The Path to Zero Carbon Municipalities

What is happening?

We are facing a climate emergency

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) warned that we must take significant action by 2030 in order to limit warming to 1.5° Celsius (C) to avoid worsening the long-lasting and irreversible impacts of climate change. A rapid, far-reaching culture shift is necessary to immediately reduce greenhouse gas (GHG) emissions and minimize impacts on ecosystems and human health.¹

The growing scientific evidence for climate change is finally having a global social response. In September 2019, more than 6 million people² participated in a global climate strike. Inspired by Greta Thunberg’s “Skolstrejk för klimatet” (school strike for climate), strikes took place in more than 4,500 locations in 150 countries.³ Youth are drawing attention to issues of moral responsibility and social justice, highlighting that climate disruptions are...
Putting billions of people at risk, and disproportionately harming the youngest, poorest, and most vulnerable people who have contributed the least to the problem.⁴

In November 2019, more than 11,000 scientists signed a declaration stating that:

“Scientists have a moral obligation to clearly warn humanity of any catastrophic threat and to ‘tell it like it is.’ On the basis of this obligation and the graphical indicators presented below, we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency.”

William J. Ripple, Christopher Wolf, Thomas M. Newsome, Phoebe Barnard, William R. Moomaw, and 11,258 Scientist Signatories from 153 Countries.⁵

More than 475 communities across Canada declared a climate emergency in 2019, including the City of Vancouver, Richmond, Islands Trust Council, Squamish, North Vancouver, West Vancouver, Burnaby, Bowen Island, and Surrey.⁶

The Federal government has also declared a national climate emergency, describing climate change as a “real and urgent crisis, driven by human activity, that impacts the environment, biodiversity, Canadians’ health and the Canadian economy” and committing to meet the Paris Agreement targets, as well as deeper reductions to keep global warming below 1.5°C.⁷

Skwxwú7mesh Úxwumíxw/Squamish Nation has also declared a climate emergency, and has committed to advocate to all levels of government for climate actions that will reduce Canada’s carbon emissions by 40–60% below 2010 levels by 2030 and to achieve net zero by 2050, to meet the requirements for a stable climate as outlined in the Intergovernmental Panel on Climate Change (IPCC) Report.⁸

To limit warming to 1.5°C, the IPCC report recommends that human-caused emissions of carbon dioxide (CO₂) need to fall 45% below 2010 levels by 2030, and achieve “net zero” by 2050.¹ However, the IPCC’s recommendations have been criticized as too conservative.⁹,¹⁰ Other scientific studies suggest that limiting warming to 1.5°C will not be sufficient to mitigate climate change impacts to ecosystems and communities.⁵,¹¹,¹² Climate change is happening much faster than scientists predicted,¹,⁵,¹³,¹⁴ and new research indicates that climate scientists have consistently underestimated the pace and severity of climate change.¹⁵
Communities have an opportunity to lead the transition to a zero carbon economy

Communities (i.e., cities, towns, and villages) consume 75% of the world’s energy, and emit 80% of greenhouse gases. Communities are also uniquely positioned to take immediate action to reduce greenhouse gas emissions as decisions on land use, buildings, local transport, and waste are largely controlled at the local level.

Addressing our climate emergency is an unprecedented opportunity to generate new, vibrant economic and social wealth as we transform where our energy comes from and how it is used. It is an opportunity to achieve energy security, develop more sustainable economies and jobs, become better environmental stewards, reduce pollution, improve public health, and enhance our quality of life. Transitioning away from fossil fuels to a zero carbon economy has clear benefits for people and natural ecosystems, and is an opportunity to create a more prosperous and equitable society.

“\textit{The world has seen remarkably fast economic transition in the past and can do so again. We can create 100% renewable energy systems, make our buildings, transport, agricultural and industrial systems zero carbon, minimise waste – and do it remarkably quickly.}”

\textit{– BEYOND ZERO EMISSIONS}$^{17}$

Students from Sk̓wxwú7mesh/Squamish, B.C. call for immediate climate action at the global climate strike on September 27, 2019.

(Credit: Tracey Saxby)
What is a zero carbon community?

