



West Kootenay 100% Renewable Energy Plan

Creating a pathway for local communities to use 100% Renewable Energy for transportation, buildings, electricity and local infrastructure no later than 2050.

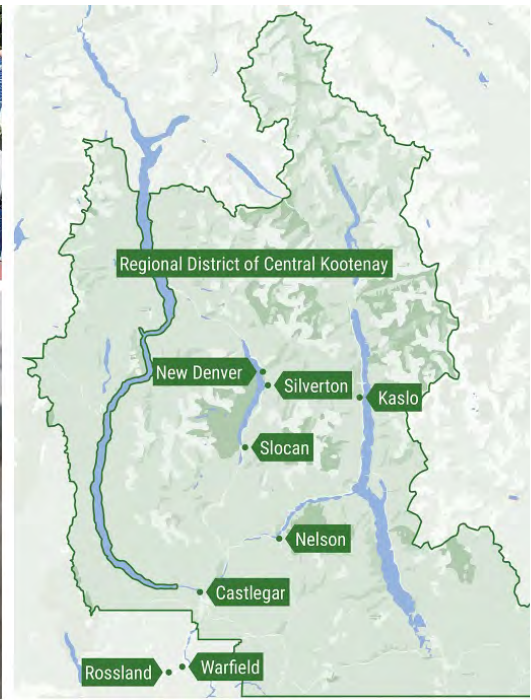


The “West Kootenay” region addressed in this plan includes the traditional and unceded territory of the Sinixt, Ktunaxa, Secwepemc, and Syilx First Nations.

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Executive Summary

The health, economic well-being, and safety of community members in the West Kootenay Region are of great concern for our local governments. Recognizing that transitioning to 100% renewable energy is a powerful way to address these priorities, eight municipalities and the Regional District of Central Kootenay have passed resolutions pledging to reach 100% renewable energy by 2050 across community-wide energy use in transportation, heating & cooling, electricity and waste management. The *West Kootenay 100% Renewable Energy Plan* is the result of a collaborative effort to identify pathways for participating communities to make progress toward these renewable energy goals. As the political and technological context changes over the coming years, of course, it will be necessary to update the plan with new actions. Read more about how the plan was created and why in Part 1.

West Kootenay 100% Renewable Energy Communities
City of Castlegar
Village of Kaslo
City of Nelson
Village of New Denver
Regional District of Central Kootenay (unincorporated)
City of Rosland
Village of Silverton
Village of Slovan
Village of Warfield

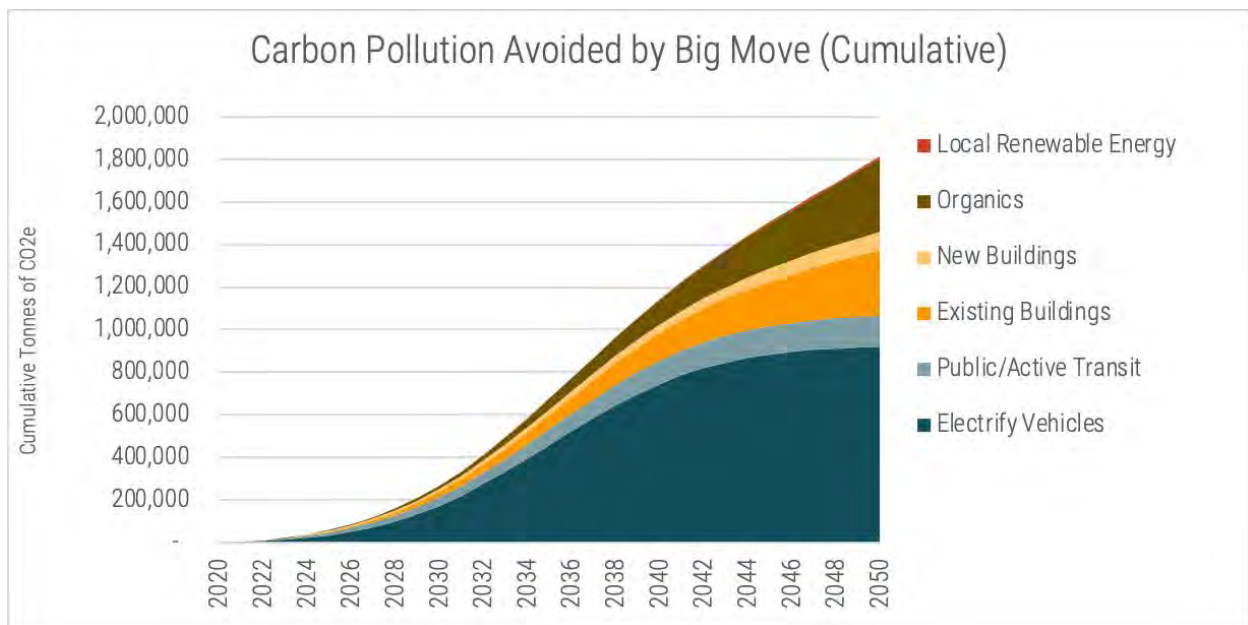
Our local governments have a critical role to play in moving local communities toward renewable energy. Local governments shape daily behaviour with policy and infrastructure, and elected leaders make decisions in the interest of diverse constituencies. Collaborating with other local



governments to develop the *West Kootenay 100% Renewable Energy Plan* has allowed our local governments to share resources, build capacity, and reduce costs.

The plan is built around four *Big Moves*, each of which includes a variety of policy, infrastructure, and outreach actions to help community members save money and reduce pollution in their daily lives. Learn about the Big Moves in Part 2 (pg XX). The Big Moves address:

- How we move around, including electrification of passenger vehicles, public transit, walking, biking and other modes of active transportation, and decarbonizing commercial vehicles;
- The buildings where we live, work and play;
- What we use (and throw away), including composting, landfill gas capture, and landfill diversion; and
- How we generate energy.



For each Big Move, each community has created a list of actions which reflect the priorities of their community members. The actions will make it faster, easier, and cheaper for local residents and businesses to save energy in their transportation and shelter if they choose to. **Local governments can prevent 1.8 million tonnes of carbon pollution by 2050 by implementing these actions.** That's about the same amount of pollution as 10,000 railcars of coal, or 30 years of



driving 13,000 cars. Each community's context and action list is unique, and the plan includes a section for each community in Part 3.

Community	Projected reduction in carbon pollution (from 2020 levels)		Remaining pollution is from...		
	Tonnes	Percent	Mobility fuels (commercial vehicles)	Natural gas, propane, wood, and heating oil	Solid waste
Castlegar	34,630	63%	28%	63%	4%
Kaslo	5,092	68%	69%	27%	2%
Nelson	43,219	54%	27%	69%	4%
New Denver	1,783	53%	76%	10%	5%
RDCK	108,279	58%	55%	38%	5%
Rossland	17,289	69%	30%	57%	11%
Silverton	397	71%	25%	42%	15%
Slocan	1,280	61%	59%	36%	3%
Warfield	8,437	74%	26%	62%	11%

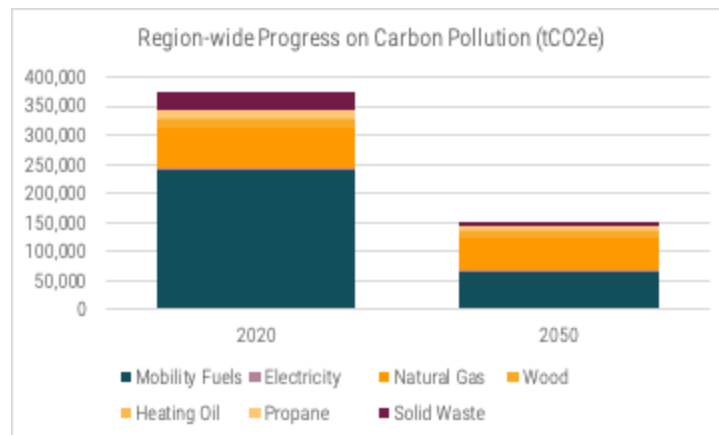
There are a few trends throughout the region:

- Because many people rely on their personal cars for daily mobility needs, shifting to electric vehicles saves the most money and carbon pollution. Increases in active and public transportation also help reduce gasoline use.
- Improving the efficiency of existing buildings with improved insulation, air sealing, and more efficient appliances is the second greatest potential impact for several communities.
- Over time, benefits of reducing organic waste and capturing landfill gas become more substantial.
- Upcoming provincial regulations for new buildings make local changes less significant in the short term, but early adoption has multiplier effects over time.



- Renewable generation makes a smaller impact because our region already has abundant renewable electricity to meet current electricity needs and local renewable natural gas is not yet available.
- Switching transportation and building energy to electricity is complicated by the electrical grid's vulnerability to weather events which are becoming more frequent due to global warming, such as wildfire, wind-, and snowstorms.

Although the plan makes big strides toward 100% renewable energy, gaps remain for all communities. The remaining non-renewable energy is mostly fuel for commercial vehicles and for heating existing buildings, where local governments have less direct influence and attractive replacements don't exist. Nevertheless, technology for electric commercial vehicles and renewable natural gas is evolving rapidly and it is likely that the opportunities to transition these uses to renewable energy will expand over the next few years. Local communities will work together to advocate for policies at the provincial and federal level that will accelerate these changes and fill these gaps.



Through this collaboration, our communities are taking an important next step on the long journey to 100% renewable energy. Each community will move at its own pace, and our regional collaboration will help us identify and share resources. The coronavirus pandemic has brought unexpected challenges to the region, but it has also revealed strengths and created opportunities to recognize our shared needs and values: well-being, resilience, and community. Our local governments will draw on communities' strengths to adjust timing and priorities to adapt to these and other challenges as we work to implement the plan over the next several years.



By 2025, the assumptions, impacts, and actions in this plan will need to be reevaluated to integrate lessons learned and changes in context and technology. The Big Moves framework and the related data analysis will be an important asset in maintaining our course and assessing progress on the path toward 2050. The sooner the West Kootenay region starts transitioning to 100% renewable energy, the sooner its residents will start to enjoy the benefits of improved health, economic opportunities, and increased community safety.





Part 1: We Can Achieve 100% Renewable Energy

Transitioning to renewable energy protects people's health and well-being, creates sustainable employment, and avoids the worst effects of climate change like droughts, landslides, floods and wildfires. Renewable energy improves air quality, reduces traffic, increases active healthy lifestyles, increases comfort and affordable living, and creates good jobs for the long term. Although people have a long history of leveraging the abundant energy of fossil fuels like coal, oil, and gas, pollution from these fuels takes a toll on human lives and is the leading cause of climate change. **Ongoing improvements in renewable energy, on the other hand, have made renewable energy safe, clean, and affordable.** Because we use fossil fuels so frequently, however, it will take coordinated, ongoing effort to make the transition from fossil fuels to renewable energy. Although transitioning to renewable energy will be challenging, fossil fuels come at a high cost; the Government of Canada has determined that every ton of carbon pollution produces \$50.65 in social costs.¹ For the West Kootenays, that cost will amount to nearly \$19 million in 2020 alone for fossil fuels' impacts on our health, safety, and economy.

¹ Environment and Climate Change Canada, 2016. Technical Update to Environment and Climate Change Canada's Social Cost of Greenhouse Gas Estimates



community energy uses, including local government operations, and sets out actions that each of the nine participating local governments will take in four broad areas referred to as *Big Moves*:

- How we move around, including electrification of passenger vehicles, public transit, active transportation, and decarbonizing commercial vehicles
- The buildings where we live, work and play
- What we use (and throw away), including composting, landfill gas capture, and landfill diversion
- How we generate energy



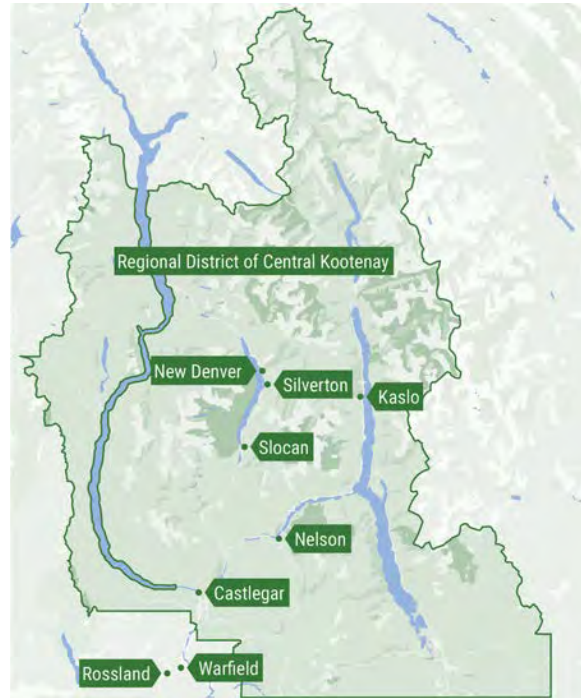
Each community's actions are analyzed to project how they contribute to reduced carbon pollution over time, and what pollution will remain despite these actions. **Additional future actions will be needed in every community to reach 100% renewable energy.** The actions included in this plan help participating local governments pick the many low hanging fruits. In another few years, when these actions are underway, it will be time to get a ladder. In other words communities need to get started and work hard to begin the transition to renewable energy, and will need to reassess periodically to adjust to the changing landscape and adapt their actions.

The nine participating local governments are quite different from each other, but they share many similar opportunities and obstacles. The West Kootenay region is filled with proud, resilient,



hard-working, innovative and creative people. Rivers, lakes, mountains and valleys offer world-class outdoor recreation in all four seasons, and there is a strong culture of entrepreneurship and industry.

The West Kootenay region has abundant electricity from existing dams, which generate almost no carbon pollution and creates an annual energy surplus for the region. Meanwhile, the greatest energy uses in our region (aside from industrial uses) are transportation and home heating. Therefore, the biggest impact for the least cost comes from switching as rapidly as possible to electric-powered vehicles and appliances and from ensuring we are very efficient with whatever fossil fuels we continue to use. Generating more renewable energy to replace natural gas is also an opportunity, though one with limited impact in the short term. In the medium and long term, generating more renewable energy and improving the reliability of our electrical grid is needed since we expect to increase electricity use as we move away from fossil fuels.



West Kootenay 100% Renewable Energy Communities & their 2016 populations	
City of Castlegar	7,259
Village of Kaslo	968
City of Nelson	10,664
Village of New Denver	473
Regional District of Central Kootenay (unincorporated)	31,589
City of Rossland	3,729
Village of Silverton	195
Village of Slocan	272
Village of Warfield	1,729

* Statistics Canada



Why 100% Renewable Energy?

Transitioning to 100% renewable energy in the West Kootenays benefits residents now and for generations to come. Benefits include health, economy, and community safety.



Health & Well-being

The primary health benefit of 100% renewable energy is the elimination of pollution from gasoline and diesel engines. Cars and trucks produce air pollution that affects people who have asthma and other underlying conditions. Living with pollution lowers people's sense of financial and personal well-being and their ability to manage stress.⁵ Some of these pollutants are carbon dioxide, carbon monoxide, and particulates. In addition, motor oil leaks contaminate waterways and soils, impacting our clean water for drinking and healthy soils for growing food. Chronic exposure to fine particulate matter (a major component of air pollution) from the burning of fossil fuels is estimated to result in 7,142 premature deaths per year in Canada with welfare-related costs valued at \$53.5 billion.⁶ Just imagine what that \$53.5 billion could do to help with COVID health costs and more public transportation, solar panels and energy retrofits in homes.

Electric vehicles do not produce these pollutants. Active transportation is another way that renewable energy supports community health. Walking or biking for frequent errands, social trips and going to work can help reduce chronic diseases and improve well-being.

⁵ Thomson E. M. (2019). Air Pollution, Stress, and Allostatic Load: Linking Systemic and Central Nervous System Impacts. *Journal of Alzheimer's disease* : JAD, 69(3), 597–614. <https://doi.org/10.3233/JAD-190015>

⁶ <https://cape.ca/wp-content/uploads/2019/04/Module-5-Factsheet-updated-ready-to-upload.pdf>





Economy

One important economic benefit to 100% renewable energy is that some of the money we now spend on gasoline, natural gas, oil, and propane will be available to spend in our local economy. In addition, transitioning to 100% renewable energy will include new transportation infrastructure and building retrofits, providing jobs for local people who don't have to leave the region for work, but can stay here at home with their families. To ensure that local people have the capacity to fulfill these roles, local governments can partner with community groups, educational institutions and skills development organizations, and create policies and programs that support worker transition to new careers in renewable energy and energy efficiency.



Safety

Renewable energy and climate change are different sides of the same coin - as we move to 100% renewable energy, we move away from the fossil fuels that drive climate change. Canada is warming at twice the rate of the global average⁷, and the West Kootenay region is already facing new challenges related to more frequent droughts, more severe rain storms, and milder winters. Some of the climate impacts we can expect in the West Kootenays include:

- **More frequent and severe** natural disturbances such as wildfires that cause dangerous smoke for people with asthma and threaten homes and businesses.
- **Extreme rain and snow events** with increased risk of flooding and landslides, where people can lose their homes.
- **Hotter, drier summers, a low snowpack and delayed rainfall**, can cause shortages of water for drinking and irrigation.
- **Increased incidents of pest outbreaks**, such as certain mosquitoes and the Mountain Pine Beetle and can increase the risk of fire, reduce economic vitality, and introduce diseases like Lyme and West Nile Virus.⁸

⁷ [Canada's Changing Climate Report](#)

⁸ Columbia Basin Trust, Climate Basin Climate Source, 2019



Why local governments?

Climate Change is a global problem, but it won't be solved without local actions. Local governments are uniquely poised to lead the transition to clean energy because they can:

1. Experiment with innovative approaches
2. Collaborate with other local governments, community groups and provincial governments
3. Customize actions to make them work for local conditions
4. Engage with community members on an ongoing, personal basis
5. Respond more quickly to changing conditions
6. Build local transportation and utility infrastructure to support individual actions
7. Leverage federal and provincial funding to meet local needs
8. Operate utilities
9. Manage planning and permitting for land-use and buildings

More than 250 cities worldwide (and more than 160 in the US) have targets for 100% renewable energy, though specific goals and depth of focus vary between these jurisdictions. In Canada, there are 18 local governments that have set a goal of reaching 100% Renewable Energy by 2050.

100% Renewable Communities in BC		Elsewhere in Canada
<ul style="list-style-type: none"> ● Castlegar ● Kaslo ● Nelson ● New Denver ● RDCK ● Rossland ● Saanich 	<ul style="list-style-type: none"> ● Silverton ● Slocan ● Ucluelet ● Vancouver ● Victoria ● Warfield 	<ul style="list-style-type: none"> ● Charlottetown, PEI ● Edmonton, AB ● Guelph, ON ● Oxford County, ON ● Regina, SK

Redefining the Baseline

The Canadian and BC governments have adopted high-level programs to reduce carbon pollution and transition to clean energy. The local government actions in the West Kootenay 100% Renewable Energy Plan are examined in terms of their ability to *further* reduce carbon pollution from the baseline established by provincial and federal initiatives. For more detail on the modelling analysis, see Appendix I.



Regional collaboration is the key to success for small communities

Many local governments have already created climate action plans or community energy plans or are currently developing them. These plans are limited to the boundaries of their districts or municipalities. The West Kootenay region is an area of towns and rural communities that are connected and that depend on each other. People travel around the area every day for work, business, shopping, recreation, health appointments and social activities. Carbon pollution and renewable energy use do not stop at city limits. The participating local governments recognize that regional collaboration is necessary to implement this plan's actions, track progress, share best practices and support each other. This collaboration:

- Enables the use of similar incentives and restrictions, thus avoiding confusion
- Helps residents and businesses understand and take advantage of programs
- Helps local governments learn from and build on each others' successes
- Helps local governments find best practices from outside the region and adapt to local contexts
- Helps small local governments maximize their staff resources
- Creates opportunities for bulk purchases for equipment and materials
- Creates space and social capital for increased regional collaboration on climate change research, planning, initiatives

The collaboration around this plan was led by local government representatives, both elected and staff, of the West Kootenay Renewable Energy Working Group, who met once every one to two months throughout the planning process. As new communities passed resolutions for the 100% renewable energy transition by 2050 they joined the Working Group. A complete list of Working Group members is in Appendix V. This group was coordinated and facilitated by the West Kootenay EcoSociety with ongoing input and participation from the Community Energy Association and Renewable Cities.



Although the COVID-19 impacts are daunting, the crisis has provided some insights that can also be applied to the future disruptions, including those brought on by climate change:

1. People are more conscious than ever before about how their choices affect others and vice-versa.
2. The COVID-19 pandemic has forced policy makers and citizens to adopt more agile management strategies - we're making smaller experiments and adapting our actions on a short term basis rather than making big plans and hoping they pan out.
3. We have a new appreciation for the role of government in coordinating information, giving advice, and directing resources during a crisis.
4. Working remotely has emerged as a viable option for many businesses, and has the potential to significantly reduce vehicle emissions and overall traffic congestion moving forward.
5. As a society, we rely on each other to meet our basic needs, and we support programs and opportunities to help each other.
6. Many Canadians reportedly expect broad transformations to emerge from the pandemic, including greater focus on health and well-being. Leaders have the mandate to make changes to avoid going back to business-as-usual.

Elected officials and project partners engaged citizens in the design and development of this plan to help ensure that this plan addresses the needs and concerns of all community members. Workshops in Rossland, New Denver, Silverton, Slocan, Castlegar, Warfield and Nelson engaged community members and stakeholders before the COVID-19 pandemic shifted all engagement efforts online in Spring of 2020. The complete outputs from the workshops can be read in Appendix IV. Plans had been developed for in-person workshops in Kaslo and across the Regional District of Central rural areas, but the pandemic forced these to be cancelled for public health and safety.



Community members across the West Kootenays then had the opportunity to participate in an online survey. In both the online and in-person settings, members of the public shared their visions of how their communities can achieve 100% renewable energy, and what those actions might mean for daily life in the West Kootenays. West Kootenay Renewable Energy Working Group members incorporated these concepts into actions for each local government. More detailed community feedback can be found in each Local Government section in Part 3. In addition, committees of community experts reviewed the community actions. Committees on Equity, Diversity, and Inclusion and on Worker Transition also provided invaluable advice and input for the whole plan. For a list of community experts who provided input see Appendix IV.

Finally, the public was invited to a series of online meetings in November 2020 to learn about the plan, give feedback and provide insight into implementation priorities. Themes that arose included enthusiasm for implementation, concern about cost to community members and local governments, and community-specific suggestions for implementation tactics. In addition, over 400 people in the region participate in an online survey about implementation priorities and feedback. Community-specific results can be found in community sections of Part 3, and more information about the survey can be found in Appendix VIII.

Next Steps

The effort and momentum that brought this plan together reflect the concerns and needs of the residents of the West Kootenays, the leaders they have elected, and the staff the local governments have employed. While this plan was being drafted, the COVID-19 pandemic brought new perspective to the need for collaborative emergency planning and preparation. The pandemic also reinforces that we are planning for an increasingly unpredictable future due to the unknown scope and duration of COVID-19 impacts as well as from global warming and technological advancement. In Part 2, this Plan describes how actions in buildings, transportation, waste, and energy can help maintain and increase the health, safety, vibrancy, prosperity, and sustainability of the communities of the West Kootenay. As the future unfolds, new opportunities and obstacles will certainly arise. The hope is that the deep collaboration built into this plan carries forward and helps communities both survive and thrive while meeting their 100% renewable energy vision.



