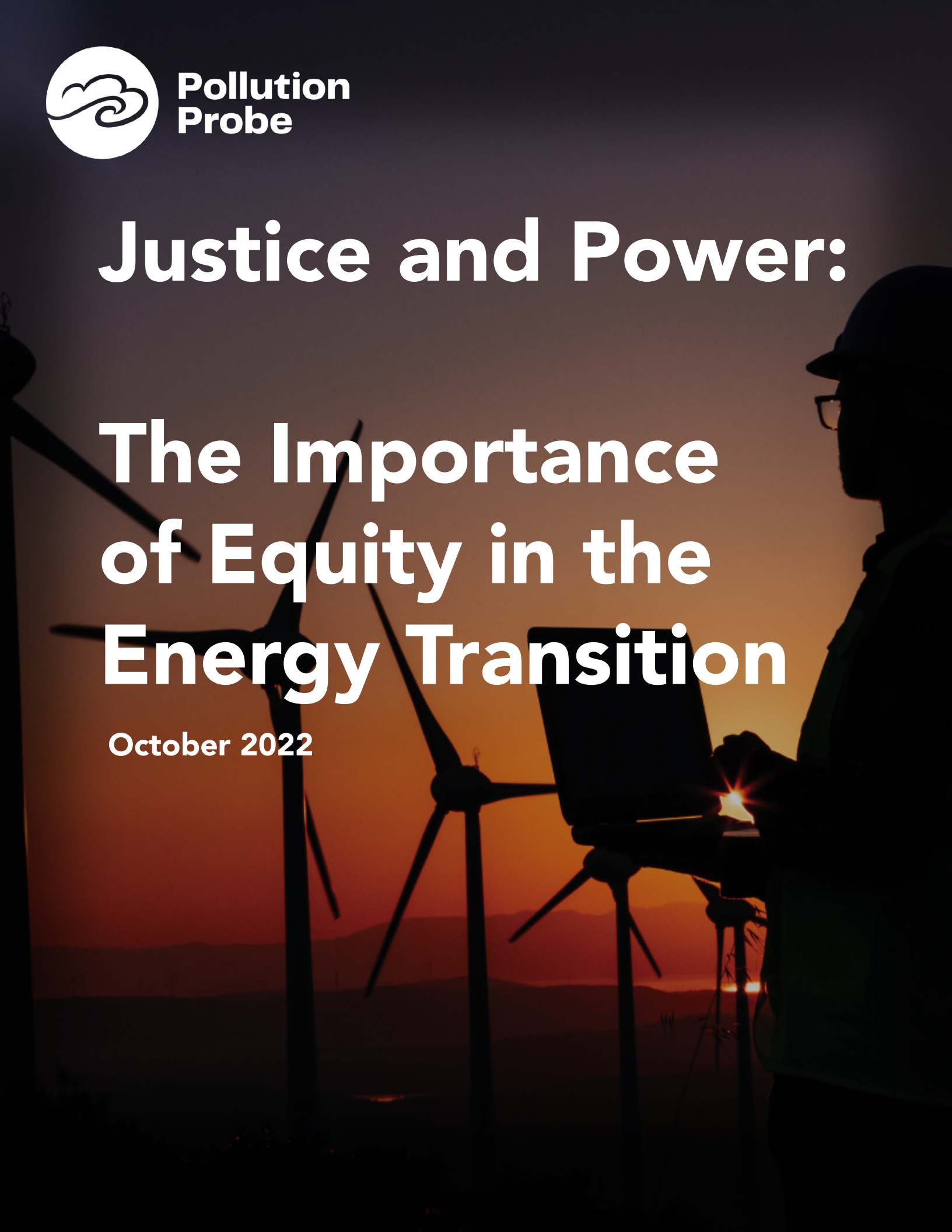
Pollution Probe

Justice and Power:

The Importance of Equity in the Energy Transition

October 2022



Acknowledgement

This project was created through the research and efforts of Daniella Mikanovsky during her internship at Pollution Probe.

Pollution Probe is solely liable and responsible for the contents of this report. Inclusion of the names of all external organizations is for acknowledgement purposes only and does not constitute endorsement of contents.

Pollution Probe

902 – 130 Queens Quay East
Toronto, ON, M5A 0P6
Canada

Tel: (416) 926-1907
Fax: (416) 926-1601
www.pollutionprobe.org

For more information, please contact:

Richard Carlson
Director, Energy Policy and Energy Exchange
rcarlson@pollutionprobe.org

Table of Contents

Introduction

To reach Canada's goals of reducing greenhouse gas (GHG) emissions by 40-45% of 2005 levels by 2030[1] and achieving net-zero by 2050,[2] rapid decarbonization is necessary. The clean energy transition, which seeks to replace emitting energy sources such as gasoline, natural gas, and gas-fired or coal-fired electricity with renewable and lower carbon sources will play a significant role in achieving Canada's carbon reduction goals. In 2019, transportation and buildings in Canada contributed 25% and 12% of GHG emissions,[3] respectively, the second and third largest emitters. Thus, how Canadians live and move will need to change to achieve Canada's international commitments to the Paris Agreement and our domestic climate change goals.