A zero carbon community is one that is taking strategic and targeted actions to reduce community-wide greenhouse gas emissions to zero within ten years.\(^{17}\)

Local governments around the world are leading the way on climate action by setting bold greenhouse gas reduction targets for community-wide emissions, and aligning these targets with the latest climate science and international agreements.\(^{17}\) Many communities across Canada are already working towards achieving 100% renewable energy goals\(^{19}\) and zero emissions targets.\(^{20}\)

The internationally recognized climate change think tank, Beyond Zero Emissions, recommends a ten-year timeframe to transition to zero carbon, stating that:

“Without ambition to take this challenge seriously we will fail before we begin. Setting an ambitious target is challenging but also inspires leadership and innovative solutions. Leading communities need to aim high and demonstrate that rapid change is possible.”

BEYOND ZERO EMISSIONS\(^{17}\)

The technology needed to transition to zero carbon already exists. Creating thriving, zero carbon communities is achievable and affordable now.\(^{17}\) Atl’ḵa7tsem/Txwnéwu7ts/Howe Sound communities have an opportunity to lead this transition to a zero carbon economy, and inspire other communities across Canada.

Collaboration is essential to achieve zero carbon

Climate change is too big and too complex to be addressed by a single entity alone. Identifying solutions and inspiring behaviour change will require collaboration between all levels of government (including First Nations), and profit and non-profit sectors.
Why is it important?

Climate change is already impacting Átl’ḵa7tsem/Txwnéwu7ts/Howe Sound communities

Canada’s climate is warming twice as fast as the rest of the world, while the Canadian Arctic is warming at three times the global rate. This warming is effectively irreversible on multi-century timescales. The increased concentration of greenhouse gases in our atmosphere has led to the following direct climate change impacts for Canada (Figure 1):

- rising sea levels
- increased precipitation with less falling as snow and more as rain
- increased intensity and severity of extreme weather events
- more extreme heat and less extreme cold
- shorter snow and ice cover seasons
- earlier spring peak streamflow
- thinning glaciers
- thawing permafrost.

Ocean acidification is happening at the same time as climate change, because about a third of the carbon dioxide released from fossil-fuel combustion has dissolved into the upper ocean, making it more acidic. This threatens the survival of organisms such as oysters that make their shells from calcium carbonate, and threatens the health of marine ecosystems.

Ocean acidification negatively impacts the ability of oceans to absorb carbon through photosynthesis, creating a positive feedback loop that further contributes to climate change.

Indirect impacts of climate change and/or ocean acidification include, for example:

- reduced biodiversity
- ecosystem changes
- species shifts
- loss of critical ecosystem services
- social and economic impacts
- human health impacts
- reduced food security and increased food costs
- increased socio-economic disparity
- increased flooding
- increased drought and wildfire risk
- increased erosion
- damage to physical infrastructure
- reduced freshwater supply in summer
- pest and disease outbreaks
- loss of key fisheries (Figure 1).

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1) Feedback loop – where the output from that system can feedback into the system, resulting in either negative or positive outcomes.
### Impacts of greenhouse gas emissions

#### DIRECT IMPACTS
- Rising sea levels
- Increased precipitation with less snowfall and more rainfall
- Increased intensity and severity of extreme weather events (e.g., storms)
- More extreme heat and less extreme cold
- Shorter snow and ice cover seasons
- Earlier spring peak streamflow
- Thinning glaciers and thawing permafrost
- Ocean acidification

#### INDIRECT IMPACTS
- Reduced biodiversity
- Increased flooding
- Ecosystem changes
- Increased drought and wildfire risk
- Species shifts
- Increased erosion
- Loss of critical ecosystem services
- Damage to physical infrastructure
- Social and economic impacts
- Reduced freshwater supply in summer
- Human health impacts
- Pest and disease outbreaks
- Reduced food security and increased food costs
- Loss of key fisheries
- Increased socio-economic disparity

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**Figure 1.** The increased concentration of greenhouse gases in our atmosphere results in direct climate change impacts (orange) and ocean acidification (purple), which then lead to indirect impacts (yellow). For example, increased intensity and severity of extreme weather events (direct impact) can cause damage to physical infrastructure and social and economic impacts (indirect impacts).21
Climate change costs are primarily being borne by municipalities

The costs of adapting to climate change are primarily being borne by municipalities, which own 60% of public infrastructure,\(^{22}\) posing a significant burden on their often-limited financial capacity. The Federation of Canadian Municipalities and the Insurance Bureau of Canada estimate that an average annual investment in municipal infrastructure and local adaptation measures of $5.3 billion is needed Canada-wide to adapt to climate change.\(^{22}\) For example, the cost of upgrading dike infrastructure to prepare Metro Vancouver for one meter of sea level rise is estimated to be in the range of $9.5 billion.\(^{23}\)

The good news is that every $1 invested by communities in local adaptation projects yields an estimated $6 in terms of climate costs avoided.\(^{24}\) Early action is vital, as it is more cost-effective, and allows communities to take advantage of natural opportunities to upgrade infrastructure and plan for zero carbon communities.\(^{25}\)
What is the current status?

