



COMMUNITY ARCHETYPES

A Framework to Inform the Development of Net-Zero Transition Policy in Canada

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Board of Canada**

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1. PURPOSE

This report is part of the first phase of the Diverse Pathways to Net-Zero initiative that is focused on policy options that reflect the unique socio-economic contexts, energy resources, and capacity to implement the net-zero transition in Canadian communities.

Getting to net-zero will require strong support and buy-in from communities, and ensuring that they have both the resources and capacity they need to be successful. But equipping Canada's diverse 4,000-plus communities with unique resources and capacity needs one by one will not get us to the outcome of net zero emissions by 2050.

This report is a first attempt to outline why we first need to develop robust community archetypes that provide insight into the diversity of our communities.



The community archetypes identified in this report outline a process to identify communities that are representative of Canada's diverse communities, and to provide a baseline of community archetypes that allow for additional community archetypes to be added as the initiative evolves.

This report is the first building block in the development of a comprehensive archetype framework for Canada. The initial research and engagement identified the need for the refinement of existing criteria, as well as the development of additional criteria and indicators to provide more nuance and inclusivity to the archetype framework.



2. OVERVIEW

A Community Archetype Framework is needed to inform the development of federal and provincial/territorial net-zero policies and programs reflecting the diversity of Canada's communities.

Canada is one of the most diverse nations in the world. The more than 4,000 communities within it are diverse in their political infrastructure, their needs for services, products, and communication, and their socio-economic composition. In this regard, developing representative community archetypes involves identifying the classification of different communities using suitable criteria outlined in a community selection framework (see Appendix).

This allows us to define the potential net-zero solution set for communities meeting that archetype description so that local organizations and businesses can contribute to net-zero emission goals in an effective and inclusive manner.

The archetypes consider economic, social, demographic, infrastructure and energy factors. A series of community profiles has been developed to build understanding on the impact and implications of net-zero transition at the local level. Policies, programs, and investments that are tailored to the specific needs and context of each community type will facilitate more rapid decarbonization, allow them to overcome the barriers to adoption, and increase local understanding of and capacity to implement low-carbon projects.



3. METHODOLOGY

The criteria used in the community archetypes framework have been determined based on a review of relevant projects and programs such as QUEST's Getting to Implementation and Smart Energy Community Benchmark projects, as well as the Federation of Canadian Municipalities Partners for Climate Protection program. A number of criteria with measurement indicators applicable to the Diverse Pathways initiative were assessed from these resources.

In addition, interviews with subject matter experts representing municipal associations, former municipal politicians, researchers, and consultants, were conducted to further inform the development of the framework.

4. DEVELOPING THE COMMUNITY ARCHETYPE FRAMEWORK

Arising from these consultations, several criteria were identified, some of which had a broad consensus supporting their importance as key criteria to be considered for the Diverse Pathways initiative.

They include:

1. Population size
2. Population density
3. Jurisdiction/ Electricity system
4. Net-zero economic impacts and opportunities

However, these indicators may not be sufficient to develop more flexible and meaningful archetypes that encompass the objectives of the Diverse Pathways initiative and that can be applied towards a comprehensive archetype framework reflective of the diversity of Canada's communities. This first phase of research and engagement identified the need for the refinement and development of additional criteria and indicators to provide more nuance and inclusivity to the archetype framework. Their development requires additional focus and resources. More information is laid out in the Other Influencing Factors section (see page 9).

To ensure inclusivity, we also put a strong emphasis on the constraints associated with generalizing Indigenous communities within the archetypes due to the diversity of their cultures, environments, and governance.

As an example, there are many different remote Indigenous communities, but many urban municipalities also have large Indigenous populations.

Based on experience with past projects, the recommendation was to either create a separate pathway project specific to Indigenous communities or to find an appropriate way to include them within the evolving archetype framework.

The project team recommends engagement with Indigenous subject matter experts, as well as Indigenous communities and organizations to ensure the diversity perspectives are appropriately and respectfully represented in the Diverse Pathways community archetype framework.

