

# **FIX THE GRID:** How Canada can Integrate Its Electricity Systems for a Clean, Prosperous Future

While some provinces feast on clean power and export excess to the United States, others face electricity famine. A Canada Clean Power Fund could knit together a national grid to create a competitive advantage in the low-carbon future. [By Brian Topp](#)



## SUMMARY AND RECOMMENDATIONS

Canada is a world leader in clean electricity, with two-thirds of production coming from renewables and roughly 80 percent from emissions-free sources of one type or another. About 11 percent is exported over 34 major intercontinental transmission lines, according to Natural Resources Canada.

The exports originate in British Columbia, Manitoba and Quebec, three of Canada's "have" provinces in the electricity sector, which control some 65,000 megawatts of hydroelectric power. They are pursuing plans to substantially increase their capacity—for example, through B.C. Hydro's recently approved Site C Clean Energy Project. These provinces are pursuing the short-to-medium term financial benefits of selling into the American market.

Unfortunately, this practice diverts power from the domestic market and builds yet more economic dependence on the United States. Current proposals to develop five new international power lines would further reinforce this long-term vulnerability, including HydroQuebec's Northern Pass transmission line project, transmission lines associated with the New England Clean Energy Connect project, and plans to build a transmission

Canada's present and future economic success increasingly depends on access to affordable, clean, reliable electricity delivered at the lowest and most sustainable price.

Dependable access to clean electricity provides a tremendous competitive advantage in a world of carbon reduction (think: the emergence of electric vehicles). However, certain historical patterns and recent developments in how we create and distribute electricity in Canada stand in the way of this country reaching its potential.

Canada's electricity story is one of feast coexisting with famine in which a patchwork of systems improvised over time has created highly disparate outcomes for the provinces. Provinces have each attempted to be self-sufficient, creating "haves" and "have-nots" in electricity generation—the "haves" being able to access affordable, relatively clean electricity such as hydroelectric power, and the "have-nots" requiring costly, polluting projects to meet public need.

There is little inter-provincial trade in electricity to take advantage of each province's relative strengths and weaknesses in production, and no national strategy in this area of provincial jurisdiction. One result has been that the "haves" are pursuing the short-to-medium term financial benefits of selling into the American market, which diverts power from the domestic market and increases Canada's economic dependence on the United States.

Canada's clean energy surpluses should be diverted into the domestic Canadian market. And, to the extent that Canadian federalism permits, a unified national grid—called the Canada Clean Power Fund—should be woven together to pool access. A pan-Canadian approach to electricity distribution provides an opportunity to turn export vulnerability into domestic competitive advantage.



line between Quebec and New York City. Instead of increasing our U.S. dependence, that surplus electricity could be used domestically to attract investment to energy-intensive industries. In Canada, Quebec's feast of inexpensive electricity has attracted the energy-intensive aluminum industry and, more recently, the new 67-kilometre electrical light rail system under construction in Montreal. And there are many similar opportunities arising. In the new economy, the so-called "cloud" requires large quantities of dependable electricity.

As demonstrated by the fraught negotiations leading to the United States Mexico Canada Agreement—and by Canada being deemed a national security threat by the Government of the United States—it is arguably in Canada's long-term best interest to reduce its exposure to our American friends and partners where possible. Canada's "have-not" provinces, meanwhile, seek to fulfill peak loads totaling about 43,000 megawatts combined. They achieve this by turning to costly or polluting solutions for generating electricity.

- Alberta derives 65 percent of its electricity from coal generation, a carbon-intensive dependence it aims to reduce to zero by 2030. The province's consumption peaks at around 12,000 megawatts.
- Saskatchewan derives 50 percent of its electricity from coal and an additional 34 percent from natural gas. Its peak load is around 3,800 megawatts.
- Ontario derives 63 percent of its electricity from nuclear power—much of it from generators near the end of their service life. Peak demand in Ontario in 2017 was slightly less than 22,000 megawatts. [Ontario is pursuing a \\$25 billion](#)

[refurbishment](#) to extend the service life of its existing nuclear fleet by 25 to 30 years, which means the province will need to begin planning and preparing for a permanent solution within a decade.

- Nova Scotia derives 42 percent of its electricity from coal. Peak demand is around 2,200 megawatts.
- New Brunswick derives 40 percent of its electricity from fossil fuels (natural gas, coal and petroleum) and 30 percent from nuclear. Peak demand is around 3,000 megawatts.
- Prince Edward Island imports the bulk of its electricity from New Brunswick.