To bring this plan to fruition, the elected body of each local government will adopt the plans with an official vote. Once the local governments adopt the plan, staff at local governments will incorporate West Kootenay 100% Renewable Energy Plan actions into their respective official community plans, bylaws, and other policies, which will lead to the development of relevant initiatives and infrastructure. Local governments will approve projects through annual budgets and work plans and direct staff to implement them. The West Kootenay Renewable Energy Working Group will continue to collaborate on joint implementation, problem solving, outreach, resources sharing, impact monitoring and advocacy initiatives.





Part 2: The Big Moves

In order to achieve 100% renewable energy by 2050, some big moves are going to be necessary. These big moves will also save energy and money over time, and add to the health, safety, and quality of life of community members. When fully implemented, the West Kootenay 100% Renewable Energy Plan will result in many benefits including: more comfortable space to live and work in energy-efficient houses and workplaces; less air and noise pollution with quieter and more efficient cars and trucks; more accessible communities and healthier and active residents through better and easier walking and biking paths; and more affordable and accessible transportation with more regular and electrified public transit service. The Community Energy Association developed the Big Moves as a framework for local policy, infrastructure, and outreach actions to reduce the threat of climate change and have been adapted and adopted by local governments across the country.





2.1: Transportation Moves

Projected changes in transportation-related carbon pollution are based on reductions related to each of the three Big Moves in the Transportation sector:



Electrifying the Car



Moving Beyond the Car: Active Transportation and Public Trans



Eliminating Emissions from Commercial Vehicles

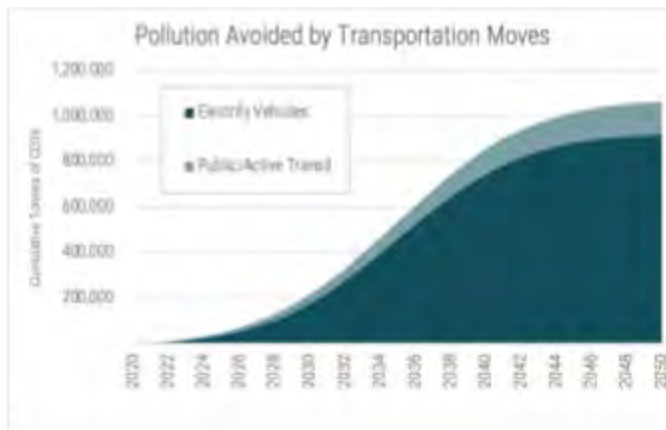
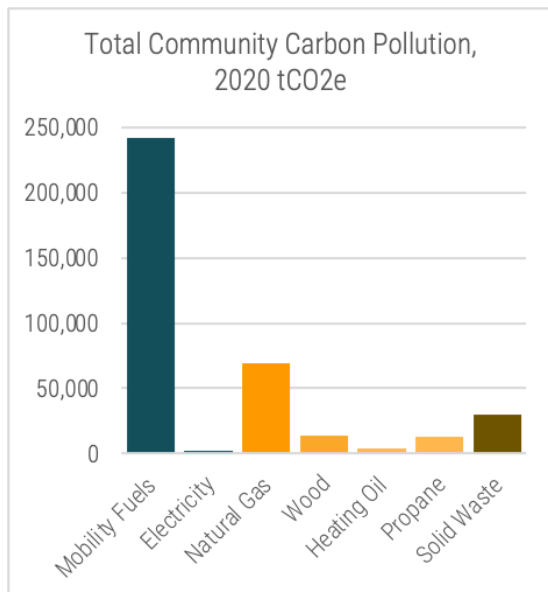
Transportation accounts for more than half of all carbon pollution in the West Kootenays.

Transportation includes passenger vehicles, transit, active transportation, and commercial hauling.

Community	Emissions (tCO2e)	Energy spending	Energy (GJ)
Castlegar	34,995 (63%)	\$19,152,423 (40%)	538,867 (43%)
Kaslo	6,378 (83%)	\$6,378 (65%)	97,064 (76%)
Nelson	46,342 (59%)	\$25,317,990 (61%)	712,340 (38%)
New Denver	2,782 (81%)	\$1,501,209 (61%)	42,238 (84%)
RDCK	133,530 (70%)	\$72,159,717 (59%)	2,030,266 (60%)
Rossland	13,905 (54%)	\$7,598,617 (62%)	213,793 (39%)
Silverton	318 (56%)	\$169,427 (36%)	4,767 (55%)
Slocan	1,612 (75%)	\$873,267 (58%)	24,570 (66%)
Warfield	6,735 (57%)	\$3,694,415 (67%)	103,945 (45%)

This table shows what share of a community's carbon pollution, energy spending, and total energy use come from transportation





Above: Tonnes of carbon pollution from transportation that can be avoided with the actions in this plan, cumulative by year
Left: Total Carbon Pollution for all participating local governments as of 2020, broken out by source.

The overall population density of the West Kootenay region is relatively low, making personal vehicles an important mode of transportation. The transportation network is heavily constrained by topography, with arterial highways on valley bottoms beside water bodies. Although remote work is a growing sector and active transportation is an important mode in some communities, most workers drive to their place of work. Commercial supply chains are served primarily by medium duty and heavy duty commercial vehicles.

Modes of commuting in participating communities, 2016

Community (# of commuters)	Passenger Vehicle, Driver alone	Passenger Vehicle, Carpool	Transit	Active	Other
Castlegar (2,975)	75%	12%	2%	9%	2%
Kaslo (285)	54%	11%	0%	35%	4%
Nelson (3,950)	48%	15%	2%	34%	2%
New Denver (120)	63%	0%	0%	38%	0%
RDCK (18,815)*	69%	13%	1%	15%	2%
Rossland (1,475)	69%	13%	1%	15%	1%



Silverton (35)	57%	29%	0%	0%	0%
Slocan (75)	53%	0%	0%	47%	0%
Warfield (690)	78%	12%	3%	6%	1%
BC (1,766,965)	63%	11%	14%	10%	1%
* RDCK data includes incorporated communities as well as rural areas. StatsCanada, 2016					

Vision

By 2050, people, goods, and services moving around the West Kootenays will generate no carbon pollution. All energy for transportation comes from 100% renewable energy sources. Vehicles using internal combustion engines run on renewable fuels. Everyone can get to work, school, child care, and medical appointments regardless of income. A seamless, affordable, and integrated mobility system prioritizes active and low-carbon transportation including walking, biking, public transit and shared electric mobility options. Residents live in well-designed neighbourhoods with attractive amenities in their municipalities. Residents living in rural areas are connected to each other and municipalities through transportation fueled with 100% renewable energy.

The West Kootenay 100% Renewable Energy Plan provides tools and strategies for shifting beyond the car through a) active transportation, ride- and load-sharing, remote work and transit; b) gradual transition of passenger and vehicles to electricity and renewable natural gas; and c) transition to renewable sources and methods for commercial vehicles.



- Limited selection of electric vehicle types (lack of pick-up trucks, vans, and AWD models for snowy, mountainous terrain, etc)
- Need to integrate new charging stations carefully into communities to reduce wait times and avoid disruptions to parking and traffic patterns
- Some residents rely on street parking (so-called “garage orphans”) and may not be able to charge their vehicles at home

Opportunities for Vehicle Electrification

- Provincial legislation phases in zero-emissions vehicle requirements
- Long-term costs of operation and ownership are lower
- Electric vehicles allow people to maintain similar transportation habits and ownership models with low/no emissions
- Option for EVs to serve as batteries for homes and to utilize off-peak hydro generation
- Kootenay Carshare Cooperative offers several EVs, which supports community access with lower financial and infrastructural barriers
- Kootenay Carshare Cooperative’s Peer-to-Peer vehicle sharing allows EV owners to offset their costs by getting paid to share their vehicle on their network.
- Relatively few days of extreme cold
- New EV designs being developed every year
- Users of EV charging stations are a captive market for local businesses
- Autonomous EVs can alleviate parking and traffic difficulties
- Hybrid and plug-in hybrid vehicles offer more vehicle types and can address some of the challenges in the short term



Examples of Actions that Communities Can Pursue

Minimal	Mid-Level 1	Mid-Level 2	Full Deployment
Policy examples			
	Establish renewable energy and low-carbon procurement policy for local government fleet including lifecycle costs and social costs of carbon	Require 100% new non-street parking to be electrified	Institute EV-only parking in core areas
Infrastructure Actions			
Develop an EV charging strategy	EV charging strategy	Leverage grants to deploy a network of Level 2 public charging stations at local government sites	Deploy L2 charging hubs to support people without home charging capability
Outreach examples			
Builder/developer education on EV charging for large and small buildings, time of permit information, advise local groups of EV outreach incentives from emotive	Create incentives for new buildings to be EV ready	Staffed outreach capacity for builders, public, auto dealers, incent ride-hailing operators to switch to EV's	Partner with neighboring communities on ongoing active outreach to public and dealers
To see the actions that a given community has selected, view their list of actions .			





Shift Beyond the Car

Key Concepts

- Public and active transportation are widely used in many communities. Increased convenience, safety and comfort can increase usership.
- For people who need cars for some of their trips, park-and-ride facilities and ridesharing services can reduce the number of trips and the length of car trips.
- Advances in battery technology are dramatically changing the way that people use bikes, scooters, carts, skateboards, and other personal mobility devices.

Impacts

- **Health:** Walking, cycling, and other modes of active transportation improves physical health which can lead to a reduction in heart disease, diabetes, and cancers. Regular exercise is also connected to an improvement in mental health including reduced depression and anxiety. Reduced car traffic makes streets safer for other users.
- **Economy:** Active transportation supports local shops and stores. Public transportation provides local jobs in driving vehicles and maintaining fleets. Fewer car miles travelled means less local tax money is spent on road maintenance.
- **Community Resilience:** Fewer cars on the streets makes more room for other uses, including other forms of transportation as well as patios, outdoor art installations, and street fairs. Public and active transportation promote social interaction and build community cohesion.



Actions

- Update Official Community Plans and zoning bylaws to create incentives for public and active transportation connections
- Create multi-mode park-and-ride facilities and all-access paths and routes
- Deliver education and incentives programs for public and active transportation

Although electric vehicles offer significant advantages over gasoline-powered vehicles, not everyone in the West Kootenays wants, needs, or owns a personal vehicle. Ride-sharing has a long tradition in the West Kootenay, and improved options for public transportation and self-propelled transportation can reduce the need for additional electricity generation as well as supporting the health and quality of life for residents. Personal vehicles not only waste energy and pollute the air; they also make neighbourhoods noisier and less safe for seniors, children, pets, and pedestrians. Creating more options for public transit and active transportation can help realize a vision of more enjoyable, healthy, and social communities.

Active Transportation

Walking, biking, rollerblading, skateboarding, or otherwise propelling oneself on one's errands has a range of personal and community benefits, including reducing carbon pollution. Active transportation reduces other forms of air and water pollution like carbon monoxide and heavy metals, while reducing the likelihood of chronic and sometimes fatal diseases like diabetes, heart disease, and depression. Fewer car trips also means fewer vehicle accidents, less noise, and safer streets for seniors, children, pets, and pedestrians. Active transportation requires infrastructure, which may include trails, lanes, or sidewalks as well as streets, and protected infrastructure which separates cars from other users increases safety, comfort, and use. Smaller communities with less vehicle traffic may

To meet the community's 2030 energy target, how many kilometers of car travel need to be avoided through public and active transportation (per person per year)?

Castlegar	890
Nelson	830
Rossland	870
Warfield	820
Kaslo, New Denver, Silverton, Slocan	20% increase in remote work



not require new infrastructure because existing streets are adequate and safe for mixed transportation modes. Living close to daily needs like work, school, shopping, and recreation makes active transportation easier. Local governments can help direct new housing and commercial development toward existing neighbourhoods to encourage walkability, and they can develop and maintain trails, paths, and streets that are safe for multiple uses.

Complete Streets

Complete streets provide safe and enjoyable transportation for a variety of transportation modes and ensure access for people of all ages and abilities.



Car-Oriented Street



Complete Street

Active Transportation: Where Are We Now?

According to the 2016 census, the communities in the West Kootenays have a higher use of active transportation for commuting purposes than BC as a whole (21% for our communities vs 10% for BC). West Kootenay communities are relatively small, so people who work and live in the same community often have the opportunity to walk or ride a bicycle to work. For shopping and recreation, however, smaller communities do not have as many amenities like restaurants, stores, and theatres; cars are an important part of the transportation network.

In rural areas, where approximately 60% of RDCK residents live, additional active transportation infrastructure is relatively expensive compared to the number of people who live close enough to use it. In many cases, distances between houses and essential services like groceries and employment are farther than residents are able to walk or cycle. The rapid uptake of electric bicycles is making active transportation more feasible (especially during snow-free months) for



Examples of Actions that Communities Can Pursue for Transportation

Minimal	Mid-Level 1	Mid-Level 2	Full Deployment
Policy examples			
Refresh Active Transportation plans	Create incentives for active transportation through parking requirements and fees	Require new subdivisions to include walking and bike paths	Require new development to have higher walk scores and lower emissions than the community average
Infrastructure examples			
Improve bike parking and security options especially at Park-and-Ride locations	Design and build new walking and cycling infrastructure, including “complete streets” and car-free zones.	Create safe active transportation routes connecting neighbourhoods to major destinations	Connect all neighbourhoods to active transportation paths
Outreach examples			
Hold public events to support and encourage active transportation	Conduct a community survey on transportation	Educate all transportation users to more safely share the road	Create a collaborative regional active transportation outreach program
To see the actions that a given community has selected, view their list of actions .			

Public Transit

Public transit creates cost-effective connections between and within communities and offers affordable transportation, especially with subsidized fares for targeted riders. Frequent service and strategic location of routes and stops are critical for increasing ridership. BC Transit, in partnership with local government through the West Kootenay Transit Committee, provides for planning, marketing, fleet management, funding and contracting for transit services. “Local governments share in the funding responsibilities, approve all service plans and tariffs, account for revenue, maintain local transit infrastructure (e.g., bus stops, exchanges, shelters and benches) and market local ridership benefits and programs.”¹¹

¹¹ ([Regional Transit System | Funding and Governance | BC Transit](#)).



Public transit can present challenges in rural areas when it comes to efficiency and travel times. Higher density makes transit more efficient because every bus stop might have hundreds of people living in easy walking distance, or provide access to dozens of shopping destinations and workplaces. Transit ridership increases dramatically when transit stops are within 400m of a person's destination.¹² In areas with fewer houses and destinations per acre, more stops are needed to reduce walking distance. Adding stops adds travel time, which is another important factor, especially with relatively long distances between communities as in the West Kootenay Region. Through land use planning, local governments can support more and better transit service by allowing and encouraging higher density development near transit nodes and close to existing commercial areas.

People living in less populated areas may find it difficult to avoid relying on personal cars for daily errands due to the distance between houses, and between houses and essential services and employment. The current network and schedule does not meet many families' daily needs, and expanding service in rural areas is expensive due to the high fixed costs (labour, fuel, and maintenance) and low number of potential users to pay fares. In other words, adding more routes and scheduled trips costs much more than they are likely to generate in fares. Subsidies for these routes must be balanced against other budgetary needs that might have more benefit to residents in these areas of the region. Local governments can support community-based solutions such as Kootenay Rideshare and informal ride- and load-sharing practices to help to mitigate some of these challenges.

Public Transit: Where Are We Now?

Since 2013, transit ridership in the West Kootenay region has risen by 30 per cent. The regional system now carries over 460,000 passengers per year.¹³ The BC Transit system serves a significant portion of the population of the region but excludes some rural residents, particularly north of Meadow Creek and along the east shore of Kootenay Lake. Frequency increases on some routes during peak travel times, and varies from 15 minutes between busses to just under an hour for several of the most popular routes to semi-weekly for more remote areas.

¹² El-Geneidy, A., Grimsrud, M., Wasfi, R., Tétreault, P., & Surprenant⁴³ Legault, J. (2014). New evidence on walking distances to transit stops: Identifying redundancies and gaps 44 using variable service areas. *Transportation*, 41(1), 193-210. accessed at http://tram.mcgill.ca/Research/Publications/Transit_service_area.pdf

¹³ [Views sought on public transit in Trail – BC Local News](#)



BC Transit ridership by operating area.

	Kootenay Boundary		Kootenay Lake West		Nelson	
	2017-18	2018-19	2017-18	2018-19	2017-18	2018-19
Service hours per capita	.61	.61	.26	.28	.73	.74
Passenger trips per capita	11.19	14.06	1.5	1.8	21.21	23.48
Passenger trips per service hour	18.5	22.9	13.0	13.9	29.24	31.87

Census data show that only a small portion (0-3%) of residents of participating communities primarily used transit for their commute in 2016, but data is not available for other uses. In the US, commuting accounts for only 15% of trips compared to nearly half for shopping (45%), and one-quarter for recreation (27%).¹⁴ BC Transit completed a service review of Greater Trail in 2016, and is currently completing a Transit Future Service Plan for Kootenay Lake West (Slocan and Arrow Lakes), Castlegar and Nelson. BC Transit is rolling out a Low Carbon Fleet Program to support provincial targets for greenhouse gas emissions and to align with the CleanBC Plan. Core to this program is a 10-year fleet replacement strategy to replace over 1200 buses and expand the fleet by an additional 350 buses using the potential of advanced GHG reducing technology. In addition, BC Transit is working to roll-out “Smart Bus” technology, including real-time bus location information.

¹⁴ [National Household Travel Survey Daily Travel Quick Facts](#)



Examples of Actions that Communities Can Pursue for Public Transit

Minimal	Mid-Level 1	Mid-Level 2	Full Deployment
Policy examples			
<p>Identify opportunities to increase density, add infill, and ensure mixed uses in OCP and planned developments.</p> <p>Remove/lower cost barriers for targeted users like seniors and students</p>	<p>Create incentives for greater density within walking distance of transit stops, especially endpoints and neighbourhood nodes.</p>	<p>Add additional incentive systems to promote new buildings in existing developed areas.</p>	<p>Require new development to have higher walk scores and lower emissions than the community average</p>
Infrastructure examples			
<p>Refresh the regional transit plan (underway)</p>	<p>Create high-profile car-free zones and “complete streets” which includes design for transit users</p>	<p>Invest in enhanced transit</p> <p>Collaborate with other users to switch from diesel fuel</p>	<p>10-year transit investment program to connect all neighborhoods and connect to other communities</p>
Outreach examples			
<p>Promote awareness of zero-emissions transit options</p>	<p>Conduct survey about travel habits and needs</p>	<p>Create and deliver programs to encourage transit use</p>	<p>Work with other communities to promote transit use</p>
<p>To see the actions that a given community has selected, view their list of actions.</p>			





Big Move: Emissions from Commercial Transportation

Commercial vehicles are the primary method for transporting goods in, out and around the region. Medium- and heavy-duty vehicles such as box trucks and tractor-trailer combinations account for 19% of regional emissions. Local governments do not have jurisdiction over most aspects of commercial vehicle operation, but the West Kootenay 100% Renewable Energy Plan offers tools to incentivize renewable commercial transportation. Options for renewable commercial transportation include trucks powered by electric batteries, hydrogen cells, and renewable natural gas. Of these, natural gas-powered light duty trucks are currently available, and electric (battery) trucks are in development. All of these systems require substantial infrastructure to deliver fuel and refilling stations throughout the region.

Where Are We Now?

Commercial medium- and heavy-duty traffic emits carbon pollution at a rate of about a kilogram of carbon for every 1.7 km. We don't have very much information about how much vehicle traffic there is now as it is difficult to measure. Achieving the 2050 goal will depend heavily on the future availability of commercial vehicle technology and provincial/federal mandates on minimum sales of new commercial vehicles as renewable/low-carbon. Electric commercial vehicles are presently not cost-competitive with conventional vehicles, but some analysts project that cost-effective short- and medium-haul electric trucks will be available in 2025, and long-haul trucks will become cost-effective by 2031.¹⁵ There are presently no provincial requirements for minimum sales of zero-emission commercial vehicles within the CleanBC Plan, though California recently announced a policy phasing in a requirement for zero-emission commercial vehicles.¹⁶ California's leadership may accelerate the timeline for commercial vehicle electrification.

¹⁵ McKinsey & Company, 2017. [What's sparking electric-vehicle adoption in the truck industry?](#)

¹⁶ Green Car Reports, 2020. [California mandate: Commercial trucks go electric starting in 2024, all-EV by 2045](#)



Obstacles to Renewable Commercial Transportation

- Jurisdiction of local governments over commercial vehicle operation is limited
- Limited technology and infrastructure for renewable fuel sources
- Lack of clear direction from Province of BC regarding fuel choice for commercial vehicles
- Historically low fuel prices remove incentives for electrification
- Cold climate limits the opportunities for biodiesel using current technology

Opportunities for Renewable Commercial Transportation

- Existing train service to the West Kootenay region could be expanded
- New technology is emerging rapidly
- Sample legislation in California for electrification of commercial vehicles
- Fortis provides incentives to convert vehicles to compressed natural gas, which could be serviced with renewable natural gas in the future.

Actions that Communities Could Pursue for Commercial Vehicles

Minimal	Mld-Level 1	Mid-Level 2	Full Deployment
Include in evaluation criteria for municipal services (such as snow clearing or garbage collection), an evaluation of programs / plans to reduce transportation based emissions	Engage other heavy / medium duty fleets in the community regarding conversion from diesel to compressed natural gas with renewable natural gas certificates or electrification		
To see the actions that a given community has selected, view their list of actions .			



Equitable and Inclusive Transportation

Transportation is a fundamental need for all people and has profound impacts on quality of life, health and well-being. Transitioning away from conventional gas-powered vehicles on a community-wide scale will reduce the health impacts of air pollution (particulates, ozone, carbon monoxide, etc), and noise pollution for all residents.

Although electric vehicles virtually eliminate air pollution from cars, noise pollution remains a factor. Lower-income people are more likely to be affected by noise pollution since low-income housing in urbanized areas tends to be closer to major highways and arterials. While this proximity makes it easier to live without a car, it also subjects residents to more traffic noise. In addition, the transition to electric vehicles is likely to remain more difficult for people with more limited means. People who access government subsidies for new electric vehicles have the combination of cash and credit needed to buy a new car. When they sell the vehicle, they essentially get to keep the subsidy. An alternative would be to offer cars by rent or lease, or to support carsharing of electric vehicles. Subsidies could also be passed to subsequent buyers as a portion of the resale value, though the mechanism for such a requirement is not obvious. Electrification also poses a challenge for people living in more rural areas, where access to free or subsidized charging stations is more limited, and where a sustained power outage could leave residents stranded if their vehicles can't be charged. A combination of changes to charging behaviour (to avoid relying entirely on home-based charging), improvements to the electrical grid, and renewable-natural-gas-powered generators may be necessary to ensure continued mobility. In addition, most electric vehicles currently available are not suitable for access lanes and driveways that require high clearance or four-wheel drive.

People who can't afford or don't have personal vehicles rely on active transportation and public transit. At the same time, much of the region's most affordable housing is in low-density or outlying areas that are more difficult to serve with public transportation and where active transportation infrastructure is more limited. Ridesharing and car sharing services can play an important role in decreasing carbon pollution in car-dependent areas by reducing the barriers to personal vehicle use. Expanding and increasing park and ride areas can also help make it easier for people to mix transportation methods. Active transportation routes are not always built to accommodate mobility scooters and wheelchairs, and people who rely on these devices have limited options for sharing rides and cars. Policies that create incentives for electric vehicles need to consider their impacts on people who do not have access to electric vehicles and other transportation modes.



