

The Global Exchange

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Introduction to the Energy Papers Series

by **Colin Robertson**

These short essays on energy, which also address climate and the environment, were commissioned by the Canadian Global Affairs Institute, with support from Natural Resources Canada, to help stimulate discussion in energy policy development. They complement the Trudeau government's "Generation Energy" cross-country dialogue.

The topics were chosen following discussions with legislators and senior officials at the various levels of government, the private and public sector, and with the advice of the Advisory Council of the Canadian Global Affairs Institute.

The authors write from practical experience, all having either served or done work with governments and/or the private and research sectors. Our instruction to the authors was that the essays be short enough to be digested in a single sitting and that they offer policy advice based on the authors' experience and analysis. The authors also participated in conversations that are all available in podcast form on CGAI's Global Exchange.

The general thread running through these essays is that Canada can and should be a global player in energy and climate development and that our knowledge and experience enable us to play a helpful role in global affairs.

However, our influence and capacity have limits, many of which derive from how we manage and how we are seen to manage both our resources and climate at home. Domestic initiatives depend on social licence. This is something Canadian governments are coming

to terms with, but coming to terms does not mean waiting forever. Consensus is not unanimity.

We have abundant hydro resources and we should be using renewable sources like wind, solar and tidal. However, in a cold climate, we need to maximize all our energy resources, including fossil fuels.

Dennis McConaghy has written a pair of papers. "The Inescapability of Carbon Taxes for Canada" points out that recent decisions — the Trump administration's approval of the Keystone XL pipeline and the Trudeau government's approval of the Kinder Morgan Trans Mountain and Enbridge Line 3 expansion projects — solve the market access crisis for Canadian hydrocarbons.

McConaghy also argues that "carbon pricing, reflecting the market, is the only viable answer" and he makes a series of suggestions as to its implementation, including uniform adoption as a federally imposed national tax with no mandates or cross-subsidies for clean technologies.

In "Can Canada Restore a Functional Regulatory Process for Major Infrastructure Projects?" McConaghy argues that any political intervention should come early and only in respect to specific public interest issues. This will help avoid uncertainty for industry, including "the expenditure of hundreds of millions of dollars to comply with the expected regulatory rigour of a complete application." McConaghy concludes "it remains in the country's long-term interest to, at the very least, find as much efficiency in its regulatory processes as possible. If value

judgments are to be imposed on resource development then that should be as up front as possible, and not waste capital and human resources.”

Mike Cleland, in his “Canada and the Low Carbon Energy Revolution” says that meeting our Paris targets will require a “massive energy transformation” that under current conditions will mean “a huge shift in the role of electricity as a source of end-use energy, from where it stands today — approximately a fifth to a quarter (depending on province) of all end-use energy — to something closer to three-quarters by 2050.”

Cleland says while this may be desirable there will be costs, namely: “the stranding of Canadian resources and established infrastructure, the loss of Canada’s comparative advantage, higher end use energy costs to the economy and the diminution of the fuel diversity which has underpinned the security, reliability and resilience of our energy systems.” Cleland observes that “it will be hard. And for governments it will involve mostly political grief and only rarely, political joy.” We need “an open and realistic public debate on energy ... a debate that confronts our physical, economic, social, institutional and political realities (and) that at the same time addresses our aspirations regarding greenhouse gases.”

How does Canada respond to stranded asset risk whether it be oil or gas? Amy Meyers Jaffe says: “Canadian companies have stepped up the purchases of oilsands assets on the sale block from the international majors but it remains unclear whether reducing project size and deferring projects will be sufficient to allow these companies to keep the oilsands as an expanding production domain.”

She says much will depend on global market oil prices as well as competition from other sources, including natural gas. “If protecting jobs and preventing more companies from exiting Alberta are more of a priority than revenues,” Jaffe writes, “Canadian provinces might need to reconsider how companies are taxed for riskier, higher cost oilsands projects. Diversification of government revenues to other sources of income as Canada shifts

increasingly to non-resource related industries would be a prerequisite for this strategy.” Other policy levers to be considered include “increased public commitment to R & D spending to find technologies and processes to lower the break-even costs of new and existing oilsands production projects and long-run programs to increase market creation for Canadian natural gas.”

With the latest developments on the North American pipeline landscape, is Energy East necessary? Kelly Ogle says yes, because “North American market diversity and access to tidewater are needed so Canada can safely and profitably realize on its enormous resource bounty.”

Ogle looks at four aspects of Energy East: the ever-fluid and dynamic global oil trade and Canada’s place in it; Canada’s asymmetric oil relationship with the U.S.; the safety, economic benefits and relative simplicity of the construction and operation of the Energy East pipeline; and export optionality for this largest of Canadian resources.

To understand the shift in energy security, Petra Dolata says we need to look at both short-term geopolitics and partisan politicism, especially in democracies, and long-term energy development — the gradual shift away from fossil fuels — trajectories. She contends that besides “focusing on the supply side through championing renewables, demand-side measures, including energy efficiency targets, will become more important.” Her recommendations include: broad public discussion and debate on our energy future, and supporting natural gas as a transitional energy resource.

Monica Gattinger writes about “Big Projects, Big Politics, Big Policy”, suggesting we need to strengthen public confidence in our energy decision-making if we are to avoid a “slow-motion train wreck.” Oilsands and pipelines may be today’s points of contention but so will be wind farms, fracking and big hydro projects.

“Renewable or not,” writes Gattinger, “linear or non-linear, energy projects of all kinds and descriptions are running into opposition.”

Failure to resolve Canada's energy challenges costs the country in environmental performance, attracting investment and fostering economic growth and innovation.

With lack of trust and policy gaps, Gattinger says public confidence in energy decision-making is low and declining. As a result, she says "decision-makers need to accept that social and value changes — and changes in the information and communications environment — are here to stay." Regulators, for example, "need to develop more flexibility to engage with local and Indigenous communities and governments on big projects" and "decisions need to be taken in a timely fashion on big policy and on big energy projects."

In "Energy as a Service: Going Beyond Energy Supply", Normand Mousseau argues that Canada would greatly benefit from "focusing its transition largely on the consumption side." Rethinking energy usage, writes Mousseau, forces us to question almost all our habits, structures and processes. It helps all aspects of society to find "more efficient approaches to building, heating, transporting and manufacturing." The electricity sector, for example, needs to finish its transition to low-carbon production and find solutions for heavy transportation. A national vision, says Mousseau, requires a combined, collaborative effort adapted to each sector: building, transportation, urbanism, industry, agriculture, etc.

In "Thoughts on Canada's Carbon Tax Agenda", Kenneth Green writes that "in the new Trumpian environment ... the U.S. is poised to boost its energy economy. Canada is poised to contract its own, through carbon pricing and climate action plans that are inimical to provincial and federal economies, and to people's detriment in terms of higher prices for everything."

Until we generate power and fuel mobility more cheaply than with carbon-intensive methods, and more reliably than current alternatives such as wind and solar power, Green contends we will see little progress on the kind of "massive decarbonization that Trudeau and

other signatories to the Paris agreement pledged to achieve."

To avoid this calamity, Green recommends postponing the implementation of the various climate action plans and carbon taxes, until analysis can be done on their impact on Canadian competitiveness. In the meantime, says Green, Canadian policy-makers need to refocus their attention on making Canada resilient to climate change while ensuring that Canadians can adapt, whether climate change is man-made or natural.

In their paper, "More Hydro Power in Canada: Tapping Our Potential", John Haffner and Jim Burpee argue that hydro power is the most significant power generation source in Canada's electricity system and it needs to be harnessed to advantage.

Haffner and Burpee point out the environmental and economic advantages that would accrue to Canada by doubling our hydro power capacity. To do so, they make four recommendations: add a reliability factor in evaluating costs of future generating options; push for a North American carbon price; include decarbonization contribution as part of project assessments; and strengthen low carbon electricity co-operation across jurisdictions.

Our authors offer differing and sometimes contrasting policy options but they are united in recognition that our resource wealth is our national heritage. The rewards of this heritage should be applied to national purpose and to the national welfare. Development can be done in a sustainable fashion.

We are innovative in the application of technology to reduce the impact of development on our land, water and air. We have been creative in the development of practical rules and regimes to govern use of these resources in a sustainable fashion, and we have also adapted. As Mike Cleland points out, "In the past century we've moved from wood to coal to oil and now multi-fuel sources."



CREATING A BIG BANG: IMPLEMENTING THE PROCUREMENT AMBITION IN STRONG SECURE ENGAGED

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Once again, we are adapting our energy use and energy sources but we need to do so to Canada's advantage. We hope that these papers contribute to the generation of more ideas and better policy options.

A former Canadian diplomat, **COLIN ROBERTSON** is a Senior Advisor to Dentons LLP living in Ottawa, Canada. He is Vice President and Fellow at the Canadian Global Affairs Institute and hosts our regular Global Exchange podcast. He is an Executive Fellow at the University of Calgary's School of Public Policy and a Distinguished Senior Fellow at the Norman Paterson School of International Affairs at Carleton University. Robertson sits on the advisory councils of the Johnson-Shoyama School of Public Policy, Conference of Defence Associations Institute, North American Research Partnership, the Sir Winston Churchill Society of Ottawa. He is an Honorary Captain (Royal Canadian Navy) assigned to the Strategic Communications Directorate. He is a member of the Deputy Minister of International Trade's NAFTA Advisory Council. He writes a regular column on foreign affairs for the Globe and Mail and he is a frequent contributor to other media.

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Cover

Force Ten Design



COVER STORY

Canada and the Low Carbon Energy Revolution

by **MICHAEL CLELAND**

Under the Paris Accord of 2015 Canada has committed to reduce its greenhouse gas (GHG) emissions by 30 per cent from 2005 levels, by 2030. Less formally, we have set out a goal of 80 per cent reduction by 2050. It is important to put this in perspective. The time frame involved here is 13 to 33 years. Over the approximately 25 years since 1990 when Canada made its first GHG reduction pledge, its emissions have grown by 20 per cent, albeit with significant ups and downs and various underlying causes for both.

The 2050 pledge involves a time frame approximating our GHG management history to date but it is an abrupt reversal of direction in emissions performance which

will require both steep reductions in energy intensity and a radical transformation of the fuel mix. In other words, it is a massive energy transformation, arguably a necessary one, but massive nonetheless. Mainstream thinking suggests that this transformation will be dominated by a huge shift in the role of electricity as a source of end-use energy, from where it stands today — approximately a fifth to a quarter (depending on province) of all end-use energy — to something closer to three-quarters by 2050.

“ ...with the great majority of Canadians quite unaware of what they are ostensibly committed to. As long as that remains the case, we really are not committed to anything at all.

Although the above is largely well understood among the people who dominate the energy and climate change conversation in Canada, most choose to brush off the implications. Consequently, the conversation has a surreal quality, with the great majority of Canadians quite unaware of what they are ostensibly committed to. As

long as that remains the case, we really are not committed to anything at all.

Canada and other western countries have experienced several fuel mix transformations over the past century or so. Since 1900 we have moved from an energy economy largely dependent on wood to one dominated by coal, then oil, and more recently to what we could call the multi-fuel economy. This involves all the traditional fuels combined with natural gas and a broad spectrum of power-generation technologies from hydro to nuclear to new renewables.

Big transformations are far from unprecedented, although they typically entail time frames of approximately 50 years, not the 30 years contemplated for the transformation to a low-carbon economy. The trend has been to add to the diversity of our energy sources. These transformations have typically entailed use of resources where Canada had a very significant comparative advantage (oil, natural gas, hydro power, uranium) or where Canada was a technological leader (nuclear). They conferred several big benefits. They gave the Canadian energy-using economy a large advantage with respect to both cost and security. And they typically led to the emergence of important industries — particularly in regional economies — as well as significant export opportunities.

“ ...Canadians are being asked to step up to some serious choices if their aspirations to do the right thing for the global environment are more than political rhetoric.

Energy transformations have been a big economic plus for Canada. Common sense suggests that the low-carbon transformation, even if it is made manageable with realistic time frames and the most efficient possible mix of policy, will be a different proposition. It will quite likely entail net economic costs: the stranding of Canadian resources and established infrastructure, the loss of Canada's comparative advantage, higher

end use energy costs to the economy and the diminution of the fuel diversity which has underpinned the security, reliability and resilience of our energy systems.

It is important to be clear with Canadians that they are being asked to step up to some serious choices if their aspirations to do the right thing for the global environment are more than political rhetoric. Canadians are also going to have to believe that their governments can get this right. The previous energy transformations resulted from a mix of factors: world economic forces, technology largely developed in other countries, the happy coincidence of energy needs with the emergence of means to exploit Canadian resources, and a great deal of private capital and entrepreneurial energy. These market forces cannot be relied upon to shift our energy systems at anywhere near the degree or speed that the Paris accord suggests.

Government had important roles in the previous transformations, especially in exploiting hydro power or developing nuclear technology, as well as less direct but critical roles in establishing sensible tax, regulatory and trade regimes. Government played, on balance, a relatively modest role; in contrast, the low-carbon transformation will unavoidably require a much larger role for government. It will have to establish heavy new regulatory and tax regimes and in many cases directly mobilize capital investment. All this will happen at the same time that the forces of slowing economic growth, aging demographics, aging infrastructure throughout the economy and growing expenditure demands in other areas are creating other priorities.