## WHY THE PROVINCES DON'T POOL

The geography of Canada's low-carbon renewable hydro power is both curious and convenient in that what one province lacks, its neighbours have in abundance. British Columbia has clean electricity that Alberta needs; Manitoba has it and Saskatchewan and Ontario need it; Quebec has it and, again, Ontario and New Brunswick need it; Newfoundland and Labrador has it and the Maritimes need it. With continued advances in the efficiency of electricity transmission, these proximities provide a strong base off which to operate.

In its interventions in the electrical grid to date, the federal government has focused on the poverty of the east-west grid, and the need for much greater transmission capacity between Canadian jurisdictions. These initiatives have been politely received, in part because free federal money is always welcome. But no province is currently contemplating a



# 59.1%

**of Canada's electricity comes from hydro generation, but there is wide disparity among provinces:**

Manitoba	97.0%
Quebec	95.3%
Newfoundland and Labrador	94.3%
Yukon	93.7%
British Columbia	89.4%
Northwest Territories	37.4%
Ontario	22.3%
New Brunswick	21.5%
Saskatchewan	13.3%
Nova Scotia	8.7%
Alberta	2.8%

Source: [Natural Resources Canada](#)

move away from provincial self-sufficiency.

Why? Here are some of the arguments often put forward by government officials and industry experts for maintaining provincial self-sufficiency.

### **Economic development**

Provincial governments want to keep economic stimulus and job creation opportunities in the province. The large construction and capital budgets involved in major power development can be used as counter-cyclical economic development tools, and to generate politically popular job creation. Buy-local and community-benefits policies can also be used to spread the economic benefits of development more widely through the provincial economy. These benefits could all fall to “have” provinces in a poorly designed, nationally pooled system.

### **Capital retention**

Provincial self-sufficiency means that gross billings for electricity remain in the provincial economy and, in provinces with public power systems, net profits go to the provincial treasury. A pooled system with no national role would tilt gross and net revenue to the four “have” provinces—a very large transfer of wealth and economic opportunity.

### **Defending incumbents and invested capital**

All provinces have incumbent power providers, who have placed 20- to 100-year bets on the stability and predictability of the regulatory regime and the competitive environment in each province. A shake-up in Canada's electricity system, in particular the large-scale entry of B.C. Hydro, Manitoba Hydro, Hydro Quebec and a newly powerful New-

## EYES ON EXPORTS

As spelled out in their strategic plans, British Columbia, Manitoba, Quebec, and Newfoundland and Labrador aim to produce a larger net return to their provincial governments by expanding export sales to the United States.

- **B.C. Hydro** is relatively circumspect about export plans, since its generation expansions are controversial in the province and are most easily defended as designed to meet domestic requirements. But the province is tightly integrated into the Pacific Northwest electricity market. It has periodically investigated export opportunities to Alberta, but these have not come to material fruition, despite Alberta's current transition away from coal.
- **Hydro Quebec** is aiming to double its gross revenue by 2030 by expanding export opportunities, and through out-of-province acquisitions.
- **Manitoba Hydro** derives 25 percent of its total electric revenue from export sales and is aiming to expand this.
- **Newfoundland and Labrador**, meanwhile, is in its own category as a "have" province. It is the site of some 7,600 megawatts of power generation—the overwhelming majority (5,400 megawatts) generated at Churchill Falls but controlled by Hydro Quebec. Runaway costs notwithstanding, a development at Muskrat Falls will add 824 megawatts by the end of 2020, this time under Newfoundland and Labrador's control. The surplus electricity produced at Muskrat Falls has been identified as an opportunity to export power. The province consumes less than 1,600 megawatts of electricity domestically a year, and so will proportionately be the largest clean power exporter in Canada when it reclaims control of its resources. Its contract with Hydro Quebec expires in 23 years, which is relatively soon in the timescale of power development.

foundland and Labrador Hydro into other provincial power markets, could potentially result in the downgrading of debt, a flight of equity capital and, potentially, a stranding of capital in the provinces' uncompetitive incumbent power plants. Many generators might not survive the experience, leading to a greater concentration of the industry.

### Lack of trust

Finally, there is the question of trust. As a good deal of public opinion research demonstrates, Canadians generally prefer publicly owned power utilities because they believe that given a choice between the public interest or narrow financial interest, publicly owned utilities will put citizens first. Provincially owned or regulated power utilities, however, owe this duty of public interest only to the citizens in their own jurisdictions. As recent history demonstrates, provinces do not feel a duty of public interest to each other. Here are three examples of that missing confidence getting in the way of inter-provincial cooperation:

- **Churchill Falls:** History shows that Newfoundland Premier Joey Smallwood was most ill-advised to sign the Churchill Falls agreements with Hydro Quebec. These agreements price Newfoundland power for a fraction of its worth and provide Hydro Quebec with an ocean of virtually free electricity it can export to the United States. All legal challenges to these agreements have failed and no attempt at moral suasion, keeping in mind that Newfoundland is one of Canada's poorer provinces, has altered the terms of these agreements. The two lessons of these events are not lost on other provinces: a provincially owned or regulated power utility will attend to the public interest only in its



own jurisdiction; and it is exceptionally hard to correctly predict appropriate prices and rules in a very long-term agreement, in this case a 65-year contract.