Next Steps

Transportation offers a range of opportunities to eliminate carbon pollution and support affordable, vibrant, walkable, and healthy communities in the West Kootenay Region. Local governments play an important role in planning for the future of local communities to support transit and active transportation. Taking steps to promote electric vehicle use, vehicle- and ride-sharing, and fuel switching for commercial vehicles also plays an important role. Although it's important for communities to work in collaboration and mutual support, each community will take policy, infrastructure, and outreach actions that reflect their unique opportunities and challenges. Here are some possible actions that communities can get started on right away:

1. Adopt policies to incentivize installation of electric vehicle charging stations
2. Investigate feasibility of inviting community members for to participate in bulk purchases for personal vehicles and e-bikes
3. Experiment with free transit days and demographics and discounted passes
4. Experiment with dedicating streets or intersections to active transportation
5. Advocate to the provincial government to adopt a timeline for commercial vehicle electrification
6. Advocate to the provincial government for e-bike financing with utilities, especially to promote participation by renters.





2.2: Building Moves

Low Carbon High-Performance Buildings

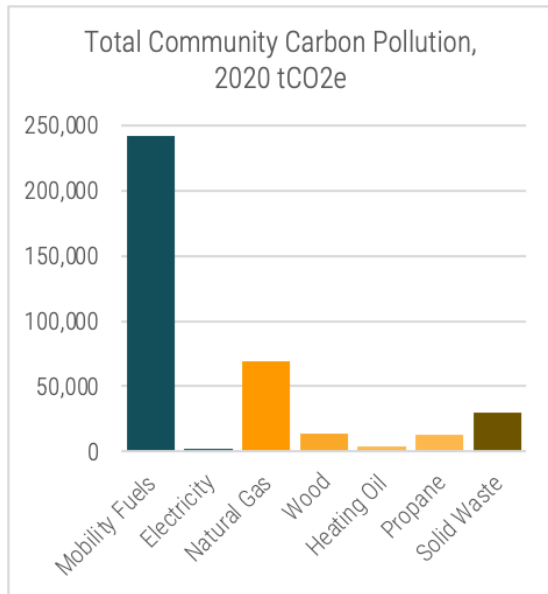
Whether it's a tiny cabin or a sports arena, the places where people live, work, worship and play require energy. Globally, the energy used for heating, cooling, cooking, lighting and other needs accounts for about 28% of all carbon pollution, while construction of new buildings accounts for another 11% of carbon pollution.¹⁷ Reducing or eliminating carbon pollution from buildings saves money for building owners and operators and will be critical for reducing the risks of global warming. In some communities (Nelson and area, Castlegar, Creston, and Salmo), houses are also connected to the natural gas network, and some households throughout the region rely on wood or propane for heating, cooking, lighting, and refrigeration.

2018 % from Buildings	Emissions (tCO2e)	Expense	Energy (GJ)
Castlegar	17,804 (32%)	\$29,206,348 (60%)	1,356,881 (57%)
Kaslo	1,007 (13%)	\$1,892,344 (35%)	31,188 (24%)
Nelson	29,259 (37%)	\$16,511,793 (39%)	1,179,758 (62%)
New Denver	323 (9%)	\$967,701 (39%)	8,295 (16%)
RDCK	40,890 (21%)	\$50,025,404 (41%)	1,356,881 (40%)
Rossland	8,297 (32%)	\$4,678,314 (38%)	332,877 (61%)
Silverton	135 (24%)	\$302,353 (64%)	3,877 (45%)
Slocan	421 (20%)	\$634,866 (42%)	12,524 (34%)
Warfield	3,473 (30%)	\$1,813,607 (33%)	129,596 (55%)

This table shows the percentage of total 2018 emissions, energy expense, and energy use that came from buildings

¹⁷ UNEP 2017. Global Status Report. Accessed 4/20/2020 at https://www.worldqbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf





Two actions that will help reduce carbon pollution and conserve energy from buildings in the West Kootenay region are:



Upgrading existing buildings

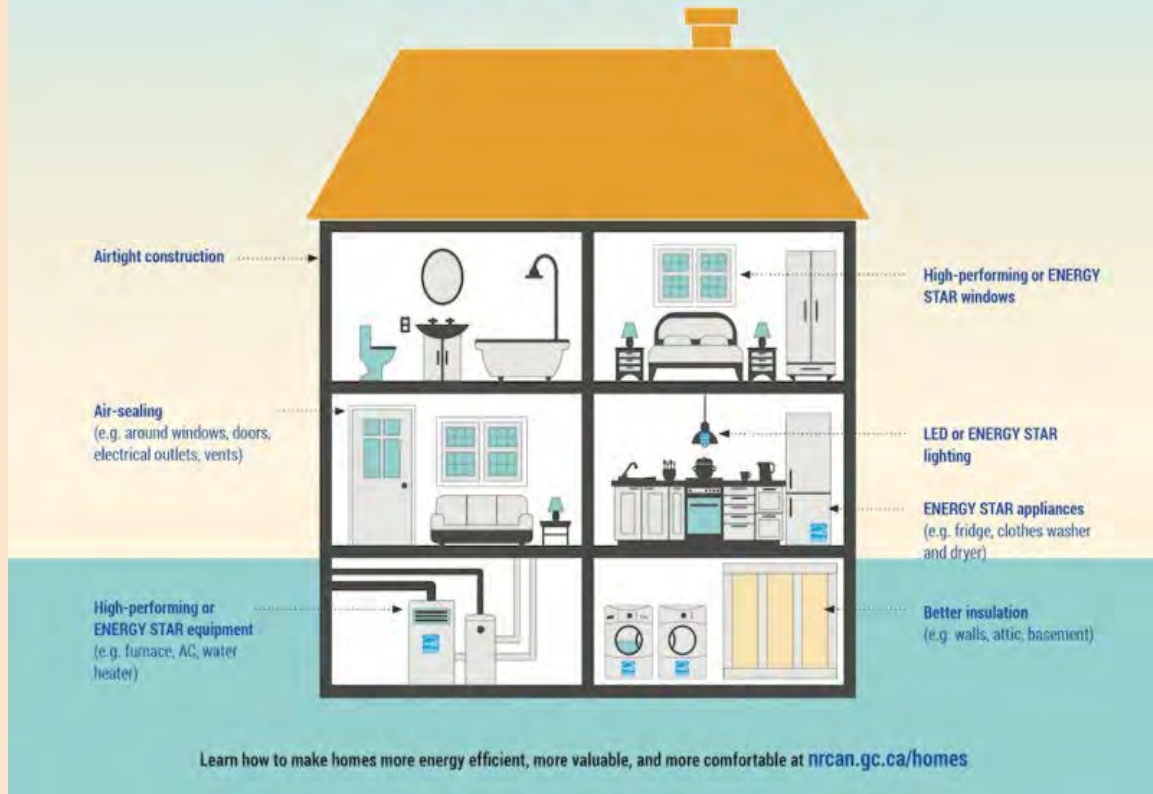


Improving efficiency standards for new buildings

Existing residential and commercial buildings account for more than a quarter of the region’s carbon pollution. Retrofitting these buildings via deep energy retrofits or through targeted improvements (such as windows, insulation and heating appliance upgrades) will enable building owners and tenants to save energy and money. For new buildings, a high standard for efficiency can be reached through a combination of building code, education and incentives. Finally, home and building owners will save money by replacing natural gas and propane with renewable gas or electricity as infrastructure develops and operating costs decline. Local, provincial, and federal agencies have recognized the need for improved buildings, and they offer financial assistance for residential, commercial, and government buildings in partnership with utilities such as BC Hydro, Nelson Hydro and FortisBC.



A house that uses energy more efficiently is a happy home.
What makes a home energy-efficient?



Why it's important to conserve electricity. Although the West Kootenay region produces a lot of clean hydroelectricity (see Section 2.4), we also import electricity from other areas. In addition, there is a risk of running out of clean energy as more buildings and transportation transition to renewable energy from fossil fuels. Adding new energy production creates carbon pollution from construction, so it's wise to conserve.¹⁸

¹⁸ Figure from <https://www.streetsidebc.com/2019/01/an-energy-efficient-streetside/>



Vision

By 2050, the West Kootenay will be home to efficient, renewably powered, high-performance buildings. Building design, operations and management will deliver more sophisticated, comfortable, healthier, low carbon buildings, with far lower energy needs. A locally-based sustainably-sourced building supply industry will strengthen and support our region's leaders in sustainable, high-performance building design and construction.



Actions

- Streamline building permit process for retrofits, especially heat pump installation
- Adopt policies and bylaws to support and standardize energy efficiency retrofits
- Support, promote, and improve regional programs to educate and subsidize homeowners to make building improvements

The historic communities of the West Kootenay feature a blend of heritage and newer buildings. Upgrading historic buildings to retain more of their heating and cooling energy will make an impact in the region's energy use and carbon pollution. Older electric and natural gas heating systems in residential, commercial, and government buildings cost more to operate than newer systems, and some old natural gas systems waste 40% or more on heat that goes right out the chimney. Newer systems, on the other hand, can be up to 97% efficient. In addition to reducing heat wasted through chimneys, buildings can also be upgraded with better windows, air sealing, and insulation to prevent heat from escaping. Although new buildings may waste less energy than existing buildings (if they are built to be efficient), the new materials required can cancel out some or all of the gains, especially since newer buildings are often larger than the buildings they replace. Improving our existing buildings is a powerful, high-priority step in the transition to 100% renewable energy.

To meet the community's 2030 target, how many buildings need to be retrofitted to use 33% less energy?

Castlegar	1120
Kaslo	180
Nelson	1520
New Denver	100
RDCK EAs	5540
Rossland	880
Silverton	50
Slocan	60
Warfield	210



Embodied Energy and Life Cycle Analysis

In the example below, House 1 is 18% more efficient than House 2, but because House 1 is larger and used materials with more embodied carbon, House 2 is responsible for 50% less carbon pollution than House 1 over a 20-year period. In order to accurately assess the impact of new materials and technologies, it's necessary to consider all the energy and materials used in their manufacture, transport, installation, operation, and end of life. This assessment is known as Life Cycle Analysis, and the carbon pollution included in the manufacture of the objects is called embodied carbon.

House 1: 3000 ft², materials with high embodied carbon = 37 kg/sq ft; operating efficiency of 4.5 kg/sq ft

- Embodied carbon in materials: 111,000 kg
- Annual carbon pollution: 13,500 kg
- Total pollution after 20 years: 381,000 kg

House 2: 1500 square feet, materials with low embodied carbon = 19 kg/sq ft, operating efficiency of 5.5 kg/sq ft

- Embodied carbon in materials: 28,500 kg
- Annual carbon pollution: 8,250 kg
- Total pollution after 20 years: 193,500 kg ¹⁹

¹⁹ <https://www.sciencedirect.com/science/article/pii/S1364032119306781>



Better Existing Buildings: Where are we now?

The West Kootenays must improve existing (and new) buildings to meet its goals for eliminating carbon pollution by 2050. Programs in the region are actively working in collaboration with utilities and the provincial government to help building owners make improvements. The Province of BC is developing a *retrofit code* to establish standards for building retrofits. While Nelson Hydro provides access to financing for building retrofits for its customers, many more households could benefit from lowering the financial barrier.

In areas with a less reliable electrical grid, homes rely on gas generators and wood stoves during power outages for critical electrical needs and home heating. In the long run, grid reliability must be improved in order for these residents to transition to 100% renewable energy. In the meantime, the most cost- and energy-efficient long-term option for many of these homes would be to:

1. Dramatically improve energy efficiency (heat retention) through insulation and air sealing
2. Install a modern, cold-weather heat pump, which saves 30-40% on heating costs compared to baseboard heat and up to 50% compared to electric furnaces
3. Use high-efficiency wood stoves for aesthetic and backup heat purposes
4. Replace gas generators with backup batteries or renewable natural gas generators if and when they become more affordable and worthwhile to the user.

Even if many residents choose not to change their primary heating method, energy efficiency improvements can improve the quality of their lives through increased comfort, and decreased investment of time and money in heating the home. In order to facilitate these improvements, residents need access to qualified contractors to make efficiency improvements and to properly configure heat pump systems (including protection from electrical surges and outages). Many residents will also need financial assistance in the form of subsidies and loans to make these significant investments. Major progress toward 100% renewable energy is possible even with the limitations of the existing electrical grid.



Lowering financial barriers

The Eco-Save program from the City of Nelson and Nelson Hydro (a city-owned electrical utility) allows customers to borrow money for energy efficiency improvements at attractive interest rates and make payments on their utility bill. Since energy savings will often offset the initial cost of the improvement over time, this innovative process helps homeowners to improve their homes with little or no change in their monthly expenses. The on-bill financing also has the advantage of removing barriers for people with less access to credit from traditional lending institutions.

Property-assessed Clean Energy financing (PACE) is a similar concept that allows homeowners to finance their energy retrofits on their property tax assessment. Current Provincial law does not allow this type of financing, so legislative action is needed.

Obstacles to Better Existing Buildings

- Most people don't have a thorough understanding of the benefits, subsidies, and decreasing costs of energy retrofits.
- Energy prices are very low, and people often don't account for the likelihood that energy prices will rise, making efficiency increasingly worthwhile.
- People consider wood heat to be essentially free if you're willing and able to cut it yourself, making even very efficient electric heat expensive by comparison
- Many homeowners and renters are wary of increased upfront costs even when long term savings more than make up for them.
- Home and building sale prices don't accurately reflect the relative value of higher efficiency. Due to the economic impacts of the COVID-19 pandemic, building owners may have less ability to pay for upgrades in the near future.
- There are a lot of older buildings that need retrofits.
- Retrofitting can be expensive, especially with heritage buildings.



- Existing rebates and incentives don't account for some facts about our rural area:
 - Many residents burn wood or oil for their primary heat source
 - It's not always possible to find a contractor to do the work
- BC does not have enabling legislation for Property Assessed Clean Energy financing.

Opportunities for Better Existing Buildings

- There are a lot of older buildings that can be improved.
- There is a local history of improving buildings by training and employing local tradespeople.
- Some inexpensive retrofits like air sealing can make a big difference.
- Innovative retrofit programs within the West Kootenay region have proven their effectiveness
- Retrofit subsidies can support employment opportunities as part of a COVID-19 recovery program.
- Local examples of creative financing are leading the way.

Success story: Regional Energy Efficiency Program

The Regional District of Central Kootenay has worked with partners at the Nelson Hydro and Community Energy Association to develop the Regional Energy Efficiency Program (REEP) to reduce carbon pollution. This program is for homeowners and renters looking to renovate their buildings, as well as people building new homes.

Through REEP, residents of the RDCK can access low-cost energy evaluations to find out which energy efficiency upgrades can be done to their homes to reduce carbon pollution while reducing the energy needs of the house. Residents can then access rebates, financing options, and a list of contractors to work with to make upgrades to their homes.²⁰

²⁰ RDCK REEP: [Home Renovation](#)



For people building new homes, the REEP program provides valuable information and advice. This includes:

- How to approach planning the construction of a new home
- Costs, benefits and incentives for working with a Certified Energy Advisor
- Understanding the Energy Step Code
- How to achieve a highly energy efficient new home
- What rebates are available for energy efficient technologies, measures and products.²¹

Examples of Actions that Communities Can Pursue for Existing Buildings

Minimal	Mid-Level 1	Mid-Level 2	Full Deployment
Policy examples			
	Integrate EnerGuide assessments in renovation permits Streamline permitting and ease bylaws to encourage heat pump installation	Provide property-linked financing for deep energy efficiency retrofits	Adopt 'retrofit code' when it becomes available
Outreach examples			
Educate realtors on energy efficiency and clean heat options	Encourage building envelope improvements through education	Collaborate with local governments in the region on a coordinated 10-year campaign to promote fuel-switching from natural gas to heat pumps	Engage natural gas utility to secure permanent, locked in 100% renewable natural gas commitments
To see the actions that a given community has selected, view their list of actions .			

²¹ RDCK REEP: [New Home](#)





Big Move: Better New Buildings

Key Concepts

- Clean BC will mandate increased energy efficiency for all new buildings across the province by 2024 through the Step Code.
- Local governments have the option to accelerate Step Code adoption, which will start saving energy and pollution sooner.
- High-efficiency new buildings make up for higher construction costs within a relatively short time (3-7 years)
- Home buyers are increasingly sensitive to the energy costs of buildings

Impacts

Health: More efficient new buildings have better air quality.

Economy: Less money spent on energy bills means more money for other needs. Short term investments in energy efficiency pay off for many years.

Community Resilience: More efficient buildings mean less energy use, especially in abnormally hot or cold years. Buildings that use less energy than they can create means they can generate local renewable energy for other needs.

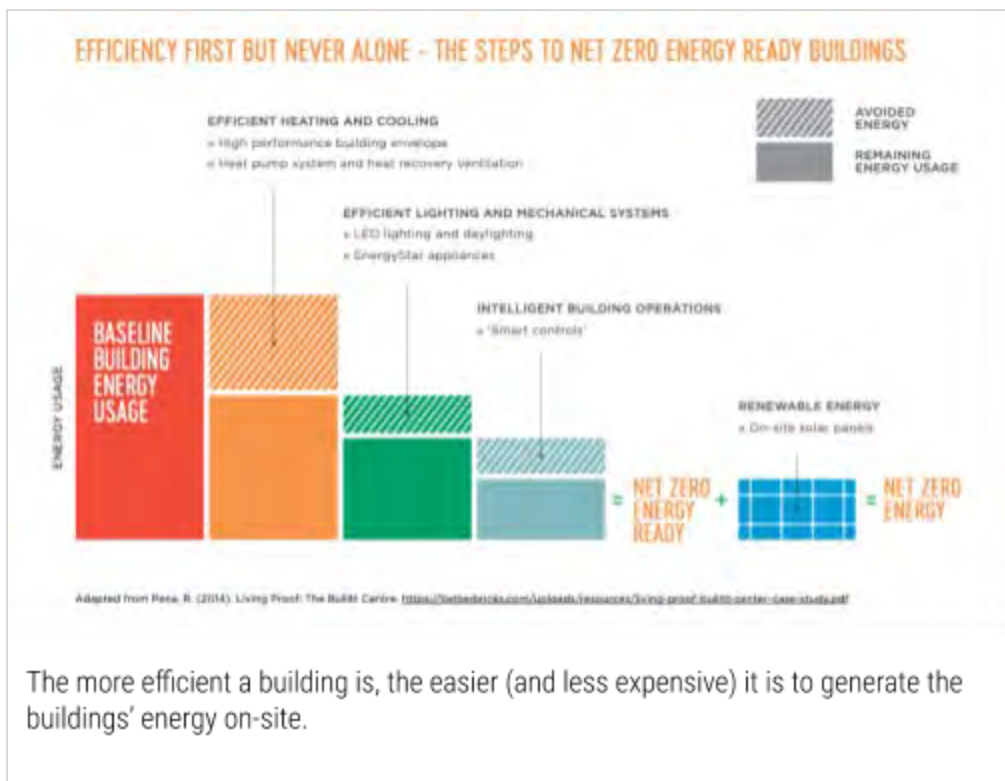
Actions

- Adopt the BC Step Code in advance of Provincial deadlines.

The West Kootenay Region can expect 2% of potential reduction in carbon pollution to come from Increased efficiency in new buildings at the current rate of new construction. Local governments can control where and what type of buildings are constructed, while construction methods and efficiency requirements are largely set by the province. British Columbia introduced the BC Energy Efficient Step Code in 2017 to transition all new buildings to Net Zero Energy by 2032. The first step to net zero energy buildings is to make buildings more efficient - the less energy a building



uses, the less energy the building will need to generate with solar panels. Although the carbon pollution from the operation of new buildings may be much less than existing buildings, the construction materials and processes create pollution too; choosing low carbon materials and methods can help reduce the waste created in the construction process. Finally, new buildings can also be constructed in a way to be more adaptable to how energy may be produced in the future. For example, current solar panels are not cost efficient for some buildings with poor sun exposure, but as solar panel technology improves, it might make sense to add them in the future. It's often much less expensive to install wiring when a building is being constructed than retrofitting afterward.



Where are we now?

The BC Energy Step Code does not specify how to construct a building, but identifies an energy-efficiency goal that must be met and lets the designer/builder decide how to meet it. To comply with the BC Energy Step Code, builders/home owners must work with energy advisors who utilize energy modelling software and on-site testing to demonstrate that both their design and the constructed building meet the requirements and provide recommendations for energy



efficiency measures. Although the BC Energy Step Code is currently a voluntary standard across B.C., it will be adopted into BC building code in 2022. In addition, local governments can choose to require or encourage builders to meet one or more steps of the BC Energy Step Code as an alternative to the BC Building Code's prescriptive requirements. As of March 2020, 64 local governments in BC are consulting with the province to adopt the BC Energy Step Code in some way, including Castlegar, Kaslo, Nelson, New Denver, RDCK, Rossland, and Slocan. Other local governments also have policies and programs in place to encourage efficient new buildings, such as the RDCK's Regional Energy Efficiency Program. In addition, utility providers offer a variety of incentives for buildings which meet higher Step Code goals.

Relative to income, housing is expensive throughout the region, and anecdotal evidence indicates that housing prices are going up. Prices for labour and materials seem to have increased as well. Building energy efficiency into new homes as required by step code reduces operating costs for homeowners, but buyers must weigh efficiency along with many other factors affecting home price, including size, location, and build quality. Unless potential buyers are willing to either pay more or forego other features, builders may experience lower profit margin on new construction. Local governments can reduce the risk for builders by adopting accelerated step code to ensure all new buildings meet the same requirements, and by coordinating timing of step code adoption with neighbouring communities to avoid regulatory discrepancies.

In unincorporated areas, new buildings are more likely to be custom homes and more likely to be owner-built. Potential builders face the same tradeoffs of cost, efficiency, material cost, and size as within municipal boundaries, but may also face more uncertainty about future buyers' willingness to pay. Step code and energuide ratings can help increase return on investment for these builders, too, by providing potential buyers a third-party assessment of the home's energy efficiency. Especially in areas without natural gas, electric heating can be prohibitively expensive, making energy efficiency an even more valuable asset for the home.

CleanBC and Better New Buildings

CleanBC's goal for reaching an 80% reduction in carbon pollution includes many actions relating to new and existing buildings in the Province. Each dollar invested in energy efficiency generates up to four times that amount in economic growth.²² Though high-efficiency buildings can cost

²² Clean Energy Canada, 2018. [The Economic Impact of Improved Energy Efficiency in Canada](#).



more upfront, homeowners and commercial building owners save money in the long run due to reduced utility costs and live and work more comfortably inside their buildings. In order to shift the market toward buildings that produce far less carbon pollution, the Province has developed the BC Energy Step Code, which will require new buildings to reach levels of efficiency above the BC Building Code:

- Step 1: 20% more efficient by 2022
- Step 2: 40% more efficient by 2027
- Step 3: 80% more efficient by 2032

Once a building reaches 80% greater efficiency than the current BC Building Code standard, it is considered net-zero energy ready. This means that when solar or other local renewable sources of energy are added to the building, the building will likely be able to supply as much energy as it consumes. There are many actions that the provincial government has taken to reach these goals, and further reduce carbon pollution by 2.0 Mt by 2030. Some of these actions include:

- Rebates for people who are building and renovating
- By 2025, new standards will be in place for space and water heaters, and windows; improving on 2018 updates for lights, air source heat pumps and natural gas fireplaces

Obstacles to Better New Buildings

- Efficiency improvements increase initial cost of new buildings while need for more affordable housing creates urgency for low construction cost
- Some community members are concerned about Smart Controls for residential buildings due to potential loss of privacy and loss of functionality during power outages
- Pace of new construction may decrease substantially due to COVID-19 impacts
- New buildings add carbon pollution from construction processes and materials (embodied energy) even when the resulting buildings are highly efficient.
- Residents in rural areas sometimes have difficulty finding qualified builders.
- The need for more energy efficient design puts some limitations on design freedom.
- Some people in the region are opposed to Step Code.
- Home buyers aren't necessarily willing to pay more for a more efficient building.
- Residents and builders don't realize how little it costs to meet step 3 compared to the building code, especially considering the energy and cost savings down the road.



