Irwin & Co, 1965), 308.

and St. Lawrence projects, the Commission had developed the last major hydraulic site available in Southern Ontario. The report further stated that the remaining hydraulic sites in the Northern Ontario offered negligible returns on power and profit, the largest of which would represent about one-quarter of the increase in power requirements needed by HEPCO in 1956.⁸⁴

What once seemed impossible was now a reality. The waterways of Ontario's hinterland that seemed in endless supply were disappearing. While HEPCO could upgrade some hydro-electric dams in Northern Ontario, the output was negligible to the demands that the Commission were planning for in the 1960s and beyond. The completion of the Niagara and St. Lawrence projects in Southern Ontario and the completion of the Alexander Project at Nipigon in 1958 solidified the Commission's closing of the hydro-electric frontier – HEPCO had done all they could with water power in Ontario.⁸⁵ Such an environmental rift not only signified the physical capacities of nature but also exemplified to HEPCO the necessity of innovation, technology, and capital. If the Commission wanted to maintain control of their monopoly over Ontario's power utilities, they needed new technologies and a new source of generating power.

As a result, HEPCO embarked on a massive strategical shift towards the implementation of nuclear energy. Nuclear energy not only provided a technical solution to HEPCO's closing of the hydro-electric frontier, but it provided a solution which took advantage of domestic resources.⁸⁶ The discovery of vast uranium deposits near Elliot Lake in Northeastern Ontario in 1953 provided the nuclear industry with the fuel needed to build and operate nuclear power stations in Ontario. The partnership between the Hydro-Electric Power Commission of Ontario

⁸⁴ *HEPCO Annual Report, 1956*, 56-57.

⁸⁵ *Ibid.* and Denison, *The Peoples Power*, 237.

⁸⁶ Creighton, *The Forked Road*, 122.

and Atomic Energy of Canada Limited (AECL) not only secured HEPCO's control of the electrical industry, but projected the province to modernity.

While Canada's nuclear program began in earnest in the 1940s, it nevertheless signified the visions of the modern nuclear state. As Donald Creighton argues, the Second World War not only solidified Canada's second industrial revolution but brought the country to "technological maturity" with greater emphasis on science and technology, industrial skills and techniques, and research funding.⁸⁷ Canada's involvement with Britain and the United States in the atomic bomb programme gave them the industrial and technical basis for developing their own peaceful nuclear energy programme.⁸⁸ In 1942, British officials proposed bringing Canadian scientist into the atomic efforts. The discovery of uranium at Great Bear Lake in the North-West Territories provided the project with the necessary resources for fuel. The vast acres of Canada's hinterland also meant a nuclear project could develop clandestinely while being in proximity to the work being undertaken in the United States.⁸⁹ Canadian scientists and engineers had gained access to one of the most technologically advanced programmes in history. Canada's newfound knowledge of nuclear fission became the starting point for creating a peaceful atomic energy program in the post-war era.

In coalition with the National Research Council's Montreal laboratory, the Canadian government funded the development of the National Research Experimental Plant (NRX) at Chalk River, Ontario. Scientists sought to develop the means to fission Uranium-235 from natural uranium, a resource which was in abundance in Canada. After many financial and technical challenges, the NRX reactor became operational on 26 July 1947. The million-dollar

⁸⁷ Creighton, *The Forked Road*, 122.

⁸⁸ Babin, *The Nuclear Power Game*, 42.

⁸⁹ "The Canadian Atomic Energy Project," *Bulletin of the Atomic Scientists* 1, no. 7 (March 1946): 7.

project at Chalk River set in motion the development of Canada's nuclear energy programme.⁹⁰

The *Bulletin of the Atomic Scientists* praised Canada's atomic energy program in 1946 for its efforts towards scientific understanding, development, and application of nuclear energy.⁹¹

While the NRX reactor was an astonishing feat for Canadian science and technologies, the prototype was not perfect. In 1952, a nuclear meltdown forced the NRX to shut down. After a full-scale shut-down, remediation, and repair of damaged areas, the NRX returned to operation in February of 1954.⁹² The meltdown was the first nuclear accident of the modern age and showed the potentiality for disaster in the use of nuclear energy.⁹³ Nevertheless, the NRX was a turning point in Canada's nuclear enterprise, as it demonstrated the feasibility of producing power from uranium fission.⁹⁴

HEPCO did not base its decision to develop a nuclear programme solely on the ideologies of a new technology. Although HEPCO was exploring other options for creating energy such as coal and gas generation, such technologies meant a continued reliance on foreign states for fuel needs. Beginning in 1951, HEPCO added six coal-fired generating stations to their power grid. The addition of coal power to the grid both increased the price of power in the province and made electricity prices a function of provincial fuel costs (of which were much more vulnerable to market fluctuations).⁹⁵

⁹⁰ Robert Bothwell, *Nucleus: The History of the Atomic Energy of Canada Limited* (Toronto: University of Toronto, 1988), 58-59.

⁹¹ George C. Laurence, "Canada's Participation in Atomic Energy Development," *Bulletin of the Atomic Scientists* 3, no. 11 (November 1947): 325-328.

⁹² Eugene Critoph, "Organization, Management, and Operations," *Canada Enters the Nuclear Age: A Technical History of Atomic Energy of Canada Limited* (Montreal and Kingston: McGill-Queen's University Press, 1997), 50-51.

⁹³ Duane Bratt, *The Politics of CANDU Exports* (Toronto: University of Toronto Press, 2006), 6.

⁹⁴ D.G. Hurst, "Overview of Nuclear Research and Development," *Canada Enters the Nuclear Age: A Technical History of Atomic Energy of Canada Limited as seen from its Research Laboratories* (Montreal and Kingston: McGill-Queen's University Press, 1997), 15.

⁹⁵ Leonard Waverman and Adonis Yatchew, "Regulation of Electric Power in Canada," in *International Comparisons of Electricity Regulation*, ed. Richard J. Gilbert and Edward P. Kahn (Cambridge: Cambridge University Press, 1996), 379.

In the 1950s, prospectors found large deposits of raw uranium near Blind River in Northeastern Ontario. The deposits were large enough that Ontario could develop a self-sufficient nuclear fuel cycle. The full cycle included mining raw uranium from Northern Ontario, processing the uranium into fuel in Port Hope, Ontario, and finally using the finished product for reactor fuel at power stations in Southern Ontario. A full nuclear fuel cycle appeased HEPCO's ever-growing need for power and exemplified the structure of the modern state through the vertical integration of resources. If the province was to embark on the utilization of nuclear energy, it needed to develop its uranium industry.

Mining activity began near Blind River in 1953 at an unprecedented rate. The 'Big Z' a one-hundred-square-mile deposit off Highway 17 in Northern Ontario, was where the greatest activity developed. In 1954, Elliot Lake received Improvement District status, and for the next two years, planners with the mining industry and the provincial government set out to develop a conceptual plan for the construction of the town site.⁹⁶ By 1955, twelve active mines were operating in the area.⁹⁷ City planners designed the town of Elliot Lake to accommodate the growing population in the area. Like most northern resource communities, Elliot Lake was a boom town which developed around the uranium mining industry.⁹⁸ The economy relied exclusively on mining projects led by Dension Mines Limited and Rio Algom Limited, the two largest interests in the Ontario uranium industry.⁹⁹ The uranium industry was a joint venture between private capital and government interests. The discovery of uranium near Elliot Lake was

⁹⁶ Oiva W. Saarinen, "Single-Sector Communities in Northern Ontario," in *Power and Place: Canadian Urban Development in the North American Context*, ed., Gilbert A. Stelter and Alan F.J. Artibise (Vancouver: UBC Press, 1986), 249.

⁹⁷ Shawn Heard, "The City of Elliot Lake to 1991: Before the Roof Fell in," in *Boom Town Blues: Elliot Lake, Collapse and Revival in a Single Industry Community*, ed., Jane Pitblado and Anne-Marie Mawhiney (Toronto: Dundurn Press, 1999), 22-23.

⁹⁸ Catherine Dixon, *The Power and the Promise* (Elliot Lake, ON: Gillidix Publishing, 1996), 1-9.

⁹⁹ Robson, "Building Resource Towns," 109.

only possible because of work done by the Geological Survey of Canada in the mid-1920s. Ontario Hydro, the AECL, and private mines negotiated long-term agreements for the stock piling of uranium. These contracts not only signaled the government's full support of nuclear power, but solidified the mining operation's tenure in the north. Many citizens believed that if uranium proved to be a long-range proposition there was no reason why Elliot Lake's population could not reach 20,000.¹⁰⁰ By the end of the decade, Elliot Lake had become a model boom town. Nine of the twelve mines near Elliot Lake had the capacity to produce more than 2,000 tons of uranium per day, payloads which were well above the global standard.¹⁰¹ Schools, hospitals, and community centres were all built through mining tax revenues.¹⁰² As *the Globe and Mail* reported in 1958, Elliot Lake was "as neat as a pin and solidly constructed, planned that way by the Ontario government, whose aim it was to make the town the province's most modern city of the north."¹⁰³

With the technical understanding of nuclear energy, and an abundance of uranium as the resource of energy production, the Canadian government viewed the development of a nuclear energy programme as a means of progress, modernity, and self-sufficiency.¹⁰⁴ The federal government officially launched their nuclear energy programme with the establishment of the Atomic Energy Control Board (AECB) in 1946 and later the creation of the Crown Corporation the Atomic Energy of Canada Ltd. (AECL) in 1952. The federal government established the AECL to both promote and develop nuclear reactors for both domestic and international markets.

¹⁰⁰ "Billion-Dollar Empire," *Time* 66, no. 5, August 1, 1955.

¹⁰¹ D.M. LeBourdais, *Canada and the Atomic Revolution* (Toronto: McClelland & Stewart, 1959), 123.

¹⁰² "Optimistic About Future - Elliot Lake Residents Thriving on Uranium," *The Globe and Mail*, November 12, 1958.

¹⁰³ *Ibid.*

¹⁰⁴ Babin, *The Nuclear Power Game*, 36.

Together, the AECL and AECB acted to modernize the Canadian state and establish the country's position in the burgeoning global-nuclear industry.

From the beginning, Canada's nuclear energy programme developed bi-laterally as a federal-provincial partnership with the Ontario government.¹⁰⁵ In the mid-1950s, both HEPCO and the Ontario government were looking to develop a nuclear programme. As HEPCO's Chairman R. L. Hearn explained, "the possibility of generating electrical power from nuclear reactors, using fuels which are available in abundance in Canada, therefore assumes increasing importance."¹⁰⁶ In 1952, HEPCO, the AECL, and Canadian General Electric met and negotiated terms for the construction of the Nuclear Power Demonstration (NPD) reactor at Rolphton. While the capabilities of nuclear power intrigued the planners of HEPCO, the extent of Ontario's nuclear endeavors depended on "experience in the operation of the 20,000-kilowatt Nuclear Power Demonstration plant (NPD)."¹⁰⁷

The construction of the NPD reactor did not occur without some challenges. Although HEPCO and the AECL anticipated a completion date of 1958, changes to the reactor design led to both delays and cost overruns. The NPD reactor became operational in 1962 at a cost of \$33 million, twice the original cost predicted by HEPCO and the AECL.¹⁰⁸ Although plagued with technical and structural issues, the completion of the NPD reactor nevertheless symbolized the revolutionary contributions of Canadian science and technology in the post-war era and symbolized Canada's new position within the international community as a nuclear state. As the president of the AECL J. Lorne Gray explained, although the initial incidents with heavy-water

¹⁰⁵ Mez Lutz and G. Bruce Doern, "Nuclear Energy in German and Canada: Divergent Regulatory Policy and Governance Path," in *Governing the Energy Challenge: Canada and Germany in a Multi-Level Regional and Global Context*, ed. Burkard Eberlein and G. Bruce Doern (Toronto: University of Toronto Press, 2009), 123.

¹⁰⁶ *Annual Report of the Hydro-Electric Power Commission of Ontario, 1954* (Toronto: Queen's Printer, 1955), xi.

¹⁰⁷ *Annual Report of the Hydro-Electric Power Commission of Ontario, 1955* (Toronto: Queen's Printer, 1956), xi-x.

¹⁰⁸ McKay, *Electric Empire*, 58; Jamie Swift and Keith Stewart, *Hydro: The Decline and Fall of Ontario's Electric Empire* (Toronto: Between the Lines, 2004), 16.

systems were serious in nature, he was confident in both the flexibility and reliability of their nuclear system.¹⁰⁹ With the completion of the NPD reactor, Ontario had officially entered the nuclear age.

If the first half of the Hydro Electric Power Commission's existence signified the exuberance of Ontario's economic and industrial growth and the primacy of public utilities, then its later half signified how new economic and environmental rifts challenged the stability of HEPCO's monopoly. The challenges faced by HEPCO in the 1930s through the 1950s not only demonstrated the barriers to economic growth and expansion, but reinforced the Commission's relationship to greater industry in the province. As the province's economy stabilized, so too did the demand for power. HEPCO continued to take control of water systems in Northern Ontario to build and generate power. Most notably, the completion of the Ogoki and Long Lac Diversions symbolized the technical and engineering abilities of HEPCO's to take full control of its resources.

Although HEPCO's ostentatious growth in the 1940s and 1950s signified the economic and industrial growth of post-war Ontario, ecological barriers now challenged the Commission's growth. HEPCO had invested the full capabilities of hydro-electric power to mend the metabolic rifts of coal power generation, but the shift in technologies did not come without new rifts elsewhere in the substructure. The physical limits of Ontario's waterways could not meet the future demands of power in the province. Such a metabolic rift not only forced HEPCO to close its hydro-electric frontier, but helped it again transfer capital investments towards technologies that could mend the rifts of nature. Ontario's partnership with the AECL, while opening the

¹⁰⁹ See Eggleston, *Canada's Nuclear Story*, 340; Arthur Porter, *Interim Report on Nuclear Power in Ontario*, Royal Commission on Electric Power Planning (Toronto: Queen's Printer for Ontario, 1978), xi; and J. Lonre Gray, "A Promise of Cheap Nuclear Power," *New Scientist* 372 (January 1964): 18.

market to new companies, allowed HEPCO to maintain its monopoly over the province's electrical utilities while mending the metabolic rifts of hydro-electric power. The successful launch of the NPD Reactor at Rolphton signified the capabilities of Canadian science and technology to work through environmental rifts and the limitations of nature.

CHAPTER 3

Ontario Hydro's CANDU Attitude: Nuclear Power in Ontario, 1963-1977

With the successful launch of the Nuclear Power Demonstration (NPD) reactor at Rolphton, and with a stable supply of uranium from Elliot Lake, HEPCO and the AECL began an aggressive campaign to further develop nuclear power in Ontario. Between 1963 and 1977, Ontario's nuclear grid grew to meet the needs of post-war growth and to replace the inadequate capacities of hydro-electric power. Nuclear power served to mend the economic and environmental rifts of hydro-electric power, but new rifts established in other sectors of the provincial substructure. Although Uranium mining near Elliot Lake not only provided the province with the fuel needed to generate its nuclear power, by the late 1960s, the ecological effects of the uranium industry were visible in Northern Ontario. While Northern Ontario received none of the social benefits of nuclear power, they bore the environmental damage of the front-end of the nuclear cycle, as waste tailings from the uranium industry created new environmental issues for communities in the north. Although HEPCO and the AECL sought to grow the demand of nuclear power in the province, growing antagonism challenged such long-term planning. The provincial legislature established the Royal Commission on Electric Power Planning to formally research the nuclear debate in the late 1970s and to solidify the province's future infrastructure needs. HEPCO and the AECL not only used nuclear technology to reaffirm their monopoly position in Ontario's utilities industry but also used it helped reaffirm the politics of resource-development and hinterland-metropolis relationships in the post-war era.

While the construction of the NPD reactor did not occur without technical and financial challenges, the potentiality of nuclear power in the province impressed the Hydro Electric Power Commission of Ontario. Although an expensive lesson in nuclear energy, the NPD reactor

provided the AECL and HEPCO greater understanding of how to develop commercial nuclear systems.¹ In 1959, before even the successful launch of the NPD reactor, HEPCO signed a joint agreement with the AECL to build and operate a 200,000-kilowatt nuclear-electric station on the shores of Lake Huron at Douglas Point.²

Two important factors led to HEPCO and the AECL's decision to build Douglas Point. First, the rapid expansion of technological innovation and scientific understanding of nuclear fission meant Canadian scientists were at the forefront of the industry.³ As HEPCO's new Commissioner James S. Duncan noted, the Douglas Point Station shadowed the "important future developments that will undoubtedly take place in a challenging but still relatively uncharted field of power generation."⁴ Second, the construction of Douglas Point stanchioned any fears of a calming uranium industry. By 1960, Canada had mined nearly 31 million pounds of uranium, worth over \$331 million.⁵ Ontario mines accounted for nearly eighty percent of the country's uranium output, with the majority coming from Elliot Lake in Northern Ontario.⁶ While the 1950s were successful for the town of Elliot Lake, they were nevertheless a single-industry town. Shifts in global policies and beliefs about the nuclear industry had dramatic repercussions for the northern community.

¹ See H.K. Rae, *Canada Enters the Nuclear Age: A Technical History of Atomic Energy of Canada Limited as seen from its Research Laboratories* (Montreal and Kingston: McGill-Queen's University Press, 1997), 200 and Duane Bratt, *Canada, the Provinces, and the Global Nuclear Revival: Advocacy Coalitions in Action* (Montreal and Kingston: McGill-Queen's University Press, 2012), 115.

² *Annual Report of the Hydro-Electric Power Commission of Ontario, 1959* (Toronto: Queen's Printer, 1959), 77-81. See also Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro* (Toronto: Between the Lines, 1983), 58-59.

³ Ron Finch, *Exporting Danger: A History of the Canadian Nuclear Energy Export Program* (Montreal: Black Rose Books, 1986), 36-37

⁴ "News from Abroad," *Bulletin of the Atomic Scientist* 12, no. 1 (January 1956): 31; and *Annual Report of the Hydro-Electric Power Commission of Ontario, 1959*, xi.

⁵ Morris Zaslow, *The Northward Expansion of Canada, 1914-1967* (Toronto: McClelland and Stewart, 1988), 241-242.

⁶ Shawn Heard, "The City of Elliot Lake to 1991: Before the Roof Fell In," in *Boom Town Blues: Elliot Lake, Collapse and Revival in a Single Industry Community*, ed. Jane Pitblado and Anne-Marie Mawhiney (Toronto: Dundurn Press, 1999), 22-23.

In 1959, the United States Government did not renew its uranium contracts with Canadian mining companies. The loss of one of the industry's largest purchasers of uranium initiated a collapse of mining activity at Elliot Lake. As MPP for the Kenora District Albert Wren noted, "a snap of the [US] president's fingers can reduce a multi-million-dollar investment to ashes."⁷ In 1960, five mines in the region shut down; Three more mines at Elliot Lake scheduled to close in 1964, leaving hundreds of miners unemployed in the region.⁸ In February of 1959, there was a peak labour force of nearly 11,565 workers in the area. By January of 1961, this number had dropped to fewer than 4,000 workers.⁹ The population of Elliot Lake dropped from nearly 25,000 in 1959 to 6,664 in 1966.¹⁰ As Sean Heard explains, the collapse of the global uranium industry had made Elliot Lake "the world's most modern ghost town."¹¹ Fearing the collapse of the uranium industry and the newly established town of Elliot lake, in 1966, the Canadian government announced the creation of a five-year uranium stock piling program. These contracts, coupled with the development of the Douglas Point Generating Station decreased fears of instability in the uranium industry and renewed the province's confidence in nuclear energy.

The AECL called their commercial system the CANDU (Canadian Deuterium Uranium) reactor, a name which symbolized the perseverance and determination of the Canadian nuclear energy program. HEPCO chose the location of Douglas Point because of its access to large

⁷ "Warns U.S., Policies to Ruin Elliot Lake," *The Globe and Mail*, February 27, 1959.

⁸ As correspondence between Douglas Fischer, H.J. Fenwick, and G.H. Gilchrist reveals, the collapse of the uranium industry had detrimental effects on the town of Elliot Lake. Unemployment in the area rose drastically. Provincial and Federal ministers moved quickly to provide unemployment assistances, vocational upgrading, and retraining for workers laid off by the mines. See "Elliot Lake," Douglas Fischer Fonds, Box 7, Lakehead University Archives.

⁹ "Elliot Lake – Demand Government Investigate Financing," *The Globe and Mail*, January 21, 1961 and "Was Elliot Lake Dropped to Satisfy Political Situation in Manitoba," *Sudbury Star*, June 26, 1961.

¹⁰ Douglas Fischer to H.J. Fenwick and G.H. Gilchrist, letter, March 6, 1964, Douglas Fischer Fonds, Box 7, Lakehead University Archives.

¹¹ Shawn Heard, "The City of Elliot Lake to 1991," 23-24.

quantities of cool water with very little sand, because of its formation on solid bedrock, and because of its proximity to highways, railways, and hydro transmission lines.¹² Under the terms of the agreement, HEPCO accepted to pay one-third of the cost towards construction of the nuclear station and later purchase power from the AECL. Once the power plant had demonstrated its ability to deliver power near the costs of a coal-fired operation, HEPCO agreed to purchase the plant from the AECL.¹³ Construction began on the Douglas Point Nuclear Generating Station in January of 1963. The station attained criticality in November 1966 and began feeding power to the provincial grid in January 1967. The final cost of the Douglas Point station was \$85 million – \$25 million more than HEPCO economists projected.¹⁴ While Douglas Point signified the beginnings of commercial nuclear power in Ontario, the station, like the NPD reactor, it was not free of problems. As Robert Bothwell states, Douglas Point was frequently down for repairs between 1968 and 1971. These often time-consuming and costly repairs involved multiple teams of engineers and full shut downs of systems.¹⁵ Nevertheless, the technical staff of the AECL had learned much from their two prototypes and sought to use this information in the construction of their much larger project near Pickering.¹⁶

HEPCO did not limit its vision of nuclear power to Southern Ontario. Social and economic growth in Northern Ontario also demanded greater power. Between 1945 and 1960, Northern Ontario's manufacturing industry had grown by 243 per cent.¹⁷ Michel S. Beaulieu and Chris Southcott state that new technologies and the mechanization of resource industries

¹² *Annual Report of the Hydro-Electric Power Commission of Ontario, 1964* (Toronto: Queen's Printer, 1964), 61

¹³ "They'll Draw Power from the Atom: Canada's First Nuclear Power Station Will Go into Operation sometime next year," *The Globe and Mail*, December 10, 1960.

