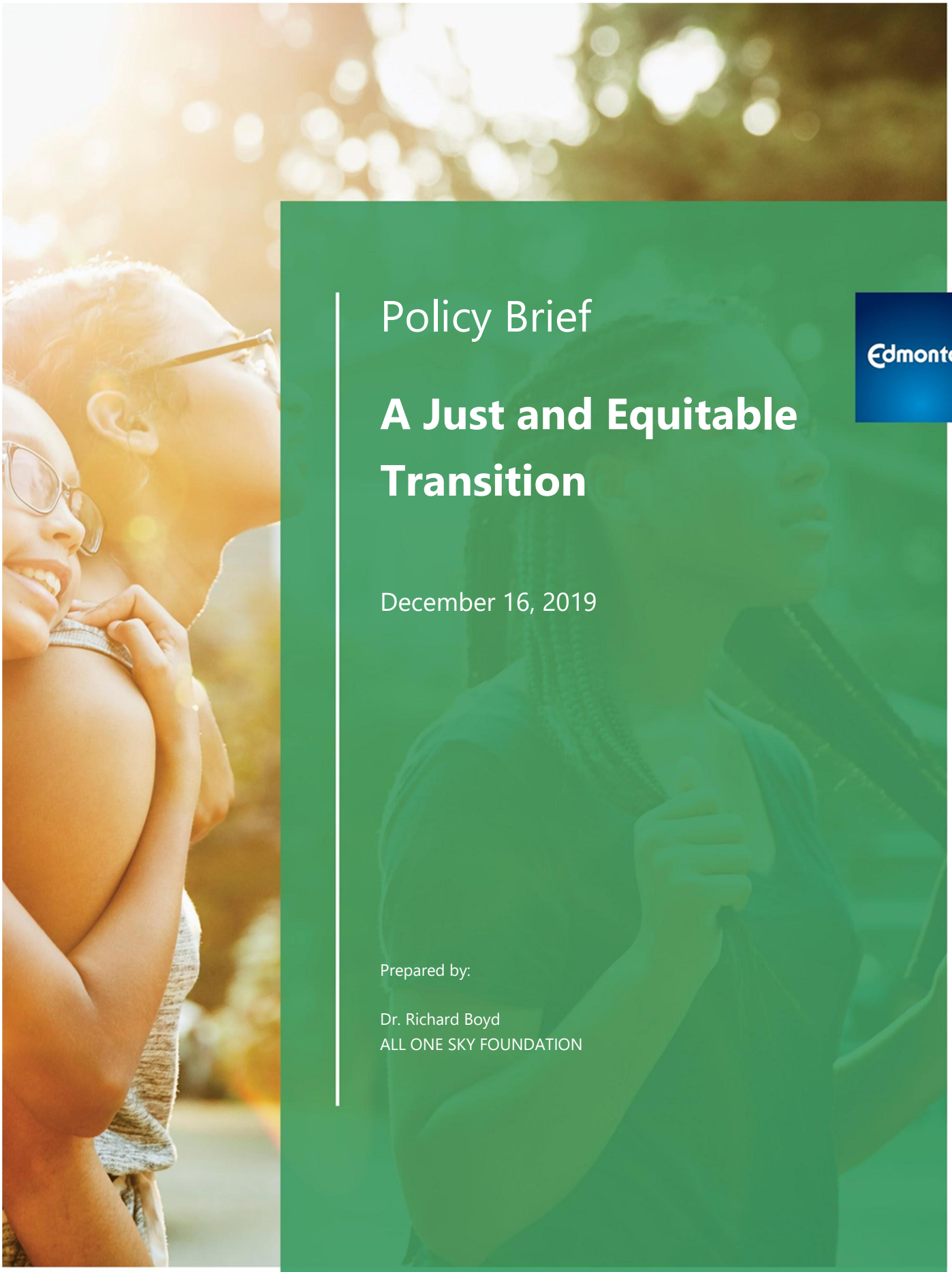

Policy Brief

A Just and Equitable Transition

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Introduction

Cities account for about two-thirds of global carbon emissions. Avoiding the most devastating impacts of climate change will require putting cities on a rapid path towards carbon-neutrality—consistent with the *aim* of the Paris Agreement to pursue efforts to limit global average temperature increases this century to 1.5°C above pre-industrial levels. Indeed, the climate science is unambiguous: the next 10-15 years are critical if the most dangerous impacts of climate change are to be circumvented. The need for urgent and dramatic action to this end underpins the Edmonton Declaration of the Change for Climate—Global Mayors Summit, held in Edmonton on 3-4th of March 2018. The Declaration calls on signatories, including the City of Edmonton, to recognize the need for immediate action that will limit warming globally to +1.5°C.

Since the Summit, the City of Edmonton has established a carbon budget (155 mega-tonnes of CO_2e) for the period 2019-2050 commensurate with achieving this aim. At current emission rates, however, the carbon budget would be consumed in about 8 years.[1] As a result, Edmonton's Community Energy Transition Strategy (CETS) is being updated to deliver more ambitious emission reductions to ensure the carbon budget is not exceeded. This will require achieving emission rates per capita in 2030 and 2050 of, respectively, 3.2 t CO_2e and zero t CO_2e.[2] Essentially, Edmonton must be carbon-neutral by 2050.

Individual actions to deliver the required levels of emissions reductions have been grouped under four Climate Shifts—namely: "Low Carbon City and Zero Emissions Transport", "Emissions Neutral Buildings", Renewable Revolution" and "Negative Emissions". Two additional Climate Shifts—"Tools and Targets" and "Just and Equitable Transition"—do not directly deliver emission reductions, but rather provide cross-cutting support and guidance to the design and implementation of those that do, and provide a lens through which to evaluate the fairness of the social, economic and environmental consequences of the transition to a carbon-neutral Edmonton. This is important since achieving ambitious emissions reductions will require a significant reshaping of Edmonton—transformative changes to energy systems, transportation networks, waste management practices, buildings and neighbourhoods, as well as systems of governance. If these changes are not managed appropriately, not all Edmontonians will necessarily benefit from the jobs, improved infrastructure and enhanced quality of life offered by decarbonization.

Against this background, the purpose of this Policy Brief is threefold: first, to explain what is meant by a "just and equitable transition" to a low-carbon future; second, to examine key potential injustices of

[1] City of Edmonton, 2019: Getting to 1.5C. A Discussion Paper, Change for Climate, City of Edmonton, p. 15.

[2] *Ibid.*

decarbonization for Edmonton; and third, to propose principles and an *initial* set of recommended actions for achieving a "just and equitable transition" to support the updated CETS.

Issue scope

At its simplest, equity and justice encompass the concept of fairness in the way people are treated. The central fairness challenge for climate change policy revolves around: 1) managing the impacts of climate change, which are not borne equally; 2) identifying who is responsible for climate change and thus actions to mitigate it causes; and 3) understanding how the policies with respect to 1) and 2) affect society and human development—internationally, nationally and locally.[3] Affordable housing is also an equity issue relating to energy and climate, this topic is being discussed as part of the Emissions Neutral Buildings work.

1. Climate impacts and adaptation

Study after study has demonstrated that the impacts of climate change are most severely felt by populations already challenged by social, economic and political disadvantage.[4] Inequalities influence where people work, live and play, their access to resources and opportunities, and thus their vulnerability to climate-related impacts. In addition, there is an extensive literature on the disparities of efforts to manage the impacts of climate change—documenting "acts of commission", whereby the negative effects of adaptation actions largely impact disadvantaged groups and communities, and "acts of omission", whereby marginalized groups receive fewer adaptation benefits and are underrepresented in decision-making.[5] Though the focus of this paper is on Edmonton's transition to carbon-neutrality, it is important not to lose sight of the fact that **the need for social justice is equally relevant in the context of formulating strategies to prepare for, cope with and recover from the impacts of climate change**.[6]

2. Climate mitigation responsibilities and capacities

Equity concerns have been central in negotiations for an international climate agreement. Indeed, the 1992 United Nations Framework Convention on Climate Change (UNFCCC) placed equity at the center of its core principles: Article 3(1) of the Convention states that "The Parties should protect the climate system

[3] Klinsky, S., et al., 2015: Building Climate Equity: Creating a New Approach from the Ground Up. World Resources Institute, Washington, DC., p. 112.

[4] For a synthesis of this literature see: Olsson, L., et al., 2014: Livelihoods and Poverty. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C., et al., (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 793-832.

[5] See, for example, Anguelovski, I., et al., 2016: Equity impacts of urban land use planning for climate adaptation: critical perspectives from the global north and south. Journal of Planning Education and Research, 36, pp. 333–348; and Meerow, S. and Newell, J., 2019: Urban resilience for whom, what, when, where, and why? Urban Geography, 40, pp. 309–329.