Climate change is already being felt across the country. Canada's Northern region is warming three times faster than the global average,[4] with the rest of the country warming at double the global rates. The record-breaking heat wave of 2021 resulted in 700 premature deaths in British Columbia[5] and burned 90% of Lytton, BC, to the ground.[6] Extreme heat events in Canadian cities increase the risk of mortality between 2% to 13%.[7] In the past decade, extreme weather events have doubled in frequency and costs.[8]

The effects of anthropogenic climate change may be experienced by anyone, but they are not experienced universally; certain communities are disproportionately impacted. Intersections of a variety of factors including income, race, age and ability can increase vulnerability to climate change impacts. For example, while an extreme heat event can impact anyone, seniors, individuals without access to air conditioning, and those with existing health conditions are disproportionately more likely to suffer severe consequences as a result.

---

1 Environment and Climate Change Canada. (2021, April 23). Canada's Enhanced Nationally Determined Contribution [Backgrounders]. https://www.canada.ca/en/environment-climate-change/news/2021/04/canadas-enhanced-nationally-determined-contribution.html

2Canadian Net-Zero Emissions Accountability Act, S.C 2021, cc 22 https://laws-lois.justice.gc.ca/eng/acts/c-19.3/FullText.html

3 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html

4 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy. Page 13.

5 Berry, P., & Schnitter, R. (Eds.). (2022). Health of Canadians in a Changing Climate: Advancing our Knowledge for Action. Ottawa, ON: Government of Canada. https://doi.org/10.4095/329522

6 Isai, V. (2021, July 10). Heat Wave Spread Fire That 'Erased' Canadian Town. The New York Times. https://www.nytimes.com/2021/07/10/world/canada/canadian-wildfire-british-columbia.html

7 Berry, P., & Schnitter, R. (Eds.). (2022). Health of Canadians in a Changing Climate: Advancing our Knowledge for Action. Page 133.

8 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy.

Key Terms

Energy Justice aims to provide all people with clean, safe, reliable and affordable energy.[9] The three main principles of energy justice are:

1. Distributional fairness: seeking equity in affordability and availability of energy resources. Distributional fairness asks questions such as, who has access to affordable energy and the infrastructure needed to engage with clean energy? Who does not?
2. Procedural fairness: seeking equity in the decision-making process. Procedural fairness asks questions such as, who is making decisions regarding clean energy? Which voices are heard, and which voices are underrepresented? Do all impacted parties have the ability to engage in the decision making process?
3. Recognition fairness: seeking equity in the treatment of all people, with regard to clean energy. It asks questions such as, are the unique energy needs of all people being met? Are anyone's unique needs being ignored and/or diminished?

Energy Poverty refers to the struggle faced by households across the country to afford to heat and cool their homes. The Canadian Urban Sustainability Practitioners (CUSP) define energy poverty as spending over 6% of annual income on energy costs, which is double the median household's expenditure on energy in Canada.[10] Energy poverty is the result of various interacting factors, including income, energy costs, home energy efficiency, and access to affordable energy networks. Energy poverty can result in thermal discomfort and lead to sacrifices on other living essentials such as food or healthcare to afford energy costs. Both factors can influence health outcomes, including lower quality of life.

Across the country, one in five households experiences energy poverty, with the highest rate in the Atlantic region, where 35-40% of households experience energy poverty. Energy poverty is experienced by both homeowners and renters, in both urban and rural settings, and in single-family homes as well as multi-unit residential buildings (MURBs). While more people are suffering from energy poverty in urban areas, rural residents experience disproportionately higher rates of energy poverty. Racialized households and newcomers to Canada are also disproportionately more likely to have high energy cost burdens.[11] In Toronto, close to half of the people living in energy poverty are seniors, and this is likely the experience in other cities.[12] Finally, energy poverty is not exclusive to low-income communities. Around 60% of households experiencing energy poverty are middle or high-income households, who may live in large, old, and energy inefficient homes.

9 McCauley, D., Heffron, R., Stephan, H., & Jenkins, K. (2013). Advancing Energy Justice: The triumvirate of tenets. International Energy Law Review, 32, 107–110.
10 CUSP. (2019). Energy Poverty in Canada: A Canadian Urban Sustainability Practitioners Backgrounder. Canadian Urban Sustainability Practitioners. https://energypoverty.ca/backgrounder.pdf
11 CUSP. (2019). Equity Implications of Energy Poverty in Canada. Canadian Urban Sustainability Practitioners. https://cuspnetwork.ca/wp-content/uploads/2020/05/Equity_Energy_Poverty_EN_Nov19.pdf
12 CUSP. (2021). Energy Poverty in Toronto. Canadian Urban Sustainability Practitioners. https://cuspnetwork.ca/wp-content/uploads/2021/04/energypov-TO-ppt-16feb21.pdf

Indigenous Experiences with Energy Inequity

Indigenous peoples have unique experiences and histories associated with energy in Canada. Indigenous people have been displaced for extractive energy projects and exposed to undue harm for the benefit of multinational corporations and urban energy users. They bear a disproportionate burden of climate change impacts, particularly Northern communities.[13]

Nationally, Indigenous households experience higher levels of energy poverty than non-Indigenous households, particularly in the Prairies and Ontario.[14] Furthermore, Indigenous homes are twice as likely to need major repair, which affects energy efficiency and home comfort. Among other factors, systemic discrimination embedded in the Indian Act and the ongoing legacy of Residential Schools influence the conditions presently faced by Indigenous communities. Approaches toward a fair, clean energy transition must incorporate reconciliation at the forefront to equitably address energy challenges faced by Indigenous people.
Rather than claiming expertise in this area, Pollution Probe wishes to uplift communities and organizations working on Indigenous energy justice. To learn more about equity and reconciliation in energy, please visit some of the following sources:

- Indigenous Clean Energy https://indigenouscleanenergy.com/about/
  - Indigenous Clean Energy and CUSP. (2022). Waves of Change: Indigenous clean energy leadership for Canada's clean, electric future. https://climateinstitute.ca/wp-content/uploads/2022/02/ICE-report-ENGLISH-FINAL.pdf
- Ecotrust Canada https://ecotrust.ca/priorities/energy/
  - https://ecotrust.ca/priorities/energy/moving-toward-energy-security-in-bcs-rural-remote-and-indigenous-communities-2020/
- Book Chapter: Carpenter, K. A., & Jampolsky, J. A. (2015). Indigenous peoples: From energy poverty to energy empowerment. In International Energy and Poverty. Routledge.

13 Crown-Indigenous Relations and Northern Affairs Canada. (2021). Climate change in Indigenous and Northern communities. https://www.rcaanc-cirnac.gc.ca/eng/1100100034249/1594735106676
14 CUSP. (2019). Equity Implications of Energy Poverty in Canada. Page 13.

Energy Use

As efforts toward the clean energy transition advance, we will begin to change how we use energy. The major sources of emissions in Canada include oil and gas, agriculture, buildings, heavy industry, transportation, electricity, and waste. Thus the way Canadians live will affect all future emissions in all sectors, but transportation, buildings and electricity sectors are those which have technologies and financial tools available for consumers to directly change their GHG emissions. In this section, equity considerations associated with energy use will be explored.

Transportation

Transportation accounts for 25% of Canada's annual GHG emissions. While this includes emissions from heavy-duty trucks, rail transport, and aviation, nearly half of Canadian transportation emissions come from light-duty vehicles, which include cars, SUVs, and pickup trucks.[15] Reducing the impact of these light-duty vehicles is essential if we are to achieve our emission reduction goals.

In addition, air pollution from internal combustion engines (ICEs) is associated with an increase in mortality in cities. As a result, residents living in proximity to large roads are consistently exposed to polluted air and are at a greater health risk. In the Greater Toronto-Hamilton Area alone, one study estimates that pollution from ICE vehicles leads to 872 premature deaths annually, with the young, elderly and those with health conditions the most affected.[16] This becomes a further equity concern in that marginalized communities and households of lower socioeconomic status are most affected as they disproportionately live close to major transportation corridors.

Reducing pollution from transportation requires multiple approaches. Supporting active transportation such as walking and cycling is a critical first step to ensuring that streets are safe for our most vulnerable road users. This, in combination with a rapid acceleration of public transit infrastructure, will help make cleaner transportation options more attractive and viable for thousands of current drivers. Complementing public transit and active transportation, electric vehicles (EVs) will be instrumental in reducing air pollution associated with ICEs.

15 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy. Page 53.
16 environmental defence & Ontario Public Health Association. (2020). Clearing the Air: How Electric Vehicles and Cleaner Trucks Can Help Reduce Pollution, Improve Health and Save Lives in the Greater Toronto and Hamilton Area. https://clearingtheair.ca/

Given Canada's relatively clean electrical generation, EVs charged on Canadian grids generate significantly less GHGs and air pollution in comparison to traditional vehicles.

With higher upfront price tags when compared to similar-sized ICEs, EVs have long faced scrutiny for elitism and unaffordability. However, over its lifetime an EV can be significantly more affordable than the gasoline and motor maintenance costs associated with ICE ownership. In comparison to unstable gasoline prices and rising carbon tax, EV drivers can see cost savings overtime. For people who drive, EVs present a huge potential to reduce their costs of living.

Given their high upfront costs, low and middle-income (LMI) consumers may struggle to afford an EV - but this barrier is only the tip of the iceberg. Many LMI households do not have access to secure private parking where they can install a vehicle charger. Drivers who rent, and depend on apartment/condo parking, or public street parking, would require public charging facilities. Studies from the United States suggest that in many large cities, public charging infrastructure tends to be sited in higher-income communities.[17] This is largely due to this population trending to be early adopters of new technologies. However, by focusing on public infrastructure in these 'early adoption' areas, the lack of infrastructure in other areas becomes an additional barrier to LMI communities.

Public charging infrastructure is particularly lacking in communities with higher proportions of racialized people and MURBs.[18] Another American study found that across multiple state and utility programs to fund public EV infrastructure, very few prioritized equity.[19] While there have been fewer studies focusing on the Canadian context, a 2018 study suggests similar patterns of low EV uptake in LMI communities and poor proliferation of public charging infrastructure in Toronto.[20] Finally, public EV charging infrastructure is often not designed with accessibility in mind, which acts as a barrier to EV adoption for disabled drivers.[21]

Increasing equity in EV access requires multiple approaches. Vehicle rebates to address affordability and expanding the used EV market are important first steps. Expanding public charging infrastructure in underserviced areas and creating incentives for existing MURBs to install charging infrastructure will also be instrumental. On a policy level, updating building

