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Rachel Carson Center for Environment and Society
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Matthew Evenden

World War as a Factor in Energy Transitions: The Case of Canadian Hydroelectricity

Energy transitions generally occur over long time periods in geographically uneven patterns. Multiple drivers lie in the background and diverse consequences in the foreground. Although the word transition suggests a neat from-to story, it is best modified with adjectives like jagged and episodic to provide proper perspective.

Of the many factors that shaped energy transitions in the twentieth century, the World Wars are rarely considered. Yet the dramatic effects of war mobilization on energy systems and the restructuring of supply lines through new geographies of military action and alliance suggest the importance of war as an external shock or crisis with the power to reshape the political economy of energy systems profoundly. Hydroelectricity in Canada during World War II provides one example of this process.

In the early twentieth century, Canada became one of the most active hydro developers in the world. Well-endowed with swift flowing rivers and uneven topography, with good access to capital markets and technology transfers, the country hosted a boom in dam building and transmission-line construction. Despite slow growth during the 1930s, by 1939 hydroelectricity accounted for 98 percent of all electric power generated. When measured per capita, Canada's generating capacity was second in output only to the United States. Within the country, the vast majority of this hydropower was concentrated in the central provinces of Québec and Ontario, and in a second tier of western development in Manitoba and British Columbia.

Hydroelectricity provided a ready energy resource for Canada at the outbreak of the conflict in 1939, but demand quickly outstripped capacity and led to a six-year development drive. By 1945, hydroelectric generating capacity had expanded over pre-war figures by 40 percent. New dams had been raised, transmission lines built, and diversions completed to meet the increased needs of wartime production. Most of the activity occurred in Québec and Ontario, though new dams were also built in Alberta and British Columbia. War did not initiate a transition to hydroelectricity, but it certainly consolidated it and propelled it further.

States respond to wars in part by redesigning institutions and constitutional arrangements. Although the division of powers in Canadian federalism makes the regulation of hydroelectricity primarily a provincial matter, during the Second World War the federal government assumed authority over the power supply through its Department of Munitions and Supplies. Herbert Symington, a Montreal lawyer with expertise in power matters, was appointed as the power controller with authority to regulate power in the interests of Canada's wartime strategy. Although Symington sought to negotiate with provincial governments and corporate interests, there is no doubt that this novel centralization of authority facilitated a rapid shift towards development in targeted regions linked to war production. Barriers to development were frequently overcome by Symington's intervention, delivered over the phone from his corporate office in Montreal. Wartime control entailed a shift from pre-war provincial regulatory asymmetry to wartime centralization and focused national strategy.

Power control policy developed around several principal considerations. First, available power and plausible sites of expansion were located in the central provinces, as were the majority of industries on military contracts. The focus of power control policy thus had to be Ontario and Québec; other regions were dealt with on a case-by-case basis as problems arose. Second, Ontario faced a looming crisis because of sharply rising electricity demands owing to war production. Third, the importance of the air war, and the shortage of aluminum in the UK and the US, placed political pressure on Canada and the Aluminum Company of Canada (Alcan) to increase output massively, a task that would require diverting electricity from other industrial centers in southern Québec and expanding hydroelectric facilities, particularly within the Saguenay basin. These factors led Symington to prioritize hydro for aluminum in Quebec while seeking to shore up Ontario's power supply by increasing water diversions in the Great Lakes and imposing demand control power conservation policies. Generating capacity soared as a result, but wartime industrial demand absorbed it just as rapidly. Until 1945, conservation policies limited commercial and domestic energy consumption and shut down some high-use manufacturing facilities, particularly pulp and paper mills. By the end of the war, the calls for conservation had worn thin, and consumers and manufacturers looked forward to having cheaply available electricity in the future.

Increasing Canada's hydro-generating capacity was one significant shift in these years, but the changes were also political, institutional, and social. By 1944, the federal state

had begun to unwind its controls, and provinces had reassumed their jurisdictional primacy. The model of wartime control and the capacity of state planning helped to influence the creation of new provincial hydro agencies to intervene and drive development with a view to extending electrification across society. In Québec, the provincial government nationalized the Montreal Light, Heat and Power Company as Hydro-Québec, and in British Columbia the province created a new commission to oversee hydro expansion outside of urban regions. Beyond wartime dam construction, therefore, there was also a reorientation of the role of the state in hydroelectric development across Canada that set the stage for a new phase of post-war expansion.

Although the war drove hydro development in Canada, did it contribute to an energy transition? With such a short time frame in focus, the answer must be qualified. Although the dominance of hydroelectricity in Canada was hugely reinforced and advanced because of wartime development, this applied only to core hydro regions. Outside of central Canada, hydro expansion stalled. If regions were not significant sites of wartime production, they held no strategic priority for hydro development. Projects were therefore delayed and cancelled. But the war did restructure the country's economic geography in significant ways, building, for example, a massive aluminum smelting business that accounted for roughly 90 percent of British and commonwealth wartime supply and that relied on cheap hydroelectricity to operate effectively. In this fashion, the war propelled economic activity that could benefit from and build the foundations for a new hydroelectric regime. This was not, however, a simple or linear transition. As aluminum smelters drove up their demands for hydro, pulp and paper mills purchased coal boilers to offset conservation controls. As electric systems interconnected and built larger and larger regional systems, consumers reverted to wood fuel and sawdust to meet the frequent calls to modify their electricity demands. Behind a general story of growth, expansion, and transition, therefore, lay jagged subplots.

Further Reading

Evenden, Matthew. 2009. "Mobilizing Rivers: Hydroelectricity, the State and the Second World War in Canada." *Annals of the Association of American Geographers* 99 (5): 845–55.

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