Meanwhile, public trust in government is in question and apparently declining, a reality underscored by recent research by the University of Ottawa's Positive Energy Program.

One of the inevitable consequences of the low-carbon fuel transformation will be a large growth in new energy infrastructure. Recall that we are talking about our electricity

systems not only being cleaner but potentially delivering a vastly greater share of energy end use than they do now. In some instances the inherent efficiency gains from electricity use (in vehicles, notably) will offset the new demand. But the inherent land intensity of the new energy systems will be much greater than today — from a potentially massive increase in hydroelectric capacity, and because wind and solar have much lower energy density and much greater land requirements compared with fossil fuels.

“ ...meeting a major electrification push in only the buildings and road passenger transport sectors would require power generation to more than triple from today’s level.

There are many ways of looking at the numbers. However, to illustrate the point, according to recent work done by the Canadian Energy Research Institute, meeting a major electrification push in only the buildings (residential, commercial and institutional) and road passenger transport sectors (which alone would leave Canada far short of the requirements to support the pledge for 2050) would require power generation to more than triple from today’s level. In addition to new capacity and probably new transmission to support that generation, we would need to replace or refurbish older power infrastructure whether because of its carbon emissions (either through retirement or adding carbon capture) or simply because of age. This adds up to a very large construction program, all to be undertaken in an era when the old way of making decisions has become as obsolete as Ontario’s coal-fired power plants.

Canadians no longer accept that major capital projects can be undertaken without extensive engagement of affected communities. There is a growing skepticism on the public’s part that government can be trusted to do its job fairly and competently. Much of the private sector appears to get

this; the question is whether governments do, in the sense of something more than rhetoric.

“ ...for governments it will involve mostly political grief and only rarely, political joy.

The new world of energy decision-making will need a lot more than warm words. It will add significantly to the time required to get things done. It will require genuine a priori commitment to changing plans if need be. It will involve substantial hard costs to account for changed plans including various measures to mitigate impacts, to offset negative effects on communities or to ensure that local communities have a genuine financial stake and some measure of ongoing control. It will involve significant rethinking of our decision-making infrastructure and institutions. It will require new human resources, skills and organizational cultures far beyond anything undertaken or envisaged to date.

It will be hard. And for governments it will involve mostly political grief and only rarely, political joy.

None of the foregoing is an argument for governments to walk away from their climate commitments even though Canadian governments – federal and provincial going back to 1990 – have not been able to connect rhetoric with results. This is an argument for getting real.

“ ...We are very unlikely to meet most of the targets that governments have expressed. Governments can’t admit that but all knowledgeable observers know it.

First, a massively interventionist economic policy framework is – fortunately – improbable. The transformation will need to be done in a framework of open trade and investment largely supported by private investment sources. It will need to engage a multitude of private players complemented

by local and indigenous governments and many participants from civil society. It will be enormously complex and will need to rely at its foundation on sound, stable market signals rather than direct government action.

Second, we need to worry less about targets and more about what needs to be done. Such a change of focus would steer us in much more productive policy directions. We are very unlikely to meet most of the targets that governments have expressed, whether for 2030 or 2050. Governments can't admit that but all knowledgeable observers know it. So what? As noted, this has become something of a national specialty and the world has not collapsed around us. The question is not about targets but about what path Canada's medium-sized, open, resource-intensive economy — which contributes very little to the world's emissions — should follow so that we stay aligned with our competitors in the transformation. We will need to protect and ideally improve our competitive economic position and maintain (or perhaps recover) some measure of moral authority and self-respect.

“ If carbon price signals could be delivered through straightforward carbon taxes that can truly be offset by reduced taxation elsewhere, then we would have the most essential part of the foundation needed for real change.

Third, we need to recognize that no one can know what the physical energy economy might look like in 2050. Public policy should strive at all costs to avoid actions that presume that we do. This means whatever policies are chosen must be flexible, and just as important, that we get ready to make lots of mistakes as we grope our way forward. The challenge is to keep the mistakes small and correctable and to learn from them. The new energy economy may be predominantly electrical, or it might not be. The issues here are how best to deliver the energy services we demand, how to manage cost and

system integrity challenges and how to ensure environmental performance. How that will actually get done remains to be seen.

Fourth, the transformation will inevitably involve an immense number and broad diversity of players in active roles, relying on a broad base of well understood, stable rules and price signals. Many actions that involve detailed government interventions will be unavoidable (building codes, equipment standards) but history tells us that the big forces generating truly transformative change are far beyond the reach of governments. Most — including market and technological changes — will come from outside Canada.

“ Far too much has been done in the past few decades to erode the independence of regulators at both federal and provincial levels, making their decisions subservient to political priorities unsupported by objective evidence.

What about price signals? The clearer and the simpler the better, ideally with a future path that investors can see. If carbon price signals could be delivered through straightforward carbon taxes that can truly be offset by reduced taxation elsewhere, then we would have the most essential part of the foundation needed for real change. The issue is efficiency. If we are taking on what may be the toughest public policy challenge in our history, we can't afford to go about it except as efficiently as possible.

We will also need new and redesigned institutional infrastructure and much more, and more effective, use of civil society. Public policy-making mechanisms will need to be more inclusive and able to operate effectively at a regional scale to catch the land-use implications of the transformation. That includes more effective regional

planning and strategic environmental assessment, mechanisms that we have worked with for years but which remain a long way from being adequately developed or deployed. We will need much more extensive, deeper, more broadly accessible and more credible energy information, something that governments persistently ignore. All of this will entail significant investment by government, and investment in government or government-like capabilities with zero direct political payoffs — a reality that political leaders will have to be prepared to admit to taxpayers.

Much of the job of approving projects needs to be left in the hands of diverse, independent energy regulators. Here we have a conundrum. We need better policy and planning mechanisms that operate with clear and direct political accountability. However, they need to be able to operate in better co-ordinated ways with the regulatory system — treating regulators as sources of advice as well as execution capacity. Then, the regulators need to be left to do their jobs. Far too much has been done in the past few decades to erode the independence of regulators at both federal and provincial levels, making their decisions subservient to political priorities unsupported by objective evidence. This needs to be reversed.

Ultimately, an open and realistic public debate on energy is missing, a debate that confronts our physical, economic, social, institutional and political realities at the same time that it addresses our aspirations regarding greenhouse gases. The optimists may be right and Canadians may come out of all of this as winners three or four decades from now, but it is certain that there will be costs and risks. Some people and communities will bear the bulk of the negative consequences. Those realities raise political questions. As long as those questions continue to be glossed over, they will continue to emerge and crystallize around individual energy projects of all sorts, unhinging regulatory processes, adding cost and risk and satisfying no one.

All in all, this adds up to a very big job for the

next 25 years but it is not impossible to make real progress — and the point is real progress, not targets — if we learn the lessons of the past 25.

MICHAEL CLELAND is a private consultant with extensive experience in energy and environment policy. He is Senior Fellow with the University of Ottawa and a member of uOttawa's Positive Energy research team', Chair of the Board of Directors at the Canadian Energy Research Institute and a member of the Board of Directors of QUEST (Quality Urban Energy Systems of Tomorrow). In 2015, Mr. Cleland was named Canadian Energy Person of the Year by the Energy Council of Canada. He is formerly President and CEO of the Canadian Gas Association, Senior Vice President, Government Affairs for the Canadian Electricity Association, Assistant Deputy Minister, Energy Sector at Natural Resources Canada, and Director General of the Energy Policy Branch. From 1987 to January 1990, he was Assistant Director, Resource Policy Division in the Department of Finance. Before joining the federal government, Mr. Cleland was a private consultant who also lectured in business –government relations at Dalhousie University. Prior to that he worked in various capacities with the Nova Scotia Departments of Development and Municipal Affairs. Mr. Cleland was educated at the University of British Columbia (BA in political science 1972) and Queens (MPL urban and regional planning 1974).

Lead image: **Louis Helbig**



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The Inescapability of Carbon Taxes for Canada

by **DENNIS MCCONAGHY**

What had been called Canada's "market access" crisis for its hydrocarbons has been substantially redressed via the Trudeau government's explicit approval of the Kinder Morgan Trans Mountain and Enbridge Line 3 expansion projects, and its public support for a revived Keystone XL project, albeit catalyzed by Donald Trump's election to the U.S. presidency.¹

If built, these pipeline projects would not only provide more efficient access to incremental markets for Canadian oilsands production but also potential for additional capacity for future incremental production.²

Another consequence is that carbon emissions from the oilsands are likely to be sustained at least at current levels, if not likely grow, over the economic life of these projects. All of this would unfold in the context of the developed world still trying to realize absolute carbon emission reductions, as codified in the Paris Climate Accord.³

Incredibly, Canadian governments have consistently committed Canada to carbon emission reduction targets in successive United Nations' processes, without any tangible plan on how such reductions could be physically achieved or at what cost to Canada relative to what its trading partners were prepared to impose on themselves. This has continued from Kyoto to Copenhagen to Paris.

Moreover, the world has yet to demonstrate it is capable of materially reducing its demand for crude oil and natural gas, at least out to the middle of this century, if not longer.⁴

Canada has as much right as any country to exploit its hydrocarbon resources, regardless of the relative carbon intensity of

its oilsands production and attributed carbon emission per unit of production. Yet that relative carbon intensity has been the principal reason for the unique animus which the ENGO community directs at the Canadian oilsands, and which former U.S. president Barack Obama ultimately bought into in his fatuous and cynical rejection of Keystone XL in November 2015.⁵ (Ironically, this was the same month that Alberta Premier Rachel Notley would introduce her carbon tax regime in Alberta).

Unless Canada chooses to eschew any opportunity to grow its oilsands and natural production, or even more extreme, to constrain existing production, Canada is unlikely to meet its Paris commitment, which is essentially a 25 per cent reduction in existing emissions by 2030.⁶

With that reality, how does Canada ever find credibility vis-a-vis other countries in terms of its contribution towards dealing with the global climate change risk? Obviously, carbon pricing is the only viable answer — by reasonably internalizing economically the otherwise unaccounted-for cost of its carbon emissions via a carbon price. However, this is a price essentially set by what Canada's trading partners are imposing on themselves via comparable explicit carbon pricing regimes or implicitly via their other policy instruments. If Canada's oilsands industry can afford that price, then it can continue to produce its hydrocarbons and therefore be deemed to have contributed adequately to dealing with the climate risk. Such a formulation should have been all that Obama could have reasonably asked of Canada given the significance of hydrocarbon production to its economy, and it should have been enough for him to have rationalized a Keystone XL approval. The same is true for Canada's other major trading partners.

Of course, the Harper government was never prepared to accept this logic. Instead, it offered disingenuous emission-reduction targets, regulated reductions in specific economic sectors and issued dubious invocations of technology breakthroughs.

However, it had no intention of truly intervening to achieve targets. The cynicism was apparently not lost on the Obama administration.

Can it now be said that Prime Minister Justin Trudeau “gets” what former prime minister Stephen Harper didn't — that carbon pricing is the only viable carbon policy option for Canada?

Who can reasonably argue that the Notley government's initiative to impose a carbon tax with significant stringency — \$30 a tonne — was not a necessary condition for Trudeau to justify the pipeline approvals of late 2016?⁷ Trudeau's subsequent national carbon-pricing standard was intended largely to have carbon policy in other provinces conform to it. Clearly, carbon pricing is a cornerstone of carbon policy for the Trudeau government.⁸

For those conservative elements in Alberta who ask what their province got for having to endure a carbon tax, the answer should be obvious — regulatory approval of pipelines by liberal governments. Yet many are unwilling to concede the point, including, sadly, the current leaders of the province's two right-wing options. Conservatives across Canada, and certainly in Alberta, should focus on ensuring that appropriate conditions apply to carbon-pricing regimes in the country, rather than deconstructing them. Conservative should not expect that outright climate denialism is somehow a viable policy position.

Specifically, the following should be codified as fundamental conditions of Canadian carbon-pricing policy:

- Carbon pricing is to be implemented uniformly across the country via a consistent and transparent carbon tax on actual emissions that occur. No exceptions. No cap and trade. Ideally, it should be as a federally imposed national tax;
- Moreover, such a carbon tax is the pre-eminent, if not sole, policy instrument to deal with the risk of climate change in

Canada. No mandates or cross-subsidies for clean technologies. No early phase-out of certain fuel types in certain sectors beyond what the incremental price signal from the carbon tax may or may not induce. And certainly, there is no place for arbitrary emission reductions in specific economic sectors. All emissions are priced the same, given that their impact is physically the same;

- The stringency of such a national tax over time will be a function of what Canada's major trading partners are doing in terms of carbon pricing explicitly, or implicitly via other carbon policy instruments;
- The tax will be applied as close as is practically possible to where the emission occurs;
- Adjustments for trade-exposed sectors must be provided;
- Such a tax will be revenue-neutral in terms of overall tax collection to Canadian governments. Off-setting its most regressive impacts is a priority, as is advancing tax reform to reduce those taxes that most negatively affect re-investment and productivity improvements within the country;
- Existing and future Canadian emission reduction targets, such as the INDC from the Paris Climate Accord, are acknowledged to be only aspirational, not binding legal commitments;
- Acknowledge existing contractual commitments that previous governments made to third parties to advance low-carbon technologies. These should persist as a matter of law.

