Canada-US Relations, Energy Security and the Road to Net Zero by 2050

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KEY FINDINGS:

1. The rise of shale oil and gas production, along with the increasing salience of climate change on political and policy agendas, has weakened attention to energy security in Canada-US relations.

2. But the Canadian and US governments' commitment to net zero emissions by 2050 will require focused attention to security. Without reliable and affordable energy sources, it will be difficult to secure ongoing public, investor and political support for emissions reductions.

3. Growing electrification of energy systems, the evolving role of oil and gas in energy systems, the need to rapidly scale up production and supply chains for critical minerals, and more frequent extreme weather events due to climate change will challenge energy security in new and unprecedented ways. So will the Russian invasion of Ukraine, which has focused attention on the security of oil and gas supplies in global energy markets against the backdrop of growing global alignment on net zero by 2050.

4. Although the Roadmap for a Renewed US-Canada Partnership gives scant attention to energy security, there are multiple opportunities to integrate it into the bilateral collaboration agenda. Three key areas merit attention.

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KEY FINDINGS: *(continued)*

THREE KEY AREAS MERIT ATTENTION:

1. Canada and the US could collaborate on planning, including producing joint energy outlooks and coordinating infrastructure planning and builds.
2. They could collaborate on innovation and trade, including producing reliable, affordable, and carbon/cost competitive oil and gas for domestic and global markets, electricity trade to reduce emissions while strengthening reliability and affordability, security of critical minerals supply, and low or zero-emissions vehicles.
3. They could work together on regulatory reform, public and investor confidence in infrastructure decision making, and inclusive net zero decision making.

The widespread power outage in Texas in early 2021 was a devastating reminder of the importance of energy security. So was the spring 2021 ransomware attack on the Colonial Pipeline, a line that supplies half the gasoline to the US east coast. And the Russian invasion of Ukraine has focused attention squarely on the security of oil and gas supplies in global energy markets. Like the ubiquity of energy in advanced economies, people don't stop to think how pivotal energy security is to their lives until they don't have it. While none of these security crises occurred as a direct result of policies to reduce greenhouse gas (GHG) emissions, they are important wake-up calls about energy security. And events like Texas and Colonial may become more frequent and intense in Canada and the United States if decision makers aren't attentive to security imperatives on the road to net zero emissions by 2050. Reliable, affordable energy will be crucial to secure and maintain political support for emissions reductions. It will also be crucial to enable businesses to pursue emissions reductions and maximize prosperity. In short, policy approaches that attend to both climate and energy security imperatives will be paramount in the years ahead.

Ottawa and Washington are both committed to net zero. They are also committed to working together on climate. But their collaboration agenda scarcely mentions energy security. This follows a trend over the last twenty years of energy security slipping further and further off bilateral agendas as a result of the "shale revolution," which transformed the US from hydrocarbon poor to hydrocarbon rich, and the ascendance of climate on political and policy agendas. Both developments knocked energy security ever lower on bilateral policy agendas. This is a big gap in Canada-US relations. This paper outlines why, documents how security slid off bilateral agendas, and identifies key opportunities for Canada and the US to collaborate on energy security in the decades ahead. The Russian invasion of Ukraine will no doubt see the return of energy security to the bilateral energy relationship, but it will be paramount that collaboration around security of oil and gas supplies in global energy markets advances security *and* emissions reductions objectives.

ENERGY SECURITY AND THE ROAD TO NET ZERO[1]

The International Energy Agency (IEA) defines energy security as comprising three key pillars: "Ensuring the *uninterrupted availability of energy sources* at an affordable price" (IEA 2021a, emphasis added). Concerns over energy security are rooted in the nature of energy as a ubiquitous and indispensable input to economic, social, and governmental activity. Multiple *energy sources*—oil, gas, coal, solar, geothermal, wind, nuclear, etc.—enable everything from heating and lighting to mobility and shipping to construction and manufacturing to telecommunications and computing. Prior to concerns over climate change, people gave little thought to which source of energy powered which aspect of their lives. The key was that it be *available* and *affordable*, two distinct but inter-related dimensions of energy security. The former encompasses things that shape whether energy is there when consumers need it, including electricity reliability, the global geopolitics of oil and gas supply, and the adequacy of infrastructure to carry energy from producing to consuming locations. Affordability, for its part, is grounded in energy prices and relationships between supply and demand. It is shaped by multiple factors, including the availability of energy sources; production costs; the functioning of spot markets; contractual arrangements; and supply chains for energy sources, equipment, and infrastructure. As this brief overview makes clear, energy security has multiple underpinnings at the domestic and global levels: economic, technological, and geological; policy, regulatory, and scientific; political, social, and cultural.

What's more, energy security is not a static concept. Understandings and key areas of policy emphasis have evolved and broadened over time. In the last decades of the twentieth century, energy security in North America centered on the security of oil and gas supply, owing to disruptions in oil supply from the Middle East and dwindling oil and gas production in North America (as described below, this was to fade in the wake of the shale revolution). Following the September 11, 2001 terrorist attacks, of primary concern was the physical and cyber security of critical energy infrastructure like pipelines, nuclear facilities, refineries, and electricity transmission lines. Protection of critical energy infrastructure also heightened over the last two decades as a result of hacking efforts targeting energy firms and critical energy infrastructure in Canada and the United States, some allegedly by the Chinese military (Sanger et al. 2013). Cybersecurity was in sharp focus again in 2021 when the Colonial Pipeline, the largest petroleum pipeline in the US, was knocked offline by a ransomware attack by the cybercriminal group DarkSide (Morrison 2021). Electricity reliability was brought into sharp focus by the Northeast blackout of 2003—the largest electricity outage in North American history during which 50 million Canadians and Americans lost power.

What does energy security have to do with commitments to net zero GHG emissions by 2050? Start with the definition of 'net zero.' In general terms, it means that the amount of greenhouse gases emitted and the amount of emissions sequestered ('offset') by things like carbon capture and storage result in no 'net' emissions. This seemingly straightforward definition masks the complexity of net zero in practice. There are multiple ways of scoping what's in and what's out of the global and domestic emissions and offset categories: all emissions or just anthropogenic emissions? All forms of sequestration or just those that aren't viewed as perpetuating fossil fuel use? Only emissions reductions achieved within a country, or those it has helped to achieve beyond its borders? The definition is also silent on the weight to be placed on emissions reductions versus offsets: at 2050, what should the absolute level of emissions be? The absolute level of offsets? What is the optimal 'pathway' to net zero? Unsurprisingly, the International Energy Agency notes that countries' net zero pledges "vary considerably in their timescale and scope," with key differences on GHG coverage, sectoral boundaries, use of carbon dioxide removal, use of international mitigation transfers, and timeframes (IEA 2021b:34).

