



SQUAMISH

District of Squamish

Community Climate Action Plan

April 2020



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Community Climate Action Plan

Executive Summary

Climate change is happening, and local governments play an important role in reducing greenhouse gas emissions. The need to respond to climate change is urgent.

In 2019, the District of Squamish declared a climate emergency and resolved to create a Community Climate Action Plan to guide Squamish toward a low carbon future.

WHAT WE KNOW

- The Intergovernmental Panel on Climate Change (IPCC) warns that we must limit global warming to 1.5 degrees Celsius (°C) if we are to avoid significant negative impacts.
- Average global temperatures have already increased by 1°C (since pre-industrial times) and will exceed 1.5°C in the next 10 to 30 years if we do not take urgent action to reduce greenhouse gas emissions.
- To keep warming under 1.5°C global emissions must be lowered by 45% by 2030 and be net-zero by 2050.

OUR VISION

“In 2030, emissions in the District of Squamish will be reduced by at least 45% from 2010 levels, and we will be on track to achieve net-zero emissions by 2050”.

This Plan focuses on how we can collectively reduce greenhouse gas emissions in Squamish. There are many co-benefits associated with climate action including: creating vibrant walkable communities, conserving natural spaces, reducing waste, and improving our air and water quality. Co-benefits and climate change adaptation (or adjusting to the impacts of climate change), although not usually discussed in this report, must be carefully considered as we implement all Strategies and Actions. This Plan also focuses on greenhouse gas emissions within the community (see Baseline). Although local governments have little control over other sources of emissions related to the community, we need to think carefully about ways to reduce all emissions if we are going to limit global warming to 1.5°C.

HOW WE DEVELOPED THE PLAN

This is a community plan that reflects extensive input and collaboration with stakeholders, subject-matter experts and residents.

- Established a volunteer Climate Leadership Team consisting of local experts to identify opportunities and barriers to action at key stages in Plan development
- Created a community-wide emissions inventory.
- Summarized actions already occurring within the municipality.
- Engaged larger stakeholder focus group.
- Gathered feedback from the broader community through a public open house and community survey.



Figure A: The Community Open House Event.

THE BASELINE

The 2017 baseline inventory focuses on greenhouse gas emissions that occur within District of Squamish boundaries, or from electricity that is used within municipal boundaries. It does not include emissions from land use change or forestry, indirect emissions (e.g., emissions that occur elsewhere in the production of products that are consumed in Squamish), or potential emissions from large industry.

The total greenhouse gas emissions for the community are approximately 97,000 tonnes of CO₂ equivalent (CO₂e) per year, or 4.8 tonnes per person. The majority of these emissions come from gasoline and diesel fuel used in transportation, natural gas that's used to heat buildings and organic materials breaking down in landfill waste. (Figure B)

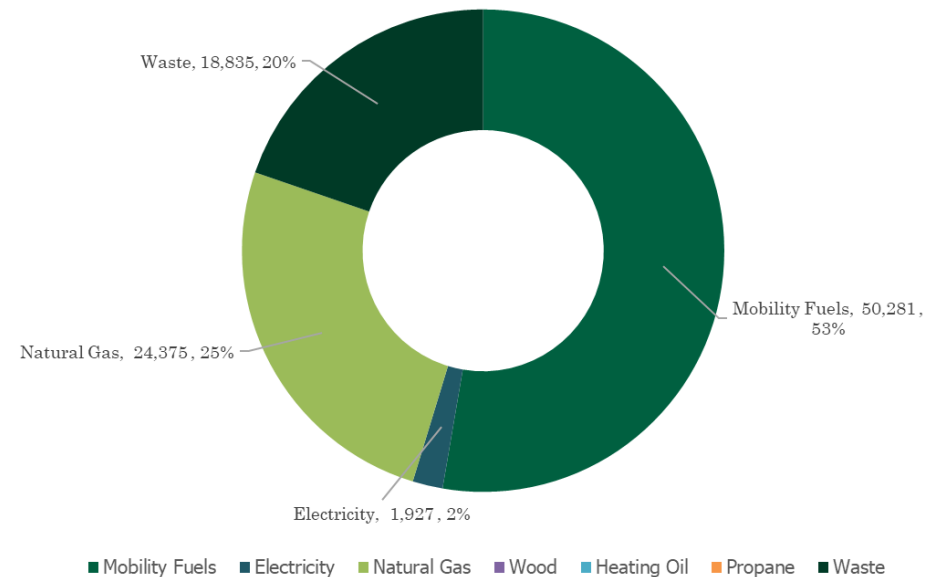



Figure B: Proportion of Greenhouse Gas Emissions by Sector in Squamish.

BIG MOVES STRATEGIES & ACTIONS

To guide District of Squamish actions to align with limiting warming to 1.5°C, six **Big Moves** have been established. The following pages overview each of the Big Moves, including:

- A **Vision** for the future, **Considerations** of current emissions, and a **Projected outcome** for emissions reduction by 2030.
- A sampling of Strategies for each Big Move, along with an example Action for each Strategy.
 - Most Strategies have several Actions, and not all Strategies are included in the executive summary.
 - Actions are classified as **green**, **blue** or black, similar to ski or bike trails.
 - EASY** **MODERATE** **DIFFICULT**
 -   
- The Actions relate to:
 - Directing measures that the District has control over;
 - Incentivizing and encouraging actions;
 - Educating others; and/or
 - Partnering with other groups or levels of government.



THE ACTIONS OUTLINED IN THIS PLAN WILL REDUCE EMISSIONS BY

38,300

Tonnes CO₂e
by 2030

1

CLOSE THE LOOP ON WASTE: divert organics, capture landfill gas, reduce waste

Vision

Our community diverts all organics and recovers value from waste.

Considerations

Waste accounts for 20% of community emissions (19,000 tonnes CO₂e). (3rd largest source)

Projected Reduction (2030)

Through implementation of landfill gas collection/flaring system and increased organics diversion this Big Move will result in a reduction of

20,000 Tonnes CO₂e

compared to business as usual.

STRATEGY

EXAMPLE ACTION

Capture and flare landfill gas, and further research options for utilization (capture and convert methane gas to energy)

Continue with implementation plan for landfill gas flare project.

Divert organic waste from the landfill

Education and engagement about organics collection including the source separation requirements of the Solid Waste Utility Bylaw.

2

SHIFT BEYOND THE CAR: active transportation and transit

Vision

Active transportation and transit are preferred modes of travel to and within Squamish.

Considerations

Transportation accounts for 52% of community emissions (50,000 tonnes CO₂e). (largest source)

Projected Reduction (2030)

Through doubling the number of trips taken by active transportation and transit this Big Move will result in a reduction of

2,500 Tonnes CO₂e

compared to business as usual.

STRATEGY

EXAMPLE ACTION

Improve urban form (compact communities enable active transportation and transit)

Support and incentivise high density infill development along the core transit networks, around neighbourhood nodes and in mixed use areas.

Improve active transportation (enhancing connectivity, safety, and convenience)

Augment existing Active Transportation infrastructure budget to make biking and walking safer and more accessible.

3

DECARBONIZE TRANSPORTATION zero or low carbon passenger, medium and heavy-duty vehicles

Vision

It's easy to own and use electric vehicles in Squamish. Infrastructure supports electrified (or low-carbon) cars, buses, fleets and larger vehicles.

Considerations

Transportation accounts for 52% of community emissions (50,000 tonnes CO₂e). (largest source)

Projected Reduction (2030)

Through a combination of decarbonizing 50% of passenger and 10% commercial/fleet vehicles, this Big Move will result in a reduction of

12,000 Tonnes CO₂e

compared to business as usual.

STRATEGY

EXAMPLE ACTION

Enhance public EV charging infrastructure (EV use is fully supported in Squamish)

Develop community EV charging infrastructure. Consider other actions, such as integrated transportation hubs.

Support the use and purchase of passenger EVs (residents are enabled to own and use EVs)

Develop an EV communications strategy that includes outreach to builders/developers, electrical trades, local businesses, and the general public.

4

DECARBONIZE EXISTING BUILDINGS Retrofits and Upgrades

Vision

Energy retrofits and conversions to low-carbon energy systems occur in all types of buildings in Squamish.

Considerations

Buildings account for 29% of community emissions (28,000 tonnes CO₂e). (2nd largest source)

Projected Reduction (2030)

Through a combination of 40% of private residences completing energy retrofits residences and 6% installing zero-carbon energy systems this Big Move will result in a reduction of

1,700 Tonnes CO₂e

compared to business as usual.

STRATEGY

EXAMPLE ACTION

Improve corporate building efficiencies (benchmark, assess and reduce energy use in corporate facilities)

Implement energy efficiency retrofits, reduce GHG emissions at corporate facilities and meet corporate reduction targets.

Enable and incentivize improvements for single family and multi-family residential owners (homes, condos, apartments, etc.)

Implement a financing/loan program for the implementation of energy efficiency improvements and/or emissions reductions that is connected to the property, not the property owner.

5

CONSTRUCT BETTER BUILDINGS zero and near-zero emissions structures/vehicles

Vision

New buildings in Squamish are energy efficient and use low carbon energy sources for space and water heating.

Considerations

Buildings account for 29% of community emissions (28,200 tonnes CO₂e). (2nd largest source)

Projected Reduction (2030)

Through implementation of the BC Energy Step Code this Big Move will result in a reduction of

2,100 Tonnes CO₂e

compared to business as usual.

STRATEGY

EXAMPLE ACTION

Enable and incentivize efficient new buildings

Develop program roadmap for transition to the highest Step applicable for all buildings.

Enable and incentivize low-carbon energy sources in new buildings

Support or encourage wood-based building materials, or other materials that store carbon.

6

OTHER ORGANIZATIONAL ACTIONS

Vision

Beyond the first five moves Squamish will ready the organization, continue to learn, and lay foundations for deep reductions.

Considerations

These actions will help the District to implement this Plan.

Projected Reduction (2030)

Greenhouse gas emissions reductions were not modelled for this Big Move.

STRATEGY

EXAMPLE ACTION

Establish a financial commitment to climate action

Incorporate greenhouse gas emissions considerations into purchasing policies.

Align business development activities to support climate actions

Support growth of local business, home-based workforce development and local startups with incubation, acceleration programming and shared resources.

RESULTS OF STRATEGIES & ACTIONS

Figure C shows the projected greenhouse gas emission reductions for the six Big Moves, assuming that the Strategies and Actions are implemented to their full extent.

It is estimated that the Actions outlined in this Plan will reduce emissions by 38,300 tonnes CO₂e per year by 2030, which is 38% below 2010 levels. Therefore, the District will have a shortfall of approximately 6,200 tonnes CO₂e (or 7%) from meeting the 2030 1.5°C target.

The biggest reductions come from capturing landfill gas, decarbonizing passenger vehicles and diverting organic waste. The gap largely exists because the District lacks the authority to deal with some sectors. These targets also do not include indirect emissions, which are larger than community emissions. Future Plans may be updated to incorporate a wider range of emissions into the scope.

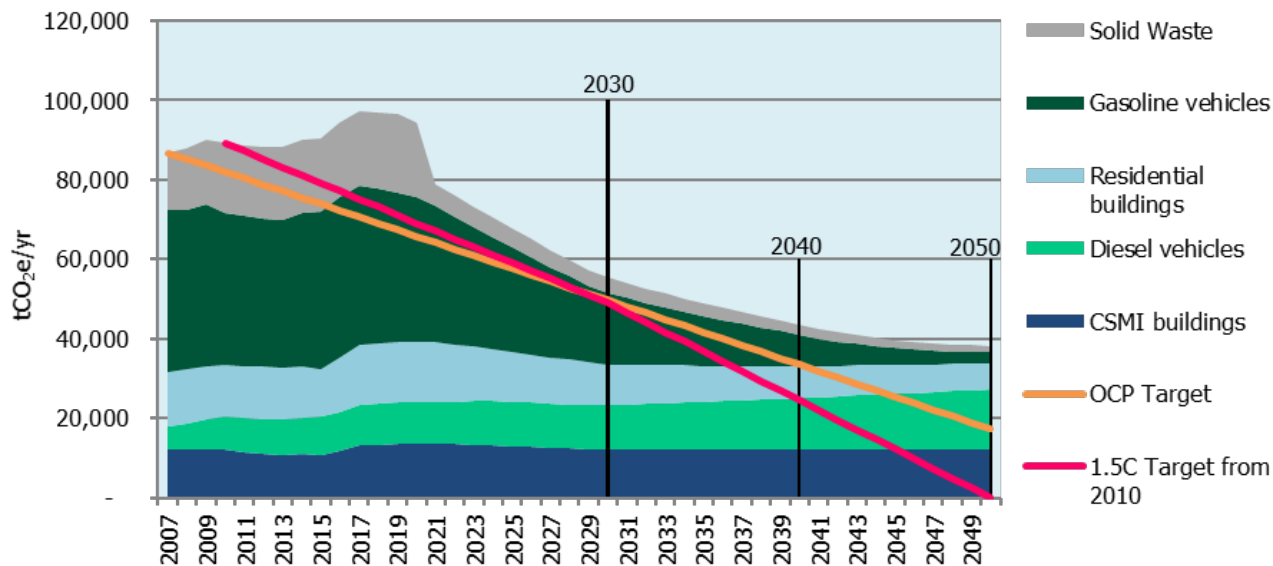


Figure C: Projected Emissions Reductions by Sector if Community Climate Action Plan is Implemented.

NEXT STEPS & CONCLUSIONS

Although the District of Squamish has not yet outlined enough measures to hit our target, this is NOT a plan to fail.

This is a Plan that acknowledges that this is an ambitious and challenging task. We are going to have to capitalize on opportunities, adopt new technologies, work with other organizations to break down barriers and push ourselves to learn more and to do more. This Plan is an important step, but it needs to be regularly revisited, adapted and updated. Progress on emissions reductions will be reported yearly, and the Plan should be updated in 3-5 years. As we move closer to 2030, we must also begin to focus toward the 2050 targets with full consideration of technological, cultural or legislative landscape changes. Another important consideration is equity. It is crucial that all District of Squamish residents can participate in and benefit from climate action initiatives. Not everyone contributes to climate change equally, both on a global and a community scale.

The citizens and businesses of Squamish have the biggest role in lowering emissions. Success depends on our individual choices about how to get around, where to live, and how to handle food and yard material. To engage citizens and businesses, the Plan will necessarily depend on ongoing, sustained engagement to help all residents understand what their choices are, and how those choices impact the direction of the community and the world.

Introduction to the Community Climate Action Plan

The climate is changing in British Columbia and around the world. The Intergovernmental Panel on Climate Change (IPCC) has shown that average global temperatures have already increased by approximately 1 degree Celsius (°C) above pre-industrial levels, and that temperatures are expected to increase to 1.5°C between 2030-2052 if humans do not significantly decrease greenhouse gas emissions.¹ The District of Squamish is already experiencing the impacts of a changing climate, and will continue to do so over the coming decades. Squamish is committed to be a leader in the global movement to aggressively mitigate our carbon emissions so that we can do our part to remain under a 1.5°C threshold. Action by local governments is necessary to ensure that we remain under this level, along with strong support from higher levels of government.

Although each individual community contributes only a small part to the climate change challenge in terms of emissions, local governments have established themselves as champions in tackling climate change. Many communities around the world are working to understand and to ultimately significantly decrease their emissions. In BC alone, over 120 communities have a plan to reduce emissions. Squamish has already taken many active steps to transition to a low-carbon future (many of these steps are overviewed in the 'where we are at' sections of the big moves); however, there is a long way to go, and many communities are ahead of us. For example, the City of Copenhagen is on track to become net carbon neutral by 2025.

There are many reasons that a community should reduce its greenhouse gas emissions. For one, doing nothing is projected to lead to significant impacts as the climate continues to change. These impacts relate to increases in temperatures, changes in precipitation patterns and an increasing frequency and severity of extreme events (such as droughts and storms). These costs will be transferred to future generations, whereas acting now to build low carbon and resilient communities will have positive legacy effects into the future. Also, climate action often has significant co-benefits that help many aspects of a community environmentally, socially and economically. Some of these include creating healthier and more liveable communities for people of all ages and abilities, conserving land for ecological and recreational values, and leveraging external funding sources to drive local job growth and economic development. Please see the Scope section for a detailed overview of what is and is not included in this Community Climate Action Plan (the Plan).

¹ [Summary for Policy Makers](#). In: Global Warming of 1.5-°C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

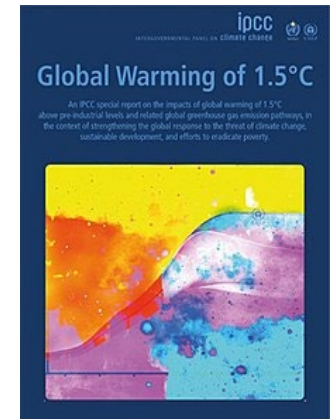
Climate Action at All Levels

Global Action

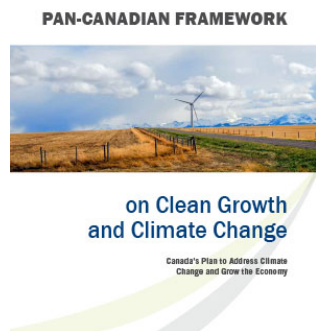
When Canada signed the Paris Agreement in 2015, we joined a global commitment to keep global warming below 2°C, and as close to 1.5°C as possible. In October 2018, the United Nations Intergovernmental Panel on Climate Change (IPCC) released a major report that emphasized the dramatic difference in consequences between a 1.5°C and 2°C increase.

The report shows that warming beyond a 1.5°C threshold will lead to increased impacts of extreme weather, more wildfires and floods, increases in sea-level rise, and severe threats to human health and well-being. By limiting global warming, we can ensure a healthy environment, economy and society for ourselves and future generations.

While it is not too late, time is of the essence if we are to achieve this target. The key finding of the IPCC report is that limiting warming to 1.5°C is possible, but requires deep emissions reductions across all areas of society – reducing global emissions by 45% from 2010 levels by 2030 and reaching net zero emissions by 2050.



National Action



In 2016, the Government of Canada released its Pan-Canadian Framework on Clean Growth and Climate Change. The framework sets out the Federal government’s strategy to meet its commitment under the Paris Agreement to reduce national greenhouse gas emissions 30% below 2005 levels by the year 2030. In 2017 (the most recent emissions inventory year) Canada’s emissions were 716,000,000 tonnes of CO₂ equivalent (CO₂e)², which is a 2% decrease from 2005 levels. This means that in order for Canada to meet its emissions reduction target, we need a decrease of 28% from 2005 levels in just ten years. More recently, the Government of Canada has established a target of net-zero emissions by 2050, requiring an acceleration of action by all levels of government.

Actions available to the Federal government include vehicle fuel-efficiency standards, model national building codes, energy ratings, and carbon pricing. The Province is a partner in the Forest Carbon Initiative, which invests in projects that sequester carbon in forests and promotes the use of residual wood fibres in biofuels and products.

² Carbon dioxide equivalent, or CO₂e is the standard unit for measuring greenhouse gas emissions. It works by converting all greenhouse gases into an equivalent amount of CO₂. For example, Methane (CH₄) is a more potent greenhouse gas than CO₂, and has a CO₂e of 25 over a 100-year time frame. For this report a 100-year time frame is used for CO₂e. This is further discussed in Appendix C.

Provincial Action

In December 2018, the Province of British Columbia released its CleanBC climate plan. The plan reaffirmed the Province’s target to reduce emissions 80% below 2007 levels by the year 2050, and established a new interim target to reduce emissions 40% by 2030. In 2017, BC’s provincial emissions were 0.5% below 2007 levels, which means that in order for BC to meet its emissions reduction target, we need a decrease of 40% from 2007 levels in just ten years.



CleanBC outlines a path to meeting the 2030 targets, outlining a range of actions to meet 75% of the target. These actions include sourcing clean and renewable electricity, incremental increases in building-energy performance in the BC Building Code, tailpipe emissions standards, and measures to reduce emissions from industry. The Province is currently identifying the actions to achieve the remaining 25% of emissions reductions.

CleanBC builds on a history of provincial climate action: The provincial government has enacted laws and regulations to reduce emissions and transition to a low-carbon economy. These include the Climate Change Accountability Act, Carbon Tax Act, Greenhouse Gas Industrial Reporting and Control Act, and Clean Energy Act.

Through its Wood First program, the Province encourages the forest industry, researchers and design professionals to innovate in B.C.’s built environment through value-added wood products – helping to grow local and global markets, while promoting climate-friendly construction and supporting our forest sector.

As shown in Figure 1, senior levels of government have recognized the need for strong climate action (particularly on mitigation), and to provide support to local governments.

The federal government uses national standards and funding in climate action because provinces have constitutional jurisdiction over both energy and local governments.

Local governments are the front lines of climate action because communities are where the buildings, vehicles & infrastructure are.

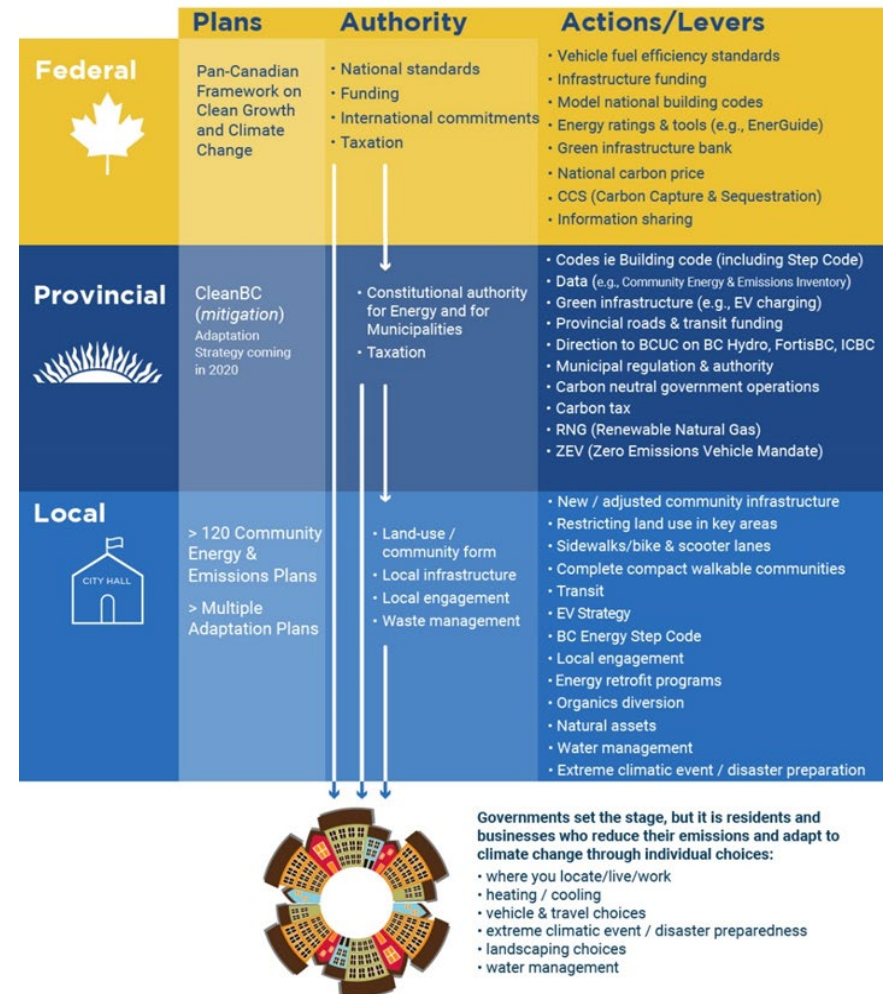


Figure 1 Interrelationships between different levels of government and climate action in BC (Source: Community Energy Association).

Local Action

More than 120 British Columbia local governments to date have created Climate Action Plans or Community Energy and Emissions Plans that outline actions they can take, or are taking, to reduce greenhouse gas emissions. Local governments have varying degrees of influence over different sources of emissions within their boundaries, as shown below in Figure 2.

Local Government Relative Influence over GHG Emissions



Figure 2 Summary of local government levels of influence over greenhouse gas emissions (Source: BC Climate Leaders Playbook).

If local governments are to succeed, they will need leadership and/or support from other orders of government, as well as commitments from residents and businesses. Further, the outputs of plans and the targets/actions prioritized for implementation will need to be embedded into relevant policy, as well as operational, budgetary and asset management plans or strategies. Communities and regional districts play an important role in climate mitigation and adaptation. Almost every British Columbia local government has committed to some degree of action under the B.C. Climate Action Charter.

Across Canada, local and regional governments directly and indirectly influence approximately 60% of the nation's overall energy use and 50% of its greenhouse gas emissions. Local governments have three main categories of tools that influence the choices of residents and businesses through changes in land use, transportation, buildings, and solid waste:



Enable choice through **infrastructure** decisions



Shape choice through **policy and regulation**



Support choice through **engagement and outreach**

Residents and businesses also have an important role in climate action. Individual choices on where to live and work, how to heat or cool, how to travel, and how to handle household waste all have significant implications with regards to greenhouse gas emissions. Meanwhile, businesses' decisions regarding operations and planning (as well as acting as leaders and innovators) also impact community-based emissions. Residential and business decisions are shaped by other levels of government, creating an opportunity for governments to influence choices in a way that addresses environmental issues and climate action. This Plan will necessarily depend on sustained feedback to help residents, businesses and the District of Squamish sort through what their choices are, and how those choices impact the direction of the community and the world.