[6] This includes assimilating and supporting climate migrants and people temporarily displaced by weather and climate extreme events.

for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their *common* but *differentiated responsibilities* and *respective capabilities*."[7] What this principle (often referred to as the CBDR-RC principle) means precisely, and putting it into practice, has been much debated. Much of the debate has revolved around how to allocate the mitigation effort needed to achieve desired levels of carbon emission reductions. Some Parties to the Convention have argued that responsibility and propensity to act should be based on, respectively, historic emissions and capacity to pay for emission reductions.[8] According to this view, developed countries, like Canada, should take the lead in reducing global carbon emissions, since they are historically responsible for the majority of accumulated emissions causing climate change and have the financial resources to invest in mitigation efforts. In practical terms, proponents of this view argue that the available global carbon budget to keep warming below a specific level should be allocated to Parties on a per capita basis, with richer countries in the "North" being required to reduce emission rates per capita to a common future value and less wealthy countries in the "South" being allowed to increase emission rates per capita to the same common future value[9]. A prime example of this viewpoint in practice is the "contract and convergence" approach to carbon budgeting adopted by the C40 Cities, in which members' per capita emissions converge to common rate of 2.9 t CO_2e by 2030 and zero by 2050.[10] This approach was also used to define the City of Edmonton's emissions targets on a per capita basis. **From a *global perspective* the City of Edmonton's carbon budgeting approach thus embeds the core equity principle of the UNFCCC—reflecting both the City's responsibility for contributing to climate change and its capacity to solve the problem**. It also reflects a fundamental principle of climate justice that all people have equal rights to development.[11] This places inter-generational equity principles more centrally, as the rights of future generations to enjoy a good quality of life are recognized.

3. Impacts of climate mitigation policy

The remaining core fairness challenge involves understanding the ways in which policies and programs to reduce carbon emissions impact society and human development and ensuring that these actions are just and equitable. But what does this mean in practice? What does a just and equitable low-carbon transition for Edmonton look like?

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[7] United Nations, 1992: United Nations Framework Convention on Climate Change. United Nations, New York, New York, p. 33.

[8] Klinsky, S., et al., 2015.

[9] Averchenkova, A., et al., 2014: Taming the Beasts of 'Burden-Sharing': An Analysis of Equitable Mitigation Actions and Approaches to 2030 Mitigation Pledges. The Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, London, p. 40.

[10] Hurst, T. and Clement-Jones, A., 2016: Deadline 2020: How Cities will Get the Job Done. C40 Cities and ARUP, London, p. 112.

[11] Mary Robinson Foundation, Principles of Climate Justice (https://www.mrfcj.org/principles-of-climate-justice/).

Issue definition

This section first looks at the origins of a "just transition" advocated by labour movements in response to environmental and climate policy, then considers the integration of social equity principles, before proposing a working definition of a "just and equitable transition" for Edmonton's updated CETS. It is important to understand the limitations of how a "just transition" is traditionally interpreted, with its narrow focus on employment issues, before considering broader interpretations that place greater emphasis on principles of social equity.

Traditional roots of a just transition in labour movements

The idea of a "just transition" arose in the late 1970s when labour unions in the United States sought to draw attention to the needs of workers in polluting industries whose jobs were threatened by regulations to improve air and water quality.[12] The underlying premise was one of fairness. Simply put, no worker should be asked to bear disproportionate costs—in the form of losing his or her job—to achieve environmental goals for all. Instead, these costs should be shared fairly across society.[13] The term "just transition" rapidly spread across the labour movement in North America and internationally. The International Labour Organization (ILO) first discussed the topic at a conference in 2013 focused on links between climate change and green jobs, where labour unions called for a standard on "Just Transition".[14] In 2015, the Guidelines for a just transition towards environmentally sustainable economies and societies for all was unanimously adopted in the ILO. The ILO guidelines state that "A just transition […] contribute(s) to the goals of decent work for all, social inclusion and the eradication of poverty."[15]

The concept of a "just transition" had by this time also gained increasing currency amid plans for government transitions to a lower carbon future. The link between climate action and a just transition was ultimately enshrined in the preamble of the Paris Agreement, with Parties to the Agreement "taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities."[16] This instigated the preparation of a

[12] Kohler, B., 1998: Just transition: a labour view of sustainable development. CEP Journal on-line, Summer, 6 (2); and Mazzocchi, T., 193: A superfund for workers. Earth Island Journal, 9 (1), pp. 40-41.

[13] Leopold, L., 2007: The Man Who Hated Work and Loved Labor: The Life and Times of Tony Mazzocchi. Chelsea Green Publishing, White River Junction, Vermont, p. 540.

[14] ITUC, 2017: Just Transition – Where Are We Now and What's Next? A Guide to National Policies and International Climate Governance. International Trade Union Confederation (ITUC) Climate Justice Frontline Briefing 2017, ITUC, Brussels, Belgium, p. 18.

[15] ILO, 2015. Guidelines for a Just Transition Towards Environmentally Sustainable Economies and Societies for All. International Labour Organization (ILO), Geneva, Switzerland, p 23.

[16] UNFCCC, 2016a: Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015. Part two: Action taken by the Conference of the Parties at its twenty-first session. FCCC/CP/2015/10/Add.1. United Nations Framework Convention on Climate Change, Bonn, Germany, p. 36.

technical paper on the subject by the UNFCCC.[17] Outside the UNFCCC, several national governments have initiated just transition planning processes, including Canada; the Pan-Canadian Framework makes a commitment to "provide Canadian workers with a just and fair transition to opportunities in Canada's clean growth economy."[18]

A broader interpretation of a just transition

As traditionally framed above, a "just transition" aims to take appropriate action to shift jobs in vulnerable industries. In the context of climate change mitigation, the focus of a "just transition" is on supporting a transition away from fossil fuel production (i.e., coal, oil and natural gas extraction, processing and transportation) and energy-intensive industry (e.g., metal processing, chemicals), towards opportunities in the so-called "green energy economy".[19] However, this reflects a very narrow interpretation of a "just transition". For a start, it typically considers only direct employment impacts, omitting secondary (indirect and induced) impacts in other sectors of the economy. Direct jobs in the "oil and gas extraction" and "petroleum and coal product manufacturing" sectors in Alberta, for example, support three to four times as many jobs across the economy.[20] The impacts of low-carbon transitions extend beyond only those felt by people directly employed in vulnerable sectors. Consequently, "just transition" plans should include issues apposite to a broader set of workers than those directly affected.

Notwithstanding this limited focus on labour issues, the concept of a "just transition" can still be applied more widely within directly and indirectly affected sectors, embracing a more inclusive transition that seeks to reduce existing inequalities in the workforce concerning historically disadvantaged groups like women, youth, Indigenous and immigrant workers.[21,22] Expanding the concept of a "just transition" to embrace wider equity concerns in job markets when formulating transition plans means it is necessary to look at how support is distributed across workers, households and communities to ensure that existing gender, ethnicity, age, etc. disparities are recognized and not exacerbated. Indeed, this is crucial in terms of addressing "recognitional (in)justice" (see below).

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[17] UNFCCC, 2016b: Just transition of the workforce, and the creation of decent work and quality jobs. Technical paper by the United Nations Framework Convention on Climate Change (UNFCCC), Bonn, Germany, p. 59.

[18] Government of Canada, 2016: Pan-Canadian Framework on Clean Growth and Climate Change, Canada's Plan to Address Climate Change and Grow the Economy. Government of Canada, Ottawa, p. 76.

[19] This includes opportunities in renewable power supply and alternative energy, energy storage and grid infrastructure, green buildings and energy efficiency, and green transportation (Shorthouse, P., et al., 2019: Edmonton's Green Energy Economy. Summary Report prepared for the City of Edmonton by Delphi Group, Ottawa, p. 49.)

[20] See the relevant Type I and II multipliers in: Government of Alberta, 2017: Alberta Economic Multipliers 2013. Office of Statistics and Information, Economic Statistics, Government of Alberta, Edmonton, Alberta, p. 62.

[21] UNFCCC, 2016b.

[22] Mertins-Kirkwood, H., 2018: Making decarbonization work for workers: Policies for a just transition to a zero-carbon economy in Canada. Canadian Centre for Policy Alternatives, Ottawa, p. 35.

Injecting equity into a "just transition"

For a "just transition" to be truly equitable, it needs to embrace a broader view of social equity issues beyond its traditional interpretation of providing support to workers and communities that stand to lose out as a result of decarbonizing the economy. Principles of energy justice[23] and climate justice[24] suggest a tripartite framework for considering social equity in the context of low-carbon transitions, which includes distributional (costs and benefits), recognitional (acknowledgement and respect) and procedural (due process) dimensions of equity.[25]

Distributional equity

The distributive dimension is first and foremost about the equity of outcomes—i.e., the fair distribution of *all* costs and benefits of a low-carbon transition. In addition to those considerations of a "just transition" discussed above, this involves:

- Ensuring that jobs in the new low-carbon economy pay a "livable wage"[26] and—crucially—are accessible to marginalized workers (women, immigrants, Indigenous peoples).[27]
- Providing access to low-carbon goods and services (e.g., solar energy rebates, public transit and active transportation) to disadvantaged groups and communities—ensuring *all* member of society can participate in the low-carbon transition.
- Attending to the potential regressive economic consequences of carbon reduction policies and measures for low-income individuals and families (e.g., see the discussion on energy poverty below).

The fair distribution of costs and benefits is not solely about intra-generational equity, but also about inter-generational equity. The latter is particularly relevant to Edmonton's youth, who will inherit a hotter, less predictable climate that has significant consequences for their quality of life. Today's children are the

[23] McCauley D., et al., 2019: Energy justice in the transition to low carbon energy systems: exploring key themes in interdisciplinary research. Applied Energy, 233, pp. 916–921; and Sovacool, B., et al., 2016: Energy decisions reframed as justice and ethical concerns. Nature Energy, 1, p. 16024.

[24] Mary Robinson Foundation, Principles of Climate Justice (https://www.mrfcj.org/principles-of-climate-justice/).