Opportunities for Better New Buildings

- Provincial, regional, and local incentive programs.
- BC Energy Step Code provides framework for local governments for increasing building efficiency beyond provincial requirements sooner than they will be legislated.
- Selkirk College offers existing training programs that could help train workers to build more efficient buildings.

Success Story: Bedford RoadHouse Passive House

The Bedford RoadHouse is a certified Passive House Triplex near Nelson BC. The building is a joint venture between Cover Architecture and local design/build, with financial support from the Province of British Columbia and FortisBC. The house features an innovative “core and shell” construction method which allows for extremely low air leakage. In addition, the design of the roof and decks take advantage of winter sun to warm the house while providing needed shade in summer. The efficiency measures increased construction cost of the building by only 10%, while reducing energy use by 80%.



Success Story: Nelson Laneway House Design Competition

Supporting the development of laneway houses in existing neighbourhoods can help a community reduce its carbon pollution. With more people in a smaller area, there are more customers to support nearby shops, more places to walk to, and less reason for communities to sprawl. The City of Nelson hosted a laneway house design competition in 2019 and selected three designs ranging in size from 404 square feet to 850 square feet of living space. Pre-reviewed plans for these laneway houses are available from the City of Nelson to prospective builders for a small fee. This is a great example of a community taking the initiative to push for sustainable development.



The winning design Kootenay Three-Step by Tony Osborn Architecture + Design Inc. from Vancouver, BC.²³

²³ City of Nelson, 2019. [Laneway House Design Competition | Nelson, BC](#)



Examples of Actions that Communities Can Pursue for New Buildings

Minimal	Mid-Level 1	Mid-Level 2	Full Deployment
Policy examples			
Adopt policies and programs to incentivize adoption of higher steps in the BC Step Code	Adopt the Energy Step Code in community-wide bylaws, and commit to adopting Step 3 in advance of 2022. Adopt policy to ensure all new local government facilities are energy efficient and low-emission.	Require builders to pass efficiency testing during construction. Require that all new civic facilities are net-zero emissions in their operations.	Adopt timelines for adopting the highest steps in advance of 2032.
Outreach examples			
Provide information and promote incentive programs Promote and/or provide industry education and training on the Energy Step Code Leverage BC Hydro funding to provide Energy Advisor rebates Educate realtors on energy efficiency and renewable energy	Provide incentives for mid-construction air tightness testing. Provide building permit rebates for achieving steps beyond the base requirement.	Top up provincial incentives for heat pumps to replace fossil-fuel heating systems in new buildings	
To see the actions that a given community has selected, view their list of actions .			



Equitable and Inclusive Buildings

Housing accounts for the greatest single expense for most people in the region, and many people struggle to find housing they can afford. Retrofitting existing buildings requires investment of time and money that some people don't have, and deep retrofits can cost tens of thousands of dollars. Even if incentive programs reduce or eliminate the upfront cost, retrofits currently require commitment of time to coordinate with contractors, research and understand options, and complete forms for applications and rebates. In addition, some people may have personal experience or cultural reasons for being reluctant to invite energy auditors in their homes. Retirees and others living on fixed incomes may find it easier to pay a high utility bill than invest in a new heating system. In addition, renters make up a substantial portion of residents in some parts of the region (23.3% throughout the RDCK area, and up to 38.9% in Nelson).²⁴ Renters typically do not have authority or incentive to make significant investments, even though they would benefit from a lower utility bill. Well-resourced home owners who take advantage of subsidy programs also benefit from increased sale prices, especially as buyers become more willing to pay higher prices for more efficient homes. In short, although incentive programs may help to accelerate home retrofits, in their current structure, they disproportionately benefit homeowners.

Raising the standard for new buildings to be more efficient through the BC Step Code can increase up-front building cost, though the greater energy efficiency starts saving money within about seven years compared to base code. Despite the long-term benefits of energy efficiency and net-zero readiness, the upfront costs could be a factor for someone shopping for their first home, especially if mortgage lenders don't properly value energy efficiency in the assessment process. In the West Kootenay region, there are not very many new homes built each year, and the majority are custom-built (ie not designed for affordability). Meanwhile, all new publicly-funded affordable housing must meet a high standard of efficiency.

²⁴ RDCK 2020. Housing Needs Assessment Report - DRAFT. June 2020 Board report.



Next Steps

Local governments can make a big contribution to reducing energy waste and carbon pollution by supporting energy-saving retrofits and requiring new buildings to meet the highest possible standards for energy savings right away by adopting Step 3 of Energy Step Code, not waiting until they are forced to by other levels of government. Policy tools such as official community plans and by-laws can complement outreach, education, and incentive programs. In addition to the details of each building, how and where the buildings are arranged can also contribute to energy and pollution reduction. Placing new buildings in already-urbanized areas supports public and active transportation, protects farmland and wilderness, and supports more vibrant economic centres. Actions described in each local government section (Part 3) will help communities become more energy efficient, walkable, bikeable, and livable. Here are some actions that local governments can get started on right away:

1. Adopt highest possible step of step code
2. Advocate to the Province of BC to pass enabling legislation for property-assessment financing
3. Provide funding for innovative local experiments in deep retrofit technologies
4. Adopt high-efficiency laneway house design options to accelerate infill housing
5. Apply for federal and regional funding programs for energy efficiency retrofit subsidies
6. Build education and awareness of high performance materials, techniques and products with builders and residents through the region





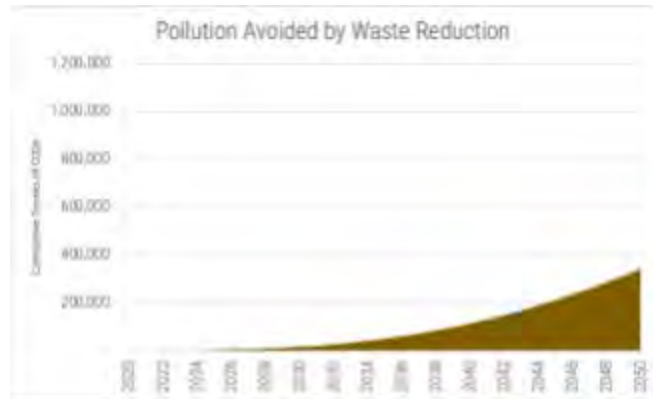
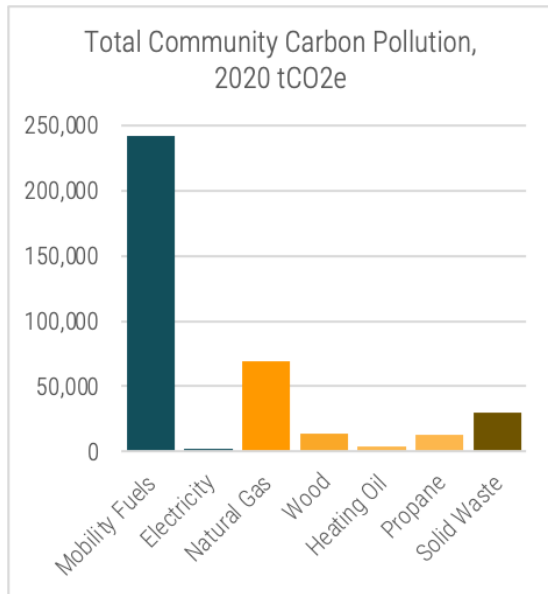
2.3: Zero Waste Actions

Carbon pollution can also come from solid waste (residential and commercial garbage). As organisms grow, they absorb carbon from their food and from the atmosphere. When organisms die and decompose, they leave some carbon in the soil and release carbon either in the form of carbon dioxide (carbon and oxygen) or methane (carbon and hydrogen). Methane is released when organisms break down without access to oxygen, as is the case in landfills, poorly managed compost piles, and renewable natural gas facilities.

2018 Waste	Tonnes of waste	Waste per person (kg)	Community's Carbon pollution (tCO ₂ e)
Castlegar	4,469	522	17,473 (4.5%)
Kaslo	546	542	301 (3.8%)
Nelson	6,359	562	3,501 (4.4%)
New Denver	287	575	315 (9.2%)
RDCK Unincorporated	17,928	556	17,473 (9.1%)
Roseland	2,062	527	3,354 (19.5%)
Silverton	108	533	118 (16.3%)
Slocan	193	642	106 (5.0%)
Warfield	941	536	1,530 (19.3%)

In terms of carbon pollution, the goal of waste and resource recovery is to eliminate the release of methane, which is a more powerful agent of climate change than carbon dioxide. To reduce methane pollution, organic waste can be diverted from landfills to composting facilities, and in some facilities, landfill gas can be captured and used in place of natural gas. The pollution from these sources come from kitchen and yard waste, as well as other biodegradable things such as





discarded clothing, wood and paper. Throughout the West Kootenays, solid waste accounts for about 7% of carbon pollution, with some variation among communities depending on access to and location of landfill and composting facilities.

Key Concepts

- Choosing things that can be repaired, repurposed or recycled saves money and reduces the waste that goes into our landfills.
- Diverting organic waste to compost facilities avoids methane pollution and creates a useful soil amendment.
- Without proper maintenance, backyard composting can contribute methane gas and wildlife conflicts.
- People living in more remote rural areas may have difficulty accessing composting facilities.

Impacts

Health: A circular economy can protect the health of communities by reducing pollution in the air, water and soil by keeping toxins and waste out of landfills.



Economy: Finding ways to keep resources in circulation means economic opportunity for local builders, artisans, and craftspeople. Finding ways to meet local people’s needs with locally available resources keeps money in our local economies.

Community Resilience: Sharing goods and resources can support members of marginalized communities, and reduce reliance on imported goods.

Actions

- Enact policies to support material reclamation, such as deconstruction in place of demolition, trash to treasures days, and more.
- Support regional collaboration to divert and compost organic household, commercial and institutional waste.
- Support home-based composting in rural areas with education and infrastructure resources.

Vision

By 2050, a sustainable, circular economy is the foundation of the West Kootenay Region with close to zero waste. Community members conscientiously reduce, reuse, and recycle. Residents seek out second-hand or locally made items to meet their needs, and avoid creating waste. Organic components of household and commercial waste are diverted to community-scale composting facilities and in some places well-managed backyard systems, with practically zero methane production. Many things traditionally thought of as *waste* have found new uses as *recoverable resources* that can be reused or repurposed, and if not they can be recycled into new materials. Discarded wood, metal and other waste items are available for reuse by artisans, education institutions, innovators and other businesses within the West Kootenays.



Reducing pollution from waste

The most straightforward and efficient way to reduce the carbon pollution from organic waste is to reduce the amount of waste. The average Canadian household throws away 140 kg of food per year, 63% of which could have been eaten.²⁵ More careful shopping and food management could avoid a significant portion of that food waste and resulting carbon pollution. For unavoidable organic waste (including waste resulting from power outages), backyard composting is an accessible and efficient way to avoid having organic material decompose and produce methane in the landfill, but poorly managed compost also results in methane production, which also creates bad smells, attracts animals and annoys neighbours. Community-scale composting provides professional management and maintenance to decrease the likelihood of methane pollution, and also creates opportunities for commercial and institutional buildings to participate. Restaurants, hospitals, and schools, for example, generate enough organic waste that is often difficult or impossible to properly compost on-site. Community-scale composting can also be managed to break down bioplastics and other materials that don't break down in backyard compost piles (though there are considerable challenges with bioplastics). Finally, community-scale composting facilities also present an opportunity to create renewable natural gas.



Composting is a perfect example of how communities can shift toward a more regenerative and sustainable way of thinking about resources, known as the *Circular Economy*. The concept invites community members to find ways to maintain, repurpose and reuse materials rather than using them up and throwing them out, as shown in the “Zero-Waste Hierarchy.” Just as food scraps become compost which helps grow more food, unwanted clothing, building materials, and other items can often find new life as insulation, art or garden projects, and more. The annual trash-to-treasures day observed in many West Kootenay communities complements resource sharing and reselling through online and traditional avenues. The circular economy concept can also be extended to renewable energy, forest products, and more. Finding ways to keep primary

²⁵ Love Food Hate Waste, 2017. [Food Waste in the Home](#)



and secondary products in circulation can have a big impact on pollution from transportation and production as well as stimulating the local economy.



Where Are We Now?

Many residents currently compost in their backyards, and some programs exist to remove organics from institutional and commercial waste streams. For example, the RDCK promotes landfill diversion of yard debris and wood construction waste. Many rural residents may find it difficult or impractical to bring household compost to community composting facilities. For these residents, backyard composting will remain the best way to reduce carbon pollution from solid waste. The primary obstacles they will face in backyard composting are poor ventilation leading to smells and methane production, and wildlife interactions including bears, raccoons, skunks, and rodents. Education and support for proper composting techniques and infrastructure (such as enclosures and electric fencing) can help these residents compost successfully.



Coming soon: Regional composting facilities

In early 2020, the Regional District of Central Kootenay (RDCK) and the Regional District of Kootenay Boundary (RDKB) became partners in the first cross-regional composting program in BC's Interior.

This program is part of the RDCK Organics Waste Diversion Strategy as well as the RDKB Solid Waste Management Plan. The new facility received support from the Low Carbon Economy Leadership Fund, combining funding from the federal, provincial and local levels of government. It will divert thousands of kilograms of kitchen and food waste from landfills across the two regions to a new regional composting facility near Salmo. Funding has also been secured to develop a new composting facility in Creston, as well as expanding the existing compost facility in Grand Forks.

Currently, about 40% of waste that goes to landfill is compostable. To supplement or replace backyard composters, food will be collected and sent to the new regional composting facilities. This will also include organic waste from the commercial sector.

CleanBC and Waste

CleanBC aims to reduce 0.7 Mt of carbon pollution by 2030 by reducing and making better use of waste. This includes funding to help divert 95% of organic waste from landfills for agricultural, industrial and municipal sources of waste, while capturing 75% of landfill gas.



Obstacles to Reducing Carbon Pollution from Waste

- Some community members prefer backyard composting despite wildlife and other concerns
- Educational/information barrier to adopting new composting and recycling practices and buying habits
- Potential for wildlife interactions in urban areas with backyard composting
- Transportation of organics to central location could create carbon pollution without electrification
- Regional composting program are not accessible by 40% of the RDCK due to distance from transfer stations
- Organics diversion requirements will require enforcement
- Embodied carbon not part of this plan and important to address in future iteration

Opportunities to Reduce Carbon Pollution from Waste

- The region enjoys a strong history and culture of re-use and upcycling
- RDCK and RDKB and all municipalities within each district currently working to implement a regional composting facility with secured funding
- Strong tradition of backyard composting in some communities
- Local farms provide a potential destination for recovered organic waste
- Local food production can reduce risk of spoilage during transit while also contributing to food security
- People are doing more gardening thanks to COVID-19, and are interested in acquiring compost as a soil amendment.
- New regional composting facilities can make an instant impact, especially with homeowners, businesses, and institutions which may not have other access to composting facilities



Examples of Actions that Communities Can Pursue for Zero Waste

Minimal	Mid-level 1	Full Deployment
Policy examples		
	Require deconstruction in order to salvage building materials and avoid construction / demolition waste	Ban all residential, commercial, institutional organics (food waste, yard waste) from landfill
Infrastructure examples		
Assessment of community organic waste volumes and feasibility of landfill collection and diversion Evaluate landfill for gas capture options including RNG potential	Build out organic diversion infrastructure and implement curbside collection	Capture (and ideally use rather than flare) landfill gas
Outreach examples		
Education on organic collection and composting; Encourage back-yard composting; Support existing and new capacity for reusable items	Encourage reduction in food waste Encourage buying locally made products, encourage better buying to not create food waste	
To see the actions that a given community has selected, view their list of actions .		

Equitable and Inclusive Waste Reduction

Every household produces organic waste and is affected by waste regulation. Urban residents benefit from curbside waste pickup, as well as access to many more options for re-use and upcycling. Rural residents may prefer backyard composting, especially if they are growing gardens which would benefit from compost. Required participation in regional composting puts a greater burden on rural residents who must transport their waste to the composting facility or transfer station. Increasing the number and distribution of composting drop off sites could help alleviate some of this problem. Meanwhile, diverting construction waste through mandatory deconstruction and resale could help drive down costs for home renovation, including for energy retrofits.



Next Steps

Local residents of the West Kootenays have a strong tradition of community self-reliance, which includes sharing unused resources and finding new uses for old items. As gardeners and farmers, locals also tend to recognize opportunity to turn food waste and scraps into next year's vegetables, though the encroachment of consumer culture has weakened these historic tendencies. Transitioning to community compost can reduce carbon and methane pollution while also creating useful high quality compost for residential, commercial and industrial uses. Meanwhile new technologies and facilities for long-held sharing and re-use habits can help those habits carry on into the future. Here are some actions that local governments can consider implementing right away:

1. Launch composting education program (with Wildsafe BC and local composting experts)
2. Subsidize wildlife-safe compost containers
3. Review and revise bylaws which prohibit or discourage resource recovery (i.e. relating to clothing, non-perishable items)





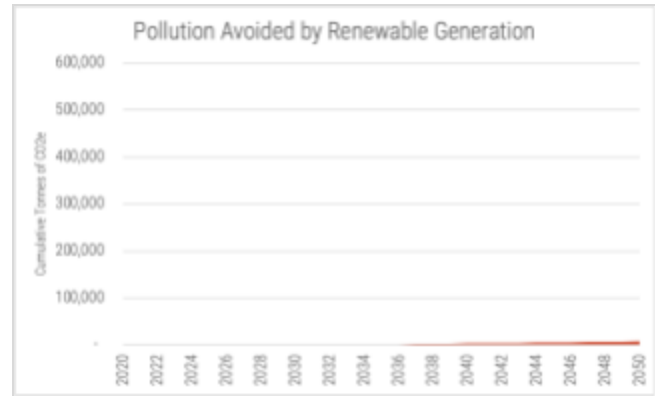
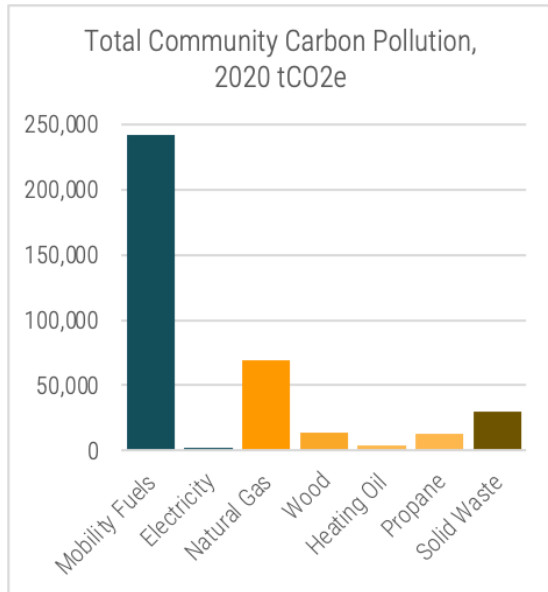
2.4: Generating Energy

In order to phase out carbon-polluting fossil fuels like oil and natural gas, it will be necessary to conserve energy wherever possible and create more renewable energy. Renewable energy comes from sources such as the sun's rays (solar), or the movement of water (hydroelectricity) and air (wind). Plant material can also generate energy such as wood heat, landfill gas, and other biofuels. Renewable electricity can replace coal- and gas-fired generating facilities, and can replace natural gas and propane used for heating and cooking. Renewable electricity will also be an important replacement for gasoline- and diesel-powered vehicles. Although renewable hydroelectricity is relatively abundant in our region, much more electricity will be needed to replace fossil fuels, especially for uses in transportation and heating buildings. This section explores how local West Kootenay communities can generate renewable energy that will help them meet daily needs and promote local resilience.



Carbon Pollution from electricity supply technologies (gCO ₂ eq/kWh)			
Technology	Min.	Median	Max.
Coal	740	820	910
Gas – combined cycle	410	490	650
Biomass – Dedicated	130	230	420*
Solar PV – Utility scale	18	48	180
Solar PV – rooftop	26	41	60
Geothermal	6.0	38	79
Concentrated solar power	8.8	27	63
Hydropower	1.0	24	2200**
Wind Offshore	8.0	12	35
Nuclear	3.7	12	110
Wind Onshore	7.0	11	56

* Does not account for the carbon pollution the plants have absorbed
 ** Largely associated with fossil fuel combustion in the construction of the plant.



Key Concepts In Energy Generation

- The opportunity to reduce carbon pollution through new renewable energy generation is very low (less than .5% of the pollution that can be reduced by this plan).
- Our region already generates more renewable electricity than it uses.
- Increasing renewable electricity generation will not necessarily eliminate imported non-renewable energy because of the way power is bought and sold.
- Although there is a high amount of biomass in the region, most of the available and inexpensive biomass is already in use at local and regional pulp mills, pellet manufacturers, and incinerators.
- Provincial policy makes it difficult for community-scale electric generation to access the electrical grid, despite the potential benefit in alleviating power outages.
- Since our electricity is close to as renewable as it will get, new rooftop solar will only reduce carbon pollution if it replaces natural gas, propane, or other fossil-fuel energy.
- Rooftop solar panels pay for themselves in 12-14 years with current cost and technology.

Impacts

Health: Replacing fossil fuel appliances and furnaces with electric appliances can eliminate health impacts of air pollution. Replacing wood stoves with high efficiency pellet boilers can reduce health impacts of wood smoke while still utilizing local renewable material.

Economy: Installing solar panels and battery systems creates local employment. Bio-energy facilities (like district energy plants) provide local jobs and utilize local resources.

Community Resilience: Solar panels with battery systems displace fossil-fuel generators for people with unreliable electricity service. Local pellet manufacture and district energy systems use local resources to create local energy and rely less on long supply chains.



Actions

- Advocate to the Province of BC to create an exception to the current clean energy policy which prevents local generation from accessing the grid.
- Develop community-scale energy generation to alleviate grid vulnerabilities.
- Explore opportunities to develop a local use for sustainable forestry byproducts

Vision

By 2050, the region's energy needs are met by a mix of clean, renewable sources in a distributed grid that eliminates carbon pollution, promotes energy independence and delivers local community benefits. Technology helps utility companies, residents and businesses to conserve and store energy from intermittent sources.

Generate more renewable energy locally

There are a variety of potential sources of local renewable energy, including solar panels, hydroelectricity, geothermal, wind and biomass. How and whether local communities access this energy depends on factors such as cost, abundance, and the willingness to accept economic and ecosystem impacts.

Energy storage is another important consideration, as many renewable sources don't produce the same amount of electricity at all times. For example, although hydroelectricity produces the same amount of electricity throughout the day and night, there can be significant changes from season to season. Solar panels, on the other hand, only produce energy during daylight hours. Grid connection, battery storage, and load management are ways that utilities and communities can address the storage challenge.