Past Climate Action in District of Squamish

The District of Squamish has been taking action on climate change for many years. In 2007 the District completed its first greenhouse gas emissions baseline and forecast, and joined the Federation of Canadian Municipalities Partners for Climate Protection program. The Province of BC also launched the BC Climate Action Charter in 2007; a voluntary agreement committing local governments to become carbon neutral in their operations, measure and report their emissions, and create more compact and energy efficient communities. Squamish signed on to the Charter in 2008 and became carbon neutral in its corporate operations in 2017, including purchasing offsets for 2016 and 2015. The District produces an annual report under this program which is available at:

<https://squamish.ca/our-services/environment-and-sustainability/climate-action-charter/>, or see Appendix A for a summary. These annual reports detail the wide range of actions at both the corporate and community levels that the District has undertaken to reduce emissions and become more resilient to our changing climate. The District also completed a climate adaptation report in 2016, the results of which were incorporated into the District's Official Community Plan (OCP) in 2018. The OCP includes a wide variety of objectives and policies related to climate change and is available at:

<https://squamish.civicweb.net/filepro/documents/157445>.

District of Squamish Direction for Climate Action

Throughout the engagement process for the Squamish Official Community Plan (Squamish2040) the importance of building a resilient community and implementing climate action was repeatedly emphasized (Figure 3). The climate actions outlined in this Plan support each of the Squamish2040 goals. Some of the Squamish2040 goals include:

- creating healthier and more liveable communities for people of all ages and abilities;
- conserving land for ecological and recreational values;
- increasing our community resilience to changing climates;
- connecting our community through active transportation; and
- leveraging external funding sources and local ingenuity to drive local job growth and economic development.



Figure 3 Squamish2040 Goals.

The 2019 Council Strategic plan was guided by Squamish2040 and prioritizes acting on climate change. One of the four priority areas outlined in the Strategic Plan focuses specifically on climate action, and a goal is to adopt community greenhouse gas emissions reduction targets and to create an implementation plan. Co-benefits of this Community Climate Action Plan relate directly to housing affordability, the local economy and neighbourhood connectivity, which are the other three priority areas of the Strategic Plan.

In support of this direction and responding to the importance of limiting global warming to 1.5°C, the District of Squamish Council passed a Climate Emergency Resolution on July 2, 2019 that made several declarations, including:

- that climate change constitutes an emergency for the Squamish;
- that council shall continue to develop policy and demonstrate leadership in helping vulnerable people and transition to renewable energy;
- that the climate emergency declaration shall be clearly at the heart of all future staff reports and operations; and
- that a report be directed that outlines a plan for community-wide emission reduction targets that are in line with the long term goal of limited global warming to 1.5°C.

Squamish kept to its Climate Emergency Resolution by embarking on this Community Climate Action Plan. The District of Squamish acknowledged that achieving this target will “require rapid, far-reaching and unprecedented changes in all aspects of society” and that we have until 2030 to undertake these changes.

What is the Squamish Community Climate Action Plan?

The Squamish Community Climate Action Plan (CCAP or Plan) is a greenhouse gas emissions reduction strategy. It is an important component of Squamish's overall climate action strategy, which also includes efforts to address emissions from the District's own operations and a climate adaptation plan. This Plan consists of organized Actions aimed at enabling and supporting residents, business and the Municipality in reducing greenhouse gas emissions.

The four major types, or categories, of Actions included in this plan are:

1. **Direct** - the District has direct influence or control over the action and can complete it on its own.
2. **Incentivize** - the District can promote and encourage these actions by making them more attractive or easier to do.
3. **Educate** - the District can promote, encourage or themselves learn more about these actions through education.
4. **Partner** - Work with other organizations and/or levels of government; citizens and the community will work with other groups toward achieving the Action. Often the District has little control over these actions, and must work to break down barriers.

This Plan is a result of an in-depth, systematic process. This includes a technical review of current conditions, gap analysis to identify information needs, visioning on progress over the next 30+ years, and creating an outcome-oriented Action Plan for District of Squamish for the next ten years. This Plan recognizes the need to act quickly and with purpose. The next two sections outline the scope of the Plan, and the key steps we took to create and finalize it.

Scope of this plan

This document describes the actions and targets for the District of Squamish's Community Climate Action Plan and discusses their impacts in terms of carbon emissions. Because climate change is a truly huge challenge in terms of its scope and implications, it is very important to clarify what is and is not included in this Plan. The following subsections describe the limits of this Plan. The sections are:

- A. Focus on climate change mitigation
- B. Focus on community emissions within Squamish
- C. Other assumption and limitations

This work is part of the District's efforts to honour its recent commitment to meet community greenhouse gas reduction targets congruent with the IPCC's recent 1.5°C report. The Plan is complementary to, but separate from, many other initiatives that Squamish has undertaken, and is in the process of embarking on. Many of the ongoing actions that the District is pursuing are outlined throughout the Plan, and a summary of past climate actions is overviewed in Appendix

A. The limits of the scope of the Community Climate Action Plan are as follows:

A. Focus on Climate Change Mitigation

This document is explicitly oriented toward climate change mitigation, which refers to actions that reduce the amount of greenhouse gases in the atmosphere. Mitigation actions are focused on reducing human emissions (e.g., riding a bicycle or increasing building efficiencies) and/or enabling earth to naturally uptake more carbon (e.g., planting trees or conserving wetlands). Climate change adaptation refers to actions that we take to adjust to the impacts of climate change, such as preparing for sea level rise or responding to wildfires.

Climate change mitigation and adaptation are both necessary responses to climate change. If we do not mitigate, the impacts of climate change will get worse and worse and will reach a point where adaptation becomes extremely expensive, undesirable or even impossible. Adaptation is now also required, as the climate has already shifted significantly and will continue to change for the next generation even if we pursue aggressive mitigation (due to greenhouse gases already in the atmosphere). Although adaptation is a necessary response, this document focuses solely on mitigation. While pursuing mitigation we should always be thinking about potential adaptation co-benefits, and also making sure that actions don't make the community more vulnerable to climate impacts.

The District of Squamish is investing actively in climate change adaptation and will continue to do so. One of these examples is the Integrated Flood Hazard Management Plan. It outlines plans for Squamish to prepare for one meter of sea level rise including over 20km of dikes throughout the District (among many other measures). This is just one example of many actions that have significant associated costs. Active mitigation will help prevent us from having to spend more and more on projects like these. Also, and more importantly, many regions in the world have far less resources than us and are far more vulnerable to climate impacts. Mitigation is the best way to proactively help communities around the world to avoid the worst impacts of climate change.

There are many co-benefits to reducing carbon emissions that extend well beyond the climate. Some of the major co-benefits associated with climate action in Squamish are outlined in table 1 below. While we are cognizant of these benefits, the actions of this report are discussed almost solely in terms of carbon reductions. It is extremely important to consider and maximize co-benefits (and minimize trade-offs); however, this document must concentrate primarily on the benefits of actions in terms of greenhouse gas reductions only. In a few places co-benefits are mentioned, but for most strategies and actions they are not specifically outlined.



ENGAGEMENT INSIGHTS

Climate action benefits most important to survey and open house respondents:

1. Improves biodiversity/habitat creation
2. Supports clean energy transition
3. Reduces waste: optimizes resources
4. Improves air and/or water quality
5. Improves human health and well-being

Table 1 District of Squamish Community Climate Action Plan co-benefits.

Economic	Environment	Social
Economic development and job creation	Improved environmental services	Better air and water quality
Future revenue streams	Reduced waste, optimized resources	Improved community livability/viability
Energy resiliency and affordability	Improved green space/recreation	Improved social equity
Sustainable asset management	Improved energy efficiency	Enhanced local autonomy
Optimized energy savings	Conservation of habitat and biodiversity	Health benefits (e.g., walking and cycling)
Improved cost savings		

B. Focus on Community Emissions Within Squamish

Appendix B outlines the inventory and modelling methodology for this report. Because it is a municipal plan, some sources of emissions were included in the emissions inventory while others were out of scope. The Federation of Canadian Municipalities Partners for Climate Protection program has developed a supplement to the International Emissions Analysis Protocol that provides guidance for the development of local government emissions inventories. Squamish’s inventory follows these guidelines with the exception of emissions from buried wood waste.

Emissions that were included in the emissions inventory include:

- Most ‘Scope 1 and 2 emissions’. Scope 1 emissions are direct emissions from sources within the municipal boundary. Scope 2 emissions are indirect emissions from the generation of purchased energy (electricity only) consumed within the municipal boundary.

The following sources of emissions were not included in the inventory:

- Emissions from woodwaste landfills. These emissions should be included in our inventory, however at this time sufficient data is not available.
- ‘Scope 3’ emissions. These are emissions which occur outside of the District as a result of activities taking place within the District. These are generally associated with consumption of products produced outside the Municipal boundary (examples of these are emissions from the production and transportation of products like meat, household items or toys that are created elsewhere and transported to Squamish). Air travel and emissions associated with upstream energy production are other examples of Scope 3 emission sources.
 - The municipality has very limited leverage over most Scope 3 sources of emissions.
- Emissions from land use, land use change and forestry. These emissions are highly uncertain, and the only available estimate for Squamish was created for 2012 by the Province of BC.

- Emissions from marine traffic. Data is not currently available, but an estimate has been created.
- Emissions from large industry. There are currently no “large industrial” sources of emissions; however, Woodfibre LNG is a potential and significant source of emissions. This is excluded from emissions projections for Squamish.
 - The municipality has very limited leverage over emissions from large industry.

Emissions from the non-inventory items are discussed in the *Where We Are: District of Squamish Today* section, and in Appendix B.

Although these sources of emissions are not included in this Plan, if we are (globally) to meet the IPCC 1.5°C targets then ALL sources of emissions need to be reduced. Some of these sources of emissions need to be addressed by other levels of government in Canada and internationally, but local governments should keep working toward limiting emissions in all ways possible.

C. Other Assumptions and Limitations

- One underlying assumption that this document makes is that Squamish will have access to ample low-carbon electricity. If this situation is to change, because BC's electricity grid begins to draw from sources with a higher carbon footprint or there are electricity shortages, then many of the actions in this document will have to be re-evaluated.
- We acknowledge that this document does not comprehensively address issues related to embodied carbon (i.e., the emissions associated with creating something) or life cycle emissions (i.e., how many greenhouse gases are emitted over the whole lifetime of an energy source or object). Further adjustments, modifications and prioritizations may need to occur to fully consider life cycle assessments.
- All projections and calculations have been made using a 100-year global warming potential value (i.e., estimating the amount of warming that will occur over the next 100 years as a result of greenhouse gas emissions). Appendix C includes some discussion on calculating an inventory using 20-year global warming potential values. 20-year values show a substantial difference in warming related to methane (CH₄) emissions, as methane is a very potent greenhouse gas, but it does not remain in the atmosphere for as long as CO₂ does.

District of Squamish in 2030

This Plan’s development is in response to direction from the community as captured in the Official Community Plan (Squamish2040) and the most recent Council Strategic Plan. During the two-year community engagement process to update the Official Community Plan for Squamish hundreds of participants gave feedback, including children, youth, and elders, community organizations, Squamish Nation members, governments, agencies and partners. Through that process a Vision for Squamish2040 was adopted in 2018 as the foundation for the Official Community Plan and other plans like this Squamish Community Climate Action Plan. The clear, shared vision defines and brings meaning to what’s important for the future of Squamish and where we want to go:

In 2040, Squamish is a vibrant, inclusive, connected coastal mountain community with a big heart and a small town spirit. At nature’s doorstep, Squamish is a leader and steward, sustaining ecological and human health while supporting resilient neighbourhoods and a thriving, diverse economy for all.

The following Squamish2040 goals and selection of aspirational descriptions of the future help to describe some of the community outcomes supported by climate action in Squamish.

Table 2 Squamish2040 Goals and related climate action outcomes.

Squamish 2040 Goals				
Resilient	Healthy	Connected	Liveable	Engaged
Outcomes supported by community climate action				
<ul style="list-style-type: none"> Squamish is a climate action leader, adapting to the effects of climate change 	<ul style="list-style-type: none"> A healthy built environment supports active living and mobility; affordable and accessible age and family-friendly housing across the housing continuum; parks and natural open space; and access to healthy local foods in close proximity to all neighbourhoods The community’s natural areas and ecological assets on which our health and prosperity depend are protected. 	<ul style="list-style-type: none"> In Squamish, people feel connected, welcomed and genuinely included; citizens know their neighbours and feel a sense of community across cultures and generations. The community is accessible by an active transportation network of trails, sidewalks, and cycling paths; it’s easy to move around town by transit and shared roadways which connect neighbourhoods to employment and activity centres. Residents have access to a variety of efficient regional transportation options; commuters are not dependent on single-occupant vehicles. Community 	<ul style="list-style-type: none"> Squamish is highly liveable, with a vibrant small-town feel. Diverse local employment opportunities exist, bringing a balance between well-paying jobs and affordable and diverse age friendly housing options The waterfront and local neighbourhoods in Downtown Squamish thrive with plentiful opportunities for people to live, work, play, and shop Natural assets, access to green spaces, blueways, and recreation are maintained and protected 	<ul style="list-style-type: none"> The community is passionate and engaged in community and civic life. Residents, including children and youth, understand, actively participate in and have a voice in local decision-making. A culture of collaboration exists along with meaningful opportunities for involvement.

Aligned with Squamish2040 and the District of Squamish Council’s declaration of a Climate Emergency the District of Squamish has communicated its intent to reduce community emissions from 2010 by 45% by 2030 and achieve net zero emissions by 2050. In simple terms, the climate action Vision for Squamish in 2030 is:

In 2030, emissions in the District of Squamish will be reduced by at least 45% from 2010 levels, and we will be on track to achieve net-zero emissions by 2050.

The 2010 baseline emissions level for Squamish is approximately 89,200 tonnes CO₂e per year. Current emissions levels (2017) are 97,000 tonnes, and the estimated 2030 emissions in a business as usual scenario are approximately 93,600 tonnes CO₂e. Therefore, to meet our target, Squamish must reduce its emissions to 49,100 tonnes CO₂e (2030 target), which equates to a total of 44,500 tonnes CO₂e in emission reductions compared to the business as usual scenario.

In order to ramp up District of Squamish action toward the Squamish2040 vision and this climate action goal this climate action plan offers a set of six ‘Big Moves’. Targets that would be necessary for each Big Move to get Squamish to meet GHG emission reduction targets for 2030, 2040, and 2050 are shown in the following table. Note that the current Actions are not sufficient to reach these targets.

Table 3 Big Move targets for 2030, 2040, and 2050.

Big Move	2030 Big Move Target	2040 Big Move Target	2050 Big Move Target
Close the Loop on Waste: Divert organics, Capture landfill gas, reduce waste	50% reduction in organics going to landfill, and 75% improvement in landfill gas capture.	75% reduction in organics going to landfill.	90%+ of organic waste diverted from landfill, and all landfill gas captured. (Or carbon dioxide removal or other measures to compensate for any emissions.)
Shift Beyond the Car: Active Transportation and Transit	Twice as many trips in the community are taken by active transportation or transit.	As 90% of passenger vehicles will use low carbon fuels, this action will have minimal impact on emissions, but should still be pursued for its co-benefits.	As 100% of passenger vehicles will use low carbon fuels, this action will have minimal impact on emissions, but should still be pursued for its co-benefits.
Decarbonize Transportation: Zero or low carbon passenger, Medium- and heavy-duty vehicles	90% of passenger vehicles and 25% of commercial vehicles use low carbon fuels.	90% of passenger vehicles and 50% of commercial vehicles use low carbon fuels.	All vehicles use zero (or very low) carbon fuels.
Decarbonize Existing Buildings: Retrofits & Upgrades	30% of dwellings and commercial / small-medium industrial buildings heated with low carbon energy systems (or equivalent with conventional retrofits).	60% of dwellings and commercial / small-medium industrial buildings heated with low carbon energy systems.	All buildings use zero (or very low) carbon fuels.
Construct Better Buildings: Zero and near zero-emission structures	All new buildings are at least one Step ahead of the base building code (at the time they're built), and are built with low carbon energy systems.	All new buildings are 70% more efficient than 2020 BC Building Code, and being built with low carbon energy systems.	All buildings use zero (or very low) carbon fuels.
Organizational Actions: Laying the foundation	No direct emission reduction impacts for many organizational actions, but foundations being laid for other actions.	No direct emission reduction impacts for many organizational actions, but foundations being laid for other actions.	Carbon capture & sequestration for any remaining emissions (e.g. remaining methane emissions from waste, or residual emissions from vehicle and building fuels).

Big Moves & Climate Equity

Implementing these Big Moves to reduce greenhouse gas emissions will need to consider climate equity to help ensure people in Squamish feel connected, welcomed and genuinely included in climate action.

Taking a climate equity approach ensures that all District of Squamish residents can participate and benefit from climate action initiatives, without being overly burdened with costs and challenges. Especially since typically those members of our society that contribute the least to climate change are most at risk for additional costs to adapt to climate or to mitigate impacts.

All levels of government have a role to play in helping to set policy that considers equity. In Canada the federal and provincial governments play a very large role structuring income tax systems in a way to reduce the burden on those with lower incomes. Both levels of government also provide benefits or programming to various demographics to enhance equity.

Many of the Squamish Community Climate Action Plan Big Moves should make living in Squamish more accessible for example, Shifting Beyond the Car is about reliable and affordable transit and more walkable/bikeable neighbourhoods, so all residents can participate in low carbon accessible transportation choices. Decarbonizing Transportation is primarily about individuals and businesses transitioning over time to zero emission vehicles; but it's also about improved access to public charging stations and a reusable zero-emission car market.

Since climate equity impacts can be subtle it is important to consider various perspectives when specific programs, incentives, education events and partnerships are being designed. Through appropriate design an incentive program could provide higher incentives to those with lower incomes or target incentives and programming at specific demographics such as low income home renters instead of owners.

During the planning process the engagement activities actively sought input on the importance of equity and what the District of Squamish could do to make climate action more accessible. Respondents indicated a high level of importance in making climate action accessible to all and identified the following general themes for doing so:

- Incentives and other methods to reduce the costs of action (for transit, home renovations, etc.).
- Education and engagement events.
- Making climate action fun, and celebrating simple low-carbon lifestyles.

Methodology & Process Overview

The process to develop the Community Climate Action Plan has been extensive and involved hundreds of people and several activities. The engagement activities are listed as part of the steps below and more details on each tactic are provided along with a summary of public feedback in Appendix D.

The Climate Action Plan is the District's first comprehensive climate change plan, and lays out a clear course for District of Squamish over the next ten years. This Plan includes actions for both the District of Squamish and the community-at-large. A number of key steps were involved in the planning process including the following:

- Step One** Completion of a community-wide emissions inventory to establish a baseline (2017) for future greenhouse gas emission reductions. Full inventory details are provided in Appendices B and C.
- Step Two** Assessment of District of Squamish previous climate action (Appendix A).
- Step Three** Establishment of a volunteer community-based Climate Leadership Team to provide input and direction for the Community Climate Action Plan through the development process (Appendix D).
- Step Four** Workshop for District of Squamish staff and Climate Leadership Team to identify climate action opportunities (see Figure 4).
- Step Five** Workshop with invited stakeholders from the community (commercial, private, regional, etc.) to review and identify further climate action opportunities.
- Step Six** Collation of proposed actions into coordinated strategies and Big Moves specific to District of Squamish including timing, responsibility, difficulty and prioritization.
- Step Seven** Open House for all community members to provide input to coordinated strategies and Big Moves (confirming support and prioritization) (see Figure 4).
- Step Eight** Providing an additional opportunity for community members to provide input to the plan through an online survey (almost identical content to that shared at the Open House).
- Step Nine** A final meeting of the Climate Leadership Team to discuss targets, and address difficult moves and actions.
- Step Ten** Detailing a Climate Action Plan encompassing all relevant details, specifically:
 - Interim reduction targets for community emissions that help to put us on course for our target of net zero emissions by 2050.
 - A mechanism to track and publically report progress on the emission reductions and implementation plan.



SQUAMISH
HARDWIRED for ADVENTURE

A Community of Action

QUESTION: Place a sticky dot on the 3 best ways we can engage others on this topic. Add more details and ideas on the poster.


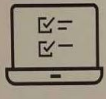








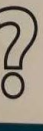

 More events like this	 Online surveys	 Speaker series events	 Direct mail outs
 Outreach at community events	 Social Media	 Short Videos	 Presentations
 Outreach to schools	 Newsletters	 Others?	<p>Go talk to people at - Whistler Centre - Sit on (2) Bayside St - Sit on (2) Bayside St - Hold meetings with COMMUNITY WITH CARE</p> 

Figure 4 Images from the Climate Leadership Team workshop (top left) and the community open house (bottom left and right) (Source: Community Energy Association and Whistler Centre for Sustainability).

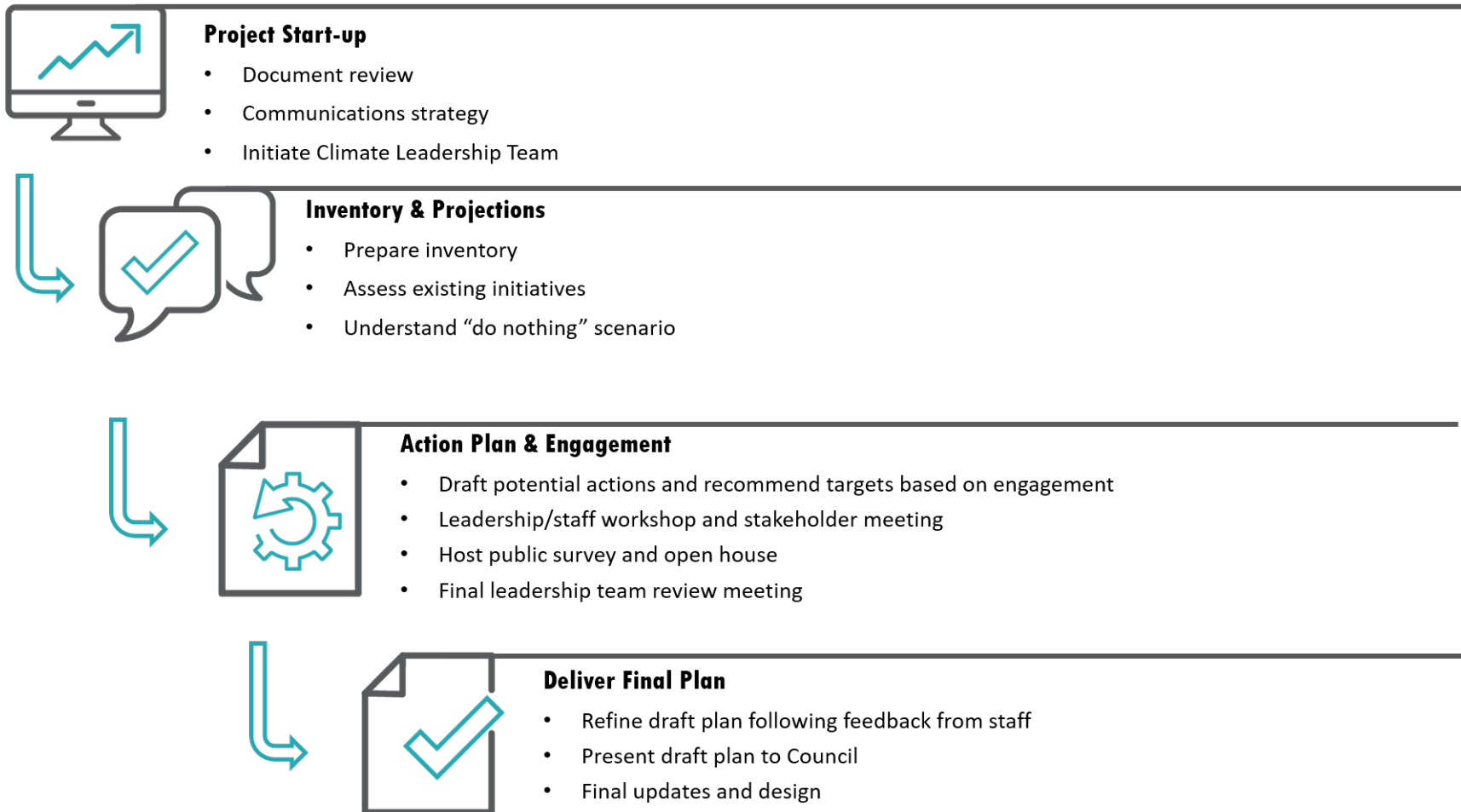


Figure 5 Community Climate Action Plan process overview.

Detailed methodologies regarding the development of the inventory, business as usual projections, and future projections if actions are taken are provided in Appendices B & C.

Where We Are: District of Squamish Today

Current Community Greenhouse Gas Emissions Profile and Projected Business as Usual Scenario

The following provides a summary of current greenhouse gas emissions in the District of Squamish (2017 calendar year). This includes emissions for the municipal area as a whole (also referred to as “community emissions”, which is inclusive of emissions associated with operations by the District of Squamish, “corporate emissions”). Total greenhouse gas emissions for the community for 2017 are 97,000 tonnes of CO₂ equivalent (4.8 tonnes per capita). As Figure 6 shows, the majority of greenhouse gas emissions in the District of Squamish come from mobility fuels.