17 Khan, H. A. U., Price, S., Avraam, C., & Dvorkin, Y. (2022). Inequitable access to EV charging infrastructure. The Electricity Journal, 35(3), 107096. https://doi.org/10.1016/j.tej.2022.107096
18 Hsu, C.-W., & Fingerman, K. (2021). Public electric vehicle charger access disparities across race and income in California. Transport Policy, 100, 59–67. https://doi.org/10.1016/j.tranpol.2020.10.003
19 Huether, P. (2021). Siting Electric Vehicle Supply Equipment (EVSE) With Equity In Mind (ACEEE White Paper). ACEEE. https://www.aceee.org/white-paper/2021/04/siting-electric-vehicle-supply-equipment-evse-equity-mind
20 Pollution Probe & The Delphi Group. (2018). City of Toronto Electric Mobility Strategy Assessment Phase [Final Project Report]. City of Toronto. https://www.toronto.ca/wp-content/uploads/2021/12/932d-Toronto-Electric-Mobility-Strategy-Assessment-Phase-Report.pdf
21 Auto Trader. (2022). Electric Vehicles & Accessibility—A Driver's Guide. Auto Trader. https://www.autotrader.co.uk/cars/electric/ev-drivers-with-disabilities/

codes or municipal approvals for new MURBs to require charging infrastructure can be especially impactful. In Vancouver, some of these first steps are taking place (see case study 1).

It is important to highlight that EVs by themselves will not bring about an equitable clean transition. Expansion and integration of public transit, coupled with efforts to improve our streets for pedestrians, cyclists, wheelchair users, skateboarders, and all other forms of active transportation are essential. Many people who drive today will, with better infrastructure, be able to move around the places where they live carbon-free, with or without an EV. Infrastructure planning for active transportation and affordable, connected transit must also keep equity in mind. Communities which are currently underserved should be prioritized, and community engagement to ensure that all voices are heard is essential.

Case Study One: City of Vancouver's Climate Emergency Action Plan and Transportation

The City of Vancouver released their Climate Emergency Action Plan (CEAP) in 2020 outlining an ambitious and detailed pathway toward city improvements in response to the climate crisis. CEAP develops six major targets, called "Big Moves", which outline goals for 2030. Half of the Big Moves relate to transportation and movement in the city:

> Big Move 1: By 2030, 90% of people to live within an easy walk/roll of their daily needs.
> Big Move 2: By 2030, two-thirds of all trips in Vancouver will be made on foot, bike or transit.
> Big Move 3: By 2030, 50% of the kilometres driven on Vancouver's roads will be by zero-emissions vehicles.[22]

Reconciliation and equity are highlighted as priorities in CEAP, and focus is placed on a just transition. This focus is affirmed throughout the planning of the Big Moves and in the development of a Climate Justice Charter and ongoing engagement with equity-seeking communities.

Much of the developments towards Big Move 1 are built into the Vancouver Plan, a land-use plan which embodies conscious growth and prioritizes complete street development. In CEAP, Vancouver commits to expanding equity considerations within the Vancouver Plan.

22 City of Vancouver. (2020). Climate Emergency Action Plan Report to Vancouver City Council (No. 08-2000–20). City of Vancouver. https://council.vancouver.ca/20201103/documents/p1.pdf. Page 5.

One of the biggest components of Big Move 2 involved a shift to transportation pricing, where drivers are charged additional fees for driving in certain metropolitan areas. This method, used in some European cities such as London and Oslo, will be coupled with dramatic improvements in affordable public transportation and targeted needs-based discounts in order to avoid burdening already disadvantaged community members. Other focuses include improving transportation opportunities for low-income communities specifically and considering low-income exemptions to on-street parking fee increases.

Big Move 3 is particularly relevant to EV infrastructure improvements. Specific activities include installing hundreds of Level 1 public EV chargers and dozens of Level 2 and 3 public charging stations, with a focus on rental areas and areas with lower EV adoption. The City will also develop a program to incentivize the installation of EV charging infrastructure in rental MURBs, and specifically commits to engagement with disabled people to design more accessible charging infrastructure. ICEs will be charged a pollution-based fee on parking permits, a fee which will only be charged to new 'high-price' vehicles, to incentivize EV purchasing. Older vehicles and low-price new purchases will not be subject to the carbon intensity fee to protect lower-income drivers.

Buildings and Residences

Heating is critical across Canada, and buildings account for 12% of national annual emissions, which are largely driven by carbon-emitting heating fuels such as natural gas and heating oil.[23] Given population and economic growth, emissions from residential buildings are expected to triple by 2050 if no GHG reduction efforts take place.[24]

23 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy. Page 33.
24 TEFP (Trottier Energy Futures Project). 2016. Canada's Challenge and Opportunity: Transformations for Major Reductions in GHG Emissions. Full Technical Report and Modelling Results. https://www.mcgill.ca/tised/files/tised/final_report_on_tefp_canadas_challenge_and_opportunity_transformations_for_major_reductions_in_ghg_emissions.pdf p. 16

Some emissions reductions will come from designing newer, more efficient buildings. However, approximately 80% of Canadian buildings in 2030 are already part of the building stock, which stresses the importance of energy retrofits to reduce emissions.[25]

Tools that can help to reduce building heating emissions are available. For example, heat pumps use less electricity than resistive electric heating. They are essentially a two-way air conditioning unit and work by moving heat from a 'source' to a 'sink'. In the winter, it moves heat from a source outside the home, such as the ground or the air, and moves heat into the home. In the summertime, heat pumps can be reversed and act as air conditioning units.[26] While a backup heating system may be required for peak heating needs with heat pumps, heat pumps would still overall reduce energy use. Home heating emissions can also be reduced through energy efficiency measures and deep energy retrofits. Efficiency improvements such as increased insulation, replacing old windows, and air sealing can go a long way by reducing heat loss.