Notwithstanding this complexity, net zero pledges attest to the shared objective of reducing emissions. Governments are increasingly aligning on the goal of net zero, with 136 countries representing 88% of emissions, 90% of global GDP, and 85% of the global population committing to net zero (zerotracker.net). Companies are also establishing net zero targets, with 683 of the 2000 largest publicly traded companies pledging net zero (ibid).

1 This section draws on Gattinger 2021c and 2021e.

Against this backdrop, how do energy availability, sources, and affordability relate to net zero, and how might understandings of energy security evolve in the decades to come?

At the heart of answers to these questions lies government policy. Countries' efforts to reduce emissions—whether through putting a price on carbon, government investments to spur innovation, or regulations to reduce the carbon intensity of fuels and power production—all impact energy prices, sources, and reliability, and do so in ways that are complex and difficult to predict. Skyrocketing energy prices in Europe and Asia in 2021 revealed the unintended consequences of enacting climate policies that do not attend sufficiently to energy security (Bordoff 2021).

Scholarship to date on the pricing impacts of climate policy in North America has focused predominantly on carbon pricing (carbon taxes or cap-and-trade systems), with studies underscoring the close link between energy prices and political support for climate action. Research in the United States notes the aversion of lawmakers to imposing direct costs on consumers and industry (Rabe 2010), and draws attention to the importance of designing pricing systems that create clear benefits, distribute costs in ways that citizens see as fair, and address concerns about higher consumer energy prices (Raymond 2019). Where carbon pricing policy does not achieve these ends, it is vulnerable to policy reversals, as seen in Canada in the provinces of Ontario (Raymond 2020) and Alberta (Bratt 2020). Survey experiments on public support for renewable portfolio standards suggest similar dynamics, with impacts on residential electricity prices, jobs, and pollution being key drivers of support (Stokes and Warshaw 2017). Support for policies across partisan lines also emerges as a key variable in the latter study, although the unraveling of cross-partisan support for federal carbon pricing in the United States and Canada underscores the challenges of achieving durable policy when energy and climate are polarized along partisan lines (Bratt 2020; Skocpol 2013). When it comes to energy availability and reliability, electricity system operators undertake some of the most comprehensive research on the impacts of climate policy on the reliability of power systems. These studies find that increasing reliance on intermittent renewable power sources like wind and solar challenges system reliability (see, for example, Hibbard et al. 2020).

The International Energy Agency helps to identify the myriad issues and challenges at play for net zero and energy security. In spring 2021, it released a study describing a proposed roadmap to net zero in the global energy system (IEA 2021b). The study carves action into two time periods: now to 2030 and now to 2050. Between now and 2030, the scenario calls for an "unprecedented clean technology push" to drive the energy intensity of GDP down by 4% per year. Key actions include aggressive efficiency measures and electrification, ramping up renewable electricity, and reducing methane emissions by 75%. Between now and 2050, the report calls for "unprecedented clean technology innovation." In the scenario, fully half of emissions reductions to 2050 come from technologies at the demonstration or prototype stage (the proportion is higher for heavy industry and long-distance transportation).

This constitutes a complete remaking of energy and economic systems over the next thirty years. The IEA provides a whopping 400 milestones needed to achieve the ambitious changes, including the headline-grabber that there should be no development of new oil and gas fields. While this has been used by some to call for governments to wind down the oil and gas industry (see, for example, Bankes-Hughes 2021), as noted below, oil and gas supply will decline in the IEA's scenario, but both sources will continue to be part of the global energy mix to 2050. Another key milestone beginning today is that there should be no new unabated coal-fired power plants. Looking forward, by 2030, most emissions reductions technologies in heavy industry would need to be demonstrated at scale, and unabated coal plants would need to be phased out in advanced economies. As of 2035, governments would need to mandate no new internal combustion engine car sales (the Canadian government put this measure in place shortly after the IEA report was released [Transport Canada 2021]), the electricity sector would need to have reached net zero emissions in advanced economies, and 50% of heavy truck sales would need to be electric. As of 2040, 50% of fuels used in aviation would need to be low emissions, the global electricity sector would need to have reached net zero emissions, and all unabated coal and oil power plants would need to be phased out. By 2045, 50% of heating demand would need to be met by heat pumps, and by 2050, almost 70% of electricity generation would need to consist of solar and wind.

Of course, as the IEA itself notes, the roadmap is just a roadmap, not *the* roadmap. It is also not a projection of what's to come, but one possible path to reach net zero emissions in the global energy system. Nonetheless, the study is the most rigorous analysis currently available to examine what net zero commitments might mean for energy sources, availability, and affordability.

Start with sources. By 2050, in the scenario, the energy system would be transformed: two-thirds of total energy supply would come from wind, solar, bioenergy, geothermal, and hydro (solar would become the largest energy source, accounting for one-fifth of energy supply). Half of total energy consumption would be electricity, and 90% of electricity would be generated from renewables. Low emissions fuels like hydrogen and biomethane would account for 20% of supply (up from 1% today), and nuclear would contribute about 10% (about doubling nuclear capacity). Fossil fuel sources would plummet from 80% to 20% of supply, and would be used predominantly for products (e.g., plastics), in plants with carbon capture, utilization and storage (CCUS) and for hard to abate sectors. According to the scenario, in 2050, the world would be producing 24 million barrels of oil per day (a three-quarter decline from current production levels) and 1,750 billion cubic meters of natural gas (a drop of more than half). Coal demand would decline 90% to become just 1% of energy use.

Looking at affordability and prices, the scenario sees spending (constant dollars) on energy increasing by 75% to 2050 (mainly on electricity), while average annual household energy bills would decline by about a third in advanced economies (it would double in emerging market and developing economies as more people gain access to electricity). These changes depend on a very large number of things, however, including successfully meeting the 400 milestones above, as well as unprecedented levels of public and private investment. Spending on the electricity grid alone would need to triple. And investment to achieve all of the changes put forward in the scenario is estimated at a jaw-dropping $5 trillion USD per year to 2050, a five-fold increase in current annual investment levels.