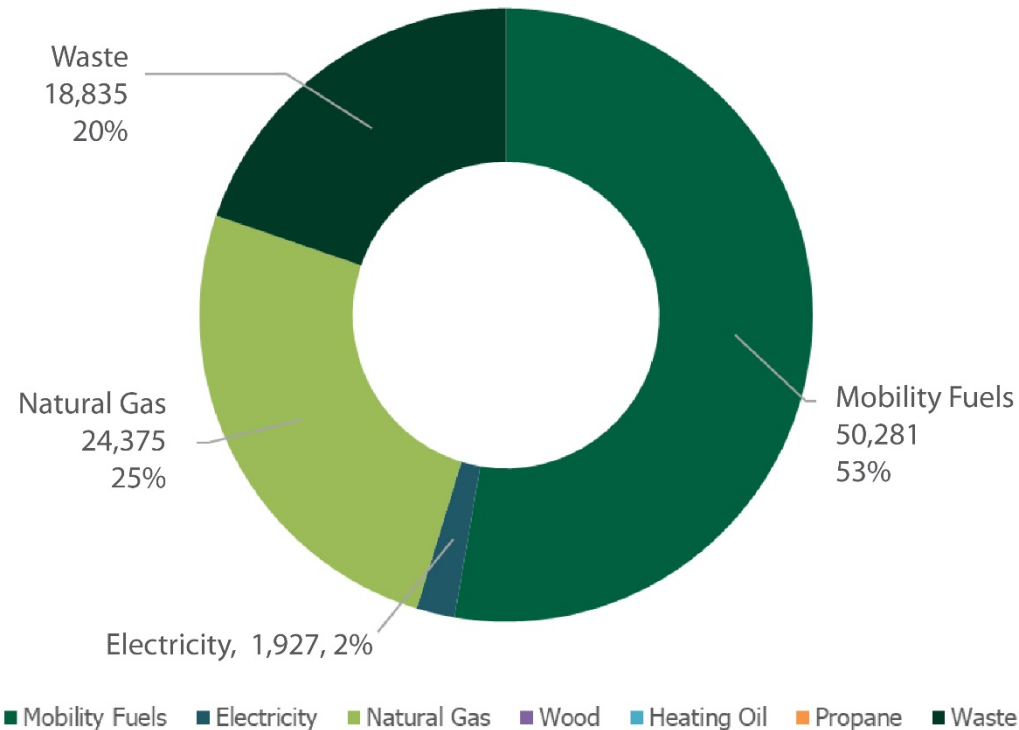


Figure 6. Proportion of greenhouse gas emissions by sector in Squamish.

The distribution of energy consumption, emissions, and estimated energy expenditures for each sector is shown in Figure 7. Transportation represents the largest source of emissions and cost, whereas buildings are the largest user of energy.

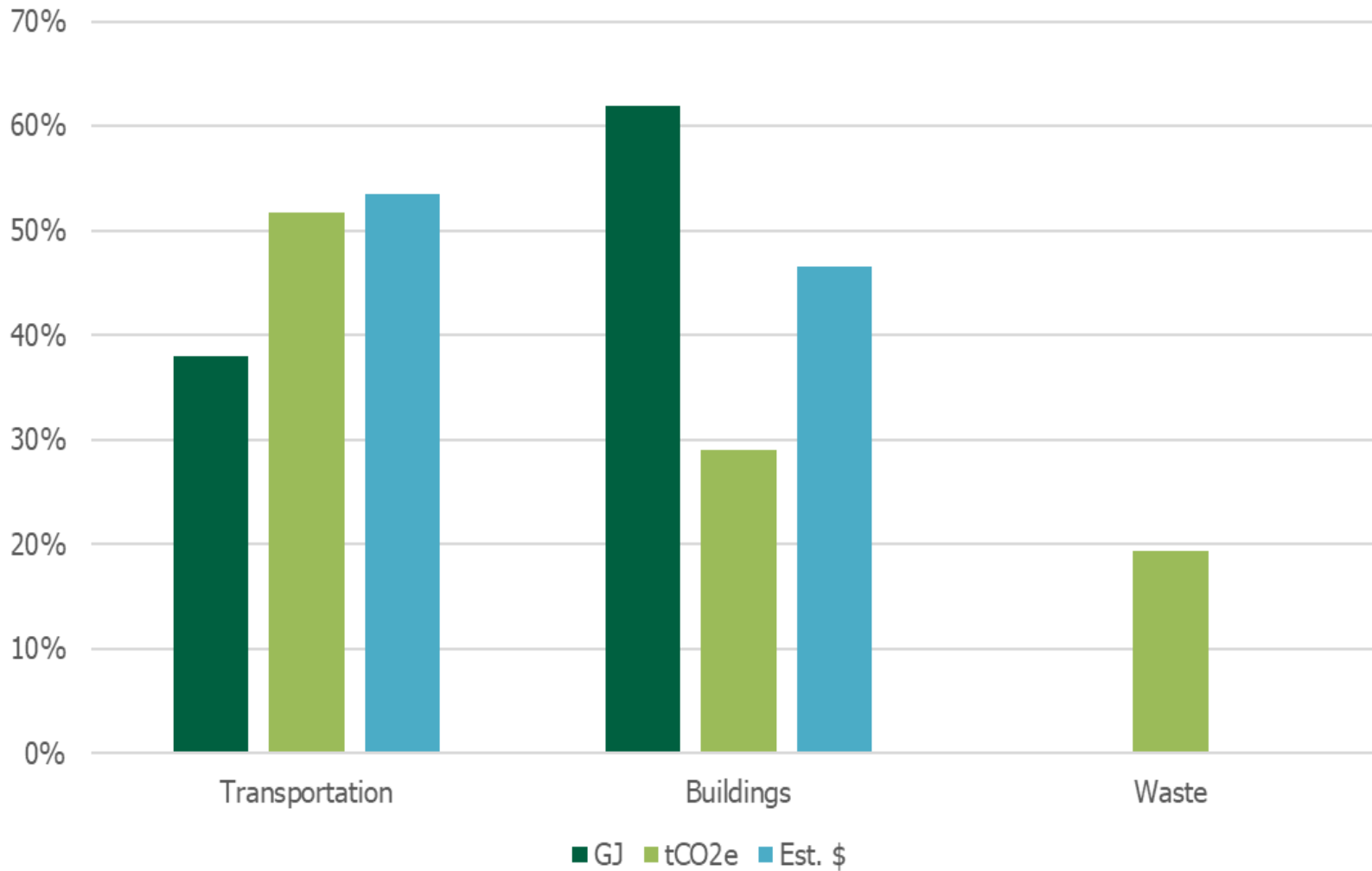


Figure 7. Proportion of energy consumption (GJ), greenhouse gas emissions (tonnes CO₂e), and estimated energy expenditures (Est. \$) by sector in 2017. Values are shown as percentages.

Figure 8 shows the 2007-2017 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. 2017 was a colder year, and led to a spike in emissions for residential and commercial / small-medium industrial (CSMI) buildings. Emissions from gasoline vehicles (primarily passenger vehicles) were essentially the same in 2017 as they were in 2007, but emissions from diesel vehicles (primarily commercial) increased.

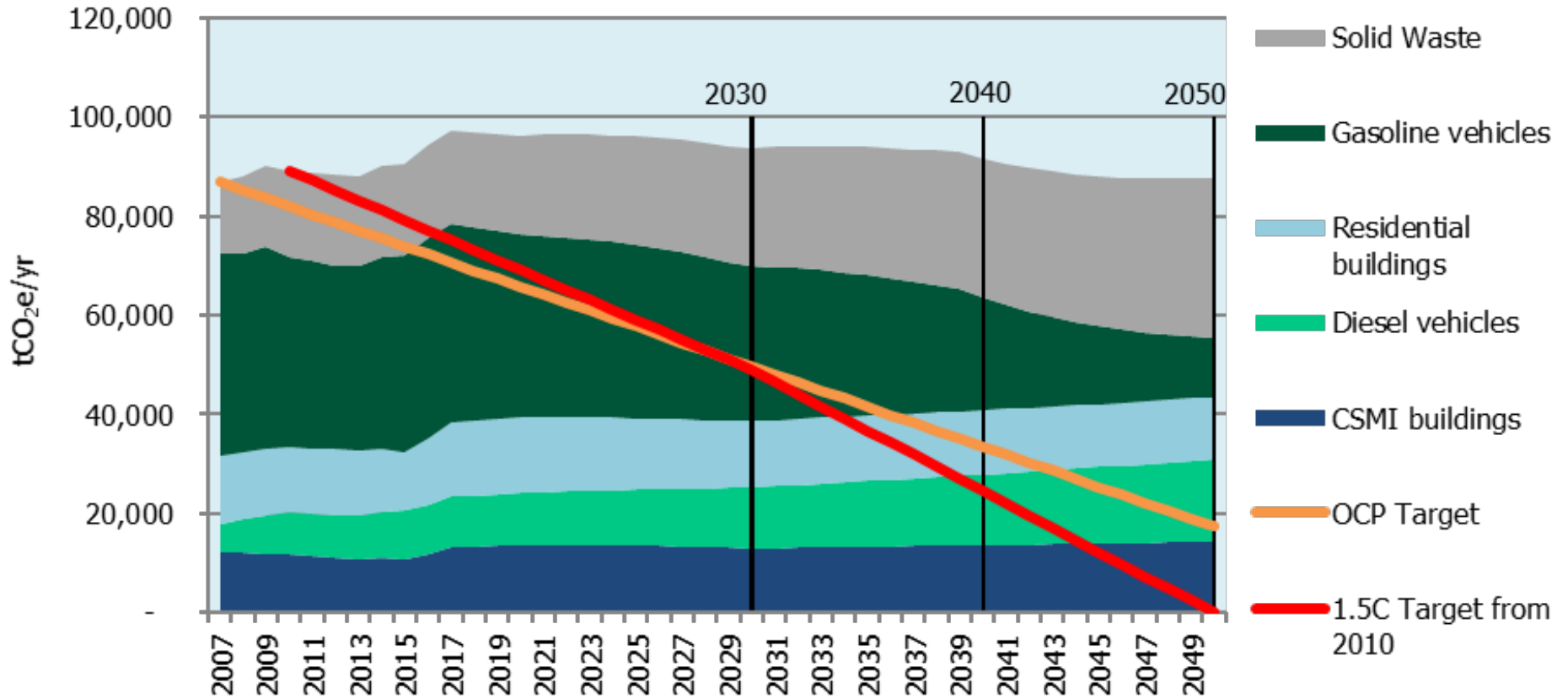


Figure 8 2007-2017 greenhouse gas emission inventories and business as usual projections by sector.

A full summary of the current emission inventory and business as usual projection methodology is included in Appendix B.

Emissions from Sources Outside the Scope of the Inventory

As noted in the Scope section, a number of items have not been included in the forecasts and inventories including:

- Woodfibre Liquefied Natural Gas (LNG)
- Woodwaste landfills
- Marine emissions
- Land use, land use change and forestry emissions (LULUCF)
- Scope 3 emissions (defined in the Scope section above)

The relative impacts for each of these items compared to the standard 2017 emissions inventory are shown in Figure 9. Woodfibre LNG would potentially more than double the community's current emissions during operations. Note that, consistent with natural gas consumption in buildings, these emissions calculations only include the emissions within the municipal boundary, and do not include "upstream" impacts such as those related to the natural gas industry (except for electricity consumption). Woodwaste landfills may have an impact ranging from quite low to substantial, but there is considerable uncertainty around even this wide range of estimates. Marine emissions have been estimated to have a smaller but still significant impact, while LULUCF emissions are relatively small. By far the biggest impact would be the inclusion of scope 3 emissions, but the District currently has almost no levers with which to affect these.

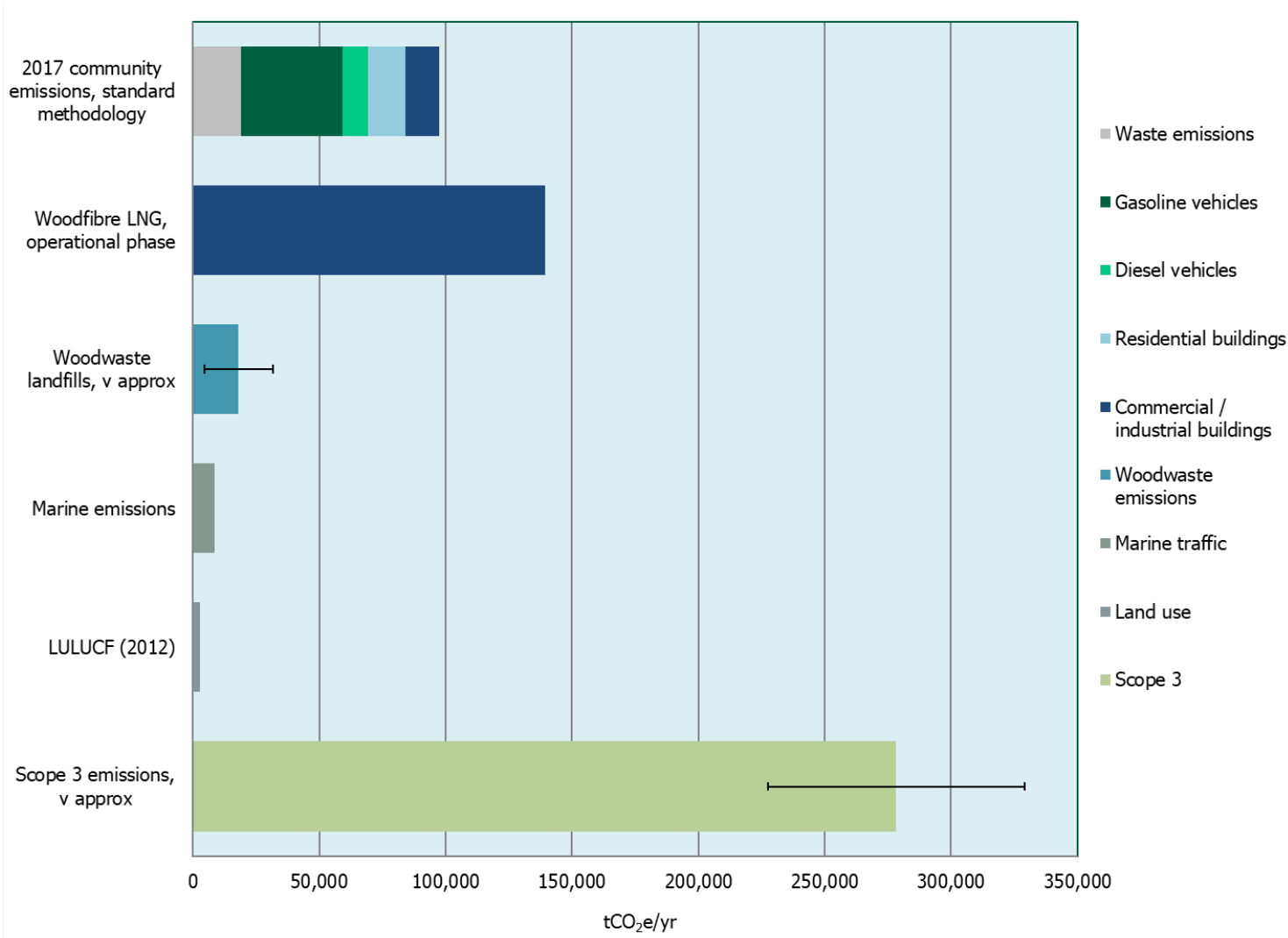


Figure 9 Estimated emissions of Woodfibre LNG, woodwaste Landfills, marine travel, land use/land use change/forestry (LULUCF), and scope 3 emissions, compared to the 2017 standard methodology community inventory.

Detailed methodology regarding the development of the inventory, business as usual projections and future projections if actions are taken is provided in Appendices B and C.

Getting there: Big Moves, Strategies and Actions

The following section outlines how Squamish will realize our vision and goals.

It is structured into Big Moves. Each Big Move has associated Strategies and each Strategy has associated Actions.



For each Strategy there is an assessment of cost, leverage and impact.

These were evaluated internally by District of Squamish staff based on the following criteria:

Table 4 District of Squamish internal evaluation criteria for Strategies.

Cost: Estimated annual expenditure associated with implementing the strategy	Low	Less than \$100,000 per year
	Medium	Between \$100,000 and \$1,000,000 per year
	High	More than \$1,000,000 per year
Leverage: Amount of control, or ability to affect change, that the municipality has related to the strategy	Low	Minimal control
	Medium	Some control
	High	High amount of control
Impact: Level of potential emissions reductions associated with the strategy	Low	Minimal emissions reduction opportunity
	Medium	Some emissions reduction opportunity
	High	Large emissions reduction opportunity

The actions are colour coded in a similar style as mountain bike trails or ski runs, and correlate to:

- Green circle – a relatively easy action to implement
- Blue square – a moderately difficult action to implement
- Black diamond – a challenging action to implement



Each action is identified by type:

- **Direct** - the District has direct influence or control over the action and can complete it on its own.
- **Incentivize** - the District can promote and encourage these actions by making them more attractive or easier to do.
- **Educate** - the District can promote, encourage or themselves learn more about these actions through education.
- **Partner** - Work with other organizations and/or levels of government; Citizens and the community will work with other groups toward achieving the Action. Often the District has little control over these actions, and must work to break down barriers.



ENGAGEMENT INSIGHTS

The most relevant Big Moves to survey and open house respondents are (in order):

1. Close the Loop on Waste
2. Shift Beyond the Car
3. Decarbonize Transportation
4. Construct Better Buildings
5. Decarbonize Existing Buildings

Finally, each action has an associated timeline, which correlates as follows:

- **Short** – the District should begin making progress on this action within two years
- **Medium** – the District should begin pursuing this action within the next two – seven years
- **Long** – the District should consider action within the next seven – ten years.

*Please note that there are some linkages between these different categorizations. For example, strategies that have low associated costs are often assessed to be relatively **easy** to implement, can be **Directed** by the District and should be implemented on a **short** timeline. This is not always the case though – there are many exceptions. For example, some **difficult** strategies that require **Partnerships** should still be implemented on a **short** timeline.*

The following figures will be referred to throughout each of the Big Moves. **Error! Reference source not found.** summarizes the greenhouse gas emissions associated with each sector for 2017 and **Error! Reference source not found.** summarizes the impact of completing the strategies and actions identified for each Big Move.

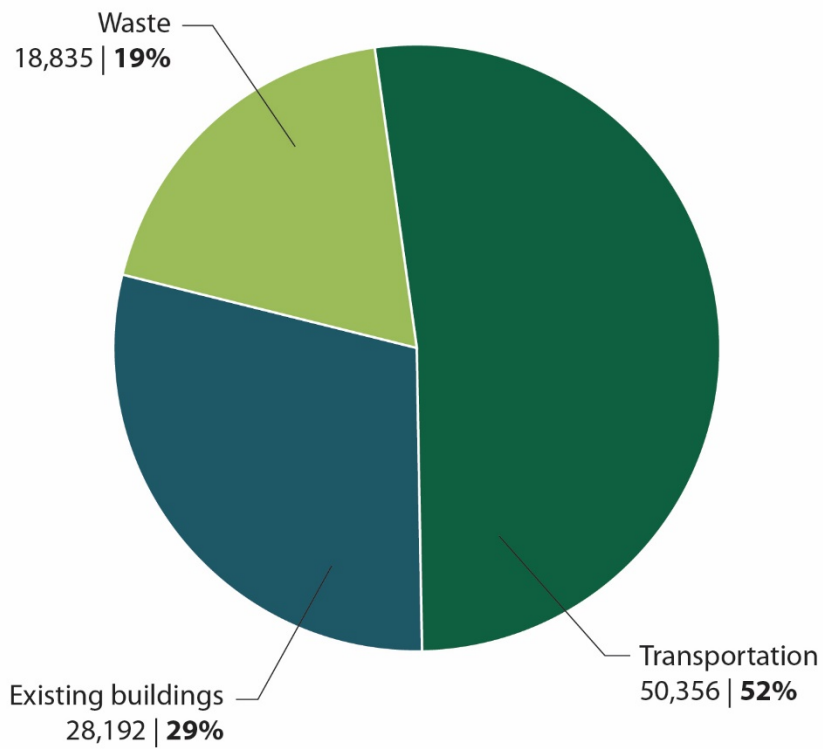


Figure 10. 2017 District of Squamish community emissions by sector (97,000 tonnes CO2e).

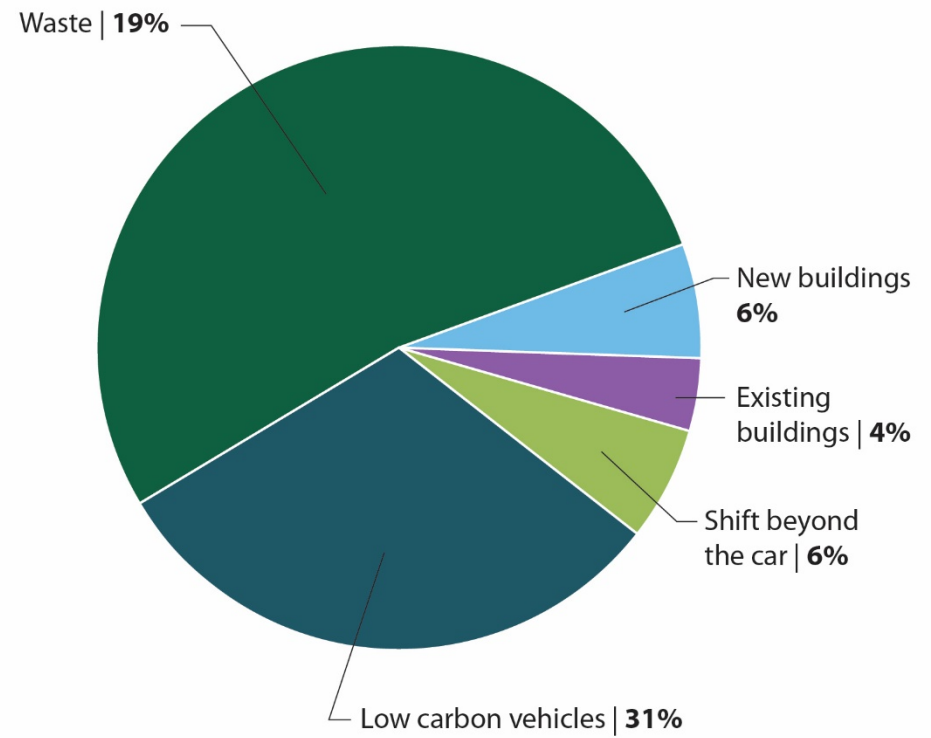


Figure 11. How much each Big Move helps us to achieve our 2030 target.

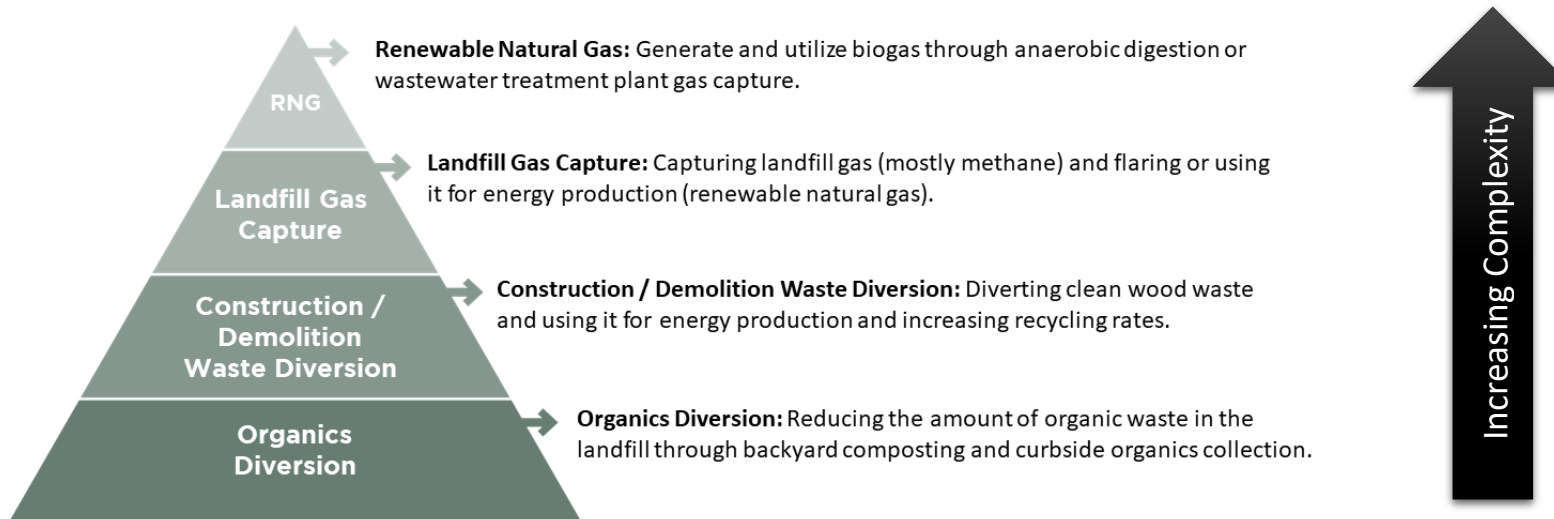
Big Move 1 - Close the loop on waste: divert organics, capture landfill gas, reduce waste

Vision: Our community diverts all organics and recovers value from waste.

Considerations

As of the 2017 Emissions Inventory for Squamish, waste accounts for 20% of community GHG emissions and is the third largest emission source for the community (19,000 tonnes CO₂e) (**Error! Reference source not found.**).

Emissions from waste occur when organic waste (which is usually mixed in with garbage) decomposes in the landfill and produces methane, a potent greenhouse gas that is released into the atmosphere. Organic waste typically makes up about 35-40% of landfilled waste, and includes food waste from homes and businesses, yard and garden waste, wood waste, and paper that cannot be recycled (e.g., food-soiled paper). Organic material in an oxygen free, or anaerobic, environment releases methane and takes significantly longer to decompose compared to an oxygenated process. Diverting organics will not completely eliminate emissions from the landfill, because the products already buried will continue to release emissions. Therefore, a more comprehensive approach to managing diverted waste and emissions associated with remaining waste in the landfill is necessary. Diverting as much waste as possible (aka 'diversion rate') is key to emission reductions. For the waste that cannot be diverted at this time, capturing and utilizing the methane produced in the landfill is important. Organics collection and diversion can lead to energy savings, GHG emission reductions, and economic opportunities. In addition, it can prevent capital investments in new landfills by extending the life of existing ones.