For households experiencing energy poverty, the cost burden to maintain home comfort is often unmanageable. To afford their bills, families may keep their homes at a lower temperature, or make cut-backs on other essentials. Access to safe and affordable heating is a health issue. An American study found that a decrease in heating costs led to a decrease in winter mortality rates.[27] Furthermore, those living in energy poverty may reduce investments into healthcare or healthy food to afford home heating, which also increases vulnerability. With seniors facing energy poverty due to living in older, inefficient homes, this group is particularly vulnerable to mortality due to cold temperatures.

For those in energy poverty, energy efficiency measures that reduce heating costs would not only improve comfort but also their quality of life. While these households stand to greatly benefit from deep energy retrofits, they are also the least likely to be able to afford the upfront costs for them. Beyond affordability, renters and residents in MURBs face unique challenges to accessing deep energy retrofits. Renters responsible for their own utility bills, especially those experiencing energy poverty, stand to benefit by savings in their energy expenditures, but they

25 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy. Page 32.
26 Natural Resources Canada. (Updated February 11, 2021). Heating and Cooling With a Heat Pump. Natural Resources Canada. https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817
27 Chirakijja, J., Jayachandran, S., & Ong, P. (2021). Working Paper: Inexpensive Heating Reduces Winter Mortality. https://seemajayachandran.com/heating_mortality.pdf

may not have the decision-making authority for any improvements. Furthermore, home-ownership is often a prerequisite for programs and rebates which seek to improve energy efficiency, excluding renters from opportunities which increase affordability. In MURBs, occupants may share decision-making responsibilities with other occupants. In other cases, a building is operated by a management authority that holds decision-making power. In both scenarios, occupants — be they owners or renters — face administrative challenges when it comes to decision-making authority.

There are several programs across Canada aiming to improve residential energy efficiency. Government, utilities, and third-party providers operate programs that provide a range of rebates, subsidies, and other financial tools for retrofits ranging from small-scale customer-self-install improvements to specialized programs offering custom solutions for MURBs. There are targeted low-income energy efficiency programs in every province and territory, typically gauging eligibility by income.[28]

A study by Efficiency Canada finds that of low-income efficiency programs, the highest uptake occurs in programs that provide small-scale 'turnkey' solutions, and there are no programs which specifically target the most energy inefficient homes. Health dangers such as mould and dampness often fall outside the jurisdiction of these programs, although solutions to these can involve energy efficiency improvements. As well, efficiency programs which specifically target low-income groups with income qualifications fail to address the large population of middle-income households experiencing energy poverty. Stable, long-term funding and targeted programming are necessary to continue to expand energy retrofits of the existing building stock. A study of retrofit costs and benefits across Canada recommends prioritizing deep energy retrofits and focused funding where they will maximize social and environmental benefits. To maximize, solutions which benefit the most vulnerable should be prioritized first.[29] Of particular importance are renters, who not only lack decision-making power in home retrofits but also may face displacement due to renovations.

The City of Vancouver's proposed measures to address building energy efficiency should act as a model to be replicated in other large cities.[30] The City plans to, by 2030, cut building emissions to half of 2007 levels. Rapid moves towards net-zero buildings are proposed, with a particular emphasis on equity. In particular, carbon limits will first focus on buildings and homeowners with the resources capable of adjusting, and financial programs will focus on supporting those most in need. Emission limits on buildings will not be applied to rental and non-market subsidized housing, ensuring that costs are not passed along to vulnerable community members

28 Kantamneni, A., & Haley, B. (2022). Efficiency for All: A review of provincial/territorial low-income energy efficiency programs with lessons for federal policy in Canada. Efficiency Canada, Carleton University. https://www.efficiencycanada.org/low-income-report/

29 Hoicka, C. E., & Das, R. (2021). Ambitious deep energy retrofits of buildings to accelerate the 1.5°C energy transition in Canada. The Canadian Geographer / Le Géographe Canadien, 65(1), 116–127. https://doi.org/10.1111/cag.12637

30 City of Vancouver. (2020). Climate Emergency Action Plan Report to Vancouver City Council (No. 08-2000–20). Page 46.

and driving displacement. Finally, the City said it is committed to engaging with racialized and otherwise disadvantaged residents and business owners to ensure their concerns and needs are met. By considering the needs of equity-seeking communities in their efforts to reduce building emissions, Vancouver presents approaches which should be considered in all Canadian jurisdictions to achieve energy equity in our building stock.

Case Study Two: Montreal Affordable Housing Renovation Program

In Quebec, where electricity is very affordable and low emission, many homes use electrical heating. Approximately 200,000 homes are heated using fossil fuels such as heating oil or natural gas.[31] In Montreal alone, heating oil contributes close to 30% of residential emissions, although it represents a very small fraction of the building stock.[32] In the city, efforts to decarbonize home heating include bylaws banning new oil furnace installations and requiring the replacement of aging, polluting furnaces rather than repairs. One particular concern is MURBs and affordability for renters, who may have to bear the cost of retrofits taken on by landlords as required by law. This is particularly true for low-income renters. The Affordable Housing Renovation Program was introduced in response to these concerns.[33] Under this subsidy program, mid-sized residential buildings older than 20 years and with at least two-thirds leased as affordable units can receive up to $500,000 in subsidies towards energy efficiency improvements, including heating and air sealing as well as health and safety improvements such as plumbing and fire safety features. The program specifically targets retrofits which do not require entry into dwelling units and includes requirements regarding rent stabilization. While this program does not address retrofits in larger MURBs, it is a step in the right direction for medium-sized buildings. Similar programs for market rental units, particularly in municipalities with higher rates of fossil-fueled heating can also be particularly valuable.

