SPECIAL REPORT

Talking Transition

Shaping Canada's Clean Power Pathways

Clean Power PATHWAYS

DAVID SUZUKI FOUNDATION

ISBN Print: 978-1-988424-50-7

ISBN Digital: 978-1-988424-51-4

Canadian Cataloguing in Publication Data for this report is available through Library and Archives Canada.

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Appendices for this report are available online at:
https://davidsuzuki.org/science-learning-centre/?search=talking%20transition

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The David Suzuki Foundation appreciates contributions from James Gaede for developing the survey of stakeholder preferences. The Foundation would like to thank the 150 plus energy and electricity system experts and stakeholders who provided their insights for the survey.

ACKNOWLEDGEMENTS:

The author would like to thank members of the Clean Power Pathways Expert Advisory Committee for their feedback.

While the author thanks the peer reviewers for their contributions, the report's contents and recommendations remain the sole responsibility of the author and the David Suzuki Foundation.

Funding for this report was made possible through the generous support of the Trottier Family Foundation. We'd also like to thank the Peter Gilgan Foundation.

This is the second in a series of reports from **Clean Power Pathways: Fast-tracking Canada's energy transition.**

Thank you to David Dodge with Green Energy Futures for use of their photos.

Design and production: Sara Bailey, Mika Creative

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About this document

Talking Transition: Shaping Canada's Clean Power Pathways is the second phase of **Clean Power Pathways: Fast-Tracking Canada's Energy Transition**, a three-year initiative of the David Suzuki Foundation in partnership with the University of Victoria, University of Regina and Royal Roads University. Clean Power Pathways aims to build broad and enduring support for a suite of actions that will transition Canada's energy system at a scope, scale and speed in line with the climate emergency.

This report follows and builds on our 2019 report *"Zeroing in on Emissions: Canada's Clean Power Pathways,"* an extensive review of decarbonization research and models. While *"Zeroing in on Emissions"* outlined lead actions, technologies and considerations, this report seeks to capture and compile the diverse perspectives of an array of energy stakeholders and experts, as well as the views of Canadians as captured by recent engagement exercises, polls and focus groups, on how to reach net zero by 2050 or sooner.

To better understand where Canadians are at, what they value, and what they will and won't support, we retained independent consultant James Gaede to design, deliver and analyze a survey of public and stakeholder preferences. More than 150 expert observers of Canada's energy system participated. These stakeholders closely follow innovations and adoption curves, and they not only track where and when climate policies and regulations are introduced, or infrastructure proposed, but how they are received by the public.

With this report, we seek to capture not only the views of the experts surveyed by Gaede, but also those of the engaged citizens who participated in the Government of Canada's recent Generation Energy initiative, and those of citizens as captured via public opinion researchers. We sought to understand what Canadians would like to see happen in a low-carbon transition, what they value from our electricity system and what they would like their leaders to prioritize.

We will use these preferences to inform one of several decarbonization scenarios now under development by Madeleine McPherson at the University of Victoria. We will release that work in 2021 as the third and concluding phase of this project.

Note: *The research for this report was undertaken in a pre-COVID-19 world and the ensuing collapse in oil prices. We acknowledge that, as with most sectors of the Canadian society, the context for the clean energy sector has shifted substantially over the past months. However, much of the polling, focus group and key informant interview data is still relevant in terms of providing insight into Canadian preferences and values around energy transition. Once we enter into a recovery phase, we will continue to face the issue of how to shift to an economy that is free of carbon emissions.*

Awakening to the challenge

There has been a monumental shift in concern over climate change among Canadians in 2018 and 2019. The concept of "climate emergency" has entered everyday conversations as Canadians increasingly grasp what is at stake. An Abacus Data poll before the 2019 federal election revealed that 90 per cent of voters prioritized action on climate change as urgent or important.[1] Other research suggests that 82 per cent of Canadians see a destabilized climate as a serious problem, with 47 per cent considering the phenomenon "extremely serious." Hundreds of thousands turned up for climate strikes throughout the country in September 2019.