Where we are at (Today)

- The District is working to install a landfill gas flare system which may be converted to capture renewable natural gas or for energy production in the future once sufficient data is available on quantity and quality of the captured landfill gas.
- Three wood waste biomass district energy systems operate already in Squamish.
- The District has a Zero Waste Strategy (2016) and is working towards it. Reducing organics in waste is the District's zero-waste strategic priority.
- The District completed a Wood Waste and Organic Waste Study in 2016 that quantified available sources of wood and investigated opportunities to divert wood waste.
- A residential organics collection program operates in the District of Squamish; collected material (including yard and wood waste) is composted at Sea to Sky Soils. The District does not encourage backyard composting given concerns with attracting wildlife.
- There is an existing bylaw ("ban") on organics to landfill, if organics are deposited at the landfill a higher mixed waste fee is charged. The District has hired a staff person to manage compliance, they will address business, construction sites and multi-unit buildings.
- The District completes a biennial assessment of wood waste and is developing a regional integrated forestry wood waste disposal working group, including the Province. Further, the District has in place a solid waste management plan.
- The Province of British Columbia has committed to ensuring that, by 2030, 95% of organic waste will be diverted from landfills, and 75% of landfill gas will be captured. The Province has also committed to fund workforce training.

Projected Outcome (2030)

- Through successful implementation of a landfill gas collection/flaring system, and continuing to increase organics diversion, this Big Move will result in a reduction of 20,000 tonnes CO₂e compared to business as usual projections. This equates to collecting and flaring about 75% of the landfill gas and diverting about 50% (120 kg) of the organic solid waste generated per person that is currently sent to landfill.



ENGAGEMENT INSIGHTS



The most helpful municipal actions to aid open house and survey respondents' to better separate food and yard waste, in order of popularity:

- Fines if your food and other organic waste are mixed with garbage
- Education and engagement about the importance of organic collection
- More frequent collection by the District year-round
- Education on the types of organics I can separate from waste









Strategies & Actions

Big Move #1: Close the loop on waste

STRATEGY: Capture landfill gas, and explore options for utilization (*capture and convert methane to energy*)



Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: High Leverage: High 	 Continue with implementation plan for landfill gas flare project.	Direct	Short
	 Evaluate utilization of landfill gas and implement if feasible.	Direct, Partner, Incentivize	Medium

STRATEGY: Divert organic waste from the landfill







Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: High Leverage: Medium 	 Education and engagement about organics collection including the source separation requirements of the Solid Waste Utility Bylaw.	Educate	Short
	 Fund and distribute kitchen catcher containers for all units in multi-family complexes.	Direct	Short
	 Support the food recovery network within the community and region.	Educate	Short
	 Increase promotion and participation in the provincial Love Food Hate Waste campaign and other waste reduction campaigns from the Province, SLRD or Metro Vancouver.	Educate	Short
	 Increase funding to the Squamish Lillooet Regional District to increase their school program (in Squamish) on educating about organic waste diversion.	Partner	Short
	 Fund/Support ongoing positions dedicated to organic diversion (and waste reduction) and create bylaw support for zero waste program implementation.	Direct	Short
	 Require organic diversion for event permitting. Develop internal approval process.	Direct	Short
	 Integrate organic collection in streetscapes (i.e. multi-stream waste collection bins), where appropriate.	Direct	Medium

Big Move #1: Close the loop on waste *(continued)*





STRATEGY: Divert organic waste from the landfill *(continued)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: High Leverage: Medium 	 Explore the development of guidelines/policy that regulates the retrofits of existing buildings (MFH/ICI), so that they change the size of their current waste rooms to be able to fit the containers required to collect multiple streams.	Direct	Long
	 Support (where possible) organizations that are looking at establishing an organic materials processing facility or innovative technology to recycle organics, in Squamish.	Partner	Long

STRATEGY: Reduce Waste *(minimize waste production to save energy and reduce embodied carbon)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Low Leverage: Low 	 Continue to support and provide a liaison person from the Engineering Department to the Squamish Climate Action Network Zero Waste Action Team.	Partner	Short
	 Support the creation and staffing of a Share/Free Shed on District property.	Direct	Long
	 Establish a stakeholder committee to guide the implementation of solid waste management initiatives.	Educate	Medium
	 Reduce single use items through regulation.	Direct	Medium
	 Upgrade Squamish Landfill Transfer Station including additional diversion options, better signage, and improved site design.	Direct	Medium
	 Work with the business community to develop a circular economy network for inputs and outputs. Consider expanding it to a regional concept.	Partner	Medium

STRATEGY: Manage wood waste

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: High Leverage: Medium 	 Enforce construction materials separation at the Landfill.	Direct	Short
	 Develop recycling targets as part of the construction, renovation and deconstruction/demolition permit process. Support the processes with policy, fee/rebate structures and possibly a bylaw amendment.	Direct	Medium
	 Partner with the Province and others to explore strategies to manage current forestry wood waste in Squamish (e.g. from log sorts, mills).	Partner	Short
	 Develop a working group/project to assess existing buried wood waste and determine options for resource recovery.	Partner	Medium

Big Move 2– Shift beyond the car: active transportation and transit

Vision: Active transportation and transit are preferred modes of travel to and within Squamish.

Considerations

As of the 2017 Emissions Inventory for Squamish, transportation accounts for 52% of community GHG emissions and is the largest emission source for the community (50,000 tonnes CO₂e) (**Error! Reference source not found.**). This number includes residents and businesses, but not visitors. This Big Move and Big Move 3 are both oriented at addressing transportation emissions. This Big Move has substantial co-benefits (biodiversity and habitat, health, social, and others) related to reducing private vehicle trips, and also is more accessible to a greater number of people than Big Move 3.

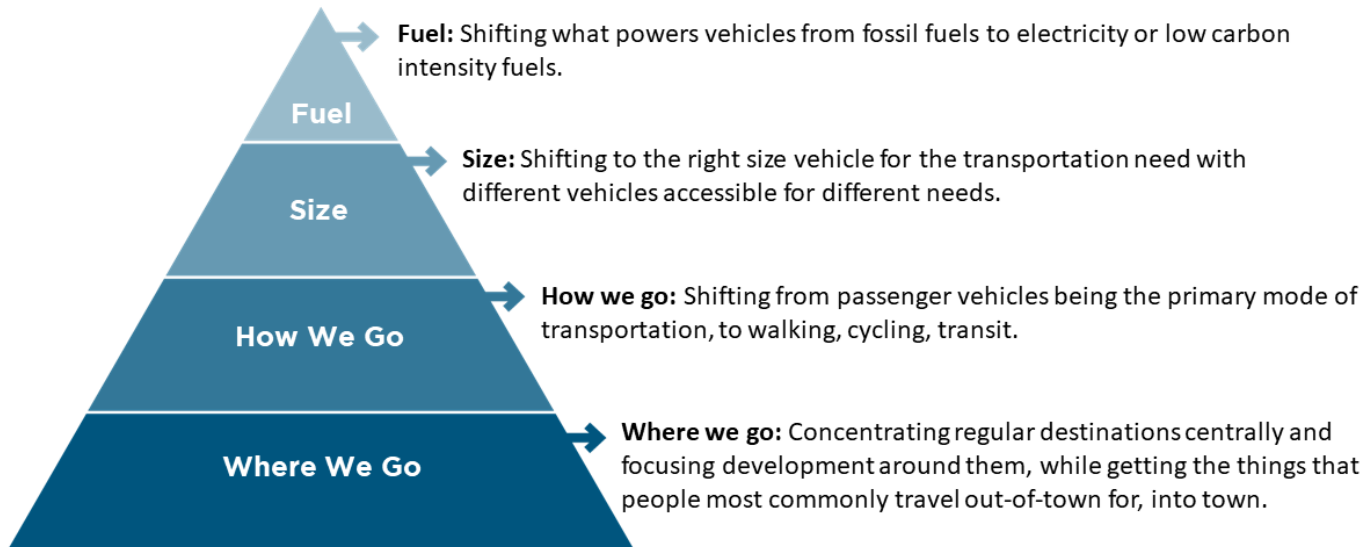
Planning for a zero-carbon transportation system requires a paradigm shift. Rather than solve traffic and infrastructure problems by expanding roads or building more of them, communities can support all transportation options and facilitate alternative travel choices that reduce the need for more, or bigger, roads. Not only does this reduce transportation-related emissions, this shift can result in reduced infrastructure and maintenance costs. Transportation fuels cost Squamish residents approximately \$27,000,000 (2017) per year currently; therefore, there are large opportunities to save people money.

Walking and cycling are not just weekend recreational activities – they are viable, beneficial, economical and environmentally-friendly modes of transportation. The District of Squamish can design and build well-connected, accessible, safe and enjoyable routes, which will encourage residents and visitors to choose an active mode of travel. Good sidewalks, bike lanes, and trails make active transportation a viable choice when traveling through neighbourhoods, communities, and downtowns. The same infrastructure also affords access for those who rely on mobility aids, such as scooters and wheelchairs.

Transit provides a great option when walking and cycling are not desirable, due to distance, terrain, weather or preference. Squamish has a good transit system for a community of our size; however, we can continue to make improvements related to on time performance, frequency, bus stop amenities, sidewalk connections, etc. Additionally, we can ensure that our community grows in a way that supports transit use, by focusing density and development along our transit networks.



Saving energy, emissions and money on transportation will require simultaneous change in all four transportation characteristics in the graphic below.



Where we are at (Today)

- 2016 census information indicates that 3.3% of residents travel to work using transit, 7.5% of residents walk to work and 4.3% of residents bike to work, for a total of 15% of all work commutes.
- The Squamish transit system currently includes 8 conventional buses and 3 HandyDart vehicles, and provides ~342,000 passenger trips per year (2018/19).
- The District of Squamish has an existing Active Transportation Plan and capital program with \$800,000 committed capital funding each year. An additional \$100,000 is allocated annually for transit stop infrastructure improvements.
- In 2016, the District amended the Traffic Bylaw to allow for the use of “neighbourhood zero emissions vehicles” on streets with speed limits of 50 km/hr or less. Neighbourhood zero emissions vehicles are four wheeled electric vehicles that travel between 32 and 40 km/hr. The District is planning to evaluate reclassification of speed limits in the municipality.
- Transit for individuals 12 and under in the District of Squamish is provided free of charge, and summer weekends are free for all riders.

- A car sharing service (MODO) has initiated operations in the District with 2 hybrid vehicles. MODO is aggressively pursuing an EV only fleet.
- The Official Community Plan 2040 has identified at least 21 specific policies to pursue on climate change adaptation and mitigation, many of which relate to urban form, mode shift and density.
- With respect to future development, OCP Policy supports higher density along the core transit network and in neighbourhood nodes. The goal for each neighbourhood node is to have a suite of amenities that enables residents to reduce travel to other locations in the community.
- As part of the Province of British Columbia’s commitment through [CleanBC](#) to embrace clean and renewable energy across the board, the government developed [Move Commute Connect – B.C.’s Active Transportation Strategy](#). This strategy will support local governments to reach their mode shift goals through policy and legislative changes, funding and education (e.g. the Active Transportation Design Guide).

Projected Outcome (2030)

- Through doubling the number of transit and active transportation trips taken³, the community’s 2030 emissions related to this Big Move will result in a reduction of 2,500 tonnes CO₂e compared to business as usual projections.



ENGAGEMENT INSIGHTS

The most helpful municipal actions to aid open house and survey respondents’ to shift car trips to sustainable modes of transport such as - walking/cycling, transit, e-bikes, e-scooters, etc. for half or more of their trips around Squamish, in order of popularity:





- Advance regional transit service (Sea to Sky Corridor)
- Implement more active transportation pathways between all neighbourhoods and nodes
- Make active transportation (walk, bike, e-bike, scooter, etc) easier and more attractive than driving

³ A doubling of alternative transportation trips correlates to an approximate 15% decrease in the total number of private vehicle trips.





Strategies & Actions

Big Move #2: Shift Beyond the Car

STRATEGY: Improve urban form (*compact communities enable active transportation and transit*)






Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: Low in the short term, but medium/high in the long term Degree of leverage: High 	 Consider using the Community Lifestyle Infrastructure Costing (CLIC) tool to assess financial impacts of development proposals.	Direct	Medium
	 Add mixed-use neighbourhood commercial as a permitted use in the RS-1 and RS-2 zone in specified locations such as neighbourhood nodes, corner lots and centrally located larger properties.	Direct	Short
	 Support and incentivise high density infill development along the core transit networks, around neighbourhood nodes and in mixed use areas through additional housing forms (plexes, row housing, suites), density bonuses, and reductions in parking requirements.	Direct, Incentivize	Short
	 Develop a scoring system to evaluate rezoning applications. The system will be based on 'walkability' to key daily aspects of community life such as transit, employment, neighbourhood commercial and greenspace.	Direct, Incentivize, Educate	Long

STRATEGY: Outreach, education, and options (*Ensuring maximum utilization of other transportation assets*)





Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: Low Leverage: High 	 Increase community engagement in active transportation and transit (via website, social media, cycling maps etc.).	Educate	Short
	 Continue to support the establishment of car-sharing in Squamish including provision of on street car share parking where appropriate, corporate use of car share, and working with developers to provide car sharing vehicles/memberships when appropriate.	Direct, Partner	Short
	 Awareness events for e-mobility beyond cars (e.g. bikes and scooters), including demos.	Educate	Medium
	 Educate community on benefits of densification.	Educate	Short

Big Move #2: Shift Beyond the Car *(continued)*

STRATEGY: Improve active transportation *(Enhancing connectivity, safety, and convenience)*




Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: Medium Leverage: High 	 Consider developing a financial incentive program to support residents in purchasing commuter e-bikes.	Direct	Short
	 Develop a strategy to enhance streets with ditches that considers active transportation, environmental values and storm water management.	Direct	Short
	 Strategically implement Active Transportation Plan. Augment existing active transportation infrastructure budget to make biking and walking safer and more accessible.	Direct	Medium
	 Apply trip-end facility requirements (e.g., showers, more racks, secure bike parking etc.) to a broader range of commercial and industrial buildings.	Direct	Medium
	 Incentivize an e-bike share program.	Incentivize	Medium

STRATEGY: Improve public transit within Squamish *(improve frequency, reliability, routing, infrastructure and communications)*



Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: Medium Leverage: High (if Province continues to support expansions) 	 Improve availability of transit fare products (more locations) and improve communications regarding service interruptions.	Incentivize, Educate	Short
	 Continue to improve transit stop infrastructure – shelters, benches and accessibility. Prioritize based on stop usage volumes.	Direct	Short
	 Continue to invest in enhanced transit in the community. Work with BC Transit to establish an optimal frequency on the core transit network during peak times.	Direct	Medium
	 Implement the Transit Future Action Plan (in development) to support transit mode shift goals. Include a detailed review of how to further increase frequency on the core transit network during peak times.	Direct, Partner	Long

Big Move #2: Shift Beyond the Car *(continued)*




STRATEGY: Improve regional transportation *(Develop affordable and reliable transit and improve support for carpooling)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High (without additional support or authority from Province) Degree of impact: Medium Leverage: High 	 Establish additional designated carpooling meet-up locations (Park and Rides) through use of municipal land if available, as well as by working with landowners/businesses.	Direct	Medium
	 Advance interim regional transit approach while additional support/authority from Province is not available.	Partner	Short
	 Continue to collaborate with neighboring communities (Pemberton, Whistler, Vancouver) on safe and convenient inter-community transit that is responsive to the needs of the communities. Continue to lobby Province for support.	Partner	Short



STRATEGY: Get more people working in Squamish *(people working locally have shorter commutes)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low to medium Degree of impact: Medium once implemented Leverage: Medium 	 Increase employment density on employment land and align zoning with the projected demand of businesses and the workforce to support more local employment and reduce the need to commute.	Direct	Short
	 Align District business development activities to create high-value employment opportunities in Squamish.	Direct, Incentivize	Long

STRATEGY: Dis-incentivize private vehicle use *(a critical component of incentivizing mode shift)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Medium Leverage: Medium 	 Update parking requirements to maximize land use efficiency and increase residential and employment density: reduce parking minimums and establish maximums for specific permitted uses along core transit network.	Direct	Short
	 Develop and implement a strategy to price parking along parts of the core transit network and provide adequate enforcement in order to incent mode shift.	Direct, Incentivize	Medium
	 Host car free days once a week during warmer seasons (possibly combined with farmers market).	Direct	Medium

STRATEGY: Improve coordination of decision making between transportation modes

Assessment of strategy.	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: Medium Leverage: Medium 	 Establish a stakeholder group/committee to guide the implementation of transportation initiatives.	Direct, Partner	Short
	 Initiate annual mode share data collection.	Direct	Short

Big Move 3 – Decarbonize transportation: zero or low-carbon passenger, medium and heavy-duty vehicles

Vision: It's easy to own and use electric vehicles in Squamish. Infrastructure supports electrified (or low-carbon) cars, buses, fleets and larger vehicles.

Considerations

As of the 2017 Emissions Inventory for Squamish, transportation accounts for 52% of community GHG emissions from residents and businesses, not including visitors. This is the largest emission source for the community (50,000 tonnes CO₂e) (**Error! Reference source not found.**). This Big Move and Big Move 2 are both oriented at addressing transportation emissions⁴.

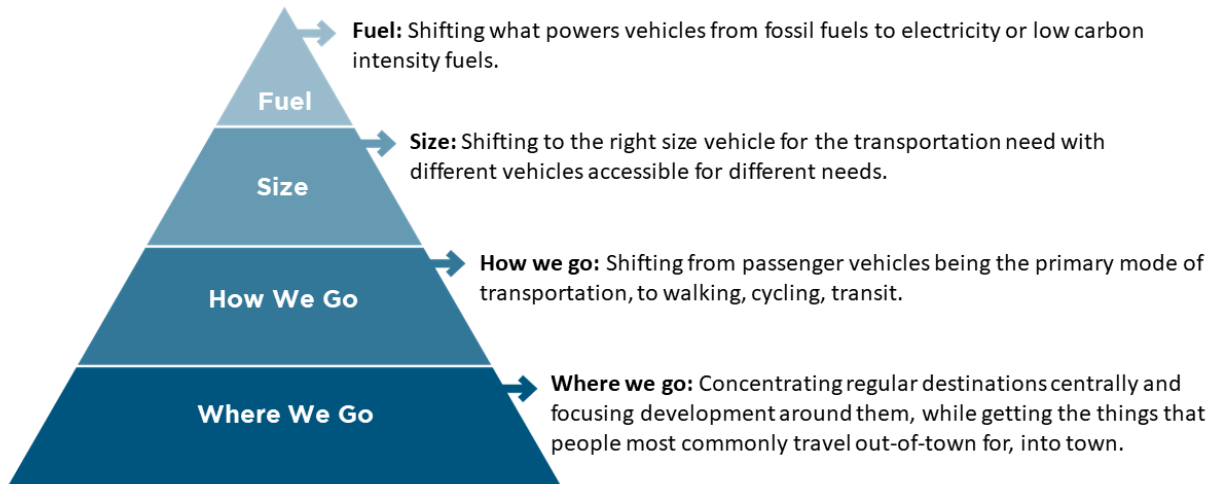
Zero-emission vehicles (ZEVs) are clean, efficient, and cost-effective. In British Columbia, where at least 94% of all electricity is renewable and non-emitting, ZEVs are already a viable near zero-emission option. Transportation fuels such as gasoline and diesel are the largest expenditure on energy in the community. At almost \$27,000,000 (2017), saving a proportion of transportation costs can add up to economic development opportunities.

Local governments can make zero-emission vehicles an easier choice for residents and businesses by investing in infrastructure, enacting supportive policies, and engaging with companies and organizations that operate large fleets. Local governments also deliver community outreach and education on zero-emission transportation choices. If every British Columbian local government implemented this Big Move, by 2030 they would collectively reduce the province's total greenhouse gas emission inventory by 1.5 to 2 million tonnes. This is the equivalent of removing half a million internal combustion vehicles from our roads. At the individual community level, this move could yield emissions reduction of 5 – 25% by 2030.

⁴ Embodied carbon is a consideration in this Big Move. Life Cycle Analyses indicate that EVs in British Columbia produce approximately one-third of the emissions as a traditional vehicle, per km, over the entire life of the vehicle (including manufacturing, use and disposal). Therefore, this Big Move is a significant focus, along with Big Move 2.



Saving energy, emissions and money on transportation will require simultaneous change in all four transportation characteristics in the graphic below.



Where we are at (Today)

- There are a number of charging stations available for the public in Squamish, although demand is increasing. Stations include:
 - A BC Hydro fast charger outside of the District Office
 - A bank of Tesla super chargers outside of Boston Pizza
 - A level 2 outside of Squamish Savings
 - A level 2 outside of West Coast Railway Heritage Park
 - A level 2 at Greg Gardner Motors
- The District of Squamish is in conversations with BC Transit to electrify the transit fleet. A new transit maintenance facility is due to be built by 2025 and can be designed to support decarbonized transportation/low carbon intensity fuels.
- As of mid-2019, there were over 20,000 licensed zero emissions vehicles on the road in British Columbia. The provincial government expects adoption will grow at 30% per year between today and 2030. At that point, there will be 350,000 zero emissions vehicles on the road.
- In May 2019 the Province enacted the [Zero Emissions Vehicle Act](#) to follow through on the transportation commitments in its [CleanBC](#) climate plan. The legislation requires manufacturers to ensure that a steadily increasing proportion of all new light-duty cars and trucks sold or leased in British Columbia will be zero-emission vehicles. The Province of British Columbia established its [Clean Energy Vehicle Program](#) to support the transition.

The program provides incentives to reduce the price of new zero-emissions vehicles and charging stations, and works to raise awareness of the benefits of such vehicles. The Government of Canada also provides purchase and lease [incentives](#) for new zero-emission vehicles, and offers tax deductions for businesses.

- Other relevant provincial legislation includes the [Greenhouse Gas Reduction \(Renewable & Low Carbon Fuel Requirements\) Act](#) and the [Renewable & Low Carbon Fuel Requirements Regulation](#), which aim to help:
 1. Reduce British Columbia's reliance on non-renewable fuels;
 2. Reduce the environmental impact of transportation fuels; and
 3. Contribute to a new low-carbon economy.
- The British Columbia Ministry of Transportation and Infrastructure is steadily expanding an existing network of [DC Fast Chargers](#), contributing to one of the largest public charging networks in Canada.
- [BC Hydro](#) and [Fortis BC](#) work with local governments to deploy and operate charging networks, and a growing number of private-sector companies such as [Petro-Canada](#) and Canadian Tire now offer publicly accessible charge points, often in partnership with companies such as [Flo](#) and [ChargePoint](#).

Projected Outcome (2030)

- Through a combination of decarbonizing passenger and commercial/institutional vehicles/fleets this Big Move will result in a reduction of 12,000 tonnes CO₂e compared to business as usual projections.
- In Squamish in 2030, almost **50%** of passenger vehicles will be electric or similarly zero carbon (e.g. alternative fuels such as hydrogen or biofuels). Further, the District will have used its position of leadership and influence to encourage **10%** commercial and institutional fleets to be low or zero carbon.



ENGAGEMENT INSIGHTS




The most helpful municipal actions to aid open house and survey respondents' to purchase/lease an electric vehicle for their next vehicle in the next 5 years, in order of popularity:

- Top-up provincial financial incentives to purchase an EV
- Provide incentives to install in-home chargers
- Ensure more access to EV charging throughout the community






Strategies & Actions

Big Move #3: Decarbonize Transportation



STRATEGY: Enhance public EV charging infrastructure (*Squamish is a place where EV use is fully supported*)

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: High Leverage: Medium 	 Develop a community EV charging infrastructure strategy (including demand for charging levels). Consider opportunities to leverage public institution charging infrastructure to account for homeowners who don't have a garage or driveway.	Direct	Short
	 Develop community EV charging infrastructure. Consider other actions, such as integrated transportation hubs (connectivity of charging infrastructure to e-bike shares, transit options, etc.)	Direct	Short
	 Leverage Provincial decal program (EV-OK) to provide a suite of EV priority parking, may include free or priority parking.	Partner, Incentivize	Medium

STRATEGY: Support the use and purchase of passenger EVs (*residents are enabled to own and use EVs*)







Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: High Leverage: Low 	 Develop an EV communications strategy that includes outreach to builders/developers, electrical trades, local businesses, and the general public.	Educate	Short
	 Top up provincial residential (including multi-unit) Level 2 charger retrofit incentives.	Incentivize	Short
	 Develop requirements for charging infrastructure on off-street parking (e.g., commercial, municipal).	Direct	Medium
	 Incent ride-hailing and taxi operators to switch to EV's (e.g. priority parking for EV taxis, or business permit price reductions for fleets that switch).	Incentivize	Medium
	 Explore authority of local government to require EV charger readiness (electrified, dedicated outlet) as part of the future Province of BC Retrofit Step Code.	Partner	Long

STRATEGY: Utilize low-carbon fuels and lower-carbon transport options








Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: Medium Leverage: Low 	 Host an emerging and future technology workshop for Medium-Duty and Heavy-Duty fleet operators.	Educate	Medium
	 Plan to optimize opportunities for marine transport, or other forms of lower carbon transportation for shipping.	Partner	Medium

Big Move #3: Decarbonize Transportation *(continued)*

STRATEGY: Support the decarbonisation of larger vehicles *(Buses and trucks switch to electric, or hydrogen)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Medium Leverage: Low 	 Develop a District (corporate) EV charging strategy for municipal buildings/facilities as well as workplaces. Align with budget and capital plans for municipal infrastructure.	Direct	Medium
	 Engage with BC Transit and School District to identify early adoption opportunities of low-carbon bus and transit options (recognizing 100% electric transit target for BC Transit, and available school bus funding for School Districts).	Partner	Short
	 Create a procurement strategy to incent low carbon vehicles for municipally contracted services.	Direct, Incentivize	Medium
	 Require new construction of buildings with delivery bays/loading zones to have capacity and conduit for electrification of those zones.	Direct	Long
	 Require applications for commercial and industrial re-zoning to trigger EV charging infrastructure requirements.	Direct	Medium
	 Create a zone that requires delivery by zero emissions vehicles.	Direct	Long

STRATEGY: Support low emissions fleet vehicles *(municipal, commercial, industrial, etc.)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Medium Leverage: Low 	 Convene a Commercial and Industrial fleet operators' workshop to discuss current and future opportunities around low emissions/electrification of fleets. Identify grants and incentives to leverage for implementation.	Educate	Medium
	 Develop a communications strategy to support outreach/engagement with commercial sector.	Educate	Medium
	 Establish a low-carbon fleet vehicle policy. Align fleet transition plan with long-term budget and capital plans.	Direct	Short
	 Complete a needs assessment for community wide fleet charging/fueling requirements, through to 2040 that identifies heavy duty charging/fueling hubs.	Educate	Medium
	 Design a non-municipal commercial/institutional EV charging network strategy, with emphasis on hub-style charging to leverage fleet needs and electrification of delivery bays. Integrate as much as possible with community and corporate charging strategies.	Direct	Medium
	 Create additional incentives (beyond current business license fee savings) for taxis and ride-hailing vehicles to electrify.	Incentivize	Medium
	 Facilitate joint procurement/joint funding in coordination with commercial fleet operators for the implementation of the commercial/institutional EV charging network strategy.	Partner	Long

Big Move 4– Decarbonize Existing Buildings, Retrofits & Upgrades

Vision: Energy retrofits and conversions to low-carbon energy systems occur in all types of buildings in Squamish.