As for availability and reliability, much would hinge on the ability to finance, permit and construct a mind-boggling amount of energy infrastructure in the "unprecedented clean technology push." The proposed increase in renewables, for example, is equivalent to adding the world's largest solar photovoltaic park (over 2000 MW) to the grid every day. It would also require ramping up the production of inputs and supply chains to support new energy sources and uses. The rapid growth in EVs and grid-scale storage, for example, would necessitate battery production to skyrocket from 160 GWh today to 6600 GWh in 2030, an increase of 4000% in less than a decade. As for electricity reliability, the electricity system would need to become far more flexible to accommodate rapid changes in demand and supply, with the scenario estimating a four-fold increase in hour-to-hour flexibility requirements. Batteries and demand response would be the primary sources of flexibility, followed by hydro and hydrogen-based power sources. In oil and gas markets, if the IEA's scenario came to pass, by 2050, OPEC would be providing over half of the global oil supply (up from a third), the highest proportion in the history of oil markets. And liquefied natural gas exports would come predominantly from the Middle East, Russia, and Africa (followed by Australia and, distantly, Southeast Asia and North America). This could increase the likelihood of supply disruptions in oil and gas markets due to geopolitical conflict.

Is all of this feasible? The IEA notes that in addition to rapid technological advances, the changes require "skilful policy development and implementation." This includes policy attention to energy security. Against the backdrop of the myriad issues noted above, the IEA implores policymakers to "address emerging energy security risks now," stating that "[e]nsuring uninterrupted and reliable supplies of energy and critical energy-related commodities at affordable prices will only rise in importance on the way to net zero" (ibid:23). The Agency identifies three emerging security risks. First, the reduction of oil and gas production for producing countries and companies, which requires governments to replace lost revenues and economic output and attend to traditional energy security concerns as production is concentrated in OPEC's hands. Second, the substantial supply of critical minerals needed to support new sources of energy production and storage, which creates new security concerns like price volatility and increased costs if supply can't keep pace with demand. And third, the growing centrality of electricity reliability as more and more sectors electrify, the proportion of power generated from intermittent wind and solar multiplies, and the energy system's vulnerability to cyberattacks grows.

The IEA also states that achieving net zero will require robust international cooperation. How are Canada and the United States doing on these fronts?

ENERGY SECURITY IN CANADA-US RELATIONS: FROM LEAD ROLE TO BIT PLAYER

In their first meeting, US President Joe Biden and Canadian Prime Minister Justin Trudeau signaled their intention to collaborate closely on climate change in the Roadmap for a Renewed US-Canada Partnership. As detailed below, however, energy security is scarcely mentioned in the document. This follows a trend over the last twenty years in which energy security has slipped further and further off bilateral agendas. In the Bush administration's (2001–2009) relationship with Canadian prime ministers Chrétien, Martin, and Harper, energy security was front and center in domestic and bilateral policy and political agendas. But this security focus waned over time.

Why? Two developments explain the shift: shale and climate. As detailed below[2], the "shale revolution" transformed the US from hydrocarbon poor to hydrocarbon rich, reducing domestic and bilateral policy attention to security of oil and gas supply. Climate, for its part, came increasingly to dominate political and policy agendas. Both developments pushed energy security ever lower on bilateral agendas.

SHALE: FROM OIL AND GAS SCARCITY TO ABUNDANCE IN THE US

In the last two decades of the twentieth century, growing US dependence on energy imports propelled energy security—understood as security of oil and gas supply—ever upwards on American political and policy agendas. 9/11 amplified the security focus and, as noted above, added critical infrastructure protection to energy security concerns. In this context, the US looked to Canada to help secure its oil and gas supplies. But beginning in the mid- to late-2000s, the "shale revolution" profoundly reshaped North America's energy landscape. The capacity to profitably develop the continent's massive reserves of unconventional oil and gas (shale/tight oil and shale gas) with the technologies of hydraulic fracturing ("fracking") and horizontal drilling transformed the oil and gas reserve and production picture in the United States and pushed energy security ever lower on bilateral policy agendas.

As of 2019, the US possessed 44.2 billion barrels of proved oil reserves, an all-time high and a doubling of reserves in just ten years (proved reserves were 20.7 billion barrels in 2009) (US EIA 2021c, Table 5:27). In natural gas, the picture is even more striking: the increase in proved reserves of shale gas skyrocketed more than fifteenfold in just over a decade, from 23.3 trillion cubic feet in 2007 to 353.1 trillion cubic feet in 2019 (US EIA 2021e). Proved reserves of all forms of natural gas (conventional and unconventional) in the United States in 2019 were 494.9 trillion cubic feet (US EIA 2021c, Table 9:35), almost doubling in just over a decade.

The shale revolution has reshaped Canada-US energy relations. The US has gone from hydrocarbon scarcity to abundance, and oil and gas production has climbed steeply along with it. Crude oil production increased from 5.2 million barrels per day in 2005 to 12.2 million barrels per day in 2019—a level well beyond the American oil production peak of 9.5 million barrels per day in the early 1970s (US EIA 2021a, Table 3.1:59).[3] Thanks to the shale revolution, the US has become the largest oil producer in the world. The production increases prompted the US Congress to do something in late 2015 that would have been unthinkable a few short years prior: lift the ban on exporting crude oil beyond North America. While the United States will continue to be a net importer of petroleum products—its domestic requirements exceed 20 million barrels per day (US EIA 2021a, Table 3.1:59; this dipped to 18.1 million barrels per day in 2020 due to the pandemic but bounced back to an average of 19.0

2 The sections on shale and climate draw on Gattinger 2021a and Gattinger and Aguirre 2016.

3 For comparison purposes, data from 2019 has been used instead of that from 2020 given the production declines resulting from the pandemic. Average daily production in 2020 was 11.3 million barrels per day and was 10.9 million barrels per day in the first six months of 2021 (ibid).

in the first six months of 2021)—import volumes are predictably on the decline. The country reduced petroleum imports by 4.6 million barrels per day between 2005 and 2019 (ibid; from 13.7 to 9.1 million barrels per day), with the majority of the decline accounted for by reduced imports from OPEC countries, from 5.6 million barrels per day in 2005 to just 1.6 in 2019 (US EIA 2021a, Table 3.3c:66). The pandemic appears to have sharpened these trends, with imports dipping down to 7.9 million barrels per day in 2020 (US EIA 2021a, Table 3.1:59), and imports from OPEC countries cut almost in half in one year (to 0.9 million barrels per day in 2020; US EIA 2021a, Table 3.3c:66). As for imports from Canada, they have increased over this period, from 2.2 million barrels per day in 2005 to 4.4 in 2019 (US EIA 2021a, Table 3.3d:67), but lower oil prices in North America and a lack of pipeline capacity to US markets have been an ongoing challenge for producers in Canada.