¹⁴ McKay, *Electric Empire*, 59.

¹⁵ Robert Bothwell, *Nucleus: The History of Atomic Energy of Canada Limited* (Toronto: University of Toronto Press, 1988), 295-296.

¹⁶ Bratt, *Canada, the Provinces, and the Global Nuclear Revival*, 115-116.

¹⁷ Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario* (Toronto: James Lorimer and Company, 2010), 100.

dramatically reshaped northern development. The introduction of gasoline-powered chainsaws, skidders, and other technologies helped reinvigorate the forestry industry. Meanwhile, mining in Northern Ontario produced record outputs in the 1950s, as new aerial and mechanical techniques reshaped production.¹⁸ As the *Globe and Mail* reported in 1955, “the significance of Northern Ontario to the general welfare of the province could be seen from the fact that the area has yielded 8 Million dollars in mineral production.”¹⁹ The challenge for the continued development of the north lay in providing these industries with adequate power supplies.

Between 1945 and 1955, power demands in Northwestern Ontario increased by 216 per cent, a number which reflected the growth of both industry and populations.²⁰ However, HEPCO could do very little to provide further hydro-electric power in Northern Ontario, as the Commission had established projects on all major water systems in the north. To meet Northern Ontario's future demands, HEPCO agreed to develop all remaining hydraulic sites and to commit to the construction of a thermal generating station. Although HEPCO was unsure if future station would be nuclear or a ‘conventional burning’ station, HEPCO Chairman James Duncan touted that “future developments, as these emerge, will be provided by additional thermal plants - some of which will no doubt be powered by nuclear energy - and by interconnections with the Northeast and Southern Ontario grids.”²¹ HEPCO ultimately chose to do develop a coal burning station on Mission Island at Thunder Bay over nuclear power. The plant cost \$27 million dollars to build, and carried a total generating capacity of 250,000 kilowatts of power.²²

¹⁸ W. Robert Wightman and Nancy M. Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800 to the 1990s* (Toronto: University of Toronto Press, 1997), 231-232.

¹⁹ See “Push Mining Boom, Mines Minister Urges; Record Set in 1955,” *The Globe and Mail*, February 17, 1956; and “Hydro Plant Help to Open Northwest,” *The Globe and Mail*, September 26, 1959.

²⁰ “More Power Promised Northland,” *The Globe and Mail*, May 4, 1956.

²¹ “Hydro Plant Help to Open Northwest,” *The Globe and Mail*, September 26, 1959.

²² A.W.H. Taber, *Electricity and Fort William: The History and Development of Electricity in the City of Fort William* (Fort William: The Hydro Electric Commission of Fort William, 1967), 67.

In 1964, Ontario Hydro signed an agreement with the AECL to build a second plant near Pickering, twenty miles East of Toronto on Lake Ontario. Such an agreement came even before Ontario's first generating plant at Douglas Point had shown success. HEPCO and the AECL designed the Pickering plant with two 500,000 kilowatt units, and the capacity to build as much as 2,000,000 kilowatts if needed. Unlike its other contracts with the AECL, HEPCO accepted to own the Pickering reactor out-right.²³ The Pickering reactors attained critically between 1971 and 1973. The construction of the Pickering nuclear station was the largest and most expensive project in Hydro's sixty-year history. The AECL installed the two units with a total generating capacity of 1,080,000 kilowatts at a cost of \$260 million.²⁴

By the end of the 1960s, the Ontario Government and Ontario Hydro fully committed themselves to the development of nuclear energy. With the completion of the Douglas Point Generating Station in 1967 and Pickering Generating Stations in 1971, Ontario had established one of the most technically advanced power systems in the world. In nearly twenty years, hydro had developed the means to not only continue using domestic resources to generate power but also the means to maintain control of their electric empire. Although HEPCO and the AECL had successfully launched their nuclear program, their execution was not perfect. Cost overruns and delays plagued the construction of Ontario's nuclear generating stations; moreover, issues with equipment failure and reactor leaks forced generating stations to continuously shut down for maintenance and repair. While Ontario's first few years of nuclear power kept politicians and

²³ Bratt, *Canada, the Provinces, and the Global Nuclear Revival*, 116

²⁴ "Ontario to Pay \$186,500,000 Of \$266,000,000 Nuclear Plant," *The Globe and Mail*, August 21, 1964. See also McKay, *Electric Empire*, 58-59 and Babin, *The Nuclear Power Game* (Montreal: Black Rose Books, 1985), 73.

technocrats in a state of constant focus, the AECL and Ontario Hydro maintained their optimism of the CANDU reactors as the future of Canadian energy.²⁵

Such optimism continued well into the 1970s, as HEPCO sought to further develop their nuclear energy program. In 1970, the AECL began construction on Bruce Nuclear Generating Station near Kincardine. The AECL built Bruce Generating Station to work in pair with Douglas Point Generating Station in providing power to the lower lakes region. The company also planned to build Bruce Heavy Water Plant to aide in relieving heavy water shortages in the province. Deuterium oxide, or heavy water as it is commonly known, is the moderator used in CANDU's reactors, and allows the reactors to use natural uranium to generate fuel.²⁶ Although Ontario Hydro's was eager to grow their nuclear program, shortages of heavy water inhibited its growth and resulted in many disruptions in the operation of their nuclear stations.²⁷

HEPCO's ostensible need to grow the nuclear program came out of growing concerns of local and international energy prices, regulations, and availability. In February 1972, Canada, along with Australia, France, South Africa, and Britain formed an international uranium cartel. These countries established the cartel as a means of implementing a "complete scheme of price-fixing, bid-rigging, and the allocation of markets" and to challenge the United States' influence on the global uranium market. The cartel's use of artificial inflation made uranium prices rise by nearly 700 per cent. Such inflation not only led to the stability of the uranium market, but

²⁵ "Is Canada having trouble in Atomland," *The Globe and Mail*, December 9, 1967; and "Nuclear installation back in operation," *The Globe and Mail*, April 25, 1968.

²⁶ For a full review of the CANDU Fuel Cycle and the reactor process see Royal Commission on Electric Power Planning, *A Race Against Time: Interim Report on Nuclear Power in Ontario* (Toronto: Queen's Printer, 1978), 37-60.

²⁷ "See Ontario and Quebec support heavy water supply rationing" *The Globe and Mail*, March 11, 1970; "Ontario Supply of Heavy Water Touch and Go," *The Globe and Mail*, May 9, 1973; and "Heavy Water is Problem at Pickering," *The Globe and Mail*, July 11, 1973.

stability in the resource towns built around the industry.²⁸ The international cartel controlled the uranium market in clandestine until whistleblowers exposed the cartel in 1976. The timing of the cartel, although by chance, was beneficial to their strength. The combined pressures of increasing global demands for oil and the establishment of OPEC (The Organization of the Petroleum Exporting Countries) economic controls resulted in a doubling of oil prices between January and October of 1973.²⁹

OPEC's oil embargo and the energy crisis of 1973 not only led to dramatic social and economic changes globally but also helped assert a new faith in nuclear energy as a 'clean' alternative to coal and oil.³⁰ As Hydro's 1972 annual report noted, "the vital role of Hydro's nuclear-power program in meeting the future energy needs of Ontario - a province rich in reserves of uranium but deficient in fossil fuels - was underscored in 1972 by the emerging energy crisis in the United States."³¹ Ontario's large uranium deposits and the furthering of nuclear power meant the province did not need to rely on coal and oil from the United States and Western Canada for energy production. More importantly, Hydro understood that as national and international supplies of fossil fuels diminish, electricity production from nuclear power was "destined to provide a growing share of total energy demands."³²

The Canadian nuclear industry also used the energy crisis as an opportunity to expand development of power for export. In 1973, H. P. Acres Limited proposed to the Ontario government to both finance and construct a nuclear power plant on the north shore of Lake

²⁸ Larry R. Stewart, "Canada's Role in the International Uranium Cartel," *International Organization* 35, no. 4 (Autumn 1981), 657-659; Shawn Heard, "The City of Elliot Lake to 1991," in *Boom Town Blues: Elliot Lake, Collapse and Revival in a Single Industry Community*, ed. Jane Pitblado and Anne-Marie Mawhiney (Toronto: Dundurn Press, 1999), 22; and Ron Finch, *Exporting Danger*, 114-115.

²⁹ Marc Lalonde, "Riding the Storm: Energy Policy," in *Towards a Just Society*, ed. Thomas S. Axworthy and Pierre Elliot Trudeau (Markham, ON: Viking, 1990), 54.

³⁰ "Future looking Great for Uranium Industry," *Thunder Bay Chronicle Journal*, January 18, 1974.

³¹ *Annual Report of the Hydro-Electric Power Commission of Ontario, 1972* (Toronto: Queen's Printer, 1972), 4-5.

³² *Annual Report of the Hydro-Electric Power Commission of Ontario, 1973* (Toronto: Queen's Printer, 1973), 4-5

Superior.³³ Known as “Project Alpha,” the proposed nuclear plant would feed 3,000 megawatts of power to the Midwestern United States while creating thousands of jobs in the commercial nuclear industry north of the border.³⁴ Many experts also argued that Ontario Hydro needed to build four new power plants along the Great Lakes by the 1990s to maintain adequate power supplies. The cities of Thunder Bay (the amalgamation of Port Arthur and Fort William) and Sault Ste. Marie garnered much attention from the nuclear industry, as their access to Lake Superior and proximity to the United States made them viable options for development.³⁵ Unfortunately, as Acres Ltd explained to shareholders the following year, the circumstances regarding international energy exchange and public policy ran counter to the success of the project, and Acres Ltd abandoned the project.³⁶

The energy crisis most notably solidified the transfer and centralization of decision-making power towards HEPCO. In 1974, the provincial government officially renamed HEPCO Ontario Hydro and restructured the Commission solely as a Crown Corporation. Ontario Hydro's political and economic agency had been growing since the early 1960s. As Neil B. Freeman argues, Hydro had grown from simply being a service provider of electrical utilities to becoming an “instrument of industrial strategy and counter-cyclical economic policy” which was gaining ever-more influence over Ontario's economy.³⁷ Hydro's institutionalization of greater technocratic and scientific practices not only reflected the changing social relations of post-war society, but reflected what Ronald Babin calls a reorganization of the capitalist mode of

³³ *Acres Limited Annual Report 1973*, Published for Acres Ltd. Shareholder's Meeting (Toronto: Acres Ltd, 1974):4.

³⁴ *Ibid.*, 5.

³⁵ See “Nuclear Power Exports Urged Over Plant Sales,” *The Globe and Mail*, June 19, 1973; “N-Power Station May be Built Here,” *Thunder Bay Chronicle Journal*, January 26, 1974; and “Sault Site Mentioned for New N-Power Plant,” *Thunder Bay Chronicle Journal*, January 29, 1974.

³⁶ *Acres Limited Annual Report 1974*, Published for Acres Ltd. Shareholder's Meeting (Toronto: Acres Ltd, 1975):10.

³⁷ Neil B. Freeman, *The Politics of Power: Ontario Hydro and Its Government, 1906-1995* (Toronto: University of Toronto Press, 1996), 119-120.

production. The restructuring of power relations allowed Ontario Hydro to fully implement their technocratic ideologies, and allowed for greater confidence in technocratic policy and long-term planning.³⁸

The same year of Hydro's restructuring, the Crown Corporation released the findings of the *Report on Long-Range Planning of the Electric Power System*. The report provided both Ontario Hydro and the provincial government with a concurrent understanding of future power needs. As Ontario Hydro's report concluded, the uncertainties of future load growth over the next 20 years complicated their ability to produce an accurate long-range plan. Hydro chose to adopt "middle-of-the-road prediction" of 7% per annum as a safe prediction of load growth.³⁹ As the report explained, the development of new generating stations and transmission lines at a growth of seven per-cent per annum resulted in a 1993 load demand ranging from 33,000 megawatts to 75,000 megawatts.⁴⁰ The seven per-cent increase was coupled with the fact that Ontario had to not only doubled the size of its power grid between the 1960s and 1970s, but faced doubling the grid in the 1980s and again in the 1990s. Planners called for the construction of large 'Energy Centres' to be built across Ontario. In total, Hydro had concluded that they needed nineteen new power stations by 1993 to supplement the province's power needs.⁴¹

Ontario Hydro did not limit its predictions of growing power consumption to the industrial sectors of Southern Ontario. The report concluded that Northern Ontario also needed to develop large nuclear stations to supplement demand.⁴² In early 1974, Ontario Hydro began exploring potential sites near Thunder Bay, Red Rock, and Nipigon in Northwestern Ontario for

³⁸ Babin, *The Nuclear Power Game*, 95.

³⁹ See "Long-Range Planning of the Electric Power System," *Ontario Hydro Report* No. 556-SP, February 1974, 7.

⁴⁰ *Ibid.*, 6.

⁴¹ *Ibid.* See also "\$10 billion nuclear energy expansion urged for Ontario," *The Globe and Mail*, June 19, 1973.

⁴² "Long-Range Planning of the Electric Power System," 16-19.

a new 800-Megawatt thermal station.⁴³ In Thunder Bay, the proposed plant received much opposition from both residents and city officials.⁴⁴ Many residents who attended the open houses in Thunder Bay questioned the environmental impacts of increased thermal generation in the region.⁴⁵ Others asked whether nuclear power was an option to offset the impacts of thermal generation. Hydro officials stated that the demands for power in Northwestern Ontario at the time did not warrant the need for a nuclear plant.⁴⁶

In June 1974, Ontario Hydro approved the expansion of the Thunder Bay Generating Station to 400,000 kilowatts capacity.⁴⁷ Hydro also approved studying the potential for a new 'energy centre' in the area with the ability of turning nuclear by the 1990s. Initially, Hydro proposed the construction of four nuclear generating stations along Lake Superior's north shore. The envisioned chain of power centres had the potential to generate an initial 800 megawatts of power (fossil fuel stage), and later 2,800 megawatts of power with the addition of nuclear power. The proposed project could satisfy the future needs of Hydro's West System and its projections of five per-cent per annum growth.⁴⁸ Unfortunately, assessments found that Ontario Hydro could not install a nuclear unit at the existing generating station at Mission Island. As reports found, the earliest Ontario Hydro could install a nuclear generating station at Thunder Bay was 1984.⁴⁹

⁴³ "Hydro issue a thick report," *Thunder Bay Chronicle Journal*, February 19, 1974.

⁴⁴ See "Hydro Plant Near City Gets Heavy Opposition," *Thunder Bay Chronicle Journal*, February 12, 1974 and "Against Hydro Plant in City," *Thunder Bay Chronicle Journal*, February 12, 1974.

⁴⁵ *Ibid.*

⁴⁶ "Hydro Plant Near City Gets Heavy Opposition," *Thunder Bay Chronicle Journal*, February 12, 1974.

⁴⁷ "Correspondence to James Jessiman, MPP regarding TBGS," November 30, 1974, Hydro – Thermal Generating Station 1973 Fonds, Series 117, Thunder Bay Archives. See also "Power Producing Projects Worth Total of \$2.6 Billion are Approved by Province," *The Globe and Mail*, July 12, 1974.

⁴⁸ "City Outcry Could Send Hydro Plant to Nipigon," *Thunder Bay Chronicle Journal*, February 28, 1974 and "Hydro issues a Thick Report," *Thunder Bay Chronicle Journal*, February 19, 1978.

⁴⁹ Ontario Hydro, *Proposed Generating Station for Thunder Bay* (May 1974), 4-3, Ontario Hydro – Proposals, 1974 Fonds, Series B1, Thunder Bay Historical Museum Archives.

Although Hydro had envisioned a nuclear station in Northern Ontario, they decided to continue using hydro-electric and coal-powered generating stations in the north.

While the Ontario Government accepted the findings of the *Report on Long-Range Planning of the Electric Power System*, not all critics met the report with confidence. Energy Probe, a think tank consortium focused on Canadian energy policies, reported that they were skeptical of Ontario Hydro's future planning and the reliance on nuclear energy. Energy Probe stated that Hydro's full commitment to nuclear energy ran the risk "of horrendous potential hazards to ourselves and our posterity - hazards which may be irreversible for thousands of years." Furthermore, Hydro's ability to expand 'unchecked' and the inability for the public to provide insight into Crown Corporation's operations had the potential to create a severe loss in the social, economic, and environmental affluence of the province.⁵⁰

Ontario Hydro had also yet to receive the full support of the public on nuclear energy. Most citizens had little to no understanding of the technical aspects of nuclear fission and power generation in Ontario. The scientists and technocrats of nuclear energy sector sought vigorously to provide the public with a general understanding of the nuclear power, as Ontario Hydro, the AECL, and other private firms in the nuclear industry spent millions of dollars in advertising, public awareness, and promotion of atomic energy.⁵¹ A provincial report on 'Nuclear Power in Ontario' found that while a large majority of the public had no understanding of Hydro's nuclear program, they were "skeptical or indifferent and many are even hostile" to the essential role of nuclear energy in the province.⁵² Reactor safety was the greatest of these concerns. Although the AECL and Ontario Hydro were confident in the stability of their reactors and the safety of the

⁵⁰ "Hydro Expansion 'Risks Horrendous Hazards,' Report Says," *The Globe and Mail*, January 16, 1975.

⁵¹ See McKay, *Electric Empire*, 87; and Babin, *The Nuclear Power Game*, 142-143.

⁵² Committee on Government Productivity of Ontario, *Nuclear power in Ontario* (Toronto, 1973), 58.

public, fear of a nuclear meltdown and the release of radio-active materials remained a constant fear of those living near generating stations. Moreover, Hydro's apparent lack of proper emergency plans to cope with these accidents further propagated public fears.⁵³ Despite the efforts of the industry to coerce the public into the wonders of nuclear energy, many citizens continued to see nuclear power as "a Frankensteinian monster too powerful and too dangerous for us ever to control safely."⁵⁴

Lack of public consent further complicated the schism between the public and the nuclear industry. Up until the mid 1970s, Ontario Hydro and the AECL's nuclear energy program hid behind a veil of secrecy which sought to exclude the public from any discussion of the social, economic, and environmental ramifications of nuclear energy production.⁵⁵ Michael D. Mehta states that the anti-nuclear movement evolved out of the peace movement and the ecological movement of the 1960s and 1970s as a response to the government's interests in developing the industry without public consent.⁵⁶ Groups such as the Canadian Coalition for Nuclear Responsibility (CCRN), Energy Probe, and the Campaign for Nuclear Phaseout (CNP) established as a public response to the nuclear industry. These groups, made up largely of environmentalists and ecologists, argued that nuclear power further aggravated the environmental crises of the 1970s.⁵⁷ The CCRN, for example, called for a moratorium on all future nuclear developments, including licensing, construction, and sales of CANDU reactors. As the CCRN argued, such a moratorium "will give the people of Canada an opportunity to

⁵³ "Nuclear Dangers," *Thunder Bay Chronicle Journal*, January 15, 1974.

⁵⁴ "The Road to Destruction: Even the 'Peaceful' use of nuclear power could mean our annihilation," *The Globe and Mail*, May 1, 1986.

⁵⁵ Michael D. Mehta, "Regulating Nuclear Power: The Mismanagement of Public consultation in Canada," in *In the Chamber of Risks: Understanding risk Controversies*, ed. William Leiss (Montreal and Kingston: McGill-Queen's University Press, 2001), 102.

⁵⁶ Mehta, "Regulating Nuclear Power," 102.

⁵⁷ Babin, *The Nuclear Power Game*, 143.

assess the social, environmental, economic, and political implications of a rapidly expanding nuclear industry, before decisions have been cast in concrete.”⁵⁸

Environmental impacts of nuclear energy at the front end of the fuel cycle also created new challenges for the nuclear industry, as the uranium industry came at a large environmental cost to Northern Ontario. When mines extract and processes uranium, only about 15 per cent of radioactive material is usable. The other 85 per cent of radioactive material leaves the mill as waste.⁵⁹ In other words, only about 2.6 pounds of every ton of uranium ore that mines extract becomes fuel for nuclear energy. The uranium industry discards the other 1997.4 pounds of waste ore in tailing pools.⁶⁰ In 1976, government officials confirmed that waste tailings had contaminated the Serpent River System, a series of waterways which run through the Elliot Lake mining area. The *Status Report on the Serpent River System* reported that there were no fish or animals living within a 55-mile zone of the mining operation and that humans should not use or consume the water in the river.⁶¹ The Ministry of Health went as far as state that children should not drink the water, as the Serpent River contained more than double the provincial standard for

⁵⁸ The Canadian Coalition for Nuclear Responsibility, “Time to Stop and Think: A Brief to Pierre Elliot Trudeau,” May 27, 1977.

⁵⁹ Andrew Brook, “Uranium Mine Tailings and Obligations to Future Generations,” *Moral and Ethical Issues Relating to Nuclear Energy Generation* (Toronto: Canadian Nuclear Association, 1980), 52.

⁶⁰ Tailings are the waste material that arise from a uranium mill after the uranium has extracted from the ore. Uranium tailings contain radioactive products of uranium mixed with non-radioactive rock. Such a mixture is finely ground and mixed with water. Thorium, the most common waste product, has a half-life of 80,000 years, and decays into uranium-238, which is one of the most toxic radioactive substances known. These tailings were left in open piles, which allowed for the toxic waste to leech into local waterways. For further information, see Arthur Porter, *Interim Report on Nuclear Power in Ontario*, Royal Commission on Electric Power Planning (Toronto: Queen's Printer for Ontario, 1978); Ralph D. Torrie, *Half Life: Nuclear Power and Future Society, A research report prepared under the direction of the Ontario Coalition for Nuclear Responsibility* (Ottawa: Infoearth, 1977); Select Committee on Ontario Hydro Affairs, *Final Report on the Management of Nuclear Fuel Waste* (Toronto: The Legislative Assembly of Ontario, June 1980); and Kenneth Hare, *The Management of Canada's Nuclear Wastes*, Report EP 77-6 (Ottawa: Energy, Mines and Resources Canada, Energy Policy Sector, 1977), 54. For tailings in Elliot Lake, see Terry Graves, *Nuclear Waste and the North* (Ottawa: The Royal Commission on the Northern Environment, 1980).