But what are Canadians thinking when it comes to action on the energy transition? A healthy majority of us now acknowledge that such a transition is necessary and will happen with or without our nation's participation. In fact, most believe the transition will benefit Canada in the long run. As early as 2016, researchers found that 70 per cent of us want the country to "shift its energy use as quickly as possible to cleaner, lower-carbon sources of energy and away from fossil fuels."[2]

More recent polling suggests Canadians overwhelmingly support a transition to renewable energy. Focus groups confirm this finding: "Clean energy is universally perceived as a good thing, worthy of support, and strongly understood to be in alignment with Canadian identity and values," one researcher wrote in a recent report that summarized multiple candid conversations. "People want to feel hope for the future, and they know that clean energy is one topic that delivers."[3]

That said, a wholesale transformation of Canada's energy system will not prove straightforward. Fossil fuels currently meet 75 per cent of Canada's end-use energy demand.[4] An economy-wide transition would begin with energy efficiency and demand-side management, and include renewable liquid fuels and renewable natural gas for freight and high-process heat for industry. In decarbonizing its economy, Canada will also need to consider how to remain globally competitive.[5]

Reaching Canada's target will necessarily involve electrifying as much as possible. Any fossil-based energy service that *can* be electrified with clean electricity – think buses and passenger vehicles – must be repowered in that manner.

In our view, electrification rests at the core of the transition. Canada's transportation networks, buildings and industries will require significant new clean-power generation and transmission infrastructure. In the following chapters, we explore some of the challenges, barriers and opportunities associated with the transition, focusing on zero-emissions power, and the implications of producing what could end up being gigawatts worth of new clean electrons, increasing Canada's clean electricity capacity in more places and on a larger scale than ever before.[6]

Investors are moving their money from fossils to renewables

Canada's oil and gas sector recently faced a severe price shock as the novel coronavirus slowed economic activity and as low-cost oil producers flooded global markets. Oil prices were already under pressure, and 2014 prices of around $100 a barrel have become a distant memory. Investors, policy-makers and regulators are now recognizing long-term structural changes as an opportunity to redirect investments and intensify diversification efforts. Investment in renewables – such as Canada's largest private sector solar farm, a half-a-billion dollar project – is ramping up across the Prairies, as power producers take advantage of enviable wind and solar resources.[7]

Photo by Green Energy Futures

Which energy technologies will Canadians support?

While energy literacy remains low throughout the country, Canadians understand that wind turbines, solar photovoltaic arrays and hydro projects produce electricity that is "cleaner" than that generated by burning fossil fuels.

We also know that while a majority of Canadians express broad support for renewable energy, their enthusiasm can wane when a given new-project proposal goes public. To be clear, all proposed energy infrastructure – whether carbon-based or not – faces at least some resistance. But for this report we wanted to know which of a range of low-emitting power-generation technologies Canadians would most readily back.

To find out, we asked 150 energy experts to rank the perceived acceptability of various low-emitting generation and transmission options. Here's what they expect Canadians will likely support and oppose. Respondents consider the technologies highlighted in green to be likely acceptable, while those in yellow are more indeterminate. Meanwhile, companies and utilities hoping to develop technologies highlighted in red have some heavy lifting ahead of them before they can secure social licence, respondents said.

Low-emissions power preferences

LIKELY ACCEPTABLE

- PV, distributed
- PV, grid scale
- Geothermal
- Hydro, refurb
- Solar thermal
- Ocean energy (tidal/wave)
- Trade with provinces
- Wind, offshore
- Pumped hydro storage
- Hydro, run of river
- Biomass
- Wind, onshore

INDETERMINATE

- Hydro, new small
- Transmission lines

LOW-RATED

- Fossil w CCS
- Hydro, new large
- Nuclear, small
- Nuclear, large

Many of our stakeholders asserted in comments that Canada will not immediately require a great deal of additional electrical capacity, but most agree that situation will change as policy, along with shifting consumer preferences, begins to accelerate electrification. Climate-concerned Canadians are likely unaware of the quantities of electricity that will need to be produced to electrify the economy in response to climate change.

Photo by Dan Myers, Unsplash.

WILL CANADIANS BE READY FOR THE BIG SCALE-UP?