The Trudeau government has yet to embrace such conditions explicitly. This is all the more reason for Canadians to insist that the federal government clarify itself on carbon policy and resolve contradictions and ambiguities. It ratified the Paris accord, but has yet to acknowledge how much it will cost the country to comply with it or what its actual legal constraints on Canada are. Pipeline approvals have been achieved although Paris emission-reduction commitments are at odds with them. There is

no assurance that all Canadians will face the same price. Does the federal government expect that obstruction to specific infrastructure projects that have regulatory approval and related hydrocarbon production in Canada must cease? As long as the carbon tax is being paid on emissions attributed to specific projects and related production, then there is no constraint on them from a carbon perspective. Either a carbon tax implies a right to emit or it does not.

Canadian political leadership's great challenge is whether it can bring such appropriate rationality to carbon policy via carbon pricing, appropriately conditioned. Much remains for them to do.

End Notes

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How does Canada Respond to Stranded Asset Risk?

by **AMY MYERS JAFFE**

At the end of 2014, when Saudi Arabia was assessing its loss of market share worldwide, the tally showed a loss of close to 500,000 barrels a day from the U.S. market, mainly on the back of competition from Canada. At the time, the increase in coking refining capacity in the U.S. Midwest strongly favoured Canadian heavy crude while U.S. crude imports, mainly to the U.S. Gulf Coast, from the Organization of the Petroleum Exporting Countries (OPEC) had been slashed in half since oil's price peak in 2008.

Much ink is being spent writing about how OPEC (read Saudi Arabia) has not been successful in fashioning a price war against U.S. shale producers and Russia. But in the

long-term game of setting the stage for competition to prevent prolific oil reserves from getting stranded, OPEC has achieved a round one victory against the Canadian oilsands. The oilsands are an important target for Saudi Arabia since it cares about long-term market share and continued access to the U.S. market. Saudi Arabia has both commercial and vital geopolitical interests in maintaining its U.S. market share and is taking concrete steps to protect this market, including its recent announcement of possible expansions in its U.S. Motiva refining network.¹

The stakes for Canada are high in terms of jobs and government revenues. Previous forecasts were that Alberta oilsands royalty revenues would be quite considerable at C\$676 billion for the period of 2016-2036 or roughly US\$7.14 to US\$13.50 per barrel of oil produced, should oil prices average \$50 a barrel.² Current oilsands production remains high at 2.2 million barrels a day. Oilsands operations employ roughly 130,000 people, according to Alberta government statistics.

In a sign that the Saudi strategy is, in fact, succeeding where Canada's oilsands are

concerned, Marathon Oil, Statoil, Total and, to a large extent, Shell and ConocoPhillips have announced their exit from Canada's oilsands resources.³ Under pressure from the U.S. Securities and Exchange Commission, ExxonMobil has written down its massive and costly Kearl oilsands project. Considering that the Canadian oilsands represent a major heavy crude competitor to Saudi Aramco which owns refining capacity in the United States, it is reasonable to question whether Saudi Arabia, which, like Canada, holds between 50 and 70 years' worth of low-cost oil reserves, has targeted the Canadian oilsands for stranding.

Canadian companies have stepped up the purchases of oilsands assets on the sale block from the international majors but it remains unclear whether reducing project size and deferring projects will be sufficient to allow these companies to keep the oilsands as an expanding production domain. Steam-assisted gravity drainage (SAGD) project phasing to allow for continuous improvement in operational efficiency, well design and well pad construction are hoped to be effective in reducing costs and requiring less land reclamation when production ends. The Canadian Association of Petroleum Producers (CAPP) has lowered its 2030 outlook for oilsands production several times in recent years.

Lowering costs of production⁴ is of critical importance in today's volatile oil market. At a recent U.S. oil gathering in Houston, top executives from the world's largest firms such as ENI and Statoil noted that they lowered hurdle rates for new upstream projects to \$30 a barrel.⁵ By contrast, the Canadian Energy Research Institute (CERI) reports that the West Texas Intermediate equivalent costs for a greenfield SAGD project have fallen 25 per cent to US\$60.52 a barrel based on lower operating costs.⁶ Stand-alone mines are higher at US\$75.73 a barrel. Thus, getting down the costs of next generation oilsands projects is existential.

Moreover, the cost challenges for the oilsands bleed into the health of Canada's

natural gas industry as well. In a recent Citibank research brief, entitled "A Revival of Oil Sands, New Pipeline Deals and Competitive Costs to Give Canadian Gas a Lift", Citi nonetheless noted that "Canadian gas remains in a constant battle for market share, as abundant shale resources throughout North America have created gas-on-gas competition." For now, the opening of TransCanada's Mainline's open season helped create markets for Canadian gas. However, longer term access to U.S. markets, especially California, is questionable, given rising supply from the Permian Basin, the Niobrara play and increased competition from utility-scale renewable projects paired with battery storage. The U.S. East Coast is increasingly supplied by regional pipelines such as Algonquin/TETCO from the Marcellus and Utica plays, while Massachusetts and New York state are also seeking to increase the proportion of renewable energy in their electricity mix. If, on top of competition for the U.S. electric power market, Canadian gas producers find their gas is not needed in Alberta for oilsands operations, the longer-term outlook for Canada gas reserves could be similarly dim.

The Canadian government has few levers to pull to assist its oil and gas industry so it must decide fundamentally what its priorities are. The oil majors' withdrawals from resources should be taken as a wake-up call that these companies do not anticipate current technology will lower costs sufficiently in the future.

In the short run, if protecting jobs and preventing more companies from exiting Alberta are more of a priority than revenues, Canadian provinces might need to reconsider how companies are taxed for riskier, higher cost oilsands projects. Diversification of government revenues to other sources of income as Canada shifts increasingly to non-resource related industries would be a prerequisite for this strategy.

In past times of oil price volatility, governments have adjusted their royalty

payments systems to be more responsive to changes in nominal oil price levels. The current oilsands regime includes a sliding scale that automatically calculates a reduced tax burden during times of low prices and restores higher royalty rates when oil prices are rising for both pre-payout and post-payout net royalties. While the pre-payout tax is very low when the oil price benchmark is below \$55 (Canadian dollars for West Texas Intermediate crude oil), the withdrawal of major companies from Canadian assets indicates that additional incentives are needed. A longer tax holiday and even infrastructure investment subsidies might be needed to stimulate renewed investment in anything other than incremental extensions to existing operations, given the ongoing risks of uncertainty about long-term oil prices. Costs for greenfield projects remain well above those for competing resources around the world, including reserves inside OPEC and in the U.S. shale plays.

Adjusting royalty rates and taxes during times of low oil prices was an effective strategy used by the U.K. government to protect North Sea investment during the oil price war of the 1980s.⁷ More recently, Russia has moved to protect the competitiveness of its costly Yamal Liquefied Natural Gas (LNG) project by offering developers, led by Russian firm Novatek, a 12-year tax holiday from the mineral extraction tax and allowing the LNG project to be free from export taxes. The Russian government has also subsidized the construction of port facilities to be used by the project as part of an infrastructure development plan for the Russian Arctic.⁸

If the politics of adjusting royalty systems are challenging, the Canadian government should consider expanding other kinds of forward-looking programs that signal a commitment to the Canadian oil and gas industry's long-term future, such as an even larger expanded program for oilsands research and development. Long-run programs for market creation for Canadian natural gas could also be helpful, such as federal incentives to move

natural gas into trucking or to sell Canadian LNG fuel into the U.S. trucking market.

Abundant, inexpensive fossil natural gas is leading to increases in the natural gas vehicles market in the U.S. with several states such as Oklahoma and Utah offering incentives.⁹ Major corporations are already investing billions of dollars to build infrastructure to feed natural gas into the U.S. trucking industry and expand its use in fleets. United Parcel Service (UPS) has been ordering more gas-powered tractors in recent years and Cisco, H-E-B, Pepsi, Verizon, Ryder, AT&T, Waste Management and Walmart are also trying out natural gas trucks. In the state of California, natural gas fuelling infrastructure is expanding, especially in and around the ports of Los Angeles and Long Beach. China is also focused on expanding the use of natural gas in its on-road freight sector with a growing market for LNG fuel for trucks.

Blending natural gas fuel with renewable natural gas (RNG) from biomass can potentially help improve the climate performance of such a market.¹⁰ Given the slightly lower carbon intensity of fossil natural gas, switching from conventional fuels like gasoline and diesel into fossil natural gas achieves a small reduction in emissions. RNG has substantially lower carbon intensity and adding it to natural gas fuel can achieve substantial reductions in overall climate performance in transportation.

Conclusion

Canada is one of the world's most important oil producers but it is facing a high degree of stranded asset risk. In particular, the Canadian oilsands represent a specific target of market share competition with global oil powerhouse Saudi Arabia and thus face cost pressures from current oil price levels. The cost challenge of new oilsands projects, combined with the possibility that Saudi Arabia and other major producers will continue to target high-cost producers like the oilsands for stranding, has prompted several major international oil companies to sell their oilsands assets to local Canadian

firms. Lowering the cost of production will be vital to the local Canadian firms who have purchased the reserves and increased their exposure to stranded asset risk.

The oilsands industry employs 130,000 people and is an important contributor to the Canadian economy. Provincial governments will have to consider the appropriate response to the possibility that global oil prices will not return to the levels needed to ensure a steady flow of capital to exploit the remaining oilsands reserves. In light of recent developments, Canadian provinces might need to reconsider how companies are taxed for riskier, higher cost oilsands projects. Other producers, notably Russia, are offering tax holidays and government subsidies to infrastructure development for oil companies to encourage development of Arctic resources. Precedents exist for tax regimes that vary widely with the price of oil but it would require diversification of provincial government revenues to other sources of income and a concerted effort for Canada to shift increasingly to non-resource related industries.

Other policy levers that could be considered to lower the chances of stranding are increased public commitment to R & D spending to find technologies and processes to lower the break-even costs of new oilsands production projects and long-run programs to increase market creation for Canadian natural gas. Since strategic capital programs in oil and gas are set many years in advance, a timely response to long-term competition from other oil producers is of critical importance to meet the challenges that are already emerging in the global oil world. The longer it takes for Canada to forge a strategic response, the greater the risk of stranding will be added for oilsands reserves. Producers who get projects off the ground sooner will maintain a first mover advantage that may discourage investment in remaining reserves if demand for oil fails to exhibit sufficient growth to accommodate all players in the coming decades.

End Notes

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Understanding the Shift in Energy Security

by **PETRA DOLATA**

Global shifts in government policies and in public opinion with regards to energy transitions and energy security will affect the demand for fossil fuels produced in Canada and elsewhere. In order to understand and respond to these changes, it will be crucial to differentiate between short-term and long-term trajectories.

Long-Term Trajectories

For over a decade now, energy security has been recalibrated to increasingly include sustainability and efficiency objectives. Both the International Energy Agency (IEA) and the European Union (EU) insist that energy security not only means “the uninterrupted availability of energy sources at an affordable price” (IEA) but also “clean and sustainable energy” (EU). Government

policies such as the German *Energiewende* or the EU 20-20-20 targets have introduced a gradual shift away from fossil fuels. A similar development can be expected in China, which has already introduced laws that address air pollution and climate change. Even OPEC producers are planning for a low-carbon future for their own energy consumption, intending to use their sovereign wealth funds to finance these shifts. While most of these policies stipulate an increase in renewable energies, they also leave room for natural gas as a bridge or transitional energy resource, especially for heating purposes. Power plants will be refitted to phase out CO₂-intensive coal.

Nuclear power, while undergoing a revival in some countries and being introduced in the oil-producing countries in the Gulf region, could potentially play a larger role in the long-term future, especially if CO₂ reduction goals cannot be met as envisioned. However, the current lack of investment in new nuclear power plants, public opposition and long lead times make it difficult for nuclear power to make such inroads in the future energy mix. Renewables will also need new infrastructure, but the more

decentralized character of some of these sources will make construction more flexible and achievable in the mid-term.

As renewables increase their share in the energy mix, energy grids and systems will become more decentralized and will allow for small-scale local solutions. While peripheral areas such as Canada's northern and Arctic regions will welcome this because the access to energy may help overcome current energy insecurities (energy poverty), it will also mean that business, and especially large-scale energy corporations, will lose consumer markets in the core segment of their commercial activities. Investments will be redirected to industries and activities that provide renewables technology as well as energy infrastructure. With the exception of transport, where oil will continue to play a crucial role, fossil fuels will become less of an internationally tradeable commodity and possibly lose some strategic significance. As economic actors compete more fiercely for diminishing markets, (global) public opinion might be able to play a more deciding role. As we have seen with the discussions on offshore Arctic drilling, some of the big multinationals such as Total have already decided to accommodate public resistance to drilling in the Arctic. In general, broader public discussions on energy justice and energy poverty will further redefine the meaning of energy security. They will address questions of equal access to energy as well as increased community involvement in energy matters. Here is where local and global activism potentially impacts business activities. Discussions such as those focusing on free, prior and informed consent may attract increasing attention in such a scenario.