- **Saskatchewan and Manitoba:** In the 1990s, Saskatchewan Premier Roy Romanow made the following offer to the Government of Manitoba: He proposed that Manitoba give Saskatchewan its provincially owned telephone utility, in return for which Saskatchewan would give Manitoba its provincial power utility. The result would be that both utilities would serve both provinces. Manitobans would get better and cheaper phone service—Sasktel being a first-class utility—and the people of Saskatchewan would enjoy the benefits of stable, inexpensive and clean hydroelectricity, ridding the province of its dependence on brown coal. In summary, the Government of Manitoba thanked Mr. Romanow for this good idea but said they had a better one, and then they privatized their phone company. In a trade-off between a quick local win and a long-term economic benefit for the country, the local win prevailed, as it often does.
- **British Columbia and Alberta:** Alberta is currently implementing a policy to replace 65 percent of its power generation with clean power. The province has a strategic need to reduce greenhouse gas emissions associated with oil sands production. British Columbia, its western neighbor, has abundant and scaleable hydroelectric resources. But co-operation between these two provinces has been fatally poisoned by 10 years of pipeline disputes between the governments of B.C. and Alberta across the political spectrum, in addition to the self-sufficiency considerations set out above.

## THE SOLUTION: A CANADA CLEAN POWER FUND

For all these reasons—economic development, capital retention, incumbents and trust—it is unlikely, absent the introduction of a strong incentive, that Canada’s provincial governments will collaborate to create a pooled national grid anytime soon. Progress could be made by introducing a new national player that has a public interest mandate and is sensitive to the economic and fiscal pressures at play, and prepared to partner with incumbents to give them an opportunity to evolve into useful components of a more integrated national system. A new national player (not necessarily the federal government) could enter into a more positive relationship with provincial actors than provinces often have with each other.

The Government of Canada should consider authoring the establishment of a publicly owned, national Canada Clean Power Fund with a mandate to partner with willing parties to address the many challenges. The fund should be given a broad mandate to connect Canada’s clean power grid together where it finds willing provincial partners or open, regulated markets in which it can participate. Led by an expert board and team with strong knowledge of, and relationships with, the players in Canada’s electricity system, the purpose of the Canada Clean Power Fund would be to identify and invest in opportunities to connect provincial electricity systems.

Some transactions, such as funding the construction of inter-provincial electricity transmission ties, would likely be straight public infrastructure investments without an intended return of capital. Others—for example, providing risk capital for the con-

struction and commercialization of low-emission power generation—could be designed to look for returns similar to what investors can expect from investments in regulated industries. Some transactions—for example, when the Clean Power Fund acts as a broker between provinces to facilitate power sales—would be political acts, fundamentally. They would be attempts to supply a trusted third party to facilitate the blindingly obvious benefits of inter-provincial electricity sales between provincial players that cannot trust each other with their economic futures because their public and private power generators are accountable to the legislature of only one province.

Well-capitalized and aggressively led, a Canada Clean Power Fund could focus on three contributions with the objective of creating a clean national electricity grid.

## 1 TRANSMISSION

The Canada Clean Power Fund could capitalize and drive the construction of a robust east-west power grid, and then either operate it in the public interest, or spin it off to regulated private operators. Mercantile considerations could not apply in this work. Like the rail system a hundred years ago, geography wants the electricity system to flow north-south. Similar to the creation of Canada itself, the creation of this grid would require an act of political will and vision for long-term economic benefits that only governments can finance. It would be a foundation stone of a modern, digital economy fueled by electricity for the next century or more.

Notably, the Government of Canada is already considering some of these issues from a

regional perspective, focusing on [Atlantic Canada](#) and [western Canada](#).

Transmission investments should be twinned with a careful review of Canada’s national interest in any further expansion of north-south interties (interconnections permitting the passage of current between electric utilities).

## 2 SURPLUS DIVERSION AND DOMESTIC POOLING

The Canada Clean Power Fund could provide “have” provinces with an alternative market to the United States by reselling electricity to “have-not” provinces, with appropriate revenue recycling arrangements to mitigate wealth transfer issues. Again, mercantile considerations would need to be set aside. Under this proposal the federal government would need to make clear it is not seeking new revenue streams; breaking even while developing the national economy would need to suffice. Revenues would be appropriately recycled to the jurisdictions where they were raised, akin to the federal backstop to the carbon levy.