US natural gas production climbed from 18.1 trillion cubic feet of dry (consumer grade) natural gas in 2005 to 33.7 trillion cubic feet in 2019 (US EIA 2021a, Table 4.1:101). This has had a foreseeable impact on natural gas trade: the United States has been a net importer of natural gas for decades, with most imports coming from Canada. Now, the United States exports natural gas in increasing volumes, including to Eastern Canada from shale deposits in the Northeast: gas exports grew sixfold over the last decade, rising from 729 billion cubic feet in 2005 to 4.7 trillion cubic feet in 2019 (ibid). By 2017, the United States was a net exporter of natural gas—the first time since the 1950s (ibid). US imports of Canadian natural gas have declined from 3.7 trillion cubic feet in 2005 to 2.7 trillion cubic feet in 2019 (US EIA 2021a, Table 4.2:102).

Production increases have had a predictable impact on affordability, placing strong downward pressure on prices in North America. In the last twenty years, the price of a barrel of West Texas Intermediate (WTI), the benchmark price for oil in North America, peaked at about $100 a barrel in 2008, but by 2015 was about half that, and averaged about $50 a barrel in the following years (US EIA 2021d). Natural gas prices also peaked in 2008 at about $9 per million Btu, but dropped to floor levels in the years following, averaging about $3 per million Btu (US EIA 2021c). This has challenged Canadian gas producers, who are not only selling less into the US marketplace, but are also getting lower prices for their product.

All told, the shale revolution weakens American energy security concerns across all three IEA dimensions: supplies, availability, and affordability. Throughout the post-war period, energy scarcity dominated US thinking and policy, including in its relations with Canada, to whom it looked for plentiful, affordable, and reliable oil and gas supplies. The rapid transformation to hydrocarbon abundance means the US worries less about security of oil and gas supplies. Public opposition to domestic and cross-border pipelines to carry oil and gas from producing to consuming areas generates periodic security concerns (e.g., Michigan Governor Gretchen Whitmer's opposition to Enbridge's Line 5 pipeline), but these situations tend to be regional and specific to individual infrastructure projects, rather than focused on security of the broader energy system in the domestic or North American context. The latter features less prominently—if at all—in US relations with Canada in recent years, as detailed further on in this paper.

CLIMATE: THE ASCENDANCE OF CLIMATE ON POLITICAL AND POLICY AGENDAS

Beginning in the 1980s, policymakers began to attend in greater earnest to the environmental impacts of human activity. Impacts range from global issues like climate change to regional concerns like air pollution to local effects on land, air, and water. Notwithstanding the wide range of environmental issues, recent years have seen climate change come to dominate environmental agendas. Successive reports of the United Nations' Intergovernmental Panel on Climate Change document that the climate is changing rapidly and argue for the urgency of increasing global mitigation efforts (IPCC 2018; 2019; 2021). Climate policy is especially germane for the energy sector, given that energy production and use—in industry, transportation, buildings, electricity, and heat production—account for approximately three-quarters of global GHG emissions (United States Environmental Protection Agency 2021). Combustion of fossil fuels (oil, gas, coal) makes up the lion's share of energy emissions (IEA 2020).

Given this, much of climate policy and politics has focused on energy sources, notably fossil fuels (oil, gas, coal) and renewables (e.g., wind, solar, hydro), with attention centered on transitioning the energy mix from one dominated by fossil fuels to one dominated by renewables. But despite decades of climate efforts, the world's energy mix has remained virtually unchanged: the proportion of global primary energy demand accounted for by fossil fuels has sat stubbornly at about 80 percent for the last four decades (IEA 2020). In North America, perceptions of inadequate government action on climate have often resulted in climate politics and activism being played out through opposition to individual energy projects—think Keystone XL. Advocacy can also target particular fossil fuel sources, notably the Canadian oil sands or the use of (fracked) natural gas as a bridge fuel to lower-emitting energy sources. While this framing of climate action attends to the "sources" dimension of energy security, as discussed later in this paper, it neglects the imperatives of affordability and availability/reliability. This can have the unintended effect of stymying emissions reductions if a lack of reliable and affordable energy reduces public, industry, and political support for climate action.

Both Canada and the US have seen climate rise on public agendas, and federal administrations in both countries prioritizing climate change. Interestingly, however, over the last twenty years, climate enthusiasm on one side of the border has not always been matched on the other. In the US, climate featured prominently at the federal level beginning in 2009 under the Obama administration (2009–2017), notably with the Clean Power Plan and efforts to create a cap-and-trade system for carbon emissions early in the president's first mandate. This enthusiasm for climate action was not shared on the other side of the border by the Harper government (2006–2015), however, which eschewed climate in favor of seeking North American and international market access for Canadian oil and gas. This changed in 2015 with the election of the Trudeau government, for whom climate has been a top priority. Over the course of successive mandates, the government established a nationwide carbon tax, a comprehensive climate plan, and net zero by 2050 legislation. The short period of climate alignment under the Trudeau-Obama administrations ended with the election of Donald Trump as US president (2017–2021). Trump opposed climate action, canceled the Clean Power Plan, and pulled the US out of the Paris climate accord. With the election of Joe Biden as president, both countries are now on a firm climate footing. But, as detailed below, energy security is a bit player in their bilateral agenda, and this gap could stymie their shared climate objectives.

In sum, alongside the shale revolution, the ascendance of climate on political and policy agendas has diminished the focus on energy security in bilateral relations. The tendency to focus on energy sources in climate policy and politics means Canada and the US have put more attention on collaboration to develop "clean" energy sources (e.g., innovations in renewable power), with limited attention to questions of affordability or availability/reliability. And even though both countries are large oil and gas producers (the US is the largest in the world), climate activism targeting fossil fuels has made it politically challenging for progressive governments, whether Liberal or Democrat, to include collaboration on oil and gas—the traditional areas of focus for energy security in North America—on bilateral agendas.

THE DECLINE OF ENERGY SECURITY IN BILATERAL AGENDAS: FROM THE NORTH AMERICAN ENERGY WORKING GROUP TO THE ROADMAP FOR A RENEWED US-CANADA PARTNERSHIP[4]

Canada-US energy relations over the past two decades can be divided into four periods, each aligned with successive US presidencies. Security featured prominently in the first period under US President George W. Bush (2001–2009). While 9/11 propelled energy security upward on political and policy agendas, it was already a high priority for the Bush administration prior to the terrorist attacks. US dependence on foreign energy sources doubled between 1980 and 2000, and the greatest growth in dependence took place over the last decade of the 20th century: the US imported 25 quadrillion British thermal units of energy in 2000, up from 12 in 1980 and 14 in 1990 (North American Energy Working Group 2002). Rising gasoline prices in 2000–2001 also focused attention on energy security, as did tight energy supplies in North America. In 1999, North American oil demand comprised 31 percent of global demand, but the continent accounted for only 19 percent of global oil production (ibid). Forecasts at the time suggested the energy deficit in oil would continue and begin to extend to natural gas as well (ibid). While history would of course prove these forecasts wildly wrong, they drove energy policy and bilateral energy relations in North America at the time.