⁶¹ Hare, *The Management of Canada's Nuclear Wastes*, 54 and “Northern Schoolchildren Drinking Radioactive Water,” *The Globe and Mail*, January 4, 1977.

the allowance of radioactive contaminants. As Chief of the Serpent River First Nation Earl Commanda explained in interviews years later, “these twelve uranium mines that were operating – they made sure that all the water continued from the effluents to flow past our community on the Serpent River watershed. Although we have kids who swim in there, who drink in there, who eat fish from there, there was no real protection from the contaminants that were coming through there.”⁶²

Community leaders and environmentalists stressed the importance of developing systems for the monitoring and maintenance of tailings. As one protester argued, “it’s not a case of what we do in terms of tailings management for 10 years, or 20 years, or 30 years, but what are we talking about in terms of 100 years, 200 years.”⁶³ Contracts between the Ontario Government and the two largest uranium mines, Denison Mines and Rio Algom Mines, allowed for the mines to continue extraction while absolving them from any responsibility for the management of tailings. By 1978, uranium mining had produced 100 million tonnes of nuclear waste in Canada, with the majority stored in temporary, above ground tailings. Moreover, the two leading mines in Elliot Lake expected to tail another 200 million tonnes by the end of the century.⁶⁴

The effects of the uranium industry were also having physical effects on the workers of the Elliot Lake uranium fields. In the 1960s, workers in the mining and metallurgy industries were becoming more concerned with the safety of working conditions. Uranium miners were at the greatest risks to work-related illness. Long-term exposure to uranium, thorium, and radon gas

⁶²See Catherine Dixon, *The Power and the Promise* (Elliot Lake, ON: Gillidix Publishing, 1996), 298.

Anabel Dwyer, Keith Lewis, and Lorraine Rekmans ed, *This Is My Homeland: Stories of The Effects of Nuclear Industries by People of The Serpent River First Nation and The North Shore of Lake Huron* (Cutler, ON: Serpent River First Nation, 2003), 10-11.

⁶³ Mark Prystupa, Donald W. Hine, John Wewko & Craig Summers, “Stakeholder Perceptions of Risks Related to Elliot Lake Area Mine Tailings,” in *Boom Town Blues*, 267,

⁶⁴ *Ibid.*, 274.

led to high number of workers diagnosed with cancers and other diseases. The long-term detrimental effects of working in the industry made the Elliot Lake mines among the worst working conditions in Canada.⁶⁵ In 1974, workers at Denison Mines staged a wildcat strike.⁶⁶ As Laurel Sefton MacDowell argues, poor and unhealthy working conditions faced by workers in the uranium industry triggered the strike at Elliot Lake. The wildcat strike of 1974 not only led to the establishment of the *Royal Commission on the Health and Safety of Workers in Mines* (also known as the Ham Commission), but it also led to the establishment of Occupational Health and Safety Act of 1978.⁶⁷

By the mid-1970s, the Ontario Government and Ontario Hydro could no longer ignore the visible social, environmental, and economic rifts of nuclear energy. While the technocrats and policy makers of the province continued to see nuclear energy as the sole path for Ontario, growing public pressures forced the provincial government to act. On 17 July 1975, the provincial government established the Royal Commission on Electric Power Planning, also known as the Porter Commission (named after the Chairman Arthur Porter).⁶⁸ The purpose of the Porter Commission was to provide preliminary public meetings and information secession regarding the future of energy needs in Ontario and to examine fully the “technical, socioeconomic, and environmental factors” of the province’s energy concepts. For nearly two-and-a-half years, the Porter Commission listened to questions and concerns of the public and

⁶⁵ Laurel Sefton MacDowell, “The Elliot Lake Uranium Miners’ Battle to Gain Occupational Health and Safety Improvements, 1950-1980,” *Labour/Le Travail* 69 (Spring 2012): 93.

⁶⁶ Dixon, *The Power and the Promise*, 286-287. See also Donald Trotter, “Breakthroughs in Health and Safety in Northern Ontario Mines,” in *At the End of the Shift: Mines and Single Industry Towns in Northern Ontario*, ed. Matt Bray and Ashley Thomson (Toronto: Dundurn Press, 1992), 122-123.

⁶⁷ For an extensive overview of the events at Elliot Lake, and the creation of the Occupational Health and Safety Act, see Laurel Sefton MacDowell, “The Elliot Lake Uranium Miners,” 91-118.

⁶⁸ See Babin, *The Nuclear Power Game*, 71-72; Swift and Stewart, *Hydro: The Decline of an Empire*, 28; and Duane Bratt, *Canada, the Provinces, and the Global Nuclear Revival*, 116.

received input regarding the state of the provinces energy grid.⁶⁹ As *New Scientist* explained in 1978, the Porter Commission was especially valuable for not only its attempts to explore nuclear power solely through the context of power generation but also for “its careful dissection of the economic issues affecting nuclear planning.”⁷⁰

One of the most interesting components of the Porter Commission was its commitment to listening to northern communities. As the Commission explained, community meetings needed to reach as far as possible to provide an adequate understanding of the needs of the province. The Commission committed itself to learning of the “unappreciated value of Northern cultures” and the challenges of living in Ontario’s hinterland.⁷¹ While the Commission supplied the metropolis of Southern Ontario with adequate meetings and hearings regarding power, the Commission visited Kenora, Thunder Bay, Sault Ste. Marie, Sudbury, and Timmins to discuss future power planning and its implications on the North.

Northern communities took advantage of these public meetings to voice their concerns. There are visible differences between the questions and concerns of northern communities over those of Southern Ontario. Whereas the transcripts of meetings in Southern Ontario discuss public policy, energy pricing, and urban planning, transcripts from meetings held in Northern Ontario moreover discuss issues of social, economic, and environmental inequality. As one citizen from Thunder Bay explained, “the first priorities of this Commission should be to publicly state that

⁶⁹ Royal Commission on Electric Power Planning, *A Race Against Time*, 5.

⁷⁰ “Porter with Nuclear Reservations,” *New Scientist* 80, no. 1127 (November 1978): 362-363.

⁷¹ Royal Commission on Electric Power Planning, “The Meetings in the North” (Toronto: Queen’s Printer, 1978), 3.

[Northern] Ontario will not become the sacrificial lamb to the pundits of doom and zero growth and that the special requirements of this frontier of Ontario will be acknowledged.”⁷²

The hinterland-metropolis relationship was a prevalent issue at the Northern Ontario meetings. The power industry, like all industries which thrive on hinterland resources, had created greater inequality between the north and south of the province. While the opulent suburbs of Toronto reaped the social and economic benefits of electrical power, many northern communities, although living in the heart of Ontario's electrical grid, continued to have little to no access to power. The hamlet of Armstrong in Northwestern Ontario, for example, continued to receive inconsistent energy supplies at higher costs than in larger cities. Northern communities understood that Hydro's mandate of "Power at Cost" was a myth that was no longer realistic. Moreover, Hydro's platform of 'Live Better Electrically' conflicted with the social and cultural values of northern life.⁷³ Communities were looking for power planning which sought to allow northern participation in the 'products of the affluent society' while maintaining an understanding of the hinterland's traditional lifestyle.⁷⁴ These concerns transcended the issues of electric power and were connected to the greater hinterland-metropolis relationship between the province and Northern Ontario; the issue of power was simply the manifestation of these issues.

Of the utmost concern from northern communities was the continued devastation of the environment. As the Royal Commission's interim report concluded, while nuclear energy has the potential to provide society with many social and economic benefits, the technology "constitutes

⁷² Royal Commission on Electric Power Planning, *Shaping the Future - First Report by The Ontario Royal Commission on Electric Power Planning* (Toronto: Queen's Printer, 1976), 17.

⁷³ See Royal Commission on Electric Power Planning, "Preliminary Meetings of the Royal Commission on Electric Power Planning – Thunder Bay," vol. 13 (Toronto: Queen's Printer, 1975), 1619-1620.

⁷⁴ Royal Commission on Electric Power Planning, "Preliminary Meetings of the Royal Commission on Electric Power Planning – Sudbury," vol. 2 (Toronto: Queen's Printer, 1975), 144.

a major environmental challenge.”⁷⁵ These environmental challenges were already prevalent in the hinterland, as Northern Ontario had already experienced the environmental effects of the front-end of the nuclear cycle in Elliot Lake. Many communities argued that further expansion of a nuclear program in Northern Ontario only assisted in increasing these environmental issues in the north. Nuclear power's environmental impact had the potential to not only disrupt the economic stability of Northern Ontario's agriculture, fishing and trapping, and tourist industries, but it also threatened to destroy the social and cultural facets of living in the hinterland. As one citizen from Sudbury explained to the Porter Commission, “we have no ‘Maple Leaf Gardens’ or ‘O’Keefe Theatre’ near where [we] live and so our recreation and entertainment is the outdoors, the forests, lakes and streams that we enjoy and share with others.” Planning for future power use should include ‘all possible safeguards’ to protect Northern Ontario from future environmental crises.⁷⁶

The Porter Commission also provided Indigenous communities an opportunity to voice their concerns about Ontario's energy program. Between August and September of 1976, the Royal Commission visited the Treaty 9 communities of Mattagami, Attawapiskat, Fort Hope, Webequie, and Winisk to gather further public insight on northern development. As the Commission's report on “the Meetings in the North” concluded, northern development of Ontario's electric grid should only take place after the Commission has examined the concerns of Indigenous communities. The Porter Commission was not only looking to gain greater insight

⁷⁵ Royal Commission on Electric Power Planning, *A Race Against Time*, 65.

⁷⁶ Commission on Electric Power Planning, “Preliminary Meetings of the Royal Commission on Electric Power Planning – Sudbury,” 153-154; Royal Commission on Electric Power Planning, “Preliminary Meetings of the Royal Commission on Electric Power Planning – Thunder Bay,” 1631; Royal Commission on Electric Power Planning, “Preliminary Meetings of the Royal Commission on Electric Power Planning - Cornwall,” vol. 8 (Toronto: Queen's Printer, 1975), 1143.

into the environmental concerns of Indigenous communities but to garner further understanding of the social, economic, and cultural impacts of nuclear power in the north.

At the various meetings, environmental damage was of the greatest concern to Indigenous communities. Communities such as Mattagami First Nation and Serpent First Nation experienced first hand the environmental damage created at the cost of providing power to the province of Ontario. As one resident in Mattagami explained, “there must be a way of solving problems without destroying the environment.”⁷⁷ For these communities, the environmental concerns of Northern Ontario's hinterland outweighed the energy concerns of the province.

Agency in the process of electrical planning also concerned Indigenous communities. Twentieth-century development in Northern Ontario had drastically reshaped the socio-economic means of Indigenous communities. These changes, which often developed without consulting Indigenous leaders and communities, came at a disadvantage to Indigenous peoples and catered to provincial capital and industry. Grand Chief Andrew Rickard of the Grand Council Treaty 9 explained that the Royal Commission's visits to northern communities was the first step to recognizing “the need to fully involve the people of the North in the North's future.”⁷⁸

The inability to control Hydro's need to develop more power from the north undermined not only the social contracts between Indigenous and non-Indigenous societies but also the Indigenous way of life. Many of these communities relied very little on electric power to survive. Limited access to the utility and continued practice of cultural traditions meant many had no use for electricity. As the Whitefish River First Nation explained to the Porter Commission, the ‘serious and far reaching effects’ of nuclear energy were detrimental to the environment,

⁷⁷“The Meetings in the North,” 14.

⁷⁸ Ibid., 12-22.

detrimental to their community, and detrimental to the future of the north.⁷⁹ The Porter Commission concluded that while Indigenous communities did not reject modernity, they were adamant of gaining more agency in the planning process, as these changes affected “their communities, their life-styles, and the environment in which they live.”⁸⁰ The meetings in Treaty 9 provided the Porter Commission with ample understanding of Indigenous concerns of power planning and development.

Not all discussion at the Northern Ontario meetings regarded the negative aspects of nuclear power and the province's energy programs. Transcripts of the town meetings note the challenges faced by civic leaders, members of various chambers of commerce, and industries to campaign for lower energy costs while maintaining the northern environment. In the mid-1970s, many northern communities struggled through economic downturn. These single-industry communities were susceptible to market vulnerability and competition amongst the global market. Cheaper energy was a necessity to maintaining economic growth in Northern Ontario.⁸¹ Industrialist not only favoured nuclear energy in Northern Ontario as the most fiscally sound means of providing power to the north but believed in its potential to rid the province of its “bottleneck of supply versus provincial energy demand.”⁸² Developing a nuclear energy program in Northern Ontario could provide economic stability to towns involved in the industry and provide an opportunity to create long-term employment across the region at large power generating complexes. Although there was need to control the environmental footprint of

⁷⁹ Whitefish River Indian Reserve Band Council, “Brief on Nuclear Power Planning and Development,” Submitted to *The Royal Commission on Electric Power Planning* (Toronto: Queen's Printer, April 1977), 8.

⁸⁰ “The Meetings in the North,” 18.

⁸¹ Royal Commission on Electric Power Planning, “Preliminary Meetings of the Royal Commission on Electric Power Planning - Timmins,” vol. 4 (Toronto: Queen's Printer, 1975), 27.

⁸² Ibid.

Hydro's expansion, many in the north believed Ontario needed to prioritize a provincial energy policy which focused on conservation and economic strength.⁸³

The completion of the Porter Commission provided the Ontario Government, Ontario Hydro, and the public with the first comprehensive analysis of the future of the province's energy needs. In 1978, the Porter Commission published their interim report on nuclear power. The report, fittingly entitled *A Race Against Time*, provided the provincial government with the Royal Commission's examination and recommendations of the full nuclear cycle in Ontario. Based on the comprehensive analysis of both public and technocratic discourse, the Porter Commission stated that nuclear power had a role in the future of Ontario's power planning, however, "nuclear power should not continue to receive the dominant portion of energy research and development funds."⁸⁴ Although Hydro officials had predicted a 7 per-cent growth per annum, the Porter Commission inferred a growth of only 4 per-cent, and recommended that Ontario Hydro be more flexible in its future planning. Hydro needed to begin researching other renewable energy sources to off-set Ontario's dependence on nuclear power. The Porter Commission's final recommendation regarding nuclear power stated that "because of the safety record of Ontario's power stations...we reaffirm our earlier finding to the effect that CANDU reactors are safe within reasonable limits."⁸⁵

While the findings of the Porter Commission acknowledged the overall safety of nuclear energy, it nevertheless noted the interconnections of nuclear power to greater social and political

⁸³ See submission by H.L. Harris, Manager of the Public Utilities Commission of the City of Sault Ste. Marie, Royal Commission on Electric Power Planning, "Preliminary Meetings of the Royal Commission on Electric Power Planning – Sault Ste. Marie," vol. 3 (Toronto: Queen's Printer, 1975), 2-7.

⁸⁴ Royal Commission on Electric Power Planning, "Preliminary Meetings of the Royal Commission on Electric Power Planning – Concepts, Conclusions, and Recommendations," vol. 1 (Toronto: Queen's Printer, 1980), 63.

⁸⁵ Swift and Stewart, *Hydro: The Decline of an Empire*, 28; and "Preliminary Meetings of the Royal Commission on Electric Power Planning – Concepts, Conclusions, and Recommendations," 64.

issues. As the Porter Commission concluded, society needed to be knowledgeable about “the proposed technologies, their environmental, societal, and political implications, and their capital and fuel requirements,” and the necessities in securing both the short-term and long-term programs to maintain Ontario’s energy needs. If the nuclear power industry wanted to maintain its hegemony in Ontario’s future power planning, it needed to maintain public confidence and reassurance.⁸⁶ The findings of the Porter Commission provided Ontario Hydro and the Atomic Energy of Canada Limited the necessary support to continue expanding their nuclear program.

In the 1960s and 1970s, Ontario’s nuclear energy program reshaped the social, political, and economic landscapes of the province. The shift towards nuclear energy was not only a means of mending the metabolic rifts created by hydro-electricity, but it reaffirmed the monopolization of Ontario’s energy sector. Ontario Hydro’s partnership with the AECL allowed for the province to once again become one of the most advanced electrical grids in North America. While Ontario’s commitment to nuclear energy solidified the province’s entrance into the technological age, such modernity came at a cost. Ontario’s role as both a domestic and international supplier of uranium fostered the development of massive mining projects in Northern Ontario, projects which came at a large environmental cost to the North. The nuclear industry neglected the economic and environmental problems found at the “front end” of the fuel cycle, the mining operation itself, as a cost of development in the hinterland-metropolis relationship.

The economic stability of single industry towns such as Elliot Lake rested entirely on the growth and expansion of the nuclear industry in the globalized world. While the needs of

⁸⁶ Royal Commission on Electric Power Planning, “Concepts, Conclusions, and Recommendations,” 63-64; Royal Commission on Electric Power Planning, *A Race Against Time*, 181-182. See also Babin, *The Nuclear Power Game*, 71.

Southern Ontario drove the demand for nuclear energy, the negative ecological impacts of such an energy source were bore by the North. The uranium industry created much environmental damage in Northern Ontario, as water-systems and landscapes were changed dramatically by nuclear by-products and wastes.⁸⁷ Ontario Hydro had entered a 'vicious cycle' of constant growth and continual expansion on the sole means of maintaining its electrical-utilities monopoly.⁸⁸ Ontario's approach to developing their nuclear program rested on a disproportionate balance between environmental degradation, economic development, and exchange of energy between the Northern and Southern Ontario. When the nuclear waste controversy began in the late 1970s, it only added to this disproportionate balance between the province and the North.

⁸⁷ Graves, *Nuclear Waste and the North*, 26.

⁸⁸ "Hydro Expansion 'Risks Horrendous Hazards,' report says," *The Globe and Mail*, January 16, 1975.

Chapter 4

“We’ll be the only place in North America that glows in the dark” - Nuclear Waste and Northern Ontario, 1977-1998

While the Royal Commission of Electric Power Planning had emphasized the importance of nuclear energy in Ontario, it also brought new issues to the public forum. By the 1970s, the environmental effects of nuclear power were not only visible at the front-end of the nuclear cycle but were also becoming more apparent at its back-end. As the Porter Commission concluded, the management of thousands of tonnes of nuclear fuel spent, “which at all times must be isolated from the earth’s ecosystem,” presented a massive problem for the nuclear power industry.¹ Years of nuclear fuel waste from Ontario’s three major nuclear power stations had created a new environmental issue for the provincial and federal governments, Ontario Hydro, and the AECL to address. The technologies used to mend the metabolic rifts of hydro-electricity were now creating rifts of their own.

The search for Canada’s first nuclear waste storage facility began in haste in the 1970s and quickly became a new source of local, provincial, and national debate.² As Terry Graves stated in his 1980 report to the Royal Commission on the Northern Environment, “if our modern age can be characterized by two words, complexity and immediacy, then the issue of nuclear waste is truly a child of our new age.”³ Between 1977 and 1998, nowhere was the issue of nuclear waste more complex and immediate than as in Northern Ontario, where the AECL, Ontario Hydro, and provincial and federal governments sought to find communities willing to develop a nuclear waste site program. The abundance of land on the Canadian Shield and low

¹ Royal Commission on Electric Power Planning, *A Race Against Time: Interim Report on Nuclear Power in Ontario* (Toronto: Queen’s Printer, 1978), 87.

² Ronald Babin, *The Nuclear Power Game* (Montreal: Black Rose Books, 1985), 154.

³ Terry Graves, *Nuclear Waste and the North* (Ottawa: The Royal Commission on the Northern Environment, 1980), 2.

population made Northern Ontario a viable option for further research and testing of nuclear waste storage. While experts in the nuclear industry believed the hinterland to be the solution to the issue of nuclear waste, many northern communities argued the issue was a continuation of the historical provincial dominance of the North. The front-end of the nuclear cycle had already affected Northern Ontario, as uranium mining at Elliot Lake had created serious social, economic, and environmental changes to the region. As protesters irreverently stated, “we’ll be the only place in North America that glows in the dark.”⁴ The attempts to establish a deep-geological waste repository in Northern Ontario not only re-affirmed the inequalities of the hinterland-metropolis relationship but further exemplified how the provincial and federal governments, Ontario Hydro, and the AECL attempted to mend the rifts of its technological and economic evolution.

The development of province’s nuclear program was essential to the continued growth of Ontario Hydro and the AECL’s monopoly. By the end of the 1970s, the province’s three nuclear reactors were providing millions of kilowatts of power to Southern Ontario while plans for a fourth reactor were in order. Construction of the Darlington Generating station between Bowmanville and Oshawa began in 1977, with the 3.4-megawatt station being operational by 1981.⁵ Ontario Hydro coupled these plans with their long-term vision of building massive nuclear complexes across the province to create a continuous supply of domestic energy.

Although Ontario Hydro and the AECL prepared to invest in a long-term nuclear program, their track record of managing nuclear waste was negligible. By 1975, there existed over 1,500 tonnes of irradiated fuel spent from power reactors; by 1980, this amount had grown to

⁴ Terry Graves, *Nuclear Waste and the North*, 2.

⁵ *Ontario Hydro Statistical Yearbook, 1977* (Toronto: Queen’s Printer, 1977), 16.

over 3,000 tonnes, and researchers expected this number to continue to grow with the expansion of Ontario’s nuclear program.⁶ Moreover, experts believed the industry needed to plan for the management of over 140,000 tonnes of spent fuel by the year 2000, a challenge which further complicated the nuclear waste issue.⁷ The nuclear industry and the provincial and federal governments could no longer avoid the issue of nuclear waste.