Canada is not on track to achieve our greenhouse gas reduction targets

Canada is one of the top ten polluting countries in the world, producing 1.58% of total worldwide greenhouse gas emissions in 2016 (Figure 2), with per capita emissions more than 2.5 times higher than the G20 average.

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**Figure 2.** Canada is amongst the top ten producers of greenhouse gas emissions in the world. SOURCE: Climate Watch (2018)

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i) The G20 comprises 19 countries and the European Union. The 19 countries include: Argentina, Australia, Brazil, Canada, China, Germany, France, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, and the United States.
Figure 3. Canada’s annual greenhouse gas emissions have increased by 20.9% since 1990, and emissions have resumed an increasing trend since 2016. To achieve the Copenhagen targets for 2020, Canada needs to reduce emissions 17% below 2005 levels to 605.9 Mt CO₂e. To achieve the Paris Agreement target for 2030, Canada needs to reduce emissions 30% below 2005 levels to 511 Mt CO₂e. To achieve the latest IPCC recommended targets, Canada needs to reduce emissions 45% below 2010 levels to 380.6 Mt CO₂e by 2030 and net zero by 2050. Adapted from Environment and Climate Change Canada (2020).
In 2018, Canada’s total greenhouse gas emissions increased to 729 megatonnes (Mt) of CO₂ equivalent (CO₂e), which averages out to 19.67 tonnes of CO₂ equivalent per person. Since 1990, Canada’s total greenhouse gas emissions have increased by 20.9%, and while emissions have been relatively static since 2005, the last three years have shown an increasing trend (Figure 3). Canada has missed every greenhouse gas emissions reduction target it has set since 1992, and is not on track to achieve any of the greenhouse gas reduction targets outlined below:

- 17% below 2005 levels by 2020 (Copenhagen Accord 2009);
- 30% below 2005 levels by 2030, with a long-term goal of 80% below 2005 levels by 2050 (Paris Agreement 2015);
- Canada has yet to adopt the latest targets recommended by the IPCC report of 45% below 2010 levels by 2030, and “net zero” by 2050.

In 2018, an assessment of climate policies worldwide revealed that Canada’s current policies would lead to more than 5.1°C of warming by 2100 if they were adopted globally. Since then, the Federal government has committed to: phase out coal power plants; implement a nationwide carbon price starting at CAD $20 per tonne of CO₂e in 2019 and increasing annually; and enact the Canadian Energy Regulator Act (CERA) to oversee the energy sector. The 2019 Climate Transparency assessment for Canada notes that despite these improvements to federal policies, Canada is still not on track to achieve emissions reductions compatible with 1.5°C of warming to prevent irreversible impacts of climate change. The Parliamentary Budget Office has recommended that the federal carbon tax needs to increase by an additional CAD $50 a tonne by 2030 to meet the Paris Agreement.

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iii) CO₂ equivalent or carbon dioxide equivalent (CO₂e), is a standard unit for measuring carbon emissions. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO₂ that would create the same amount of warming. Greenhouse gases that are included in CO₂e are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).
What is being done?

Comparison of climate actions and climate targets for Atl’ka7tsem/Txwnéwu7ts/Howe Sound municipalities and regional districts

Several municipalities around Atl’ka7tsem/Txwnéwu7ts/Howe Sound have now declared a climate emergency, and updated their climate targets to reflect the latest IPCC recommendations of 45% below 2010 levels by 2030, and “net zero” by 2050. We have compared specific climate commitments for municipalities around Atl’ka7tsem/Txwnéwu7ts/Howe Sound (Table 1) and reviewed current climate targets (Table 2).

Table 1. Comparison of climate commitments for municipalities and regional districts around Atl’ka7tsem/Txwnéwu7ts/Howe Sound. SCRD – Sunshine Coast Regional District. SLRD – Squamish-Lillooet Regional District.