Besides focusing on the supply side through championing renewables, demand-side measures, including energy efficiency targets, will become more important. These have the potential to considerably lower energy demand, but they are not easy to accomplish, as they would add to job losses in established coal, oil and gas industries. However, they will also provide new opportunities for technological innovation

and entrepreneurship. At the same time, they may create new global inequalities as they depend on existing strengths in STEM education and research as well as favourable investment climates for small and medium-sized enterprises.

Long-term prognoses such as the above are difficult to substantiate and there may be legitimate skepticism about the expected shift toward renewables and a low-carbon future. However, the fact that discussions on sustainability and efficiency have continued and even picked up while oil prices were low — and thus did not necessitate the search for alternatives — shows the longer term and possibly irreversible trend toward an increasingly decarbonizing world.

Short-Term Trajectories

In the short term, partisan politics affect energy policies, particularly in democracies, and so do geopolitical crises. Currently, the two most influential developments are the rollback of climate change-related energy measures in the U.S. in the name of job creation and European discussions of energy independence from Russia. Since the mid-2000s, new NATO and EU members in Central and Eastern Europe have pushed for the inclusion of European energy security because their high dependency on Russian energy supplies made them more sensitive to their energy vulnerabilities and more willing to define them as a matter of national security. While they were muted towards the end of the decade, these traditional energy security concerns were revived as a result of events in Ukraine since 2014. This caused the EU to pass an energy security plan which proposes a number of strategies, one of which is to diversify supplier countries and routes. As long as these supply dependencies and vulnerabilities to disruption persist in the region, diversification strategies will prompt European countries to look for alternative suppliers. This is where natural gas from Canada shipped through LNG facilities in the East could become attractive for European markets.

The direction of energy policy under the new Trump administration is more important for Canada in the immediate future. The official America First Energy Plan prioritizes creating coal jobs, ensuring prosperity for American workers and guaranteeing U.S. energy independence. President Donald Trump's March 28 executive order confirms this by repealing many of former president Barack Obama's energy policies that address climate change and pledges to "review existing regulations that potentially burden the development or use of domestically produced energy resources and appropriately suspend, revise, or rescind those that unduly burden the development of domestic energy resources beyond the degree necessary to protect the public interest or otherwise comply with the law." Experts agree that the U.S. coal industry cannot create many more jobs, since increasing mechanization has taken most of these. Nor can it compete internationally against foreign coal (lower priced Columbian coal) or nationally against domestic energy sources (natural gas through fracking). Despite these challenges, Trump will pursue this kind of energy policy, as energy security is now defined as meaning job security and translated into a push for domestic energy production at any price. The emphasis on U.S. domestic production will result in a strengthening of small, medium-sized and independent producers who traditionally are more active with respect to upstream activities within the U.S. and production from unconventional sources. There will be new discoveries in offshore regions including the Arctic; however, these will be increasingly developed by mid-size independent producers and/or relative newcomers to these oil and gas plays.

To summarize: In the short term, energy security will continue to mean ensuring energy independence and a secure supply of oil and gas. In addition to this traditional understanding of the concept, the U.S. will increasingly define it as ensuring job security. In the long run, however, energy security will include sustainability and efficiency targets as well as address issues of energy justice and energy poverty.

Recommendations

- Support natural gas as a transitional energy resource. This includes facilitating infrastructure (pipelines and LNG facilities). In the short term, LNG shipments could also be attractive for Europe which hopes to diversify its natural gas intake away from Russia;
- Differentiate between short-term pressures on energy policies due to their significance for the creation of jobs as well as their strategic and geopolitical implications and long-term redefinitions toward energy efficiency and sustainability goals;
- Engage in public discussions which combine a mid-term solution of natural gas with longer-term trajectories toward renewables and explain how both are part of the path toward a low-carbon society;
- Create a favourable investment climate for small and medium-sized enterprises that can push the shift toward renewable energy through technological innovation and providing infrastructure needs;
- Encourage technological and entrepreneurial solutions to local and decentralized energy supply (northern and Arctic regions, Indigenous communities) as best practice;
- Engage in circumpolar and global discussions on free, prior and informed consent by highlighting best practices with regards to existing co-management arrangements in Canada;
- Engage internationally in discussions on energy justice (equal access to energy) and energy insecurities (energy poverty).

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Lead image: **Force Ten Design**



Big Projects, Big Politics, Big Policy: Strengthening Public Confidence in Energy Decision-making in Canada

by **MONICA GATTINGER**

Canada has been in a slow-motion train wreck when it comes to energy decision-making. The last decade has seen increasing conflict, contentiousness and polarization around big energy projects. While oilsands and major pipelines are the key flashpoints for opposition, they are by no means the only contentious projects or forms of energy. Think large-scale hydro in British Columbia,

wind farms in Ontario or fracking in New Brunswick. Renewable or not, linear or non-linear, energy projects of all kinds and descriptions are running into opposition. In hindsight, some of this was predictable. But in the here and now, the country needs to figure out fast how to address the situation.

There are tremendous economic opportunities before us when it comes to energy. More than \$700 billion worth of natural resource projects are planned or in the works in the coming decade, and most of these are in the energy sector. Many of these opportunities are on, run across or are adjacent to indigenous communities. While energy development could transform many communities' energy security, energy affordability and economic, social and cultural development, it has been highly contentious. But the lost opportunity doesn't end there. Failure to resolve Canada's energy development challenges is costing — and will cost — the country in environmental performance, and in our capacity to attract investment and foster economic growth and innovation. This failure will also affect the energy system's ability to cost-effectively deliver reliable energy, and ultimately,

Canada's ability to manage the transformation to a much lower-carbon energy economy.

The Diagnostique: Why All the Ruckus over Energy?

So what's the problem? Why is Canada seemingly facing a crisis of confidence when it comes to developing its energy resources?

The first and most fundamental reason is that the context for energy decision-making has transformed in the postwar period. Extensive, widespread and permanent social and value change has taken place over the last six decades. This includes declining levels of trust in government, declining deference to authority and expertise, increasing preoccupation with risk, and growing expectations to democratize public decision-making and involve citizens in decisions that affect them. It also includes social fragmentation, greater individualism and growing mistrust of "big" whether in the form of business corporations or public institutions. The myriad effects of social media amplify all of this.

The impacts of these changes are far reaching and in the largest sense are evident in a new kind of politics throughout the western world — neatly captured in terms like "post-truth" or "post-fact" politics. Canada and energy are far from uniquely affected. But affected we are: citizens are less likely to trust that governments make fair, unbiased and balanced decisions. People lack confidence in expert opinion and scientific evidence; they may give more weight to evidence from sources they trust, regardless of their knowledge or expertise. Perceptions of risk can trump realities of risk and risk mitigation. Governments are trying to open up decision-making processes, but this can generate real and perceived tensions between participatory democracy (citizen involvement) and representative democracy (elected or appointed officials taking decisions). And when people's line of sight is centred more on individual/local interests than on national/group interests, appeals to the national interest or to broader regional/group interests may get less

traction or even fall on deaf ears. The transformation in the information and communications environment — notably the rise of social media — magnifies and intensifies the above tendencies.

All told, it's no wonder energy has become so much more contentious in recent years. It's a brave new world of politics and energy decision-making.

The second reason driving down public confidence in Canadian energy decision-making relates to gaps in public policy. Three gaps stand out: climate, reconciliation with indigenous peoples and energy development's cumulative/regional effects. Debate on climate change, the future of fossil energy and the path toward a low-carbon economy has gone on for 25 years without coming seriously to grips with the underlying challenge of how to actually make progress on these fronts. The history of Canada's fraught relationship with indigenous peoples has multiple dimensions and deep-seated challenges. Indigenous communities' opposition to energy development is often based on concerns extending to issues like clean drinking water, affordable housing and government follow-through (or lack thereof) on commitments and legal agreements. This gap is exacerbated by the fact that indigenous communities occupy and claim rights over much of Canada's land where energy resource and infrastructure projects are being proposed or contemplated. We are far from establishing mutually acceptable conditions for arriving at the needed decisions. Finally, we have yet to develop adequate policy and planning systems to deal with the wide-ranging and cumulative effects — economic, social and environmental — of energy development on local and regional communities.

The result of this is that public confidence in energy decision-making is low and declining. Tough policy problems invoke widely divergent interests and values, and only processes with explicit political accountability can address them. But the political context is one in which society often

distrusts authority and expertise. In the midst of this, energy regulatory processes — evidence-based and expert-driven by design — are called on to adjudicate individual energy project proposals. It is hardly surprising that many such processes have failed the test of public expectations.

The ultimate consequence is that public authorities' decisions on all types of energy have become increasingly protracted and uncertain, leading to outcomes that can be contrary to Canada's interests, without necessarily satisfying local communities, the business community or advocacy groups. We are all losing.

So what's to be done?

Big Projects, Big Politics, Big Policy: We Need to Address All Three

The most important thing to recognize about Canada's energy quandary is that it is not about big energy projects alone. Big projects are bound to have contentious elements and while we should strengthen project decision-making processes (as noted below), it would be a mistake to think that Canada's energy challenges can be addressed effectively with changes to the regulatory system alone. Likewise, it would be a mistake to think that "post-truth politics" is solely a communications challenge, and that the right message can somehow quell opposition, contentious politics and conflict. Communications will be pivotal, but only effective if part of a broader strategy to govern in the contemporary political context. It would also be a mistake to think that consulting with indigenous peoples on big policy issues like climate and reconciliation is the way out of this challenge. Yes, governments need to listen to people's concerns, aspirations and interests, but at the end of the day, they need to make decisions — some of them tough. This is necessary to provide clarity, predictability and timely answers to all involved — investors, individual Canadians, communities, regulators, companies and indigenous peoples.

In brief, Canada needs to move on big politics, big policy and big projects in a coordinated fashion, recognizing that these three P's form part of a broader system of energy decision-making that needs strengthening.

On big politics, decision-makers need to accept that social and value change — and changes in the information and communications environment — are here to stay. The horses have left the barn on this one. It is the new normal. The context for energy decision-making has changed fundamentally since the 1950s when organizations like the National Energy Board were created. Canada needs to think in new ways about how to develop trust, credibility and legitimacy in energy decision-making. Inclusiveness, representativeness, openness and transparency will be challenging but essential *sine qua nons* of energy decision-making now and into the future.

On big policy, governments need to address the gaps in a way that establishes a clear policy framework articulating the broad public interest when it comes to Canada's energy future. This is particularly important for climate change and the development of Canada's fossil fuel resources. The federal government's commitments in Paris went a long way to address — at least in perception — the policy gap on climate, but now comes the hard part of identifying what Canada's future energy system will look like, and where the development of its vast oil and gas resources sits now and in the future. Comparator countries like the United States and Australia are moving quickly on developing their hydrocarbon resources, including liquefied natural gas (LNG) and crude oil for export. The window for Canada on LNG is fast narrowing. Does the country want to miss the boat on this one?

Regulators need to develop more flexibility to engage with local and indigenous communities and governments on big projects. This includes being able to undertake less formal, legalistic, adversarial processes in addition to traditional regulatory hearings. It also means

diversifying the profile of staff and board members to be representative of the multiplicity of energy interests (indigenous, local, environmental, etc.). This doesn't mean abandoning expertise, but rather seeking different kinds of expertise and perspectives. Local and indigenous authorities (governments) also need greater formal roles in energy project decision-making, ensuring that they identify and represent their communities' views in credible, inclusive, transparent ways. Above all, for big projects, it means clarity in process: who does what, when, using which timelines and through which channels?

And yes, decisions need to be taken in a timely fashion on big policy and on big energy projects. People need to see that their input had an impact on decisions: what did policy-makers or regulators hear? How was it incorporated (or not) into their decisions? Why did public authorities opt for the decision they chose?

Only by addressing the three P's of Canada's energy challenge can the country's energy opportunities — economic, environmental and social — be unlocked. This is not just about projects, politics or policy: it's about all three. Deal with only one and we'll keep spinning our wheels. Deal with all three and the country can make real progress.

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With the latest developments on the North American pipeline landscape, is Energy East necessary?

by **KELLY OGLE**

Energy East is a 4,500-kilometre pipeline that would transport approximately 1.1 million barrels of crude oil per day from Alberta and Saskatchewan to the refineries of Eastern Canada and a marine terminal in New Brunswick. Most of the project, from Western Canada to Montreal, is the repurposing of the existing TransCanada gas mainline. The need for the gas mainline may become redundant due to ever-increasing gas supply¹ from the United States into Ontario and Quebec and

the eventuality of western Canadian LNG exports from Canada's West Coast.