31 Grant, J. (2021, December 31). Quebec bans oil heating in new homes starting Dec. 31. CBC. https://www.cbc.ca/news/canada/montreal/quebec-bans-oil-heating-1.6252420
32 Ville de Montréal. (2022, May 5). From heating oil to electricity, opting for a greener solution. https://montreal.ca/en/articles/heating-oil-to-electricity-opting-greener-solution-22095
33 Ville de Montréal. (2022, May 19). Affordable Housing Renovation Program. https://montreal.ca/en/programs/affordable-housing-renovation-program

Carbon Pricing

Carbon pricing refers to a suite of economic tools used to alter consumption behaviours and encourage a reduction in activities which generate GHGs. Carbon pricing tools create a cost for polluting and compel industries and consumers to consider the external costs of their activities. There are two main forms of carbon pricing. Fixed-price measures set a specific fee per unit of pollution or consumption and are often known as carbon taxes.[34] Cap and trade is an alternative system where the government sets a total cap on emissions, and provides allowances, either for free or through a market, for those emissions, and then participants can trade the emissions they do not need. These economic tools often are directed at industries, which may pass on increased costs to consumers. In provinces where federal pollution pricing applies, revenue from carbon pricing is redistributed back to residents at set periods and is expected to be revenue neutral.[35]

Where consumers experience energy poverty, any increase in energy costs associated with carbon pricing can be challenging, even in net-neutral programs. This is particularly true for consumers which cannot make capital investments toward electrification and increased efficiency. While higher-income consumers can make these investments to shield themselves from carbon costs, it is low and middle-income households who are left behind. The disparity may be even greater in cases where carbon pricing revenues are used to fund rebate programs. For example, the California Electric Vehicle Rebate Program provides rebates for EV purchases funded by the state's cap-and-trade program. A study of this program found that not only are high-income earners the primary beneficiaries of the rebate but the costs of funding the rebate are disproportionately borne by lower-income communities paying increased costs associated with the cap and trade program.[36]

The design of carbon pricing regimes must consider energy poverty and income burdens to achieve equity. Revenue-neutral programs are a step in the right direction but should be coupled with programs to ease the transition away from polluting technologies to reduce the cost of living. Carbon pricing programs which exempt certain income groups are also particularly valuable, such as Vancouver's approaches to carbon pricing as outlined in the case study below.

34 Environment and Climate Change Canada. (2018, October 23). Carbon pollution pricing systems across Canada [Program descriptions;departmental actions]. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work.html
35 Canada Revenue Agency. (2022, April 20). Climate action incentive payment. Government of Canada. https://www.canada.ca/en/revenue-agency/services/child-family-benefits/cai-payment.html
36 Ku, A. L., & Graham, J. D. (2022). Is California's Electric Vehicle Rebate Regressive? A Distributional Analysis. Journal of Benefit-Cost Analysis, 13(1), 1–19. https://doi.org/10.1017/bca.2022.2

Case Study Three: Carbon Pricing in Vancouver's Climate Emergency Action Plan

As part of the Climate Emergency Action Plan, the City of Vancouver proposes charging carbon intensity fees to incentivize decarbonization in several sectors. In Big Move 3, carbon intensity fees for ICE vehicle parking permits are introduced, as discussed in case study 1. This carbon pricing measure excludes older and lower-priced vehicles to protect lower-income drivers, to ensure that they do not bear increased burden under this fee. Big Move 4, which seeks to cut building emissions to half of 2007 levels by 2030, will apply carbon limits to existing buildings to encourage retrofits to reduce emissions. At first, this fee will only apply to detached homes and large commercial buildings, such as offices and retail buildings. The city prioritizes avoiding renovictions — evictions to facilitate renovations — by initially excluding rental and non-market housing from carbon intensity fees. The building carbon intensity fee initiative is coupled with retrofit programs targeting rental and non-market housing to assist in decarbonization, as well as two pilot MURB retrofit programs to investigate scalable improvements to building envelopes which do not displace residents. With equity built in as a guiding principle of the Big Moves, these carbon pricing schemes present strong examples for other municipalities to follow suit.

Energy Supply

Energy supply refers to the sources of energy for consumption. In the previous section, we discussed tools to reduce emissions and increase access and availability of these tools. Here, we will discuss how equity-seeking groups are impacted by energy supply efforts, and how our supply systems could be optimized to offer benefits to all.

Solar

Solar photovoltaics (PV) is a growing technology that converts solar energy to electrical energy. One of the advantages of solar is its scalability, and installations range from single panel installations on buildings to thousands of modules in large-scale solar farms.

For communities and households facing energy poverty, solar PVs can be an opportunity to reduce energy costs. In some jurisdictions, households with solar PV installations can enter into net metering agreements, sending their generated electricity into the grid in exchange for credit for their utilities, reducing their overall utility costs. Alternatively, behind-the-meter generation allows users to consume the electricity they generate, lowering their need to draw electricity from the grid and lowering utility bills. These systems can be combined, and the use of batteries can allow owners to choose when they export to the grid. By turning consumers into generators, small-scale PV has the potential to democratize energy generation and reduce energy costs for those who need it most.