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>IN PROGRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLIMATE ACTIONS</strong></td>
<td>BOWEN ISLAND</td>
<td>GIBSONS</td>
</tr>
<tr>
<td>Declared a climate emergency</td>
<td></td>
<td></td>
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<tr>
<td>Created a climate emergency response plan</td>
<td></td>
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<tr>
<td>Have set climate targets</td>
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<tr>
<td>Have set climate targets equal to (or higher than) the 2019 IPCC recommendations of 45% greenhouse gas reduction by 2030 and net-zero by 2050</td>
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<tr>
<td>Climate action has been identified as a strategic priority</td>
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</table>
Table 2. Current climate targets for Átl’ḵa7tsem/Txwnéwu7ts/Howe Sound municipalities and regional districts. SCRD – Sunshine Coast Regional District. SLRD – Squamish-Lillooet Regional District.

<table>
<thead>
<tr>
<th>COMMUNITY</th>
<th>TARGETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowen Island</td>
<td>33% below 2007 levels by 2020(^{37})</td>
</tr>
<tr>
<td>Gibsons</td>
<td>7% below 2007 levels by 2030(^{38})</td>
</tr>
<tr>
<td>Lions Bay</td>
<td>20% below 2007 levels by 2020(^{51})</td>
</tr>
<tr>
<td>Squamish</td>
<td>45% below 2010 levels by 2030</td>
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<td></td>
<td>100% below 2010 levels by 2050(^{44})</td>
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<tr>
<td>Vancouver</td>
<td>33% below 2007 levels by 2020</td>
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<tr>
<td></td>
<td>50% below 2007 levels by 2030</td>
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<tr>
<td></td>
<td>Carbon neutral before 2050(^{46})</td>
</tr>
<tr>
<td>West Vancouver</td>
<td>45% below 2010 levels by 2030</td>
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<tr>
<td></td>
<td>100% below 2010 levels by 2050(^{47,48,49})</td>
</tr>
<tr>
<td>Whistler</td>
<td>33% below 2007 levels by 2020</td>
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<td></td>
<td>80% below 2007 levels by 2050</td>
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<tr>
<td></td>
<td>90% below 2007 levels by 2060(^{50})</td>
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<tr>
<td>Islands Trust</td>
<td></td>
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<tr>
<td>Keats Island</td>
<td>33% below 2007 levels by 2020</td>
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<td></td>
<td>85% below 2007 levels by 2050</td>
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<tr>
<td>Gambier Island</td>
<td>33% below 2007 levels by 2020</td>
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<tr>
<td></td>
<td>85% below 2007 levels by 2050(^{51,52})</td>
</tr>
<tr>
<td>SCRD</td>
<td>7% below 2007 levels by 2031(^{31,53})</td>
</tr>
<tr>
<td>SLRD</td>
<td>33% below 2007 levels by 2020</td>
</tr>
<tr>
<td></td>
<td>80% below 2007 levels by 2050(^{54,55})</td>
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</tbody>
</table>

Eating a plant-rich diet and supporting local agriculture are two of the most impactful actions that individuals can take to reduce their personal greenhouse gas emissions. (Photo: Adobe Stock)
How are we currently tracking greenhouse gas emissions?

Local government reporting: Climate Action Revenue Incentive Program (CARIP)

Local governments in Canada have been world leaders in climate action since as early as 1988. Since 2007, 187 of 190 local governments have signed on to the B.C. Climate Action Charter, which is a voluntary agreement between the B.C. government, the Union of B.C. Municipalities, and each local government signatory to take action on climate change.

Under the Charter, local governments commit to:
- become carbon neutral in their corporate operations;
- measure and report community-wide greenhouse gas emissions; and
- create more complete, compact, and energy efficient communities.

The B.C. Climate Action Charter is non-binding, and there are no accountability mechanisms or legislated targets to significantly reduce emissions at the municipal level. While many Atl’ḵa7tsem/Txwnéwu7ts/ Howe Sound municipalities report corporate emissions every year through the CARIP, which enables them to receive a grant equivalent to 100% of the carbon tax they pay, most municipalities are not independently reporting community-wide greenhouse gas emissions (Table 3). This is partially due to budget and staff capacity constraints, particularly for smaller communities, and partially due to the lack of complete data available to easily track emissions at the local level.
### Table 3. Comparison of CARIP reporting and specific climate adaptation actions taken by municipalities and regional districts around Atl’ḵa7tsem / Txwnéwu7ts / Howe Sound.