The Bush administration's May 2001 National Energy Policy (NEP) emphasized energy security. The Plan, *Reliable, Affordable, and Environmentally Sound Energy for America's Future*, listed its goals in order of priority. Environmental considerations took a decided backseat to increasing energy supply. Fully one-third of the NEP's 105 recommendations focused on building international relationships, notably with Canada and Mexico, to achieve the administration's aim of greater diversity in energy supply (Abraham 2002). The plan conceived of energy security in continental terms and viewed increased energy production and cooperation in North America as an important building block. The Chrétien government in Canada viewed American interest in the country's energy resources as a major opportunity for the energy sector (particularly Alberta), and in the years that followed, Ottawa advocated the view to US politicians, opinion leaders, and citizens that "Canada is the largest, safest and most secure supplier of energy to the US" (Canada, Department of Foreign Affairs and International Trade 2004).

The NEP's continental approach was presaged by the creation in April 2001 of the North American Energy Working Group (NAEWG), a Canada-US-Mexico initiative announced following the meeting of Prime Minister Chrétien, President Bush, and Mexican President Vicente Fox during the Summit of the Americas in Québec City. Composed of senior energy officials from the three countries and chaired jointly by Natural Resources Canada, the US Department of Energy, and the Mexican Secretariat of Energy, the group's mandate was to strengthen energy markets in North America with a focus on reliability, infrastructure, technology, production, best practices, regulations, energy efficiency, and conservation. In 2005, the NAEWG began operating under the auspices of the Security and Prosperity Partnership (SPP), created by the American, Canadian, and Mexican governments in the aftermath of the September 11, 2001 terrorist attacks. The SPP Energy Working Group built on the NAEWG's mandate and placed security front and center: "to increase reliable energy supplies for the [North American] region's needs and development, by facilitating investment in energy infrastructure, technology improvements, production and reliable delivery of energy; by enhancing cooperation to identify and utilize best practices, and to streamline and update regulations; and by promoting energy efficiency, conservation, and technologies such as clean coal" (Security and Prosperity Partnership 2008). A number of forward-looking "outlook" documents were prepared by energy officials from the

4 This section draws on Gattinger 2011b, 2012, 2016, 2021a, 2021d and Gattinger and Aguirre 2016.

three countries during this period, including a "vision" for natural gas development in North America and a report on collaborative development of Canada's oilsands (see North American Energy Working Group 2005; 2006). The NAEWG also published documents detailing key energy statistics and comparative regulatory information for each country. Collaboration in this period also included the Trilateral Agreement on Energy Science and Technology signed by Canada, the US, and Mexico in 2007. The Agreement established a broad framework for joint projects and programs, including exchange of personnel and cost-sharing arrangements, but its potential remained largely unrealized.

During this period, energy security was also a key priority because of the "Great Blackout" of 2003 that left some 50 million Canadians and Americans without power in Ontario and the Northeastern and Midwestern US. The Canadian and American governments collaborated extensively following the outage, creating a bilateral task force to investigate its cause(s) and recommend how to decrease the possibility of such outages in the future. The Task Force found that the outage was largely preventable and that failure of some electricity sector players to comply with voluntary industry standards—including standards for basic vegetation management (tree-trimming) around transmission wires and adequate staff training—was a major contributing factor. The group's final report called "first and foremost" for reliability standards to be made mandatory, with significant penalties for failure to comply (United States–Canada Power System Outage Task Force 2004). Bilateral collaboration pursuant to this report fed into the US Energy Policy Act of 2005, which called for the creation of an Electric Reliability Organization (ERO) to develop and administer mandatory reliability standards under the oversight of the Federal Energy Regulatory Commission (FERC). The legislation also called for the ERO to gain recognition in Canada and Mexico. Following this legislation, the North American Electric Reliability Council (NERC), an industry self-regulatory body established in the 1960s to develop voluntary reliability standards for the bulk power system, reformed its governance structure, successfully applied to the FERC to become the new ERO, and incorporated as a not-for-profit organization as the North American Electric Reliability Corporation. NERC sought recognition from federal and provincial energy regulators in Canada as well. NERC develops standards through a bottom-up industry-led process, which includes representatives of both Canadian and American operators across the electricity industry (see Gattinger 2011a).

But this bilateral focus on energy security was not to last. In the second period of bilateral relations under President Obama (2009–2017), the shale revolution gained steam, the administration had a strong focus on climate, and energy security slid off the bilateral agenda. This happened despite the fact that the Conservative government of Stephen Harper (2006–2015) eschewed climate and touted Canada as an "energy superpower." The Conservative Party's 2006 election platform committed to developing a "made-in-Canada" plan to reduce greenhouse gas emissions (Conservative Party of Canada 2006:37). Once in power, the government stated that Canada would not meet its Kyoto GHG reduction targets at the 2006 UNFCCC meetings in Germany (Canada was chair) (Curry 2006). Canada called for the second post-2012 phase of the Kyoto Protocol to use voluntary targets, establish lengthier deadlines, and include exceptions for Canada's resources (ibid). In 2007, the government's *Turning the Corner* plan pledged a 20 percent reduction in Canada's 2006 emissions levels by 2020, a target that was critiqued for halving the country's original Kyoto commitment (Bramley 2008). When the party went back to the polls in 2008, it committed to transforming Canada into a "clean energy superpower" by supporting pipeline development, investing in biofuels and renewable energy, and aiming to have 90 percent of Canadian electricity generated by non-emitting sources like nuclear, hydro, and wind (Conservative Party of Canada 2008:23). The Conservatives also pledged to establish a cap-and-trade system in North America, but once in power, did not follow through on the commitment in the wake of the global financial crisis and recession, which knocked cap-and-trade off the policy agendas in both Canada and the United States.