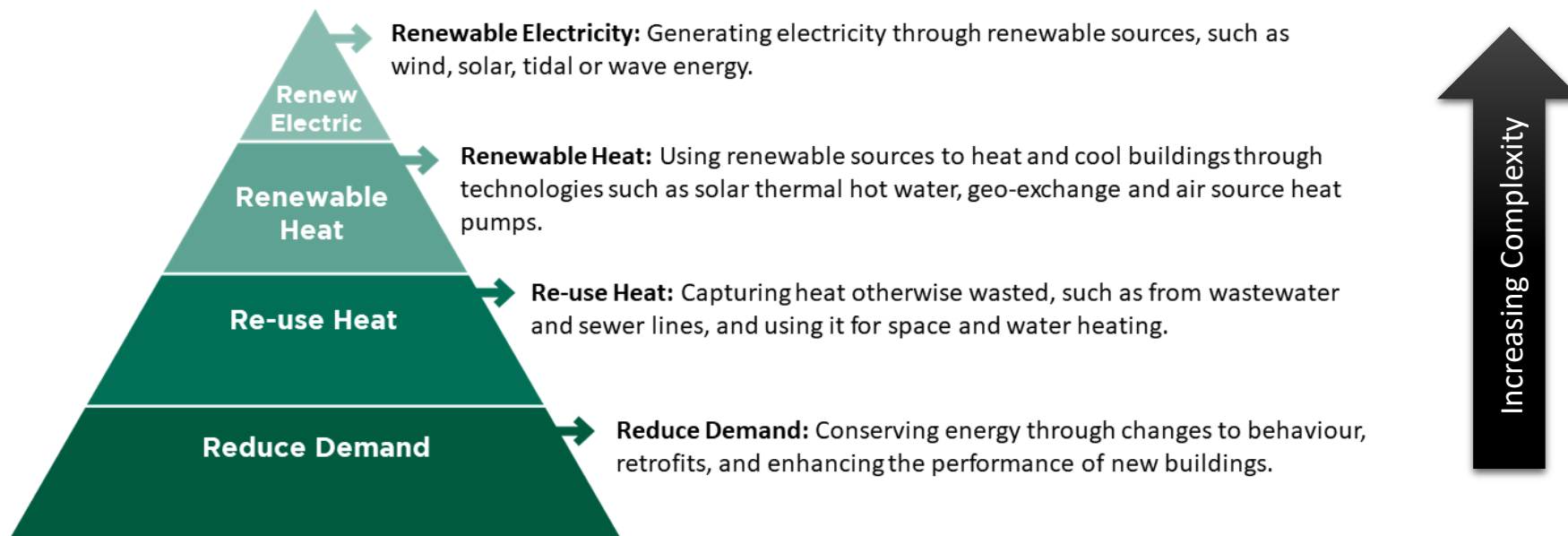
Considerations

As of the 2017 Emissions Inventory for Squamish, commercial and residential buildings combine to account for 29% of community GHG emissions and are the second largest emission source for the community (28,000 tonnes CO₂e) (**Error! Reference source not found.**).

Buildings make up the second largest portion of District of Squamish greenhouse gas emissions (27%) because the primary fuel source is natural gas. Reducing energy consumption in buildings will help residents and businesses save money, and also leads to a host of other benefits including more comfortable and healthy spaces to live and work. High performance, energy efficient buildings are also more durable and resilient in the face of extreme weather events, which are becoming more frequent due to climate change. The focus for saving energy, reducing greenhouse gas emissions and costs in the existing buildings sector is on reducing overall energy demand. With efficiency maximized, there are opportunities to recover heat and invest in renewable energy at both the single building and community scale.

In 2030, three quarters of the all buildings in the Province will be the ones that are already standing today. Existing buildings account for 11% of British Columbia's total GHG emissions. Owners of 20-year-old gas-heated homes can lower their energy bills by as much as 30% through energy efficiency retrofits and reduce about 4.5 tonnes of greenhouse gas emissions per year. Homeowners can pursue various degrees of building energy retrofits—from replacing individual pieces of equipment to comprehensive overhauls of the whole building. Deep energy retrofits involve changes to the entire building, including insulation, windows and doors, air barriers, as well as ventilation, space and water heating equipment. To ensure emissions reductions as well as energy reductions, an energy retrofit should include fuel switching from fossil fuel sources to zero-carbon sources such as electricity or 100% renewable gas. Such projects usually rely on the expertise of an energy advisor, who conducts energy modelling and airtightness testing. Many building owners choose to spread the deep energy retrofit out over time to manage up-front costs, and then benefit from cost savings due to reduced energy bills over the lifespan of the building, as well as an increase in value.

Local governments have limited jurisdiction over requirements for existing building retrofits but have an opportunity to influence and enable building owners to make investments in the energy efficiency of their buildings. An opportunity for leadership does exist in the existing municipally-owned building stock. Facilities owned and operated by the municipality are often significant contributors to corporate emissions and can serve as demonstration projects for energy and cost savings through retrofits.



Where we are at (Today)

- The Province of BC, BC Hydro and FortisBC have been promoting their energy efficiency programs in the community. Although some residents will be using these programs, utilization rates are expected to be far lower than during the peak of the LiveSmart BC and ecoENERGY for Homes programs, around 2009-2011.
- The Province of British Columbia has partnered with utilities and BC Housing on CleanBC Better Homes, a searchable web portal that allows home owners to quickly access information on all of the available energy-efficiency retrofit incentives and find a science-based assessment of options and opportunities to improve the building's energy efficiency.
- The Province of British Columbia is offering rebates on energy-efficient heat pumps, which can be retrofitted into homes that run inefficient oil or gas furnaces.
- The federal government plans to introduce a model code for alterations to existing buildings in 2022. Provincial codes will be developed to meet the federal standards and align with a range of other priorities, including energy efficiency, earthquake safety, and occupant health and safety. The province will conduct research and consult with stakeholders on a plan to adopt the model code within two years of the national publication (i.e. by 2024).

- Through Codes Canada, the National Research Council and Natural Resources Canada are working to develop a series of model national energy codes that would serve to help the government deliver on its commitment that all provinces and territories should adopt net-zero energy-ready codes by 2030. Through Natural Resources Canada, the federal government also manages the EnerGize Rating System for new and existing buildings.
- Under its Energy Efficient Buildings Research, Development and Demonstration program, the federal government committed to increase energy efficiency and address climate change by improving how our homes and buildings are designed, renovated, and constructed. It is also allocating funding to support the research, development, and implementation of building codes for existing buildings and new net-zero energy-ready buildings.

Projected Outcome (2030)

- Through a combination of 2,700 or 40% of private residences completing energy retrofits (e.g. insulation, heat recovery, air tightness, windows and doors), and 390 or 6% of residences installing a zero-carbon energy system (e.g. electric air source heat pumps) this Big Move will result in a reduction of 1,700 tonnes CO₂e compared to business as usual projections.
 - This target assumes that natural gas will be 15% renewable by 2030, as per the CleanBC plan. (Note that there is a high degree of regulatory uncertainty over this, and if it is not realised as currently expected, there will need to be 15% more retrofits and upgrades.)






ENGAGEMENT INSIGHTS

The most helpful municipal actions to aid open house and survey respondents to invest in a retrofit that includes making their home or building a) more energy efficient and b) operate with a zero emission heating, in order of popularity:





- Lowering the initial investment required for retrofitting (incentives, or low interest financing)
- Incentives for an energy assessment and coaching to identify the best opportunities
- Programming to ease the adoption of retrofits and efficient and zero emission heating systems e.g. quality assured installers

Big Move #4: Decarbonize Existing Buildings




STRATEGY: Improve corporate building efficiencies (*benchmark, assess and reduce energy use in corporate facilities*)

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Low Leverage: High 	 Establish energy benchmarking procedures for all municipal facilities.	Direct	Short
	 Commission energy assessments of all corporate facilities and communicate results to the public as part of the future Corporate Energy and Emissions Plan.	Direct	Short
	 Implement energy efficiency retrofits, reduce GHG emissions at corporate facilities and meet corporate reduction targets.	Direct	Medium

STRATEGY: Support community building energy use and emissions benchmarking and assessments

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Medium Leverage: Medium 	 Work with the Province to develop energy benchmarking and disclosure enabling legislation as well as a common provincial program, which would allow the District to require the disclosure of building energy use information in the community. Support the public disclosure of this information for retrofit economy development purposes.	Partner	Medium
	 Develop a voluntary benchmarking and disclosure program for community residential and commercial buildings, to support capacity building.	Direct	Short
	 Support energy assessments for higher energy consuming facilities, to facilitate energy efficiency retrofit project development and implementation activities.	Incentivize	Short
	 Complete mass thermal imaging for community or key neighborhoods to support retrofit marketing.	Direct	Short

STRATEGY: Enable and incentivize improvements for single and multi-family residential owners (*help people to retrofit their condos, townhouses and homes*)

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low to medium, depending on LICs / PACE costs Degree of impact: Medium, depending on implementation Leverage: medium 	 Provide additional incentives for the installation of air-source heat pumps as replacements for natural gas furnaces in addition to the Provincial ASHP incentives to support greater implementation.	Incentivize, Partner	Medium
	 Implement a financing/loan program for the implementation of energy efficiency improvements and/or emissions reductions that is connected to the property, not the property owner, such as using Local Improvement Charges (LICs) or PACE financing (Property Assessed Clean Energy), or other mechanisms to provide financing for deep energy efficiency retrofits.	Incentivize	Medium
	 Require minimum energy performance standards aligning with the Province's upcoming retrofit code (proposed to be introduced by 2024).	Partner, Direct	Medium

Big Move #4: Decarbonize Existing Buildings *(continued)*

STRATEGY: Enable and incentivize improvements for commercial building owners *(help to retrofit commercial, industrial and rental properties)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium, depending on how implemented Degree of impact: Low to medium, because of uncertainty Leverage: Medium 	● Partner with the Thermal Environmental Comfort Association (TECA) or other group(s) to increase understanding of the viability of heat pumps in larger buildings.	Partner, Educate	Short
	■ Complete deep retrofit demonstration projects in collaboration with large portfolio owners. Use these projects to understand and communicate the benefits of deep retrofits as well as the costs, regulatory and market barriers, and training needs.	Partner, Educate	Medium
	◆ Initiate LICs (Local Improvement Charges), PACE financing (Property Assessed Clean Energy), or other mechanisms to provide financing for deep energy efficiency retrofits that are tied to the building (not the building owner).	Incentivize	Long
	◆ Require minimum energy performance standards aligning with the Province's upcoming retrofit code (proposed to be introduced by 2024).	Partner, Direct	Long

STRATEGY: Owner, renter, realtor and contractor education and coaching *(help people to make and implement the best solutions)*

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Med to High Degree of impact: Medium Leverage: Low 	● Promote "Better Buildings and Better Homes BC" at front counter, in property tax mailings and in business license renewal mailings. Promote Home Performance Stakeholder Council and certified/accredited vendor list.	Educate	Short
	● Provide easily accessible information to people to help inform purchases and retrofits (e.g., information on heat pumps, furnaces, etc., that includes the business case).	Educate	Short
	● Educate realtors on energy efficiency and low carbon choices for space and water heating.	Educate	Short
	■ Signal intention to adopt 'retrofit code' when it becomes available (outreach to public, retailers, realtors, trades).	Educate	Short
	■ Establish a 10-year program for a community-wide marketing campaign (based on 'energy diets') to encourage building envelope improvements, electrification or other low carbon fuel sources.	Educate	Medium
	■ Collaborate with local governments in the region on a coordinated 10-year campaign to market fuel-switching from heating oil, propane, and natural gas to heat pumps. Jointly pursue external grants/contributions to support incentives and program costs.	Partner, Incentivize	Medium
	■ Collaborate with others to provide extensive training and development for heat pump system designers and installers.	Educate	Medium

Big Move 5 – Construct better buildings: zero and near-zero emission structures

Vision: New buildings in Squamish are energy efficient and use low carbon energy sources for space and water heating.

Considerations

While existing buildings generate the majority of building-related greenhouse gas emissions, local governments have greater authority to influence new construction. New buildings add emissions directly to the community's energy & emissions inventory; therefore, they should be built to be as low carbon as possible. Every inefficient new building is one more building that will have to be retrofitted down the road.

The BC Energy Step Code is a section of the BC Building Code that local governments may use to require or incentivize better-than-code energy performance in new construction. While the BC Energy Step Code is a great tool for improving overall building energy performance, it does not explicitly address emissions from new buildings. Local governments can address this shortcoming by implementing the regulation in tandem with incentives that target zero-emission heating and cooling systems (e.g. air source heat pumps).

Growth rates vary across the province. Some communities are growing as fast as 5%, adding hundreds of new buildings each year. Every new building built to minimum code standards is a lost opportunity for improved energy efficiency and reduced carbon emissions.

Energy performance should be quantified and verified, so homeowners and buyers have a better understanding on the long-term operations cost of the home. Energy efficient homes can be quiet, comfortable and durable. Energy costs can also be minimized through efficient design that reduces demand.

Where we are at (Today)

- The Province of British Columbia developed the BC Energy Step Code and made it available to local governments to use as a technical shared pathway to reaching its target of net-zero energy-ready new construction by 2032. The Energy Step Code Council, chaired by a representative from the Province's Building Safety and Standards Branch, developed the BC Energy Step Code and now oversees implementation. Its members include industry associations, local governments, utilities, and non-governmental organizations.
- The Province's CleanBC climate plan outlines the dates when the base *BC Building Code* will adopt BC Energy Step Code performance targets:
 - In 2022, all new buildings require 20% better energy performance than those built to meet today's minimum code requirements.
 - By 2027, all new buildings will be required to achieve 40% better energy performance.
 - By 2032, all new buildings will be required to achieve 80 percent better energy performance, complying with "net zero energy ready" performance.

- The province has introduced CleanBC [Better Homes](#), which links homeowners and residential builders to rebates and resources, and CleanBC [Better Buildings](#), which provides funding and capital incentives to encourage energy efficient design, construction and renovation. The Better Buildings program also included a juried competition and incentive program to boost industry capacity to build tall and complex high-performance buildings.
- Other relevant provincial legislation includes the [Greenhouse Gas Reduction \(Renewable & Low Carbon Fuel Requirements\) Act](#) and the [Renewable & Low Carbon Fuel Requirements Regulation](#), which aim to help:
 4. Reduce British Columbia's reliance on non-renewable fuels;
 5. Reduce the environmental impact of transportation fuels; and
 6. Contribute to a new low-carbon economy.
- The Province's CleanBC plan includes a target for renewable natural gas (RNG). It directs Fortis BC to source 15% of the gas in its distribution network from renewable sources by 2030.
- Federally, Natural Resources Canada's [Build Smart: Canada's Buildings Strategy](#) includes a target for more stringent building codes across the country starting in 2020, and establishes the goal that all provinces and territories will adopt a net-zero energy-ready model building code by 2030. In addition, the Federal Government has established a goal that all space-heating technologies for sale in Canada will meet an energy performance of more than 100% by 2035, with interim targets set for 2025 and 2050. The Government of Canada will continue to invest in research, development, demonstration, and cooperation with industry to help reduce technology costs over time.
- The District has implemented Step Code, a summary of its timing is available - (<https://squamish.ca/business-and-development/home-land-and-property-development/energy-step-code/>)

Projected Outcome (2030)

- Through implementation of the BC Energy Step Code (i.e., all new buildings will be 20% more efficient than the BC Building Code requirements, and in addition 75% adopt zero or low carbon heating systems) this Big Move will result in a reduction of 2,100 tonnes CO₂e compared to business as usual projections.



ENGAGEMENT INSIGHTS

The most helpful municipal actions to aid survey respondents' looking for a new building, commercial building or a home residence that is built to a higher energy efficiency standard with zero emission heating in the next 5 years, in order of popularity, are:

1. Lowering the initial investment required for a new energy efficient home (incentives, low cost financing etc.)
2. Education and training on how to find or to build a more efficient home with zero emission heating
3. Establish maximum floor areas for smaller single family/duplexes to require less energy and increase housing affordability.
4. Awareness, education and outreach on new home incentive programs for homeowners










ENGAGEMENT INSIGHTS

The most helpful municipal actions to aid survey respondents' constructing new buildings to build to a higher energy efficiency standard with zero emission heating in the next 5 years, in order of popularity, are:


1. Top up provincial incentives for efficient electric heating e.g. heat pumps to replace fossil heating systems in new buildings
2. Building permit rebates for achieving standards beyond the base efficiency standard
3. A system which provides additional density/development for zero emissions construction
4. Awareness, education and outreach on new home incentive programs for builders and homeowners

Big Move #5: Build better new buildings


STRATEGY: Enable and incentivize efficient new buildings

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low to medium Degree of impact: Medium Leverage: Low 	 Promote existing training and education programs to build industry capacity. Promote education for realtors on systems and selling high performance buildings.	Educate	Medium
	 Develop program roadmap for transition to the highest Step applicable for all buildings.	Direct	Short
	 Enforce requirements for mid-construction air tightness testing.	Direct	Short
	 Leverage BC Hydro or other funding to provide subsidies to builders that offset the additional cost of Energy Advisors and mechanical design for net zero construction. Improve promotion of available rebates.	Incentivize, Educate	Medium
	 Spatially track EnerGuide assessment results for all buildings. Work with Province to make information publicly accessible.	Educate, Partner	Medium
	 Initiate more rapid adoption of Step Code for larger homes.	Direct	Short
	 Utilize a density bonus system to incentivize net zero, higher step code, or more efficient construction in exchange for additional residential density or reduced parking standards.	Incentivize	Short


STRATEGY: Enable and incentivize low-carbon energy sources in new buildings

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low to Medium Degree of impact: Medium to High Leverage: Low 	 Incentivize low carbon energy sources or net zero construction through either a) a density bonus structure and/or reduced parking standards (preferred option if feasible), or b) allowing construction to a lower step code if a low carbon energy source is provided.	Incentivize	Short

STRATEGY: Low-carbon corporate buildings

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: Medium Leverage: High 	 Establish a corporate policy to include an evaluation of the opportunities to lower energy consumption and greenhouse gas emissions as far as practical within all major capital projects.	Educate, Direct	Short

STRATEGY: Encourage building materials that store carbon and/or have less embodied emissions

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: Medium Leverage: Low 	 Support or encourage wood-based building materials, or other materials that store carbon.	Incentivize	Medium

Big Move 6– Other organizational actions

Vision: Beyond the first five moves Squamish readies the organization, continues to learn, and lays foundations for deep reductions.

Considerations

These actions will help the District with implementing this Plan.

A Council-approved Climate Action Plan will have the authorization and approval to implement the actions outlined in order to achieve the District's climate change goals and targets. The Plan provides the rationale and motivation for the required resources to be allocated as part of the District's annual Business Plan and Budget.

The majority of actions outlined above will require staff time to implement. This time could be spent implementing the action, overseeing its implementation by a third party, or working in partnership with other organizations to complete the action. Each action will be assigned to a Department within the District that will be responsible for its implementation. Additional staff resources may be required for items that cannot be integrated into annual work plans.

Funding sources that communities typically use for climate action are shown in the table below.

Table 5 Potential funding sources for climate action.

Internal Funding Sources	External Funding Sources
<ol style="list-style-type: none"> 1. Forgone revenue (charge less for a municipal service to use the difference to fund a climate initiative) 2. General revenue (e.g. property taxes) 3. Utility fees and landfill revenue 4. Building permit fees and other service fees charged by Development Services 	<ol style="list-style-type: none"> 1. UBCM Gas Tax Agreement Funds 2. FCM's Green Municipal Fund supports plans, studies, capital projects and pilot projects for environmental initiatives in a number of focus areas 3. Federal government programs such as the Low Carbon Economy Challenge and Clean Energy Innovation Program 4. Provincial government programs such as the Clean Energy Vehicle Program, Active Transportation Infrastructure Program, and CleanBC Communities Fund 5. Emotive grants for EV educational events to foster greater EV adoption 6. FortisBC energy efficiency incentives for new home construction and FortisBC and CleanBC Better Homes incentives for increasing energy efficiency in existing buildings 7. BC Housing and FortisBC for education or demonstration projects to encourage the building industry to construct low energy and GHG emission homes.

Monitoring and evaluating the implementation of the Plan is critical for its success. The District of Squamish will report annually on progress. The annual report will:

- Provide a snapshot of progress on action pathways, with direct reference to the indicators mentioned in this section
- Share success stories
- Share areas for improvement or future work/study
- Report on progress towards the goals and targets

Key Performance Indicators (KPIs) enable communities to measure the outcomes of a plan's implementation. When KPIs are monitored regularly, communities can determine how to best allocate resources to support implementation, and what success different actions are having. Suggested indicators are provided in Appendix E. Two types of indicators are recommended: primary indicators measure community energy consumption and GHG emissions, while secondary indicators can quantify the indirect success of various actions.

Several key factors are important for the successful implementation of a Climate Action Plan based on research conducted by CEA, QUEST, and Smart Prosperity.⁵ Among others, they include establishing broad support for implementation, building staff and financial capacity for implementation, and institutionalizing the plan in order to withstand political and staff turnover. Many of the strategies and actions were created with these ideas in mind.

Where we are at (Today)

- The District has initiated natural asset inventory work and wildfire protection planning.
- The District of Squamish and the Squamish Nation is continuing establishment of a community forest, and has a governance structure for 10,000 hectares of forest land in the region.
- The Squamish Valley Agricultural Plan includes substantial climate considerations and will be completed in 2020.

Projected Outcome (2030)

Greenhouse gas emissions reductions have not been modelled for this Big Move.

A graphic titled "ENGAGEMENT INSIGHTS" with a light blue background. It features two speech bubble icons at the top left. The text below the title reads: "The most helpful engagement and communication categories for reaching out on climate action to friends and family included:" followed by a bulleted list of four categories: Speaker Series Events, Social Media, Outreach at community events, and Outreach to schools.

ENGAGEMENT INSIGHTS

The most helpful engagement and communication categories for reaching out on climate action to friends and family included:

- Speaker Series Events
- Social Media
- Outreach at community events
- Outreach to schools

⁵ Community Energy Implementation Framework, <https://questcanada.org/project/getting-to-implementation-in-canada/?dc=framework>

Big Move #6: Ready the organization

STRATEGY: Establish a financial commitment to climate action

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: High Degree of impact: High Leverage: Medium to High 	● Incorporate greenhouse gas emissions considerations into purchasing policies.	Direct	Short
	● Develop a corporate energy and emissions plan.	Direct	Short
	■ Establish a revolving energy efficiency fund where cost savings from energy efficiency upgrades are reinvested into further actions.	Direct, Incentivize	Medium
	◆ Commit to integrating climate action into financial planning and budget processes by including GHG reduction potential into decision-making framework for capital projects and strategic plans. (This may be accomplished by establishing an internal price on carbon to guide decisions.)	Direct	Medium

STRATEGY: Measure and report on progress

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: High Leverage: Medium 	● Maintain and update the Community Climate Action Plan every 3-5 years.	Direct	Short
	■ Track and report progress on Plan implementation, including annual updates on actions taken and progress towards meeting targets, including quantifiable metrics where possible. Ensure that updates are easily available to the public, and integrate with Official Community Plan performance indicators where possible.	Direct	Short

STRATEGY: Build organizational and community capacity



Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: High Leverage: Medium-High 	● Host (or facilitate) educational events and speaker series to promote a community of learning and action on climate change.	Educate	Short
	■ Ensure every department has a clear mandate to develop and implement policies and actions to achieve emissions reductions.	Educate, Direct	Short
	■ Reinvigorate internal climate change working group.	Partner	Medium
	◆ Embed ongoing climate action into other planning documents, bylaws and policies, departmental/master plans, and District staff job positions.	Direct	Medium

STRATEGY: Align business development activities to support climate actions



Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: High Leverage: Medium 	◆ Pursue climate action items (e.g. pilots, supporting infrastructure) through business development activities.	Direct	Medium
	◆ Support growth of local business, home-based workforce development and local startups with incubation, acceleration programming and shared resources.	Educate, Partner, Incentivize	Medium

Big Move #6: Ready the organization *(continued)*



STRATEGY: Collaborate with others to advance climate action

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Low Degree of impact: High Leverage: Medium to High 	 Collaborate with other local governments in the region on regional climate action plans.	Partner	Medium
	 Collaborate with Regional District, the Ministry of Agriculture and others to explore opportunities to increase our knowledge of agriculture-related emissions, and to lower emissions.	Partner	Medium

STRATEGY: Support Carbon Sequestration

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Low to High Leverage: Low 	 Encourage carbon capture and sequestration in local industry: support local industrial emitters of CO2 to capture and store CO2, and encourage the development of infrastructure to transport CO2 from emitter site to sequestration site.	Partner, Incentivize	Long
	 Investigate/Collaborate on carbon dioxide removal. Potential projects include: <ul style="list-style-type: none"> Work with land owners / managers to sequester carbon, as part of the community forest (Active Management Approaches) or agricultural sector. Consider ways to sequester carbon in nearby aquatic environments (e.g. kelp forests, estuaries). Evaluate more technical negative emission technologies such as Bioenergy with Carbon Capture and Storage or Direct Air Capture and Storage. 	Partner	Long

STRATEGY: Prepare for and support a greater demand for low-carbon electricity

Assessment of strategy	Actions, and level of difficulty (green/blue/black)	Type	Timeline
<ul style="list-style-type: none"> Financial cost: Medium Degree of impact: Low Leverage: Unknown, but potentially high 	 Work with partners to explore the generation of more low-carbon energy in Squamish. Potential opportunities include: private residential generation, district energy systems and incenting local projects.	Partner	Medium
	 Work with BC Hydro to assess the capacity to support electrification, and to increase capacity where needed.	Partner	Long

Projected Impact of Climate Action

In order to align with targets congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the District of Squamish must reduce its greenhouse gas emissions from 93,600 tonnes CO₂e (2030 business as usual projection) to 49,100 tonnes CO₂e (2030 target). This equates to a total of 44,500 tonnes CO₂e emissions reductions.