[25] See, for example: Bulkeley, H. and Fuller, S., 2012: Low Carbon Communities and Social Justice. Viewpoint: Informing Debate, Joseph Roundtree Foundation, York, UK, p. 16; Bulkeley, H., et al., 2014: Contesting climate justice in the city: examining politics and practice in urban climate change experiments. Global Environmental Change, 25 (1), pp. 31–40; Schlosberg, D., 2007: Defining Environmental Justice: Theories, Movements, and Nature. Oxford University Press, Oxford, p 256; and SEI, 2019: Realizing a Just and Equitable Transition Away from Fossil Fuels. Stockholm Environment Institute (SEI), Seattle, Washington, p. 12.

[26] The estimated "livable wage" for Edmonton in 2019 is $16.51 per hour, as per Edmonton Social Planning Council, 2019: Living Wage Edmonton 2019. Edmonton Social Planning Council, Edmonton, p. 11.

[27] For context, according to 2016 Census for Edmonton: 50% of the population and 47% of the labour force are women; about 8% of the population are recent immigrants (landed after January 2011); 68% and 16% of these recent immigrants are from Asia and Africa, respectively; recent immigrants comprise just over 5% of the labour force; about 14% of visible minorities are considered low-income state according to the Low-income measure, after-tax; just under 6% of the population identified as Indigenous (First Nations, Inuit and Metis), of which about 25% are considered low-income according to the Low-income measure, after-tax; and just under 4% of the labour force in Western provinces are Indigenous. Statistics Canada, 2017: Edmonton Census Profile, 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001.

"first generation to feel the impacts of climate change and the last that can do something about it."[28] As stated above, Edmonton's approach to carbon budgeting places inter-generational equity principles centrally. This is a start. But if the required carbon emission reductions are to be delivered, children in Edmonton need to be empowered to support the necessary climate actions.[29]

Recognitional equity

While distributional equity is vital, it is not sufficient to guarantee an equitable (and just) transition. It is also important to recognize the underlying social structures (beliefs, norms, culture, language) that shape differences in society and influence existing disparities. This is particularly relevant to city-level analysis, where the structural factors that drive and sustain inequality and marginalization are highly visible. Integrating recognitional equity into a low-carbon transition requires:[30]

- Acknowledging the different intersecting identities of members of the community (e.g., gender, ethnicity, age, culture and language).
- Recognizing that these identities are influenced by historical disparities that can shape individual's ability to access low-carbon resources and to participate in decision-making.
- Promoting respect for different groups in the community so their views are accepted and valued.

These issues crosscut both distributional and procedural equity dimensions.

Procedural equity

The procedural dimension of justice is primarily about governance and process—ensuring the participation of key constituencies at all stages of public decision-making. This involves determining whose interests and what issues should be part of transition planning, who gets to participate in the social dialogue, and specific outreach to marginalized groups that are often underrepresented in traditional public engagement processes—like youth, new immigrants and Indigenous peoples.[31] With respect to marginalized groups, how the low-carbon transition is framed is crucial for it to be meaningful.[32] More generally, studies suggest that procedural justice is best served through inclusive, participatory

[28] Connect4Climate at https://www.connect4climate.org/initiatives/youth4climate.

[29] For context, according to 2016 Census for Edmonton, just under 11% if the population are between the ages of 10 and 20; 50,845 are boys and 48,355 are girls. Statistics Canada, 2017.

[30] Bulkeley and Fuller, 2012; Bulkeley, et al., 2014; McCauley, et al., 2019; and Schlosberg, 2007.

[31] SEI, 2019.

[32] Anguelovski, et al., 2016.

processes.[33] A further important aspect of governance concerns the robust tracking of progress towards desired equity outcomes as it relates to decarbonizing the economy.[34]

All three dimensions of justice are mutually reinforcing; overlooking one compromises progress on the others.[35] Put another way, a "just *and* equitable transition" planning effort should pay due attention to all three dimensions of social equity.

Defining a just and equitable transition

Merging traditional interpretations of a "just transition" with the tripartite framework for considering social equity in the context of climate policy, leads to the following working definition for a "just and equitable transition" Climate Shift for Edmonton's updated CETS:

> **An inclusive social dialogue between citizens, worker and business groups, investors, communities and the City. This dialogue develops plans, policies and investment that acknowledges and respects the history, needs and rights of different constituencies including marginalized groups, that supports workers and neighbourhoods disadvantaged by the transition away from fossil fuels, that ensures equitable access to low-carbon goods, services, infrastructure and economic opportunities, and that fosters equitable participation in decision-making and governance.**

Potential injustices of a carbon-neutral transition

Transitioning to a low-carbon economy will have obvious economic benefits. Economic modelling done in support of the CETS suggested the current value of financial benefits generated by the plan would exceed the required investment costs by $2.5 billion.[36] Though not quantified and monetized, the plan will also generate numerous additional economic, public health, environmental and social (co-)benefits for Edmontonians; many studies have highlighted these potential (co-)benefits.[37] However, decarbonization

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[33] Matin, N., et al., 2018: What is equitable resilience? World Development, 109, pp. 197–205; Meerow and Newell, 2019; and Shi, L., et al., 2016: Roadmap towards justice in urban climate adaptation research. Nature Climate Change, 6 (2), pp. 131–137.

[34] Zabin, C., et al., 2016: Advancing Equity on California Climate Policy: A New Social Contract for a Low-Carbon Transition. Institute for Research on Labour and Employment, University of California, Berkeley, California, p. 112.

[35] Silveira, A. and Pritchard, P., 2016: Justice in the Transition to a Low Carbon Economy. A Working Paper by the Cambridge Institute for Sustainable Leadership, University of Cambridge, Cambridge, UK, p. 37.

[36] City of Edmonton, 2019: Getting to 1.5°C: Deriving a Local Carbon Budget and Meeting the Ambition of Limiting Edmonton's Emissions to Levels that Align with a Global Average Temperature Increase of a Maximum of 1.5 Degrees Celsius. A Discussion Paper, City of Edmonton, Edmonton, p. 15.

[37] See, for example: Gouldson, A., et al., 2018: The Economic and Social Benefits of Low-Carbon Cities: A Systematic Review of the Evidence. Coalition for Urban Transitions, London and Washington, DC, p. 91; Sustainability Solutions Group, 2017: Modelling Toronto's Low Carbon Future. Technical Paper #4: Considerations of Co-benefits and Co-harms Associated with Low Carbon Actions for Transform TO. Sustainability Solutions Group, Vancouver, p. 55; and Floater, G., et al., 2016: Co-benefits of Urban Climate Action: A Framework for Cities. A working paper by the Economics of Green Cities Programme, LSE Cities and C40 Cities, London School of Economics and Political Science, London, p. 86.

can have adverse consequences related to differential financial and other impacts across populations groups, communities and sectors. Indeed, there is evidence that low-carbon transitions can "create new injustices and vulnerabilities, while also failing to address pre-existing structural drivers of injustice in energy markets and the wider socio-economy."[38] This raises questions over whether the deep and rapid reductions in carbon emissions required in the updated CETS can co-exist with a "just and equitable transition" Climate Shift.

The two main sources of potential injustices cited most in the literature reviewed for this Policy Brief relate to:

1. Impacts on the availability and affordability of energy, transport services, housing and amenities; and
2. Impacts on business and employment opportunities, and the workforce.

Each of these concerns has multiple dimensions. For example, the former is *directly* influenced by the equality of access to low-carbon goods, services and resources, as well as possible regressive economic effects of carbon reduction policies and measures, and *indirectly* influenced by underlying social structures that shape existing disparities in Edmonton. Furthermore, the latter source of injustice is not only concerned with potential negative effects on employment and competitiveness, but also with equitable access to the business opportunities and jobs generated by decarbonization. Again, linked distributional equity concerns are influenced strongly by underlying social structures that determine existing inequalities. These potential sources of injustice are examined below.

[38] Sovacool, B., et al., 2019: Decarbonization and its discontents: a critical energy justice perspective on four low-carbon transitions. Climate Change, 155 (4), pp. 581-619.

Availability and affordability of energy, transport, housing and amenities

The issue of energy poverty

Concerns exist over whether the deep and rapid reductions in carbon emissions required in the updated CETS can co-exist with a "just" approach that seeks to protect low-income households from likely higher energy prices. This would increase the prevalence of energy poverty in Edmonton, other things being equal. Energy poverty refers to the inability of a household to maintain 'adequate' access to energy services at reasonable cost. By adequate, we mean a level of energy consumption in the home—whether existing or new construction—necessary to meet basic health and well-being needs. The term first emerged on the policy scene in the United Kingdom (UK) in the mid-1970s, amidst concerns over detrimental health and social impacts. Living in poor-quality, cold homes is linked with ill health—both physical and mental—and increased mortality risk. It is also associated with risk-taking behaviours, lower educational attainment and social isolation.[39] The young, elderly, disabled and long-term sick are especially vulnerable to these effects.

The extent of energy poverty in a population is most often measured as the number of households spending more than an 'acceptable' fraction of their income on home energy costs. For the purpose of this Policy Brief, a household is considered energy poor if annual spend on all home energy services (i.e., space heating, space cooling, appliances, water heating and lighting) as a fraction of *disposable* income is more than twice that of the median household.[40] There are a number of definitions and thresholds relating to Energy Poverty and this paper utilizes one of the more common ones for illustration purposes. Based on 2016 data, twice the expenditure of the median household in Alberta on home energy services equates to just over 7% of its disposable income. The poorest 20% of households in the province spent about 15% of their disposal income on home energy costs in 2016; slightly more than 8 times that of the richest 20% of households.[41] The home energy burden of the poorest households is clearly disproportionate relative to the richest and median household(s).