Unfortunately, most small-scale solar installations are not serving these populations. Solar PV comes with a very large upfront cost. While this cost is generally offset over time through energy cost savings, this upfront cost can be too great a burden for most energy impoverished households to bear. As such, LMI households are underrepresented in solar adoption. For example, in the United States, LMI households — including renters and those in apartment buildings — account for 43% of the population and 42% of rooftops with potential for solar installation, yet they represent just 15% of solar adopters in the country.[37, 38]

As research suggests that both high-income and LMI households are interested in solar, the disproportionately low uptake among LMI households is likely due to their inability to manage upfront costs.[39] To achieve equity and ensure that households experiencing energy poverty can engage with solar power to reduce their energy expenditures, the upfront costs must be addressed.

While affordability is a key challenge with this technology, it is not the only barrier hindering equity. Renters and residents in MURBs face extra challenges accessing solar technology, similarly to the challenges in accessing energy efficiency technologies and programs. Even in cases where landlords or property management for a MURB decide to invest in solar technology, the energy savings are often kept by the landlord or distributed to shared spaces such as hallways and common areas, where the cost savings may not be directly felt by residents.

Increasing equity in solar technology participation involves addressing affordability and the logistical challenges faced by many renters and MURB occupants. Community solar is one potential solution to address the latter challenge as it can be used by those who don't have an appropriate or accessible roof. Financing programs to expand affordability and increase opportunities for LMI solar engagement should be priorities when developing renewable energy incentive systems. The U.S. National Renewable Energy Laboratory has published an extensive matrix outlining multiple solar PV financing options and which are best suited for different settings, including single-family homes, MURBs, tenants, and community solar projects.[40]

37 Sigrin, B., & Mooney, M. (2018). Rooftop Solar Technical Potential for Low-to-Moderate Income Households in the United States (Technical Report NREL/TP-6A20-70901). National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy18osti/70901.pdf
38 Heeter, J., Sekar, A., Fekete, E., Shah, M., & Cook, J. J. (2021). Affordable and Accessible Solar for All: Barriers, Solutions, and On-Site Adoption Potential (Technical Report NREL/TP-6A20-80532). National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy21osti/80532.pdf
39 Wolske, K. S. (2020). More alike than different: Profiles of high-income and low-income rooftop solar adopters in the United States. Energy Research & Social Science, 63, 101399. https://doi.org/10.1016/j.erss.2019.101399
40 Cook, J. J., & Bird, L. (2018). Unlocking Solar for Low- and Moderate-Income Residents: A Matrix of Financing Options by Resident, Provider, and Housing Type (Technical Report NREL/TP-6A20-70477). National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy18osti/70477.pdf

Case Study Four: Solar Uptake by Word of Mouth

In a three-year study of LMI communities and solar uptake in California funded by the National Renewable Energy Laboratory, it was found that a significant portion of funds in LMI solar incentive programs are directed towards identifying qualified participants.[41] Reducing this expense frees up funding for more LMI solar panel installations. Researchers examined a program which provided qualified LMI customers with free solar installations to identify intake techniques. Peer referrals were the most successful technique, by a fair margin, which generated leads that were more likely to be qualified and participate in the program. As we seek to expand solar uptake in Canada and improve access for LMI communities, this evidence suggests that peer referrals and engagement with disproportionately burdened communities should be prioritized to reduce costs and reach as many potential beneficiaries as possible.

Microgrids

A microgrid is a system of energy generation, storage, and supply which can be both connected to the larger grid and operate independently of the grid in "island modes".[42] While microgrids may reduce energy costs overall, they are particularly valuable for emergency preparedness. In times of larger grid outages, microgrids can act independently and provide backup power to those connected.

Climate chane increases extreme weather events, including wildfires, hurricanes, ice storms, tornadoes, and flooding, all of which can lead to power outages. Loss of power can be deadly for those most vulnerable and can make it difficult to communicate. Microgrids can be developed in urban centers to protect emergency resources such as hospitals and warming or evacuation centers. When planning microgrids for emergency preparedness, equity is a critical consideration. Neighbourhood socioeconomic makeup and racialized identities should influence microgrid placement, in addition to vulnerability to grid instability, to ensure that vulnerable communities have equal access to resilient energy in an emergency.

In Canada, microgrids also present a unique opportunity to help decarbonize remote communities.[43] These communities, many of which are Indigenous nations, are not grid-connected and thus depend on expensive diesel generators for electricity. Developing microgrids with renewable generation can reduce dependency on diesel. Locally-generated clean electricity

42 New York State Energy Research and Development Authority. (2015). Microgrids 101. https://www.nyserda.ny.gov/All-Programs/NY-Prize/Resources-for-applicants/Microgrids-101
43 Terrell, I. (2020, January 24). Microgrids: An idea whose time has come? CBC. https://www.cbc.ca/news/science/what-on-earth-newsletter-microgrids-green-energy-1.5437568

has the potential not only to decarbonize but also to empower communities. These communities may not have the capital to fund projects independently, so financing opportunities to support these projects are especially valuable.