Figure 10 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top three Strategies by impact will be:

- Improved landfill gas collection efficiency
- Decarbonize passenger vehicles
- Divert organic waste

Each of these actions are projected to achieve over 8,000 tonnes of greenhouse gas emission reductions per year, while the others achieve reductions of 2,000 tonnes or less.

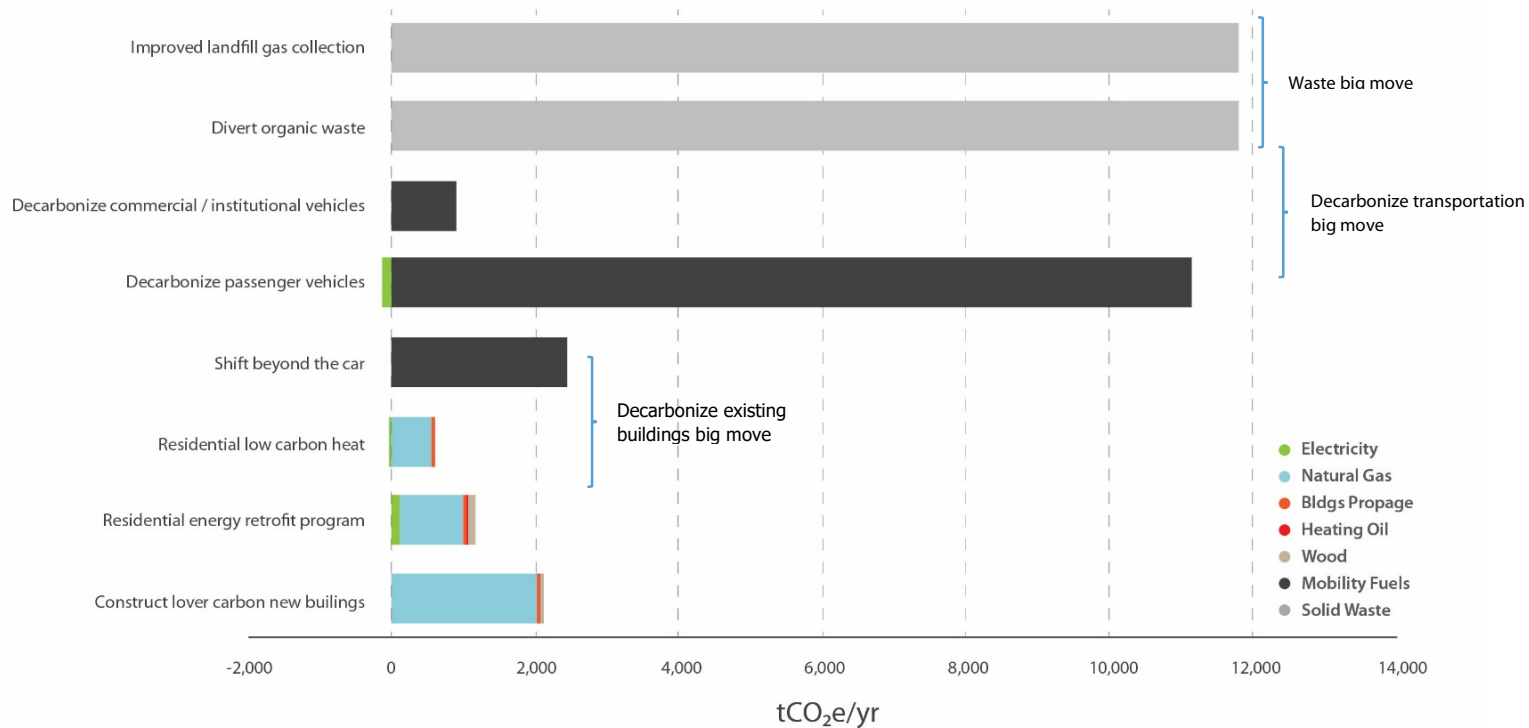


Figure 10 Estimated greenhouse gas emissions reduction impact of each Big Move.

Figure 11 shows the estimated emissions reductions through to 2050. Our modelling indicates that the District will achieve 38% reductions below 2010 levels by 2030 to 55,300 tonnes CO₂e, 7% short of the 1.5°C target of a 45% reduction. This means the District will reduce emissions by 38,300 tonnes CO₂e, and have a shortfall of approximately 6,200 tonnes CO₂e of greenhouse gas emissions to meeting the 2030 1.5°C target.

Note that the greenhouse gas emission reduction impact of the District’s efforts to decarbonize passenger vehicles are expected to start tapering off towards 2050. This is because under the business as usual scenario, due to the Province’s Zero Emissions Vehicle mandate (2040 = 100%), the proportion of EVs would have started increasing anyway, albeit less rapidly.

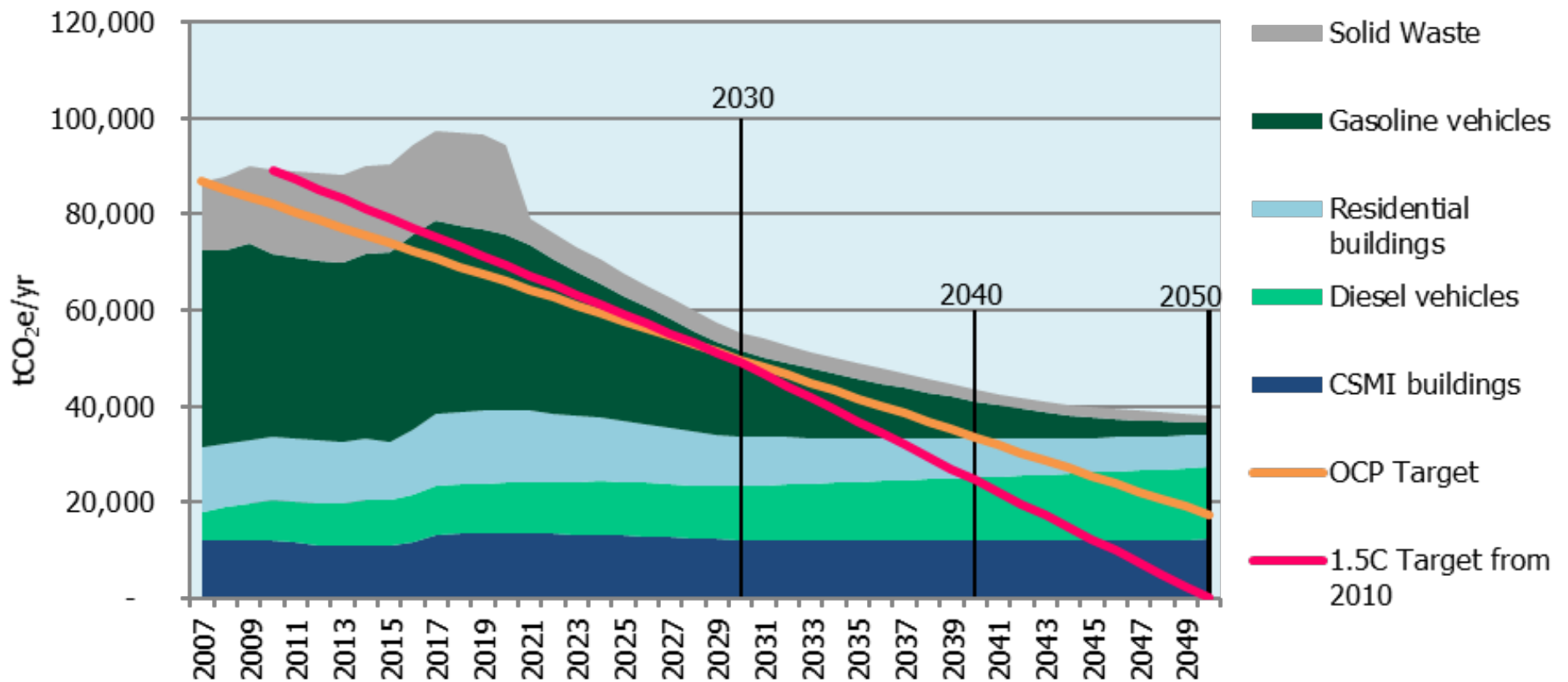


Figure 11 Projected greenhouse gas emissions reductions by sector if Community Climate Action Plan is implemented.

Figure 12 shows the emissions reductions from eight Strategy focus areas, compared to business as usual projections. The remaining emissions and OCP and 1.5°C target trajectories are also shown.

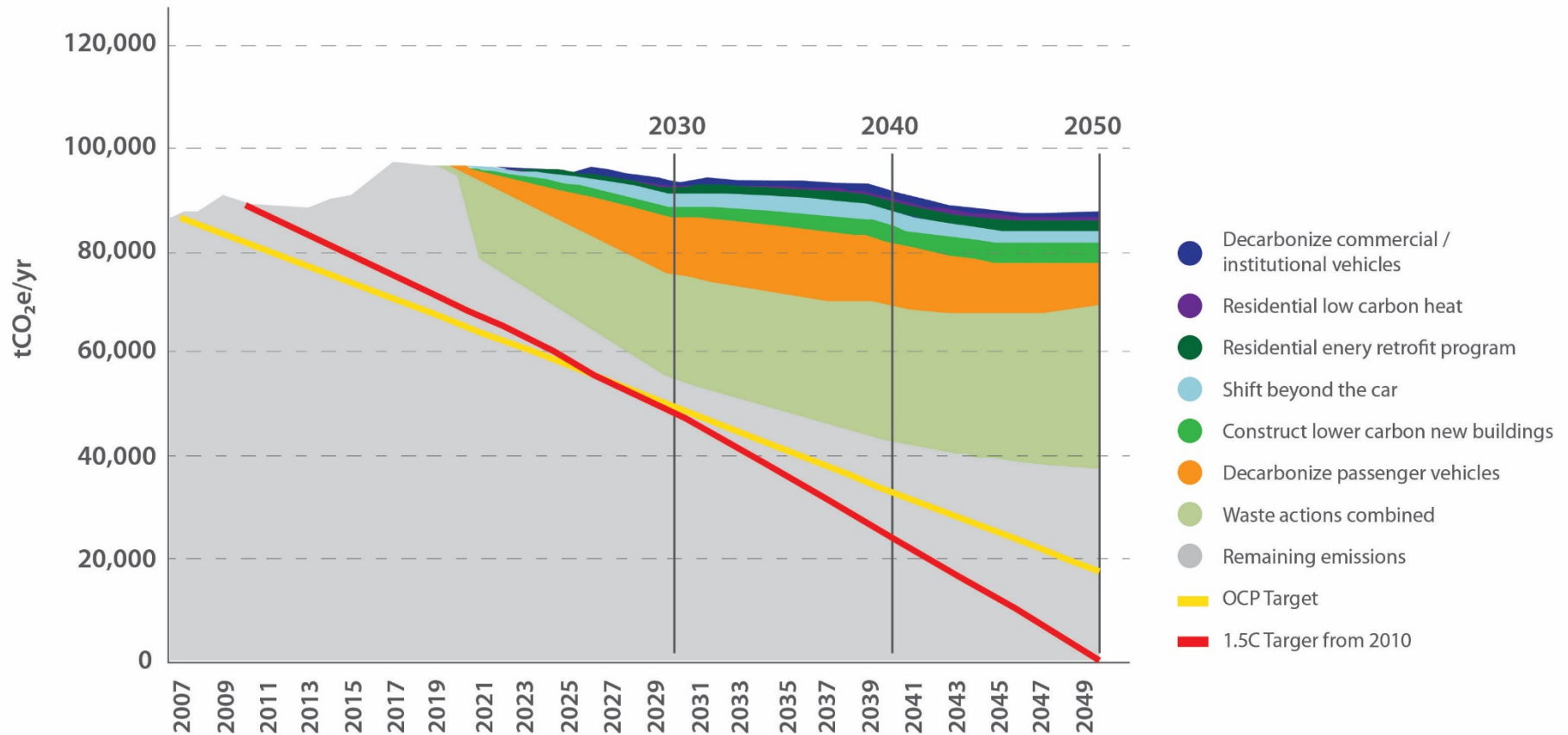


Figure 12. Emissions reduction by Strategy from business as usual projections.

In addition to reducing greenhouse gas emissions, implementing the Climate Action Plan will also reduce energy expenditures in the community. In 2017, energy expenditures were approximately \$50 million, and including assumptions about energy prices in our model, energy expenditures by residents and businesses within the District of Squamish are projected to be approximately \$68 million by 2030 in the business as usual scenario. Implementing this Climate Action Plan could potentially result in energy expenditures of \$58 million by 2030, realizing cost savings of approximately \$10 million per year, or about \$440 per person.

What do These Reductions Mean for the Individual Big Move Targets?

The anticipated reductions associated with each Big Move are expressed in plain language in the following table.

How each Big Move will contribute was estimated a number of ways. For waste, shifting beyond the car, and energy efficiency in new buildings, they were estimated through considering the District’s plans in those areas, as those current plans are already sufficient. For decarbonizing transportation and conventional retrofits on existing buildings, it was through considering what may be possible based on experiences in other jurisdictions. Finally, for low carbon heating systems in existing / new buildings, the targets are a stretch but not beyond what may be feasible.

Table 6 Big Move reductions in plain Language, and contribution to 2030 target.

Big Move	What each big move should achieve by 2030	Is Squamish hitting the 2030 target?
<p>Close the Loop on Waste: Divert organics, Capture landfill gas, reduce waste</p>	<ul style="list-style-type: none"> Through successful implementation of a landfill gas collection/flaring system, and continuing to increase organics diversion, the community’s 2030 emissions related to this Big Move will be 20,000 tonnes CO₂e less than business as usual projections. This equates to collecting and flaring about 75% of the landfill gas and diverting about 50% (120 kg) of the organic solid waste generated per person that is currently sent to landfill. 	<ul style="list-style-type: none"> This Big Move should achieve what is necessary for the 2030 target.
<p>Shift Beyond the Car: Active Transportation and Transit</p>	<ul style="list-style-type: none"> Through about a 15% decrease in the total number of single occupant trips by person (replacing with cycling, transit, walking), the community’s 2030 emissions related to this Big Move will be 2,500 tonnes CO₂e less than compared to business as usual projections. 	<ul style="list-style-type: none"> This action should achieve what is necessary for the 2030 target, but will only provide a relatively small part of the emission reductions necessary for transportation.
<p>Decarbonize Transportation: Zero or low carbon passenger, Medium- and heavy-duty vehicles</p>	<ul style="list-style-type: none"> Through a combination of decarbonizing passenger and commercial/institutional vehicles/fleets the community’s 2030 emissions related to this Big Move will be 12,000 tonnes CO₂e less than business as usual projections. In Squamish in 2030, almost 50% of passenger vehicles will be electric or similarly zero carbon (e.g. alternative fuels such as hydrogen or biofuels). Further, the District will have used its position of leadership and influence to encourage 10% of commercial and institutional fleets to be low or zero carbon (fleets over which the District may have influence or that may be interested include the District fleet, solid waste services, B.C. Transit, School District, and Squamish Terminals). 	<ul style="list-style-type: none"> On passenger vehicles, this big move may achieve what is necessary for the 2030 target. For commercial vehicles, 25% would be necessary, so this action will fall short in this regard.

<p>Decarbonize Existing Buildings: Retrofits & Upgrades</p>	<ul style="list-style-type: none"> Through a combination of 2,700 or 40% of private residences completing energy retrofits (e.g. insulation, heat recovery, air tightness, windows and doors), and 390 or 6% of residences installing a zero-carbon energy system (e.g. electric air source heat pumps) the community’s 2030 emissions related to this Big Move will be 1,700 tonnes CO₂e less than business as usual projections. <ul style="list-style-type: none"> This assumes that natural gas will be 15% renewable by 2030, as per the CleanBC plan. (Note that there is a high degree of regulatory uncertainty over this, and if it is not realised as currently expected, there will need to be 15% more retrofits and upgrades.) There are 6,756 private residences in Squamish (2016 Census), 1,245 are strata residences (18%). 	<ul style="list-style-type: none"> For residential buildings this action will fall short. Even with 40% of dwellings having conventional energy retrofits, almost 20% would need to shift to low carbon energy systems. (This combination is equivalent to 30% of dwellings shifting purely to low carbon energy systems. Note that if renewable natural gas does not manifest as currently expected, then these estimates will be 15% greater.) For commercial / small-medium industrial buildings, this action is currently assumed to make no progress. To achieve the target, 30% of these should be heated with a low carbon energy system (or a lower percentage and a higher percentage of retrofits).
<p>Construct Better Buildings: Zero and near zero-emission structures</p>	<ul style="list-style-type: none"> The District is currently committed to implementing Step Code as described on our website. In order to contribute to our 2030 Climate Action Plan targets, our target for new buildings is to, as far as possible, always be one Step ahead of the base building code when they are built, and for 75% of all new buildings to be built with zero or low carbon heating systems. Through a combination of these factors, the community’s 2030 emissions related to this Big Move will be 2,100 tonnes CO₂e less than business as usual projections. 	<ul style="list-style-type: none"> This action will fall short. All new buildings would need to be built with low / zero carbon energy systems.

What Makes up the Remaining Emissions?

The shortfall of 6,200 tonnes CO₂e of greenhouse gas emissions represents the emissions that are hardest to reduce. The hardest sectors to address are commercial / industrial building retrofits, commercial vehicles (medium and heavy duty), and to a lesser extent, residential retrofits. The gap largely exists because the District lacks the levers and authority to deal with these sectors. In future iterations of the plan, the District will need to identify further actions to reduce the greenhouse gas emissions associated with these emission sources.

How do we address the remaining 'piece of the pie'?

The following figure shows the reductions that are needed in the left-hand pie-chart, to hit the 2030 target. This is comprised of reductions through the Plan and then options to fill the gap. The reductions through the plan are realised through reducing emissions associated with (in order of magnitude) waste, low carbon vehicles, shifting beyond the car, new buildings, and existing buildings.

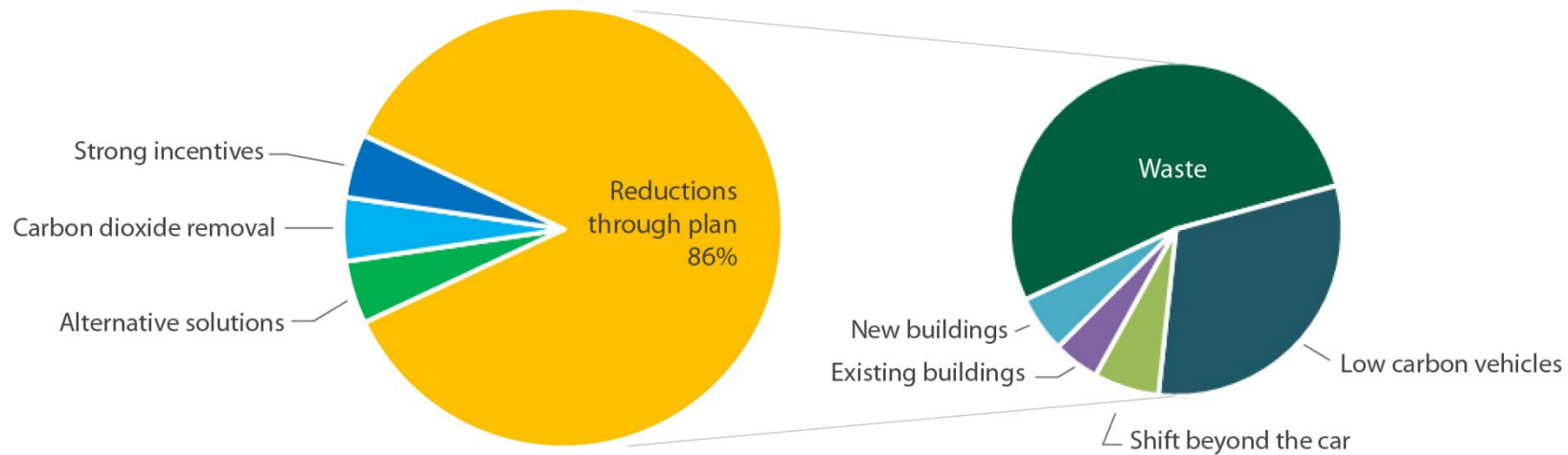


Figure 13. Summary of District of Squamish greenhouse gas emission reductions and remaining emissions.

If no additional authority is given to BC municipalities, and if the Provincial and Federal governments do not address these areas, then there are a number of options that the District can take to fill the gap. These options may change over time, but are currently as follows:

- 1) Provide significant financial incentives to remove the cost barrier to deep greenhouse gas emission reductions. This may mean \$40,000 - \$60,000 + per existing home for deep energy retrofits (including decarbonisation of the heating source), or millions in incentives for commercial sector transportation options, for example.
- 2) Use carbon dioxide removal techniques to remove and safely store remaining carbon dioxide.
- 3) Consider alternative solutions to reducing the remaining emissions. Offsetting emissions would be a last resort. For the 2020 – 2030 Climate Action Plan, funds are better spent on longer-term emission reduction opportunities like infrastructure that will enable more emission reductions in the future.

Carbon offsets are not a preferred route forward. If carbon offsets are pursued then it should take place at a local or regional level, so that the revenues (and co-benefits) remain within the community.

Hitting Our Emissions Targets: this is NOT a plan to fail.

Although we have not yet identified significant Actions to meet our emissions reductions targets, this is NOT a Plan to fail. This is a Plan that acknowledges that we are going to have to capitalize on opportunities, adopt new technologies, work with other organizations to break down barriers and to push ourselves to learn more and to do more. The District of Squamish is committed to achieving its targets: the current shortfall is simply an acknowledgement that:

- a. These are ambitious targets.
- b. Tools, technologies and opportunities will change over time, and Squamish needs to take advantage of new opportunities.
- c. We must carefully measure our progress and be adaptive and iterative. This plan is evergreen and can and will change.

This is also not a Plan to address the 2050 targets. We have focused toward the 2030 targets for now, recognizing that we need to be thinking toward the 2050 targets. The reason that we took this approach is because we simply do not know what the technological, cultural or legislative landscape will be like in 20-30 years. We must further develop this Plan and extend out horizons as we move closer to 2030.

It is also important to continue to consider scope 3 emissions, industry emissions, woodwaste emissions and other sources not currently addressed in this Plan. In future iterations, the scope of the Community Climate Action Plan could be updated to include more emissions sources, while ensuring that certain emissions are not counted in multiple inventories. (It is important that the same emissions, or emissions reductions, are not accounted for in more than one place or plan.) The District of Squamish could technically succeed in reducing emissions included in this Plan in line with targets, but still may not have adequately contributed to achieving the IPCC 1.5°C targets due to emissions that have been considered out of scope.

Next Steps

Following the completion of the Climate Action Plan, the District is planning to:

- Develop and implement a strategy to engage the community on the Climate Action Plan and targets
- Develop a 5-year financial plan and work plan to implement the Climate Action Plan
- Ensure that municipal budgets and 5-year financial plans reflect the urgency of climate change and prioritize taking action locally.
- Prioritize implementation of the Economic Development Sector strategy through a lens of climate emergency, sustainability and equitable opportunity.

In addition, Community Energy Association and Whistler Centre for Sustainability recommend that the District of Squamish use this report to progress through the Federation of Canadian Municipalities Partners for Climate Protection Program. The Partners for Climate Protection is a network of Canadian municipal governments that have committed to reducing greenhouse gases and to acting on climate change. Since the program's inception in 1994, over 350 municipalities have joined the Partners for Climate Protection Program, making a public commitment to reduce greenhouse gas emissions. Program Membership covers all provinces and territories and accounts for more than 65% of the Canadian population. The District joined the program in 2007, but has not applied for recognition of any milestones.

Summary/Conclusion

Climate change is one of the most important global and local issues today. Municipalities like the District of Squamish can be critical leaders to alter the trajectory of climate change by incentivizing and directing emissions reductions in transportation, buildings and waste within our community.