<table>
<thead>
<tr>
<th>CLIMATE ACTIONS</th>
<th>BOWEN ISLAND</th>
<th>GIBSONS</th>
<th>LIONS BAY</th>
<th>SQUAMISH</th>
<th>VANCOUVER (CITY OF)</th>
<th>WEST VANCOUVER</th>
<th>WHISTLER</th>
<th>ISLANDS TRUST</th>
<th>SCRD</th>
<th>SLRD</th>
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</thead>
<tbody>
<tr>
<td>Have signed the BC Climate Action Charter to become carbon neutral in corporate operations and to reduce community-wide emissions</td>
<td>YES</td>
<td>NO</td>
<td>IN PROGRESS</td>
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<tr>
<td>Reported corporate emissions in 2018/2019</td>
<td>NO</td>
<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<tr>
<td>Reported community-wide emissions in 2018/2019</td>
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<td>YES</td>
<td>IN PROGRESS</td>
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<tr>
<td>Climate Action is incorporated into the Official Community Plan (OCP)</td>
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<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<tr>
<td>Have a corporate greenhouse gas reduction plan</td>
<td>NO</td>
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<td>IN PROGRESS</td>
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<tr>
<td>Have a community-wide climate action plan</td>
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<tr>
<td>Have a community energy and emissions plan</td>
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<td>IN PROGRESS</td>
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<td>Have an integrated community sustainability plan</td>
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<td>Have a regional growth strategy</td>
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<tr>
<td>CLIMATE ADAPTATION ACTIONS LISTED IN CARIP FOR 2018</td>
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<td>Risk and vulnerability assessments</td>
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<td>Risk reduction strategies</td>
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<td>Emergency response planning</td>
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<td>Asset management</td>
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<tr>
<td>Natural/eco asset management strategies</td>
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<td>YES</td>
<td>IN PROGRESS</td>
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<tr>
<td>Infrastructure upgrades (e.g. stormwater system)</td>
<td>NO</td>
<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<td>Beach nourishment projects</td>
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<td>Economic diversification initiatives</td>
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<td>IN PROGRESS</td>
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<td>Strategic and financial planning</td>
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<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<td>Cross-department working groups</td>
<td>NO</td>
<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<td>Official community plan policy changes</td>
<td>NO</td>
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<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<tr>
<td>Changes to zoning and other bylaws and regulations</td>
<td>NO</td>
<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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<tr>
<td>Incentives for property owners (e.g. reducing stormwater run-off)</td>
<td>NO</td>
<td>YES</td>
<td>IN PROGRESS</td>
<td>NOT APPLICABLE</td>
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</tbody>
</table>

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i) Climate Action is incorporated into one of four of the SLRD’s Official Community Plans, for Electoral Area D. Updates are in progress for the other three Official Community Plans.
Provincial government reporting: Community Energy and Emissions Inventory (CEEI)

The Community Energy and Emissions Inventory (CEEI) provides a framework for tracking and reporting emissions from buildings, local transport, and waste to support local governments to meet their commitments under the BC Climate Action Charter (Figure 4).59

CEEI reports were first made available by the Province for every municipality in BC in 2007, 2010, and 2012,60 with a more limited data set published every year since 2012 as part of the Provincial Greenhouse Gas Emissions Inventory.61 The 2013–2017 data sets only include emissions from buildings and waste, as the Climate Action Secretariat does not have access to accurate community-level transportation data. The Province is currently exploring options to collect information on annual vehicle use at the community level.62

CEEI reporting is reliant upon data providers (e.g., utilities) and the Province to complete the rigorous data collection, analysis, and reporting required. There is often a significant time lag between data reporting and data availability, for example, 2017 data was published in 2019.

Federal government reporting: National Inventory Report (NIRs)

Every year since 2003, Canada has prepared a National Inventory Report (NIR)28 to report sector-based emissions, and submitted it to the United Nations Framework Convention on Climate Change (UNFCCC).63 Although NIRs include ‘chapters’ for each province and territory, the Province of BC generates its own Provincial Inventory Reports (PIR), which is largely based on the NIR. These data overlap with CEEI reporting on buildings, transport, and waste; however emissions are calculated using different data, scope boundaries, and a different methodology, and also include emissions from industry, agriculture, and oil & gas production (Figure 4).