Case Study Five: A Microgrid in Old Crow, Yukon

The Vuntut Gwitchin First Nation of Old Crow, Yukon, is a fly-in community that, up until recently, depended entirely on diesel for electricity generation. As Yukon's northernmost community, diesel must be driven by truck over an ice bridge during the few months in the year the route is available, or otherwise can be flown at very expensive rates the rest of the year. In 2017, the bridge failed to freeze completely, leading to a steep increase in fuel prices.[44] With temperatures rising in the north, instability of the ice bridge will become an annual challenge for Old Crow's 250 residents. This past year, Vuntut Gwitchin First Nation's solar-powered microgrid went online. The system, consisting of over two thousand solar PV panels, battery storage, a microgrid controller, and diesel generators, will offset approximately 680 tonnes of CO2e annually.[45] While the winters in Old Crow are long and dark, 24 hours of sunlight during the summer will reduce their annual diesel consumption by 25%. While funded in partnership with the federal government and Yukon utilities, the microgrid is owned by the Nation. It will eventually generate approximately $400,000 in profits for the community. At a side event at COP26 in Glasgow, Chief Dana Tizya-Tramm spoke of the silence that came when the solar went online: "We can now enjoy silence and hear our animals and the crow's caw from across our village for the first time in 50 years."[46] Projects such as Sree Vyah (The Old Crow Solar Project) empower communities not only to decarbonize, but to reclaim autonomy and protect themselves from climate instability.

44 Francklyn, L. (2018, July 11). Bringing A Renewable Microgrid to the Canadian Arctic Village of Old Crow. HOMER Microgrid News. https://microgridnews.com/old-crow-renewable-microgrid/
45 Vuntut Gwitchen Government. (2021, August 17). Sree Vyah (the Old Crow Solar Project) Advances the Transition to Clean Energy in Canada's North - Media Release. https://www.vgfn.ca/pdf/NEWS_RELEASE_Sree_Vyah_07_09_2021.pdf
46 Baker, R. (2021, November 7). The silent strength of Indigenous renewable energy micro-grids. Canada's National Observer. https://www.nationalobserver.com/2021/11/08/news/silent-strengths-indigenous-renewable-energy-micro-grids

Facility Siting

To decarbonize Canada's electricity and manage the increase in demand from electrification, more generation facilities must be built. This could include small-scale facilities as well as utility-scale facilities and grid infrastructure.[47]

As facilities are planned across the country, it is important to keep energy justice in mind. Solar and wind farms are disproportionately most likely to be sited in low-density agricultural regions, affecting rural communities. Of particular importance is the principle of procedural fairness. Even if a wind farm is objectively safer than a coal plant and its associated pollutants, community engagement must take place to ensure equitable treatment of local communities. Examples of local opposition to large-scale renewable energy projects are numerous across Canada, the United States, and many countries in Europe.

Many renewable energy proponents dismiss local opposition as "NIMBYism" — Not In My Backyard sentiments. This dismissal views the grievances of local opposition as self-centred and unreasonable. However, in most cases of local opposition to renewable energy projects, adequate community engagement fails to take place. When rural communities are not consulted in these decisions, sentiment builds that they are being forced to bear social impacts associated with wind or solar farms, while electricity and revenue are funnelled to the cities.[49] Procedural injustices which disempower local communities from actively engaging in clean energy opportunities ignite resentment and opposition. Local opposition to these projects often results in project cancellation, in some cases resorting to tear-downs of built infrastructure.[50]

Approaching projects with procedural justice at the forefront and delivering on local community benefits can work towards earning trust and project support. Studies suggest that local support is greater for projects in which considerations of socioeconomic benefit and fair participation are included.[51] These elements, often overlooked, are critical if Canada is to build the renewable energy projects we need to equitably achieve our climate change goals.

---

47 Environment and Climate Change Canada. (2022). 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy. Page 19.
48 O'Shaughnessy, E., Wiser, R., Hoen, B., Rand, J., & Elmallah, S. (2022). Drivers and energy justice implications of renewable energy project siting in the United States. Journal of Environmental Policy & Planning, 0(0), 1–15. https://doi.org/10.1080/1523908X.2022.2099365
49 Scott, D. N., & Smith, A. A. (2017). "Sacrifice Zones" in the Green Energy Economy: Toward an Environmental Justice Framework. McGill Law Journal, 62(3), 861–898. https://doi.org/10.7202/1042776ar
50 Mazur, A. (2019, September 24). Decommissioning of White Pines Wind Project to begin in October. Global News. https://globalnews.ca/news/5944848/white-pines-wine-project-decommissioning/
51 Rand, J., & Hoen, B. (2017). Thirty years of North American wind energy acceptance research: What have we learned? Energy Research & Social Science, 29(Complete), 135–148. https://doi.org/10.1016/j.erss.2017.05.019

Conclusion

Achieving energy justice requires cooperation among all players in the energy sectors, both private and public. There are many changes that will take place as Canada strives toward our clean energy future. Prioritizing equity as we reduce emissions to optimize societal benefit is critical, especially if we hope to build and maintain support for the transition.

Many of the challenges and responses described here focus on distributional impacts, such as affordability and availability of resources. While those considerations may be the most obvious, other energy justice principles of procedural and recognition equity must also be included for a just and clean transition. Community engagement and working with impacted communities is the first step toward achieving these forms of equity. Community engagement is a slow, ongoing process, but it is a worthy commitment in the pursuit of energy justice. With active effort, consultation, and equity considerations, we can work towards a clean energy transition and climate future that benefits us all.