As for President Obama, he quietly put an end to the SPP in 2009, an initiative that by that point was strongly critiqued for insufficient involvement of both civil society and Congress. The NAEWG also did not survive. The Harper government was looking to work with the US on

energy security and reportedly tried to engage the new president in an energy security/climate change deal at their first meeting in January 2009, but the effort was not successful (McCarthy and Clark 2008). Instead, the prime minister emerged from the meeting with the climate-focused Canada-US Clean Energy Dialogue (CED). The Dialogue "commit[ted] senior officials from both countries to collaborate on the development of clean energy science and technologies that will reduce greenhouse gases and combat climate change" (The White House 2009). CED activities focused on three main areas: clean energy technology (predominantly carbon capture and storage), clean energy research, development and deployment (including energy efficiency labeling and buildings), and the electricity grid (modernizing and "greening" the grid). Energy security was evident in some of the group's efforts, but was not an overarching focus. The most security-focused approach emerged from the electricity grid group, which aimed "to realize a reliable, adequate and secure North American electrical system—which will support a cleaner energy portfolio while providing cost effective energy solutions to consumers" (Canada 2009: 5).

Other notable collaborative initiatives during this period included a fall 2014 consultation session in Ottawa with US Secretary of Energy Ernest Moniz on the US Quadrennial Energy Review—the only session held outside the United States. The two energy ministers also signed a memorandum of understanding on science and technology collaboration, and in May 2015, along with Mexico, they founded a North American Energy Ministers' Working Group on Climate Change and Energy (Cohen 2015).

By far the most notable development during this period was the emergence and intensification of bilateral conflict between Canada and the US over development of the oil sands. The resource was criticized for having a heavier environmental footprint than conventional oil (higher GHG emissions, water usage, impact on the boreal forest, tailings ponds, etc.) and the Canadian government faced mass protests and high-profile advertising campaigns in the US against the oil sands—referred to as the "tar sands" or "dirty oil"—ever-more frequently. American politicians, including Barack Obama himself, also began to make pronouncements against "dirty oil," and develop policy and legislation against the oil sands, including federal legislation prohibiting the US government from purchasing fuels that produce more emissions than conventional oil, a resolution by the US Conference of Mayors against the use of oil sands fuel for municipal vehicles, and the development of low carbon fuel standards in California. Although the Harper and Alberta governments responded by pointing out that GHG emissions from the oil sands were comparable to those of conventional oil producers who exported to the United States, opposition did not dissipate. The flashpoint for opponents was the Keystone XL pipeline, which would carry oil from the oil sands to refineries in the US Gulf Coast. Opponents ranged from local communities and landowners, to city mayors and council members, to Indigenous leaders and communities, to local, national, and international environmental NGOs and individual citizens. The Harper government was a staunch supporter of the project, making regular trips to Washington and other US locations to advocate for the Obama administration's approval of the project. But pressure on the president to reject the project was potent, relentless, and ultimately, effective: he rejected the project during the final months of his presidency.

The tail end of this period coincides with the election of the Trudeau Liberals in fall 2015. The key change here was the new government's commitment to climate. In Paris, the Liberals committed to reducing emissions 30% below 2005 levels by 2030 (from 730 MT to 511, albeit the same commitment as the Harper government). US commitments were similar to Canada's—President Obama committed to reducing US emissions 26–28% below 2005 levels by 2025. On the bilateral front, the Liberals' first year in power featured some modest collaboration, including meetings of the North American energy ministries in early 2016 (focused mainly on electricity) and the North American Leaders Summit in June 2016. The Leaders' Statement discussed increasing clean power, reducing methane emissions, and strengthening vehicle efficiency. But the Clean Energy Dialogue, despite considerable fanfare accompanying its creation, was never well-resourced on either side of the border and progressively lost what little steam it had. Energy security, for its part, by this point was at most a bit player on the bilateral agenda.

This changed to some degree in the third period of bilateral relations under President Trump (2017–2021),

who reversed the Obama government's decision on the Keystone XL pipeline as a means of strengthening security of US energy supply. He also reversed course on climate, notably by pulling the US out of the Paris Climate accord and repealing domestic climate measures like the Obama administration's Clean Power Plan. But the seeming win for Canada on Keystone was quickly overshadowed by bilateral conflict and contention with the US over everything from steel tariffs, to supply management, to the G7, to NAFTA. There was no formal bilateral collaboration agenda on energy and climate between Trump and Trudeau, but rather, an ad hoc approach, that moved from crisis to crisis, and wasn't grounded in either energy security or collaboration.

It wasn't until the fourth period, with the election of US President Joe Biden, that robust bilateral collaboration re-emerged. In the first meeting between the two leaders, the prime minister and president unveiled an ambitious Roadmap for a Renewed US-Canada Partnership (Canada, Prime Minister's Office 2021). The document lays out a bold set of commitments on a broad range of topics, including pandemic response, climate change, and defence and security. The climate section begins with the two leaders committing to "strengthened implementation of the Paris Agreement, including by working together and with others to increase the scale and speed of action to address the climate crisis and better protect nature" (ibid). This anchors the objectives, measures, and bilateral initiatives that follow. Increasing climate ambition and targeting a net zero industrial transformation are key objectives. Collaboration in areas including zero-emissions vehicles (more on this in the conclusion), battery and renewable storage technologies, and climate-related financial risk disclosure support these objectives. The leaders also committed to working together internationally to encourage others to achieve net zero emissions by 2050. A key action here was the US-hosted Leaders' Climate Summit in April 2021, where both countries announced increases to their climate ambition above existing Paris commitments (the US to 50–52% emissions reductions below 2005 levels by 2030; Canada to 40–45%).

Energy security, for its part, is only mentioned once in the roadmap. It appears in the section on "building back better" in general terms that note the "important economic and energy security benefits of the bilateral energy relationship and its highly integrated infrastructure" (ibid). There are no specific measures to enhance energy security beyond a commitment to implement a collaboration framework for cybersecurity. Reliability, prices, and affordability aren't mentioned once in the document. It's unclear at this stage why security was not addressed explicitly—perhaps because a climate lens can obscure from view other energy imperatives, perhaps because energy security is still understood by leaders as security of oil and gas supply, perhaps because once security's slipped off the bilateral agenda it takes time to find its way back on, or perhaps because of political sensitivities in one or both countries around particular elements of security (e.g., affordability and pricing). Regardless, it's a glaring omission that will stymie efforts to reduce emissions.

The good news is there's room to build energy security collaboration into the bilateral agenda. Key elements of the process provide the opportunity to do so. Chief among them is the High Level Ministerial Dialogue on Climate Ambition led by Canada's Minister of Environment and Climate Change and the US Climate Envoy. The president and prime minister positioned the Dialogue as a privileged bilateral channel: the two ministers met the day after the leaders' meeting, committed to meeting twice yearly thereafter and announced that the Dialogue will have work streams on increasing shared climate ambition, aligning policies and regulations to address emissions and impacts, and collaborating on climate adaptation. Energy security could readily be integrated into these streams, as detailed in the next section. Alongside this process is work to renew the Memorandum of Understanding on energy between Natural Resources Canada and the US Department of Energy to target energy transition, "clean energy innovation," and low-carbon transportation. Energy security could likewise be built into this agenda. In addition, the roadmap commits both governments to include Indigenous peoples, subnational governments, workers, and stakeholders in these processes. This is an important commitment given that previous initiatives like the Security and Prosperity Partnership were critiqued for lacking openness and transparency. It is also a commitment that opens the door to broadening the agenda to encompass energy security.