The Clean Power Pathways final report, due in 2021, will convey the scale of new capacity that will be needed to serve the load associated with economy-wide electrification. In the meantime, a recent Pacific Institute for Climate Solutions study offers a glimpse of what potential load increases could look like. A research team based at the University of Victoria modelled the additional firm clean-power capacity that would be needed to support electrification of road transportation in British Columbia.[8]

The team found that, when combined with the increased electricity demand associated with population and economic growth, a provincewide switch from pumps to plugs will require an additional 14 GW of new clean electricity capacity on the grid by 2055, for a total capacity of 36 GW, almost double the capacity in 2015. This is just for electrification of transportation. For perspective, the hotly contested Site C hydropower project now under construction in northern British Columbia will supply 1.2 GW of capacity.

Though the team did not translate the 14 GW increase into "iron in the ground," a quick and overly simplistic example gives a sense of the scale of new clean energy projects this would entail.

Consider wind turbines. It would take over 3,500 onshore wind turbines at 4.0 MW each to deliver the additional 14 GW. Thousands of kilometres of new transmission lines would also be needed to connect them to the grid.

Of course, increasing capacity via a more diversified mix of generation technologies while taking advantage of B.C.'s large hydro reservoirs (which can serve as giant batteries) would be more cost-effective, so in reality it is likely that fewer turbines would actually be erected/deployed by 2055. Adding electrification of buildings (especially heating) and industry to additional demand from electrifying transportation would add to this total.[9]

> There is a continued need to engage with communities, Indigenous peoples and stakeholders to determine the appropriate places and scales of renewable energy generation.

Photo by Brian Holdsworth

The social-licence issues associated with non-emitting electricity production are not trivial. They include conflict and major questions over priorities and ownership (corporate versus community owned), concerns over the perceived "sacrifice" of a specific local area in response to a global emergency, interests in preserving the existing character of a given region's landscape, and questions around who stands to benefit directly from new projects. "Such conflicts pose a significant barrier to the acceptance and pace of the renewable energy transition, and thus hinder efforts to mitigate climate change," concludes Kevin Palmer-Wilson, lead author of a recent study on the social licence issues associated with renewable energy development.[10] Community-owned renewable projects, or projects where local communities or Indigenous partners have a significant ownership stake or participation, have often faced much less resistance, and renewables are more amenable to community ownership.[11] Indigenous land rights, treaties and ongoing legacies of environmental racism in Canada are also an important backdrop as new, non-emitting projects are being considered.

What about nuclear fission? Leaders of some coal-reliant provinces have recently expressed tentative interest in exploring small modular reactors (often called SMRs) as a potential source of new electricity. Our expert stakeholders ranked it among the least socially acceptable non-emitting generation technologies and most saw little likelihood it would play a major role in the transition. As one of the stakeholders noted:

> ***"We need to be bold, we need to facilitate the new renewables which are cheaper than new fossil or nuclear generation."***

Then there's large-scale hydro. Following more than 60 engagement sessions nationwide, Generation Energy researchers echoed the findings of our energy expert survey participants that any new proposed large-scale hydroelectric project will doubtless face deep public opposition.[12] But social licence can also impact wind, solar, biomass, marine and geothermal projects, they found. As the Generation Energy dialogue summary notes,

> "Some citizens are concerned about environmental effects, such as bird strikes from wind turbines, flooding from dams, and impacts on wildlife habitats from large solar projects. This means there is a continued need to engage with communities, Indigenous peoples and stakeholders to determine the appropriate places and scales of renewable energy generation. The potential for environmental impacts means that new renewable projects must be designed to minimize environmental impacts and be planned with the participation of local communities.

Recognizing the importance of reconciling the inevitable eventual need for new renewable electricity with the imperative to protect fragile ecosystems and important cultural sites, in 2016 WWF Canada developed a tool intended to help project developers identify potentially problematic sites. The Renewables for Nature planning tool aims to help utilities and power developers identify "habitat-friendly" sites for renewable energy projects in four regions of the country. (See "A six-point checklist," page 11).