What aren’t we measuring? Consumption-based emissions inventory (CBEI)

A consumption-based emissions inventory (CBEI) calculates emissions associated with the production, transportation, use, and disposal of goods and services consumed by communities, such as food, clothing, electronics, services, and flights (Figure 4).64

In 2014, C40 Cities initiated a study to measure consumption-based greenhouse gas emissions from 79 cities from around the world, including Vancouver.65 Upstream emissions from the goods and services that cities consume can be more than double the emissions currently measured through traditional territorial or sector-based emissions inventories. Consumption-based emissions associated with residents in wealthy, industrialized countries, such as Canada, are 2–4 times higher than the global average.64,65

Limiting emissions calculations to the CEEI or NIR frameworks means that additional emissions associated with consumption of goods and services are not being measured. The British Columbia Institute of Technology is currently piloting a project called the ecoCity Footprint Tool in ten communities across B.C. to identify each community’s ecological footprint and create a consumption-based emissions inventory.66
What is and isn’t being measured?

**Community Energy Emissions Inventory (CEEI)**

The Provincial government tracks and reports greenhouse gas emissions produced by buildings, transport, and solid waste.

**National Inventory Report (NIR)**

(Territorial or sector-based emissions)

The Federal government tracks and reports greenhouse gas emissions calculated by sector, e.g., industry, agriculture, oil + gas, plus buildings, transport, and solid waste.

**Consumption-Based Emissions Inventory (CBEI)**

Greenhouse gas emissions associated with the production, transportation, use, and disposal of products and services consumed by a community. These emissions are not currently being tracked by the Provincial or Federal governments.

**Figure 4.** A simplified comparison of methodologies to measure greenhouse gas emissions: Community Energy Emissions Inventory (CEEI) measures emissions from buildings, transport, and solid waste, which comprises approximately 25% of total emissions. The National Inventory Report measures sector-based emissions that overlap and build on CEEI, and includes emissions from industry, agriculture, and oil and gas; however, this still only comprises approximately 50% of total emissions. Nearly 50% of emissions associated with the production, transportation, use, and disposal of food, goods, and services are not currently measured, which is why we need to begin measuring emissions using Consumption-Based Emissions Inventory (CBEI) to track total emissions at the local, provincial, and federal level of government.
Independent municipal greenhouse gas emissions reported by Átl’ḵa7tsem/Txwnéwu7ts/Howe Sound communities

To reduce local greenhouse gas emissions, it is fundamental to understand where these emissions are coming from. Some communities in Átl’ḵa7tsem/Txwnéwu7ts/Howe Sound have chosen to conduct independent community-wide greenhouse gas emission inventories, using the CEEI framework to track emissions from buildings, transport, and solid waste. Whistler has been tracking emissions almost every year since 2010, while Sḵwx̱wú7mesh/Squamish recently conducted an independent emissions inventory for 2017 (Figure 5). Metro Vancouver is currently developing annual reporting of greenhouse gas emissions as part of its Climate 2050 strategy, using the CBEI framework.

Tracking local greenhouse gas emissions is critical to support evidence-based climate action planning. By tracking emissions, municipalities can identify where emissions are coming from, and pass policies that strategically reduce those emissions. By tracking emissions annually, it allows municipalities to evaluate whether specific policies and public engagement campaigns are effective, or if more needs to be done. Local governments are much more agile than Provincial/Federal government, and can adopt and test new policies quickly. Tracking emissions also enables local governments to engage with stakeholders and decision-makers, and inspire behaviour change among their constituents.

We compare the example greenhouse gas emissions inventories for Sḵwx̱wú7mesh/Squamish (2017), Whistler (2018), and West Vancouver (2010) (Figure 5). Emissions cannot be compared directly between these municipalities because the inventories were completed in different years and used different methodologies. Even so, it is clear that vehicles and buildings are the two biggest sources of greenhouse gas emissions for all three communities (Figure 5). This information provides a clear direction for strategic climate action planning. For example, what policies can municipalities pass to support the transition from gas-powered cars to electric cars? How can municipalities improve public transit and support active transportation? How can municipalities incentivize a rapid transition to zero-emission energy and heating in new and existing buildings?

What about emissions from industry and agriculture?