Renewable energy storage solutions

Technology	Advantages	Disadvantages
<p>Grid connection</p> <p>Excess power is sold on the energy market, energy is purchased as needed</p>	<p>Takes advantage of existing infrastructure</p> <p>Helps other areas benefit from renewable energy</p>	<p>Sends energy out of the region</p> <p>Renewable energy may not always be available to purchase</p> <p>Prices can change from selling to purchasing</p>
<p>Batteries</p> <p>Energy can be stored in chemical or physical battery banks, including hydrogen production and pumped water storage</p>	<p>Maintains local control</p>	<p>Energy is used in the storage process</p> <p>Requires new infrastructure investment</p> <p>Chemical batteries require resource-intensive materials and may not be easily recycled or disposed of</p>
<p>Load management</p> <p>Education, price incentives and technology help coordinate timing of peak use with peak production</p>	<p>Easy to understand</p> <p>Technology exists and is not strictly necessary</p> <p>High energy users during off-peak hours become a resource</p>	<p>Hard to predict how users will participate</p> <p>Not likely sufficient on its own</p>

Renewable energy options

Hydroelectricity

Hydroelectricity is by far the most abundant and well-developed renewable energy source in the West Kootenays. The ten major dams and associated powerhouses in the region have 2,615 MW of generating potential, making up about 16% of BC’s total electric capacity (as of 2015).²⁶ In addition, some people in the Kootenays make use of micro-hydro systems for off-grid power. Although the concrete used in the construction of major facilities generates significant carbon pollution, the long lifespan of these facilities may make it less carbon-intensive than some other renewable options. The West Kootenays typically enjoy abundant water flow due to snowmelt and

²⁶ Statistics Canada. Table 127-0009 - [Installed generating capacity by class of electricity producer, annual \(kilowatts\)](#) (accessed: May 2, 2020)



steep terrain, though the seasonal nature of many potential hydroelectric sites creates the need for storage and load management. Water can be held back during peak flow to generate energy later in the season (subject to treaty agreement and reservoir storage capacity).

West Kootenay Hydropower

Dam name	Capacity
Arrow Lakes Generating Station (Keenleyside Dam)	185 MW
Bonnington (lower)	54 MW
Bonnington (upper)	66 MW
Bonnington Falls	16 MW
Brilliant Dam & Expansion	265 MW
Corra Linn dam	49 MW
Kootenay Canal	588 MW
Seven Mile	848 MW
South Slocan	54 MW
Waneta Dam & Expansion	490 MW

In addition to carbon pollution, construction of new hydroelectric facilities has inherent ecological impacts which may limit community support and demand. Impacts range from flooding of reservoirs to dewatering of downstream waterways to site construction impacts. Habitat impacts are significant enough that California, for example, does not consider power from projects larger than 30 MW to be renewable.²⁷ Fortunately, there are four options for increasing hydroelectricity production in the West Kootenays without adding new dams:

1. Install small-scale run-of-river capacity in some of the many suitable locations in the West Kootenays
2. Increase efficiency of existing generating stations
3. Add more generating capacity to existing dams
4. Add generating capacity to dams without turbines (for example, at Duncan Dam)

²⁷ California Energy Commission, [Hydroelectric Power](#)



Solar Power

Solar power is the conversion of the sun's energy into electricity or heat. Photovoltaic (PV) cells convert light into electricity, while other technologies concentrate solar heat to power generators or to warm spaces. Buildings can also be designed to make the most of natural light and heat. Like hydroelectricity, solar energy generation can be shared among many small producers and large utility-scale facilities. Rooftop solar offers the opportunity to convert unused space on rooftops into electricity generation without creating local ecological impacts, while utility-scale solar is more efficient to install and maintain over time. Many households have very low energy use during the day, when solar generation is at its peak. To take full advantage of home-based solar panels, owners can either connect their private system to the grid and sell power to the utility, or install batteries. Selling to the utility ("net metering") takes advantage of the existing electricity infrastructure. While the cost of installing a solar photovoltaic (PV) system for electricity generation has dropped dramatically in recent years, for homeowners in B.C. connected to the BC Hydro electrical system, it can take 12-14 years to recoup the investment at today's average electricity rates.

The current net metering policy allows owners of solar panels to offset their annual electricity bill by the amount they produce, and the utility purchases excess production at wholesale prices. Previously, utilities paid for excess at the retail price, and other jurisdictions have experimented with paying a bonus for solar power. Increasing the purchase price could encourage would-be small-scale hydroelectric and solar electric producers to sell power to the grid, though the cost of such a program might result in increased rates for other users. For example, utilities in California and Arizona have found it difficult to fund necessary maintenance of electricity infrastructure as some electricity customers become electricity suppliers.

Renewable Natural Gas

The primary ingredient in natural gas is methane, which is a naturally occurring compound of carbon and hydrogen that comes from the breakdown of plant and animal matter. Burning methane turns the hydrogen into heat and releases carbon pollution. Currently, the vast majority of natural gas is not renewable because it comes from organisms that lived millions of years ago



and have been buried underground. The BC Ministry of Energy and Mines assessed the energy potential of renewable natural gas (RNG) in 2017, and identified the following potential sources:²⁸

- **Agricultural:** manure and bedding from livestock operations, and crop residues
- **Commercial:** industrial, commercial, and institutional source-separated organics, and wood waste from demolition, land-clearing, and construction
- **Municipal:** residential source-separated organics
- **Wastewater:** sludge from wastewater treatment plants and pulp mills like Celgar
- **Landfills:** waste buried in landfills
- **Forestry:** by-products from industrial forest processes.

When derived from these sources, renewable natural gas is considered carbon neutral because burning the gas has less impact on global warming than simply letting the gas escape into the atmosphere. This is because methane has 62 times the impact on global warming than the same amount of carbon dioxide over a 20-year period.²⁹ Natural gas can generate electricity, heat buildings, and (in compressed form) power vehicles. Fortis BC offers incentives for converting gasoline powered vehicles to compressed natural gas, and has committed to replacing 15% of fossil natural gas with renewable by 2030. Since natural gas can be stored and used when it is needed, it can help meet energy demand when solar, wind, or hydro power is less available. Nelson, Castlegar, Creston, and Salmo and some unincorporated areas in the RDCK already have natural gas pipelines and can readily replace geologic natural gas with renewable natural gas for home use.

According to the 2017 analysis, the short term potential generation of renewable natural gas is relatively low compared to hydroelectricity production. Renewable natural gas is constrained by a combination of technological hurdles for processing wood, and a lack of other source materials. Nevertheless, Fortis BC entered an agreement with REN Energy to purchase renewable natural gas from a proposed facility in Fruitvale that would use biomass from industrial forestry. If successfully implemented, the project could demonstrate the feasibility of replacing some of our current fossil fuel with renewable natural gas.

²⁸ BC Ministry of Energy & Mines, 2017. Resource Supply Potential for Renewable Natural Gas in B.C. Accessed at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/transportation/renewable-low-carbon-fuels/resource_supply_potential_for_renewable_natural_gas_in_bc_public_version.pdf

²⁹ IPCC, 2018. [Radiative Forcing of Climate Change](https://www.ipcc.ch/site/assets/uploads/2018/03/TAR-06.pdf). Accessed at <https://www.ipcc.ch/site/assets/uploads/2018/03/TAR-06.pdf>



Other potential sources of renewable energy

Across the Kootenays there are also existing examples of other renewable sources of energy for electricity and heating. Although **wind power** is inexhaustible and clean, generating significant power in the West Kootenays is not currently feasible. Similarly, although the West Kootenay has some **geothermal** activity, the expense of accessing generating capacity makes geothermal electricity production less attractive than other options (though geothermally- and lake-sourced heat pumps offer promise for space heating and cooling).

Bioenergy is energy created from biological growth. The most prevalent form of bioenergy in the West Kootenay Region is wood, which is currently used throughout the region in wood stoves. Wood stoves are an important heat source when residents lose connection to the electrical grid, especially during power outages (primarily caused by tree limbs falling across powerlines). Certain rural areas without redundant grid connection have relatively frequent outages that can last for several days.

The Regional District of Central Kootenay and the City of Nelson have explored using industrial forestry byproducts such as wood chips, sawdust, slash, and bark for energy purposes such as district heating, where a high-tech central boiler can provide heat for a number of connected buildings with very low pollution. Access to feedstock remains a serious constraint for all bioenergy and biomass projects in our region because industrial users of wood byproducts are willing to pay much more than the value of the energy in the wood in order to make paper, pellets, and other products. Investment in biomass-based renewable gas facilities could put additional pressure on forests in the region if there is not enough “waste” wood from industrial forestry. The Regional District of Central Kootenay has commissioned a report assessing the bioenergy potential in our region.³⁰

Regional Renewable Energy

Because of the large dams on the Columbia and Kootenay Rivers, the West Kootenay already produces more energy than it uses during peak generation. Excess power is sold on the open market. In the future, electric cars and heat pumps will replace gasoline and non-renewable natural gas, and more energy will be needed. Creating a network of electricity generation from a variety of renewable sources will make the region more self-reliant as well as eliminating the need

³⁰ Stephen, Jamie. Bioenergy Opportunities in the Regional District of Central Kootenay - A Pathway to Development (forthcoming 2020)



to purchase coal-fired electricity during peak demand. The vision for the electrification of the West Kootenays focuses on increasing comfort and affordability for people. This includes supporting homes and buildings that conserve and generate electricity in a variety of ways, and utilities that support and invest in renewable energy generation at a variety of scales. Such energy redundancy and resilience will become increasingly important as weather events become more extreme, exposing the current centralized electricity grid to increased stress and power outages. This vision will also require support from the provincial level, as provincial regulation and the BC Utilities Commission have a powerful impact on how energy is produced and purchased within the province.

Renewable Local Energy: Where are we now?

The vast majority of electricity in the West Kootenay region is renewable hydroelectricity, though energy utilities also buy and sell energy with other utilities in Canada and the US. The energy market sometimes includes significant amounts of electricity from coal-fired plants. In addition, the vast majority of vehicles rely on gasoline or diesel from fossil fuels. Nelson Hydro has completed a solar garden, and a new waste wood biomass facility is being discussed in Fruitvale. Utility providers in the region including Fortis BC, BC Hydro and Nelson Hydro provide net metering, which allows private owners of renewable systems with less than 100kw of generating capacity to sell power to the utility. BC Hydro discontinued support for independent power projects of 100kw to 1 MW in February 2019 and discontinued support for larger projects in 2013.³¹ The 100kw cutoff for BC Hydro precludes new community-scale projects from being able to access the electricity infrastructure, creating a significant disincentive for many otherwise-viable local renewable energy projects, unless (like Nelson Hydro), a local government owns the distribution system.

Obstacles to Local Renewable Energy

- Existing incentives and rebates for natural gas drive expansion of natural gas infrastructure, even though there is no timeline or commitment to completely replace fossil natural gas with renewable natural gas
- Current electricity supply infrastructure is vulnerable to frequent outages, which will become more frequent with extreme weather events related to climate change

³¹ <https://www.bchydro.com/work-with-us/selling-clean-energy/net-metering.html>



- Lack of access to affordable and efficient technology for renewable gas generation
- Provincial support for fossil-fuel based natural gas
- Lack of provincial support for independent power projects over 100 kw
- Utility monopoly can reduce financial incentives for innovation
- Many areas have relatively low solar potential, especially in winter
- Concerns about forestry practices, reducing needed forest carbon sinks, and accuracy of emissions data associated with biomass
- High demand for existing biomass resources means they are not cost effective
- Net metering doesn't account for full cost of maintaining utility infrastructure
- Relatively low price paid for net metering surplus.

Opportunities for Local Renewable Energy

- Fortis BC commitment to 15% renewable natural gas by 2030 provides confidence for potential suppliers to invest in infrastructure
- Many communities have lots of small highly-combustible trees and dead wood in the interface area that could provide a source of bioenergy
- Many small non-fish-bearing streams for micro-scale hydroelectricity
- Lots of expertise on micro-hydroelectricity in the West Kootenays
- Utilities allow for net metering, which avoids storage costs and challenges
- Untapped potential for rooftop solar on commercial/industrial/residential building
- Existing industrial processes create opportunities to capitalize on waste heat
- Block-chain technology can reduce privacy and security concerns around smart electrical grids



Actions that Communities Could Pursue for Renewable Energy

Minimal	Mid-level 1	Mid-level 2	Full Deployment
Infrastructure examples			
Conduct a renewable energy scan study to determine financially and technically feasible renewable energy options and next steps		Infrastructure: Conduct detailed feasibility and engineering plans for renewable energy systems	Construct and operate renewable energy system
Outreach examples			
	Collaborate with other local governments in the region to develop, secure funding for, launch, and market a program for bulk-buy of solar PV for residents and businesses	Municipal incentives for renewable energy installations	
To see the actions that a given community has selected, view their list of actions .			

Equitable and Inclusive Renewable Energy

With the low cost of electricity in the West Kootenay region, investments in renewable electricity take a long time to pay off. The people who can afford to wait 12-14 years for a return on an investment in solar panels can save a lot of utility cost over the 20-30 year lifespan of the panels. Meanwhile, the cost of electricity to other rate payers may increase as utilities are forced to make up for lost sales to net metering households.



Next Steps

Several options exist for increasing renewable energy across the West Kootenay Region. From local residents installing rooftop solar and micro-hydro (where feasible), to exploring sustainable bio-energy production, there is clearly potential for expanding renewable energy within the region. As electrification of vehicles and home heating expands, the demand for renewable energy will increase. Return on investments are marginal in the short term, but creating policy and infrastructure pathways for renewable energy may pay off as technology advances and costs decrease.

1. Incentivize energy savings through education, outreach and policy and , particularly electricity
2. Advocate to the Province of BC for BCUC to support responsible and ecologically sound independent power projects over 100kw
3. Conduct an assessment of grid vulnerability throughout the region and advocate to the Province of BC for improved electrical grid reliability
4. Incentivize solar panel installation in new buildings
5. Create demonstration projects with education and local labour engagement similar to Nelson's Solar Garden, especially on municipally-owned buildings
6. Advocate to the Province of BC to develop a timeline for phasing out non-renewable natural gas
7. Encourage natural gas users to participate in elective renewable natural gas program





2.5: Other Supporting Actions

In addition to the Big Moves described above, local governments can take other measures to move toward 100% renewable energy. These actions include carbon sequestration initiatives, and “organizational moves” which demonstrate local government leadership renewable energy and set the stage for future work on community, place-based, and consumption-based energy and emissions.

Carbon Capture and Storage

In order to keep global warming to less than 1.5 degrees Celsius, more carbon dioxide needs to come out of the atmosphere than goes into the atmosphere in the form of pollution. Oceans and forests are natural carbon sinks, and most carbon capture methods are tied to industrial processes, but local governments have a few ways to promote removal of carbon pollution:

1. Provide incentives to new industrial users
2. Encourage building materials such as wood that store carbon, without logging forests that are negative carbon sinks
3. Work with landowners to increase forest cover on private



4. Advocate to Province of BC and Government of Canada to protect carbon sinks on public lands
5. Establish negative carbon pollution goals beyond 2050 by advocating for and investing in nature-based solutions

Local Government Corporate Actions

Local government operations can have strong ripple effects within the community. When community members see elected officials and government staff taking steps toward 100% renewable energy in day-to-day activity, and when local governments dedicate a portion of the budget to visible programs and staff to implement them, it helps set a tone that goes beyond immediate impacts. Local governments can integrate renewable energy initiatives across departments and through specific energy and climate mandates.

Asset Management

Local governments have an important obligation to manage the public assets of their communities. Assets include infrastructure such as sewer, water, and transportation systems as well as capital investment such as community owned buildings. In addition, local governments have a leadership role in managing natural assets such as forests, parks, and lakes, which supply clean drinking water, filter stormwater and air pollution, help to cool neighbourhood streets, and much more. Stewardship of assets on behalf of the community is becoming more challenging as climate change and the global pandemic strain government resources. Nevertheless, as governments fulfill their role in managing and maintaining infrastructure, it's important to take advantage of the opportunity to support renewable energy. For example, when a roadway has to be replaced to repair sewer lines, there is an opportunity to add safe pedestrian corridors and build in natural systems for stormwater treatment. Innovative approaches not only shape the future of energy use and health, but many natural asset approaches can save money in the long term.



Next Steps

- Apply for federal and regional funding programs for energy efficiency retrofit subsidies for residents and local government owned buildings
 - Prioritize funding applications for retrofit projects on local-government-owned buildings that use local skilled labour, and can be a community education opportunity and demonstration building
- Install GPS systems in all current fossil fuel fleet vehicles to monitor use efficiency and save fuel costs to invest in other renewable energy transition programs
- Establish permanent remote work infrastructure for local government staff
- Allocate budget for staff to support implementing renewable energy goals and tracking progress
- Continue to collaborate in Renewable Energy Working Group that developed this plan
- Collaborate with other local governments for bulk purchases of electric equipment (mowers, blowers, trimmers, etc.) and/or fleet vehicles
- Conduct natural asset inventory to assess the value and function of natural systems
- Require events on public property and in local-government-owned buildings to include a waste diversion and composting plan as part of permitting process (mandating recyclable and compostable service items as well as diverting organic waste from the landfill)





Part 3: Local Government Actions

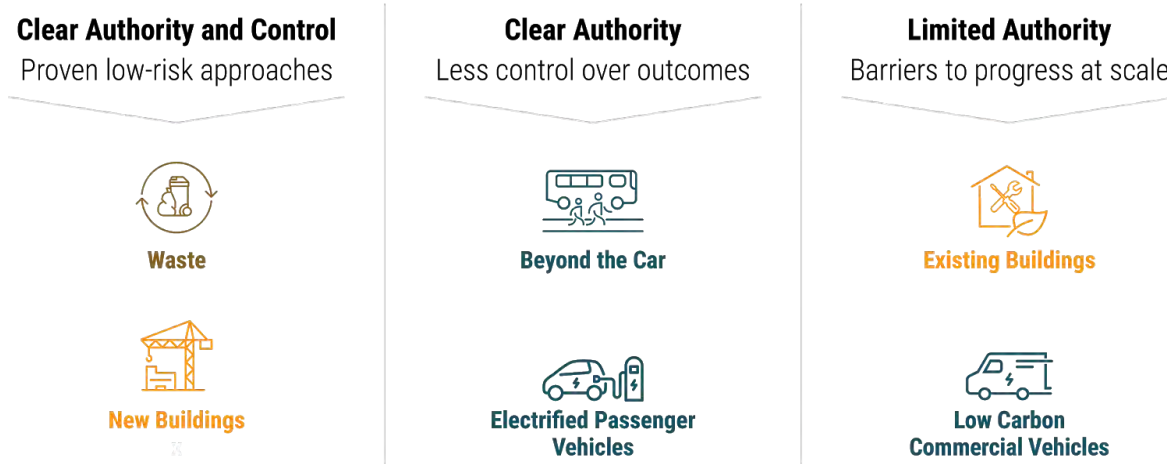
The assessment of emissions, energy, and cost information for each participating local government for each of the action areas discussed in Part 2 affects the amounts of energy waste and carbon pollution by 2030 and 2050. The action areas are:

1. Low Carbon Transportation: Electrified Passenger Vehicles, Beyond the car, and Low Carbon Commercial Vehicles
2. Better Buildings: Existing and New
3. Zero Waste
4. Generating Renewable Energy
5. Supporting actions: Carbon Capture and Local Government Corporate Actions.

For each of the action areas, each local government has identified actions they will take in three areas: Policy, Infrastructure, and Outreach/Education. Based on each local government's plan, the community was placed on an ambition scale for each major action. Ambition levels range from minimal to mid-levels 1 and 2 up to Full Deployment. The ambition levels then determined how the community's action will reduce carbon pollution in each area.

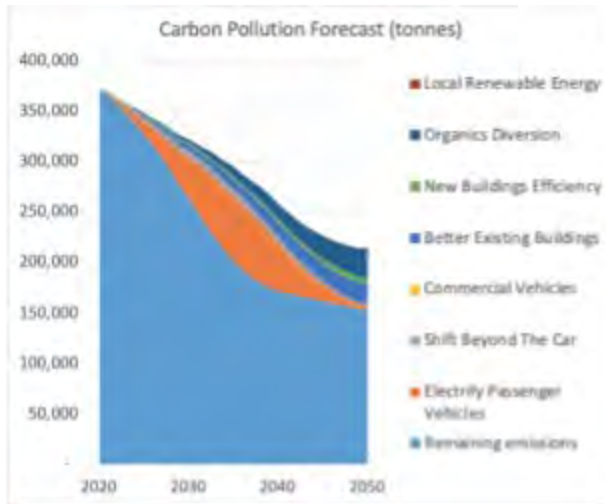


It's important to remember that although local governments have a big impact on the daily lives of community members, they have more control on some areas than others. The greater the control a municipality has over policy decisions, budgeting, infrastructure development, and capacity building, the more impactful the emissions reductions from the action.

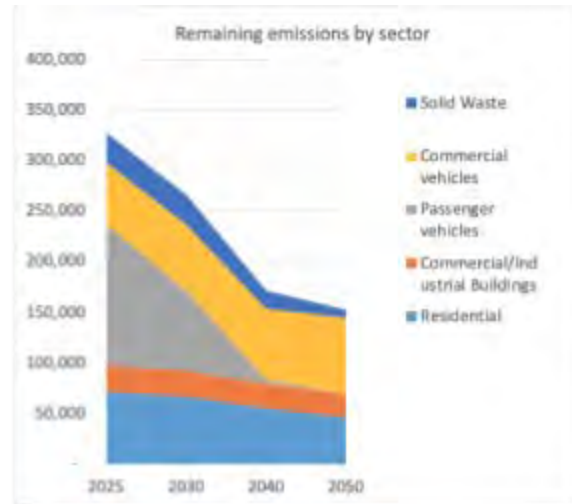


Due to local governments' limited direct authority over existing buildings and commercial vehicles, local governments will advocate for policy change and other actions to the Province of BC and the Government of Canada. They will also need to engage community members with incentive programs, education, and other forms of support. The retrofit code described in Part 2.2 Buildings, and pollution control or required electrification of commercial vehicles are examples where the Province of BC has already shown interest.





Tonnes of carbon pollution that can be removed by actions in this plan, by year



Tonnes of Remaining Emissions (Blue area in chart to left) by sector

Achieving our goals

This plan acknowledges that the current context does not reveal a predictable path to 100% renewable energy. Much like in summer 2019 we did not foresee a global pandemic that would affect all aspects of society around the world and locally, there will be unpredictable events to serve as opportunities to move the transition to renewable energy along more quickly. We are going to have to capitalize on opportunities, adopt new technologies, work with organizations, communities, countries and businesses to break down barriers and push ourselves to learn more and to do more. Each local government is committed to achieving its goal; the current shortfall is simply an acknowledgement that:

- a. This goal requires advocacy to other levels of government that manage larger tax revenues available for implementation and can regulate and deregulate in jurisdictions outside of local governments.
- b. Tools, technologies and opportunities will change over time, and local governments need to take advantage of new opportunities and attract innovation to their communities.
- c. While this plan is being implemented, continuous annual measuring on progress must take place, with regular plan updates every 3-5 years to reflect changing conditions and capitalize on new opportunities.



In future iterations, the scope of the West Kootenay 100% Renewable Energy Plan could be updated to include more carbon pollution sources, while ensuring that certain emissions are not counted in multiple inventories.