In open-ended questions, many of our energy-stakeholder respondents asserted that opposition to new energy infrastructure, regardless of its carbon intensity, can emerge from community and local environmental organizations.

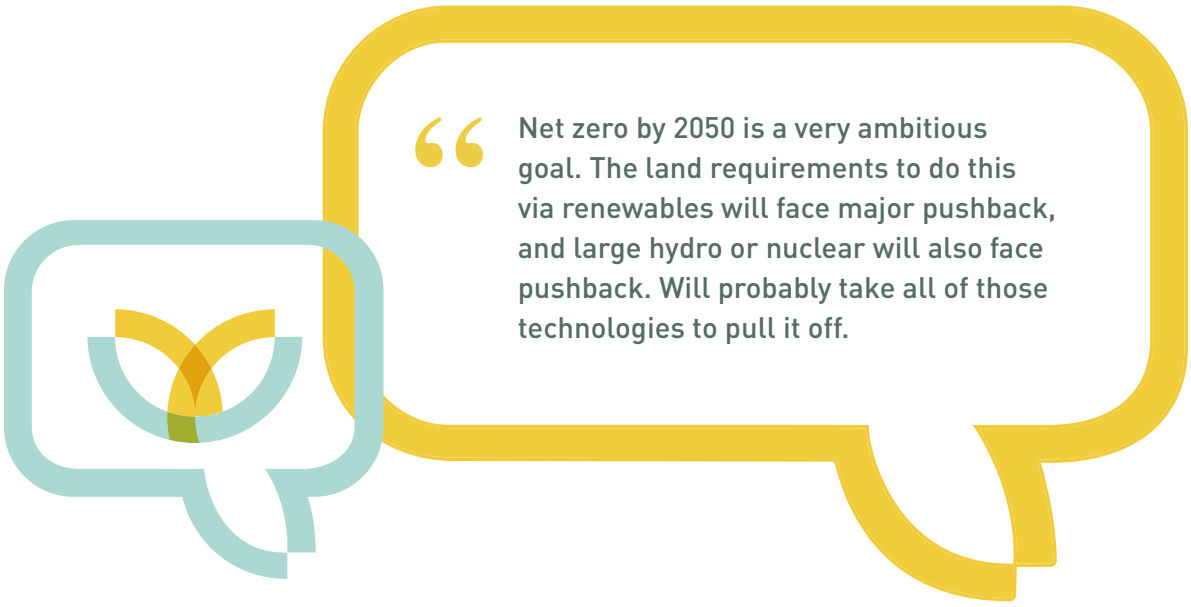
"Avoiding large-scale climate change will entail making compromises about impacts on local environments."

More common, however, are environmental advocates who would likely support clean-electricity infrastructure, such as transmission lines, if they could be assured it would facilitate emission reductions. Community organizations are more likely to support projects that secure local benefits. Another expert bemoaned that while new capacity will certainly be needed if Canada is to decarbonize its economy by 2050, the barriers to getting infrastructure built are formidable:

> ***"What is needed to reach the goal and what people are ready to accept is somehow disconnected."***

Recent polling suggests that Canadians would more readily support energy-transition projects that embed social-equity objectives. Public opinion researchers Abacus Data found that support for a transition away from fossil fuels increased under scenarios that directly addressed equity. "Governments providing financial support to low and modest income households to help them transition away from fossil fuels and requiring the wealthy and large corporations to contribute more in taxes to help pay for this plan were widely supported," the researchers found.[13]

Finally, more than a few of our stakeholders suggested that the intensifying impacts of climate disruption will tilt the scales in the direction of support for all zero-carbon generation options: "Mindsets will shift as the impacts of climate change are felt around the world." It's anyone's guess how, and how quickly, such attitudes might change, and what it might take to catalyze a tectonic shift. It may take a catastrophic event at the scale of the recent Australian wildfires – but closer to home – to trigger a broad societal re-evaluation of values, priorities, and deeply held beliefs. Indeed, the response to the novel coronavirus shows that once broad consensus that action is necessary to avoid dire consequences is achieved, we can react with measures that just months before would have seemed inconceivable. Comments like this may be tempered with renewed optimism that dramatic action under shared threat is possible:



If cost, safety and waste barriers can be lowered, it's conceivable that unpopular technologies might at some future point be grudgingly accepted by the broader public as a kind of "necessary evil." As one of our respondents observed,

> ***"...acceptability does not only depend on technologies... it also depends on costs and alternatives, and on how much the public understands the various trade-offs and the amount of effort required to reach net zero."***

In summary, while we have a good idea what generation options Canadians will and will not support today, there are too many wild-card factors at play, including energy literacy, perceived urgency, site selection, acceptability, Indigenous land rights, community benefit and authenticity of engagement and consultation, to be able to reliably forecast future acceptability.

A SIX-POINT CHECKLIST TO IMPROVE PROJECT ACCEPTANCE

WWF Canada's Renewables for Nature tool aims to help clean-energy developers understand the risks and opportunities associated with a given proposed project site. The organization released the tool in a bid to help "reduce potential conflict with nature, speed [project] approvals, and create an energy future that will sustain us all." Renewables for Nature accounts for the following criteria:

1. **Species diversity**: Significant concentrations of wildlife including both common and at-risk species.
2. **Complete ecosystems:** Significant and large ecosystems containing healthy populations of native species.
3. **Vanishing habitats**: Rare, threatened or endangered ecosystems, habitats or refugia.
4. **Ecosystem services**: Basic services and benefits from intact ecosystems, such as water purification, pollination and flood and erosion control.
5. **Community needs**: Fundamental sites and resources for maintaining health and well-being of local and Indigenous communities.
6. **Cultural values**: Significant sites of national or local importance, especially for Indigenous communities.

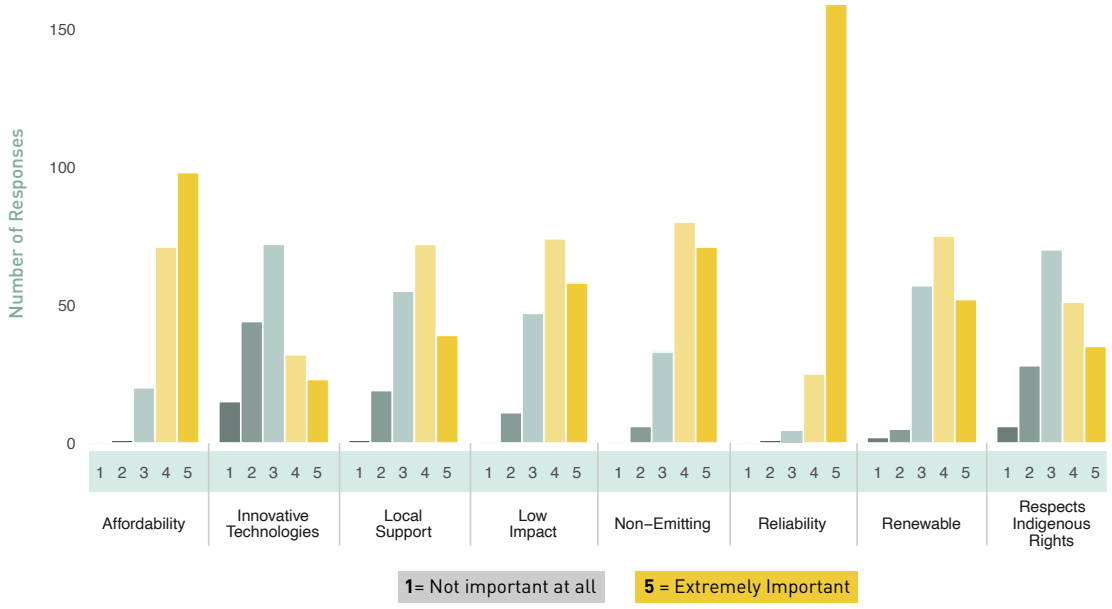
3

What do Canadians expect from their electricity system?

We asked our expert stakeholders to share their thoughts on the values that Canadians ascribe to a future clean-energy system as we move toward electrification and a renewable-power future. The results, shown below, suggest that, unsurprisingly, reliability and affordability rule.