Greenhouse gas emissions from industry and agriculture are often outside of municipal control, and will require policies and taxes/incentives from the provincial and/or federal governments. However, municipalities can still play a role by engaging in conversation with local industries and local agriculture, to ask what they are doing to reduce carbon pollution, which can often dwarf community-wide emissions. Municipal councils can also lobby the provincial and federal governments to support new policies and taxes/incentives to reduce local emissions from industry and support regenerative agricultural practices.
Greenhouse gas emission inventories

<table>
<thead>
<tr>
<th>Year</th>
<th>Community</th>
<th>Total Emissions (Tonnes CO₂e)</th>
<th>Transport</th>
<th>Residential Buildings</th>
<th>Commercial + Industrial Buildings</th>
<th>Solid Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 Squamish</td>
<td>95,420</td>
<td>52.7%</td>
<td>13.9%</td>
<td>13.7%</td>
<td>19.7%</td>
<td></td>
</tr>
<tr>
<td>2018 Whistler</td>
<td>125,711</td>
<td>61%</td>
<td>12%</td>
<td>25%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>2010 West Vancouver</td>
<td>258,060</td>
<td>39%</td>
<td>52%</td>
<td>9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Emissions cannot be compared between municipalities because the methodology and years when these inventories were compiled are different e.g., West Vancouver assessed residential and commercial/industrial buildings under “buildings.”

Figure 5. Community-wide greenhouse gas emissions for Sḵwx̱wú7mesh/Squamish (95,420 tonnes CO₂e in 2017), Whistler (125,711 tonnes CO₂e in 2018), and West Vancouver (258,060 tonnes CO₂e in 2010). Note that emissions cannot be compared between municipalities because the methodology and years when these inventories were compiled are different e.g., West Vancouver assessed residential and commercial/industrial buildings under “buildings.”
What can you do?

These actions are aimed at government level because the focus of this article is on municipalities. Actions that individuals can take will be presented in a separate article, coming at a later date.

**Government Actions and Policy:**

**Municipal Actions**

- Declare a climate emergency to enable council and staff to dedicate the resources required to immediately reduce community-wide greenhouse gas emissions.

- Update greenhouse gas reduction targets to reflect (or surpass) IPCC recommendations (45% reduction below 2010 levels by 2030 and achieving net zero by 2050 at the latest).

- Conduct a baseline greenhouse gas emission inventory, with ongoing monitoring and reporting of community-wide emissions every year to track success.

- Establish interim targets and incorporate these targets into all relevant municipal planning documents (e.g., Official Community Plan, Community Energy and Emissions Plan).

- Establish community engagement and outreach to build widespread support for climate action.

- Create a climate action plan to prioritize policies and actions that will be the most effective at reducing community-wide greenhouse gas emissions. Identify challenges and opportunities, and establish key evaluation criteria to evaluate success.

- Implement the climate action plan, then monitor, evaluate, and report on successes and challenges. Adjust climate action strategies to ensure that emission reductions are successful.

- Build partnerships with local climate champions, businesses, industry, agriculture, community groups, and organizations.

- Build regional partnerships with other communities to share resources, implement programs, and secure greater levels of funding and investments.

- Support the Provincial and Federal governments to implement the policies and actions outlined below.
**Provincial and Federal Actions**

**CARBON ACCOUNTING AND ACCOUNTABILITY**

- Support evidence-based climate-action planning by local governments by conducting consistent, comprehensive, robust, and timely greenhouse gas inventories every year at the municipal level across B.C. and Canada.72
- Initiate discussions to determine how best to make greenhouse gas reduction targets binding for all provinces/municipalities. For example, make the B.C. Climate Action Charter binding.72
- Legislate a target of 45% reduction below 2010 levels by 2030 and achieve net-zero emissions by 2050 at the latest.1,72 Ensure consistent targets for all levels of government, and update these targets regularly according to the latest science.72
- Support Local Government Act and/or Community Charter amendments which empower municipalities to achieve local climate targets.72
- Implement policies and legislation to provide funding and capacity building for municipalities as they transition to zero-carbon emissions.22
  - Develop a milestone-based incentive program to help municipalities achieve climate targets.72
  - Develop a climate action policy toolkit that municipalities can adapt and implement.72
- Convene experts (including municipalities) to identify what data needs to be collected to accurately track greenhouse gas emissions using both the CEEI and CBEI frameworks, then legislate development of and access to this data. For example, require ICBC to collect odometer readings when people renew their car insurance.
- Improve CEEI methodology to accurately track community-wide greenhouse gases and provide that data to the municipalities and the public online every year (contributing to Locally Determined Contributions).
- Transition to CEEI and CBEI at the municipal level to capture emissions that are not currently measured (e.g., embodied emissions from food, goods + services, flights).
- Standardize greenhouse gas inventory calculations between Local/Provincial/Federal governments (allow Locally Determined Contributions to inform Nationally Determined Contributions)