Ambition levels for all participating local governments

	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Castlegar	Full	Full	Mid 1	Full	Full	Full
Kaslo	Full	Mid 1	Minimal	Full	Mid 1	Full
Nelson	Full	Full	Mid 1	Full	Full	Full
New Denver	Full	Mid 1	Minimal	Full	Mid 1	Full
RDCK Unincorporated	Full	Mid 1	Minimal	Full	Mid 1	Full
Rosland	Full	Full	Mid 1	Full	Full	Full
Silverton	Full	Mid 1	Minimal	Full	Mid 1	Full
Slocan	Full	Mid 1	Minimal	Full	Mid 1	Full
Warfield	Full	Full	Mid 1	Full	Full	Full



3.1: City of Castlegar



With a population of 8,039, Castlegar’s three largest industries are retail, business services, and manufacturing employing 16%, 14% and 15% of the population respectively. The City’s electricity and natural gas services are supplied by FortisBC.

Castlegar’s governance structure is comprised of a mayor and six councillors, and has an annual operating budget of \$17.6 M as of 2016.

Residents of Castlegar participated in an in-person discussion about 100% renewable energy. In addition, 30 residents participated in an online survey about their community values, opportunities and barriers to 100% renewable energy. Participants said that they value a strong sense of community, innovative governance, a beautiful landscape and environment and rich opportunities for education, business, volunteerism and lifestyle. Participants expressed concern about natural hazards’ impact on safety and infrastructure, increasing population and cost of living in the community, and expanding recreation and transportation options. Participants expressed excitement about creating a lasting legacy of healthy communities and ecosystems, with financial savings resulting from individual actions and leadership. Obstacles identified included technological limitations, inequitable distribution of costs, and creating short term action from long term plans. See Appendix IV for a complete summary of responses.

Castlegar Quick Facts	
Area & population (density)*	19.67 km ² , 8039 (408.6/km ²)
Average Age (portion of population 65 or older)*	44.9 (23.2%)
Total Private Dwellings (permanently occupied)	3655 (3499)
Median Household Income*	\$68,800
Utility infrastructure	Natural Gas (Fortis BC), BC Hydro, Municipal Sewer, BC Transit
Solar Potential **	5.79 kwh/m2
Heating Degree Days 2018 (2050 projection)	4,053 (3,484)
Cooling Degree Days 2018 (2050 projection)	87 (184)



Where are we today?

The City of Castlegar was a signatory to the Climate Action Charter in 2007 pledging its commitment to be carbon neutral in operations by 2012. It won the Community Energy Association’s Energy Award in 2008 for the design of its City Hall. In 2011, the City furthered its commitment to carbon neutrality through completion of its Official Community Plan which integrated sustainability objectives and included a Development Permit Area specific to energy conservation. In 2012 the City passed a policy to ensure that all funds received from CARIP go into a Climate Action Fund specific to projects that further GHG emission reduction targets. The City participated in the development of a Strategic Community Energy Plan in 2015. That same year it adopted a Street Tree Master Plan in support of retaining urban forest. The City has also won the 2019 UBCM Sustainability Award for its Columbia Avenue Complete Street Project which furthers action on active transportation and sustainable infrastructure. The City installed rooftop solar panels that same year. Its Pedestrian and Cycling Master Plan which was developed in 2007 will be updated in 2021. The City has committed itself to Step 1 of the BC Step Code in December 2020 and Steps 2 and 3 planned for 2022. The City participated in Accelerate Kootenays and currently has three public EV charging stations.

The following summarizes the City of Castlegar’s current greenhouse gas emission inventory (2018 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 City of Castlegar, “corporate emissions”). Total greenhouse gas emissions for the community for 2018 are 55,100 tonnes of CO2 equivalent (6.4 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the City of Castlegar come from mobility fuels.



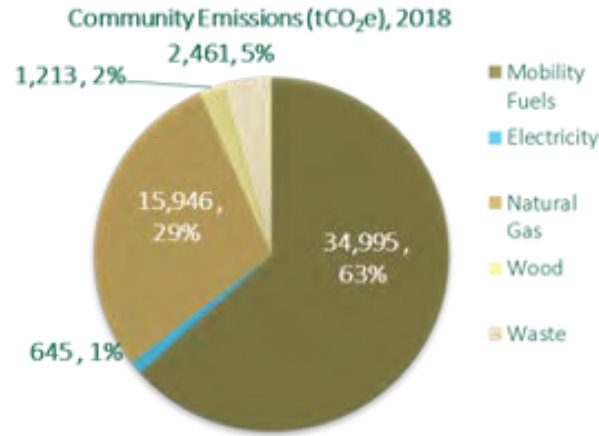


Figure 1 2018 Emissions Summary for City of Castlegar by Source

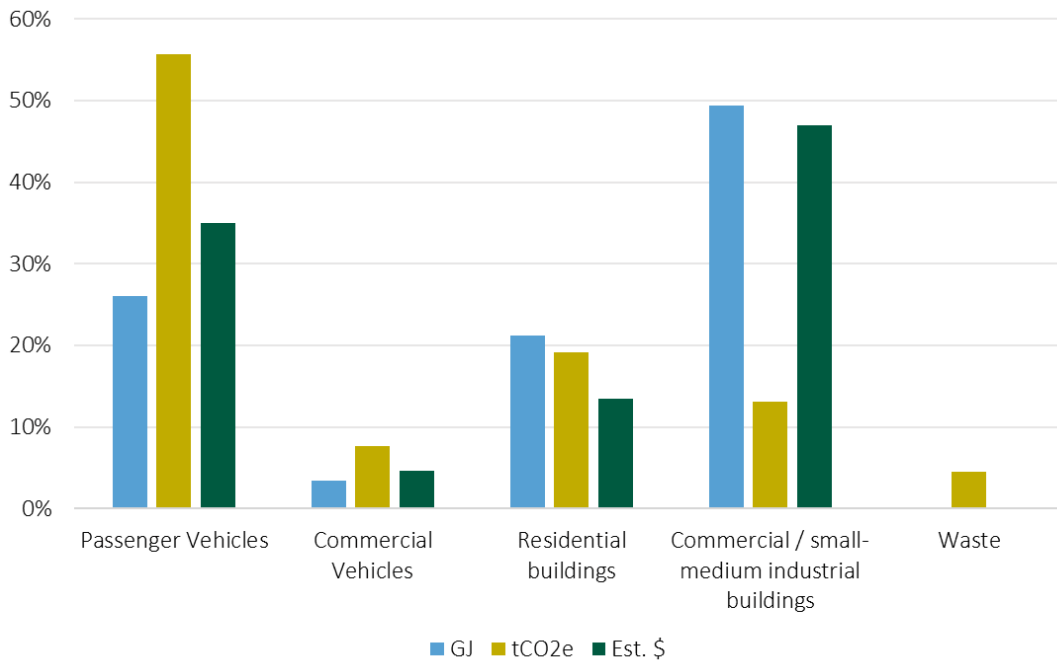


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for City of Castlegar

Passenger vehicles represent the largest source of emissions, while commercial & small-medium industrial buildings are the largest user of energy and cost, despite contributing only a moderate proportion of emissions. This is owing to the large proportion of electricity consumption, at over 210 million kWh in 2018, vs. 38 million kWh for residential buildings.



Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles rose by 10% in 2016, and an additional 4% in 2017. 2017 was a colder year, and led to a spike in natural gas emissions for residential buildings.

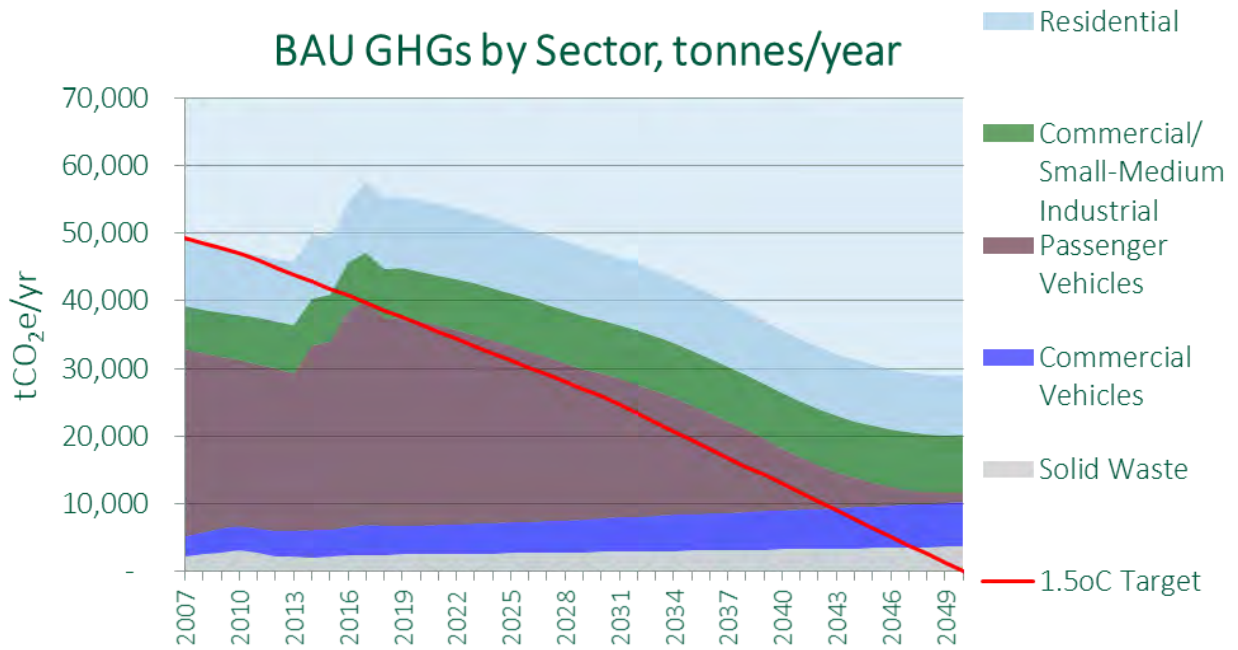


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection



Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the City of Castlegar must reduce its GHG emissions from 47,000 tonnes CO₂e (2030 business as usual projection) to 25,900 tonnes CO₂e (2030 goal). This equates to a total of 21,100 tonnes CO₂e emissions reductions. For 2050, the City of Castlegar must reduce its GHG emissions from 28,900 tonnes CO₂e to 0. Castlegar’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Castlegar’s long-term emissions.

Castlegar’s Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Full	Mid-1	Full	Mid-1	Full

Castlegar’s Actions

[Click here to see a spreadsheet of Castlegar’s actions toward renewable energy.](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.



Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four strategies by impact will be:

- Electrifying Passenger Vehicles
- Better Existing Buildings
- Shift Beyond the Car
- Organics & LFG

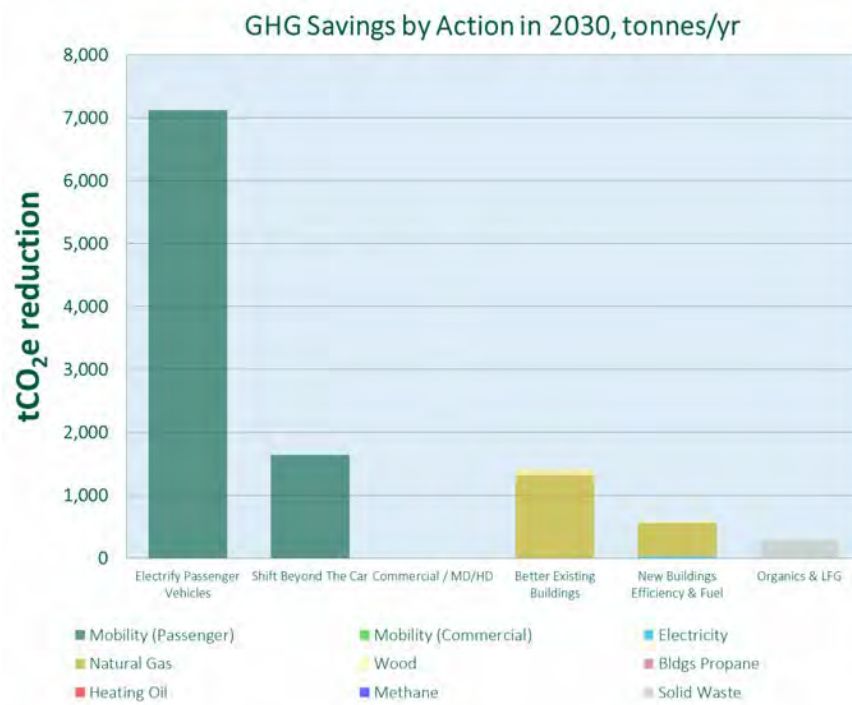


Figure 5 Emission Reductions from the Big Moves in 2030

Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 9,900 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 21% vs. 2010 levels, nearly half of the reductions to be congruent with the IPCC’s 1.5°C goal of 45% reduction.



In practical terms, Castlegar can achieve the following shifts by 2030:

- Electrify Passenger Vehicles: 1430 conventional vehicles replaced with EVs
- Shift Beyond the Car: 890 km/person vehicle travel avoided/shifted to active transportation each year
- Better Existing Buildings: 1120 buildings (30%) undergoing energy retrofits to achieve 33% reduction in energy use
- New Buildings Efficiency & Fuel: All new buildings built to 20% more efficient than BC Building Code, and 40% adopt zero or low-carbon heating systems
- Organics & LFG: Additional 21 kg/person of organics diverted per year, equivalent to about twenty 4 L milk containers

With the Big Moves in place, projections can be made as to their impacts on Castlegar's overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are illustrated in Figure 6.



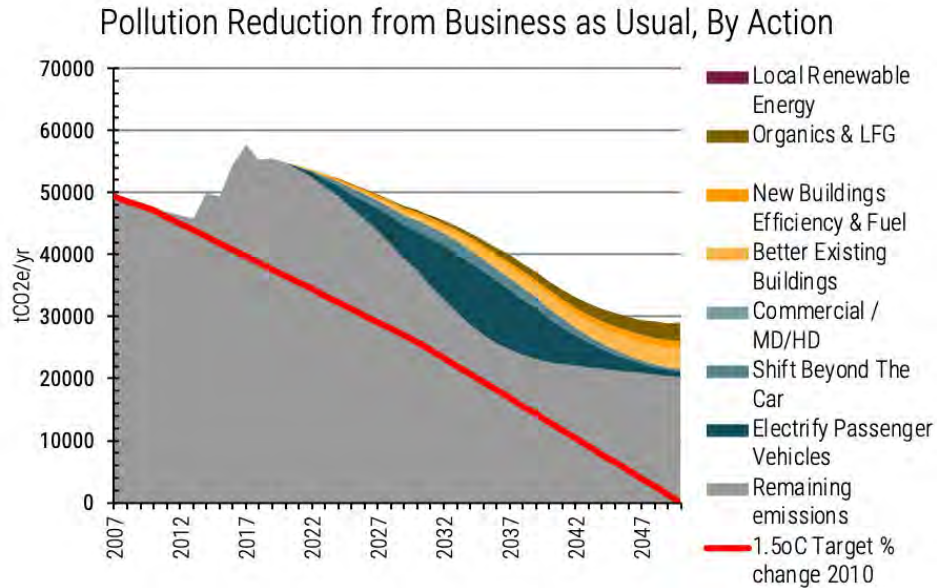


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Castlegar is able to achieve a reduction of 8,800 tonnes CO₂e, equivalent to 30% of its 2050 emissions, with the Better Existing Buildings at 3,200 tonnes CO₂e, followed by Organics and LFG (Landfill Gas Capture) at 2,950 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to “catch up”. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.

Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a significant impact on GHG reductions for the City of Castlegar, there are some gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.



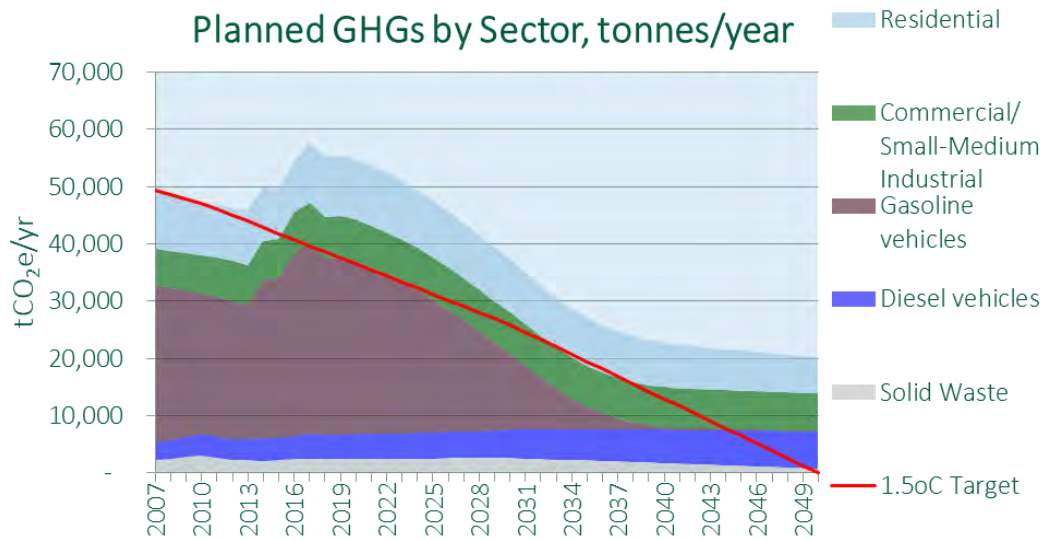


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted

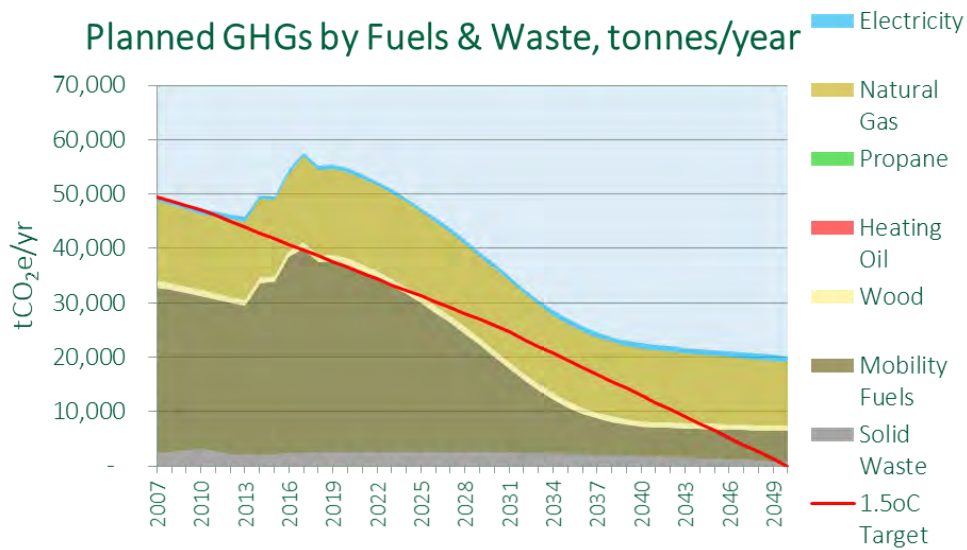


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Natural gas emissions in existing buildings
- Commercial vehicle emissions



These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code and higher renewable natural gas requirements could reduce the natural gas emissions. Advocacy to the Province of BC to decarbonize natural gas and phase in commercial vehicles can accelerate these important changes.

Castlegar Public Survey Results

Castlegar residents were asked to complete a survey rating the potential impact and feasibility of potential actions. Based on 84 respondents, the weighted average of the actions are shown in the chart below. All of the actions received average feasibility and impact ratings greater than the midpoint. The potential score ranges from 1 to 5 for both measures. The distinctions among many of the actions fall within the margin of error (+/- .44).

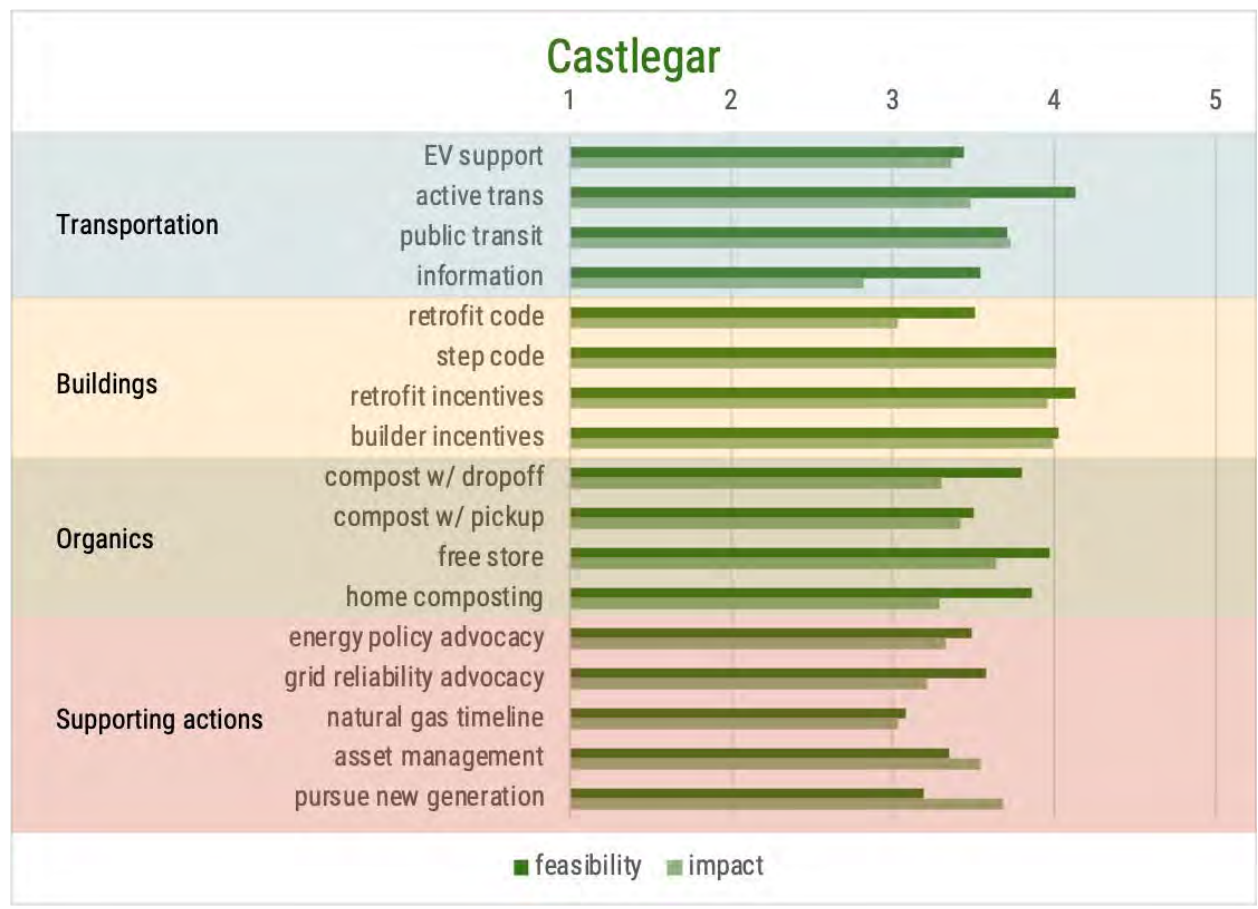
The highest impact ratings were for retrofit incentives (3.96), step code (4.01), and builder incentives (3.99), while the lowest ratings were for transportation information (2.82), natural gas advocacy (3.03), and retrofit code (3.03).