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[39] For a more detailed exposition of the health and social impacts of energy poverty see, for example, Boyd, R and Corbett, H., 2015: Energy Poverty—An Agenda for Alberta. All One Sky Foundation, Calgary, p. 36.

[40] For further details regarding the measurement of energy poverty and the rationale for using household *disposable* income as opposed to *after-tax* or *before-tax* income, see Boyd, R and Corbett, H., 2015. The Canadian Urban Sustainability Practitioners (CUSP) network, for example, consider a household to be energy poor if home energy costs as a percentage of total *after-tax* household income exceed 6%, which is twice the burden of the median Canadian household at about 3% (see http://energypoverty.ca/).

[41] Boyd, R and Corbett, H., 2018: An Energy Poverty Strategy for Alberta. All One Sky Foundation, Calgary, p. 24.

Potential for regressive impacts of low-carbon transition on the energy poor

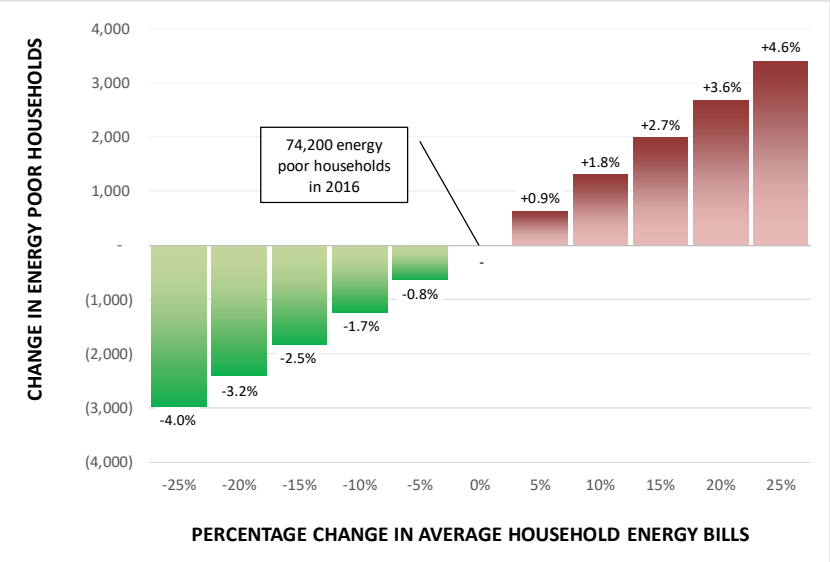
Looking specifically at the City of Edmonton, **there are roughly 74,200 energy poor households**—i.e., households spending more than 7% of their disposable income on home energy costs. Many of these households will live in low-income, but some will have higher incomes and live in poor quality, energy inefficient homes. Those households in low-income will tend to comprise lone-parent families with children or single adults, elderly women, and a visible minority or Indigenous peoples[42]. They are also more likely to live in rental accommodation (see Figure 2).

The discussion above talked about the need for a "just and equitable transition" to protect vulnerable populations from the potentially regressive effects of decarbonization. Other things being equal, climate mitigation policies that increase energy prices will have a larger proportional impact on poorer households than richer households. If, for example, a policy were adopted that raised the price of electricity and natural gas for homes by 10%, the annual energy bill of an average household in the lowest income quintile (bottom fifth) would rise by about $70, after allowing for reduced natural gas and electricity use in response to the price increase. The annual home energy bill of an average household in the richest income quintile (top fifth) would increase significantly more, by about $190. Yet, the impact of the policy on the disposable income of households is much larger for the average household in the lowest income quintile (whose disposable income declines by about 0.8%) than for the average household in the highest income quintile (whose disposable income declines by about 0.1%). The policy is thus highly regressive—on its own!

What would these carbon reduction policies mean for the number of energy poor households in Edmonton? As shown by the red shaded bars in Figure 1, a 10% increase in home energy bills would increase the number of energy poor households in Edmonton by about 1.8% (or 1,300 households). If carbon reduction policies increased home energy bills by 25%, the number of energy poor households in Edmonton would rise by 4.6% (or 3,400 households), all else being equal. Figure 1 also shows the potential impact of policies (e.g., a program to improve the energy efficiency and energy conservation behaviours of low-income households) that reduce home energy bills for Edmonton's energy poor. Policies that reduced home energy bills of the energy poor by, say, 15%, would reduce the number of households in energy poverty by 2.5% (or 1,800 households).

[42] Edmonton Social Planning Council, 2019: A Profile of Poverty in Edmonton. Edmonton Social Planning Council in partnership with End Poverty Edmonton, Edmonton, p. 38.

Figure 1: Impact of changes in home energy costs for the number of energy poor households in Edmonton in 2016



Source: Author's own calculations

Access to resources to reduce home energy burdens

The potential inequitable impacts highlighted above are exacerbated by the fact that the poorest households lack equal access to the potential benefits of low-carbon and energy-saving measures—whether, via energy efficiency or renewable energy programs for existing housing or new construction. Regressive impacts on the poorest households in Edmonton can be offset—in principle—by the introduction of well-targeted and designed programs. However, simply offering traditional residential programming, for example, is not a solution, as the same households face many barriers to participation, including the affordability of up-front costs, access to credit, split incentives between landlords and tenants, awareness, and other general programmatic barriers. In addition, there are several unique factors that limit the access of certain households to programs, including: language and cultural barriers, literacy, access to media, illness and disability. As a result, energy-poor and other marginalized households do not always identify themselves to take-up the support, and carbon- and energy-saving measures that are available. This is supported by a survey of 3,000 households in Alberta that found participation rates in government energy efficiency programs among the richest 20% of households was about three times higher than among the poorest 20% of households.[43]

[43] Boyd, R and Corbett, H., 2015.

Figure 2: Association between the prevalence of living in low income and the prevalence of living in rental property by neighbourhood in Edmonton

Source: Edmonton Social Planning Council, 2019 and author's own calculations. **Note**: the solid red lines show the upper quartile values for each axis.

Triple social injustice

When combined with the fact that the richest households in Edmonton are responsible for a disproportionate share of carbon emissions (about 12.4 tonnes of CO_2e per household versus 7.2 tonnes of CO_2e for the lowest income households), **energy poor households in Edmonton face a triple social injustice**: despite having the lowest energy consumption and carbon emissions, low-income households incur a disproportionate share of the policy costs, while also benefiting least from access to low-carbon resources. As noted above, affected households will tend to comprise lone-parent families with children or single adults, elderly women, and a visible minority or Indigenous peoples. A "just and equitable transition" Climate Shift must attend to such regressive economic consequences for energy poor households and underserved groups—for example, by ensuring access to low-carbon goods, services and

resources. It is not acceptable to offer carbon-saving and energy-saving programs that are only accessible to a sub-set of Edmontonians—typically, middle- and high-income individuals and families.

Potential for regressive impacts of low-carbon transition on public transport users

Regressive impacts from a low-carbon transition are not limited to inflationary impacts on home energy costs. Transportation cost burdens of low-income households are also disproportionate relative to more affluent households. By way of illustration, the poorest 20% of households in the province spent about 9% and 2% of their disposable income on, respectively, motor fuels for private vehicles and public transportation (city or commuter buses or trains) in 2016.[44] In contrast, the richest 20% of households spent only 2% and 0.1% of their disposable income on motor fuels and public transportation, respectively. Moreover, low-income households are far more dependent on public transportation (higher rates of ridership) than middle-income and high-income households, both of whom have greater access to private vehicles.[45] Carbon reduction policies or programs that increase the relative price of motor fuels or public transportation would thus place disproportionate burdens on low-income Edmontonians.

Furthermore, the implications of carbon reduction policies or programs regarding *access* to public transportation should be diagnosed through an equity lens; affordability is not the only potential social justice issue. The following groups have different travel needs—in addition to abilities to pay—compared with the majority of users: children, students and seniors, individuals with a disability, new immigrants and Indigenous peoples, women, and the intersection between these groups.[46] A "just and equitable transition" should ensure low-carbon public transportation options fairly meet the needs of these groups.

Low-carbon gentrification

An unintended consequence of urban densification—a cornerstone of the "Low Carbon City and Zero Emissions Transport" Climate Shift—is a phenomenon known as "low-carbon" or "carbon gentrification". Studies show that urban infill and densification—creating walkable neighborhoods near mass transit with relatively dense, energy-efficient homes and apartments—attract younger, more-educated and more-affluent people.[47] In turn, this can cause housing prices to spike, pushing low-income and disadvantaged

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[44] Estimated from Statistics Canada, 2019, Table 11-10-0223-01: Household spending by household income quintile, Canada, regions and provinces, https://doi.org/10.25318/1110022301-eng.

[45] Belmonte, P., 2014: All Aboard: Investigating Public Transit Use Across Income Levels and Implications for Transportation Policy in the United States. The Faculty of the Graduate School of Arts and Sciences, Georgetown University, Washington, DC., p. 40.

[46] Bennett, K. and Shirgaokar, M., 2016: Social Sustainability of Transit: An Overview of the Literature and Findings from Expert Interviews. Planning Program, Department of Earth and Atmospheric Sciences, University of Alberta, Edmonton, p. 45.