At the provincial level, the issue of nuclear waste had become a growing concern for both private and public interests in Ontario. In 1978, Ontario Hydro and provincial officials received the findings of *the Disposal of Ontario’s Nuclear Fuel*, also known as the Uffen Report. The Uffen Report provided the province with the first in-depth review of its nuclear waste issue. As the report found, the issue of nuclear waste was as much a social, environmental, and economic problems as it was a technical problem. Although Ontario Hydro and the AECL were exploring all potential means of disposing of nuclear waste, deep geological repositories had the greatest potential for providing a safe and secure disposal of waste in the environment. The greatest challenge in developing a management plan lay in the “maze of overlapping jurisdictions and levels of responsibility at the municipal, provincial, and federal level,” a system which the industry needed to sort to provide proper bi-lateral execution.⁸ The report also concluded that public reaction to the proposed plan had the capacity to determine the future use of nuclear reactors in Ontario, even though some critics of the Report argued that too much public debate on the issue could lead to greater discussion of the abolishment of the industry completely.⁹

⁶ See F. Kenneth Hare, *The Management of Canada’s Nuclear Wastes*, Report EP 77-6 (Ottawa: Energy, Mines and Resources Canada, Energy Policy Sector, 1977), 54; and Graves, *Nuclear Waste and the North*, 2.

⁷ “The Road to Destruction: Even the ‘peaceful’ use of nuclear power could mean our annihilation,” *The Globe and Mail*, May 1, 1976.

⁸ See Robert J. Uffen, *The Disposal of Ontario’s Nuclear Fuel: A Status Report on Alternative Proposals for the Storage, Reprocessing and Disposal of Used Fuel from CANDU Nuclear Reactors* (Montreal and Kingston: McGill-Queen’s University, 1978), 1-5.

⁹ “Nuclear Wastes Debate Threatens to Show up Rift: ENERGY,” *The Globe and Mail*, October 8, 1977.

When the Porter Commission began its inquiry into nuclear waste in Ontario, the Uffen Report offered the Royal Commission a foundation to explore the province’s options. A large focus of the Porter Commission was to further understand the necessary steps to ensure social and environmental protection of the full nuclear cycle. Understanding the issues of nuclear waste thus became a cornerstone of the Commission’s research. The Porter Commission’s *Interim Report* stressed the urgency in researching and developing a means of dealing with nuclear waste. The Commission concluded that “nuclear wastes can be disposed of permanently in geological formations in such a way that there is very little prospect of material escaping into the environment.”¹⁰

The issue of nuclear waste was also a growing concern at federal level of government. For years, nuclear waste management and disposal lay at the wayside of greater nuclear controversy. Although initial public concerns were about nuclear reactor safety, the growth of Canada’s nuclear energy program made it evident that industry and government needed plan for the management and disposal of nuclear waste. For the technical experts and politicians invested in developing Canada’s nuclear industry, creating the structures to manage nuclear waste was a small cost for the social and economic benefits of nuclear energy.¹¹ As Prime Minister Pierre Elliott Trudeau stated to *the Globe and Mail* in 1976, while nuclear waste was a risk for Canada, “you’ve got to live dangerously if you want to live in the modern world.”¹² Trudeau was firm in his position of nuclear energy’s future in Canada, however, he also understood the importance of facing the issues which plagued the nuclear industry. His speech to the Canadian Nuclear

¹⁰ Royal Commission on Electric Power Planning, *A Race Against Time*, 93, 94-97.

¹¹ Peter A. Brown and Carmel Létourneau, “Nuclear Fuel Waste Policy in Canada,” in *Canadian Nuclear Energy Policy: Changing Ideas, Institutions, and Interests*, ed. G Bruce Doern, Robert W. Morrison, and Arslan Dorman (Toronto: University of Toronto Press, 2001), 114.

¹² “Response to call for moratorium: Canada will continue to market its nuclear reactors for the time being, Trudeau says” *The Globe and Mail*, June 2, 1976.

Association in 1975, entitled *Canada’s Obligations as a Nuclear Power*, stressed the importance of developing the industry to provide safe sources of energy while preserving the environment. Maintaining high safety standards for nuclear reactors and creating a plan for the management of nuclear waste allowed the nuclear industry to grow while growing public consent for nuclear power.¹³ For Trudeau, nuclear power transcended the issues of electricity, as it represented Canada’s preparedness for shifting markets and increased liberalization in the globalized world. Nuclear waste was simply a caveat to the process that needed to be planned for.

Those with vested interests in the nuclear industry also understood the importance of developing a program for the safe removal of nuclear wastes. The Hydro Board of Directors understood that if public support in nuclear power was to be retained, techniques for the management of wastes needed to prove environmentally safe.¹⁴ The AECL also stated that the creation of a waste management program was not only a responsibility of the industry but imperative to maintaining its dominance in the nuclear industry both domestically and abroad.¹⁵ Scientist and engineers with the AECL proposed a three-step process for removing spent fuel from the environment which included cooling spent fuel bundles in large pools of water for a period of thirty years, encasing the spent bundles in concrete containers for further decay for a period of fifty to one-hundred and fifty years, and finally burying the spent bundles in deep geological repositories and removing them from the environment completely.¹⁶ The research

¹³ Waste management refers to the methods used to shield and temporarily store radioactive materials once removed from reactors. Waste disposal refers to the permanent removal of these radioactive materials from the environment. See Duane Bratt, *The Politics of CANDU Exports* (Toronto: University of Toronto Press, 2006), 65-66 and Duane Bratt, “Energy as an Instrument of Foreign Policy,” in *Canada Among Nations, 2008: 100 Years of Canadian Foreign Policy*, ed. Robert Bothwell and Jean Daudelin (Montreal and Kingston: McGill-Queen’s University Press, 2009), 224-226

¹⁴ *Ontario Hydro Statistical Yearbook, 1977*, 3.

¹⁵ “AECL foresees 80,000-ton accumulation by year 2000 nuclear wastes: The debate is heating up,” *The Globe and Mail*, January 3, 1978.

¹⁶ “The Road to Destruction,” *The Globe and Mail*, May 1, 1976.

being undertaken by the AECL at their Whiteshell Nuclear Research Establishment in Pinawa, Manitoba sought to not only develop the means for deep geological storage but also plan and manage nuclear waste in such a way that the environment is protected by ‘an insoluble matrix’ of protocols and safety measures.¹⁷ In 1976, the AECL began actively seeking locations to begin studying rock formations for building a deep-geological repository. Representatives with the AECL met with communities in Northwestern Ontario to discuss developing a repository. Although preliminary research had found two sites near Ignace, two sites near Kenora, and sites near Savant Lake and Marathon to be suitable, the AECL removed these communities from the list of prospective locations in 1977.¹⁸ Although the AECL was confident in their strategy for waste disposal, they needed further studies to garner the confidence of the federal government.

In November of 1977, the Department of Energy, Mines, and Resources published *The Management of Canada’s Nuclear Wastes*, also known as the Hare Report. The federal Government commissioned the Hare Report to offer both the government and the public with an independent review of Canada’s proposed nuclear waste program.¹⁹ The report concluded that it was necessary to develop a consolidated plan for the immediate management of radioactive waste and that there lay good potential for the safe and permanent disposal of nuclear waste in the Canadian shield.²⁰ The Hare report recommended that as Canada’s largest producer of nuclear energy, Ontario should host the first nuclear waste facility.²¹ The need for both remoteness and the proper geological foundations made Northern Ontario a viable

¹⁷ “Nuclear Power,” *The Globe and Mail*, June 3, 1976.

¹⁸ “Six Locations for Atom Dump Are Ruled Out,” *The Globe and Mail*, January 6, 1977.

¹⁹ Brown and Létourneau, “Nuclear Fuel Waste Policy in Canada,” 115.

²⁰ Michael D. Mehta, *Risky Business: Nuclear Power and Public Protest in Canada* (Lanham, MD: Lexington Books, 2005), 40.

²¹ Hare, *The Management of Canada’s Nuclear Wastes*, 54.

recommendation for the project.²² As the report noted, the selection for the final location of a waste repository depended on several larger socio-economic questions.²³ The Hare Report noted that two polarizing principles would affect the choice of a depository site:

If there are risks involved in operating and maintaining the repository, it is equitable that these risks should be borne by the people who benefit most from the power to be generated. In rebuttal, however, one can argue that one should minimize risk to human populations in the event of an unforeseen escape of radioactive materials from the repository.²⁴

While the Hare report concluded that Northern Ontario was a solution to a growing environmental issue, it also noted local communities may resist any attempt to develop a nuclear waste disposal program. As the report stated, “why should we accept noxious wastes that arise from the demands of city-folk down south? This familiar cry will be raised whenever in Northern areas the repository is finally placed.”²⁵

The Hare Report understood the social and environmental barriers to burying nuclear waste in Northern Ontario, but it nevertheless found that the benefits of disposing of wastes away from major metropolises outweighed the potential risks borne by the North. The Crown had access to lands in the north that were far enough from communities and industrial activity that they could avoid the potential environmental and economic degradation. Furthermore, the Report noted the economic potential for any community willing to accept a nuclear waste program, as the construction and operation phases prospectively cemented generations of employment.

²² Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro* (Toronto: Between the Lines, 1983), 107.

²³ Hare, *The Management of Canada’s Nuclear Wastes*, 55.

²⁴ Ibid.

²⁵ Ibid., 2-3.

The Hare Report may have been a polarizing document when released, nevertheless, it initiated a national debate on the growing issues of nuclear waste. Although the report posed serious questions and concerns regarding how the industry should manage its nuclear waste, many in the scientific community and the anti-nuclear movement criticized the report for not providing enough technical understanding of the procedures of disposing of nuclear waste and for its lack of understanding the risks involved in such a process.²⁶ The conclusions of the Hare Report sought to curb public antagonism towards nuclear power while offering the nuclear industry the means to continue growing. Developing a nuclear waste disposal site meant the survival of one of the country’s modern industries, even if the industry needed serious restructuring and a reduction in its model of expansion and infinite growth.²⁷

By the end of the 1970s, the issue of nuclear waste had ascended from being a fringe issue of environmentalists and ecologists to an issue that penetrated the greater cultural zeitgeist, and one which transcended regional, national, and international borders. The findings of the Uffen Report, the Hare Report, and the Porter Commission all came to the same conclusion. If Canada, and specifically the province of Ontario, was to continue its path of nuclear energy, they needed to implement a program to manage the growing issues of nuclear waste. Such a plan not only needed to develop bi-laterally between the provincial and federal governments and crown corporations but also needed full public support. In 1978, the governments of Ontario and Canada, in conjunction with Ontario Hydro and the AECL, accepted the findings of both provincial and federal reports and established the Canadian Nuclear Fuel Waste Management Program. The program was based on deep geological burial of nuclear waste at depths of 500 to

²⁶ Babin, *The Nuclear Power Game*, 155-156. See also Michael D. Mehta, *Risky Business*, 39-40.

²⁷ Darrin Durant, “Public Consultation as Performative Contradiction: Limiting Discussion in Canada’s Nuclear Waste Management Debate,” in *Nuclear Waste Management in Canada: Critical Issues, Critical Perspectives*, ed. Darrin Durant and Genevieve Fuji Johnson (Vancouver: UBC Press, 2009), 71.

1000 metres in the Precambrian Shield. Ontario Hydro and the AECL’s engineering and technical divisions estimated that the nuclear waste disposal concept would take twenty years to fully develop at a cost of nearly \$700 Million.²⁸

With both federal and provincial approval, the AECL and Ontario Hydro began actively studying the potential of deep-geological repositories. The AECL had selected a geological formation near Madoc (200 kilometers northeast of Toronto) in January 1977 to test their proposed underground waste disposal program. The AECL chose Madoc because of its large pluton rock formations and because of its proximity to nuclear reactors. When officials with the AECL made public their proposed testing, members of the community overwhelmingly opposed the company’s plans.²⁹ Residents created the group Citizens Opposed to Radioactive Pollution to protest the proposed testing.³⁰ On 16 March 1977, AECL representatives visited Madoc to “explain how electricity is produced from nuclear energy and other complicated matters.”³¹ Twelve-hundred citizens assembled in Madoc to protest the AECL’s plans for testing. Protesters told AECL officials that they did not want to bear the environmental costs of having nuclear waste near their community, while some carried signs that said, ‘Bury it on Parliament Hill.’³² Members of the community were further conflicted by the fact that a solution to the issue of nuclear waste was not a pressing matter. Engineers with the AECL confirmed that spent fuel

²⁸ Brown and Létourneau, “Nuclear Fuel Waste Policy in Canada,” 115.

²⁹ Benda L. Murphy, “Canadian Communities and the Management of Nuclear Fuel Waste,” in *Nuclear Waste Management in Canada: Critical Issues, Critical Perspectives*, ed. Darrin Durant and Genevieve Fuji Johnson (Vancouver: UBC Press, 2009), 137.

³⁰ “Across the Region New Information Prompts Madoc Waste Opponents to Meet,” *The Kingston Whig Standard*, June 15, 1987.

³¹ Gordon Edwards, Canadian Coalition for Nuclear Responsibility, “The Madoc Awakening: High Level Radioactive Wastes in Canada,” *The Plutonium Agenda*, (1986), accessed March 20, 2017, http://www.ccnr.org/hlw_history.html#mad.

³² *Ibid.*

could remain safely suspended in cooling pools for fifty years.³³ The uproar from residents led to the AECL eventually cancelling the testing near Madoc.³⁴ The nuclear waste controversy in Madoc was the first of many, as the ACEL began to look further north for a community partnership.

Having lost the public relations debate in Madoc, the AECL began an aggressive campaign to find a community in Northern Ontario willing to accept nuclear waste. In the spring of 1977, AECL officials began meeting with city councillors in Atikokan, Thunder Bay, Timmins, and Kirkland Lake with requests to do geological surveys to determine whether rock formations located near their communities were suitable for further research. As bulletins from the AECL explain, scientists at the Whiteshell Laboratories were confident in their approaches and were continuously refining their practices.³⁵ The AECL was looking to have the first phase of their nuclear waste management program completed by 1981, and to begin working with a community in developing a demonstration disposal site in 1982. While the AECL noted communities had every right to withdraw from consideration, such a decision had social and economic ramifications of its own.³⁶

Community leaders and city councils in the north had different opinions regarding the acceptance of a nuclear waste program. The paradox of economic incentive and stability versus social and environmental degradation provides an excellent example of social and environmental injustice faced by the north. The issue of nuclear waste left single-industry communities with the

³³ See “Living with Atomic Power: No More Danger Than TV?” *The Globe and Mail*, February 22, 1977; and “Don’t Dump Here,” *The Globe and Mail*, February 23, 1977.

³⁴ “Atikokan kept in dark by AECL, MPP states,” *The Globe and Mail*, January 17, 1988.

³⁵ AECL, *News About Radio Active Management*, Newsletter, October 30, 1978, series 117, Canadian Nuclear Waste 1978, Thunder Bay City Archives.

³⁶ AECL, *News About Radio Active Management*, Newsletter, November 8, 1978, series 117, Canadian Nuclear Waste 1978, Thunder Bay City Archives.

decision of trading short-term financial gain for long-term community and ecological health.³⁷

On the one hand, accepting nuclear waste meant accepting all environmental risks involved in the process. Between 1947 and 1978, the AECL acknowledged at least 135 accidents in the transportation of nuclear waste.³⁸ While the AECL and other federal bodies such as the Atomic Energy Board of Canada and the Canadian Transport Commission set stringent regulations regarding the transportation and containment of nuclear waste, major accidents along highways and waterways were still an eminent threat.

On the other hand, the possibility of developing a new industry persuaded many northern communities to explore the potential of long-term employment. In the 1970s, many single industry communities in Northern Ontario entered a phase of industrial and economic decline. These communities face major economic and social crises, as decisions made in boardrooms in Southern Ontario, rapid developments in industrial technologies, and economic trends connected to globalization had its greatest impacts in the hinterland of Northern Ontario.³⁹ In Atikokan, the closure of the Steep Rock Iron Mines and Caland Ore Company Limited had devastating effects on the community’s economy. The decline in the mining industries initiated a decline in the city’s population, which fell from 6,000 in 1971 to just over 5,000 by 1979.⁴⁰ Communities such as Atikokan, Marathon, Ignace, Kirkland Lake, Kenora, and Timmins all witnessed a decline in their primary industries. Larger centres in Northern Ontario were also facing economic

³⁷ Morgan Gardner, *Linking Activism: Ecology, Social Justice, and Education for Social Change* (New York: Routledge, 2005), 39-40.

³⁸ “AECL admits to 135 nuclear transport accidents,” *The Canadian Press*, February 1980.

³⁹ Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario* (Toronto: James Lorimer & Company, 2010), 114-117.

⁴⁰ “Some in Atikokan skeptical of AECL’s intentions,” *The Globe and Mail*, January 15, 1980. For more information, see W. Robert Wightman and Nancy Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800-1990s* (Toronto: University of Toronto Press, 1997), 359; and Atikokan Economic Development Corporation, *Experience Atikokan* (Atikokan: Atikokan Economic Development Corporation, 1999), 12.

challenges. In Thunder Bay, the pulp and paper industry faced economic down turn, while mining in Sudbury and steel production in Sault St. Marie also struggled to compete in the global market.⁴¹ The economic health of these single-industry communities were at the mercy of global conditions and ever-liberalizing government policies both locally and internationally. Economic and political shifts found regionally, nationally, and internationally continuously challenged the economic stability of northern communities.⁴² Single-industry communities who established in proximity to industry accepted pollution as the cost of development. These costs express in the physical world as environmental degradation which is not restricted to heavily industrialized sectors but transcends space and place to have greater long-term environmental effects on the community itself.⁴³ Thus, for many northern communities, the pressure to accept a nuclear waste repository reflected the socio-economic challenges found in the hinterland. The sparse population and economic downturn of Northern Ontario was being used to justify the dumping of nuclear waste by the AECL.⁴⁴ As reports from Thunder Bay’s City Planning and Economic Bureau noted, the \$90 million project had the capability to produce long-term employment opportunities and the possibility of future social and economic expansion.⁴⁵ While community leaders and the public were persuaded by the potential development of a new industry, such development came at the expense of greater environmental degradation in the North.⁴⁶

The tactics used by the AECL to establish themselves in northern communities further concerned the public. Attempts to avert public involvement from any discussion between the

⁴¹ See Wightman and Wightman, *The Land Between*, 359-362

⁴² *Ibid.*, 398.

⁴³ Katrin MacPhee, “Canadian Working-Class Environmentalism, 1965-1985,” *Labour/Le Travail* 74 (Fall 1974): 148.

⁴⁴ “Vote Demanded on N-Waste Site” *Thunder Bay Chronicle Journal*, January 16, 1980.

⁴⁵ Report 653/78 (Development Bureau) to Mayor W. Assef and Members of Council, letter, June 26, 1978, series 117, Canadian Nuclear Waste 1978, Thunder Bay City Archives

⁴⁶ “Kirkland Lake rejects plan for nuclear waste dump” *The Canadian Press*, October 26, 1989.

AECL and city councils only created more antagonism towards the waste repository project. The anti-nuclear movement developed out of the greater environmental movements of the 1970s of whom focused on having greater public control on policy making in Canada. The anti-nuclear movement in Canada established around the ideologies of radicalism and professionalism and through mass organization both locally and nationally. These groups sought to develop through structured organization and scientific argumentation. Public forums and open houses allowed the anti-nuclear movement the opportunity to provide the public with scientific discourse and to rid the discussion of nuclear power from economic and political influence.⁴⁷ Opposition to nuclear energy was as much an opposition to the postwar ideologies of consumerism and endless expansion. Nuclear waste was simply the physical manifestation of capitalism’s detrimental effects.⁴⁸

National groups such as the Canadian Coalition for Nuclear Responsibility (CCNR) were the greatest antagonists towards the nuclear industry. Initially, the anti-nuclear movement in Canada appeared as small, scattered groups which sought to protest the location or installation of nuclear projects. As Canada’s nuclear program developed, these small groups joined with other forces to form larger coalitions capable of developing a platform against nuclear energy.⁴⁹ As the CCNR argued, the attempts made by the nuclear industry to avoid public involvement, or to at the least overwhelm the public with highly-technical language and processes, served to silence any opposition to nuclear energy. While the CCRN understood the need for greater public control in decision making, they noted that “public participation will never develop beyond

⁴⁷ Mark Leeming, “The Creation of Radicalism: Anti-Nuclear Activism in Nova Scotia, c. 1972-1979,” *The Canadian Historical Review* 95, no. 2, (June 2014): 219-220.

⁴⁸ Jamie Swift and Keith Stewart, *Hydro: The Decline and Fall of Ontario’s Electric Empire* (Toronto: Between the Lines, 2004), 22.

⁴⁹ Babin, *The Nuclear Power Game*, 156-158.

tokenism unless there is official recognition of three significant deficiencies which prevent truly effective public participation: lack of communication, lack of information, and lack of resources.”⁵⁰

At the local level, the AECL’s entrance into Northwestern Ontario initiated much opposition from many community-based activist groups.⁵¹ Communities in the region created groups such as the Committee on Nuclear Issues in the Community (CNIC), Citizens Committee Studying Nuclear Waste (CCSNW), and the Atikokan Citizens for Nuclear Responsibility (ACNR) as a means of creating a platform to both protest and mobilize against proposed testing in Northwestern Ontario. These groups lobbied local, provincial, and federal governments for greater public involvement in the process of potentially accepting a waste repository. The CCNSW, for example, urged Prime Minister Trudeau to offer the population of Northwestern Ontario exclusively a referendum on whether “(1) you agree with the investigation/establishment of an underground nuclear waste disposal facility in Northwestern Ontario and (2) you agree with the transportation of nuclear waste through Northwestern Ontario.”⁵² Furthermore, these groups argued that the nuclear industry’s approach to their public relations created a sense of competition between communities of whom were not confident in the complete program.⁵³ The ACNR called the AECL’s information program a ‘selling job.’ As one protester explained, “if they were General Motors, they’d call it selling.”⁵⁴ In a brief delivered to media outlets, the

⁵⁰ Canadian Coalition for Nuclear Responsibility, *Nuclear Waste – What, Me Worry?* (1978), accessed March 25, 2017, http://www.ccnr.org/me_worry.html#table.