The highest feasibility ratings were for retrofit incentive (4.13) and active transportation support (4.13). The lowest feasibility ratings were for natural gas advocacy (3.08), renewable generation (3.19), and asset management (3.35).

Proposed Action	feasibility	impact
Promoting electric vehicles with charging stations & incentives	3.44	3.36
Adding more trails, paths and routes for walking, cycling etc	4.13	3.48
Adding more transit routes, stops, and rides	3.71	3.73
Providing more information about alternatives to car trips	3.54	2.82
Adopting a voluntary energy efficiency standard for building renovations	3.51	3.03
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step Code)	4.01	4.01
Providing incentives and support for home energy efficiency retrofits	4.13	3.96



Providing incentives for builders to meet higher efficiency standards	4.03	3.99
Centralized compost facilities with drop off locations	3.8	3.3
Centralized compost facilities with curbside pickup	3.5	3.42
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	3.97	3.64
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	3.86	3.29
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.49	3.33
Advocate for a more reliable electrical grid	3.58	3.21
Ask the province to set a timeline to move to 100% renewable gas	3.08	3.03
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.35	3.54
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.19	3.68



Castlegar-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the City of Castlegar. For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions

- 29% of homes have secondary wood heating, and no heating oil or propane heating, as per drive-by heating survey results
- As mentioned in Appendix I, transportation data for Castlegar up to 2018 is provided by retail fuel consumption data provided by Kent Group

Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 4,053, and in 2050 they will be 3,484
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 87, and in 2050 they will be 184
- 1% annual reduction in emissions through residential organics diversion to 2030
- 10 year lag before landfill gas capture system is installed, accounting for time required to coordinate with RDCK, develop business cases, and acquire funding. Ramp up emission reduction to 80% by 2050



3.2: Village of Kaslo



Kaslo is a community that is steeped in history, being the oldest incorporated community in the Kootenays. It is home to 1,000 residents and serves another 2,000 or so in the surrounding Area D. The recently restored City Hall is once again the seat of local government after extensive renovations were completed in 2019. Kaslovians can be justly proud that this green building features geothermal heat pumps and LED illumination. The community is also home to the SS Moyie Sternwheeler National Historic Site, and the Langham Cultural Centre, which represent important times in our history. The addition of Legacy Park beside City Hall and the recently announced Front Street Park, the extensive trail system and Kootenay Lake provide outdoor recreational opportunities for all ages. The Kaslo River once provided local hydroelectric power until the mid 20th century.

Kaslo is the West Kootenay's most remote municipality, yet it is one of the most advanced in rural broadband internet capability. Thanks to this, Kaslo is starting to attract telecommuters who are swapping their office desks for a mountain lifestyle. Innovation and creativity abound through the flexibility of virtual meetings and events like the annual Kaslo Jazz Festival, which also shifted to an online format in 2020 and thereby slashed its carbon footprint. Kaslo also has three charging stations, which is a great way to encourage EV ownership. However, residents and businesses are concerned about the reliability of the electric grid that is increasingly susceptible to long

Kaslo Quick Facts	
Area & population (density)	3.01 km ² , 968 (321.9 persons per km ²)
Average Age (portion of population 65 or over)	49.6 (29.9%)
Total Private Dwellings (permanently occupied)	555 (469)
Median Household Income	\$44,096
Utility infrastructure	Fortis BC Electrical, Municipal Sewer, BC Transit
Mean solar insolation per day**	5.92 kwh/m ²
Heating Degree Days 2018 (2050 projection)	3,571(3,039)
Cooling Degree Days 2018 (2050 projection)	122 (243)
Walk/bike score	28/29
* Statistics Canada 2016 Census Data **Natural Resources Canada, Photovoltaic Potential and Insolation Dataset	



outages due to climate change related impacts, which hinders economic investment and the uptake of solutions like EVs.

Although in-person consultation was not possible due to the COVID-19 pandemic, 33 Kaslo residents participated in an online survey about their community values, opportunities and barriers to 100% renewable energy. In general, Kaslo residents value their quiet community surrounded by a beautiful wilderness. They are concerned about the local economy, food security, and population growth, and the potential devastation caused by wildfire. To promote community resilience, residents supported local micro-hydro and solar projects. See Appendix IV for a complete summary of responses.

Where are we today?

The following summarizes the Village of Kaslo's current greenhouse gas emission inventory (2018 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 Village of Kaslo, "corporate emissions"). Total greenhouse gas emissions for the community for 2018 are 7,700 tonnes of CO₂ equivalent (7.6 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the Village of Kaslo come from mobility fuels

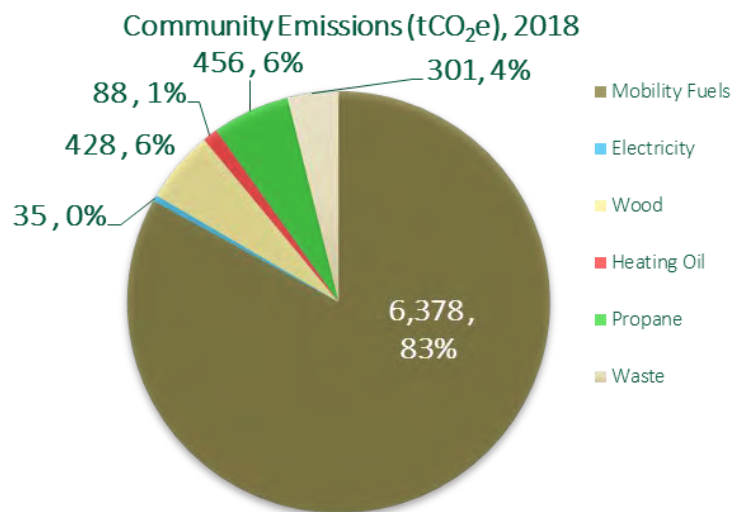


Figure 1 2018 Emissions Summary for Village of Kaslo by Source



The distribution of energy consumption, emissions, and estimated energy expenditures of each sector is shown in Figure 2.

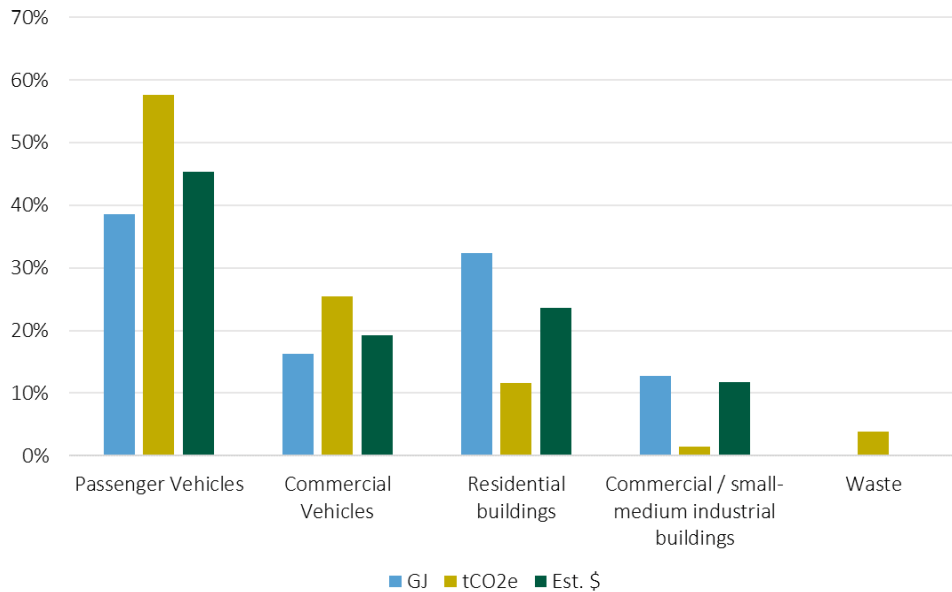


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for Village of Kaslo

Passenger vehicles represent the largest source of emissions, energy, and cost at 58%, 39%, and 45% respectively. Commercial vehicles are the second largest source of emissions at 25%, while residential buildings are the second largest source of energy consumption at 32%, and energy costs at 24%. Of note though, residential buildings only contribute 12% of Kaslo’s overall emissions. This is due to the lack of natural gas heating. Wood and propane contribute the majority of residential building emissions. Commercial buildings contribute 13% of energy and 12% of costs, but only 2% of emissions, owing to 93% of energy consumption as electricity.

Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles dropped slightly from 2007 to 2018 (4,600 to 4,400 tCO₂e). Emissions from commercial vehicles increased slightly during the same period (1,880 to 1,950 tCO₂e). Note that waste emissions spiked in 2014 to 1,180 tCO₂e, before dropping rapidly in 2015 to approximately 280 tCO₂e, and varying only slightly thereafter to 2018, despite waste tonnage



staying consistent at approximately 500 t from 2012 on. This is due to Kaslo's waste being redirected from the Central Landfill to Ootischenia in 2015, and the method in which the Province calculates, which is tied to the landfill where the waste is disposed.

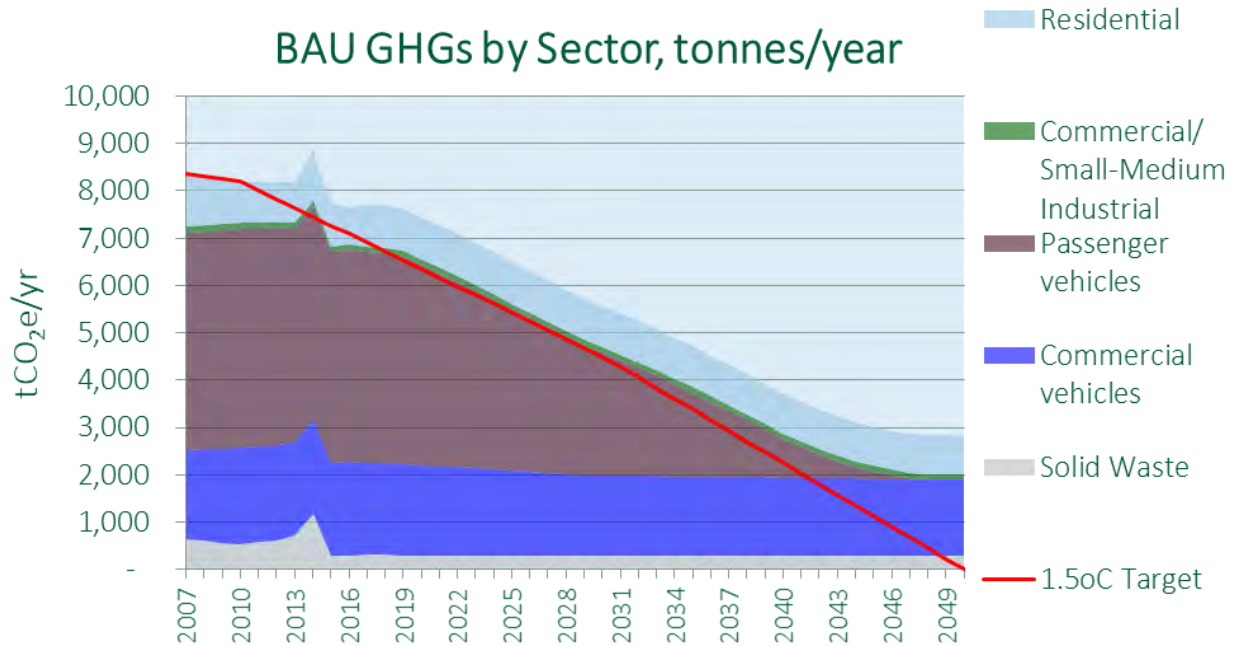


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection

Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the Village of Kaslo must reduce its GHG emissions from 5,600 tonnes CO₂e (2030 business as usual projection) to 4,500 tonnes CO₂e (2030 goal). This equates to a total of 1,100 tonnes CO₂e emissions reductions, or about 19%. The reason for the relatively small decrease in emissions is because the baseline year for the 1.5°C goal is 2010, where emissions were 8,200 tCO₂e. For 2050, the Kaslo must reduce its GHG emissions from 2,800 tonnes CO₂e to 0.



Kaslo’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Kaslo’s long-term emissions.

Kaslo’s Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Mid-1	Minimal	Full	Mid-1	Full

Kaslo’s Actions

[Click here to see a spreadsheet of Kaslo’s actions toward renewable energy.](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.

Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

- Electrifying Passenger Vehicles
- Better Existing Buildings
- Shift Beyond the Car
- Organics & LFG



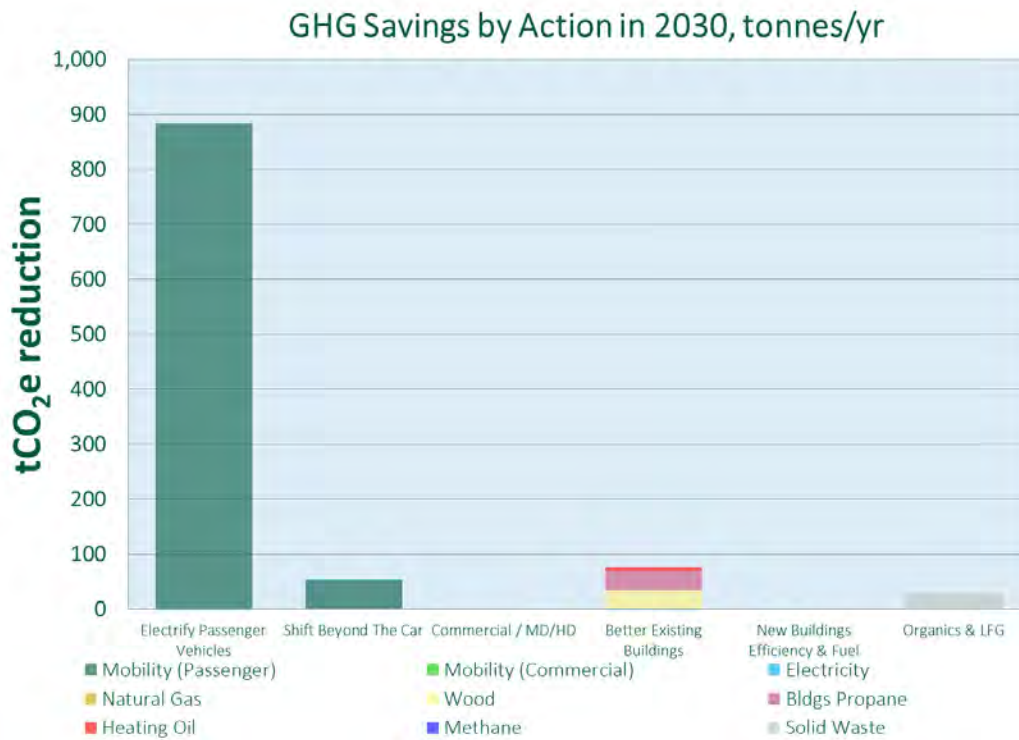


Figure 5 Emission Reductions from the Big Moves in 2030

In practical terms, the following shifts can be achieved by 2030:

- *Electrify Passenger Vehicles:* 220 conventional vehicles replaced with EVs
- *Shift Beyond the Car:* 20% of commutes eliminated through remote working policies
- *Better Existing Buildings:* 180 buildings (30%) undergoing energy retrofits to reduce energy use by 33%
- *Organics & LFG:* 22 kg/person of organics diverted per year, equivalent to about twenty 4 L milk containers



Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies will reduce GHG emissions by 1,000 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 18% vs. 2010 levels, which puts Kaslo on track to meet its 2030 IPCC goal.

With the Big Moves in place, projections can be made as to their impacts on Kaslo’s overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are shown in Figure 6.

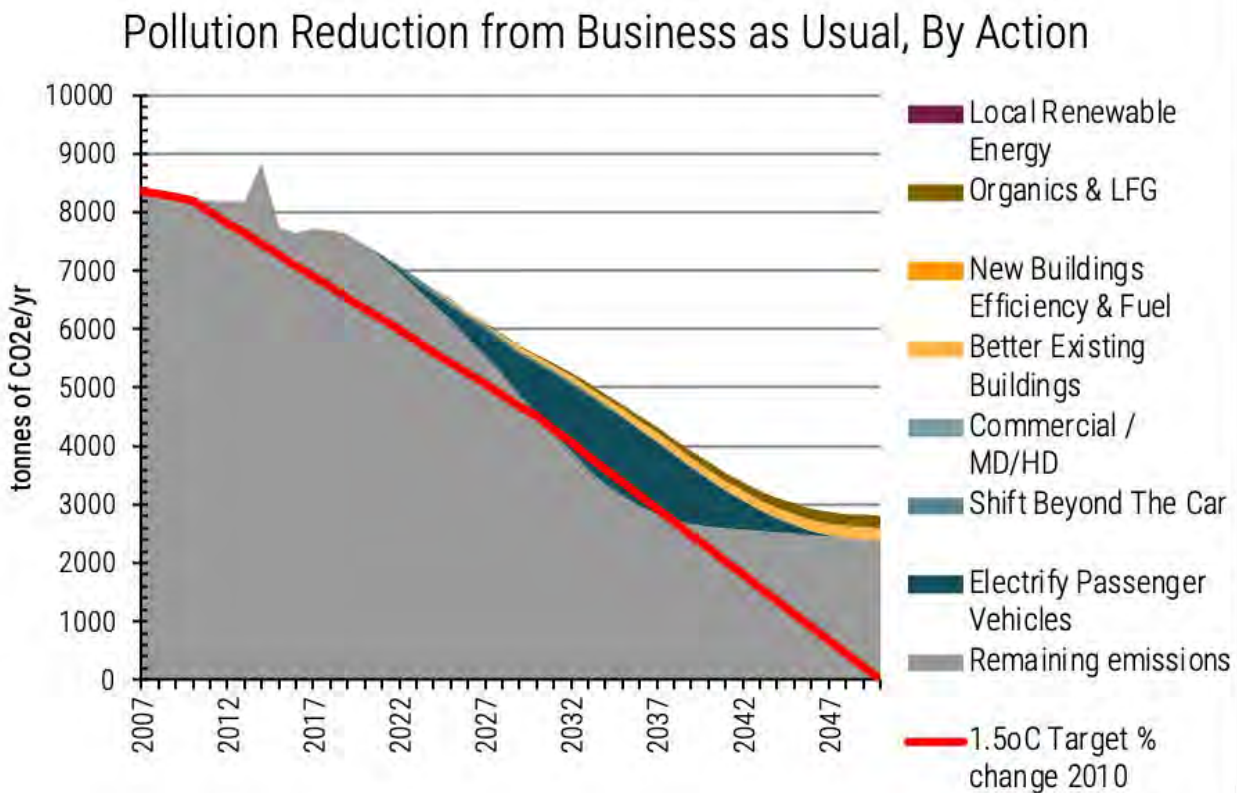


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Kaslo is able to achieve a reduction of 440 tonnes CO₂e, equivalent to 15% of its 2050 emissions, with Organics and LFG (Landfill Gas Capture) and Better Existing Buildings contributing all reductions at 220 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to “catch up”. This is the main reason why the net reductions in 2050 vs.



BAU are smaller than in 2030. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.

Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a moderate impact on GHG reductions for the Village of Kaslo, there are some major gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.

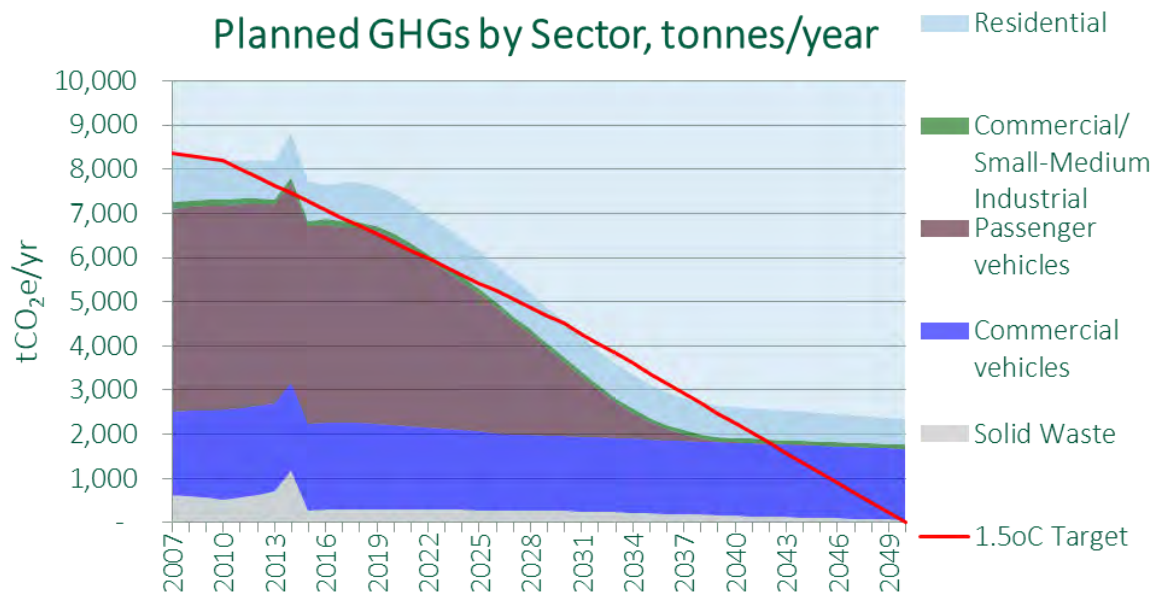


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted



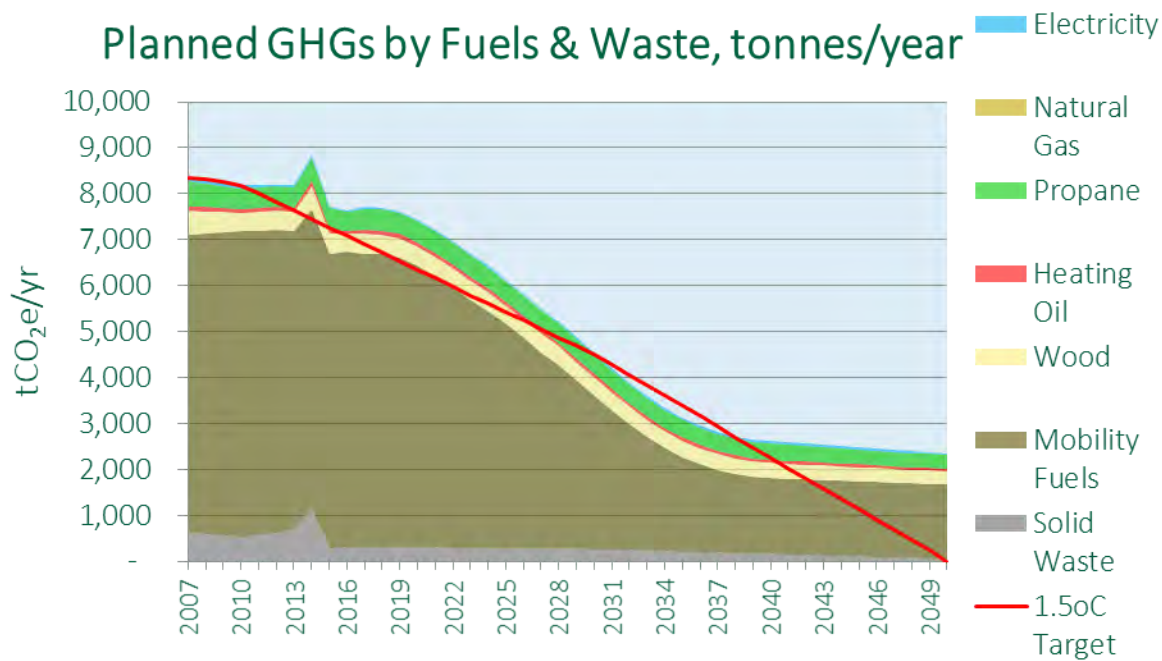


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Commercial vehicle emissions
- Non-electricity heating (propane and oil) in existing buildings

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code could reduce the building emissions. Propane and heating oil heating are both expensive compared to natural gas, and are emission heavy, making them prime candidates for replacement with low-carbon heating such as heat pumps (air or ground source). Participation in regional energy efficiency retrofit programs could accelerate retrofit deployment, and advocacy to the Province of BC to adopt a retrofit code and phase in commercial vehicles can also accelerate these important changes.