[47] See, for example, Bouzarovski, S., et al., 2018: Low-carbon gentrification: when climate change encounters residential displacement. International Journal of Urban and Regional Research, https://doi.org/10.1111/1468-2427.12634; and Rice, J., et al., 2019: Contradictions of the climate-friendly city: new perspectives on eco-gentrification and housing justice. International Journal of Urban and Regional Research, https://doi.org/10.1111/1468-2427.12740.

people out of these new "green-living hubs" and into areas with cheaper housing, where it may no longer be possible to walk to work or school. This is problematic for two reasons. First, as noted above, more-affluent people generally have a larger carbon footprint than those on smaller incomes. The anticipated carbon emission benefits of densification could therefore be eroded by the consumption patterns of the new residents.[48] The bigger issue from a social justice perspective is the displacement of people and their exclusion from opportunities to take advantage of mass transit, energy efficient housing, and other "green" amenities. It is thus vital to build equity safeguards into urban densification and infill efforts to avoid these unintended consequences. One solution is to make the provision of affordable housing a central component of any densification project. Furthermore, with a view to addressing potential inequities associated with access to public transit, consideration should be given to situating affordable housing near mass transit hubs.

Business and employment opportunities and the workforce

The rapid and significant reductions in carbon emissions required to limit warming globally to +1.5°C above pre-industrial levels will impact business and employment opportunities, and the workforce. Some impacts can be characterized as quantitative (number of jobs created, substituted, lost or transformed), while others are more qualitative in nature (the quality of jobs created, substituted, lost or transformed) (see Box 1). Furthermore—and somewhat obviously—some impacts will be viewed positively (e.g., the potential for business opportunities and job creation through investment in renewable energy infrastructure projects) while other impacts will be viewed negatively (e.g., the potential contraction of employment in carbon-intensive and supporting industries).

The extent to which Edmonton's carbon-neutral transition by itself might result in noticeable negative impacts on the energy industry—with the majority of production exported—is unlikely. Social justice concerns are more likely to arise from inequitable access to the business and employment opportunities generated from the transition, as prevailing social structures preclude certain groups of the population from accessing these benefits. Nonetheless, it would be remiss for a Policy Brief on a "just" transition to totally neglect potential adverse employment impacts from carbon reduction policies and programs, since this is the focus of most of the literature. Accordingly, the dependency of neighbourhoods in Edmonton on sectors vulnerable to potential contraction from large-scale decarbonization efforts is discussed briefly below. From a social equity perspective, it is worth noting that workers in these sectors may ultimately transition to "green jobs", and in the absence of corrective plans and policies, reinforce existing disparities

[48] Rice, J., et al., 2019.

in the workforce (see below). For example, 25% of students studying at Lethbridge College to be wind turbine technicians were once oil and gas industry workers.[49]

Box 1: Characterizing impacts of decarbonization on employment

Quantitative impacts of decarbonization policies on employment include:[50]

- **Job creation**—the expansion of no- or low-carbon intensive goods, services and infrastructure will translate to higher labour demand in certain sectors of the economy.
- **Job substitution**—some existing jobs will be substituted as a result of shifts in the economy from less to more energy efficient, and from high-carbon to low-carbon technologies, processes, goods and services.
- **Job elimination**—certain jobs in the economy may be lost, either phased out or vastly reduced in numbers, without direct replacement.
- **Job transformation**—some workers (e.g., plumbers, electricians, mechanics, construction workers) will have their jobs transformed and redefined as day-to-day workplace practices, skill sets, work methods and job profiles are greened.

The quality of employment is also important, in addition to the number of jobs created, substituted, lost or transformed. Jobs in the new carbon-neutral economy must be "decent"—among other things, paying a "livable wage".

Dependency of communities on vulnerable sectors

Two sectors of the economy are most vulnerable to an absolute contraction in output and employment as a direct consequence of decarbonization—namely, the energy sector (i.e., the extraction, manufacture and transportation of coal, oil and natural gas)[51] and energy-intensive industry (e.g., cement, iron and steel, chemicals, etc.)[52]. After all, the intention of a carbon-neutral transition is to reduce the consumption of fossil fuels. Regarding energy-intensive industry, the risk of job losses might be less of an issue, as the

[49] Baruah, B., 2019: Commentary: Addressing the diversity challenge in energy sector recruitment (https://www.iea.org/newsroom/news/2019/july/).

[50] UNFCCC, 2016b.

[51] For the purpose of this Policy Brief the "energy sector" is defined to include the business establishments of the North American Industry Classification System (NAICS) codes 211, 2121, 212291, 21311A, 2211, 2212, 32411 (Petroleum Refining), 486 (Pipeline Transportation).

[52] As noted above, other sectors will be affected indirectly.

technical potential already exists in these sectors to decarbonize and many have already achieved significant improvements in energy efficiency without causing a contraction of employment.[53] Accepting this, a carbon-neutral transition will mainly impact employment in the energy sector.[54] While it is not feasible within the scope of this Policy Brief to quantify displaced employment in Edmonton attributable to an updated CETS, it is possible to develop a better understanding of potential consequences for a "just and equitable transition" arising from wider provincial, national or international efforts to reduce carbon emissions—by mapping the City's dependence on the energy sector.

Overall, the energy sector accounted for 4.2% of Edmonton's jobs in 2016.[55] At the provincial level, the relative contribution of the energy sector to total jobs in 2016 was 5.4%. Compensation paid to energy sector workers in Edmonton in 2016 amounted to nearly $1.6 billion[56].

Figure 3 attempts to identify the most vulnerable neighbourhoods in Edmonton, in terms of two dimensions: the number of livelihoods at risk and the relative dependence of the community on energy sector jobs. Each dot represents a neighbourhood. Those neighbourhoods in the top right quadrant (denoted by red dots) are in the upper quartile on both dimensions and would be considered the most vulnerable to adverse employment impacts from decarbonization of the wider economy. The adjacent table lists these neighbourhoods. The information in Figure 3 suggests the most vulnerable neighbourhoods are Charlesworth, Summerside, Walker and Windermere.

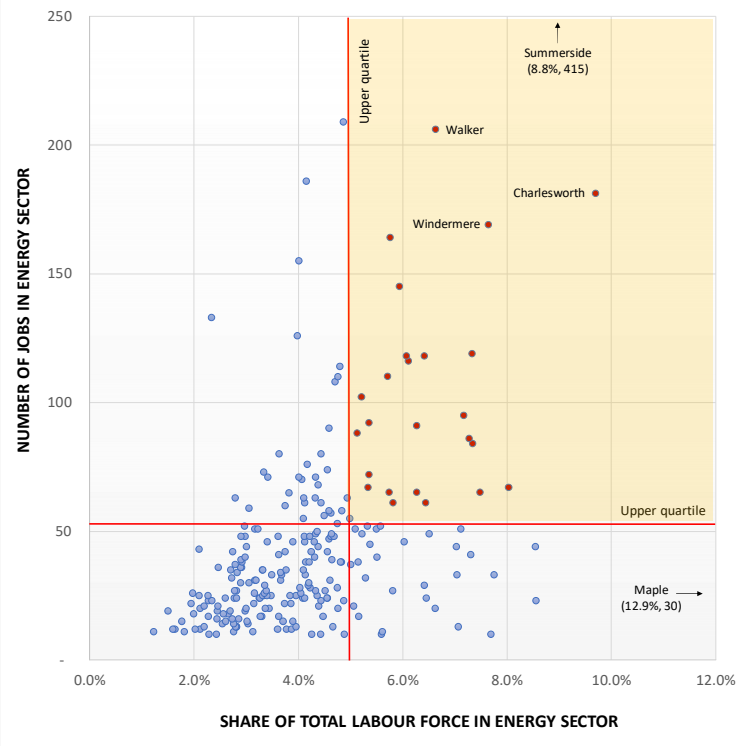
[53] Bataille, C., et al.: The potential to decarbonize Canadian heavy industry: technological and policy pathways for Canadian energy intense industry to thrive in a low carbon world. ResearchGate (www.researchgate.net/) (accessed 19 September 2019).

[54] Mertins-Kirkwood, H., 2018.

[55] Note that 15% of respondents to the 2016 Census did not identify their sector of work.

[56] Compensation costs consist of all payments in cash or in kind made to workers for services rendered. It includes the salaries and social contributions paid by employers' social contributions earned in employee jobs, plus an imputed labour income for self-employed workers. Data obtained from Statistics Canada, Table 36-10-0489-01.

Figure 3: Exposure of Edmonton neighbourhoods to potential adverse employment effects in the energy sector from decarbonization of the economy



Neighbourhood	Labour force (number)	Share of total labour force (%)	Total compensation ($ million)
ALLARD	65	7.5%	9
AMBLESIDE	118	6.4%	16
BELMONT	72	5.4%	10
BRINTNELL	119	7.3%	17
CASSELMAN	67	5.3%	9
CHARLESWORTH	181	9.7%	25
CRAWFORD PLAINS	92	5.4%	13
DALY GROVE	61	5.8%	9
ELLERSLIE	116	6.1%	16
HADDOW	91	6.3%	13
HODGSON	61	6.4%	8
KINISKI GARDENS	118	6.1%	16
LARKSPUR	145	5.9%	20
LAUREL	86	7.3%	12
MACEWAN	110	5.7%	15
MAGRATH HEIGHTS	55	5.0%	8
MCCONACHIE AREA	95	7.2%	13
MENISA	65	5.7%	9
OVERLANDERS	67	8.0%	9
RUTHERFORD	209	4.9%	29
SATOO	65	6.3%	9
SCHONSEE	63	4.9%	9
SILVER BERRY	88	5.1%	12
SOUTH TERWILLEGAR	164	5.8%	23
SUMMERSIDE	413	8.8%	57
TAMARACK	84	7.3%	12
WALKER	206	6.6%	29
WILD ROSE	102	5.2%	14
WINDERMERE	169	7.6%	23

Source: 2016 Census, Population by ward, neighbourhood and sector of employment, and author's own calculations. **Note**: the "energy sector" combines the business establishments of the North American Industry Classification System (NAICS) codes 211, 2121, 212291, 21311A, 2211, 2212, 32411 (Petroleum Refining), 486 (Pipeline Transportation). The solid red lines in the figure show the upper quartile values for each axis. The table to the left of the figure shows the values for each neighbourhood in the upper quartiles of the figure (denoted by red dots).