OPPORTUNITIES FOR BILATERAL ENERGY SECURITY COLLABORATION ON THE ROAD TO NET ZERO[5]

Energy security is a necessary condition on the road to net zero—technically, economically, politically, and socially. But as the above analysis reveals, bilateral policy relations, like climate policies and debates, have tended to zero in on the sources component of energy security (the energy mix), but have paid limited attention to availability/reliability and affordability. There are a number of opportunities for the two countries to collaborate on these areas in the years ahead.

The first is planning. Canada and the US are sovereign states and both countries have been mindful of ensuring a 'capacity for choice' and autonomy in their respective policy and regulatory frameworks (see Gattinger and Hale 2010; Hoberg 2002). But reducing emissions to net zero by 2050 while attending to energy sources, availability, and affordability requires careful planning, particularly between two countries whose energy systems and economies are as integrated as Canada and the US. What is the appropriate level, pace, and nature of energy development and production in the Canada-US region? How can governments ensure energy is produced in ways that yield affordable and reliable energy? These efforts could include producing a joint energy outlook using common methodologies for calculating energy potential, supply and demand, infrastructure and investment requirements, availability, affordability, and emissions. Given the capital intensity and duration of energy infrastructure, coordinating infrastructure planning and investments makes sound economic, environmental, and security sense, and would help to minimize overlap and redundancy, maximize the deployment and coordination of renewable energy, and strengthen energy security.

And there is precedent for this. As detailed earlier in this paper, forward-looking processes like these were undertaken in the early 2000s under the North American Energy Working Group, which adopted continental approaches and proposed recommendations for energy in North America (NAEWG 2005; 2006). Joint planning was also undertaken through the Clean Energy Dialogue, including production of the North American Carbon Storage Atlas (2008–2012), which mapped large stationary carbon dioxide sources and the location and potential of geological storage sites in Canada, the US, and Mexico (Canada, NRCan 2017). One of the most comprehensive joint planning processes to date is the Western Renewable Energy Zones (WREZ) initiative, a major project launched in 2008 spanning the Western electricity interconnection. It brought together a wide diversity of Canadian and American power sector players along the western coast of North America who developed common data standards, definitions, metrics, and modeling methodologies to identify areas in the western interconnection with the greatest potential for renewable energy development. These sorts of planning efforts should be revived and reinvigorated.

Planning would help to inform the second area for joint efforts targeting energy security: innovation and trade. Bilateral collaboration would help heed the IEA's call for an "unprecedented clean technology push" to 2030 and "unprecedented clean technology innovation" to 2050. It would also address the three key energy security risks the IEA identified: changes to oil and gas production, critical minerals supply and electricity reliability. For Canada and the US, two countries with large hydrocarbon resources, successfully charting the road to net zero is fraught. If the IEA scenario proves accurate and oil and gas remain part (albeit a much smaller part) of global energy production, Canada and the US can collaborate on innovation in the oil and gas sector to simultaneously reduce emissions while strengthening energy security. This will be crucial for domestic energy security in both countries and for potential joint efforts to strengthen global energy security, notably Europe's desire to reduce dependence on Russian oil and gas in the wake of the war in Ukraine. Here at home, the shale revolution has reduced US oil and gas imports, but imports from Canada have come to represent a much larger share of energy coming into the country.

5 This section draws on Gattinger 2012, 2021a, and 2021d.

As noted earlier, petroleum imports to the US from Canada have grown from 2.2 million barrels per day in 2005 to 4.4 in 2019 (US EIA 2021a, Table 3.3d:67) and have come to represent a much greater proportion of total imports, rising from 16 percent in 2005 to almost half (49 percent) in 2019 (ibid), edging out OPEC suppliers. In natural gas, US imports of Canadian natural gas have declined from 3.7 trillion cubic feet in 2005 to 2.7 trillion cubic feet in 2019 (US EIA 2021a, Table 4.2:102), but Canadian imports have further cemented their dominance in the US marketplace, with the proportion of gas from Canada rising from 85 to 98 percent between 2005 and 2019 (ibid). Beyond North America, both countries could expand their oil and gas exports to strengthen global energy security.

Crucially, ensuring reliable and affordable supplies of oil and gas on the road to net zero requires developing the resources in a way that is both cost *and* carbon competitive. The bilateral roadmap commits Canada and the US to collaborate on the important objective of methane management, but equally important is collaboration on carbon capture, utilization, and storage, and developing new energy sources like hydrogen. Why not a North American approach to this, including joint work on environment, social, and governance indicators, as well as measurement, verification, and monitoring of the carbon intensity of oil and gas products, including those for export? If done right, this could pave the way for Canada and the US to collaborate internationally on energy security and on emissions credits through Article 6 of the Paris Agreement.

In addition, collaboration on mitigation technologies for oil and gas supports the development and application of these technologies in other sectors. CCUS will be needed to reduce emissions in hard to abate sectors like cement, steel, and chemicals manufacturing. Likewise, work to develop the technologies and supply chains for hydrogen in the energy economy extends beyond "blue" hydrogen (produced from natural gas with CCUS) to "green" and "pink" hydrogen (produced from renewable electricity and nuclear power). The IEA net zero roadmap underscores precisely these sorts of synergies: innovations in oil and gas will help to reduce emissions in hard to abate sectors and build the markets, supply chains, and infrastructure for hydrogen.

In the electricity sector, although electricity imports to the US from Canada have declined in recent years[6], there are rich opportunities for bilateral collaboration on innovation and trade to enhance energy security and support emissions reductions (see the paper by Basseches and Ikenze in this series for an in-depth treatment of Canada-US electricity trade). Given the much lower-emitting generation profile of the Canadian electricity sector—over 82% non-emitting (Canada Natural Resources Canada 2021) compared to 40% in the US (US EIA 2020)— electricity imports from Canada not only help to reduce US emissions but also enhance electricity reliability and affordability by increasing system flexibility and strengthening competition. With the rapid demand increases propelled by widescale electrification, collaboration to maximize the cost-effectiveness, efficiency, reliability, and affordability of electricity will support emissions reductions in the decades ahead. The two countries can also collaborate on innovations in low and zero-emissions electricity applications, including batteries, small modular nuclear reactors, and zero-emissions vehicles (see the conclusion for more on EVs). Increasingly, as detailed above, the concept of energy security will include secure access to critical minerals for batteries and renewable energy. This will require rapidly scaling-up mining operations and developing robust, reliable supply chains. All of this would help to align policies and regulations to address emissions, a key work area for the High Level Ministerial Dialogue, as well as joint work on transition, clean energy innovation, and low-carbon transportation envisaged in the bilateral MOU.