As Canada’s electricity system is woven together, a strong and flexible data-sharing hub will enhance electricity producers’ abilities to meet needs, forecast requirements, plan and manage storage, and appropriately price electricity. Much of this work could be assisted by advanced artificial intelligence (AI) technology. Provinces are currently developing these tools independently. A common, widely adopted platform could be integrated over time to form a national IT and AI backbone for Canada’s electricity system. If a national IT system is not practically or politically viable, at minimum



Without a strong incentive, it is unlikely that Canada's provincial governments will collaborate to create a pooled national grid anytime soon. A well-capitalized and aggressively led **Canada Clean Power Fund** could focus on three contributions with the objective of creating a clean national electricity grid. **Transmission, surplus diversion and domestic pooling, and new clean capacity**

attention should be given to ensuring interoperable IT and AI infrastructure for electricity across Canada.

### 3 NEW CLEAN CAPACITY

In regulated markets open to new entrants, a new Canada Clean Power Fund could partner with incumbents or other players to capitalize renewable and clean generation, where appropriate. For example, several hydroelectric opportunities await capitalization and an electricity buyer in Alberta. The governments of Canada and some provinces, including New Brunswick, have studied the feasibility of zero-emissions small-scale reactors. Of course, all new energy developments come with environmental challenges, including the impacts that hydroelectricity can have on local ecosystems and populations. But these are no different if a development is slated for domestic or foreign consumption.

In all of these initiatives, the Canada Clean Power

Fund would need willing provincial partners, since electricity systems are run and governed provincially. Patience will therefore be required. Progress would be incremental—likely first through one or more regional grids, which could be combined into a national grid (including an advanced and intelligent IT dispatching spine) over time.

Risks would need to be managed, and trust built, perhaps aided by governance structure. What happens, for instance, in periods of energy shortage? Would the “have-not” provinces make themselves vulnerable in a manner that would be politically unacceptable? We already deal today with crisis management situations and, whether energy is being exported to the U.S. or another province, mechanisms exist for assigning this risk. As for fundamental supply issues, these tend to be more theoretical than real. In any case, they would have to be carefully managed through long-term supply agreements back-stopped by the federal government. It is worth noting that to mitigate oil shortage fears, the Canada-U.S. Free Trade Agreement introduced a proportionality clause. It stipulated



that the percentage of supplies exported before a shortage would be required to continue in the aftermath of a shortage.

Moreover, how would new developments be squared with Indigenous rights and reconciliation? Again, these issues are no different if the project's output is slated for domestic or foreign consumption. Perhaps more to the point, the Federal Court of Canada's judgment quashing the approval of the Trans-Mountain pipeline expansion provides a roadmap to what constitutes appropriate consultation in the case of energy and infrastructure projects. Governance and ownership structures and the inclusion of community benefits in development agreements could also form part of an answer. The recent purchase of the port of Churchill and the rail line includes an ownership position for all First Nations in the region.

## CONCLUSION

A pan-Canadian approach to electricity distribution provides an opportunity to turn Canada's export vulnerability into domestic competitive advantage. Our future digital economy looks like it lives on the cloud—but it will also be a physical infrastructure, a construction of computers, switches, mass storage and transmission that will require telecommunications and electricity systems of unprecedented efficiency, resiliency and scale delivered at the most economical price possible. It is hard to imagine that we will be powering our digital future with coal generation. The realities of climate change will drive Canada to the cleanest possible power in the years and decades to come. So we would be wise

to consider now what kind of electricity system we want, and how we can capture the best possible economies from the cleanest possible generation. There is very little evidence that this will happen consistently across Canada by itself.

Some will argue that such a direct intervention into the electricity system would be an over-reach in this era of diminished expectations for government. Would it be more efficient for provinces to simply deal with each other? Considering the results to date, this seems unlikely. Perhaps the Churchill Falls agreement between Quebec and Newfoundland would not have remained in its current form had the federal government been the bridge between these actors. Perhaps Alberta will someday consider clean hydroelectricity from British Columbia, were it on offer from some party other than the Government of B.C.

The federal-provincial issues of establishing a Canada Clean Power Fund would not be small; the blander and more technical a launch, the better. But this proposal at least highlights the serious issues Canada's electricity system faces—issues that go well beyond technical access to east-west interties. They merit a careful strategic review.

Canada might not be wise to continue to increase its economic dependence on the United States—the likely consequence of growing electricity exports to the south instead of east-west. And access to affordable, clean, reliable electricity is central to the country's economic future. Electricity is the string that ties the pearls of Canada's future clean power and digital economy together.

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