Employment opportunities and the net impact on jobs

It is important not to lose sight of the fact that Edmonton's transition to a carbon-neutral economy will also create "decent" jobs. In 2016, Edmonton's already developed "green energy economy" directly supported about 14,670 jobs across the following sub-sectors: renewable power supply and alternative energy (480 jobs), energy storage and grid infrastructure (315 jobs), green buildings and energy efficiency (11,665 jobs), and green transportation (2,210 jobs).[57] That amounts to about 2.7% of the total labour force aged 15 or over.[58] Collectively, these sub-sectors

[57] Shorthouse, P., et al., 2019.

[58] In 2016 the total labour force aged 15 or over in Edmonton was 537,755 (Statistics Canada, 2017: Edmonton Census Profile, 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001).

generated nearly $3.6 billion in gross output and $1.8 billion in GDP. [59] The job creation potential of the updated CETS has yet to be measured, but other national and provincial level studies suggest that a transition to a low-carbon economy will create significant numbers of new jobs—primarily as a result of investment in energy efficiency improvements. For example, one study estimates that the energy efficiency measures in the Pan-Canadian Framework will add (a net increase) 82,500 full-time equivalent jobs in Alberta over the period 2017-2030; that is equivalent to +8.5 FTEs for every million dollars of residential and commercial energy savings.[60] Moreover, the additional jobs will likely outnumber potential losses in the energy sector.[61] The real issue from a social equity perspective, is whether these opportunities are accessible by all Edmontonians.

Equity considerations for participating in green energy economy

The above analysis masks important inequalities which need to be recognized. At the national level Mertins-Kirkwood (2018) makes the following observations regarding workers in the fossil fuel industry in 2016[62]: they are predominantly male (77% compared with industry average of 52%[63]); are very well compensated ($68 per hour compared with industry average of $35 per hour); and immigrants are underrepresented (12% compared with industry average of 23%). The compensation disparity is very similar at the provincial level in Alberta ($68 per hour in the fossil fuel industry compared with an industry average of $35 per hour in 2016)[64]. In contrast, women and immigrants are over-represented in indirect, supporting roles to the fossil fuel industry—such as lower compensated service work.[65]

The gender pay gap in Alberta is also disproportionate relative to the Canadian average at $31,000 per year for full-time workers, making it the highest in Canada.[66] Edmonton fares no better. In a study of 25 of Canadian cities, Edmonton was ranked 24th in terms for economic

[59] Shorthouse, P., et al., 2019.

[60] Dunsky Energy Consulting, 2018: The Economic Impact of Improved Energy Efficiency in Canada: Employment and Other Economic Outcomes from the Pan-Canadian Framework's Energy Efficiency Measures, Dunsky Energy Consulting, Montreal, p. 36. Also see Bridge, T. and Gilbert, R., 2017: Jobs for Tomorrow: Canada's Building Trades and Net Zero Emissions, Colombia Institute, Vancouver, p. 78.

[61] Mertins-Kirkwood, H., 2018.

[62] The "fossil fuel industry" was defined to include the following NAICS categories: oil and gas extraction (211), coal mining (2121), support activities for mining and oil and gas extraction (213) (adjusted to remove the estimated share for mining of minerals other than coal), natural gas distribution (2212), petroleum and coal product manufacturing (324), petroleum product wholesaler-distributors (412) and pipeline transportation (486).

[63] This combines the North American Industry Classification System (NAICS) codes 11 to 91.

[64] Statistics Canada. Table 36-10-0489-01 Labour statistics consistent with the System of National Accounts (SNA), by job category and industry.

[65] SEI, 2019.

[66] Mertins-Kirkwood, H., 2018.

security for women.[67] Median incomes for women are 39% lower than men's income and 63% of women are employed full-time compared to 72% of men.[68]

Inequalities are also evident regarding opportunities in the "green energy economy". For example, the construction sector will be a major beneficiary of the transition to carbon-neutrality—benefiting from investment in public transportation, renewable energy and green infrastructure projects. But, only 15% of the construction sector workforce in Edmonton in 2015 were women. At a national level, disparities are also observed for relevant occupation groups; women comprise only 12% of "built environment" workers.[69] A survey of "environmental professionals" reveals similar disparities, finding that only 25% are women and 3% are recent immigrants.[70] Both these groups are substantially underrepresented given their shares of the total labour force. The same study finds that 6% of "environmental professionals" are Indigenous; roughly double their share of the total labour force nationally. These findings, at least regarding women, reflect disparities observed at a policy level internationally regarding women leadership in climate governance and decision-making.[71]

The presence of these inequalities in the workforce has two implications for Edmonton's "just and equitable transition" Climate Shift:

1. A transition plan that *only* provides support to workers in the energy sector whose jobs might be at risk from decarbonization will exacerbate existing inequalities in the labour force; and relatedly,
2. Policies in the plan must foster equitable access to new jobs and business opportunities generated by decarbonization, which requires the plan to recognize and readdress underlying structural inequalities.

Framework for a just and equitable transition

A just and equitable transition will not happen by itself—it requires a framework that can guide the transition to maximize benefits across all stakeholders, and to minimize adverse consequences for disadvantaged and marginalized groups and communities. This section provides the

[67] McInturff, K., 2017: The Best and Worst Places to be a Woman in Canada 2017: The Gender Gap in Canada's 25 Biggest Cities, Canadian Centre for Policy Alternatives, Ottawa, p. 90.

[68] Statistics Canada, 2017: Edmonton Census Profile, 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001.

[69] This includes occupations in sectors such as housing, transport, utilities, building services (C40 Cities, 2019: Gender Inclusive Climate Action in Cities: How Women's Leadership and Expertise can Shape Sustainable and Inclusive Cities, London, p. 68).

[70] An environmental professional is "an individual who spends at least some of his or her work time performing activities related to the environmental industry […] Environmental Protection, Resource Management, and Environmental Sustainability." (Eco Canada, 2017: Profile of Canadian Environmental Employment, September 2017. Eco Canada, Calgary, p. 51.)

[71] C40 Cities, 2019.

beginnings of a framework for Edmonton's "just and equitable transition", including (a) principles to guide the development and implementation of carbon reduction policies and programs and (b) high-level recommendations. Some of these recommendations relate to process and decision-making; others to the design of carbon reduction policies and programs. With respect to the latter, the intention is not to repeat all the good initiatives the City is currently running (e.g., allowing children 12 and under to use public transit for free, the Providing Accesible Transit Here program, etc.) or to offer detailed program or project ideas, but rather to define criteria that should be embedded in the formulation of carbon reduction initiatives.

Guiding principles

Edmonton's "just and equitable transition" to carbon-neutrality should be guided by the following core principles of energy and climate justice discussed above:

- Ensure that decisions are participatory, inclusive, informed and accountable, with transparent monitoring of outcomes.
- Advance social justice and equity in all carbon reduction policies and programs.
- Ensure the benefits of decarbonization are shared equitably, including access to low-carbon goods and services.
- Protect low-income and traditionally disadvantaged groups and communities from any adverse consequences of decarbonization.
- Choose emission reduction policies and programs that create good quality local jobs and attend to existing inequalities in the workforce, and thereby allow participation by all peoples.
- Support a just transition for workers, businesses and communities vulnerable to structural adjustments in the economy resulting from decarbonization.
- Ensure that carbon reduction policies and programs improve public health and do not exacerbate existing health disparities.

Recommendations

A number of leading cities internationally and in North America have already mainstreamed aspects of a "just and equitable transition" within their climate action plans, including the City of Portland[72], the City of Minneapolis[73], City of Seattle[74] City of New York[75], City of Boston[76] and the

[72] Williams-Rajee, D. and Evans, T., 2016: Climate Action Through Equity. Multnomah County and the City of Portland, Portland, Oregon, p. 19.

City of Toronto[77]). The recommendation actions listed below draw upon the experience of these cities.[78] It must be stressed that case studies of transitions in the literature suggest two keys to success: (1) early implementation of plans and programs to enable a gradual, managed transition; and (2) commitment to a strong social dialogue between all constituencies and government.[79]

The following recommendations should be considered by the City for immediate adoption, as they relate to the planning process and decision-making:

- **Establish an "Equity" Working Group (or Task Force)**.

Working Groups have been used in the development of climate actions plans by, for example, the City of Portland[80] and the City of Minneapolis[81] to provide low-income families, disadvantaged groups (including women and youths) and marginalized communities a voice in the decision-making process. They have proved invaluable in ensuring equity and social justice considerations are mainstreamed throughout carbon reduction plans and individual actions—from the guiding vision through implementation.