6 US imports from Canada grew from 41.5 terawatt hours in 2006 to a peak of 68.5 terawatt hours in 2015, but declined to 52.3 terawatt hours in 2019, with the proportion of imports from Canada declining from 97 to 88 per cent over this period as imports from Mexico grew (US EIA 2020, Table 2.14:np).

The third area also relates to innovation, but in this case, institutional (not technical) innovation to support energy security. The opportunities here are multiple. The roadmap commits Canada and the US to collaborate on cybersecurity, which will be crucial, particularly in the power sector, as both countries look to electrify their energy systems. But there are many other areas that need attention. Chief among them is mutual learning in reforming energy regulatory systems to incentivize emissions reductions while simultaneously ensuring reliable, affordable energy supplies. Recent research in Canada on designing energy project decision systems for net zero underscores that in order to be effective, decision-making frameworks must be functional (able to take durable decisions), adaptable (capable of evolving in light of changing circumstances), and legitimate (able to secure the confidence of the public and investors alike) (Cleland and Gattinger 2021). A potential area for mutual learning is best practices for reforming utilities regulation to broaden the focus from a cost-of-service model to one that incorporates emissions reductions in decision making. These institutional innovations will be pivotal to securing investor support for the vast infrastructure builds required to transform energy systems in the decades ahead.

Institutional reforms are also needed to secure social support for these transformations. The need for community support of energy infrastructure and the importance of local knowledge is often overlooked in decision making and planning for net zero. While fossil fuel infrastructure— notably pipelines—has been a flashpoint for opposition, renewable energy projects like windfarms, hydropower facilities, and electricity transmission projects can also face stiff opposition for their local impacts on land, water, and ecosystems; visual landscapes; or social issues like the process of reconciliation with Indigenous peoples (see, for example, Cleland et al. 2016; Simard 2016). Community support will likewise be pivotal to the development of hydrogen infrastructure (notably export sites), CCUS infrastructure (pipelines, sequestration sites), deployment of nuclear energy (mining, generation, waste management) and the expansion of mining for the critical minerals needed for batteries, solar panels, and other low or zero-emissions energy technologies. Crucially, public engagement processes are valuable opportunities to bring forward local perspectives that can improve both project and policy decision making (ibid; McAvoy 1998).

Yet community confidence is not on the bilateral energy and climate agenda. Neither is energy regulatory reform. At a minimum, Canada and the US should share best practices in both of these areas. Both countries need to learn what works and what doesn't more rapidly than ever before. And collaboration can extend beyond sharing best practices. When it comes to engagement, as noted earlier, the bilateral roadmap commits both governments to engaging Indigenous peoples, subnational governments, workers, and stakeholders in their climate agenda. This opens the door to putting in place joint public involvement processes. While joint processes would likely prove too challenging in decision making for individual projects, Canada and the US could initiate joint processes to help inform and shape debate, directions, and policy frameworks for net zero in North America. This would enable governments to better understand the views, concerns, and priorities of citizens, investors, and other levels of government, and underscore the importance and value of collaborative approaches to energy and climate decision making. It would also help strengthen citizen awareness and understanding of the opportunities, challenges, and energy security dimensions of emissions reductions.

CONCLUSION

Energy security—the affordability, reliability, and availability of energy—is easy to take for granted in Canada and the United States. That it's taken for granted is a testament to the success of energy suppliers, investors, innovators, regulators, and policymakers in North America in providing reliable, affordable energy. The rise of shale oil and gas production, along with the increasing salience of climate change on political and policy agendas, has weakened attention to energy security over the years. In this light, it's perhaps not surprising that security slipped off the bilateral agenda in the twenty-first century. But the Canadian and US governments' commitment to net zero emissions by 2050 will require focused attention to security. Without reliable and affordable energy sources, it will be difficult to get climate action that sticks. Growing electrification of energy systems, the evolving role of oil and gas in energy systems, and more frequent extreme weather events due to climate change will challenge energy security in new and unprecedented ways. So will the Russian invasion of Ukraine, which has focused attention on the security of oil and gas supplies in global energy markets against the backdrop of growing global alignment on net zero by 2050.

Although the Roadmap for a Renewed US-Canada Partnership gives scant attention to security, there are multiple opportunities to integrate it into the bilateral collaboration agenda. Three key areas merit attention. First, Canada and the US could collaborate on planning, including producing joint energy outlooks (energy potential, supply and demand, security dimensions) and coordinating infrastructure planning and builds. Second, they could collaborate on innovation and trade, including on reliable, affordable, and carbon/cost competitive oil and gas for domestic and international markets, electricity trade to reduce emissions while strengthening reliability and affordability, security of critical minerals supply, and low or zero-emissions vehicles. Finally, the two governments could work together on regulatory reform, public and investor confidence in infrastructure decision making, and inclusive net zero decision making. These areas of institutional innovation will be crucial underpinnings of energy security in the years ahead.

Time will tell how robust the implementation of the Roadmap will be. The spirit of bilateral collaboration has been dampened considerably by the Biden administration's electric vehicle tax credit, which would exclude from eligibility vehicles assembled in Canada (Dunlevie 2022). The administration appears to be taking a similar 'Buy American' approach to securing reliable supplies of critical minerals for the United States (McCarten 2022). And early momentum between the two leaders and their climate ministers seems to have waned—the two have not met publicly since their initial meeting. Likewise, no announcements have been made about revising the MOU between the two energy departments. But it is still early days and Europe's desire to reduce its dependence on Russian oil and gas will no doubt see energy security reappear on the bilateral agenda, but it will be essential that collaboration around oil and gas in global energy markets advances both security *and* emissions reductions objectives.

Neither President Biden nor Prime Minister Trudeau face imminent elections, which gives them runway to re-energize Canada-US relations, including integrating energy security into net zero decision making and the bilateral roadmap. This will be essential for both countries to successfully pursue the ambitious climate objectives to which they've committed. It would also help maintain momentum on bilateral energy, climate, and energy security collaboration, something that previous initiatives have struggled to achieve.

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