5. CONSENSUS ARCHETYPE CRITERIA

The four consensus archetype criteria are outlined below, each of which are supported by between two and four indicator categories.

For example, population size has four (or potentially up to five) indicators, while the carbon intensity of a community's jurisdiction has only two.

Based on these recommended criteria, there could potentially be more than 30 possible community archetypes.

However, not every community archetype will need to be represented in the final Diverse Pathways initiative reporting.

The extent to which each possible archetype will be represented depends on the resources available and the ability of the team to work with communities that would represent any given archetype.

Population size

Population size is the only criteria that represent the relative size of different communities and has been predominantly defined along the categories as per StatsCan's Population Centres.¹ Experience from other projects shows further classifications based on project objectives. For this project, however, there could be a consideration to add on a category for the large urban population centres above 100,000, in view of the focus on smaller and more vulnerable communities.

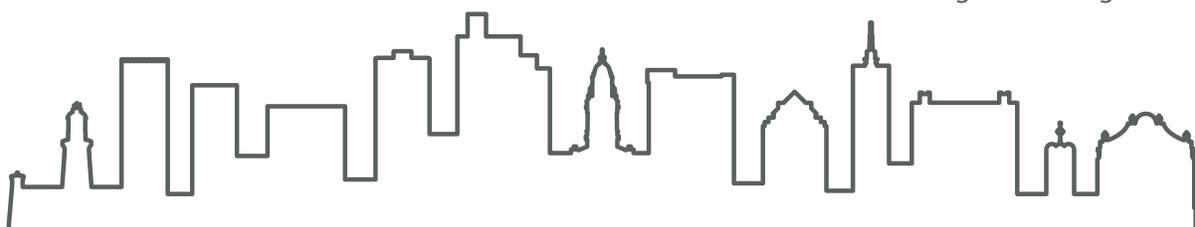
Criterion indicators

- Rural areas have a population under 1,000
- small population centres between 1,000 and 29,999
- Medium population centres between 30,000 and 99,999
- Large urban population centres 100,000 or more
- Potential for an additional category from 100,000 to 250,000 (or another number TBD) and then a "major city" or similar category above 250,000

Rationale

Population size influences the capacity to implement projects. Small capacity often has more challenges to secure adequate funding resources. This also allows Canadians to identify their home community among the archetype communities, thereby creating a sense of belonging. Population size was unanimously cited through interviews with subject matter experts as a good starting point for defining community archetypes.

1. <https://www12.statcan.gc.ca/census-recensement/2016/ref/dict/geo049a-eng.cfm>



Population density

Population density is useful in describing the set of available solutions for communities. It reflects what services and infrastructure are potentially available, and plays an important role in determining the integration of clean energy technologies and other related amenities.

While the generic definition of density is the number of people per square kilometre as defined by Statistics Canada, the Canadian Urban Institute in its Visualizing Density project (connected to the Ontario Greater Golden Horseshoe Growth Plan) also measures density as population by area and number of jobs by area.²

Statistics Canada considered density from a residential perspective using the percentage of dwelling types by area (neighbourhood density).³ The appropriate density indicator best suited for the project will be identified upon further consultation and engagement.

Criterion indicators

- **Number of people per square km**
- **Number of people per square km + jobs per square km**
- **Neighbourhood density**

Rationale

Population density provides a high-level perspective on economies of scale for infrastructure and other solutions, e.g district energy, wind, transit, etc., and also allows Canadians to identify their home community among the archetype communities.

Jurisdiction / Electricity system

Jurisdiction / Electricity System is used to determine whether the electricity system is sufficiently low emitting such that the rapid electrification of transportation and heating makes sense in the short term, while higher emitting systems may require longer term transition planning with more far reaching community implications.