Canadians will also broadly support technologies that are innovative, locally supported, low-impact, and non-emitting, renewable and respecting of Indigenous rights (see sidebar, "Indigenous priorities"). Our survey respondents generally ranked these characteristics roughly equally in importance. In comments, many stakeholders underlined the importance of equity and energy when planning energy infrastructure. For example, deep energy retrofit programs should prioritize Canadians living with energy poverty.

What attributes do you think Canadians will value from their electricity in a clean power future?



In open-ended questions, some of our survey participants identified a preference for what we might call "set it and forget it," reflecting a perceived disinterest in systems and software that allow citizens to produce, monitor or actively manage their energy services. These include net-metering, self-generation, load shifting and time-of-use pricing.

Some stakeholders expected that a minority of keen Canadians will want to generate their own power and fine-tune their home energy systems. But our experts generally agree that such active energy production and management will remain a niche market for many years.

Our stakeholder impressions about transition priorities aligned with the findings of the Generation Energy dialogues, which concluded that Canada's future energy system will be "clean, safe, reliable, accessible and affordable." In other words, make sure it's cheap, make sure it's available to everyone and make sure it works. On the latter front, one stakeholder predicted trouble on the horizon, asserting that provincial electricity planning processes are inadequate to address the anticipated load growth.

If large volumes of new power will be needed, stakeholder respondents told us, policy-makers, civil society groups and citizen clean-energy advocates will need to start warming people up to the idea, soon.

INDIGENOUS PRIORITIES FOR THE LOW-CARBON TRANSITION

Although the low-carbon transition has taken different shapes in different communities from coast to coast to coast, Indigenous communities have been at the forefront for some time. **Indigenous Clean Energy** has prepared useful guidance and supported Indigenous nations to build capacity and facilitate participation in clean energy.

In 2017, as part of the Generation Energy project, the First Nation Power Authority, Montana First Nation and Green Arrow Corp. welcomed representatives of Natural Resources Canada to an Indigenous Renewable Energy Symposium in Edmonton. More than 80 representatives of Alberta's Indigenous communities shared their priorities for the energy transition. Key insights follow:

- Renewable energy developments in Indigenous communities should be developed and implemented entirely by Indigenous groups and communities.
- A more holistic approach to Canada's future is needed, one that is focused on more than just economic benefits. Future energy decisions should be made based on community values.
- Federal, provincial and municipal governments must align their priorities and work together toward common goals. Information regarding project development needs to be more streamlined, easily accessible and, most importantly, written in an understandable manner.
- Education, both within communities and external to them, is an important component in preparing for a successful transition to a low-carbon future.

Observations and perspectives

After sifting through many hundreds of open-ended insights shared by Canada's energy system experts, we have identified the following themes and points of tension in the hope that they may in some respect inform the energy system modelling now underway.

ADD NUANCE TO THE STORY:

Current high levels of public concern over the climate crisis afford governments, researchers and private and civil society sectors an opportunity to begin informing Canadians about the broader implications, opportunities and trade-offs associated with electrification and the energy transition. To date, engagement and education have overwhelmingly focused on the benefits – e.g., cleaner air, quieter cities, resilient communities – on the far side of the transition. While this is all true and has indeed helped secure political support for climate action, it's something of an incomplete picture. To ensure enduring support, it may be time for governments and others to clearly signal that, while the payoff will be great, in the coming years Canadians will need to weigh in on high-level decisions that carry broad impacts and benefits, not just for Canada but for the world. Will we be ready to accept the chosen course as a difficult compromise, or will we politically punish the leaders who bring them forward for being either too ambitious or not ambitious enough?

DEEPEN ENERGY RETROFITS:

Decarbonizing Canada's communities will necessitate improving the performance of tens of thousands of commercial, institutional and multi-unit residential buildings. Many of our respondents pointed to the imperative of deep-energy retrofits that would involve replacing entire building envelopes (a process known as "reskinning"), but one building-science expert noted that, as long as natural gas remains cheap and abundant, in much of the country financing such projects remains challenging.[6] Instead, the respondent recommended policy-makers prioritize deep *carbon* retrofits. "This might be accomplished by combining economical building envelope retrofits with electrification of heating and hot water using heat pumps, or replacement by low-carbon district heating systems in urban centres," the respondent said.