In November 2016, Prime Minister Justin Trudeau took the controversial step of approving the expansion of the Trans Mountain pipeline from Edmonton to Burnaby and the upgrading of Enbridge's Line 3 from Edmonton to Superior, Wis. Trudeau admitted that these decisions were difficult and controversial but contended that the pipelines were crucial to Canada's national interest.² During the 2016 presidential election, Republican candidate Donald Trump promised that if elected he would immediately rescind outgoing President Barack Obama's rejection of the Keystone XL pipeline. Following his inauguration in January 2017, Trump signed an executive order allowing TransCanada to re-start the application process and on March 24, 2017, Trump signed the presidential permit necessary to proceed.³

For several decades, nearly 100 per cent of Canadian crude oil exports have gone exclusively to the U.S., for the most part at a deep discount to world prices. If Canada is to continue to produce and sell oil profitably,

markets must be enlarged. This paper asks the question: With Keystone XL, Kinder Morgan and Enbridge's Line 3 reconstruction likely to proceed, are the reconfiguration and extension of the TransCanada mainline, otherwise known as Energy East, necessary? Keystone will add approximately 830,000 barrels per day of new oil transport capacity, destined either for refineries in the U.S. Midwest or the U.S. Gulf Coast. The Trans Mountain expansion (TMX) would triple the capacity of an existing pipeline network that links the Edmonton and Vancouver regions, shipping roughly 890,000 barrels of crude oil and petroleum per day. Enbridge's Line 3 would allow western oil producers to ship up to 760,000 barrels of oil per day from Alberta to the U.S. Midwest, doubling the capacity of the existing line that is now facing pressure restrictions. The question remains, however, whether an eastern connection to tidewater is needed given the imminent construction of the Keystone XL, Trans Mountain and Line 3. Perhaps more importantly, will future Canadian oil production require this additional takeaway capacity?

Several political, strategic and economic factors (notwithstanding regulatory and environmental challenges) are inherent to this debate and one could examine a plethora of topics. However, this paper looks at four: the ever-fluid and dynamic global oil trade and Canada's place in it; Canada's asymmetric oil relationship with the U.S.; the safety, economic benefits and relative simplicity of the construction and operation of the Energy East pipeline; and export optionality for this largest of Canadian resources. According to the International Energy Agency's (IEA) latest *World Energy Outlook* (released in November 2016), oil and natural gas will still supply over 50 per cent of the world's energy in 2040.⁴ For example, the IEA projects that by 2030, India will be the world's largest oil importer, ahead of China and the U.S. Canada has ample opportunity to supply this burgeoning market if the nation has the political will. Although this view does not play well with many of Trudeau's supporters, he respects oil's strategic importance to Canada's future. At a conference in Houston in early March, Trudeau

emphasized this point when he stated that Canada, with 173 billion barrels of oil reserves, would more aggressively seek global market share.⁵

Until recently, OPEC and Russia were producing at record high levels to protect their share of the global market. In the past several years, the U.S. has become the world's second largest producer behind only Saudi Arabia. However, record production from Texas and North Dakota does not satisfy America's need for oil now or over the next several decades. U.S. energy self-sufficiency assumes that several million barrels a day of supply from Canada continues—supply that is secure. There has been a lot of discussion recently about U.S. oil exports, begging the question: if the U.S. is exporting crude oil, why does it need imports? Most U.S. refining capacity favours oil that is more viscous, i.e., heavier. Most U.S. production—Texas, the Gulf of Mexico, North Dakota and Alaska—is lighter. Canadian crude oil is for the most part a heavier variety well suited to U.S. refining capacity.

The Canada-U.S. energy relationship⁶ is one of mutual interdependence due in large part to the geographic distribution of oil and gas reserves and the challenges of efficient supply and demand distribution. The Canadian oil industry's rapid growth in the 1950s led the Diefenbaker government to undertake a royal commission on energy. The Borden Commission's⁷ findings led to the creation of the National Oil Policy (NOP). The NOP's establishment allowed Canada to co-ordinate and implement a comprehensive energy policy on a national level. However, the NOP divided Canada into two consuming regions separated by the Ottawa Valley. The NOP established a protected market for domestic oil west of the Ottawa Valley, freeing the industry from foreign competition while the five eastern provinces continued to rely on imports. A two-tiered price for oil characterized the NOP as the eastern provinces were reluctant to extend transmission of western Canadian crude oil into their markets because of the existence of cheaper imported oil, a situation that still exists today.

However, a comprehensive, binding bilateral agreement that deregulated energy policy had never gained widespread political acceptance. The ratification of the Canada-U.S. Free Trade Agreement (FTA) in January 1989 changed this. Continental energy policy (under the FTA) was the joint planning of energy production and shipment without regard to borders. During the agreement's negotiation, the bilateral energy fact-finding group considered the special problems in energy trade. It concluded that a broad agreement guaranteeing American access to Canadian supply in return for secure access to the U.S. market was mutually beneficial. The situation today is much different. As much as the FTA enhanced U.S. energy security, there now exists an equal part of demand insecurity for Canadian oil production and by association the greater Canadian economy. Oil exports continue to flow into Canada at increasing rates. Eastern Canada imported about 558,000 barrels per day from January to July 2016. In Quebec, more than half the oil used is imported. It comes by pipeline from the U.S. or by tanker down the St. Lawrence River from Saudi Arabia, Algeria, Angola or Nigeria. Although Canada has the third largest oil reserves in the world, last year Canadians paid \$14 billion to import oil from other countries. Moreover, our primary customer has become our fiercest competitor. Without access to new markets, Canadian oil resources will fight an uphill battle for market share and competitive pricing.

Pipelines are the most environmentally responsible way of transporting oil over long distances. A Fraser Institute study⁸ using statistics from the Transportation Safety Board of Canada and Transport Canada concludes pipelines are 4.5 times safer than rail when it comes to transporting crude oil. Pipelines are also the least greenhouse gas-intensive way of transporting crude oil to market. In the case of Energy East, the equivalent of 1,570 rail cars of crude oil per day would be displaced. In its initial application, Energy East conducted a risk assessment⁹ for the pipeline facilities associated with the project to determine the worst-case scenario and potential costs that

it may incur from an accident or malfunction. Indeed, by the time this pipeline is built, it will be the safest pipeline in the world. Over the next several years, if all goes as planned, TransCanada will have completed Keystone XL, which according to the U.S. Department of State,¹⁰ will result in a project that has a degree of safety greater than any typically constructed domestic oil pipeline system. Energy East will be subject to the same rigour.

Thousands of men and women will be employed in the design and construction of Energy East. According to a September 2014 Conference Board of Canada study,¹¹ the project is expected to support an average of 14,000 direct and indirect full-time Canadian jobs (over 4,000 in both Quebec and Ontario) during the pipeline's re-purposing, development and construction. Furthermore, over several decades, it will generate more than \$7 billion in additional tax revenues for governments (\$2.6 billion in tax revenues for Ontario and \$2 billion for Quebec) and add approximately \$36 billion to Canada's GDP. From an operational economic perspective, shipping oil by rail costs an average \$10 to \$15 per barrel nationwide, which is up to three times more expensive than the \$5 per barrel it costs to move oil by pipeline, according to estimates from Wolfe Trahan & Co.,¹² a New York City-based research firm that focuses on freight transportation costs.

Energy East will also foster substantial economic opportunities for New Brunswick if an upgrader¹³ in Saint John near Irving Oil's existing refinery is constructed. The unit would process heavy oilsands bitumen into light, synthetic crude, given the higher demand for lighter grades from refinery customers across the Atlantic. Additionally, Irving plans to build another tank farm in Saint John and in partnership with TransCanada a \$300 million deep-water marine terminal. However, without Energy East, both projects are redundant and will remain on the back burner.

In the next decade, will there be enough supply to fill these pipelines if they are built? Currently, Canada's pipeline network can

move about four million barrels per day, which closely matched 2015's average supply of 3.981 million barrels per day. The Canadian Association of Petroleum Producers (CAPP) projects that by 2030, production of Canadian oil will increase 37 per cent,¹⁴ greatly exceeding the current pipeline capacity. More than 850,000 additional barrels per day of oilsands supply will be available by 2021, and between 2021 and 2030 supply from Canada's oilsands is forecast to grow to more than 700,000 barrels per day. Although recent downward price pressure has curtailed oilsands expansion, international interest in accessing Canadian crude oil is still strong. Husky Energy Inc.¹⁵ recently sold a cargo of one million barrels of oil from its projects offshore Newfoundland to China, proving that producers and shippers can close the value gap if the global market is accessible. Additional North American market diversity and access to tidewater are needed so Canada can safely and profitably realize on its enormous resource bounty. The timely development of pipeline infrastructure, including Energy East, is a must.

End Notes

- 1 <https://www.forbes.com/sites/judeclemente/2017/03/19/the-importance-of-u-s-oil-and-natural-gas-exports/#70b950f6b952>
- 2 http://www.huffingtonpost.ca/2016/11/29/pipeline-pronouncement-liberals-to-pass-judgment-on-line-3-northern-gateway_n_13305886.html
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KELLY J. OGLE is the President and CEO of the Canadian Global Affairs Institute. He is a senior executive and scholar with more than 35 years of entrepreneurial experience covering several business sectors including oil and gas, agriculture, trucking, residential development and golf course construction and operations. He has also served as a board member for various corporations, both public and private and has experience in all committee types; health and safety, audit, compensation and corporate governance. Mr. Ogle has also participated in the securing and disbursement of more than \$1 Billion in debt and equity funding of oil and gas ventures, managed the clearing of numerous prospectuses, Annual Information Forms and Information Circulars. As well, he has orchestrated the merger, acquisition, strategic alternatives processes and/or sale of numerous oil and gas corporations as CEO, President and/or Managing Director.

Additionally, for the past 25 years, Mr. Ogle has given numerous presentations to various sized groups as both an industry executive and scholar and has had several journal articles published. He is also the Chairman of the Board of Silvera for Seniors, a Not For Profit organization in charge of over 1600 residences for low income senior Calgarians. He is also the former Chairman of the Board of Student Energy, a global non-profit organization creating a movement of young leaders committed to transitioning the world to a sustainable energy future. Mr. Ogle received a Bachelor of Arts degree from the University of Saskatchewan in 1978, a Masters of Strategic Studies from the University of Calgary, Centre for Military and Strategic Studies, in 2014 and in 2010 he earned the ICD.D designation from the Canadian Institute of Corporate Directors.

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Transmission pipelines: Critical infrastructure now and in the future

Chris Bloomer, President & CEO, Canadian Energy Pipeline Association (CEPA)

From heating our homes, to driving to work, to cooking dinner for our children – Canadians use energy every single day. However, the way that energy is delivered is out-of-sight, out-of-mind. The connection is rarely made between simple activities and the critical infrastructure that makes them possible – pipelines.

Pipelines are, and will continue to be, fundamental to Canada's economy and the quality of life we enjoy as Canadians. As Canada's Minister of Natural Resources, the Honorable Jim Carr recently noted, they are a "safe, efficient and reliable way to move Canadian energy to consumers."

Economic contribution

The transmission pipeline industry delivers significant economic benefits to Canadians through employment, training, taxes and investment. In 2016, CEPA members contributed nearly \$1.5 billion to government tax revenues including income, property, motor fuel and carbon taxes. An additional \$31.1 million was invested in community initiatives across Canada, including \$3 million in Indigenous communities.

Environmental responsibility

Pipelines are the safest, most environmentally friendly way to transport large volumes of oil and gas, which is key as Canada seeks to meet its greenhouse gas (GHG) emissions targets. Minister Carr has said that Canada is "on the cusp of a major transition" as we move toward a lower-carbon economy. Pipelines will play a crucial role in this transition by supplying natural gas, which will be needed as coal is taken offline, and as a reliable backup to renewable energy.

Role in the energy transition

The energy transition will take time, and will not be an "either-or" situation. For several years, we will be using a combination of hydrocarbons and renewable energy. Oil and gas will continue to be a vital source of energy as more renewables are introduced into the energy mix. CEPA's members are continuously working to shrink their environmental footprint by tracking and managing emissions and improving facility performance.

Striking the right balance

The pipeline industry has and will continue to work with governments and all stakeholders to find innovative solutions that strike the right balance between economic, social and environmental objectives. We are here for the long haul to ensure Canadians have a safe, reliable source of energy to keep their families warm, fed and comfortable in the years to come.

The Canadian Energy Pipeline Association (CEPA) represents Canada's transmission pipeline companies, which operate approximately 135,000 kilometres of pipeline in Canada and the United States. Our members transport 97 per cent of Canada's daily natural gas and onshore crude oil from producing regions to markets throughout North America.

CEPA is committed to continuously improving the operating excellence, business environment and recognized responsibility of the Canadian energy transmission pipeline industry to deliver the energy Canadians need in the safest, most responsible way.



Can Canada Restore a Functional Regulatory Process for Major Infrastructure Projects?

by **DENNIS MCCONAGHY**

Over the past 10 years, Canada has had a unique opportunity to exploit its hydrocarbon endowment. Hydrocarbon prices from roughly 2000 to 2015 were sufficient to generate massive investment in upstream oilsands production worth well over \$250 billion. This led to the advent of various pipeline infrastructure projects to transport the resulting incremental production to markets.¹

Concurrently, the opportunity to export Canadian natural gas as liquefied natural gas (LNG) to Asian markets emerged with sufficient economic credibility to generate several world-scale projects led by real players in global LNG markets. These projects included major natural gas pipeline infrastructure from northeast British Columbia to its northern tidewater ports.²

Solely private capital advanced all these pipeline infrastructure projects on the basic conviction that the Canadian regulatory system would not represent a material risk to the projects ultimately proceeding. I can categorically attest this to be the case for those projects that TransCanada Corp. advanced over this period. I have strong confidence that this was also the case for those advanced by TransCanada's competitors.

Sadly, too many of these projects evolved to acquire iconic status as examples of regulatory approval dysfunction. Keystone XL and Northern Gateway are prime examples.