⁵¹ Darrin Durant, “Radwaste in Canada: A Political Economy of Uncertainty,” in *Nuclear Waste Management in a Globalized World*, ed. Urban Strandberg and Mats André (London: Routledge, 2011), 25-26.

⁵² See Citizens Committee Studying Nuclear waste to PM Pierre Elliot Trudeau, letter, September 3, 1978, series 117, file 2760.007, Canadian Nuclear Waste 1978, Thunder Bay City Archives.

⁵³ Citizens Committee Studying Nuclear Waste to Mayor W. Assef and Members of Council, letter, August 29, 1978, series 117, Canadian Nuclear Waste 1978, Thunder Bay City Archives.

⁵⁴ “Vote Demanded on N-Waste Site” Thunder Bay *Chronicle Journal*, January 16, 1980.f

Atikokan Citizens for Nuclear Responsibility questioned whether the government should impose the hazards of nuclear waste on Northern Ontario against its will. As the group stated, “if part of society wishes to enjoy the benefits of a technology, but no part of society is willing to accept the costs, should it have such technology?”⁵⁵

Protest continued in Northwestern Ontario when the AECL bypassed public opinion and began researching sites near Atikokan.⁵⁶ Community groups in Northwestern Ontario had submitted a 20,000-person petition asking for more public hearings before testing began. To the dismay of community organizations in Thunder Bay and Atikokan, the AECL began drilling rock formations near Atikokan in the Summer of 1979. As the CCSNW argued, the AECL’s timetable created an “artificial time pressure” which forced communities and municipal councils to make hasty decisions regarding nuclear waste.⁵⁷ In the July 1979, a citizens group in Atikokan organized to protest the testing in the area without public consent. To sabotage further drilling, protesters poured sand into fuel tanks used by the AECL to test rock formations. The AECL and politicians alike highly criticized this bold attempt to stop testing in the north.⁵⁸

By the 1980s, the nuclear waste issue had greatly compromised the AECL’s reputation in Northern Ontario. In 1981, the agreement between the provincial and federal governments regarding the storage of nuclear waste underground was official postponed. In a joint statement released by the Federal Minister of Energy, Mines and Resources and the Ontario Energy

⁵⁵ “Vote Demanded on N-Waste Site,” *Thunder Bay Chronicle Journal*, January 16, 1980.

⁵⁶ “Atikokan kept in dark by AECL, MPP states,” *The Globe and Mail*, January 17, 1980.

⁵⁷ See Citizens Committee Studying Nuclear waste to Hon James A.C. Auld, letter, May 25, 1979, series 117, Canadian Nuclear Waste 1979, Thunder Bay City Archives.

⁵⁸ “Group protests test for disposal of atomic waste,” *The Canadian Press*, July 16, 1979.

Minister, the governments decided to postpone the search for a demonstration disposal site until both governments and the public fully accepted a proposed concept for geological disposal.⁵⁹

The moratorium on the search for Canada’s nuclear waste repository reflected the changing attitudes towards nuclear energy and its dominance in the energy sector. The AECL and Ontario Hydro’s unchecked expansion in the 1970s and early 1980s symbolized a lack of accountability by Crown Corporations to the government.⁶⁰ By 1982, Ontario Hydro’s vision of a nationalistic-style nuclear energy program had completely collapsed.⁶¹ Changing projections to power consumption created major issues for Ontario Hydro. Although Ontario Hydro had committed to its projections of seven per-cent growth per annum, actual consumption did not meet the corporation’s projections. Economic recession and growing trends in energy conservation created variations between what Ontario Hydro predicted and what Ontario Hydro consumed.⁶²

Even without completing the Darlington station, Ontario Hydro had the generating capacity to produce forty percent more energy than needed to offset peak demand. Ontario Hydro opted to complete construction of its final units at the Darlington Nuclear Generating Station, but they cancelled all future nuclear projects.⁶³ In Northern Ontario, the Atikokan Generation Station was the only project Ontario Hydro completed. For Premier Davis, the cancelling of the coal-fired plant in Atikokan was both an economic and political loss for his

⁵⁹ “Underground storage of spent A-fuel is postponed,” *The Globe and Mail*, August 6, 1981.

⁶⁰ Matthew J. Bellamy, *Profiting the Crown: Canada’s Polymer Corporation, 1942-1990* (Montreal and Kingston: McGill-Queen’s University Press, 2005), 200.

⁶¹ Neil B. Freeman, *The Politics of Power: Ontario Hydro and Its Government, 1906-1995* (Toronto: University of Toronto Press, 1996), 166

⁶² Swift and Stewart, *Hydro: The Decline and Fall of Ontario’s Electric Empire*, 53-54.

⁶³ See G. Bruce Doern, Arslan Dorman, and Robert Morrison, “Precarious Opportunity: Canada’s Changing Nuclear Energy Policies and Institutional Choices” in *Canadian Nuclear Energy Policy: Changing Ideas, Institutions, and Interests*, ed. Bruce Doern, Robert Morrison, and Arslan Dorman (Toronto: University of Toronto Press, 2001), 22-23.

government.⁶⁴ The coal burning station created an extra 200-megawatts of electricity and had the capability to provide nearly twenty per-cent of Northwestern Ontario’s electrical needs.⁶⁵

Although Premier Howard Pawley of Manitoba approached the Davis Provincial Government to purchase electricity from out-of-province, such a decision did not benefit Davis’ political position.

Environmental and economic think tanks were also losing confidence in Ontario Hydro’s structure of exponential growth. Increasing hydro-electric rates, unjustified nuclear projects, and continuous overhead spending in nearly every sector of the company plagued Hydro’s ability to operate autonomously from government intervention and accountability. The Darlington Nuclear Generating Station, for example, went nearly five times over budget, and cost Ontario citizens an extra \$14.3 billion in tax revenue.⁶⁶ As Rick Jennings and Russell Chute state, years of laissez-faire operations and the company’s ability to be “unshackled from the constraints that limit the actions of the private sector” had led to growing concerns within the province regarding the stability of its public utility.⁶⁷

The Canadian nuclear industry itself was also facing new social and economic challenges. Although the AECL’s CANDU reactors were among the safest and longest living nuclear reactors in the world, the company faced slumping sales both domestically and internationally. At home, Ontario Hydro had not ordered new reactors since 1974, a signal which

⁶⁴ Steve Paikin, *Bill Davis: Nation Builder, and Not So Bland After All* (Toronto: Dundurn Press, 2016), 266-267.

⁶⁵ *Ontario Hydro Statistical Yearbook, 1985* (Toronto: Queen’s Printer, 1985), 14-15.

⁶⁶ As Jim Harris states, Ontario’s nuclear projects historically follow a pattern of development. Ontario Hydro approved the initial prices well below the actual cost to secure the project. The industry then passes these cost overruns and other fees on to the citizens, who pay these costs through tax revenue. As a result, “nuclear projects in Ontario, on average, have gone 2.5 times over budget.” See Jim Harris, “The UnAtomic Age – Getting Past the Nuclear Era’s Fiscal Meltdown,” *Alternatives* 40, no. 4 (2014): 55-57.

⁶⁷ Lawrence Solomon, *Power at What Cost?* (Toronto: Energy Probe Research Foundation, 1984), 30-31; Jim Harris, “The UnAtomic Age,” 55; and Rick Jennings and Russell Chute, “Ontario’s Role in Nuclear Energy,” 128-131.

symbolized the growing challenges of domestic energy policy. Abroad, the social and political zeitgeist of nuclear power was also changing. Growing international concern regarding nuclear safety continued to keep the industry from reaching its potential. The 1979 meltdown at Three Mile Island in the United States and the 1986 disaster at Chernobyl, for example, reinvigorated public concerns of the detrimental effects of nuclear energy and perpetuated the social and ecological fears of the nuclear industry.⁶⁸ The growing issues of nuclear waste only perpetuated the public’s perception of nuclear energy.

In October of 1989, the Minister of the Environment appointed an Environmental Assessment Panel to conduct a full review of the AECL’s concepts for disposal, as well as the state of public opinion regarding the issues of nuclear waste.⁶⁹ The moratorium on the nuclear waste issue provided both governments and industry the opportunity to research their approaches far from public view. Scientists and engineers with the AECL and Ontario Hydro continued to refine methods for deep-geological repositories that would be accepted by the public as both safe and secure.⁷⁰ The Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel, also known as the Seaborn Panel, was mandated in 1989 as a means to offer final recommendations for developing the social, financial, environmental, and institutional structures needed to implement a process for the management of nuclear waste.⁷¹ The Seaborn Panel involved a ‘three-phase marathon’ of meetings, reports, and open houses involving both

⁶⁸Darrin Durant, “Radwaste in Canada,” 27.

⁶⁹ Canadian Coalition for Nuclear Responsibility, *Panel Report on High Level Waste Disposal*

Concept -- Summary (n.d), Accessed March 28, 2017, http://www.ccnr.org/hlw_fearo_summary.html.

⁷⁰ See Darrin Durant, “Public Consultation as Performative Contradiction: Limiting Discussion in Canada’s Nuclear Waste Management Debate,” *Nuclear Waste Management in Canada: Critical Issues, Critical Perspectives*, 71-73 and Genevieve Fuji Johnson, *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada* (Toronto: University of Toronto Press, 2008), 21-23.

⁷¹ Peter A. Brown and Carmel Letourneau, “Nuclear Fuel Waste Policy in Canada” in *Canadian Nuclear Energy Policy*, 113 and Steve Thomas, “Nuclear Power and Deregulation in the United Kingdom,” in *Canadian Nuclear Energy Policy*, 52-55.

public and technocratic input. Although the AECL, Ontario Hydro, and others with vested interest in the nuclear industry hoped for brief review of the technical issues of waste disposal, the Seaborn Panel sought input from “virtually every conceivable academic discipline and category of Canadian Stakeholder.”⁷² Among others, private citizens, business owners, social groups, environmental activists, indigenous groups, community chambers of commerce, and religious leaders all provided the Seaborn Panel with commentary regarding nuclear power.

The resurgence of the nuclear waste question benefitted from changing political ideologies at the federal level. Brian Mulroney’s Progressive Conservative government moved away from Trudeau’s platform of government intervention and subsidization, and sought to re-develop the nuclear waste project through means of non-interventionist policy. Although the Mulroney Government still sought a full public inquiry, they believed firmly that free-market competition and de-regulation provided the best opportunity for solidifying a nuclear waste repository in Canada. The Mulroney government also re-examined federal government’s fifty-four Crown Corporations to conclude which industries were best left to private capital.⁷³ Eldorado Nuclear, a company which had been under government control since 1943, was sold off in 1988. Canada was still mining 7,000 tonnes of uranium ore, 5,400 tonnes of which continued to flow to global markets.⁷⁴ The creation of Canadian Mining and Energy Corporation (Cameco) allowed the federal government to absolve itself from a falling market while allowing for free-market competition to operate the industry in ways a Crown Corporation never could.⁷⁵

⁷² Leslie A. Pal and R. Kent Weaver, *The Government Taketh Away: The Politics of Pain in the United States and Canada* (Washington, D.C.: Georgetown University Press, 2003), 217-220.

⁷³ Mark MacGuigan, *An Inside Look at External Affairs During the Trudeau Years: The Memoirs of Mark MacGuigan*, ed. Whitney Lakenbauer (Calgary: University of Calgary, 2002), 69 and Darrin Durant, “Public Consultation as Performative Contradiction,” 71-73;

⁷⁴ Robert Bothwell, Ian Drummond, and John English, *Canada since 1945: Power, Politics, and Provincialism* (Toronto: University of Toronto, 2001), 143.

⁷⁵ *Ibid.*, 466

All decisions made in the industry were in the interest of driving profits instead of the interest of the state. As David J. Bercuson, J.L. Granatstein, and William R. Young argue, nothing signified the Mulroney Government’s departure from Trudeau era policies more than the deregulation of the energy market. Such policies fit with the growing international trends of greater faith in the free market forces and government de-regulation that were synonymous with the politics and economics of the Thatcher-Regan-era.⁷⁶ The Progressive Conservatives pursued policies which attempted to alleviate the country of growing fiscal debt and open Canadian borders to international investors and markets. While the Mulroney Government was more moderate in their approaches to these social and fiscal policies, they also ushered in Canada’s commitment to deregulation, free-trade, and liberal policies.⁷⁷

In 1996, the Seaborn Panel began its arduous task of holding public hearings across Canada on the opinion of deep geological disposal.⁷⁸ From March 1996 to March 1997, the panel conducted meetings in sixteen communities spread over five provinces, with input from 531 registered speakers and 536 written submissions. Moreover, the panel divided public meetings into three phases: Phase 1 examined the greater social and ethical issues related to nuclear waste, Phase 2 discussed the technical aspects of the AECL’s proposed waste repository, and Phase 3 involved meetings with proposed communities to allow the public the ability to comment directly to panel members and AECL representatives. The Seaborn Panel not only provided the

⁷⁶ David J. Bercuson, J.L. Granatstein, and William R. Young, *Sacred Trust? Brian Mulroney and the Conservative Party in Power* (Toronto: Doubleday Canada, 1986), 170.

⁷⁷ See Lynda Erickson and David Laycock, “Party History and Electoral Fortunes, 1961-2003,” in *Reviving Social Democracy: The Near Death and Surprising Rise of the Federal NDP*, ed. David Laycock and Lynda Erickson (Vancouver: UBC Press, 2015), 22, 24; Jonathan Swarts, *Constructing Neoliberalism: Economic Transformation in Anglo-American Democracies* (Toronto: University of Toronto Press, 2013). For an overview the Mulroney Government and free trade, see Desmond Morton, *A Short History of Canada*, Sixth Edition (Toronto: McClelland & Stewart, 2006).

⁷⁸ Brown and Letourneau, “Nuclear Fuel Waste Policy in Canada,” 115-116.

public and community organizations the opportunity to consolidate power and exchange ideas regarding nuclear waste but sought to provide a bottom-up examination of the social, economic, and environmental constraints of nuclear waste in Canada. The Seaborn Panel provided northern communities the first real opportunity to speak directly to the government and industry about the issue of nuclear waste.⁷⁹

The greatest concern made by northern communities was the impacts of nuclear waste on the ecology and environment of Northern Ontario. Environmentally, citizens agreed that more consideration needed to be giving to the possible effects of nuclear waste on ground water, the regional biota, and the general health impacts on humans.⁸⁰ As a citizen from Atikokan irreverently stated to the panel, placing the waste in the centre of Quetico Park could create Canada’s newest hot springs destination.⁸¹ Citizens also expressed concerns towards the impacts on the local food chains. As one citizen explained, “one of the most important reasons that people live [in Northern Ontario] and choose to live here is the value that we give to the natural environment.”⁸² Anything that could affect the natural environment thereby had profound impacts on the social, economic, and cultural facets of Northern Ontario. Nuclear waste had the capacity to not only disrupt the natural environment of Northern Ontario but also disrupt the

⁷⁹ Durant, “Radwaste in Canada,” in *Nuclear Waste Management in a Globalized World*, 29; Fuji Johnson, *Deliberative Democracy for the Future*, 27.

⁸⁰ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Thunder Bay)*, Phase 3, Vol. 37 (Toronto: Farr & Associates, 1997), 85. The Ontario Coalition for Nuclear Responsibility argued that “the level of radiation exposure to the public resulting from the nuclear fuel cycle is known to be causing an increase in the incidence of cancers, of leukemia, and of genetic damage although these increases are frequently not demonstrable.” See Ralph D. Torrie, *Half Life: Nuclear Power and Future Society, a Research Report Prepared Under the Direction of the Ontario Coalition for Nuclear Responsibility* (Ottawa: Infoearth, 1977), 117.

⁸¹ Quetico Park is a 1,180,000-acre Provincial Wilderness Park located just outside of Atikokan, Ontario. Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Atikokan)* Phase 3, Vo. 39 (Toronto: Farr & Associates, 1997), 28.

⁸² Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Atikokan)*, Phase 3, Vol. 39 (Toronto: Farr & Associates, 1997), 22.

social and economic structures of hinterland culture. Communities in the North relied heavily on the natural environment for their sustainability. Any effects on game animals such as fish, deer, or moose, or any effects to the local farming industry, could potentially leave northern communities with food sources unfit for human consumption.⁸³

Not all comments towards the Seaborn Panel discussed the negative aspects of nuclear waste. Developing a waste repository in Northern Ontario had the potentiality to provide a community with economic stability and employment opportunities for many generations of workers. Much had changed in Northern Ontario since the initial attempts to develop a waste repository in the late 1970s. Changing technologies, increased globalization, and the adoption of the North America Free Trade Agreement (NAFTA) and other liberal policies created new economic challenges for the boom and bust towns of Northern Ontario.

By the 1990s, Northern Ontario faced new challenges in maintaining both demographics and economic growth. Mining, pulp and paper, railway, and forestry industries all faced financial downturn, leading mills and mines across Northern Ontario to shut down.⁸⁴ Communities who had the economic stability to say no to the AECL and Ontario Hydro in the 1970s now faced economic challenges and were exploring the potentiality of the new industry. Although citizens in the north understood the vulnerability of communities “that suffer from the problem of the failure of the single employer in a one-industry town,” communities themselves needed to adapt to changing global markets and the greater implementation of liberal economic policies. These

⁸³ See Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts* Phase 3, Vo. 39, 22 and Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Timmins)*, Phase 3, Vol. 40 (Toronto: Farr & Associates, 1997), 210.

⁸⁴ See Beaulieu and Southcott, *North of Superior*, 114-115 and Wightman and Wightman, *The Land Between*, 401-405;

issues transcended the issue of nuclear waste and were connected to the greater challenges of northern development at the end of the twentieth-century.⁸⁵

Concerned citizens also took the opportunity to reiterate how the nuclear waste controversy served to once again display the inequalities found between Northern and Southern Ontario. While Northern Ontario had benefited very little from the process of nuclear energy, the province expected the region to “share in the burden of the waste.”⁸⁶ Communities simply believed it was not fair that “the dirt of Southern Ontario should be swept under the rug of Northern Ontario.”⁸⁷ Citizens questioned why the North was made to feel responsible for the disposal of nuclear waste, when they had little control over its production or regulation. Other citizens noted it was at best ‘presumptuous’ to believe that humans could isolate such an object from the environment.⁸⁸ Even if only one in every 5,000 containers were defective, there was enough waste to fill 20,000 containers. Theoretically, as one citizen explained, “four of those containers will leak and fail, and tragedy is going to be visited upon my future grandchildren.”⁸⁹

One of the greatest fears put forth to the panel was the fear that Northern Ontario would not only serve as Canada’s dumping ground, but the region would become a ‘magnet’ for nuclear waste around the world.⁹⁰ As one citizen explained, there is no doubt that the AECL would develop not only as a national agency, but would attempt to expand into an international agency,

⁸⁵ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Thunder Bay)*, 109-112.

⁸⁶ Ibid.

⁸⁷ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Thunder Bay)*, Phase 3, Vol. 37, 140.

⁸⁸ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Atikokan)*, 139.

⁸⁹ Ibid.

⁹⁰ Ibid., 156-157.

“promoting a supposed final solution for the world’s nuclear waste.”⁹¹ Such fears were propagated after AECL representatives were quoted saying that having a permanent waste disposal site in Canada could “provide the ability in the future to integrate power plant sales with waste management services, giving the Canadian industry a unique advantage in the world export market.”⁹² Such monopolization of the full uranium fuel cycle would allow for Canada to become the dominant figure in the global nuclear industry. Through this process of monopolization, Northern Ontario would develop as a ‘haven’ for the world’s nuclear waste, and would feel the environmental impacts of nuclear energy at every stage of the fuel cycle.⁹³ All the while, the financial powers of Southern Ontario reap the social and economic benefits of their energy Goliath, with virtually none of the environmental costs.

The Seaborn Panel also provided Indigenous communities an opportunity to speak on issues of nuclear waste. The panel provided communities such as Ginoogaming First Nation near Longlac, Sagamok Anishnawbek First Nation, and Serpent River First Nation with meetings, while delegates from other Indigenous communities made trips across Northern Ontario to speak in front of the panel. These meetings not only provided an opportunity for community members, leaders, and Elders to speak on the issue of nuclear waste, but the panel also offered these meetings in Ojibway-Cree. As transcripts show, First Nation’s communities in Northern Ontario opposed nuclear waste as a threat to Indigenous culture and life. Indigenous Elders had long claimed the social and environmental costs of relations with Ontario Hydro and the AECL. The

⁹¹ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Thunder Bay)*, 139.

⁹² “Big Nuclear Agency Discussed Ontario Hydro, Atomic Energy Ponder Possible Fusion” *The Globe and Mail*, February 19, 1996.

⁹³ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Thunder Bay)*, 139; “Canada eyed as world site for N-waste: Proposal to use Canadian Shield called dangerous,” *The Globe and Mail*, October 27, 1994; “Canada as nuclear dustbin,” *The Globe and Mail*, October 28, 1994; and “Nuclear power isn’t too hot to handle,” *The Globe and Mail*, February 20, 1996.

Serpent River First Nation, for example, had been devastated by the nuclear industry in the 1960s and 1970s. Traditional hunting, trapping, and fishing practices diminished greatly with the intrusion of white settlement and industry in the north.⁹⁴ As Peter Moonias of the Mattawa Tribal Council presented to the panel, “it’s not only going to be the animals that are going to be destroyed, it’s going to be our people. Our people are going to die from it, because we don’t have anything to be protected from.” Indigenous communities argued that the issue of nuclear waste was physically and ecologically damaging to people living in the north and that it was a threat to Indigenous culture. Chief Gabriel Echum of the Ginoogaming First Nation furthered these sentiments, stating that “if [Indigenous Peoples] stand together strong, our fourth, fifth, sixth, and seventh generations will honour us for our stand.” The Seaborn Panel’s discussions with Indigenous communities echoed many of the same social, economic, and environmental worries as other non-Indigenous communities and citizen’s groups in Northern Ontario.⁹⁵

In March of 1998, the Seaborn Panel completed its environmental assessment of the AECL’s concept of geological waste management. After ten years of assessment, the panel concluded that:

(1) From a technical perspective, safety of the AECL concept has been on balance adequately demonstrated for a conceptual stage of development, but from a social perspective, it has not; and (2) as it stands, the AECL concept for deep geological disposal has not been demonstrated to have broad public support. The concept in its current form does not have the required level of acceptability for Canada to be adopted as Canada’s approach for managing nuclear fuel wastes.⁹⁶

⁹⁴ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Serpent River)*, Phase 3, Vol. 43 (Toronto: Farr & Associates, 1997), 115-118 and Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Longlac)*, Phase 3, Vol. 38 (Toronto: Farr & Associates, 1997), 30-35. For more on the Serpent River and issues of the nuclear industry, see Dwyer, Lewis, and Rekmans, *This Is My Homeland*.