The Working Group should be made up of representatives from visible minorities and Indigenous peoples, low-income households, new immigrants, social service agencies, Edmonton's youth, and community groups and non-profits working on climate-equity issues on the ground. Individuals with public health and climate policy expertise could also be included. In support of increasing gender parity in climate leadership roles, women should play prominent roles in the Working Group. To facilitate cross-over communication, membership should also comprise staff from the City's Energy Transition Team. To be most effective, the Working Group needs to be part of the planning process from the outset—i.e., established immediately. Consideration should be given to providing resources (e.g., grants or in-kind venues) to encourage and facilitate the participation of members. For example, the City of Portland offered grants to member organizations.

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[73] Minneapolis City Coordinator, 2013: Minneapolis Climate Action Plan: A Roadmap to Reducing Citywide Greenhouse Gas Emissions. City of Minneapolis, Minnesota, p. 39.

[74] City of Seattle, 2013: Seattle Climate Action Plan. Seattle Office of Sustainability and Environment, Seattle, Washington State, p. 91.

[75] City of New York, 2014: One City, Built to Last: Transforming New York City's Buildings for a Low-Carbon Future. Mayor's Office of Long-term Planning and Sustainability, City of New York, New York, p. 111.

[76] City of Boston, 2014: Greenovate Boston 2014 Climate Action Plan Update. Office of Environment, Energy and Open Space, City of Boston, Massachusetts, p. 78.

[77] See the collection of Transform TO reports and resources at: https://www.toronto.ca/services-payments/water-environment/environmentally-friendly-city-initiatives/transformto/transformto-climate-action-strategy/transformto-reports-resources/.

[78] All the aforementioned cities are members of the Carbon-Neutral Cities Alliance, which has published a guide to help cities decarbonize. Among the guide's 11 principles is one to "embrace social equity in climate action". See: CNCA, 2015: Framework for Long-term Deep Carbon Reduction Planning. Developed for the Carbon Neutral Cities Alliance (CNCA) by the Innovation Network for Communities, p. 123.

[79] Gambhir, A., et al., 2018: Towards a Just and Equitable Low-Carbon Energy Transition. Grantham Institute Briefing Paper No. 26, Grantham Institute, Imperial College, London, p. 17.

[80] Williams-Rajee, D. and Evans, T., 2016.

[81] Minneapolis City Coordinator, 2013.

- **Develop a set of equity indicators**.

Following the adage "what gets measured gets managed", the City and Equity Working Group should develop a set of climate-equity indicators to monitor and evaluate the extent to which equity issues have been mainstreamed within decision-making processes and the implementation of the plan. Performance of the plan with respect to the suite of indicators could be made public in the form of a periodic "Climate Equity Report" to allow stakeholders to monitor the degree to which equity goals have been achieved and to identify areas where actions could be improved to further advance equity.

The climate-equity indicators (or a sub-set) should also be used to appraise and prioritize actions in terms of their performance across all three equity dimensions (distributional, recognitional and procedural). The City of Seattle, for example, developed a spatial Displacement Risk Index and an Access to Opportunity Index to facilitate a quantitative equity analysis of development and planning decisions, including climate policy decisions.[82] Each index comprises 14 equity indicators. The City of Oakland, California uses a "checklist" of equity considerations for qualitative analysis to inform climate planning decisions.[83] Similarly, the City of Portland's Equity Working Group developed a "checklist" of nine key equity considerations to support a basic equity assessment of actions in the draft climate plan (see Box 2).

Tools also exist that specifically assess gender aspects of local government policies, including carbon reduction initiatives. For example, the Gender Assessment and Monitoring of Mitigation and Adaptation (GAMMA) tool facilitates an examination of the gender responsiveness of local climate policies and programs and helps identify entry points to mainstream gender specific perspectives into the formulation of actions.[84] It could be part of the toolkit used by Equity Working Group.

[82] City of Seattle, 2016: Equitable Development Implementation Plan. Office of Planning and Community Development, City of Seattle, Washington, p. 55; Puget Sound Regional Council, 2019: Opportunity Mapping: Technical Addendum. Puget Sound Regional Council, Seattle, Washington, p. 20; and Puget Sound Regional Council, 2019: Displacement Risk Mapping: Technical Addendum. Puget Sound Regional Council, Seattle, Washington, p. 14.

[83] Available at: http://oaklandclimateaction.org/wp-content/uploads/2015/06/Equity-Checklist_6_19_15.pdf.

[84] Available from Gender CC – Women for Climate Justice (https://gendercc.net/home.html).

Box 2: Equity considerations used by City of Portland to screen proposed climate actions[85]

1. Disproportionate impacts

Does the proposed action generate burdens (including costs), either directly or indirectly, to communities of color or low-income populations? If yes, are there opportunities to mitigate these impacts?

2. Shared benefits

Can the benefits of the proposed action be targeted in progressive ways to reduce historical or current disparities?

3. Accessibility

Are the benefits of the proposed action broadly accessible to households and businesses throughout the community — particularly communities of color, low-income populations, and minority, women and emerging small businesses?

4. Engagement

Does the proposed action engage and empower communities of color and low-income populations in a meaningful, authentic and culturally appropriate manner?

5. Capacity building

Does the proposed action help build community capacity through funding, an expanded knowledge base or other resources?

6. Alignment and partnership

Does the proposed action align with and support existing communities of color and low-income population priorities, creating an opportunity to leverage resources and build collaborative partnerships?

7. Relationship building

Does the proposed action help foster the building of effective, long-term relationships and trust between diverse communities and local government?

8. Economic opportunity and staff diversity

Does the proposed action support communities of color and low-income populations through workforce development, contracting opportunities or the increased diversity of city and county staff?

9. Accountability

Does the proposed action have appropriate accountability mechanisms to ensure that communities of color, low-income populations, or other vulnerable communities will equitably benefit and not be disproportionately harmed?

[85] Williams-Rajee, D. and Evans, T., 2016.

- **Establish a Task Force to ensure equitable participation in business and employment opportunities**.

Social inclusion in the growing low-carbon economy requires equitable opportunities for good quality work for all people. It would be naïve to assume this will happen organically as part of the transition to a carbon-neutral future. Consideration should thus be given to supporting the formation a Task Force to anticipate and plan for how the transition to carbon-neutrality will impact employment and business opportunities and what can be done to ensure these opportunities are accessible to traditionally disadvantaged and marginalized groups. These groups face unique barriers that will hinder their ability to participate in the low-carbon economy. New immigrants, for example, often face language and literacy barriers, difficulties with recognizing foreign accreditations, lack of information and awareness of available support services, difficulties accessing transportation, and lack of childcare, among other things. Furthermore, safety concerns can restrict women's transportation options and inhibit their participation[86]. The physically impaired, likewise, face barriers to travel around the city. A lack of resources, skills and training capacity was identified by Indigenous people as a barrier to taking climate action; concern over other more pressing challenges (e.g., mental health, housing issues) was also identified as an obstacle to participation.[87]

In addition to leading the characterization of anticipated employment and business opportunities, the Task Force could coordinate:

- An assessment of the unique obstacles faced by women, new immigrants, the physically impaired and Indigenous peoples, and other vulnerable groups, that restricts their ability to access the benefits of the "green energy economy", along with recommendations to overcome these barriers.
- A skills needs assessment and review of skills profiles and training programs.
- The provision of required training opportunities and capacity building for prospective workers in low-carbon business practices and technologies.
- Work-based peer learning and mentorship opportunities among employers and workers, as well as formal education and training in entrepreneurship to spread low-carbon business practices and the use of low-carbon technologies. Mentoring programs should

[86] C40 Cities, 2019.

[87] Government of Canada, 2018: Generation Energy: Dialogue Document. Government of Canada, Ottawa, p. 62.

seek to strengthen women's leadership in climate action. Increasing women in leadership roles is a crucial first step to realizing a gender inclusive low-carbon transition. Mentorship programs are also essential for the success of Indigenous-led businesses.

The Task Force could also investigate the feasibility of embedding requirements in low-carbon public investment projects to ensure broad access to traditionally marginalized populations. The City of Edmonton could work with the Task Force and other stakeholders to support the adoption of its findings.

The following recommendations should be reflected in carbon reduction policies and programs considered for the updated CETS:

- **Invest judiciously in low-carbon programs and projects to maximize equity benefits**.

Priority should be given to low-carbon public investments in traditionally disadvantaged communities, and which have populations vulnerable to adverse employment and output impacts from decarbonization—ensuring a variety of benefits are available to low-income families, marginalized groups and vulnerable communities. Priority should also be given to investments in specific carbon reduction policies and programs that disproportionately benefit disadvantaged and marginalized groups. For example, investment in public transit has the potential to disproportionately benefit vulnerable populations and the urban poor. In contrast to low-carbon investments in specific buildings that target individuals or certain groups—improvements to public transit networks benefit entire neighbourhoods or districts. Moreover, visible minorities and the urban poor tend to spend more time commuting; hence, they are more likely to see larger benefits from improved transit. Increased access to public transit will also benefit those individuals who cannot drive or afford a car—the elderly, the urban poor, and the physically impaired.