The District of Squamish has already made important progress in policies and actions that address climate change through early adoption of BC Energy Step Code for buildings and implementation of a landfill gas capture system. This Plan defines additional actions and policies that the District can take to provide opportunities for the community to reduce greenhouse gas emissions.

This Community Climate Action Plan creates a long-term roadmap to show the District of Squamish how emissions targets can be achieved. In addition to the challenge of meeting our greenhouse gas reduction goals, the Plan models a path for a liveable, resilient, connected, engaged and healthy community in alignment with our Official Community Plan – Squamish2040.

There is a compelling case for mitigating climate change. Implementing the actions in the Plan will reduce emissions through encouraging energy conservation and efficiency, by providing opportunities to shift transportation modes, and by densifying growth. Implementing these and other actions puts Squamish on the path to reduce emissions 45% by 2030 and achieve net zero emissions by 2050. Achieving these targets requires leadership by the District and commitment from the businesses and residents within our community. Climate change affects everyone and we must all do our part.

In moving toward long-term implementation of the Plan, accountability and transparency is important. The progress or shortfalls related to the District of Squamish's greenhouse gas reductions will be communicated in the annual Greenhouse Gas Inventory Report. If we are not on track to reach emission targets, District staff will report any shortfalls to Council with a detailed summary of opportunities to reduce these emissions as well as the associate economic and social implications. Over the long-term, Plan update reports are anticipated to be provided every year which will help us track our progress towards achieving interim targets and actions. A full update of the Climate Action Plan is expected in 3-5 years, along with a revisit regarding the scope of emissions included the Plan.

Appendix A – District of Squamish History of Climate Action

The following summary of the District of Squamish’s past climate action is assembled from a review of previous annual CARIP reports. (Note that many of these actions are also listed in the ‘where we are at’ sections of each of the Big Moves.)

Community

Broad Planning

- Squamish 2040 OCP adopted in 2018, greenhouse gas targets reaffirmed
- Smart Growth policies refined for climate change mitigation
- Creation of new Development Permit Area 3 (Universal Guidelines) for promotion of greenhouse gas reduction and design for improved energy efficiency
- Completion of Phase 2 and 3 of Community Carbon Marketplace, assisting local businesses to reduce greenhouse gas’, offsetting District’s credits, and encouraging other businesses to become Carbon Neutral
- Adoption of Zoning Bylaw amendment to facilitate the (re)development of the Squamish oceanfront peninsula, focusing on Smart growth principles for high density and mixed use
- Improved development services business process to reduce trips made by community members

Building and Lighting

- Step Code voluntarily adopted in 2018
- Amended Zoning Bylaw to encourage Green building actions, incentivize and mandate energy efficiency practices in the design, construction, retrofitting and renovation of buildings (e.g. density bonuses for energy efficient construction of multi-family and commercial development)
- Amended Fees and Charges Bylaw to eliminate building permit fees for secondary suites, for limited densification of single-unit neighbourhoods
- Became Canada’s 5th Solar City in 2015
- Solar panels built into the design of the new Legacy Project Canoe Restoration Shed, as part of the Squamish Legacy Project

Energy Generation

- Feasibility of Mashiter Creek Run of the River Project was assessed in 2016 and determined to not be a viable option
- Supported co-compliant energy generating initiative through building permitting process and new development procedure bylaw to expedite permits that support solar energy devices, biomass boilers etc. in 2013

Greenspace/Natural Protection

- “River Estuary Education Program, Wild for Salmon” delivered annually by the Squamish River Watershed Society
- Squamish Climate Action Network (CAN) has continued success with community participation, operating three community gardens
- SHIM (Sensitive Habitat Inventory and Mapping) completed
- Acquired and improved waterfront municipal park in 2014 with water access, trail, seating/viewing areas, installation of art exhibit
- Walk 4 Wildlife nature walks for wildlife education campaign included with Pitch-in Week
- Finalized new landscape security policy for development permits in 2013
- Zoning Bylaw amendments to relax requirements for rural or urban agriculture, to encourage local food production
- Adoption of Tree Management Bylaw, and ongoing development of soils and invasive species bylaws
- Removal of invasive species on municipal lands
- Rezoned lands within District’s boundary as a wellhead protection zone for long-term protection of community water system
- Acquired 1.24 ha of Riparian and 10.2 ha of Dedicated Park land
- Examined riparian and wetland areas identified in closer detail and mapped

Solid Waste

- Annual running of Reuse it Fair and Repair Café to minimize disposal of items
- Partner with Squamish CAN to host annual Zero Waste Workshop Series
- Zero Waste Strategy developed in 2016. Identifies 4 key priorities: implement an organics disposal ban; ensure recycling and organics diversion programs and services are available and convenient for everyone at home, at work and on the go; institute construction and demolition waste diversion guidelines; and promote waste minimization.
- Sewer use bylaw updated in 2016, restricting use of food waste disposers and thus potable water consumption and energy use
- Segregated waste stations purchased for community events, along with 2 community composters
- Curbside organics program approved in 2014
 - o Collected nearly 1,000 metric tonnes in 9 months from single-family dwellings in 2015
- Zero Waste Action Team developed in 2013
- Solid Waste Bylaw revised requiring source-separation by businesses, institutions, commercial and multi-family homes and events, to increase waste diversion within the community
- Hired temporary employee to focus on outreach and enforcement support the community with the transition to new source-separation requirements in the Solid Waste Utility Bylaw.
- Banned the future use of District land as a wood waste landfill.

Transportation

- Alternative transportation policies refined for climate change mitigation
 - o Emphasis placed on active transportation and public transit
- Signed partnership agreement with Modo to bring 2 carshare vehicles to Squamish
- Hire consultant/organization annually to help with Bike to Work week events and promotions
- Transit expansions annually since 2017
- Active Transportation Plan completed in 2016
- Ongoing additions and improvements to sidewalks
- Constructed 800m bike lane to connect two neighbourhoods with main off-road bike trail. Included new painted bike lanes during capital projects.
- Constructed "Discovery Trail Bridge" using locally-milled wood from 2014 capital projects
- Expanded bike network through the addition of more east/west bike lane connectors
- Installed 50 torch on bike lane decals on new road side bike lanes
- Six schools participated in HASTe (Hub for Active School Travel) BC Safe Routes for School, as part of District's School Travel Planning Program (2015-2018), with potential pedestrian and cycling safety infrastructure improvements identified
- Sea to Sky Transit Future Plan developed in partnership with BC Transit
- Added "transportation hub" as a use on development parcel zoning.
- Continue to negotiate for upgraded pedestrian and cycling infrastructure through development amenity contributions.
- New development procedure bylaw adopted 2013 to expedite permits supporting active transportation improvements and EV charging stations
- Two rideshare parking lots connected to bike network to support multi-modal transportation in 2013
- Continue to implement Active Transportation Plan
- Design projects initiated for 2 downtown bike routes (2019)
- Completed Truck Route Study to review efficiency and movement
- District working with SLRD, Province, BC Transit, and First Nations on regional transit system

Water/Wastewater

- Continued development of water conservation and wastewater source control programs
- Public outreach actions undertaken through door-to-door campaigning and an educational booth at the farmer's market and community events
- Distributed rain barrels to community to encourage water conservation
- Water meters installed on multi-family residential, commercial, industrial, and institutional facilities in 2016 after completing water metering strategy study in 2014
- Water regulations improved to enforce land owners to correct cross connections
- Water Master Plan adopted in 2015 to reduce per capita water consumption 15% by 2031. Will include:
 - o Water loss management plan
 - o Outdoor water use bylaw enforcement
 - o Customer water audits

- Building bylaw amendments for low flow fixtures and xeriscaping, education campaigns

Adaptation

- Completed climate change adaptation strategy in 2016
- Completed Community Wildfire Protection Plan (CWPP) through a \$25,000 grant from the UBCM Strategic Wildfire Prevention Initiative – first step in the wildfire mitigation process for Squamish, consists of a comprehensive risk assessment and 48 recommendations for reducing community risk profile
- Continued river dike upgrades
- Adopted Integrated Flood Hazard Management Plan and Flood Plain bylaw
- Development of SquamishAlert emergency alert system finished
- Integrated Flood Hazard Management Plan approved in 2016
- Zoning Bylaw amendments in 2015 included adjustment of building height restrictions to recognize Flood Construction Level challenges
- Completed inventory and condition assessment of drainage infrastructure, as well as inflow and infiltration study for West Brackendale sewer in 2014
- Completed detailed storm water study of downtown in order to optimize tidal inflow to Bridge Pond estuary area

Other

- First phase of Mamquam Edible School Yard Project (MESY) completed, including 30 raised beds and a “Bee to Seed” pollination and seed/saving program
- Sponsor community for the UBC School of Landscape Architecture graduate students’ projects focusing on design solutions for greenway connectivity, storm water management, brownfield reclamation, densification and waste management solutions

Corporate

Building and Lighting

- Lighting upgrades to streetlights (150), wall-pack HIDs (20), t-8 troffer fixtures (16) to LEDs
- Upgrades to:
 - RCMP HVAC system (2 inefficient gas boilers) and well pumps for geothermal system
 - 25 yr. old Brennan Park Rec. Centre HVAC unit
 - 20 yr. old Operations Works Yard gas furnace w/ electric heaters
 - UV light disinfectant system at Brennan Park Aquatic Centre pools
 - Upgraded digital controls for ice arena dehumidifier to be on demand
 - Replaced 30-year-old gas furnace for arena dressing rooms with on-demand electric heater
 - Cold water system replaced hot water boiler for ice re-surfacing
 - Fire Hall hot water tank (switched from gas to electric)
- District created a priority projects policy expediting specific projects, one criteria being for Step 4+ buildings
- Engaged staff in the Kilowatt Crackdown, an inter-building energy reduction challenge

- Solar-powered pedestrian beacon lights installed near local elementary schools, solar zinc fuel cell-powered lights installed on Brennan Park pedestrian bridge
- Installation of LED lights and timer system along the Corridor Trail

Solid Waste

- Corporate Zero Waste Strategy in development
- Enhanced waste diversion program at municipal hall implemented in 2013 to facilitate composting and paper towel recycling

Transportation

- 3 e-bikes purchased for District staff

Water/Wastewater

- Development and construction zones transitioned to non-potable water only for dust suppression
- Installed UV light disinfectant system at Brennan Park Aquatic Centre pools, saves 450,000 L/yr of water, 1,500 L/yr of chlorine, and 7 tonnes CO₂/yr
- Installed low flow toilets in District facilities
- Blower energy audit completed for WWTP in 2018, new automation system in 2017
- Sewer rehabilitation completed to reduce leakage/water loss
- Variable frequency drives added to sanitary pump stations
- 2 sanitary lift stations replaced with gravity sewers which require no maintenance or energy
- Upgrades to water main infrastructure and sewer inflow/infiltration reduction
- Completed Squamish River Pressure Zone Management Study investigating the ability to reduce pressure in Squamish's largest pressure zone
- Liquid Waste Management Plan adopted in 2015 including several emission-reducing initiatives
- Repaired Brackendale sewer system and replaced 1km of water mains and 2 pressure-release value (PRV) stations in 2014
- Developed water flow data to be presented to public through media
- Well Protection Plan implemented in 2014, included expansion of Watershed Reserve Area

Appendix B – Inventory & Modelling Methodology

This appendix describes the methodology used for the District of Squamish’s Community Energy and Emissions inventories for 2007 to 2018, business as usual projections, and modelling.

This work is part of the District’s community climate action plan work, to help the community with its recent commitment to meet community GREENHOUSE GAS reduction targets congruent with the Intergovernmental Panel on Climate Change recent 1.5°C report.

Inventories

Squamish’s inventories were created using data for electricity, natural gas, waste, and commercial vehicles obtained from the Province of BC, and data on gasoline and diesel sales from gas stations obtained from Kent Group. Based on the data compiled, full inventory years are: 2007, 2010, 2012, 2014, 2015, 2016, and 2017. Partial inventory information was also obtained for 2013 (only heating oil, propane and wood are missing from this year). Gasoline and diesel data is incorporated for all years from 2007-2018.

Emissions factors for inventory years are shown in the following table, and are sourced from the Province of BC.

Table 7 Emissions factors used for inventory years.

GHG/GJ, by Year	2007	2010	2012	2013	2014	2015	2016	2017	2018
Gasoline	0.067	0.067	0.066	0.066	0.066	0.066	0.066	0.066	0.066
Diesel	0.071	0.070	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Mobility fuels	0.067	0.067	0.066	0.067	0.067	0.067	0.066	0.067	0.067
Electricity	0.007	0.007	0.004	0.004	0.003	0.003	0.003	0.003	0.003
Natural gas	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050

Some of the emission factors have changed over time. The emission factors for mobility fuels have decreased as a result of the Renewable and Low Carbon Fuel Requirements Regulation. The emissions factor for electricity has decreased as a result of ongoing efforts to decarbonise the BC Hydro electricity grid.

The buildings and waste data sources have been the Province of BC’s Community Energy & Emissions Inventory (CEEI) data up to 2012,⁶ and utilities and landfill waste data at the utility level for data post-2012.⁷ Note that updated solid waste data from the District was sent to the Province so that they could recalculate landfill emissions data.

⁶ <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei>

⁷ <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory>

Assumptions made with respect to the inventories are as follows:

- The Province of BC made a series of standard assumptions in the creation of the CEEI data, which are outlined on the CEEI webpage: <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei>. The CEEI inventory years are 2007, 2010, and 2012.
- The Province of BC made other assumptions for the other buildings and landfill waste emissions information after 2012, which are outlined in the community level spreadsheets on the Provincial Inventory webpage: <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory>
- In creating the inventories, CEA had to make additional assumptions with respect to transportation fuels. For all years of fuel data (2007-2018), Kent Group data was used as described below. This is because the only years that the Province provided transportation data for Squamish was 2007 & 2010. Note that the Province has since stopped making this older data available because of concerns over the methodology, although CEA has retained copies of this information.

Fuel data was derived through Kent Group fuel sales data for all of Metro Vancouver for 2007-2018, and for Squamish and Whistler, then prorated based on the ratio of registered vehicles in Squamish vs. all of these communities. This ratio was derived from ICBC Quick Statistics data on vehicle insurance policies in force. Note that for the 2018 year, no ICBC data was available, therefore 2017 data was used. No ICBC data was available prior to 2013, so the 2013 ratio of registered vehicles was backdated for all years back to 2007. This method was chosen since the percentage ratio remained relatively consistent over the sample period, at around 0.85-0.87%. The prorating methodology was chosen over examining gas stations within District of Squamish boundaries only because data was only available for a limited number of gas stations in the District. These gas stations are not a fair representation of fuel consumption by vehicles within Squamish because there is considerable through traffic, and because many Squamish residents (particularly commuters) may not refuel within Squamish District boundaries.

In addition to some methodological challenges to using fuel sales data⁸, a major drawback is fuel sales through card lock stations are not included with the data. Therefore, following direction from District of Squamish staff and members of the Climate Leadership Team, commercial vehicle data was estimated and included based on a previous release of the CEEI data.

Emissions from Land Use, Land Use Change, and Forestry are not included due to uncertainty. Based on the CEEI data release, they are only available for the District of Squamish for 2012. In that year they were estimated to account for 2,600 tonnes of CO₂e as a result of deforestation for the following reasons: “mining” (1,275), “municipal” (763), “industrial” (530), and “recreation” (72). 2012 emissions are estimated at 90,000, so these deforestation emissions would be about 3% of this.

⁸ The fuel sales approach to estimating transportation energy consumption and emissions is different to the one that the Province has taken with CEEI before. It will include tourism and through-traffic, while the Province’s approach would have only included vehicles registered in the community. For a discussion on the pros and cons of the different approaches see ‘Assessing vehicular greenhouse gas emissions, a comparison of theoretical measures and technical approaches’ by Pacific Analytics. <https://www2.gov.bc.ca/assets/gov/environment/climate-change/z-orphaned/ceei/ceei-comparison-study.pdf>

Emissions from woodwaste landfills are not included, because there is so much uncertainty surrounding them. Regarding this:

- A contact at the Province of BC has stated that:
 - The Province has no greenhouse gas information for Squamish’s wood waste landfills.
 - The Province knows what it needs to do to start creating proper bottom up greenhouse gas estimates for wood waste landfills in BC.
 - Once it starts calculating these, it should be able to create data going all the way back to baseline years of 2007.
 - Lack of time has meant that they have not been able to move forward. Their waste model will not be able to deal well with wood waste only feedstocks, and so a new model would need to be created.
 - Currently, wood waste emissions come from the National Inventory Report (NIR), which are believed to be very gross and aggregated (based on 1990, 1998 and 2004 national wood residue data from NRCAN publications, which then are extrapolated).
 - The Province currently only has a ballpark figure for the whole of BC, and nothing more disaggregated. **For 2016, the wood waste emissions were estimated to be approximately 58% of the total solid waste disposal emissions** (estimated to be 1.98 Mt from a total 3.4Mt).
 - A contract that the Province of BC commissioned in 2018 stated that, with respect to available information:
 - Wood waste landfill operations are not required to fulfill the same levels of environmental reporting as municipal solid waste (MSW) landfills.
 - Most wood waste landfills will not be registered under the *Code of Practice for Landfills Incidental to the Wood Processing Industry*, because the Code only applies to new landfills or those seeking significant amendments to their operating permits, and the practice of landfilling wood waste is on the decline.
 - In 2010, a company prepared a screening level of wood waste landfills in BC based on research including interviews and historical literature. **379 wood waste landfills were identified**, of which 268 had current Permit of Refuse numbers or an application for a refuse disposal number. The remaining 111 had no available permit information. Data gaps included: site location, years of operation, and volume of waste contained. More information was missing from older landfills. At the time of this 2010 inventory, over 84% of wood waste landfills in BC were either closed or had unknown status.
 - Another 2010 report estimated maximum allowable wood waste landfilling rates, years of operation, and maximum allowable wood waste volume where information was readily available. For the 16% of active landfills, 77% (or 48) of these had annual volume of waste landfilled recorded.
 - 58% of the total number of identified landfills had records of volume landfilled, but some of this data required further verification as *“as the rate units are inconsistent or not recorded”*.
 - Approximately 63% of landfills had maximum allowable volume information available. However, these figures will not necessarily reflect the actual volume of wood waste landfilled.
 - And: *“A large data gap exists in determining the fate of wood waste residue and the actual volumes of wood waste in privately owned forestry landfills and the rate of landfilling into these landfills.”*

- Research from the National Inventory Report (NIR – 1990-2017) shows that:
 - From Part 1 (page 196):
 - **The uncertainty range for wood waste landfills is -60% to +190%** (this is for Canada as a whole). This is a high range.
 - *“The uncertainty estimate for wood waste landfills was largely influenced by the CH₄ generation rate, carbon content of the waste landfilled, and biodegradable fraction of the waste.”*
 - From Part 2 (page 182):
 - BC sends far more wood waste to landfill than any other Province (230,00 tonnes in BC in 2017, versus 120,000 for the rest of Canada combined, i.e. BC contributes 65% of the total.
 - From Part 3 (page 53):
 - In 2017, solid waste emissions (including wood waste landfills) for BC as a whole were 3.5 MtCO₂e.
 - Emissions from solid waste comprise about 5.6% of the Province’s emissions of 62.1 MtCO₂e. Although note that only about half of the Province’s total emissions fall under municipal control, and would be covered in community energy and emissions inventories.
- The District of Squamish provided a 2017 report by Tetra Tech, *Wood and Organic Waste Study (2017)*. This study could only estimate the wood waste being privately landfilled to within a factor of 3, as 5,000-15,000 tonnes of log sort residuals, with no sense of how much is currently in the landfill. This information was provided to the Province of BC, who stated that more information would be needed to calculate emissions, e.g. volumes of waste in the landfill.
- In summary, very approximately, Squamish’s woodwaste landfill greenhouse gas’ could be estimated to be currently 58% of its MSW emissions with an uncertainty range of -60% to +190%. But even this broad range must be treated with great caution and scepticism, because there is no consideration within it of the local situation for Squamish, and it assumes that the proportion of emissions from MSW versus woodwaste are the same in Squamish as they would be for BC. Squamish’s woodwaste landfill greenhouse gas’ could be even lower, or much higher than this range. Key issues are the age and material composition (fines vs chunks), according to provincial government sponsored and other (North American) research.

Emissions from marine traffic going to Squamish Terminals have not been included due to uncertainty and a lack of municipal levers. Regarding this:

- Squamish Terminals does not currently have data available
- CEA has data from previous communications with the Port of Prince Rupert, and from this has been able to create a very approximate estimate for Squamish Terminals:
 - The Port of Prince Rupert includes marine emissions within its inventory boundary, which includes anchorage locations for waiting ships and the distance between those locations to the port.
 - CEA has information for the tonnes of cargo shipped by the Port of Prince Rupert and by Squamish Terminals.
 - By assuming that marine emissions would be very approximately the same per tonne of cargo shipped, CEA was able to create an approximate estimate for Squamish Terminals of 8,400 tonnes of CO₂e, in a year. Like with the Port of Prince Rupert, this would be the single largest source of emissions for Squamish Terminals, whose landside inventory emissions have varied from 850 (2013) to 1,300 (2016) tonnes of CO₂e, from 2013-2018.
- Note that the Port of Prince Rupert has two initiatives to reduce marine emissions: The Green Wave Incentive Program and Shore Power.

Scope 3 emissions (i.e. indirect emissions from consumption) have not been included due to uncertainty and a lack of municipal levers. CEA has however been able to create an approximate estimate:

- Using the C40 Cities report of *Consumption-Based GHG Emissions of C40 Cities*, consumption-based emissions for North American cities are estimated to be 16-21 tonnes of CO₂e per capita per year.
- The calculations in the report are likely to include most, if not all of the sector-based inventory (comprised of scope 1 & 2 emissions) created by the project team. Therefore, those emissions have been removed from the consumption-based inventory.
- Very approximately, this results in a low of 230,000 and a high of 330,000 tonnes of CO₂e per year, for scope 3 emissions. These emissions are generated outside of the District's boundary. E.g. for goods manufactured in China, they will be generated in China and in international waters as they are transported.
- The District has very limited levers to affect consumption-based emissions. It can put in place measures to encourage construction with materials that have lower embodied carbon emissions (e.g. by relaxing levels of the Step Code). It can also encourage local food (e.g. support the farmers market), and conduct education & outreach.

Projections

As previously described, there are full or partial inventory years that describe the community's emissions profile from 2007-2018. From 2019 onwards, all of the data is an estimate as a business as usual projection.

The assumption is that energy consumption and emissions will increase proportionally with increases to population, although the impact of policies from higher levels of government are also incorporated and other assumptions are made. Only policies that have already been adopted or are believed to be likely to be adopted *and* that will have quantifiable impacts are incorporated. Assumptions are:

- The Province's incremental steps to net zero energy ready buildings by 2032.
- Tailpipe emissions standards. New light duty vehicle emissions decline from 200 g CO₂e/km in 2015 to 119 g CO₂e/km in 2025 (Federal policy), and then decline again to 105 g CO₂e/km in 2030 (Provincial strengthening of this policy). This is for new vehicles, and is included in the projections taking account of vehicle turnover rates.
- Renewable and low carbon transportation fuel standards. 20% by 2030, as in CleanBC Plan.
- An average annual decrease of 1.228% in natural gas consumption per residential connection is included, as FortisBC does in its planning.
- The CleanBC target for Renewable Natural Gas in natural gas, of 15% by 2030. (Note that there is a high degree of regulatory uncertainty around this factor. If this is removed, then the community's business as usual emissions in 2030 are 4,000 tonnes or 4% greater, at 98,000 tonnes of CO₂e.)
- The Province's CleanBC Plan zero emission vehicle mandate of 100% of new vehicles by 2040. From the impacts of this, in our business as usual scenario we assume that the proportion of electric vehicles on Squamish roads will slowly increase in advance of this, and we take in to account vehicle turnover rates.
- The impacts of a changing climate on building energy consumption.

The final assumption had the following methodology:

- Climate change data for the region was obtained from ClimateData.ca. CEA obtained this from the “downloads” section of the website, selected the BCCAQv2 (annual) dataset, Heating Degree Days (HDD’s) or Cooling Degree Days (CDD’s) variables, and the location on the map to be analysed.
- Projected global emissions to 2030 currently places the world in the range for the IPCC’s Fifth Assessment Report’s Representative Concentration Pathway (RCP) 6.0 scenario.
- RCP 6.0 scenario not available on ClimateData.ca, therefore RCP 4.5 (median values) used as a proxy. This is a more conservative scenario.
- Decreases in residential and commercial natural gas consumption are assumed to be proportional to decreases in HDD’s and the proportions of natural gas consumed for space heating for each sector, with this data obtained from the Navigant 2017 Conservation Potential Review for FortisBC Gas.
- Decreases in residential and commercial electricity consumption assumed to be proportional to decreases in heating degree days and the proportions of electricity consumed for space heating for each sector. However, for residential this is partially offset by, and for commercial more than offset by the proportions of electricity consumed for space cooling by each sector and how this will increase proportional to projected increases to cooling degree days. These proportions were obtained from the Navigant 2016 Conservation Potential Review for BC Hydro.

Items that are excluded from projections are:

- Large industry:
 - This is not an issue for the inventory as there are currently no large industrial sources of emissions within the municipal boundary. But regarding projections, the largest known projected source of emissions is Woodfibre LNG, which is expected to have considerable impacts during construction, followed by 140,000 tonnes of CO₂e per year for each year of operation. This is greater than the emissions from the rest of the community combined. (This estimate includes the emissions due to electricity and natural gas consumption, but excludes upstream natural gas impacts, maritime emissions and potential emissions associated with a new natural gas compressor station that may be built within the District boundary.)
 - These are excluded from projections because:
 - The District has little to no control over them and because of their size relative to the rest of the community, and so it is not a fair basis to judge the success or failure of the District’s efforts in reducing greenhouse gas emissions.
 - There is considerable uncertainty surrounding them.
- Items that are excluded from the inventory:
 - Wood waste landfills
 - Marine emissions
 - Land use, land use change and forestry (LULUCF)
 - Scope 3 emissions
- Technological changes and other developments:
 - Examples of these are reductions in prices of electric vehicles, improvements in low carbon technologies for medium and heavy-duty vehicles, and improvements in means to reduce emissions from existing buildings.
 - These are excluded because There is considerable uncertainty surrounding them.