⁹⁵ Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings (Longlac)*, 42, 89.

⁹⁶ Canadian Environmental Assessment Agency, *Report of the Nuclear Fuel Waste Management and Disposal Concepts Environmental Assessment Agency* (Ottawa: Canadian Environmental Agency, 1998).

It also recommended that the federal government establish the Waste Management Organization at arm’s length from the nuclear industry, funded in its entirety by the nuclear industry, and overseen by the federal government.⁹⁷ In 2002, the federal government passed the Nuclear Fuel Waste Act. The bill’s aim was to require the owners and producers of nuclear waste to assume “full financial responsibility and implement a comprehensive, integrated and economically sound approach for the management of nuclear waste.”⁹⁸ The bill solidified the federal government’s decision to postpone any further testing of geological disposal of nuclear waste until engineers could design a concept that is both environmentally sound and publicly supported. Communities in Northern Ontario were ecstatic with the government’s decision, as many described it as “a victory for common sense.”⁹⁹ Others reiterated that “people in the North on the Shield were saying - we don’t want the South’s garbage- that’s a very strong thing.”¹⁰⁰

At the provincial level, Ontario Hydro was also facing an internal crisis. Poor management of outstanding debts coupled with a government-implemented freeze on hydro rates had only created more issues for the Crown Corporation in the 1990s. Ontario Hydro was, as Chairman Maurice Strong said upon assuming his position, a ‘corporation in crisis’ with a ‘kaleidoscope’ of troubles. By the mid-1990s, growing calls for the privatization of Ontario Hydro had moved into the public discourse. The election of Premier Mike Harris in 1995 solidified the fate of the Crown Corporation, as his Government began the process of breaking up Ontario Hydro’s monopoly. In 1998, the Ontario Government passed the Energy Competition

⁹⁷ “Power companies to pay for nuclear waste agency: Natural Resources to consult Canadians before deciding disposal method,” *The Ottawa Citizen*, December 5, 1998. See also Fuji Johnson, *Deliberative Democracy for the Future*, 29.

⁹⁸ Fuji Johnson, *Deliberative Democracy for the Future*, 30.

⁹⁹ “Nuclear Waste Burial Plan Shelved,” *The Canadian Press*, March 14, 1998.

¹⁰⁰ *Ibid.*

Act, beginning the process towards privatization of the utility and deregulation of the electrical industry.¹⁰¹ The provincial government enacted the Energy Competition Act to change the electrical industry in Ontario in two ways. First, the government broke up Ontario Hydro into three separate companies, Ontario Power Generation (OPG), Hydro One, and the Ontario Hydro Financial Corporation (OHFC). OPG took control of all electrical infrastructure in Ontario (excluding nuclear power), while Hydro One took control the province’s high-voltage grid. The government created the OHFC solely to draw revenues from the utility industry to begin paying Ontario Hydro’s \$20.8 billion debt. The government established two other bodies, the Independent Electricity Market Operator (IEMO) and the Electrical Safety Authority, as regulatory oversight for the fiscal and technical standards of the province’s newly privatized industry.¹⁰² On 1 January 1999, Ontario Hydro officially dissolved, marking the end of a nearly century-old electric monopoly.¹⁰³

The nuclear waste controversy of the late twentieth century was a polarizing debate at the local, provincial, and national levels. The attempts made by the AECL to dispose of nuclear waste in the Canadian Shield not only initiated the conversation regarding the environmental costs of nuclear energy, but it reiterated the greater issues of industrialization, resource economy, and environmental degradation in Northern Ontario. For communities in the North, the nuclear debate only reaffirmed the region’s subordinate role in the greater provincial and federal economies. Although Northern Ontario received very few of the benefits of nuclear power, the

¹⁰¹ Katherine Furlong, *Leaky Governance: Alternative Service Delivery and the Myth of Water Utility Independence* (Vancouver: UBC Press, 2016), 59-60 and Swift and Stewart, *Hydro: The Decline and Fall of Ontario’s Electric Empire*, 128-134.

¹⁰² Furlong, *Leaky Governance*, 60.

¹⁰³ “Strong calls Ontario Hydro ‘a Corporation in Crisis:’ New Chairman Warns MPPs that Provincial Utility has High Debt, Steep Costs, Low Revenues and Oppressive Rates,” *The Globe and Mail*, December 10, 1992. See also Jack Lucas, *Fields of Authority: Special Purpose Governance in Ontario, 1815-2015* (Toronto: University of Toronto Press, 2016), 192-200;

province expected the north to bare nearly all the risks of the full-nuclear cycle. Nuclear waste served to solidify Northern Ontario’s position within the province not only as region for resource extraction but also as a dumping ground for the environmental crises of the metropolis.

More importantly, the issue of nuclear waste exemplified the challenges in mending the metabolic rifts of power generation. Although Ontario Hydro developed its nuclear power systems to mend the metabolic rifts of hydro-electricity, it also created new environmental rifts in the process, as the industry created thousands of tonnes of nuclear waste materials. Nuclear waste simply transferred the environmental degradation of Ontario’s power grid from one technology to another while displacing ecological damage to new areas of the hinterland. The attempts to establish nuclear waste management and disposal program was not only a means of mending the new environmental rifts of nuclear power but served to protect the metabolic rate which Ontario Hydro and the AECL needed to maintain its monopoly.

The economic possibilities proclaimed by Ontario Hydro and the AECL created an internal conflict within the hinterland, as communities attempted to balance social, economic, and environmental strength of the North. Growing trends nationally and internationally towards privatization, free-trade, and globalization further challenged the social and economic value of Northern Ontario, as communities witnessed both booms and busts. In the case of the Canadian nuclear waste controversy, the AECL’s attempts to inhibit public discussion only created further distrust from the public. A lack of transparency, failure to involve public opinion, and the inability of the nuclear industry to offer communities objective information regarding the environmental risks, assessments, and concepts regarding their testing were the ultimate downfall of the program. While the issue of nuclear waste was a setback to the full potential of

nuclear energy in the province of Ontario, the postponement of the nuclear waste disposal program was a victory for communities in Northern Ontario.

Conclusion

The history of Ontario's energy program is as much an experiment in capitalism as it is an experiment in providing electricity to the masses. New hydro-electric-generating technologies coupled with the province's vast waterways and growing power demands made public electricity a challenging and profitable endeavor and served to solidify Ontario's economic position within the country and the greater global free market. When HEPCO/Ontario Hydro completed its hydro-electric program, nuclear technologies allowed the Commission to continue its monopoly over Ontario's electrical utilities. HEPCO/Ontario Hydro's century-long dominance over Ontario's electricity utilities has not only provided historians and economists much to discuss in terms of public versus private ownership, but it also speaks to the challenges of monopoly capitalism and maintaining an enterprise of such magnitude. The abilities of Ontario Hydro, and later the AECL, to develop outside the full control of provincial and federal legislatures further reinforces our understanding of the 'politics of development' and the challenges facing industry-state relations of Ontario.¹

Like other industries in Ontario, power generation reflected the capabilities of public and private capital to develop the province's natural resources. Turn-of-the-century industrialization in the province relied on an intricate relationship between raw material producers in Northern Ontario and manufacturing sectors in the south. Technological development and greater investment in northern exploration and surveying not only re-established the importance of Northern Ontario to provincial economic growth but established the "manufacturing conditions"

¹ Mark Kuhlberg, *In the Power of the Government: The Rise and Fall of Newsprint in Ontario, 1984-1932* (Toronto: University of Toronto Press, 2015), 7-8.

needed to further industry in Ontario.² Hydro-electric power enigmatically rested in two spheres, as power generation was both a condition to industry as much as it was an industry of its own. While HEPCO understood its role as a provider of public utilities, profit motives nevertheless drove the Commission's expansion of electrical systems and its entrance into Northern Ontario.

Although HEPCO was hesitant to expand into Northern Ontario, the Commission's dominance of the region was an imperative requirement of its monopolistic goals. The abundant water resources of the hinterland provided adequate power for manufacturing in Southern Ontario and re-affirmed the needs of the forestry, mining, and pulp and paper industries in the north. When all potential hydro-electric sites in Northern Ontario were in use, uranium became the hinterland's new energy commodity. Northern Ontario's role as the domestic supplier of power generating capabilities served as the harbinger to economic growth in the province and helped solidify the hinterland-metropolis relationship in twentieth-century Ontario.

If the hinterland-metropolis relationship highlights the metabolic rifts of industrial capitalism, then Ontario's power generating capabilities offer an excellent avenue to examine inequalities between Northern and Southern Ontario. Although electricity brought the province of Ontario many social and economic benefits, hydro-electric power and nuclear power created many metabolic rifts for the industry to mend. These social, economic, and environmental rifts affected northern communities the most and sought to further widen the inequality gap between Northern and Southern Ontario. By examining the history of Ontario's electrical utilities through the constructs of the hinterland-metropolis relationship, and more closely, Marxists

² H.V. Nelles, *The Politics of Development: Forests, Mines, and Hydro-Electric Power in Ontario, 1849-1941* (Montreal and Kingston: McGill-Queen's University Press, 1970), 51.

interpretations of the theory of the metabolic rift, the impacts of industrialism and the relationships between humans, nature, and capital become more apparent.

The historical relationship of Northern Ontario to the province's electricity industry has furthered our understanding of Ontario's history in three ways. First, the exploration of HEPSCO/Ontario Hydro and the AECL provides us an excellent example of the rise and fall of economic empires and the challenges of monopoly capitalism. As the Crown Corporation grew, so did the barriers to maintaining economic hegemony of the utilities industry. What developed was a series of economic and political decisions that sought to benefit monopoly interests over those of the public. Second, the development of Ontario's electrical utilities was a continuation of Ontario's historical domination of Northern Ontario. The history of Ontario Hydro, the AECL, and electricity in Ontario is as much a history of hinterland-metropolis relations as it is a history of providing power to the masses. The monopoly held by Ontario Hydro for nearly a century not only affected the social, economic, and environmental stability of the hinterland but challenged the abilities of northern communities to develop independently outside of Southern Ontario's political or economic influence. Finally, the history of Ontario's electricity utilities provides us an excellent example for exploring ideas of the metabolic rift. The social, economic, and environmental rifts faced by Ontario Hydro, the AECL, and provincial and federal legislatures in developing hydro-electric and nuclear-energy projects in Ontario are an example of the challenges discussed by Karl Marx regarding the relationship between humans, nature, and capital. By examining the history of HEPSCO/Ontario Hydro through the context of the metabolic rift, the ecological and economic rifts created by the Commission are better understood simply as the causes and effects of resource development, industrial growth, and monopoly capitalism.

The history of Ontario Hydro most notably provides an example of the social, economic, and environmental impacts of monopoly capitalism. Since its inception, HEPCO's goal has been, first and foremost, to generate more power and more profits.³ HEPCO itself grew dramatically in the early-twentieth century, as new technologies, greater industrialization, and greater demand for power allowed the Commission to grow. Although the corporation faced economic challenges, both in its ability to maintain power demands and to survive through industrial downturn, HEPCO's ability to develop from its populist vision of power at cost to being one of the most advanced companies in North America is a testament to the changing political and economic climate of Ontario in the twentieth century. HEPCO's relationship with municipal and provincial governments, resource-extraction industries, and Indigenous communities exemplifies the dominant nature of Ontario Hydro in its pursuit of exponential growth.⁴ While Hydro's monopoly construction allowed the Crown Corporation to develop into a monolithic public utility, such a makeup also led to its inevitable downfall.

Ontario Hydro had institutionalized the beliefs that consumption rates in Ontario were endless, that nature could provide all the necessary requirements of power generation, and that technology could mend any environmental or economic rifts to the system.⁵ Unfortunately for the Crown Corporation, faltering consumption projections, increasing debt load, and a growing ecological footprint followed Ontario Hydro into the post-1970s. In an era of growing liberalization and deregulation, Ontario Hydro's image as a public monopoly in distress did not fit with the economic policies of open competition, deregulation, and, free-trade policies.⁶ By the

³ Paul McKay, *Electric Empire: The Inside Story of Ontario Hydro* (Toronto: Between the Lines, 1983), 267.

⁴ Ibid.

⁵ Jamie Swift and Keith Stewart, *Hydro: The Decline and Fall of Ontario's Electric Empire* (Toronto: Between the Lines, 2004), 3.

⁶ David J. Bercuson, J.L. Granatstein, and William R. Young, *Sacred Trust? Brian Mulroney and the Conservative Party in Power* (Toronto: Doubleday Canada, 1986), 170.

end of the 1990s, Ontario Hydro's dissolution signified the end of the province's public utilities experiment.

Ontario Hydro's final form was far from the original vision of Adam Beck's Hydro Electric Power Commission. HEPCO originally saw electricity as a commodity of social improvement. The development of new technologies to transmit electricity over vast distances provided the province a means of offering both personal and industrial power needs to the masses. As the economy flourished, the demand for power grew, leading to dramatic shifts in development, operation, and management of HEPCO. By the time of Beck's death in 1925, the Hydro Commission had developed into one of the largest public utilities in the world. The size of the Commission meant they needed dramatic changes to its structure.⁷

Between the 1930s and 1950s, HEPCO set off on a path of greater vertical integration of power infrastructures and greater focus on the technical aspects of engineering and scientific management.⁸ The continued expansion of HEPCO in this period not only solidified the dominance of Ontario's electrical monopoly but allowed the Commission to reach the limits of its hydro-electric capabilities. The closing of Ontario's hydro-electric frontier challenged the continued dominance of HEPCO into the post-war era and forced the Commission to adapt to new technologies. HEPCO's partnership with Atomic Energy of Canada Limited offered the Commission a new technology in nuclear power.⁹ The partnership offered HEPCO a means of

⁷ Neil B Freeman, *The Politics of Power: Ontario Hydro and its Government, 1906-1995* (Toronto: University of Toronto Press, 1996), 181-182.

⁸ Karl Froschauer, *White Gold: Hydroelectric Power in Canada* (Vancouver: UBC Press, 1999), 5 and Robert Daniels, "Introduction," in *Ontario Hydro at the Millennium*, ed. Robert Daniels (Montreal and Kingston: McGill-Queens University Press, 1996), viii-ix.

⁹ Ronald Babin, *The Nuclear Power Game* (Montreal: Black Rose Books, 1985), 70-71 and Wilfred Eggleston, *Canada's Nuclear Story* (Toronto: Clark, Irwin & Co., 1965), 308.

maintaining its dominance over Ontario's power utilities while limiting the powers of competition in the free-market.

Post-war developments and the implementation of nuclear power in Ontario catered to the changing Hydro-Electric Power Commission. No longer was HEPCO attempting to build its electric empire – it was trying to maintain its empire. Increased centralization of power and a transition towards the development of large scale nuclear power centres in the 1960s and 1970s symbolized the changing ideological pillars of the company. The provincial government's restructuring of HEPCO into Ontario Hydro in 1974 reflected the changing political and economic policies of the post-war era.¹⁰

Although Ontario Hydro and the AECL had envisioned a monolithic nuclear grid that encompassed the whole province, both politicians and the public challenged such a proposal. The completion of the Porter Commission brought these concerns into the public forum in 1978. The findings of the Commission concluded that Ontario Hydro's plans were unnecessary, financially motivated, and unaccepted by the public.¹¹ The growing issue of nuclear waste management further complicated the future of the nuclear industry. Initial attempts to find a nuclear waste repository in the late 1970s came to no avail for the nuclear industry. After continued research and study, Ontario Hydro and the AECL sought once again to find a community willing to accept nuclear waste. By 1998, the Seaborn Panel concluded that while they accepted the technical aspects of the proposed project, the project did not have the public support needed to

¹⁰ Neil B. Freeman, *The Politics of Power: Ontario Hydro and Its Government, 1906-1995* (Toronto: University of Toronto Press, 1996), 119-120.

¹¹ Babin, *The Nuclear Power Game*, 71-72.

continue.¹² The issue of nuclear waste served as beginning of the end for the Ontario Hydro Empire.

By the mid-1980s, growing issues were also beginning to challenge the solidity of the Ontario Hydro/AECL monopoly. Growing financial debt, new technological advances, and shifts towards greater liberal economic policies threatened the future of Ontario Hydro. The policies protecting Ontario Hydro's public monopoly were now the antithesis to the growing ideologies of privatization, free-market competition, and deregulation. The intensification of liberal economics coupled with continued economic and technocratic stresses within the Crown Corporation itself. By the end of the 1990s, the provincial government had decided the future of Ontario's electric empire. The Energy Competition Act of 1998 not only broke up Ontario Hydro's monopoly but ushered in a new era in Ontario's social and economic histories.¹³

Beyond furthering our understanding of the development of Ontario Hydro's dominance in the twentieth-century, the history of Ontario's electrical utilities provides a paradigmatic narrative for further exploring Marx's theory of the metabolic rift. Although larger historiographical thought contends that Marx offered very little to understanding the ecological relationships between humans, nature, and capital, growing schools of thought have now come to champion the importance of Marxist ecology. Simply put, in its current form, the capitalist system is a structure of confined chaos. Capitalism appropriates humans and nature for the sole purpose of generating more capital.¹⁴ Once the system confronts a social or ecological rift, its sole options are to find new appropriable land, to create new technologies to mend the rift, or to

¹² Genevieve Fuji Johnson, *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada* (Toronto: University of Toronto Press, 2008), 30.

¹³ Swift and Stewart, *Hydro: The Decline and Fall of Ontario's Electric Empire*, 128-134.

¹⁴ John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift: Capitalism War on the Earth* (New York: Monthly Review Press, 2010), 401-402 and 404.

appropriate the rift itself into a new modes of production.¹⁵ The further application of capital to these large-scale industries not only intensifies the metabolic demands of nature, but continuously reshapes the ‘socio-economic exchanges’ between humans, nature, and capital. This enigmatic structure not only maintains capitalism’s metabolism as the hegemonic rhythm to which humans and nature must adapt but forces the capitalist class to continuously invest in greater technology and resources.¹⁶

The social, economic, and environmental rifts faced by Ontario Hydro and the AECL in developing the power industry in Ontario is a product of the inherent flaws embedded in the capitalist system. The creation of HEPCO was a means of shifting away from the rifts of coal power in the nineteenth-century. The shift towards the new technology of hydro-electric power alleviated Ontario’s reliance on imported energy and reinvigorated the abilities of the provincial economy. Between 1906 and 1956, HEPCO developed a strategic program which involved a complete appropriation of the province’s physical landscapes and waterscapes. These changes were most apparent in Northern Ontario, as the hinterland’s vast waterway provided the “white coal” needed to grow the province’s electrical grid. As industrial demands of power grew in Northern and Southern Ontario, HEPCO continued to invest in new projects and continued to expand both physically and financially. The construction of large hydro-electric projects across the province served as a symbol of capitalism’s dominance of the natural world.

Although the raw power of Ontario’s water systems seemed in endless supply, the closing of the hydro-electric frontier served to remind HEPCO of the limits of the natural world. If

¹⁵ Jason W. Moore, “Silver, Ecology, and the Origins of the Modern World, 1450-1640,” in *Rethinking Environmental History: World-System History and Global Environmental Change*, ed. Alf Hornborg and J.R. McNeill (New York: AltaMira Press, 2007), 130.

¹⁶ John Bellamy Foster, *Marx’s Ecology: Materialism and Nature* (New York: Monthly Review Press, 2000), 236-237.

HEPCO wanted to maintain its metabolism of continuous exponential growth, they needed new technologies. The implementation of nuclear power in the province did alleviate the social and economic rifts of hydro-electric power, but again, new social, economic, and environmental challenges developed out of the industry itself. At the front end of the nuclear fuel cycle, large-scale intensive mining operations created new ecological issues for communities near Elliot Lake. Waste tailings from the operations created a scenario in which the full remediation process will take many generations to complete. At the back-end of the fuel cycle, Ontario Hydro and the AECL faced the challenge of managing its growing nuclear waste issue. The inability of the nuclear industry to find a suitable process for the safe removal of nuclear waste that was both technically sound and publicly supported remained the greatest social, economic, and environmental rift to nuclear power's complete dominance in the twenty-first century.

At its core, the history of HEPCO/Ontario Hydro and the AECL in Ontario offers another example of the province's dominance over the hinterland. Northern Ontario's vast resources not only provided the province's industrial and manufacturing sectors with the materials needed to grow, but served as the foundation of Ontario's economic strength in the twentieth century. Single-industry communities developed throughout Northern Ontario, as growth in forestry, mining, and paper and pulp industries signified the penetration of the metropolis' capital into the hinterland.¹⁷ Whether in terms of its natural landscapes or resources, the economic and political powers of Southern Ontario, who had little to no connection to the north, redistributed the hinterland's natural wealth.¹⁸ Northern communities faced the challenges of free-market competition, as economic and political shifts provincially, nationally, and international

¹⁷ Nelles, *The Politics of Development*, 105.

¹⁸ W. Robert Wightman and Nancy Wightman, *The Land Between: Northwestern Ontario Resource Development, 1800-1990s* (Toronto: University of Toronto Press, 1997), 213-214.

continuously affected the stability of single-industry towns in Northern Ontario. These challenges coupled with changing technologies which reshaped the resource industries in the north.¹⁹

The development of hydro-electric power, and later nuclear power, provided the province with the electricity needed to expand both its northern-resource and southern-manufacturing industries. Moreover, the electrical industry paradoxically intertwined itself with northern development and provincial economic growth. Economic growth could not happen without developing the north, northern development could not occur without adequate power supplies from HEPCO, and HEPCO could not supply power unless it saw the potentiality of increasing its profits. Such an enigma provided new barriers to the province's growth in the twentieth-century.