The Canadian regulatory process was expected to efficiently provide sustainable approvals for projects that were manifestly in money, using conventional technology applied in topographies well within the project proponents' experience and expertise, and providing accommodation terms to directly affected stakeholders well within, or exceeding, accepted norms. Moreover, the scope of the actual regulatory process was expected to be confined to the projects' directly attributable impacts, not expanded into a platform for vetting fundamental policy grievances typically related to climate and aboriginals.

Other than the approvals related to the Canadian sections of the Keystone system, the Canadian regulatory approval process failed to meet those expectations. Even in those cases where the national regulator ultimately recommended approvals, no one could reasonably contend that the process was efficient. Regulatory cycle times of more than five years conform to no one's reasonable standard of "efficient". Worse, in the cases where projects were rejected, such as Northern Gateway and Keystone XL under the Obama administration, the rationale bore no direct nexus to the regulatory recommendations provided to final political decision-makers. Rejections motivated by political considerations were never made explicit or were imposed long after significant dollars had been expended in the expectation of deference to the regulators' technical competence and integrity.

Projects of the scale that emerged in this period in almost all cases required the expenditure of hundreds of millions of dollars to comply with the expected regulatory rigour of a "complete application"; that is, sufficiently detailed and fulsome to ultimately establish the specific necessary operating and construction conditions for the project to proceed. Would private sector capital have taken on these projects back in 2007 to 2011 if it had known how dysfunctionally

the approval process would devolve? Likely not.³

So, what is the scorecard that has emerged as of 2017?

- Northern Gateway was rejected entirely on the singular determination of Prime Minister Justin Trudeau — notwithstanding close to six years of regulatory scrutiny and compliance efforts by Enbridge — that the project's basic premises were "too risky" environmentally to abide. "The Great Bear Rainforest is no place for a pipeline and the Douglas Channel is no place for oil tanker traffic," Trudeau said;⁴
- Kinder Morgan's Trans Mountain project achieved approval after almost five years of regulatory process, yet concerns persist about the approval's enforcement;⁵
- Energy East, after having been publicly announced in 2012 and with regulatory application filed in 2015, has yet to commence its regulatory hearings in earnest, due to a series of procedural setbacks and project revisions;⁶
- The Obama administration rejected Keystone XL in November 2015, not on the basis of the regulatory record, but on the thesis that Barack Obama's "credibility" for the Paris Climate Conference required his rejecting the pipeline. The project was essentially moribund until Donald Trump's election in November 2016. Since Trump's inauguration, his administration has essentially reversed the Obama decision. The project is now in the process of reviving itself, with some real possibility it could be under construction by the first quarter of 2018. Canadian regulatory approvals achieved back in 2010 remain valid;⁷
- The two most notable projects to move western Canadian gas to Asian markets as LNG, the Petronas and Shell consortium projects, by year end of 2016 achieved requisite regulatory approvals, inclusive of federal environmental reviews. However, final investment decisions for these projects have been

deferred until their economic fundamentals can be reaffirmed in the current commodity price environment. Cycle times for regulatory approval have run on the order of four years.⁸

The election of Donald Trump has clearly restored the possibility that the project that always held the greatest value to Canada — Keystone XL — may actually proceed in 2017. Given that the percentage of the project within Canada is less than 15 per cent and is entirely in the hydrocarbon-centric provinces of Alberta and Saskatchewan, even concerns around enforcing project proponents' rights to build should be minimal. The Kinder Morgan project has some prospect of proceeding before year end, thereby providing Canada with direct tidewater access for its oilsands resource, and serving as a legitimate complement to the Keystone XL system. However, it will doubtless face both litigation and civil disobedience over the course of 2017.

At present, in respect to Northern Gateway, Enbridge faces likely unrecoverable losses. As yet, there is no apparent willingness on its part to engage in litigation against the federal government.

From 2009 to 2016, the Harper majority government undertook one substantial attempt to provide “regulatory reform” as embodied in its 2012 budget.⁹ Those on the Canadian left deeply resented these reforms as a whole, even such relatively constructive elements as trying to impose reasonable cycle times on the entire regulatory process and consolidate substantially duplicative regulatory processes across jurisdictions. Most notably, this reform initiative changed the historical basis of regulatory approval. The final decision would be in the hands of democratically elected politicians, not the regulators. The regulators would provide a recommendation, which the politicians could accept, reject or impose their own decision upon, distinct from the regulator. Political sanction of the regulatory process was reaffirmed or not, but regardless, it came late in the process and was not necessarily

bound by what the regulators had recommended. Historically, the political level could only ratify or not ratify the regulatory approval. Post-2012, it could impose its own decision regardless of that regulatory process. Enbridge in particular would be affected by this change in respect to Northern Gateway. These were the unintended consequences arising from the good intentions of a presumptively empathetic conservative regime.

What should have been done? And would it still be relevant now, even if Canada's greatest window of opportunity has slipped by to some extent, given changes in hydrocarbon markets post-2015?¹⁰

- What would have allowed these projects to face a more reasonable regulatory risk while still confronting the genuine public interest issues that legitimately should be resolved at the political level?
- Instead of deferring political intervention to the very end of the process it should have come early and only in respect to specific public interest issues, if any, related to these projects.
- The basic elements of such a re-invention of the current National Energy Board (NEB) process for major hydrocarbon infrastructure projects are:
 - A first phase that would resolve whether the project was in the public interest or not. The essential elements of the project would be filed, with special emphasis on how the project conformed to basic public interest criteria. For example:
 - national carbon policy
 - accommodation principles for directly affected stakeholders
 - basic economic justification
 - alignment with other elements of national economic or social policy
- The filing for this first phase would be sufficient to deal with these public interest issues, but would not be the

“complete” application ultimately required for phase two, if the project were to proceed beyond phase one;

- The NEB would provide a recommendation to the cabinet on whether the project was consistent with the public interest within one year of filing. The cabinet could either accept or reject that recommendation. Once having accepted the recommendation, the political level would have no further role in the regulatory process. Any approval would be binding on current and succeeding governments;
- The second phase would be entirely within the national regulator’s control. Its function would be to apply specific operation and construction conditions on the proponents to carry out the project. That would be based on a fulsome application, inclusive of all relevant engineering and environmental impact information. This phase would be resolved within 24 months of filing a “complete application”, a standard that sufficient information has been filed to set reasonable conditions, in the regulator’s judgment. This phase would consolidate all other elements of federal and provincial environmental assessment in respect to the project;
- Significantly, the second-phase deliberations would be in the context of a project that had already been determined to be in the public interest. That point could no longer be litigated in the actual hearing process;
- Fundamentally political judgments would be confined to the first phase. The second would be fundamentally a technocratic exercise — fixing of conditions for the project consistent with current accepted best practices and risk tolerances for comparable projects globally;
- Various elements would require elaboration such as:
 - Specifics of phase one filing requirements
 - Identification of major policy issues relevant to the application
 - Process for testing filed material
 - Resolution of relevant stakeholders

If this basic process change had been in effect 10 years ago, much of the dysfunction that played out could have been avoided. Some examples:

- In Northern Gateway’s case, if the government’s view had been that no spill risk was tolerable in the Douglas Channel and related geography, then that should have been clarified within 12 months, not delayed until almost six years of regulatory process had elapsed;
- In the case of any hydrocarbon pipeline projects filed post-Copenhagen, the government would have been required to clarify that the project conformed to Canadian carbon policy or not within this 12-month period. Compliance with carbon policy would not hang like a shroud over time, to be invoked even after apparent approvals had been given, as a claim to delegitimize approvals after the fact. This process would have forced governments to have resolved this issue early and explicitly, at least with respect to the infrastructure;
- Again, in the case of virtually all major pipelines filed since 2009, the other great uncertainty on any approval remains the inevitable litigation based on whether the applicant provided adequate stakeholder consultation and accommodation, particularly in respect to aboriginals. Government would have signed off that the principles of accommodation proposed by the applicant conformed or not to the government’s expectations. Regardless of any future claims, the federal government would have already aligned itself with those accommodation principles or not. Examples of accommodation would include direct financial compensation for access, project changes, social investment, provision of procurement opportunities, etc.;
- In the case of Energy East, if provinces such as Ontario and Quebec are unalterably opposed to the project, that reality would be taken into

account within the first 12-month period in respect to determining the basic national interest.

I am firmly of the view that if such a re-invention is not undertaken, then the risks of the existing regulatory process will have become too high to justify private capital even trying to get an approval going forward. If political intervention is to occur, as it has the democratic validation to do, it must come early in the process, not late. At that point, perhaps, only millions of dollars of proponents' capital is seriously at risk, not hundreds of millions.

To fully restore Canada's capacity to execute such projects, at least three other clarifications of existing Canadian law are required:

- All Canadians must defer to determinations of national interest made by federal regulatory entities. Provinces do not have vetoes on those determinations and moreover, where provincial jurisdiction applies in respect to a specific project's elements, it cannot be applied inconsistently with the federal determination. An example of this would be the denial of perfunctory provincial permits;
- All Canadians are subject to Canadian law — specifically, the legal remedies of pipeline proponents to actually affect their projects apply to all. No Canadian is exempt from those remedies;
- Finally, Canada has free trade among its provinces. Provinces disgruntled with distribution of economic rents that arise from resource development cannot be allowed to impose what in effect are transit taxes on the flow of goods among provinces to redress that distribution.

Those who doubt that these clarifications are required can examine the litany of dysfunctional reactions from various provinces, municipalities and interest groups in respect to the aforementioned projects:

- British Columbia insisted that it had conditions which must be met to ensure

its support for any of the crude oil pipeline projects accessing B.C. tidewater. These conditions needed to be viewed as showstoppers — a de facto B.C. veto regardless of any federal determination of national interest. Worst of all, various governments and proponents of the projects largely capitulated to such demands. Whether the projects can bear those costs remains to be seen;¹¹

- Virtually every NEB decision is subjected to a perfunctory legal claim that there was inadequate consultation with aboriginal groups, thereby risking delegitimizing the entire approval process. Of course, neither Parliament nor the courts has ever resolved what represents adequate consultation, let alone accommodation. The visceral issue is whether the accepted norms of financial compensation and project modification constitute sufficient accommodation or not. Governments have chosen not to confront this issue directly, so what comes after not confirming those norms — a de facto veto for Canadian aboriginals?¹²
- Quebec communities say that the Energy East project has yet to prove adequate net benefits for them. Is such a consideration the actual decision criterion? Or is it that the ultimate regulatory determination that the project's mitigated risks are acceptable is to be ignored even before it is rendered? Or that the federal determination is binding?¹³
- Potential litigation from ENGOs arguing that any existing project approvals failed to recognize their impacts on Canada meeting its international climate commitments. This ignores, of course, that at present there is no national prohibition on hydrocarbon production or specific caps on emissions from that sector. Any regulatory decision can never be deferred to if it does not conform to these groups' specific political agendas.

Ideally, the recent NEB modernization panel would be the forum by which these specific

process recommendations and related legal clarifications would be taken up and perfected.¹⁴ Sadly, it remains to be seen if this panel will actually seize the opportunity or even recognize the real issues. The Trudeau government created the panel in response to various groups' disgruntlement at the reality that when processing applications for major hydrocarbon infrastructure, the NEB consistently recommended approval, albeit with conditions. Most notably, this happened with Northern Gateway. To assuage that disgruntlement, the panel was charged to examine fundamental process changes that would "restore trust and confidence". A cynic might suggest such a mandate could only be construed to make the existing process even more obstruction-friendly. Efficiency and competence are seemingly secondary considerations.

The way the regulatory process unfolded over the past seven years would hardly have led to concerns that interest groups had not been given sufficient opportunity to participate. The terms were fundamentally generous relative to the scope of the hearing itself or the probative value of their contributions.

The reality remains that certain interest groups are unalterably opposed to any hydrocarbon development and its related infrastructure. The regulatory process is a forum to leverage financial and policy concessions that may not be otherwise available to them through the democratic process.

A final admonition for this panel would be not to alter the NEB's composition from one that is predicated on technocratic competence and integrity to some other misplaced criteria of inclusion and political correctness as ends in themselves.

At some point, Canada either finds the capacity to deal rationally with its major economic opportunities, or else faces the consequences of further economic contraction. It may be too late for many of these recent major hydrocarbon

infrastructure projects. The window of opportunity may have closed, in part due to the current dysfunctional process. However, it remains in the country's long-term interest to, at the very least, find as much efficiency in its regulatory processes as possible. If value judgments are to be imposed on resource development then that should be as up front as possible, and not waste capital and human resources.

End Notes

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Energy as a Service: Going Beyond Energy Supply

by **NORMAND MOUSSEAU**

As a major natural resource provider, Canada has approached its transition to a low-carbon economy very much in the light of its energy production and supply. Its discussion about climate change has been dominated by worries about pipelines, oilsands, shale gas and uranium production without much thought about the other side of energy: usage and consumption. Yet, Canada is a relatively small nation that does not weigh significantly on worldwide commodity prices, consumption and investments. As an open economy, it does not even have much direct control of national investments and production in the energy sector, except regarding electricity. Besides worrying, there is therefore not much Canada can do on the

supply side, particularly in the oil and gas sector.

The situation is different with respect to consumption, whether at the consumer or at the commercial, institutional and industrial levels. Here, the various governments can significantly modify the choice of energy and its usage through policies, norms, urban design and fiscal approaches, orienting millions of individual decisions.