When formulating actions, it is vital that what appears a worthy action at first glance is nonetheless screened for barriers unique to specific groups that would preclude them from accruing the benefits; this is the function of the "equity checklists" discussed above. By way of example, expanding bike lanes might seem like an innocuous action to reduce the use of private vehicles; however, cycling is considered inappropriate for women in certain cultures. Furthermore, bicycles are expensive compared with walking, and may not be universally affordable. Also, gender aspects of transportation are commonly underappreciated. Women tend to more often travel outside peak commuting times, to more geographically dispersed locations, and using a diversity of modes. Consequently, the transport needs of women are fundamentally different to males—in addition to safety, they value flexibility, coverage and reliability more highly.

- **Ensure public incentive programs are appropriately designed for disadvantaged and marginalized Edmontonians**.

Social equity can be advanced by ensuring publicly funded programs intended to increase the adoption of energy saving or renewable energy technologies by low-income families do not require participants to be homeowners, have disposable savings, or access to credit to benefit from the incentives. Programs should be designed to encourage the adoption of low-carbon technologies where access to incentives is decoupled from the ownership of individual assets, like homes or vehicles. Equally, programs should be designed to address barriers unique to other population groups, like new immigrants (who may face language and literacy barriers).

To encourage participation, evidence suggests programs should also emphasize the (co-)benefits for people and their communities. Support for carbon reduction measures among disadvantaged groups is often predicated on improvements in mental and physical health and social well-being, as well as concern for their children (future generations). Vulnerable populations are, in general, in relatively worse health states relative to the general population and thus more likely to benefit from carbon reduction initiatives that improve local air quality or increase physical activity.[88] However, as noted above, simply investing in bike lanes is not the answer, particular groups face unique challenges that must be considered when formulating policies and programs.

- **Support grassroots, community-driven carbon reduction efforts targeting vulnerable groups.**

Grassroots, community-centric initiatives are often the most effective means of increasing wider community engagement on issues. Locally conceived initiatives are more likely to address efficiently the social, cultural and economic barriers which might prevent individuals from recognizing their own contribution to reducing energy use and carbon emissions. Put another way, community-led initiatives provide an effective means to realizing the principle of recognitional equity in practice. In the context of climate action, there needs to be a paradigm shift away from traditional top-down planning, towards bottom-up, grassroots, community-centric planning. Importantly, this approach enables policymakers to design actions that (a) can accommodate multiple entry points for people at different stages of their transition to low-carbon living and (b) reflects how they want to participate in the transition and what support they require to do so. The latter is crucial for Indigenous peoples—who should define their own transition pathways rather than having them defined by a top-down external planning process. Traditional

[88] Gouldson, A., et al., 2018.

Indigenous knowledge and wisdom to address energy and climate issues should also be harnessed and incorporated into the formulation of carbon reduction policies and measures by the City. This could be accomplished by having a strong Indigenous presence on the Equity Working Group. In general, failure to incorporate grass-roots voices in policy formulation and decision-making risks perpetuating exiting disparities.

With respect to addressing energy poverty—these types of bottom-up approaches have proven the most successful way of reaching energy poor individuals and families, who experience a range of unique barriers to participation in conventional residential energy efficiency programs (discussed above).

Two grassroots programs targeting low-income and energy poor households are currently being piloted in Edmonton: Empower Me's Energy Mentors, an energy savings program designed for new immigrant communities; and All One Sky Foundation's Energy Cafés, a program that provides low-income, disadvantaged and marginalized families with energy bill literacy, energy saving advice and light energy saving measures in a "café environment" with refreshments. The Energy Cafés also provide a triage service to other essential services and are designed to make referrals to energy efficiency programs, when available. The City should examine the outcomes of these pilots, and if successful, consider providing ongoing support to engage energy poor and vulnerable Edmontonians in the low-carbon transition.

There are also multiple examples of grassroots, community-centric initiatives that could serve as models for programs to educate, engage and raise the voice of Edmonton's youth in support of climate action.[89]

Conclusions

The City of Edmonton is updating its Community Energy Transition Strategy (CETS) to deliver more urgent and ambitious emission reductions that align with the aim of the Paris Agreement to limit global average temperature increases this century to 1.5°C above pre-industrial levels. In effect, Edmonton must be carbon-neutral by 2050. Achieving this goal will require a significant reshaping of Edmonton—transformative changes to energy systems, transportation networks, waste management practices, buildings and neighbourhoods, as well as systems of governance. There is plenty of evidence that a low-carbon transition will generate a multitude of benefits in addition to reduced climate risks, including, for example, resource savings, reduced congestion, employment and economic growth, improved air quality and public health. Yet without vigilance,

[89] See, for example: https://www.climate.gov/teaching/climate-youth-engagement/case-studies and https://www.connect4climate.org/initiatives/youth4climate.

there is also evidence decarbonization can create injustices and exacerbate existing inequalities and vulnerabilities.

The need to reconcile the demands of ambitious climate action and social justice as part of a "just and equitable transition" is playing out around the world and Canada. Born out of labour movements in North America and internationally, a just transition is a key requirement of the Paris Agreement and is an integral part of the Pan-Canadian Framework on Clean Growth and Climate Change. It has been successfully mainstreamed into climate action plans of Portland, Minneapolis, Boston, Toronto, among others. The following working definition is proposed for Edmonton's "just and equitable transition" Climate Shift:

> An inclusive social dialogue between citizens, worker and business groups, investors, communities and the City. This dialogue develops plans, policies and investment that acknowledges and respects the history, needs and rights of different constituencies including marginalized groups, that supports workers and neighbourhoods disadvantaged by the transition away from fossil fuels, that ensures equitable access to low-carbon goods, services, infrastructure and economic opportunities, and that fosters equitable participation in decision-making and governance.

Significantly, the City of Edmonton's carbon budgeting approach already embeds the core equity principle of the UNFCCC—reflecting both the City's responsibility for contributing to climate change and its capacity to solve the problem. It also reflects a fundamental equity principle that all people have equal rights to development. This places inter-generational equity principles more centrally, as the rights of future generations—including Edmonton's youth—to enjoy a good quality of life are recognized.

In terms of the policies and programs needed to keep emissions under the carbon budget, a tripartite framework is proposed for examining potential social justice and equity issues, which considers distributional, procedural and recognitional dimensions of equity. Distributional equity dimension is concerned with the unfair distribution of costs and benefits, as it relates to:

- Employment and business opportunities in the growing green energy economy, particularly concerning marginalized groups (e.g., women, immigrants, Indigenous peoples);
- Access to low-carbon goods, services and resources by vulnerable and disadvantaged populations; and

- Regressive economic consequences of carbon reduction policies and programs for the low-income individuals and families.

The procedural dimension of equity is concerned with the inclusiveness of governance and decision-making processes. It is focused on determining whose interests and what issues should be part of transition planning, who gets to participate in the social dialogue, and how to reach marginalized groups that are often underrepresented in traditional public engagement processes—like youth, new immigrants and Indigenous peoples. Achieving procedural equity requires everyone to have a voice at the table.

The third dimension—recognitional equity—crosscuts the other two. Differences in society that influence existing disparities are shaped by underlying social structures (beliefs, norms, culture, language). To achieve both distributional and procedural equity, these determinants of prevailing inequalities must be recognized and addressed. In turn this requires:

- Acknowledging the different intersecting identities of Edmontonians (e.g., gender, ethnicity, age, culture and language);
- Recognizing that these identities are influenced by historical disparities that can shape individual's ability to benefit from a low-carbon transition and to participate in decision-making; and
- Promoting respect for different groups in the community so their views are accepted and valued.

Achieving distributional, procedural and recognitional equity will not happen by itself; it requires positive action. To this end, it is recommended that the following guiding principles are mainstreamed into the development and implementation of all carbon reduction policies and programs:

- Ensure that decisions are participatory, inclusive, informed and accountable, with transparent monitoring of outcomes.
- Advance social justice and equity in all carbon reduction policies and programs.
- Ensure the benefits of decarbonization are shared equitably, including access to low-carbon goods and services.
- Protect low-income and traditionally disadvantaged groups and communities from any adverse consequences of decarbonization.

- Choose emission reduction policies and programs that create good quality local jobs and attend to existing inequalities in the workforce, and thereby allow participation by all peoples.
- Support a just transition for workers, businesses and communities vulnerable to structural adjustments in the economy resulting from decarbonization.
- Ensure that carbon reduction policies and programs improve public health and do not exacerbate existing health disparities.

These principles provide a lens through which to evaluate the fairness of the social, economic and environmental consequences of Edmonton's transition to carbon-neutrality.

In addition, the following recommendations should be considered by the City for immediate adoption, to inform the action planning process and decision-making:

- Establish an "Equity" Working Group.
- Develop a set of equity indicators.
- Establish a Task Force to ensure equitable participation in business and employment opportunities.

Furthermore, the following criteria should be embedded across the design of detailed carbon reduction policies and programs to be included in the updated CETS:

- Invest judiciously in low-carbon programs and projects to maximize equity benefits.
- Ensure public incentive programs are appropriately designed for disadvantaged and marginalized Edmontonians.
- Support grassroots, community-driven carbon reduction efforts targeting vulnerable groups

Managed well, Edmonton's transition to carbon-neutrality can become a strong driver of business and employment opportunities, social justice and poverty alleviation. Moreover, by facilitating socially fair outcomes, a "just and equitable transition" can strengthen the broad political coalition necessary to stay the course on Edmonton's ambitious emissions reduction targets. We will only succeed in achieving these targets if the full potential of *all* Edmontonians is harnessed, both men and women, young and old, the physically impaired, new immigrants, Indigenous peoples, and the rich and poor.