To provide a clear way of differentiating between “higher emitting” and “lower emitting” jurisdictions, Environment and Climate Change Canada’s Output Based Standard for electricity in the Output Based Pricing System was selected, which is 370 tonnes CO₂ per GWh of electricity generated — equivalent to a best-in-class combined cycle gas plant. This standard is also in place in Alberta’s Technology Innovation and Emissions Reduction (TIER) and Ontario’s Emissions Performance Standards carbon pricing programs.⁴

The Canada Energy Regulator (CER) includes detailed data regarding provincial and territorial power generation from hydroelectric, nuclear, hydro, wind, natural gas, coal, biomass, and other sources. The CER provides an annual snapshot of electricity generated and carbon emissions in each jurisdiction, from which a provincial carbon intensity can be calculated. These give an indication of the carbon emission intensity of these electricity systems and implications for reducing intensity from transportation and heating by electrification.

Criterion indicators⁵

- **Data on provincial electricity generation and carbon emissions is from the CER**
- **Higher emitting jurisdictions have an electricity system carbon intensity above 370 tonnes CO₂ / GWh electricity generated**
- **Lower emitting jurisdictions have an electricity system carbon intensity below 370 tonnes CO₂ / GWh electricity generated**

2. <https://www.visualizingdensity.ca/drivers-measures>

3. https://web.archive.org/web/20210506165239mp_/https://www150.statcan.gc.ca/n1/pub/11-008-x/2008001/article/10459-eng.htm#close

4. <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/industry/pricing-carbon-pollution.html>

5. Canada Energy Regulator - Provincial and Territorial Energy Profiles

Rationale

The carbon intensity of the electricity system defines the extent to which electrification can reduce GHGs. This criterion then helps communities understand timing, and the speed and scale of electrification of transportation and heating services. Jurisdictions also allow Canadians to identify their home community among the archetype communities.

Net-Zero Economic Impacts & Opportunities

The transition to net-zero will have implications for different sectors of the economy, with some growing faster, some shrinking, and some transforming. These have multiplier effects on quality of life indicators for communities such as employment growth rate, unemployment rate, population growth rate, income per capita, etc., which reflect national and sub-national economic performance and health either directly or by proxy.

The structural changes associated with net-zero could cause shocks in fossil fuel, resource-intensive and dependent communities for example, with impacts that may persist over time.

Therefore, driving net-zero ambitions in communities should be consistent with advancing the economies of communities in such a way that mitigates negative impacts and ensures a just transition.

In this regard, an index of indicators that best reflect the Diverse Pathways project's objectives for community archetypes vis-vis reflecting the impacts of net-zero on the local economies would be developed.



Rationale

The transition to net-zero will impact local economies in different ways depending on the extent to which they are dependent on carbon intensive sectors.

This criterion will help communities understand how certain actions and policies are relevant to archetypes that may face more significant impacts and opportunities with respect to their transition to net-zero. The project team acknowledges that more work is required to develop this criterion and the appropriate indicators.

Further work is planned in phase two of the Diverse Pathways initiative, including engaging with economists and local economic development experts to better describe the factors defining this archetype criterion.



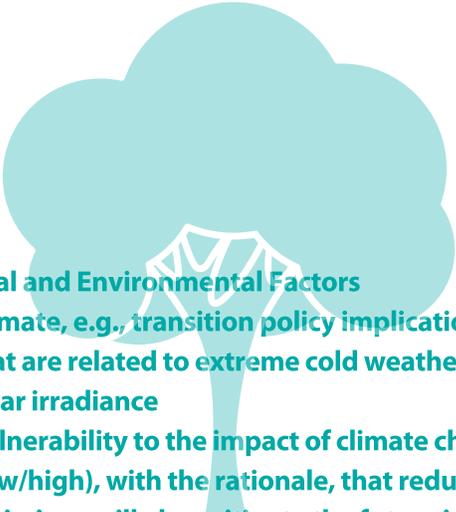
6. OTHER INFLUENCING FACTORS

While the consensus criteria to define community archetypes were described in the previous section, the net-zero transition will require developing and considering unconventional or novel metrics that could influence a community's transition pathways to net-zero. Below are additional influencing factors that could be considered in the development of a community archetype framework:



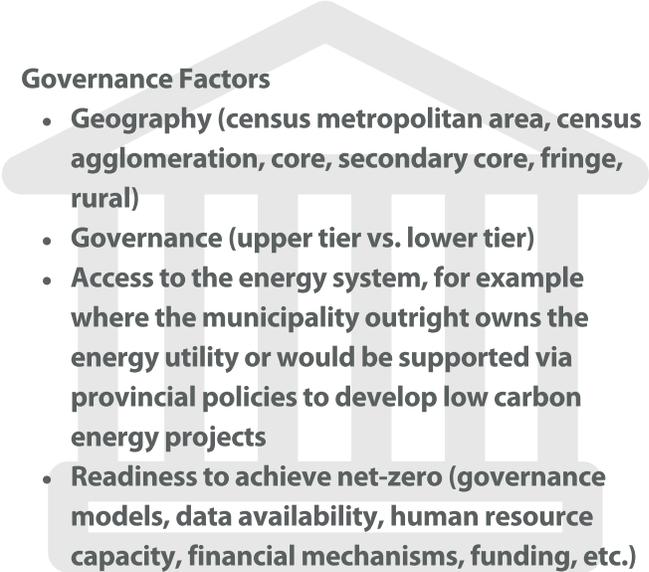
Economic Factors

- **Economic base (manufacturing, resource, mixed economy) speaks to the opportunity to transition to cleaner economic sectors**
- **Potential opportunities/assets to develop clean energy sectors (agriculture, forestry, rare earth mining, university/research)**
- **Municipal fiscal health**
- **Energy poverty (high, moderate, low)**



Physical and Environmental Factors

- **Climate, e.g., transition policy implications that are related to extreme cold weather or solar irradiance**
- **Vulnerability to the impact of climate change (low/high), with the rationale, that reducing emissions will also mitigate the future impact of climate changes on these communities**
- **Biomes and natural resources**⁶



Governance Factors

- **Geography (census metropolitan area, census agglomeration, core, secondary core, fringe, rural)**
- **Governance (upper tier vs. lower tier)**
- **Access to the energy system, for example where the municipality outright owns the energy utility or would be supported via provincial policies to develop low carbon energy projects**
- **Readiness to achieve net-zero (governance models, data availability, human resource capacity, financial mechanisms, funding, etc.)**

These factors are to be further investigated and analyzed in a future iteration of the community archetype framework.

7. CONCLUSION

This first phase of research shows that closing the gaps that have been identified to develop pragmatic and representative community archetypes requires further expert consultation. Future work to develop and refine community archetypes into a robust methodology that can be applied across Canada is essential to reach our net-zero ambitions.

The Government of Canada's Net-Zero Advisory Body's June 2021 report *Net-Zero Pathways: Initial Observations*,⁷ reinforced the need for consideration of the diversity of communities via open dialogue with workers, families and communities. The proposed community archetype project can fulfill this need.

6. Indigenous Climate Action has initiated a research process to develop Indigenous-led climate policy, anchored in the concept of land and biomes <https://www.indigenousclimateaction.com/entries/advisory-council-announcement-for-decolonizing-climate-policy-project>

7. <https://bit.ly/3vmp2hj>

8. NEXT STEPS

While consensus community archetype criteria have been recommended, the delivery of this output revealed certain gaps that need to be addressed to determine specific indicators to be utilized for all criteria. This would depend on the most suited indicators for the project that allow for a simple but holistic representation of Canadian communities. These gaps include:

A. Determining the practical population size categories

For the purpose of the Diverse Pathways initiative, there would be the need to determine if the categories as defined by Statistics Canada would suffice to meet the community archetype objectives. If part of the focus is to ensure that diverse and vulnerable communities are included and represented in the archetypes, it may be necessary to further subdivide the Statistics Canada categories to reflect this. Further consultation and research would be needed to ensure that this very important indicator is holistic.