Major shifts in energy consumption in Canada have occurred in the past, driven by a combination of individual, social and governmental orientations. Between 1979 and 1986, for example, Quebec saw its oil consumption drop by 43 per cent and the share of renewable energy go from 29 per cent to 47 per cent, transforming its energy basket faster and deeper than almost any developed economy. This transition was the result of two oil crises that made the world tremble, coupled with a major recession and Quebec's decision a decade earlier to bet massively on hydroelectricity. As the dams came into service, and with the support of Quebec's government, all these pressures led to the rapid electrification of residential

heating as well as numerous industrial processes, coupled with a significant growth in natural gas and biomass usage.

As Canada embarks on a program to reduce greenhouse gas (GHG) emissions, it will need a transformation of even larger amplitude, albeit on a longer time scale, similarly requiring the combination of a number of internal and external factors for its success.

Even as a major energy-producing country, Canada would greatly benefit from focusing its transition largely on the consumption side:

- Since energy usage is distributed relatively uniformly across the country, any transition will spread the investments and economic benefits more evenly across provincial lines, affecting almost all Canadians;
- Investments in energy usage, including savings and efficiency, have been shown to produce considerable multiplier effects per dollar invested. This means more jobs both in urban and rural areas;
- A well-planned energy transformation, with clearly spelled-out long-term goals would also avoid the pitfalls typically associated with short-term energy-saving programs. Such pitfalls tend to drive prices up and bring in industries with little knowledge and experience in the field. A well-planned transformation would also support the formation of larger scale players who could take a significant role in the export business through longer term investments in technology and training;
- A focus on energy usage would allow Canadians to act ahead of rising carbon prices, decreasing carbon control's economic impact and even contributing to reinforcing the green energy sector through a coherent transformation.
- There is no doubt that targeting energy usage is more difficult from a policy point of view than focusing on energy production by, for example, closing down coal thermal plants or subsidizing wind and solar electricity. While actions

on the supply side can be done in a relatively centralized fashion, energy service is spread across all human activities and requires a broad range of approaches that must be adjusted to each subgroup: rural or urban, household or industrial, etc. Yet, this approach has the advantage of leveraging energy investment for other social goals that can lead more directly to general improvement in the quality of life for all Canadians.

Refocusing the Debate

There are many reasons for refocusing the debate towards energy consumption in Canada. Of those, two are of particular importance.

First, over the last decade, much of the debate on GHG emissions in Canada has been linked to oil and gas production, mostly the oilsands. Yet, revenue expectation uniquely drives investor interest in supporting hydrocarbon exploration and exploitation, which is controlled by demand. If demand falls over the next decades, the value of these investments will drop in parallel; if the demand remains strong, there is not much point in Canada stopping its oil and gas production as any effort to reduce GHG emissions will be lost in the worldwide movement.

Second, transforming energy usage can positively affect Canada's economy and the lives of Canadians irrespective of the direction the rest of the world follows. This is demonstrated by countries such as Sweden that have managed to cut their GHG emissions by half while supporting strong and resilient economic growth. Rethinking energy usage forces us to question almost all of our habits, structures and processes, helping all aspects of society to find more efficient approaches to building, heating, transporting and manufacturing.

Certainly, the focus on energy usage will not suffice to fully transform Canada's energy sector into a low-carbon society. The electricity sector needs to finish its

transition to low-carbon production and find solutions for heavy transportation. Bringing the benefits more directly to all citizens will go a long way towards leveraging this transition to move Canada forward.

Developing a National Policy

Targeting energy usage in a coherent way in Canada is challenging because of the constitutional distribution of powers. While most of the responsibilities linked to energy usage sit in the hands of provinces, a number are shared between the federal government and the provinces, either legally or de facto through Ottawa's spending powers. A national vision requires a combined effort developed in collaborative fashion, one that must be adapted to each sector: building, transportation, urbanism, industry, agriculture, etc.

There is no space here to expand on each of these sectors. I'll focus on two that are too often overlooked: industry and buildings.

Transforming Industry

Industry is a combined federal-provincial responsibility that is associated with 42 per cent of the total energy-related GHG emissions (eight per cent when we exclude the oil and gas production sector as well as process-related emissions). Most of the energy is consumed to produce heat and operate heavy machinery, often requiring considerable power that needs to be delivered either by spikes or on a continuous basis and on sites that can be remote, without direct access to the grid. Since no unique solution can be applicable to this range of requirements, replacing fossil fuels for these usages will require a multi-pronged approach to optimize the energy source from biofuels and biomass to geothermal, electric sources and energy efficiency. This will provide considerable opportunities for technological development and adaptation to specific requirements.

A dedicated effort to reducing GHG emissions in this sector will need concerted and strategic research and development programs as well as large-scale innovative

trials that can only be successful if they involve federal and provincial governments as well as the various industrial sectors. Given the economic importance of a successful transition in this sector, it could be the ideal test case for developing a national approach for transitioning to a low-carbon economy, as it is more likely that all government levels will agree to work together to drive such a transition.

Towards A Low-Carbon Emission Building Sector

With 13 per cent of energy-related emissions, building is another sector that requires a global approach and specific attention from the start. While its carbon footprint represents only 40 per cent of transport, it is considerably cheaper to transform and it offers much greater economic return for the investment, further reducing its net cost. Building transformation also tends to deliver local positive fallouts, spreading its benefits more uniformly than almost any other sector across the country. Over the last decades, lowering the GHG emissions from this sector has mostly been synonymous with electrifying heating using simple resistors, essentially in the residential sector. Considerable efforts are still needed to establish norms in an industry able to provide cost-effective retrofit solutions and to propose low- or zero-emission alternatives to natural gas for residential, commercial and institutional buildings.

In order to reach sufficient transaction volumes to lower costs, provinces will have to work together to implement compatible and rapidly tightening norms. They will have to create long-term programs built upon federally supported research and development and use federally imposed revisions of lending approaches that would take the total cost of ownership into account, greatly facilitating the financing of these low-carbon technologies and approaches.

Transition in the industrial and building sector cannot be simply seen as the replacement, joule by joule, of the energy that hydrocarbons currently provide.

Programs will have to induce a deep reassessment of needs, habits and technologies in order to find the most appropriate solution for each situation. These programs will also need to be focused on cost-efficient approaches and innovative financing to ensure that they can sustain themselves and create competitive industries at the international level.

As both sectors will greatly benefit from a co-operative approach among various governmental levels and agencies anchored in research and development, as well as experimentation, and serve as a springboard to commercial development, they represent ideal sectors for developing such models while rethinking our energy use across Canada

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Since September 2011, he has been producing and hosting the weekly scientific popularization program "La Grande Équation" on Radio VM. His latest book, "Gagner la guerre du climat. Douze mythes à déboulonner" ("Winning the War on Climate Change: Twelve Myths Debunked") was published in February 2017 by Éditions du Boréal.

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Thoughts on Canada's Carbon Tax Agenda

by **KENNETH P. GREEN**

Early in 2016, Canada signed on to the Paris climate agreement,¹ joining 129 other countries² in taking actions to limit climate change to 1.5-2C. To that end, Prime Minister Justin Trudeau adopted the previous Conservative government's greenhouse gas reduction targets. The goal is to reduce Canadian greenhouse gas emissions by 30 per cent from 2005 levels by 2030. Subsequently, several Canadian provinces and the federal government announced strong actions to reduce greenhouse gas emissions. The Alberta government rolled out its Climate Leadership Plan,³ which expands Alberta's carbon tax to the broader provincial economy and institutes a range of emission reduction programs, including a 100 megatonne annual cap on oilsands emissions. Ontario released its own Climate Change Action

Plan⁴ and a cap-and-trade emission control regime aiming for an 80 per cent reduction in greenhouse gas emissions (from 1990 levels) by 2050. In August 2016, British Columbia, which already has a carbon tax, released its own aggressive Climate Leadership Plan,⁵ calling for an 80 per cent reduction from its 2007 emission levels by 2050. Finally, in October 2016, the Trudeau government announced⁶ that it will institute a pan-Canadian price floor for greenhouse gas emissions, to be imposed upon provincial governments that do not already have a program in place deemed to be equivalent with the federal price floor. That price floor will start in 2018 at \$30 per tonne of greenhouse gas emitted, rising to \$50 per tonne by 2022. All of these actions are poised to increase the costs of energy, a fundamental input to everything we do, manufacture, build, consume and export in Canada.

In the meantime, the United States presidential election has utterly shattered the idea that the U.S. will implement comparable greenhouse gas controls (through regulations rather than taxes), which would have eased concerns about Canadian

competitiveness, even moving forward with carbon pricing. Prior to Donald Trump's election, one could rationally make the argument that the U.S. was likely to proceed on its greenhouse gas regulations, both those in progress and others expected to have come in under a Clinton presidency (thus imposing additional hidden taxes on the U.S. economy). It would have followed, then, for Canada's overt carbon tax to be seen as a superior approach that would not cause a marked economic imbalance between the U.S. and Canada, and even be less costly and more efficient than a regulatory model.

Several developments have changed all of that. First and foremost, we've seen that governments in Canada have no intention of instituting textbook carbon pricing. It is not revenue neutral, it does not displace existing regulations, and revenues are used in ways that distort the economy, rather than allowing the price to drive investment in the most efficient technologies.

Consider Ontario's cap-and-trade system⁷ instituted by Premier Kathleen Wynne, which her government estimated would bring in \$2 billion in revenue per year. According to the Ontario Auditor General,⁸ out of the \$8 billion, \$1.32 billion will be earmarked to help with residential and business electricity bills. The rest will be spent on the usual governmental preferences — transit, subsidies to renewable energy, dubious efficiency programs, etc. Cap-and-trade is basically a hidden carbon tax, and like a carbon tax, the only real way to mitigate against economic harm is to fully rebate revenue via reductions in distortionary taxes such as personal and corporate income taxes. That's not going to happen in Ontario. And that's leaving aside the myriad problems with cap-and-trade systems in general.⁹

Or consider Alberta. Alberta's new carbon tax is \$30/tonne. Phased in by 2018, it is expected to generate some \$6 billion per year in revenues. Part of that will be used to subsidize Alberta's emitters (granting a windfall to the very people putting out most

of the emissions). A small portion will be given to low-income Albertans, ostensibly to avoid the optics of having them freeze to death when power bills become unaffordable. The rest, \$2.6 billion/year, or 44 per cent of revenues will be spent on government pet projects.¹⁰

And then there's Quebec, which also has a cap-and-trade system that has brought in \$330 million, but is expected to bring in \$2.5 billion by 2020 (and probably more, as it will have to match the escalating national price floor established by the federal government). Where does the revenue go? Free permits are given out to emitters, while the remaining revenue is to be spent on "programs to fight climate change."¹¹

Finally, consider the much vaunted B.C. carbon tax. A new study by the Fraser Institute¹² verifies that indeed, in this tax's early years, it was truly revenue neutral. Personal and corporate taxes were reduced and additional tax reductions were introduced to ensure revenue neutrality. But by 2013/2014, only five years into the tax system, the government had taken to shaky bookkeeping to preserve the appearance, but not the reality of revenue neutrality. Indeed, when Fraser's researchers backed out some pre-existing tax credits that had been redefined as carbon tax reductions, the researchers found that the province actually netted \$226 million in 2013/2014, with a cumulative tax take of \$377 million for 2014/2015. Projecting forward, the researchers estimate a cumulative \$865 million tax increase by 2018/2019. That's about \$800 for a family of four. And a closer look at the details shows that rather than purely rebating revenues to the general population, diversions from those types of tax reductions began in only the second year with measures targeted at specific subgroups of the population. Those special interest tax credits rose from one in year two, to six by year seven, at which point \$148 million (12 per cent) of actual offsetting tax measures were being directed to specific sub-populations like: Northern and Rural Homeowner Credits; Children's Fitness Credit and Children's Art Credit; Small

Business Venture Capital Credit; Small Business CIT; Industrial Property Tax Credits for Major Industry; Industrial Property Tax Credit for Light Industry; and School Property Tax Reduction for Farm Land.

So it is clear, in the new Trumpian environment, that the U.S. is poised to boost its energy economy. Canada is poised to contract its own, through carbon pricing and climate action plans that are inimical to provincial and federal economies, and to people's detriment in terms of higher prices for everything. Energy, certainly, will cost more, but so will the goods and services that rely on that energy to show up in the local market, including food. Because of those higher energy prices, more people almost certainly are heading for energy poverty¹³ under these plans.

What should Canada be doing? The first and most obvious actions Canada could take would be to postpone the implementation of the various climate action plans and carbon taxes, until analysis can be done to (re) evaluate the impact of those activities on Canadian competitiveness with a Trumpian U.S. economy. Little economic analysis was done on these plans to begin with (and what was done, government won't release¹⁴). It is probably too much to expect of policy-makers to actually retract their proposed climate action plans, but taking a breath to evaluate how U.S. developments will affect the impact of those plans should be justifiable even by the most ardent climate change advocate.

Canada can do other things on the climate front. There is little question that Canada will be affected by man-made and natural climatic changes. Indeed, one of the biggest lessons to have emerged from climate science research is that the climate is quite volatile, with many and subtle drivers, some of which are only weakly understood.