Appendix C – Additional Community Climate Action Plan Considerations for Squamish

This appendix describes what would occur if some alternative energy & emissions inventory considerations were made for Squamish.

Calculating an inventory using 20-year Global Warming Potentials

The District of Squamish requested an inventory that considers Global Warming Potentials (GWP) over a 20-year time horizon.

Although 100-year GWPs are the standard used by the IPCC in most of their calculations, and the standard used by the Federal and Provincial governments, there is logic for creating an inventory that uses GWPs over a shorter timeframe. Using shorter GWPs may help to more rapidly reduce short-term warming, by focussing on the bigger short-term impacts (although this point is debated). In addition, if the climate system may enter a tipping point before 100 years, then considering the impact of a gas over a 100-year timeframe may not be as helpful as the shorter-term.

Figure 14 shows an inventory calculated using 20-year GWPs. Briefly, the impact of methane more than triples because the 100-year GWP of CH₄ which was assumed to be 25 (based on 4th assessment report following Intergovernmental Panel on Climate Change/ Federal / Provincial guidance) is instead assumed to be 84 from a 20-year perspective (based on AR5 – no feedbacks). The impact increases because the gas is short-lived in the atmosphere.

Because the impact of CH₄ more than triples, waste emissions have more than tripled.

All other emissions remain the same, because they are caused almost entirely by CO₂, and so they retain a GWP of 1 regardless of the time period used.

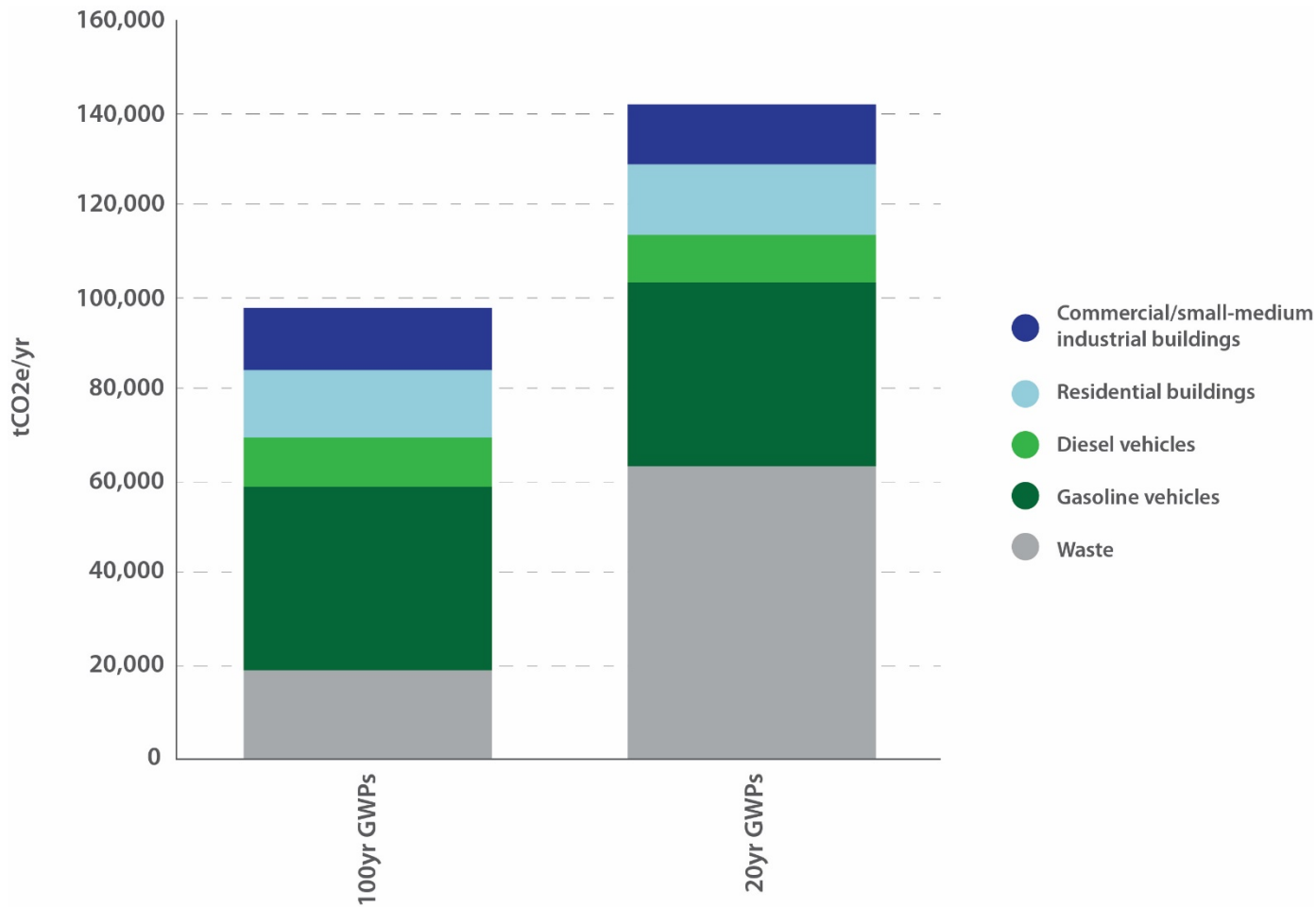


Figure 14 Community greenhouse gas emissions inventories for Squamish comparing 100-yr and 20-yr Global Warming Potentials.

From an actions perspective, if the District of Squamish were to base decisions on a 20-yr Global Warming Potentials (GWP) it would further strengthen the case for landfill gas collection and flaring / utilization, and organics diversion. It would also strengthen the case for investigating the woodwaste landfill emissions.

Appendix D – Engagement Summary

Engagement

To ensure a lasting plan with a foundation for commitment and energy for implementation the planning process for the Community Climate Action Plan deployed the following engagement approaches from late-September 2019 to mid-February 2020:

- A Climate Leaders group to champion the process, consider solutions and to act as ambassadors
- Internal staff team providing current insights and consideration of solutions
- A full day workshop for key staff, Council and Climate Leaders
- Workshop with commercial, industrial and institutional stakeholders
- Public survey
- Public open house
- Communications to support the engagement activities

Advice and Engagement Activities

Climate Leaders

Launched in September 2019, the Climate Leaders Team was tasked to champion the plan goals and process, advise District of Squamish staff on content and act as ambassadors for the project. The team included the Mayor, two Council members and eight regional and local climate leaders from various backgrounds. Local and regional climate leaders were solicited and selected by the District of Squamish project team. The Climate Leadership Team met three times throughout the process and were also invited to participate in the other engagement activities. Meeting one introduced the project, the draft greenhouse gas inventory and planning process. A small group of Climate Leadership Team participants met with project consultants and staff to consider and ensure a robust greenhouse gas inventory. Meeting two included a full day workshop to consider and advise on greenhouse gas reduction actions, and meeting three created an opportunity for the team to review and comment on draft greenhouse gas reduction projections/actions as well as provide strategic advice on targets and plan implementation.

Internal Staff Team

Initiated in September 2019, the internal staff team from the District of Squamish provided important background information on climate action to date, and identified upcoming opportunities to further climate action. The team participated in the full day workshop to share current progress and to consider and advise on new greenhouse gas reduction actions. The project team also received invaluable feedback from the internal team on draft plan components at critical moments in the process.

Full Day Workshop - November 28th /2019

The workshop for District of Squamish staff and Climate Leadership Team helped to identify climate action opportunities for Squamish and to begin to discuss how it might be possible to accomplish what is needed to achieve the Community Climate Action Plan targets. The event was prefaced by a video introduction to the 'Big Moves' needed for the plan and then kicked off with an exercise to consider Squamish through the eyes of a resident in the future. Action review, consideration and feedback exercises followed, along with a discussion on how to implement the plan once it is finished. The feedback on the plan structure and actions were reviewed and incorporated for future modelling and engagement activities.

Stakeholder Workshop-December 5th /2019

Recognizing the importance of other organizations to help support climate action a stakeholder workshop with invited stakeholders from the community (commercial, private, regional, etc.) was held to review and identify further climate action opportunities. The approximately 25 workshop attendees included members of the local building community, local developers, energy utility representatives, institutional organizations a home energy assessor, members from the forestry industry, a Canada Green Building Council representative, local transportation industry representatives and a representative from the local health authority. Workshop objectives included increasing the understanding of the Community Climate Action Plan, exploring how stakeholders can support the District with implementing the plan and to understand what stakeholders need in order to take some steps in support of the plan. Feedback from the workshop was considered and incorporated to into the action plan and implementation schedule.

Online Survey – January 31st to February 16th /2020

In addition to building awareness of the Community Climate Action Plan and the benefits of climate action, community members were asked to articulate what was required for the Big Moves to be successfully implemented, their level of support/approval for specific actions, and to identify what else they needed to take personal action. Survey questions also explored participants' personal actions that may be inaccessible due to financial or other constraints and other questions tried to understand the type of activities to best engage others on the topic of climate action. A total of 284 individual survey responses were received with 252 of those from respondents who said they lived in the District. The median age category for survey respondents who indicated their age was 35-44 years of age which is about same as the median age of 38.1 for Squamish. That said, the survey likely under represents the voices of those under 18. Most of the respondents identified as female (60%), with 34% identifying as male, and 6% preferred not to say. As climate action programs are created it will be important to dive into any differences of opinion by gender. For example, males seem to be more likely to consider home retrofits than females. The survey results were used to help guide action development and phasing and will also be used in the future as specific programs and actions are rolled out to the community.

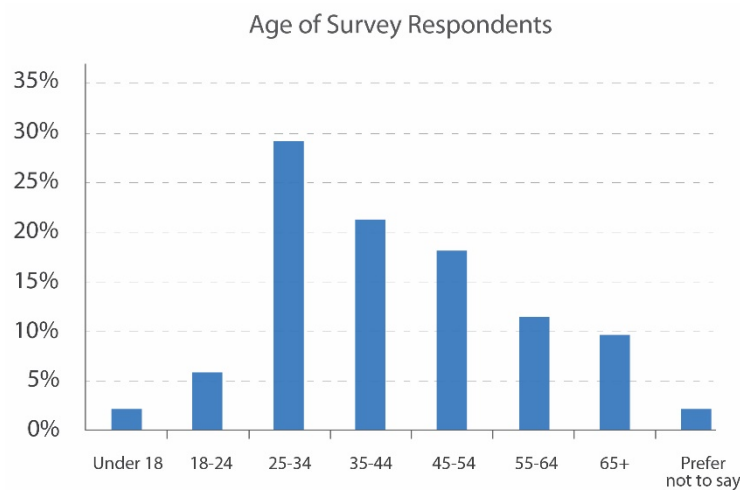
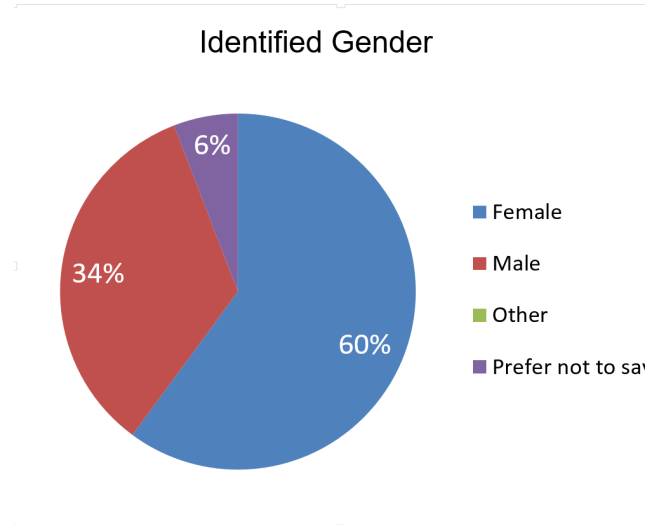


Figure 15 Survey response information.



Public Open House – February 3rd /2020

The Community Climate Action Plan open house held at the Squamish Public Library was targeted at both business and organizations as well as residents of Squamish. Businesses and organizations were invited to attend from 4:30pm onward and residents were invited to participate from 5:30pm to 7:30pm.

The open house objectives were to:

- Build excitement and awareness of the Community Climate Action Plan
- Gather input on what a low carbon future looks like, what’s needed for successful implementation, how to make climate action equitable and finally how to engage others.

Attendance at the open house surpassed 80 people though the majority of participants were residents as opposed to business. Attendees were guided around the meeting room and asked to visit six distinct stations. The first two stations focused on building awareness and providing context for the remainder of the stations, and stations three to four provided the opportunity for participants to comment on specific Big Moves and related actions. The fifth station, targeted discussions and feedback on how to make climate action equitable and affordable for Squamish residents and the final station captured input on future engagement approaches and participants perspectives on what Squamish looks like in a bright low-carbon future.

The open house results were combined with the survey results and used to guide action development and phasing. Feedback will also be used in the future as specific programs and actions are rolled out to the community.

Summary of public feedback (Survey and Open House Combined unless noted)

Climate Benefits

The climate action benefits respondents feel are most (received 8% or more of all votes) important to them are the following:

1. Improves biodiversity/habitat creation
2. Supports clean energy transition
3. Reduces waste: optimizes resources
4. Improves air and/or water quality
5. Improves human health and well-being

These benefits should be stressed and included in communication activities.

The climate action benefits respondents feel are least (received 8% or more of all votes) important to them are the following (lowest first):

1. Reduces risk to property values
2. Reduces burden on municipal infrastructure
3. Improves cost savings
4. Optimizes energy savings
5. Enhances local autonomy
6. Reduces congestion

Big Moves Relevance

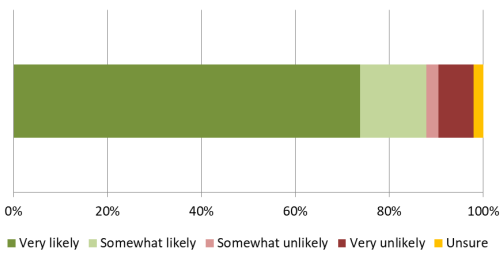
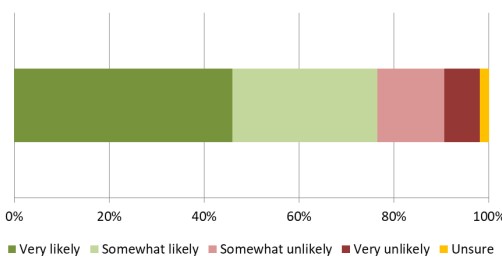
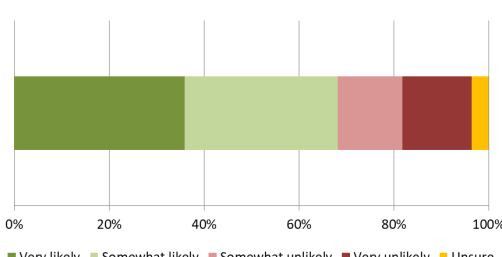
The Big Moves respondents feel are most relevant to them in order of relevance are as follows:

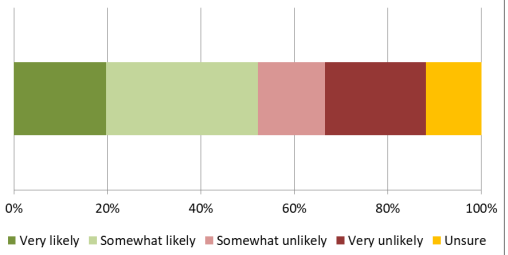
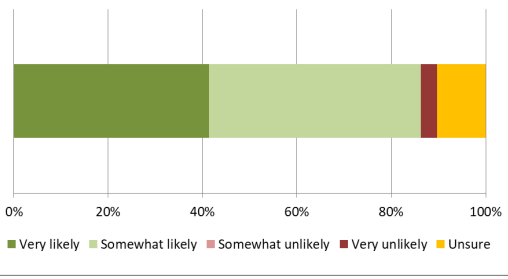
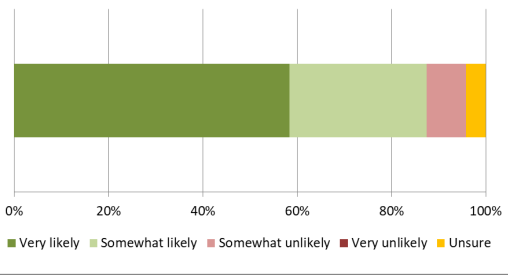
1. Close the Loop on Waste: Organic Diversion & Landfill Gas Capture (e.g. composting and reducing emissions from the landfill) – 23% of all votes
2. Shift Beyond the Car (e.g. walking, biking, e-bikes/other small devices, and public transit) -20%
3. Decarbonize Passenger Vehicles (e.g. shift to low- or zero-carbon fuel sources, i.e. electric vehicles and electric charging infrastructure) – 18%
4. Step Up New Building Efficiency & Heating (e.g. working toward zero emission buildings) – 13%
5. Better Existing Buildings (e.g. retrofitting openings, adding insulation, and changing to zero emission heating systems) - 13%
6. Decarbonize Commercial, Medium, & Heavy-Duty Vehicles (e.g. renewable fuels or electric fleets)- 12%

These results provide insight into the Big Moves, strategies and actions that will likely be the easiest to lead with in the action plan and should be considered in creating the implementation plan.

Climate Actions and Supportive CCAP Actions

Not surprisingly the most popular municipal actions to support personal climate steps focussed on incentives such as lowering the initial investment in new capital. Education and awareness as well as improving infrastructure/services are the next most popular type of municipal action to support personal climate steps. The findings continue to support the challenge of improving existing buildings with the related Big Step action of retrofitting cited as least likely activity in the coming years.

Big Move Action (in order of likelihood of personal action)	Likelihood	Most Supportive CCAP Actions (in order of popularity)
<p>Close the Loop on Waste - with knowledge of the Solid Waste Bylaw requirements (91% had this knowledge), the likelihood to increase separation of food and yard waste over the next 5 years</p>	 <p>0% 20% 40% 60% 80% 100%</p> <p>■ Very likely ■ Somewhat likely ■ Somewhat unlikely ■ Very unlikely ■ Unsure</p>	<p>Fines if your food and other organic waste mixed with garbage. Education and engagement about the importance of organic collection. More frequent collection by the District year-round Education on the types of organics I can separate from waste.</p>
<p>Shift Beyond the Car – likelihood to shift car trips to sustainable modes of transport such as - walking/cycling, transit, e-bikes, e-scooters, etc. for half or more of your trips around Squamish?</p>	 <p>0% 20% 40% 60% 80% 100%</p> <p>■ Very likely ■ Somewhat likely ■ Somewhat unlikely ■ Very unlikely ■ Unsure</p>	<p>Advance regional transit service (Sea to Sky Corridor) Implement more active transportation pathways between all neighbourhoods and nodes. Make active transportation (walk, bike, e-bike, scooter, etc) easier and more attractive than driving</p>
<p>Decarbonize Passenger Vehicles - likelihood of purchasing/leasing an electric vehicle for your next vehicle in the next 5 years</p>	 <p>0% 20% 40% 60% 80% 100%</p> <p>■ Very likely ■ Somewhat likely ■ Somewhat unlikely ■ Very unlikely ■ Unsure</p>	<p>Top-up provincial financial incentives to purchase an EV Provide incentives to install in-home chargers. Ensure more access to EV charging out in the community</p>

Big Move Action (in order of likelihood of personal action)	Likelihood	Most Supportive CCAP Actions (in order of popularity)
<p>Better Existing Buildings – Likelihood to invest in a retrofit that includes making your home or building 1. more energy efficient and 2. operate with a zero emission heating</p>	 <p>0% 20% 40% 60% 80% 100%</p> <p>■ Very likely ■ Somewhat likely ■ Somewhat unlikely ■ Very unlikely ■ Unsure</p>	<p>Lowering the initial investment required for retrofitting (incentives, or low interest financing) Incentives for an energy assessment and coaching to identify the best opportunities Programming to ease the adoption of retrofits and efficient and zero emission heating systems e.g. quality assured installers</p>
<p>Step Up New Buildings - Likelihood to seek out a commercial building or a home residence that is built to a higher energy efficiency standard with zero emission heating in the next 5 years if more of these are available on the market. <i>(29 responses only, from those looking for a new home/building) Online Survey only</i></p>	 <p>0% 20% 40% 60% 80% 100%</p> <p>■ Very likely ■ Somewhat likely ■ Somewhat unlikely ■ Very unlikely ■ Unsure</p>	<p>Lowering the initial investment required for a new energy efficient home (incentives, low cost financing etc.) Education and training on how to find or to build a more efficient home with zero emission heating Establish maximum floor areas for smaller single family/duplexes to require less energy and increase housing affordability. Awareness, education and outreach on new home incentive programs for homeowners</p>
<p>Step Up New Buildings - BUILDERS – Likelihood to place zero emission heating systems (e.g. electric, heat pumps etc.) in half or more of your new building(s) over the next few years <i>(24 responses only, from those building new homes/buildings) Online Survey Only</i></p>	 <p>0% 20% 40% 60% 80% 100%</p> <p>■ Very likely ■ Somewhat likely ■ Somewhat unlikely ■ Very unlikely ■ Unsure</p>	<p>Top up provincial incentives for efficient electric heating e.g. heat pumps to replace fossil heating systems in new buildings Building permit rebates for achieving standards beyond the base efficiency standard A system which provides additional density/development for zero emissions construction Awareness, education and outreach on new home incentive programs for builders and homeowners</p>
<p>Decarbonize Commercial, Medium, & Heavy-Duty Vehicles</p>	<p>This Big Move was rolled into Decarbonize Vehicles and was not relevant to the general public and therefore was not included in the surveys on specific actions.</p>	<p>N/A</p>

Other personal actions listed by level of access

The following table contains personal actions listed in order by the number of respondents marking the action as “accessible” with respect to personal investments and costs. These are actions that can be promoted to residents who want to participate in climate action but may have barriers to investing in home or vehicle actions.

Personal Action	Total #	Total %
1. Keeping my food/yard waste out of the landfill	202	13%
2. Buying 2nd hand items instead of new	192	13%
3. Eating less meat & dairy	185	12%
4. Biking/walking to shopping/recreation in Squamish	176	11%
5. Taking vacations closer to home	167	11%
6. Biking/walking to work in Squamish	154	10%
7. Carpooling	136	9%
8. Taking transit	108	7%
9. Buying/leasing an electric vehicle	91	6%
10. Energy retrofits to improve where you live	71	5%
11. Buying Carbon Credits	52	3%

Engagement and Communications to Involve Others

While social media was respondent's most popular medium for reaching out to others, it was closely followed by speaker series activities and outreach. Other ideas not captured below mostly included, working with other organizations to get the messages out and other forms of advertising.

Personal Action	Total #	Total %
1. Social Media	132	18%
2. Speaker series events	117	16%
3. Outreach at community events	115	16%
4. Outreach to schools	102	14%
5. Online surveys	54	8%
6. Open houses	45	6%
7. Presentations	42	6%
8. Videos	38	5%
9. Direct mail outs	30	4%
10. Newsletters	23	3%
11. Other (please specify)	21	3%

Appendix E – Key performance indicators

Table 8 description of example indicators, the measures of success, data sources for each indicator.

	Indicators	Data Sources
Overall	1. Community greenhouse gas emissions CO ₂ e	Provincial energy & emissions data at the community level, and Kent Marketing Group fuel sales data for area gas stations converted into emissions using latest factors from the Province. Annual.
Overall	2. Per capita energy usage	Provincial energy & emissions data at the community level, Kent Group fuel sales data for area gas stations, electrical utility usage data. Annual.
Existing buildings	3. # of energy efficiency incentives distributed for upgrades	Summary data from FortisBC (and other entities as applicable, e.g. Province). Annual.
Existing Buildings	4. % of adoption of heat pumps or other low carbon heating systems	Permit applications. Annual. Census and Provincial Inventory Report at community level can provide information. Every census year. ⁹
New buildings	5. # of buildings at each level of the BC Energy Step Code	Permit applications <i>Notes: suggest setting this up in advance for GIS; Some builders may currently be building to Step Code and getting FortisBC rebates without the District knowing, by following the prescriptive pathway. Advise local builders and front counter staff of the Step Code compliance pathway in the building code.</i>
Transportation	6. # of Public EV charging stations	Plugshare, and other websites with EV charging stations (e.g. Google Maps)
Transportation	7. % of vehicles registered in Squamish that are low-carbon	ICBC or Province. Annual.
Transportation	8. Annual Active Transportation Capital Investments	Engineering dept. Same as OCP Indicator #20. Annual.
Transportation	9. % of trips taken by sustainable modes	Census. Same as OCP Indicator #5. Collected every 5 yrs. Initiate an annual District led data collection program.
Other	10.% organic material (by weight) in waste heading to landfill	District of Squamish. Every 2 years.
Other	11.kg's of waste per capita to landfill	District of Squamish. Same as OCP Indicator #4a. Annual.
Corporate	12. Annual corporate GHG emissions CO ₂ e	District CARIP reporting
Corporate	13. % of corporate fleet that are EVs	District Public Works Department

⁹ E.g. take number of dwellings in Squamish (Census – in 2016 there were 6,756) and compare to number of residential natural gas connections (Provincial Inventory Report data at community level – in 2016 there were 4,081). Calculations from this show that in 2016 approximately 40% of dwellings did not have natural gas connections. This method does not account for number of homes that may be using heating oil or propane but will be a way to estimate progress.