**SOCIAL JUSTICE**

- Ensure equity and anti-racism are key components of climate action.73
- Expand the Pan-Canadian Framework to support a just and fair transition for oil and gas workers and communities as we transition to a zero-carbon economy.77
- Support developing nations as they transition away from fossil fuels toward a zero-carbon economy.5
- Enact legislation to better enable municipalities and individuals to hold fossil fuel companies accountable for past greenhouse gas emissions and to pay their fair share of climate costs.74

**FOOD**

- Implement policies to reduce the consumption of animal products – the production of which releases significant amounts of methane – and increase consumption of plant-based foods.5
- Implement policies to support cropping practices such as minimum tillage to increase soil carbon.5
- Implement policies to promote local agriculture and eliminate food waste.5
Provincial and Federal Actions (continued)

ENERGY

- Implement energy efficiency and conservation practices.5
- Promote electrification of space-heating infrastructure (e.g. heat pumps).
- Promote installation of district heating systems.
- Replace fossil fuel energy with low-carbon renewable energy and phase out fossil fuel extraction.5
- Eliminate subsidies for fossil fuels.5
- Increase carbon emissions taxes systematically and progressively over defined long-term periods to further limit fossil fuel use.5,36
- Implement policies to promptly reduce emissions that have a high global warming potential over a short time frame such as methane, black carbon (soot), and hydrofluorocarbons (HFCs) to slow climate feedback loops and reduce short-term warming by more than 50%.5

TRANSPORTATION

- Adopt a Clean Fuel Standard and enhance measures for zero-emissions vehicles, including light and heavy-duty trucks.27
- Revise the Zero-Emission Vehicle Infrastructure Programme so that 100% of vehicle sales by 2030 are zero-emission.27
- Increase funding for investments in public transit with the goal to remove commuter traffic from the roads.27
- Subsidise electric vehicles while investing in fast-charging infrastructure along major roads.
- Transition BC Ferries to electric ferries where feasible.
- Increase carbon taxes on aviation emissions and provide incentives to transition to electric planes for short-haul flights; invest in alternatives such as high-speed rail along high-population-density routes.

BUILDINGS

- Implement policies and incentives for all new buildings to be net-zero.27
- Develop a strategy and provide incentives to undertake energy retrofits of existing buildings.27

ECONOMY

- Shift economic goals away from Gross Domestic Product (GDP) growth to the Happiness Index metric,75 and recognize that humans depend on healthy ecosystems.5
- Redefine economic success to incorporate factors that measure human well-being and the health of ecosystems.

NATURE

- Create more protected areas with better interconnectedness.5
- Fund restoration of natural ecosystems.5
- Protect remaining primary and intact forests to curtail habitat and biodiversity loss.5
- Fund and incentivize reforestation and afforestation (i.e., planting trees) where appropriate.5
- Continue to fund research and monitoring of iconic and threatened species and habitats.
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Resources on Zero Carbon

This list is not intended to be exhaustive. Omission of a resource does not preclude it from having value.

My Sea to Sky has issued a #ZeroCarbonChallenge for individuals, businesses, and municipalities around Atl’ḵa7tsem/Howe Sound. Sign up as an individual or business and learn what tangible steps you can take now to start the transition to zero carbon: www.zerocarbonchallenge.ca

Climate Caucus is a non-partisan network of 250+ elected local leaders working collectively to create and implement policy which aligns with Canada’s fair share of holding global temperature to 1.5°C, while respecting planetary limits: https://www.climatecaucus.ca

Beyond Zero Emissions is one of Australia’s most respected climate change think-tanks. They have created a step-by-step guide for communities working to achieve zero-carbon emissions: https://bze.org.au/zero-carbon-communities/zero-carbon-communities-guide/

BC Climate Action toolkit: https://www.toolkit.bc.ca/

Clean BC has resources on subsidies and savings for switching to an electric vehicle. https://goelectricbc.gov.bc.ca

Project Drawdown identifies the most effective solutions to reduce greenhouse gas emissions. https://www.drawdown.org/
References


Climate Strike Squamish. (Credit: Tracey Saxby)