While the province benefitted from the developments in hydro-electric power, Northern Ontario bore its social and environmental costs. HEPCO's use of the north's landscapes and waterscapes reflected the continuation of Ontario's liberal economic project, as the lakes and rivers in Northern Ontario became a new means of developing the province's hinterland for the benefit of the greater province. The development of large hydro-electric projects in Northern Ontario not only changed the physical landscapes of the north, but reshaped its relationship to nature itself. These social and environmental relations continued to challenge the Northern Ontario with the development of the uranium industry in the 1950s, the growth of the nuclear industry, and the nuclear waste issue of the 1970s and 1990s.

¹⁹ Michel S. Beaulieu and Chris Southcott, *North of Superior: An Illustrated History of Northwestern Ontario* (Toronto: James Lorimer & Company, 2010), 10-11.

Under the vision of Ontario's full nuclear cycle, Northern Ontario's role in both the front and back ends of the cycle served to not only make the hinterland a dumping ground for the nuclear industry but solidified the issue as a cost of modernity and development in the hinterland-metropolis dichotomy. Such issues not only reiterate the historic hinterland-metropolis relationship between Northern and Southern Ontario but offer yet another means of exploring the implications of resource politics and development in Northern Ontario. HEPCO, and later Ontario Hydro and the AECL, were corporations which sought profits over everything else. Although these companies touted modernity and championed social benefits of electric power, new economic possibilities drove the decisions made by these companies in the growth of the province's power. Furthermore, the continued appropriation of Northern Ontario's landscapes and waterscapes were not only essential to the success of HEPCO/Ontario Hydro but solidified the Crown Corporation's position as a publicly-owned monopoly.

The effects capitalism's paradoxical relationship to the hinterland has been one of the greatest challenges to developing Northern Ontario. The investment in Northern Ontario's resource industries not only reshaped the physical landscapes of the hinterland, but it reshaped the social and environmental relations between the hinterland and its population. The financial energies of Southern Ontario fostered the commencement of large-scale industrial projects across Northern Ontario. As development continued, the hinterland became further embedded in the substructure of the capitalist system. Sustainability no longer comes from the relationship of northern communities to the natural world, but rather, through its relationship to capital investments. Economic and political influences from the metropolis, growing environmental degradation, and new technologies further separate humans from the physical world and further

complicated the development of the north. The paradox of the hinterland is that development and progress must come at a cost to the traditions and cultures of those living there.

The impact of Ontario Hydro and the AECL on Northern Ontario effectively provides an example to explore the issue of hinterland development. The growth of Ontario's electrical utilities was dependent on the re-appropriation of the Northern Ontario's landscapes and waterscapes. The development of hydro-electric projects, the nuclear industry, and the development of a nuclear waste management program not only changed the physical landscapes of Northern Ontario, but reshaped how communities interacted with the hinterland. Such issues were most prevalent in the historical relationship between the electrical industry and Indigenous communities. The ecological rifts created by hydro-electric power caused the government to relocate or compensate Indigenous communities in Northern Ontario for flooding damages. Waste tailings from the uranium and nuclear industries also affected communities connected to the Serpent River system.

Although the development of Ontario's electrical grid represented the province's greater pursuit of progress and modernity, such development could only happen by undermining the 'sustainable' ideologies of Indigenous communities.²⁰ The cost of growing Ontario's electrical capabilities compromised the traditional hunting, fishing, and farming lands of these Indigenous communities. The environmental degradation created by Ontario Hydro and the AECL not only challenged the cultural and traditional facets of Indigenous life but also further integrated Indigenous communities into relying on the greater economy for survival.

The challenges faced by Ontario Hydro and the AECL represents the greater challenges faced by industrial capitalism in the twentieth-century. Capitalism, in its endless pursuit to

²⁰ Jean Manore, *Cross-Currents: Hydroelectricity and the Engineering of Northern Ontario* (Waterloo, ON: Wilfrid Laurier University Press, 1999), 170.

multiply and grow, will continue to exhaust both resources and labour until greater rifts challenge its ability to maintain economic hegemony over free markets. The intensive development of industrial capitalism creates social and environmental damage in nearly every stage of the mode of production, yet, only when rifts threaten capital itself will greater shifts take place. For Ontario Hydro, the challenge to maintain its public monopoly demonstrates the greatest issues of the metabolic rift. The physical limitations of the material world, that is, the limits to the abilities of Ontario's hydro-electric capabilities, forced HEPCO to either adopt new technologies or diminish its control over free-market competition. Although HEPCO foresaw the environmental rift of hydro-electricity, the transition to other power sources only occurred when all possible waterscapes that HEPCO could economically develop were in use.

Ontario Hydro and the AECL later adopted such an ideology regarding the management of nuclear waste. Only when the issue of nuclear waste became consequential to the future of the nuclear industry did Ontario Hydro and the AECL begin to examine options for managing used fuel spent from reactors. Although the issue of nuclear waste developed as a social and ecological issue, it nevertheless transcended greater economic discussion. The attempts by Ontario Hydro, the AECL, and provincial and federal governments to establish the nuclear waste industry exemplifies the abilities in which capital can shape environmental rifts into new modes of production. Although critics, including politicians, economists, environmental activist, and indigenous leaders, have historically called for more sustainable approaches to the development Ontario's electrical utilities, Ontario Hydro and the AECL monopoly approach of large-scale, capital-intensive projects maintained a continuation of rifts throughout the system's base and superstructures.

Ontario Hydro's growth in the twentieth century shows that Capitalism builds its continuous growth into the substructure in which inequality and exploitation are not effects of capitalism, but rather components of capitalism. The metabolic rifts created are both a causes and effects of the development of capitalism and are necessary to the survival of the system. Capitalism could in fact develop itself through sustainable means, but such a system would be anti-capitalist. The controlled chaos of capitalism's environmental crises allows the system to re-appropriate crisis into profit. New crises create new industries for capital to fund, develop, and profit from, which creates more accumulative wealth for the capitalist class. It is therefore in the best interest of the capitalist class to continue to degrade both the material energies of workers and nature, and to profit off the crisis after it develops. In other words, Preventative (or Sustainable) Capitalism does not generate as much profit as Crisis (or Monopoly-Industrial) Capitalism, as the latter profits from events that would never occur in the former. Capitalism's ability to take a crisis and appropriate it into a new form of accumulative wealth is the most fundamental component of the metabolic rift, as it allows the rift itself to be both the cause and the effect of capitalism's success.

Unfortunately, capitalism, in its current form, simply cannot regulate its social metabolism to meet the sustainable requirements of the environment's natural metabolism. Through its own paradoxical structure, capitalism operates in a manner which must violate the laws of social and ecological metabolism.²¹ The irony of such a system is that capitalism's solution to the ecological damage created by the expansion of industry is further ecological damage and industrialization. As Foster, Clark, York stress, if we are to solve the issue of ecological damage, we need to treat the root cause – “the social relation of capital itself.”²²

²¹ John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift*, 85

²² *Ibid.*

More than ever, the ecological crises of the last century remind us of the social, economic, and environmental rifts created in the name of capitalist progress. Such visible and cumbersome degradation should not only make us question the capitalist system, but also make us re-evaluate our materialist conceptions of nature. No longer can we look at environmental degradation as isolated incidents that are a cause of development. Society must instead look at environmental degradation as being intrinsically connected to social metabolic order and must confront the greater issues in the relationship between humans, nature, and capital.²³ As theories such as the metabolic rift continue to add our understanding of nature, society, and capital's relationship, greater understandings of Marx's works may force us to re-evaluate our materialist ideologies of the physical world and to re-evaluate what is needed to properly regulate the metabolism of nature, society, and industry.

Such changes may force us to move away from current human-nature structures, and towards rewriting the social contracts between the material and metaphysical worlds. As Slavoj Žižek explains, "we are finite beings embedded in a biosphere that vastly transcends our horizon."²⁴ Society's ecology of fear, that is, the fear of nature's destruction through either internal or external catastrophe, is embedded in our materialist conception of nature, and is an ideology which has cemented the distrust between humans and nature.²⁵ There needs to be a shift in the dynamics of human power which fails currently to see the capacity or consequences of shaping nature to our needs. Such a shift must not only challenge the very idea of capitalism, but also the materialist conceptions of nature which have served as the foundation of the capitalist system.²⁶ Mending the social, economic, and environmental rifts of industrial capitalism means

²³ John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift*, 408-409.

²⁴ Slavoj Žižek, "Nature and its Discontents," *SubStance* #117, 37, no. 3 (2008): 54.

²⁵ *Ibid.*, 54.

²⁶ Naomi Klein, *This Changes Everything Capitalism vs the Climate* (Toronto: Vintage Canada, 2014), 25.

providing some restitution in mending the rifts imposed on society and nature. Such an ideological shift not only involves restructuring society's understanding of the natural world's position within the sub-structure as agents in the capitalist system which always needs consideration, but also involves a restructuring of the modes of production to account for social and economic metabolism which the current system fails to acknowledge.

Bibliography

Archival and Manuscript Collections

ONTARIO

Archives of Ontario

Manuscript Division

F 10: Mitchell F. Hepburn fonds

F 8: Howard Ferguson fonds

City of Thunder Bay Archives (TBA)

Thunder Bay fonds

Series 117: City Clerk's Files, 1970-1997

Series 120: Thunder Bay Mayor's Office Files

Series 148: City of Thunder Bay Council Minutes, 1969 – 2003

Lakehead University Archives

General Series

Douglas Fischer Fonds, (unprocessed)

Thunder Bay Historical Museum Society

B 48/4: Kaministiquia Power Co., Limited

G 4/3/1: City of Port Arthur Records

B1/1: Ontario Hydro

G 3/6: City of Fort William Records.

G 4/3: City of Port Arthur Records

G10/1: Joe Winterburn/Port Arthur Electric Light System collection

Periodicals Cited

Alternatives

Bulletin of the Atomic Scientists

Canadian Electrical News and Steam Engineering Journal

Fort Frances Times

Fort William Daily-Times Journal

Kenora Miner

New Scientist

Northern Miner

Ottawa Citizen

Port Arthur News-Chronicle

Pulp and Paper Magazine

The Economist
The Globe
The Globe and Mail
The Whig Standard
Time
Thunder Bay Chronicle Journal
Toronto World
Winnipeg Tribune

Other Primary Source Material

Government Documents

- Annual Report of the Hydro-Electric Power Commission of Ontario, 1919.* Toronto: King's Printer 1920.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1928.* Toronto: King's Printer 1929.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1930.* Toronto: King's Printer 1931.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1931.* Toronto: King's Printer 1932.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1934.* Toronto: King's Printer 1935.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1938.* Toronto: King's Printer 1939.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1939.* Toronto: King's Printer 1940.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1943.* Toronto: King's Printer 1944.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1954.* Toronto: Queen's Printer 1955.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1955.* Toronto: Queen's Printer 1956.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1956.* Toronto: Queen's Printer 1957.

- Annual Report of the Hydro-Electric Power Commission of Ontario, 1959.* Toronto: Queen's Printer 1959.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1964.* Toronto: Queen's Printer 1964.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1972.* Toronto: Queen's Printer, 1972.
- Annual Report of the Hydro-Electric Power Commission of Ontario, 1973.* Toronto: Queen's Printer, 1974.
- Beck, Adam. *The Public Interest in the Niagara Falls Power Supply.* Toronto: King's Printing, 1905.
- Canada. Dominion Bureau of Statistics. *Census of Canada 1956 - Part I Analytical Report, 1.* Ottawa: Queen's Printer, 1960.
- Canada. Parliament. House of Commons. "An Act Respecting the Long-Term Management of Nuclear Fuel Waste" Bill C-27, 37th Parliament, 1st Session, 2001-2002. Ottawa: Public Works and Government Services Canada - Publishing, 2001. (1st Reading, April 25, 2001). Canadian Parliament. Accessed, May 20, 2017.
http://www.lop.parl.gc.ca/About/Parliament/LegislativeSummaries/bills_ls.asp?Language=E&ls=C27&Mode=1&Parl=37&Ses=1&source=library_prb
- Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings, Phase 1.* Volumes 1-14. Toronto: Farr & Associates, 1996.
- Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings, Phase 2.* Volumes 15-30. Toronto: Farr & Associates, 1997.
- Canadian Environmental Assessment Review Agency, *Nuclear Fuel Waste Management and Disposal Concepts – Public Hearings, Phase 3.* Volumes 31-54. Toronto: Farr & Associates, 1997.
- Committee on Government Productivity of Ontario. *Nuclear power in Ontario.* Toronto, 1973.
- Economic Impact of Nuclear Energy in Canada.* Ottawa: Leonard and Partners Limited, 1978.
- Energy Mines and Resources Canada. *1987 Assessment of Canada's Uranium Supply and Demand,* Report EP79-3. Ottawa, June 1979.
- Energy Mines and Resources Canada. *A Canadian Energy Strategy: Building Autonomy.* Ottawa: Supply and Services Canada, 1976.
- Energy Mines and Resources Canada. *Energy in Canada's Tomorrow.* Ottawa: Supply and Services Canada, 1978.

- , *Nuclear Industry Review Background Papers*. Ottawa: Supply and Services Canada, 1981.
- , *Nuclear Industry Review: Problems and Prospects 1981-2000*. Ottawa: Supply and Services Canada, 1982.
- Graves, Terry. *Nuclear Waste and the North*. Ottawa: The Royal Commission on the Northern Environment, 1980.
- Hare, Kenneth. *The Management of Canada's Nuclear Wastes*, Report EP 77-6. Ottawa: Energy, Mines and Resources Canada, Energy Policy Sector, 1977.
- Hydro-Electric Power Commission of Ontario. *Address by Sir Adam Beck at the Public Ownership Conference*. Toronto, 1923.
- , *Hydro 1947 - A Brief Review of the Activities of the Hydro Electric Power Commission of Ontario during the Year 1947*. Toronto: HEPCO, 1948.
- , *Misleading Assertions that have been made relating to the Power Situation in the Province of Ontario Examined and Corrected*. Toronto: HEPCO, 1933.
- , *Misleading Assertions that have been made relating to the Power Situation in the Province of Ontario Have Not Been Withdrawn*. Toronto: HEPCO, 1933.
- , *Paid for Propaganda: Who Instigates Attacks on Hydro*. Toronto: HEPCO, 1934.
- Natural Resources Canada. *Discussion Paper on the Development of a Federal Policy Framework for the Disposal of Radioactive Wastes in Canada*. Ottawa: Natural Resources Canada, 1995.
- Ontario Hydro Statistical Yearbook, 1977*. Toronto: Queen's Printer, 1977.
- Ontario Hydro Statistical Yearbook, 1985*. Toronto: Queen's Printer, 1985.
- Ontario Hydro. "Long-Range Planning of the Electric Power System." *Ontario Hydro Report* No. 556-SP, February 1974.
- Ontario Legislature XXIII King George V 18th Legislature. *Statutes of the Province of Ontario, 1933*. Toronto: King's Printer, 1933.
- Royal Commission on Electric Power Planning. "Preliminary Meetings of the Royal Commission on Electric Power Planning." Toronto: Queen's Printer, 1975.
- , "Preliminary Meetings of the Royal Commission on Electric Power Planning – Concepts, Conclusions, and Recommendations." Toronto: Queen's Printer, 1980.
- , "Shaping the Future - First Report by The Ontario Royal Commission on Electric Power Planning." Toronto: Queen's Printer, 1976.
- , "The Meetings in the North." Toronto: Queen's Printer, 1978.
- , *Interim Report on Nuclear Power in Ontario: A Race Against Time*, Royal Commission on Electric Power Planning. Toronto: Queen's Printer for Ontario, 1978.

Royal Commission on Environmental Pollution. *Nuclear Power and the Environment*, Sixth Report. London: Her Majesty's Stationery Office, 1976.

Seaborn, Blair. *Nuclear Fuel Waste Management and Disposal Concept: Report of the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel*. Hull, Quebec: The Panel, 1998.

Select Committee on Ontario Hydro Affairs, *Final Report on the Management of Nuclear Fuel Waste*. Toronto: The Legislative Assembly of Ontario, June 1980.

Uffen, Robert J. *The Disposal of Ontario's Nuclear Fuel: A Status Report on Alternative Proposals for the Storage, Reprocessing and Disposal of Used Fuel from CANDU Nuclear Reactors*. Montreal and Kingston: McGill-Queen's University, 1978.

Whitefish River Indian Reserve Band Council. "Brief on Nuclear Power Planning and Development, Submitted to The Royal Commission on Electric Power Planning." Toronto: Queen's Printer, April 1977.

Other Primary Sources

Acres Limited Annual Report 1973. Published for Acres Ltd. Shareholder's Meeting. Toronto: Acres Ltd, 1974.

Acres Limited Annual Report 1974. Published for Acres Ltd. Shareholder's Meeting. Toronto: Acres Ltd, 1975.

Canadian Coalition for Nuclear Responsibility, *Panel Report on High Level Waste Disposal Concept – Summary*. (n.d). Accessed May 27 2016.
[Http://www.ccnr.org/hlw_fearo_summary.html](http://www.ccnr.org/hlw_fearo_summary.html).

-----, *Time to Stop and Think: A Brief to Pierre Elliot Trudeau Prime Minister of Canada*. Canadian Coalition for Nuclear Responsibility, May 27 1977. Accessed, May 28 2016.
[Http://www.ccnr.org/Stop_and_Think.html](http://www.ccnr.org/Stop_and_Think.html).

Canadian Nuclear Association. *Moral and Ethical Issues Relating to Nuclear Energy Generation*. Toronto: Canadian Nuclear Association, 1980.

-----, *Nuclear Power and the Canadian Public*. Toronto: Canadian Nuclear Association, 1978.

Canadian Nuclear Safety Commission. *Management of Uranium Mine Waste Rock and Mill Tailings*. Ottawa: Canadian Nuclear Safety Commission, 2012.

Chiefs of Ontario. *We are the Land: Nuclear Waste Discussion Report by Chiefs in Ontario - Prepared for the Nuclear Waste Management Organization*. Toronto: Chiefs of Ontario, 2009.

Edwards, Gordon. *Nuclear Technology - A Primer*. (n.d). Accessed May 27, 2017.
[Http://www.ccnr.org/nuclear_primer.html](http://www.ccnr.org/nuclear_primer.html).

-----, *Nuclear Wastes: What, Me Worry?* Quebec: Canadian Coalition for Nuclear Responsibility, 1986. Accessed, February 20, 2017. [Http://www.ccnr.org/me_worry.html](http://www.ccnr.org/me_worry.html).

- . The Dangers of Nuclear Power. Canadian Coalition for Nuclear Responsibility, December 7, 1972. Accessed, February 28, 2017. [Http://www.ccnr.org/open_letter.html](http://www.ccnr.org/open_letter.html).
- . *The Plutonium Agenda*. Canadian Coalition for Nuclear Responsibility, 1986. accessed March 20, 2017. http://www.ccnr.org/hlw_history.html#mad.

Secondary Materials Cited

- Abel, Kerry M. *Changing Places: History, Community, and Identity in Northeastern Ontario*. Montreal and Kingston: McGill-Queen's University Press, 2006.
- Armstrong, Christopher and H.V. Nelles. *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930*. Philadelphia: Temple University Press, 1986.
- Atikokan Economic Development Corporation. *Experience Atikokan*. Atikokan: Atikokan Economic Development Corporation, 1999.
- Atomic Energy of Canada Limited. *Canada Enters the Nuclear Age: A Technical History of Atomic Energy of Canada Limited*. Montreal and Kingston: McGill-Queen's University Press, 1997
- Axworthy, Thomas S. and Pierre Elliot Trudeau, eds. *Towards a Just Society*. Markham, ON: Viking, 1990.
- Babin, Ronald. *The Nuclear Power Game*. Quebec: Black Rose Books, 1985.
- Barr, Elinor. "Lumbering in the Pigeon River Watershed." *Papers & Records of the Thunder Bay Historical Museum Society* 4 (1976): 3-9.
- Bartlett, Richard H. "Mineral Rights on Indian Reserves." *Canadian Journal of Native Studies* 3, no. 2 (1983): 245-275.
- Baskerville, Peter A. *Ontario: Image, Identity, and Power*. Don Mills, ON: Oxford University Press, 2002.
- . *Sites of Power: A Concise History of Ontario*. Don Mills: Oxford University Press, 2005.
- Batik, Albert L. *The Engineering Standard: A Most Useful Tool*. Ashland, OH: Book Master/ El Rancho, 1992.
- Beaulieu, Michel S. and Chris Southcott. *North of Superior: An illustrated history of Northwestern Ontario*. Toronto: James Lorimer & Co, 2010.
- Beaulieu, Michel S. *Labour at the Lakehead: Ethnicity, Socialism, and Politics – 1900-1935*. Vancouver: UBC Press, 2011.