B. Best population density indicator measurements

There is a need to determine a consistent approach and methodology for determining density categories and allowing for communities to identify which category they belong to with readily available data. From the identified indicator options that define density, one that best serves the purpose of the Diverse Pathways initiative would be adopted. In order to achieve this, consultation with and advice from urban planning institutions such as the Canadian Urban Institute is needed.

C. Deciding on an index of indicators for net-zero impacts on the economy

There are a number of indicators that reflect the economic health of communities and therefore further consultation with subject matter experts such as an economist at The Conference Board of Canada would enable the Diverse Pathways initiative to determine the most useful indicators that can be used as a reflection of net-zero capacities and implications.

The inclusion of the other influencing factors as archetype criteria needs to be clarified through further rounds of engagement and consultation so that the applicable ones become well defined with effective indicators.

In addition, and quite importantly, deciding if the recommended indicators would reflect the diversity of Indigenous communities in such a way that they are represented within the archetypes. The options suggested to create a separate project for Indigenous communities net-zero pathways or as a separate component within this current initiative needs further analysis.

We would need to consult with Indigenous people and organizations to ensure the diversity of Canada's Indigenous populations are appropriately and respectfully represented in the Diverse Pathways community archetype framework.



6. APPENDIX

INDICATOR	DATA MEASUREMENT	CONFIDENCE/SUPPORT	RATIONALE	SOURCE	RECOMMENDATIONS
Population Size (up to 5 categories)	<p>StatsCan's Population Centres:</p> <ul style="list-style-type: none"> - rural areas have a population < 1,000 - small population centres 1,000 – 29,999 - medium population centres 30,000 – 99,999 - large urban population centres 100,000 or more 	<p>This indicator seems important just really for the representation of different communities — there's nothing else that speaks to relative size besides this indicator</p>	<ul style="list-style-type: none"> - population size influences capacity to implement projects - allows Canadians to identify their home community to the archetype communities 	<p>https://www12.statcan.gc.ca/census-recensement/2016/ref/dict/geo049a-eng.cfm</p>	<p>Stick strictly with StatsCan's breakdown or consider including an additional category for communities between 100,000 – 250,000 population and one category for communities above 250,000</p>
Population Density (up to 3 categories)	<ul style="list-style-type: none"> - Number of people per square km - Number of people per square km + jobs per square km - Neighbourhood density 	<p>There is broad support for population density as a way of describing the available solutions for different archetypes</p>	<ul style="list-style-type: none"> - provides a high-level perspective on economies of scale for infrastructure and other solutions, e.g. district energy, transit, etc. - allows Canadians to identify their home community to the archetype communities 	<p>StatsCan</p> <p>Canadian Urban Institute</p>	<p>Seek advice from urban planning organizations on best indicator suited for this project</p>
Jurisdiction / Electricity System (2 categories)	<ul style="list-style-type: none"> -Higher carbon intensity >370 tonnes CO2 / GWh electricity generated -Lower carbon intensity < 370 tonnes CO2 / GWh electricity generated 	<p>Whether the electricity system is sufficiently low emitting such that rapid electrification of transportation and heating makes sense in the short term.</p>	<ul style="list-style-type: none"> - carbon intensity of the electricity system impacts the speed and scale of electrification and heating - allows Canadians to identify their home community among the archetype communities 	<p>Output Based Pricing System</p> <p>Canada Energy Regulator</p>	
Net-zero impact & Opportunities	<p>Could be an index of some indicators (population growth rate, employment growth rate, etc.)</p>	<p>This indicator relates to the impact of net-zero on local economies as affects quality of life of the residents in communities</p>	<ul style="list-style-type: none"> - the transition to net-zero will impact local economies differently depending on reliance on carbon intensive sectors. - this criterion will help communities understand how net-zero actions and policies may result in significant impacts and opportunities 	<p>https://www.conferenceboard.ca/hcp/Details/Economy.aspx</p>	<p>Seek advice from economists on the economic indicators best suited for this project</p>