I wrote about this in an American context in *Climate Change: The Resilience Option*,¹⁵ a study I wrote for the American Enterprise Institute. In that study, I observed that governments can take many steps to

mitigate actual climate risks, which are less related to the absolute change in atmospheric temperature and more related to derivative water-related risks such as sea-level rise, drought, flooding and so forth. In that paper, I discussed how government actions to compensate people who live in flood-prone areas tend to encourage people to take more risk than they might if they had to pay the full cost of insurance against rising sea levels or surface flooding. Market-priced insurance, phased in slowly over time, would gradually encourage people to move higher value properties and dense population areas away from the most climatically vulnerable places at the water's edge or in the bottom of flood plains. Similarly, shifting to fully priced and integrated private water systems can mitigate drought by guiding water where it needs to be, at the price needed to pay for its provision. Infrastructure can be protected through a combination of privatization and market pricing, which creates an information stream about which infrastructure is most important to people, and provides the revenues with which to protect it from climatic risk. This is true for energy infrastructure as well as for agricultural or pretty much any infrastructure. These actions will take time and certainly will require significant resources, but addressing the actual manifest risks of climate change (rather than the slight change in ambient temperatures) is more likely to protect people and property than is continued, largely futile action to significantly reduce greenhouse gas emissions.

That doesn't mean there is no room for government. Many of the privatizations I mentioned would likely be public-private partnerships that would require some government investment. And then, there is the question of research and development. It is well understood that the private sector under-invests in fundamental R&D at the levels of universities and national laboratories. But as analysts with the Breakthrough Institute¹⁶ point out, this type of R&D is exactly what's needed to pave the way for economic decarbonization. Until we can generate power and fuel mobility more

cheaply than with carbon-intensive methods, and more reliably than current alternatives such as wind and solar power, we will see little progress on the kind of massive decarbonization that Trudeau and other signatories to the Paris agreement pledged to achieve.

For now, while large-scale mitigation shows itself to be unsustainably expensive in country after country, leading to retracted carbon taxes,¹⁷ disruptive rollbacks of renewable subsidies,¹⁸ retreats from international carbon-reduction pledges,¹⁹ power blackouts²⁰ and growing levels of energy poverty,²¹ we should reconsider the overwhelming governmental focus on near-term mitigation of greenhouse gas emissions. We need to refocus some of that attention on the long neglected necessity to make Canada resilient to climate change, and ensure that Canadians are able to adapt to climate changes whether man-made or natural. By developing new, affordable and reliable forms of low-carbon energy production, and by powering more of the world with our abundant supplies of natural gas, we can also do our part internationally to help developing countries get off high-carbon fuels faster. These actions will have a greater impact on GHG reductions than Canada could ever have achieved acting alone.

End Notes

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Lead image: **Pexels.com**



More Hydro Power in Canada: Tapping our Potential

by **JOHN HAFFNER AND JIM BURPEE**

Hydro power is, by far, the most significant power generation source in Canada's electricity system. Every Canadian province except Prince Edward Island has operating hydro power plants, and hydro provides about 60 per cent of the power generated across Canada. It provides about 91 per cent of the electricity generation in British Columbia, 96 per cent in Manitoba and 99 per cent in Quebec. Yet, although hydro power is already the backbone of Canadian electricity, there is still the potential to develop significant amounts of additional hydro in Canada. Canada has installed hydro capacity of 76,000 MW, and technical potential of 160,000 MW. In other words, Canada could, in theory, more than double its existing capacity.

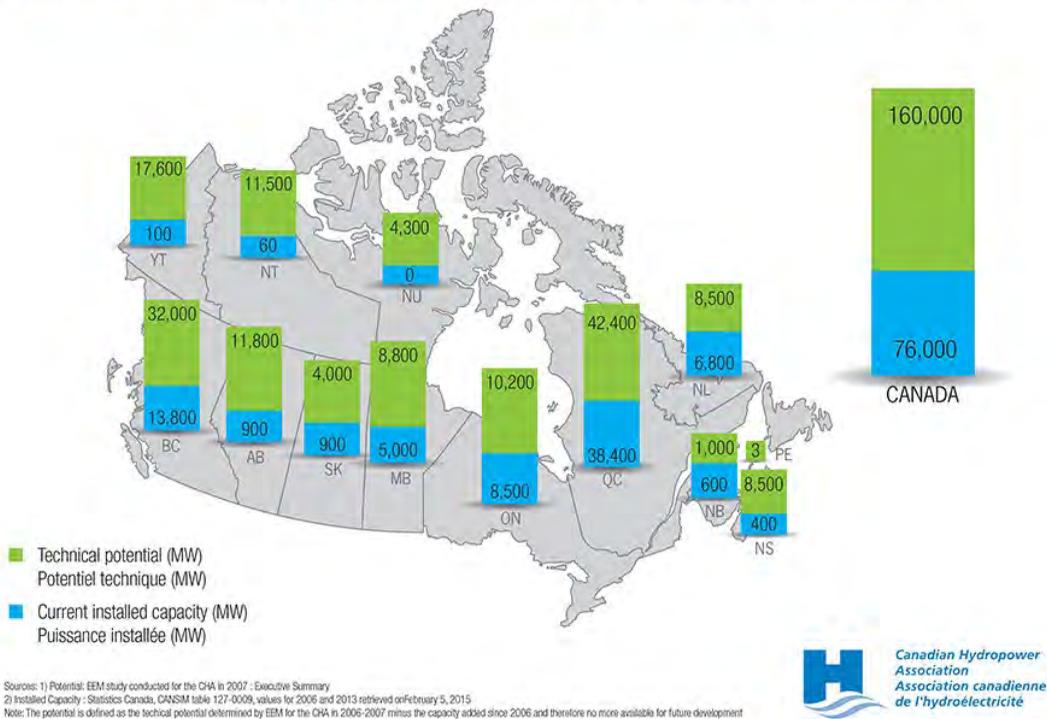
As a practical matter, some of the projects included in this estimate would face various economic, environmental or social barriers that would prevent them from proceeding. For our purposes, however, even if we were to heavily discount the estimate, the point is that Canada has very substantial untapped capacity.

Our argument here is that Canada should develop some of this additional hydro, because of its significant environmental, operational and economic advantages as a resource. The sections below are organized in two parts. First, we consider hydro power's environmental, operational and economic advantages. Second, we consider four simple and practical ideas for advancing a hydro power agenda in Canada with these advantages in mind. More Canadians need a better understanding of why hydro ought to grow into an even more important component of Canada's energy portfolio than it is today.

A. Hydro power's advantages

Hydro power has environmental, operational and economic advantages. These attributes

CANADIAN HYDRO CAPACITY & POTENTIAL (MW) L'HYDROÉLECTRICITÉ AU CANADA: PUISSANCE INSTALLÉE ET POTENTIEL (MW)



distinguish hydro power from other sources of generation and reinforce its importance and value as a unique resource.

First, on the environmental front, hydro power emits almost no greenhouse gases (the initial methane emissions that sometimes occur because of flooding are close to negligible over the life of a facility). Canada has set a target of reducing economy-wide emissions by 30 per cent below 2005 levels by 2030, and it also recognizes scientific findings that global reductions of at least 80 per cent will be required by 2050 to limit climate change. As in other countries, de-carbonization of the Canadian economy will require an electricity system that is almost entirely carbon free, and one that expands electrification into other key sectors. Largely thanks to existing hydro power, Canadian electricity is already relatively low carbon, with more than 80 per cent of electricity from almost non-emitting sources. The Trottier Energy Futures Project (TEFP) has identified hydro power as an important contributor to minimum cost

emissions-reduction pathways. Put differently, without replacing our remaining carbon-intensive power sources with additional hydro and without further electrification, we raise the cost of reduction efforts considerably and reduce our odds of success. With additional hydro, Canada can also sell surplus clean electricity to the United States, which has much farther to go than we do in de-carbonizing its electricity system.

Second, hydro power has unique operating benefits, including mass storage, emergency reserve, spinning reserve, load-following capacity, black start and system stability. Or in simpler terms, hydro power can store lots of energy and be turned on and off faster than any other generation source. While electricity customers often think they are just paying for electrons, what they really want are reliable electrons and a smoothly functioning electricity system.

Hydro's operational advantages have taken on greater importance with two parallel,

carbon-related trends. On the one hand, Canada is phasing out coal-fired generation and also looking to reduce reliance on gas-fired generation (coal and gas have traditionally provided some of the storage and ramping flexibility alongside hydro). On the other hand, Canada is adding generation from intermittent renewables such as wind and solar, non-dispatchable forms of electricity that require complementary production from hydro power for ensuring reliable, low-carbon electricity system supply. It is also important to note that while hydro can provide back-up for wind and solar in Canada, the reverse could not happen. Since clean electricity needs to grow to meet not just future demand but also to expand its role into other sectors, and since intermittent renewables need hydro, the interests of hydro and intermittent renewable power generation sources are aligned. In the big picture, growth for hydro is also good for wind and solar.

Finally, hydro power has significant economic advantages. Although it has a significant upfront capital cost, hydro subsequently provides a stable, long-term source of electricity with very low operating costs. In North America, the cities with the lowest cost of electricity all benefit from hydro power.

Hydro power also provides substantial socioeconomic benefits – ones that have recently been quantified in an ambitious study in Europe. Advisory firm DNV GL conducted a macroeconomic study of hydro power in the 28 EU member states, alongside Norway, Switzerland and Turkey. The study found that hydro power's contribution in Europe per annum was around 38 billion euros, an amount similar to Slovenia's GDP, and that this amount was projected to grow to around 75 to 90 billion euros by 2030. In the Canadian context, "hydro power project development" could generate, over the next two decades, "over \$125 billion in investments and a million jobs." Canadian hydroelectric expertise can also be applied to global markets, as highlighted in a recent study by McKinsey & Company. Manitoba Hydro and BC Hydro

have international divisions, but Canadian companies could do more to leverage the country's deep hydroelectric knowledge to support projects abroad and electrification and low-carbon pathways in emerging economies.

B. How to advance a hydro power agenda in Canada

Canada is fortunate to have such a resource in abundance. Given its environmental, operational and economic advantages, developing additional hydro potential ought to be a key component of Canada's energy strategy. However, in the contest among competing stakeholder interests and sophisticated advocacy groups, this outcome is far from certain. The following four ideas would help strengthen an agenda for developing more hydro power in Canada. All ideas involve advancing the public interest, and would benefit hydro only insofar as it contributes to the public good:

1. Add a reliability factor in evaluating costs of future generating options

It is common for different electricity generation technologies to be compared by using average energy costs (c/kwh) or initial capital costs (\$/MW). But these numbers only present part of the picture. From a system-planning perspective it is important to have a high level of confidence that customer demand can be met second by second throughout the year – their interest is dependable capacity. To compare properly large-storage hydro to, say, wind or solar, the cost of storage or demand-response programs to make the intermittent resource dependable needs to be added to the cost of energy.

2. Push for a North American carbon price

While the Trump administration represents an unfortunate reversal of global momentum towards climate action following the Paris COP agreement, climate science is a bigger story. Canada should dig in and engage with U.S. counterparts in their federal and state governments, universities and civil society

who also support climate action. We should aim and push for a North American carbon-pricing regime. If we had one, the value of hydro power's emission-free generation would be obvious and reflected in market activity.

3. Include de-carbonization contribution as part of project assessments

Many debates in Canada about the merits of specific proposed hydro projects are framed too narrowly. When projects are being considered, there ought to be a discussion of how they could support electrification of other sectors and allow Canada as a whole to achieve lower emissions. This approach will require a broader discussion of costs and benefits than has traditionally been the case. As part of this expansion, First Nations communities should not only be consulted in good faith about the potential impacts of local projects and invited to partner on projects, they should also be partners in the choices Canada will need to make in achieving its greenhouse gas reduction targets. If First Nations communities can support the development of significant additional capacity in hydro, they are also helping Canada to do its part to avert the climate crisis.

4. Strengthen low-carbon electricity co-operation across jurisdictions

From the standpoint of electricity planning, Canada's provinces often treat their borders as fences. We could do much more to improve interprovincial electricity in pursuit of optimal ways to use clean electrons to reduce emissions. The same applies between Canada and the United States. We have an interconnected North American grid with multiple interties, and as mentioned earlier, the U.S.'s electricity system is much more emissions-intensive than the Canadian system. Additional Canadian hydro can be built to serve not only Canadian de-carbonization efforts, but also those in the United States. U.S. states should be able to include imported clean electrons from Canada as part of their emissions reductions, and evidence of future U.S.

demand should support the business case for new hydro projects in Canada. Minnesota Power and Manitoba Hydro recently signed an agreement that will take effect in 2020 and enable Minnesota Power to store some of the wind power it generates in Manitoba Hydro's hydro stations. Many more projects along these lines should be developed between the two countries. The challenge, however, will be to figure out how to value the cross-border GHG reductions appropriately so that, for instance, British Columbia ratepayers are not paying for an Alberta or California benefit. Our electricity market interactions do not capture these benefits appropriately today.

Conclusion

Tapping significant additional hydroelectric resources will require policy-makers to develop a committed, long-term, interdisciplinary cross-border vision. Climate change is happening. In integrating scientific understanding with operational and economic considerations in energy planning, Canada will be well positioned to optimize its preparations for, and participation in, the low-carbon economy of the future, with hydro playing a critical role.

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