DIVERGENT VISIONS OF SCALE AND APPROACH:

Stakeholder respondents agree that electrification will require new clean-power capacity, but they diverge on how much will be needed and where it will originate. Many of our experts envision a distributed-generation future. In such a scenario,

Photo by Climate Reality Project

rooftop solar, community renewables, neighbourhood-scale biomass and/or hydrogen fuel cells, and household and/or ZEV battery storage will – in combination with net-zero building codes – obviate the need for new, large hydro dams or fleets of tens of thousands of wind turbines. ("Big, centralized projects... will not get us to where we want to be," remarked one respondent.) Others dismiss the distributed scenario as nice to have but ultimately unrealistic, given what they anticipate will be staggering new loads under electrification. Those respondents suggest that leaders must begin preparing Canadians for the inevitability of multiple gigawatt-scale projects.

FOCUS ON LITERACY:

The technical hurdles of the energy transition pale in comparison to the political and socio-cultural challenges, many respondents said, citing, for example, "populist campaigns that seek to deny climate science, media attention that focuses on conflict instead of solutions, and entrenched positions that fuel anger and resistance to adaptive measures." Respondents expressed frustration that noise, false equivalencies and outright misinformation obfuscate the deep changes needed to reach net-zero emissions by 2050 or sooner. To one respondent, the core challenge is "changing public perception from viewing the clean-power revolution as an 'imposed evil' to viewing it as an inherent opportunity to create a more just, prosperous and sustainable Canada." With some exceptions, governments remain reluctant to implement transition plans that are clear, just, integrated and realistic, and incumbent energy producers still push off the opportunity to constructively participate – though recent commitments to net-zero by a few petroleum majors suggest the latter point may be changing.

CONSIDER EMERGING OPPORTUNITIES:

The coronavirus pandemic has caused severe economic disruption throughout Canada, but particularly to oil and gas regions. This is showing that beyond reducing emissions, there is an urgent need for, **and interest in,** diversifying to include more renewable energy.

Next steps

The Sustainable Energy Systems Integration and Transitions Group, led by Madeleine McPherson at the University of Victoria, develops and applies models to understand the design and operation of energy systems as they transition to low-carbon. More specifically, the SESIT group is developing a multi-scaled modelling platform that allows exploration of the impacts of different electricity system decarbonization pathways. This modelling approach spans municipal, provincial and national levels and sectors including electricity, buildings and transportation, offering greater accuracy and sophistication than many other models. It will prove an invaluable tool for exploring cost-effective and reliable ways to integrate and transform to a low-carbon system.

The Clean Power Pathways collaboration requires that academic partners remain fully independent, and all their work is conducted under formal peer review processes. The modelling is an independent, academic, long-term effort that will leverage feedback from a diverse set of stakeholders. For example, one scenario will be informed by the Foundation's output on stakeholder and Canadian values, preferences and concerns raised in this report. Additionally, the modelling team will model scenarios that are constructed based on the leading decarbonization literature and advice from energy researchers.

The usefulness of modelling energy transitions is explained in our "Zeroing in on Emissions" report: "Modelling offers many advantages for identifying the most cost-effective path to the zero-emissions economy of the future. . . . Modelling allows us to explore the effectiveness of different policies before municipalities, businesses or households actually make any changes or invest in new technologies." By working from where we want to end up – a zero-emissions economy by or before 2050 – we can explore what policies can get us there, how quickly they need to be implemented and what investments will be required.

A package of policy solutions to meet the desired net-zero outcome will be published following completion of scenario models. Policy recommendations for provincial and federal governments will be grounded in solid scientific modelling and research and broadly supported by the energy values of people living in Canada. This process is designed to build consensus around net-zero energy pathways and policies needed to achieve climate targets. It will prove an invaluable tool for exploring cost-effective and reliable ways to integrate and transform to a low-carbon system.

Endnotes

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