- Bellamy, Matthew J. *Profiting the Crown: Canada's Polymer Corporation, 1942-1990*. Montreal and Kingston: McGill-Queen's University Press, 2005.
- Bercuson, David J., J.L. Granatstein, and William R. Young, *Sacred Trust? Brian Mulroney and the Conservative Party in Power*. Toronto: Doubleday Canada, 1986.
- Bertrand, J.P. *Timber Wolves: Greed and Corruption in Northwestern Ontario's Timber Industry*. Thunder Bay, ON: Thunder Bay Historical Museum Society, 1997.
- Biggar, E.H. *Hydro-Electric Development in Ontario: A History of Water-Power Administration Under the Hydro-Electric Power Commission of Ontario*. Toronto, Biggar Press, 1920.
- Black, David Leo. *Northern Lights: A History of Thunder Bay Hydro*. Master's Thesis, Lakehead University, 1994.
- , "Trying Times: Hydro-Electric Power at the Lakehead During the Great Depression." *Papers & Records of the Thunder Bay Historical Museum Society* 22 (1994): 40-58.
- Blatz, Perry K. *Democratic Miners: Work and Labor Relations in the Anthracite Coal Industry, 1875-1925*. Albany, N.Y.: State University of New York Press, 1994.
- Bolton, Reginald P. *An Expensive Experiment: The Hydro-Electric Power Commission of Ontario*. New York The Baker & Taylor Co., 1913.
- Bothwell, Robert and Jean Daudelin, eds. *Canada Among Nations, 2008: 100 Years of Canadian Foreign Policy*. Montreal and Kingston: McGill-Queen's University Press, 2009.
- Bothwell, Robert, Ian Drummond, and John English. *Canada since 1945: Power, Politics and Provincialism*. Toronto: University of Toronto, 1981, 2001.
- Bothwell, Robert. *A Short History of Ontario*. Edmonton: Hurtig, 2006.
- , *Nucleus: The History of Atomic Energy of Canada Limited*. Toronto: University of Toronto Press, 1998.
- Bratt, Duane. *Canada, the Provinces, and the Global Nuclear Revival: Advocacy Coalitions in Action*. Montreal and Kingston: McGill-Queen's University Press, 2012.
- , *The Politics of CANDU Exports*. Toronto: University of Toronto Press, 2006.
- Bray Matt and Ashley Thomson, eds. *Temagami: A Debate on Wilderness*. Toronto: Dundurn Press, 1990.
- Bray, Matt and A. Ernest Epp. *Vast and Magnificent Land: An Illustrative History of Northern Ontario*. Sudbury: Laurentian University, 1984.
- Bray, Matt and Ashley Thomson, eds. *At the End of the Shift: Mines and Single Industry Towns in Northern Ontario*. Toronto: Dundurn Press, 1992.

- Careless, J.M.S, "Limited Identities in Canada." *Canadian Historical Review* 50, no. 1 (March 1969), 1-10.
- , "Metropolis and Region: The Interplay between City and Region in Canadian History before 1914." *Urban History Review* 78, no. 3 (1979): 99-118.
- Carson, Rachel. *Silent Spring*. Boston: Houghton Mifflin, 1962.
- Chandler, Ralph B. *A History of the Port Arthur Public Utilities Commission*. Port Arthur: The Port Arthur Public Utilities Commission, 1967
- Charlesworth, Hector. *The Canadian Scene*. Toronto: the Macmillan Company of Canada, 1927.
- Clark, Brett and John Bellamy Foster, "Marx's Theory of Metabolic Rift: Unequal Exchange and the Guano/Nitrates Trade." *International Journal of Comparative Sociology*, 50:3-4 (2009): 311-334.
- Coates Ken, and William Morrison. *A History of Canada's Provincial Norths*. Toronto: James Lorimer & Company, 1992, 2013.
- Conteh, Charles and Bob Segsworth, eds. *Governance in Northern Ontario: Economic Development and Policy Making*. Toronto: University of Toronto Press, 2013.
- Creighton, Donald. *The Forked Road: Canada 1939-1957*. Toronto: McClelland and Stewart, 1976.
- Crosby, Alfred W. *Children of the Sun: A History of Humanity's Unappeasable Appetite for Energy*. New York: WW Norton & Co, 2007.
- Crutzen, Paul J. "Geology of mankind: The Anthropocene." *Nature* 415, no. 6867 (2002): 23.
- Daniels, Robert, ed. *Ontario Hydro at the Millennium*. Montreal and Kingston: McGill-Queens University Press, 1996.
- Day, J.C. and Frank Quinn. *Water Diversion and Export: Learning from Canadian Experience*. Waterloo: Canadian Association of Geographers Publication Series, 1992.
- Denison, Merrill. *The People's Power*. Toronto: McClelland & Stewart, 1960.
- Dewar, Kenneth C. "Private Electrical utilities and Municipal Ownership in Ontario, 1891-1990." *Urban History Review/Revue d'Histoire Urbaine* 12, no. 1 (June/Juin 1983): 29-38.
- Dixon, Catharine. *The Power and the Promise: The Elliot Lake Story*. Elliot Lake, ON: Gillidix Publications, 1996.
- Doern, Bruce G. and Robert Morrison. *Canada's Nuclear Crossroads: Steps to a Viable Nuclear Energy Industry*. Toronto: C.D. Howe Institute, 2009.

Doern, Bruce G. *Government Intervention in the Canadian Nuclear Industry*. Montreal: Institute for Research on Public Policy, 1980.

------. *The Atomic Energy Control Board*, Law Reform Commission of Canada. Ottawa: Supply and Services Canada, 1977.

Doren, Bruce G, Arslan Dorman, and Robert Morrison, eds. *Canada's Nuclear Energy Policy: Changing Ideas, Institutions, and Interests*. Toronto: University of Toronto Press, 2001.

Drache, Daniel and Meric S. Gertler, eds. *New Era of Global Competition: State Policy and Market Power*. Montreal-Kitchener: McGill-Queen's University Press, 1991.

Drummond, Ian M. "CHR Dialogue: Ontario's Industrial Revolution, 1967-1941." *Canadian Historical Review* 69, no. 3 (1988): 283-314.

------. *Progress Without Planning: The Economic History of Ontario from Confederation to the Second World War*. Toronto: University of Toronto Press, 1987.

Duke, David Freeland, ed. *Canadian Environmental History: Essential Readings*. Toronto: Canadian Scholars' Press, 2006.

Dunlap, Thomas R. *Nature and the English Diaspora: Environment and History in the United States, Canada, Australia, and New Zealand*. Cambridge, UK: Cambridge University Press, 1999.

Durant, Darrin and Genevieve Fuji Johnson, eds. *Nuclear Waste Management in Canada: Critical issues, Critical Perspectives*. Vancouver: UBC Press, 2009.

Eberlein, Burkard and G. Bruce Doern, eds. *Governing the Energy Challenge: Canada and Germany in a Multi-Level Regional and Global Context*. Toronto: University of Toronto Press, 2009.

Eggleston, Wilfred. *Canada's Nuclear Story*. Toronto: Clark, Irwin & Co, 1965.

Eichengreena, Barry and Douglas A. Irwin, "Trade blocs, currency blocs and the reorientation of world trade in the 1930s." *Journal of International Economics* 38, no. 1-2 (February 1995): 1-24.

Epp, Ernest A. "Historiography of Northern Ontario" in *The Historiography of the Provincial Norths*, eds. Coates, Ken and Bill Morrison, Thunder Bay: Lakehead University Centre for Northern Studies, 1996: 82-192.

Evenden, Matthew. *Allied Power: Mobilizing Hydro-Electricity during Canada's Second World War*. Toronto: University of Toronto Press, 2015.

Finch, Ron. *Exporting Danger: A History of the Canadian Nuclear Energy Export Program*. Montreal: Black Rose Books, 1986.

- Fleming, Keith R. *Power at Cost: Ontario Hydro and Rural Electrification, 1911-1958*. Montreal and Kingston: McGill-Queen's University Press, 1992.
- Forkey, Neil S. *Canadians and the Natural Environment to the Twenty-First Century*. Toronto: University of Toronto Press, 2012.
- Foster, John Bellamy, Brett Clark, and Richard York. *The Ecological Rift: Capitalism's War on the Earth*. New York: Monthly Review Press, 2010.
- Foster, John Bellamy. "Marx's Theory of Metabolic Rift: Classical Foundations for Environmental Sociology." *American Journal of Sociology* 105, no. 2 (September 1999): 366-405.
- , *Marx's Ecology Materialism and Nature*. New York: Monthly Review Press, 2000.
- Freeman, Neil B. *The Politics of Power: Ontario Hydro and its Government, 1906-1995*. Toronto: University of Toronto Press, 1996.
- Froschauer, Karl. *White Gold: Hydroelectric Power in Canada*. Vancouver: UBC Press, 1999.
- Fuji Johnson, Genevieve. *Deliberative Democracy for the Future: The Case of Nuclear Waste Management in Canada*. Toronto: University of Toronto Press, 2008.
- Gardner, Morgan. *Linking Activism: Ecology, Social Justice, and Education for Social Change*. New York: Routledge, 2005.
- Garfield, Chad and Pam Garfield, eds. *Consuming Canada: Readings in Environmental History*. Toronto: Copp Clark Limited, 1995.
- Gilbert, Richard J. and Edward P. Kahn, eds. *International Comparisons of Electricity Regulation*. Cambridge: Cambridge University Press, 1996.
- Guha, Ramachandra. *Environmentalism - A Global History*. New York: Longman, 2000.
- Hall, Roger, William Westfall, and Laurel Sefton MacDowell, eds. *Patterns of the Past: Interpreting Ontario's History*. Toronto: Dundurn Press, 1988.
- Hampton, Howard. *Public Power: The Fight of Publicly-Owned Electricity*. Toronto: Insomniac Press, 2003.
- High, Steven. "Planting the Municipal Ownership Idea in Port Arthur, 1875-1914." *Urban History Review* 21, no. 39 (October 1997): 3-17.
- Hodgins, Bruce W. and Jamie Benidickson. *The Temagami Experience: Recreation, Resources, and Aboriginal Rights in the Northern Ontario Wilderness*. Toronto: University of Toronto Press, 1989.

- Hodgins, Bruce W. and Ute Lischke, eds. *Blockades and Resistance: Studies in Actions of Peace and the Temagami Blockades of 1988-89*. Waterloo: Wilfred Laurier University Press, 2012.
- Hull, James. "A Gigantic Engineering Organization: Ontario Hydro and Technical Standards for Canadian Industry, 1917-1958." *Ontario History* 93, no. 2 (Autumn 2001): 179-200.
- . "Research at Abitibi Power and Paper." *Ontario History* 79, no. 2 (June 1987): 163-179
- Humphries, Charles W. *'Hones Enough to Be Bold': The Life and Times of Sir James Pliny Whitney*. Toronto: University of Toronto Press, 1985.
- Ibbitson, John. *Loyal No More: Ontario's Struggle for a Separate Destiny*. Toronto: Harper Collins, 2001.
- Innis, Harold A. *The Fur Trade in Canada: An Introduction to Canadian Economic History*. Toronto: University of Toronto Press, 1930, 2001.
- Irwin, Douglas A. *Peddling Protectionism: Smoot-Hawley and the Great Depression*. Princeton, NJ: University of Princeton Press, 2015.
- Joseph D. Winterburn, "The Woodside Generator, Port Arthur's First Electric Light System." *Papers & Records of the Thunder Bay Historical Museum Society* XII (1979): 6-10.
- Katherine Furlong, *Leaky Governance: Alternative Service Delivery and the Myth of Water Utility Independence*. Vancouver: UBC Press, 2016.
- Klein, Naomi. *This Changes Everything: Capitalism vs the Climate*. Toronto: Vintage Canada, 2014.
- Kuhlberg, Mark. "Eyes Wide Open": E. W. Backus and The Pitfalls of Investing in Ontario's Pulp and Paper Industry, 1902-1932." *Journal of the Canadian Historical Association* 16, no. 1 (2005): 201-233.
- . *In the Power of the Government: The Rise and Fall of Newsprint in Ontario, 1894-1932*. Toronto: University of Toronto Press, 2015.
- Lakenbauer, Whitney, ed. *An Inside Look at External Affairs During the Trudeau Years: The Memoirs of Mark MacGuigan*. Calgary, AB: University of Calgary, 2002.
- Laycock, David and Lynda Erickson, eds. *Reviving Social Democracy: The Near Death and Surprising Rise of the Federal NDP*. Vancouver: UBC Press, 2015.
- LeBourdais, D.M. *Canada and the Atomic Revolution*. Toronto: McClelland & Stewart, 1959.
- Leeming, Mark. "The Creation of Radicalism: Anti-Nuclear Activism in Nova Scotia, c. 1972-1979" *The Canadian Historical Review* 95, no. 2, (June 2014): 217-241.

- Leiss, William, ed. *In the Chamber of Risks: Understanding Risk Controversies*. Montreal: McGill-Queens University Press, 2001.
- Long, John S. *Treaty No. 9: Making the Agreement to Share the Land in Far Northern Ontario in 1905*. Montreal and Kingston: McGill-Queen's University Press, 2010.
- Loo, Tina. *States of Nature: Conserving Canada's Wildlife in the Twentieth Century*. Vancouver: UBC Press, 2011.
- Lucas, Jack. *Fields of Authority: Special Purpose Governance in Ontario, 1815-2015*. Toronto: University of Toronto Press, 2016.
- MacDougall, Robert. *The People's Network: The Political Economy of the Telephone in the Gilded Age*. Philadelphia: University of Pennsylvania Press, 2013.
- MacDowell, Laurel Sefton. *An Environmental History of Canada*. Vancouver: UBC Press, 2012.
- . "Relief Camp Workers in Ontario during the Great Depression of the 1930s." *Canadian Historical Review* 76, no. 2 (1995): 205-228.
- . "The Elliot Lake Uranium Miners' Battle to Gain Occupational Health and Safety Improvements, 1950-1980." *Labour / Le Travail* 69 (Spring 2012): 91-118
- Macfarlane, Daniel and Peter Kitay. "Hydraulic Imperialism: Hydroelectric Development and Treaty 9 in the Abitibi Region." *American Review of Canadian Studies* 46, no. 3 (2016): 380-397.
- MacPhee, Katrin. "Canadian Working-Class Environmentalism, 1965-1985." *Labour/Le Travail* 74 (Fall 2014): 123-149.
- Manore, Jean L. "Treaty #3 and the Interactions of Landscape and Memory in the Rainy River and Lake of the Woods Area." *Journal of Canadian Studies* 50, no. 1 (Winter 2016): 100-128.
- . *Cross-Currents: Hydroelectricity and the Engineering of Northern Ontario*. Waterloo, ON: Wilfrid Laurier University Press, 2009.
- Martin, David H. *Exporting Disaster: The Cost of Selling CANDU Reactors*. Ottawa: Campaign for Nuclear Phaseout, 1996.
- Marx, Karl. *Capital: Volume I*. Moscow: Progress Publishers, 1867, 2015.
- . *Capital: Volume III*. New York: Vintage, 1894, 1976.
- Mauro, Joseph. *Thunder Bay: A History*. Thunder Bay, ON: Lehto Printers Limited, 1981.
- Mawhiney, Anne-Marie and Jane Pitblado, eds. *Boom Town Blues: Elliot Lake: Collapse and Revival in a Single-Industry Communities*. Toronto: Dundurn Press, 1999.

- McKay, Ian. "The Liberal Order Framework: A Prospectus for a Reconnaissance of Canadian History." *Canadian Historical Review* 81 (2000): 617–645.
- McKay, Paul. *Electric Empire: The Inside Story of Ontario Hydro*. Toronto: Between the Lines, 1983.
- McNeil, John Robert. *Something New Under the Sun: An Environmental History of the Twentieth-Century World*. New York: Norton & Company, 2000.
- Mehta, Michael D. *Risky Business: Nuclear Power and Public Protest in Canada*. Lanham, MD: Lexington Books, 2005.
- Moore, Jason W. "Transcending the Metabolic Rift: A Theory of Crises in the Capitalist World-Ecology." *Journal of Peasant Studies* 38, no. 1 (January 2011): 1-46.
- , "Ecology, Capital, and the Nature of Our Times: Accumulation & Crisis in the Capitalist World-Ecology." *Journal of World-Systems Analysis* 17, no. 1 (2011): 108-147.
- Morton, Desmond. *A Short History of Canada*, Sixth Edition. Toronto: McClelland & Stewart, 2006.
- Nelles, H.V. "Public Ownership of Electrical Utilities in Manitoba and Ontario, 1906-1930." *Canadian Historical Review* 57, no. 4 (December 1976): 461-484.
- , *The Politics of Development: Forests, Mines, and Hydro-Electric Power in Ontario, 1849-1941*. Toronto: MacMillan of Canada, 1974.
- Olive, Andrea. *The Canadian Environment in Political Context*. Toronto: University of Toronto Press, 2015.
- Paikin, Steve. *Bill Davis: Nation Builder, and Not So Bland After All*. Toronto: Dundurn Press, 2016.
- Pal, Leslie A. and R. Kent Weaver, eds. *The Government Taketh Away: The Politics of Pain in the United States and Canada*. Washington, D.C.: Georgetown University Press, 2003.
- Peet, S.E. and J.C. Day. "The Long Lake Diversion: An Environmental Evaluation." *Canadian Water Resources Journal* 5, no. 3 (1980): 34-48.
- Plewman, William Rothwell. *Adam Beck and the Ontario Hydro*. Toronto: Ryerson Press, 1947.
- Rasky, Frank. *Industry in the Wilderness: The People, the Buildings, the Machines – Heritage in Northwestern Ontario*. Toronto: Dundurn Press Limited, 1983.
- Rekmans, Lorraine, Keith Lewis and Anabel Dwyer, eds. *This is My Homeland: Stories of the Effects of Nuclear Industries*. Cutler, ON: Serpent River First Nation, 2003.
- Rens, Jean-Guy. *The Invisible Empire: A History of the telecommunications industry in Canada, 1846-1956*. Montreal and Kingston: McGill-Queen's University Press, 2001.

- Reto, Zach. *Nuclear Fuel Waste Management: Biosphere program highlights, 1978-1996*. Pinawa, Manitoba: Environmental Science Branch, Whiteshell Laboratories, 1997.
- Robin, Libby and Will Steffen. "History for the Anthropocene." *History Compass* 5, no. 5 (2007): 197-222.
- Robson, Robert. "Ontario Hydro Colonies: A Study of Frontier Settlements." *Laurentian University Review* 17, no. 2 (1985): 113-139.
- Sandberg L. Anders and Sverker Sôrlén, eds. *Sustainability, The Challenge: People, Power, and the Environment*. Montreal: Black Rose Books, 1998.
- Sandwell, R.W, ed. *Powering Up Canada: The History of Power, Fuel, and Energy from 1600*. Montreal and Kingston: McGill-Queen's University Press, 2016.
- Saywell, John T. 'Just Call me Mitch:.' *The Life of Mitchel F. Hepburn*. Toronto: University of Toronto Press, 1991.
- Schull, Joseph. *Ontario Since 1867*. Toronto: McClelland and Stewart, 1978.
- Scollie, F. Brent. "The Creation of the Port Arthur Street Railway 1890-95." *Thunder Bay Historical Museum Society Papers and Records* 18 (1990): 40-58.
- Sims, Gordon H. E. *The Anti-Nuclear Game*. Ottawa: University of Ottawa Press, 1990.
- Solomon, Lawrence. *Power at What Cost? Why Ontario Hydro is Out of Control and What Needs to be Done About It*. Toronto: Energy Probe, 1984.
- Steffen, Will, Jaques Grinevald, Paul J. Crutzen, and John R. McNeil. "The Anthropocene: Conceptual and Historical Perspectives." *Philosophical Transactions - The Royal Society* 369 (2011): 847-848.
- Steffen, Will, Paul J. Crutzen and John R. McNeill. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature." *A Journal of the Human Environment* 36, no. 8 (2007): 614-621.
- Stelter, Gilbert A. and Alan F.J. Artibise, eds. *Power and Place: Canadian Urban Development in the North American Context*. Vancouver: UBC Press, 1986.
- Stelter, Gilbert. "Community Development in Toronto's Commercial Empire: The Industrial Towns of the Nickel Belt, 1883-1931." *Laurentian University Review* 6 (June 1974): 3-53.
- Stewart, Larry R. "Canada's Role in the International Uranium Cartel." *International Organization*, 35, no. 4 (Autumn 1981), 657-659
- Strandberg, Urban and Mats Andréén, eds. *Nuclear Waste Management in a Globalized World*. London: Routledge, 2011.
- Swarts, Jonathan. *Constructing Neoliberalism: Economic Transformation in Anglo-American Democracies*. Toronto: University of Toronto Press, 2013.

- Sweezy Paul, "Capitalism and the Environment." *Monthly Review* 56, no. 5 (2004): 92.
- Swift, Jamie and Keith Stewart. *Hydro: The Decline and Fall of Ontario's Electrical Empire*. Toronto: Between the Lines, 2004.
- Taber, A.W.H. *Electricity and Fort William: The History and Development of Electricity in the City of Fort William*. Fort William: The Hydro Electric Commission of Fort William, 1967.
- Torrie, Ralph D. *Half Life: Nuclear Power and Future Society, A Research Report Prepared Under the Direction of the Ontario Coalition for Nuclear Responsibility*. Ottawa: Infoearth, 1977.
- Tronrud, Thorold J. and A. Ernest Epp, eds., *Thunder Bay – From Rivalry to Unity*. Thunder Bay, ON: Thunder Bay Historical Museum Society, 1995.
- Tronrud, Thorold J. *Guardians of Progress: Boosters & Boosterism in Thunder Bay, 1870-1914*. Thunder Bay, ON: Thunder Bay Historical Museum Society, 1993.
- Waldram, James B. *As Long as the Rivers Run: Hydroelectric Development and Native Communities in Western Canada*. Winnipeg: University of Manitoba Press, 1988.
- Wallace, C.M. and Ashley Thomson, eds. *Sudbury: Rail Town to Regional Capital*. Toronto: Dundurn Press, 1996.
- Weller, Geoffrey R. "The Environment and Resource Development: The Case of Northern Ontario." Paper prepared for the annual meeting of the Canadian Political Science Association, Saskatoon, Saskatchewan, May 30, 1979. Northern Studies Research Library, Lakehead University.
- White, Randall. *Ontario 1610-1985: A Political and Economic History*. Toronto: Dundurn Press, 1985.
- Wightman, William Robert and Nancy M. Wightman. *The Land Between: Northwestern Ontario Resource Development 1800 to the 1990s*. Toronto: University of Toronto Press, 1997.
- Wood, John, ed. *Days of Reckoning*. Toronto: Breakout Education, Dundurn Press, 2003.
- Zaslow, Morris. "Does Northern Ontario Possess a Regional Identity." *Laurentian University Review* 5, no. 4 (September 1973): 9-20.
- , *The Northward Expansion of Canada, 1914-1967*. Toronto: McClelland and Stewart, 1988.
- Zizek, Slavoj. "Nature and its Discontents," *SubStance* #117 37, no. 3 (2008): 37-72.