Kaslo Public Survey Results

Kaslo residents were asked to complete a survey rating the potential impact and feasibility of potential actions. Based on 40 responses, the weighted average of the actions are shown in the chart below. All of the actions received average feasibility and impact ratings greater than the midpoint. Potential scores range from 1 to 5. The distinctions among many of the actions fall within the margin of error (+/- .6).

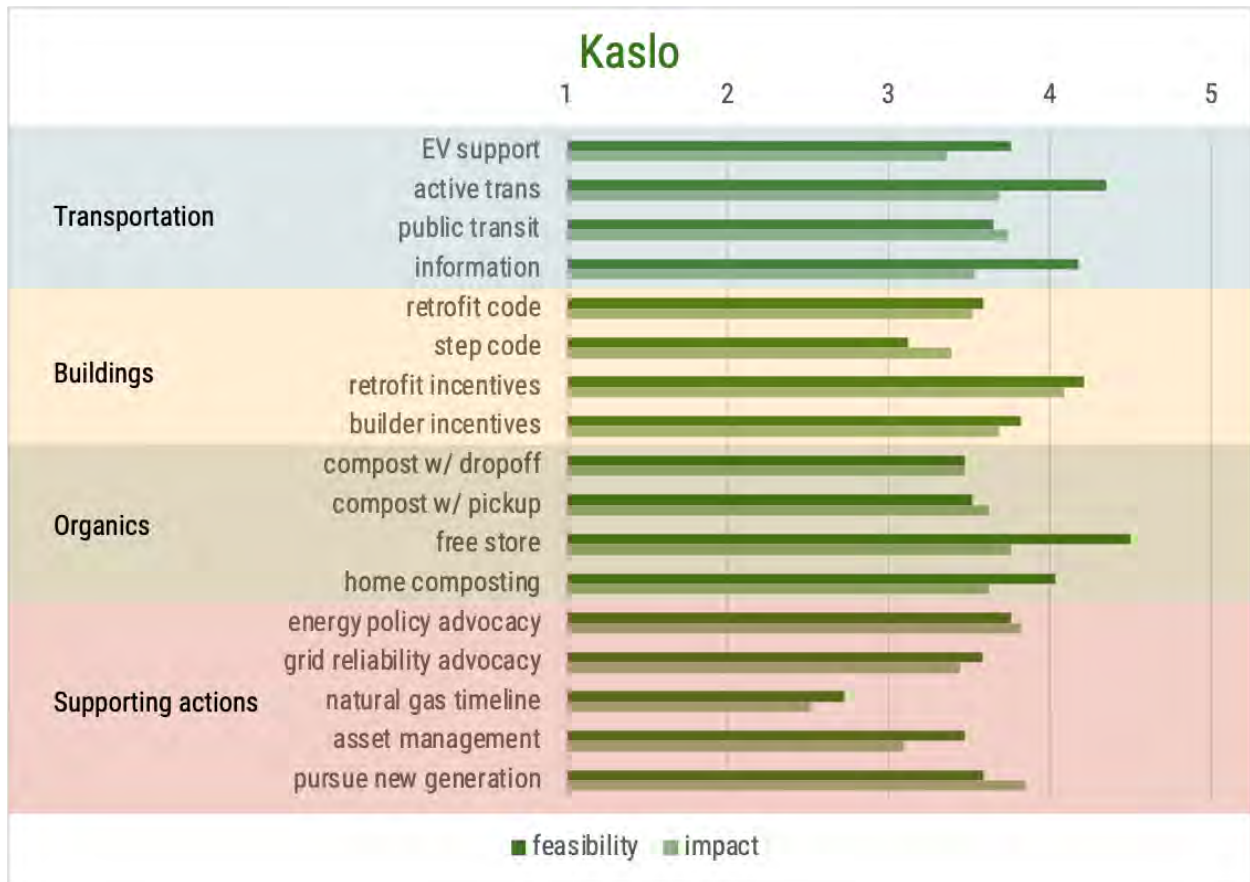
The highest impact ratings were for pursuing new generation (3.85), retrofit incentives (4.09), and energy policy advocacy (3.82), while the lowest rating was for advocating for renewable natural gas (2.52).

The highest feasibility ratings were for retrofit incentives (4.21), free store (4.5), and active transportation (4.35). The lowest feasibility ratings were for advocating for renewable natural gas (2.72), and adopting the step code (3.12).

Kaslo Proposed Actions	feasibility	impact
Promoting electric vehicles with charging stations & incentives	3.76	3.36
Adding more trails, paths and routes for walking, cycling etc	4.35	3.68
Adding more transit routes, stops, and rides	3.65	3.74
Providing more information about alternatives to car trips	4.18	3.53
Adopting a voluntary energy efficiency standard for building renovations	3.59	3.52
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step Code)	3.12	3.39
Providing incentives and support for home energy efficiency retrofits	4.21	4.09
Providing incentives for builders to meet higher efficiency standards	3.82	3.68
Centralized compost facilities with drop off locations	3.47	3.47
Centralized compost facilities with curbside pickup	3.52	3.62
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	4.5	3.76
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	4.03	3.62
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.76	3.82
Advocate for a more reliable electrical grid	3.58	3.44



Ask the province to set a timeline to move to 100% renewable gas	2.72	2.52
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.47	3.09
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.59	3.85



Kaslo-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the Village of Kaslo. For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions



- 65% have secondary wood heating, 14% of homes use propane for their primary heating source, and 3% use heating oil for their primary heating source, as per drive-by heating survey results

Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 3,571, and in 2050 they will be 3,039
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 122, and in 2050 they will be 243
- Shift Beyond the Car impacts reduced to 2% due to remote nature of community. Reductions are based on 20% of commuters working one day a week from home, and assuming that commuting accounts for 50% of all vehicle kilometers travelled (VKTs). This reduction would commence in 2022 with a 1% reduction (10% commuters), followed by 2% in 2023 (20% commuters)
- New Buildings Efficiency & Fuel will be following the approach set out by the Regional District of Central Kootenay (RDCK). Based on ambition level of “Mid 1” for RDCK, reductions are expected to be within the margin of error, and therefore negligible.



3.3: City of Nelson



Nelson is a municipality in the Regional District of Central Kootenay located on the West Arm of Kootenay Lake. It is the most populous municipality in the West Kootenay region with approximately 10,500 residents. Nelson services 7,700 additional residents in nearby unincorporated areas (2016 Census). Nelson’s seasonal tourism drives associated seasonal population fluctuation for summer and winter recreation alike, and two Selkirk College campuses located within municipal boundaries also affect transportation, employment, and housing needs.

Nelson Quick Facts	
Area & population (density)	11.95 km ² , 10,572 (884.3/km ²)
Average Age (portion of population 65 or over)*	42.5 (18.7%)
Total Private Dwellings (permanently occupied)	5,061 (4,822)
Median Household Income	\$56,714
Utility infrastructure	Natural Gas (Fortis BC), Nelson Hydro, Municipal Sewer, BC Transit
Heating Degree Days 2018 (2050 projection)	4,432 (3,753)
Cooling Degree Days (2050 projection)	50 (132)
Walk/Bike Score***	77/64

As in other West Kootenay communities, there is a strong culture of entrepreneurship. Nelson’s urban form is relatively compact and constrained by steep hillsides. Residential development at urban and suburban densities along highways in and out of the community adds to the population. Ongoing development in the downtown area includes several 4-storey condominium and rental housing buildings. Zoning permits the development of 300-400 new homes in Rosemont, unlimited density in many downtown-area zones, and major mixed-use development in Railtown. Nelson has created innovative programs to promote suites and laneway housing to address an ongoing housing shortfall. Between 2016 and 2019, approximately 421 new dwelling units were approved, representing nearly a 10% increase in the number of residential dwellings in just four years. A network of three local routes and several inter-community routes provides transit at intervals of 45 minutes upward.



The City of Nelson owns its own electric utility, Nelson Hydro, including a hydroelectric generating station. Nelson Hydro's EcoSave program works with homeowners in the Nelson Hydro service area to provide incentives and on-bill financing for energy retrofits as well as electric bikes. Nelson has also completed a fly-over thermal heat map to assist with baseline assessment of building efficiency.

Where are we today?

The City of Nelson has a long history of leadership when it comes to reducing emissions and building resilience to climate change. Key policies, commitments and actions focused on renewable energy and climate change mitigation are listed below:

Policies:

- Path to 2040 Sustainability Strategy
- Corporate Greenhouse Gas Reduction Plan
- Active Transportation Plan
- Low Carbon Path to 2040

Commitments:

- Signatory to BC Climate Action Charter
- FCM partners for climate protection program - level 5
- 100% Renewables by 2050

Infrastructure & Programs

- Community Solar Garden
- EcoSave home energy retrofit program
- [Seniors Home Weatherization Program](#)
- Residential Heat Mapping
- High-density zoning
- Early implementation of the BC Step Code
- Electric charging requirements for new construction
- Laneway Housing Program



- EV Charging Stations
- Primary bike route development
- Corporate energy efficiency
- E Bike program

Nelson’s Climate Change Action Plan

Concurrent to the development of the West Kootenay 100% Renewable Energy Plan, the City of Nelson has been working to develop a comprehensive Climate Change Action Plan that will focus on improving their corporation and community’s capacity to both reduce greenhouse gas emissions *and* to adapt to changing climatic conditions. Focusing concurrently on climate change mitigation adaptation is called a ‘low carbon resilience’ approach, whereby climate change adaptation and mitigation research and action are de-siloed and embedded at all levels of governance, planning and practice. This combined approach has the potential to drive more effective results using less resources, and opens up the door for pursuing multiple co-benefit opportunities in the realms of health, safety, livability and economy, for example

Acting as their new climate change roadmap for both mitigation and adaptation, this Action Plan serves to consolidate and coordinate Nelson’s previous policies and actions on climate change, and to address newly identified gaps and risks, either through amplification of work already in progress, or via new solutions. Many of the amplifications and solutions in Nelson’s Climate Change Action Plan are aligned with the West Kootenay 100% Renewable Energy Plan due to the interconnected, aligned and collaborative development processes by which both Plans were developed, and of course in order to align Nelson with regional climate action.

Current Emissions

The following summarizes the City of Nelson’s current greenhouse gas emission inventory (2018 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 City of Nelson, “corporate emissions”). Total greenhouse gas emissions for the community for 2018 are 79,102 tonnes of CO2 equivalent (7.0 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the City of Nelson come from mobility fuels.



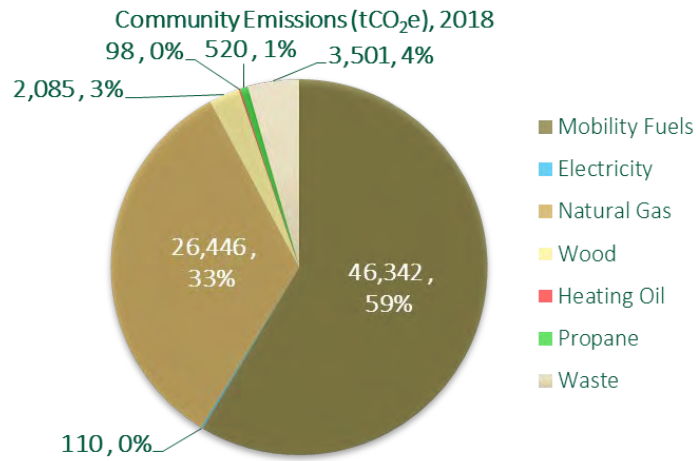


Figure 1 2018 Emissions Summary for City of Nelson by Source

The distribution of energy consumption, emissions, and estimated energy expenditures or each sector is shown in Figure 2.

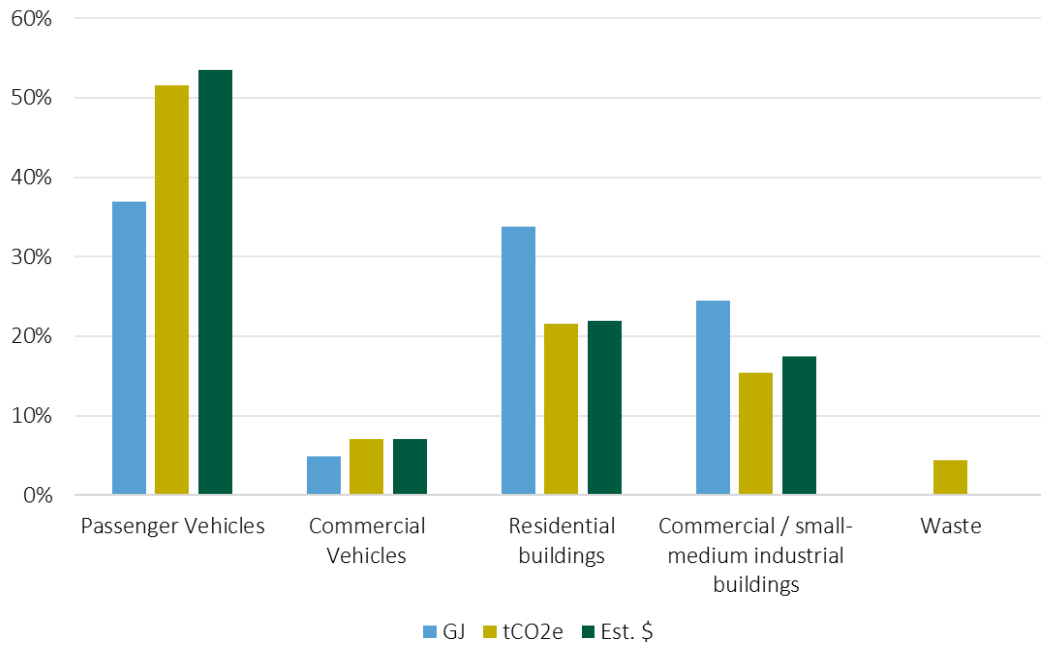


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for City of Nelson



Passenger vehicles represent the largest source of emissions (52%), energy consumption (37%), and energy cost (53%). Residential buildings are second in each category at 22% for emissions, 34% for energy consumption, and 22% for energy costs. Commercial buildings were third in each category.

Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles rose by 17% in 2014, and an additional 15% in 2016, which resulted in considerable spikes in transportation emissions. 2017 was a colder year, and led to a spike of 16% in natural gas emissions for residential buildings.

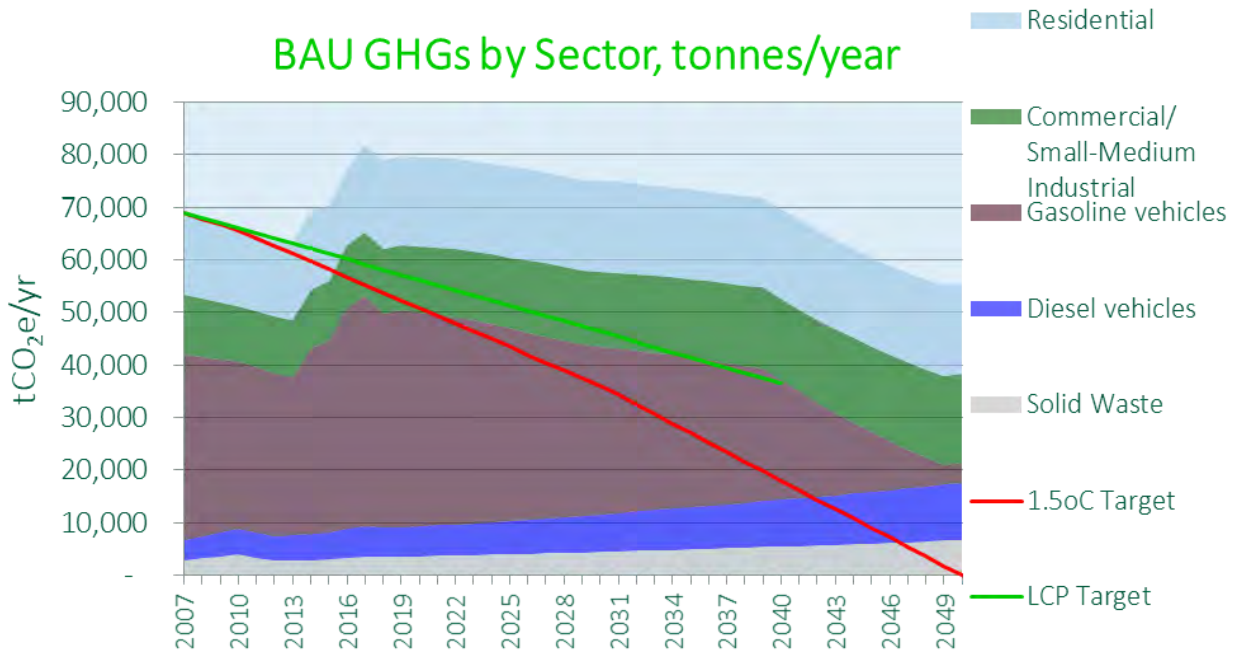


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection



Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with targets congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the City of Nelson must reduce its GHG emissions from 75,000 tonnes CO₂e (2030 business as usual projection) to 36,000 tonnes CO₂e (2030 target). This equates to a total of 39,000 tonnes CO₂e emissions reductions. For 2050, the City of Nelson must reduce its GHG emissions from 55,500 tonnes CO₂e to 0. Nelson’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Nelson’s long-term emissions.

Implementing the Nelson Climate Change Action Plan will achieve the City of Nelson’s 100% renewable by 2050 target. Like any long-term plan, the City of Nelson will need to measure its progress and adapt its actions to changing conditions. As the City of Nelson moves to implement the Nelson Climate Change Action Plan in 2021, the City of Nelson will remain a partner in the West Kootenay 100% Renewable Energy collaboration. The collaboration offers opportunities to continue strengthening regional relationships, pursue opportunities for funding, learning, and capacity building, and share resources and knowledge.

Nelson’s Actions and Ambition Levels

Nelson’s actions are included in the [Nelson Climate Change Action Plan](#), which will be released for public review after this plan is completed. Nevertheless, due to Nelson’s multiple commitments to climate change action, the projected emissions reductions were based on “Full” Ambition for each Move, except for Commercial Vehicles, where no “Full” ambition moves exist at this time. If Nelson’s Climate Change Action Plan does not include the actions included in full implementation (or if actions are not implemented), then remaining emissions will be higher than described below.

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Full	Mid-1	Full	Full	Full



Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

- Electrifying Passenger Vehicles
- Better Existing Buildings
- Shift Beyond the Car
- Organics & LFG

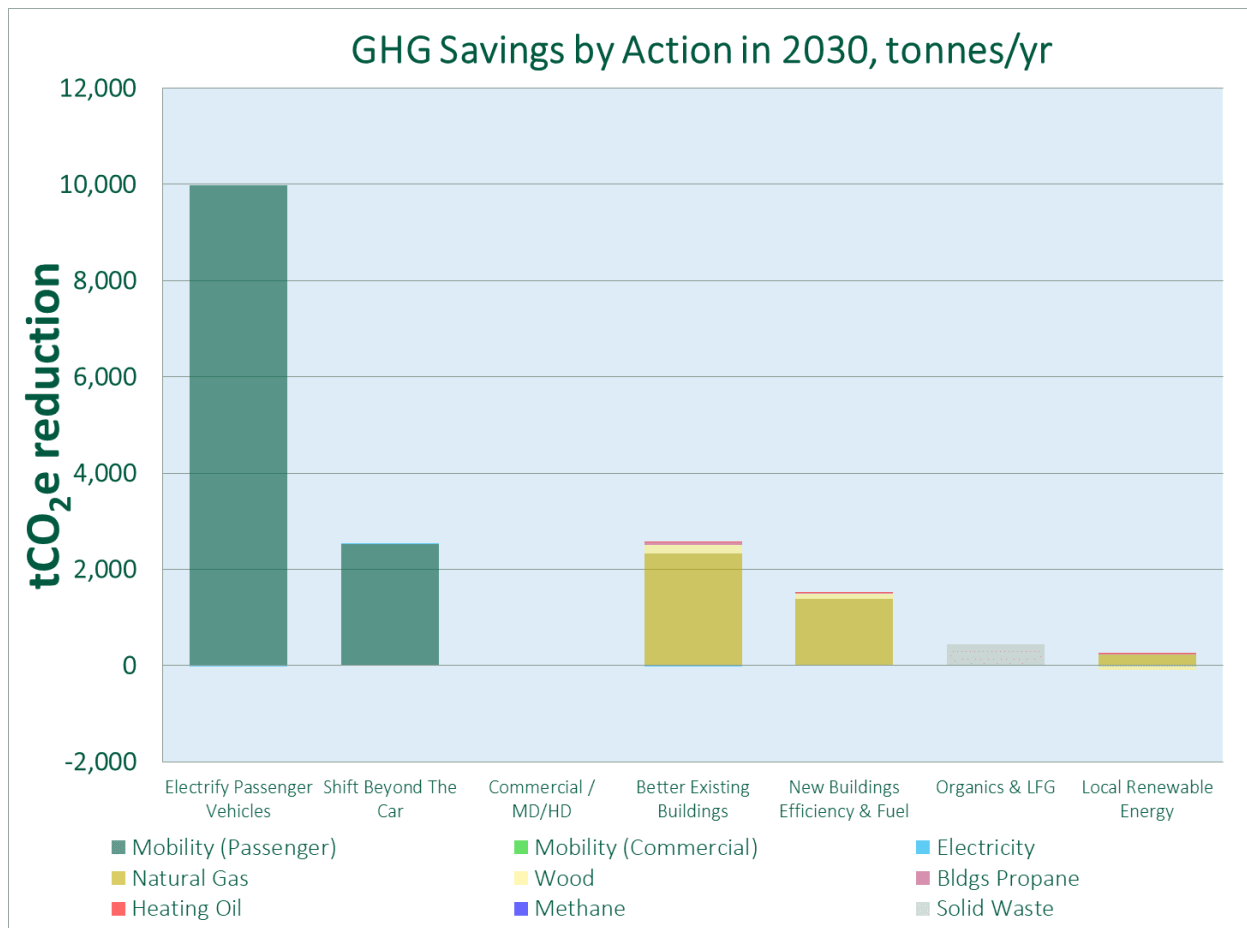


Figure 5 Emission Reductions from the Big Moves in 2030

Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 15,000 tonnes CO₂e in 2030 vs. BAU, accounting for a reduction of 20% vs. 2030 BAU, but only 8% vs. 2010 levels, nearly one-fifth of the reduction necessary to be congruent with the IPCC's 1.5°C target of 45% reduction. The relatively low



reduction compared to other communities in this plan, is due to sharp rises in transportation emissions in 2014 - 2018, and natural gas emissions in 2017, both of which were the most recent real data points available. This is important as BAU projections for emissions are based off the most recent data points, and action impacts are compared against the BAU projections.

With the Big Moves in place, projections can be made as to their impacts on Nelson’s overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are shown in Figure 6.

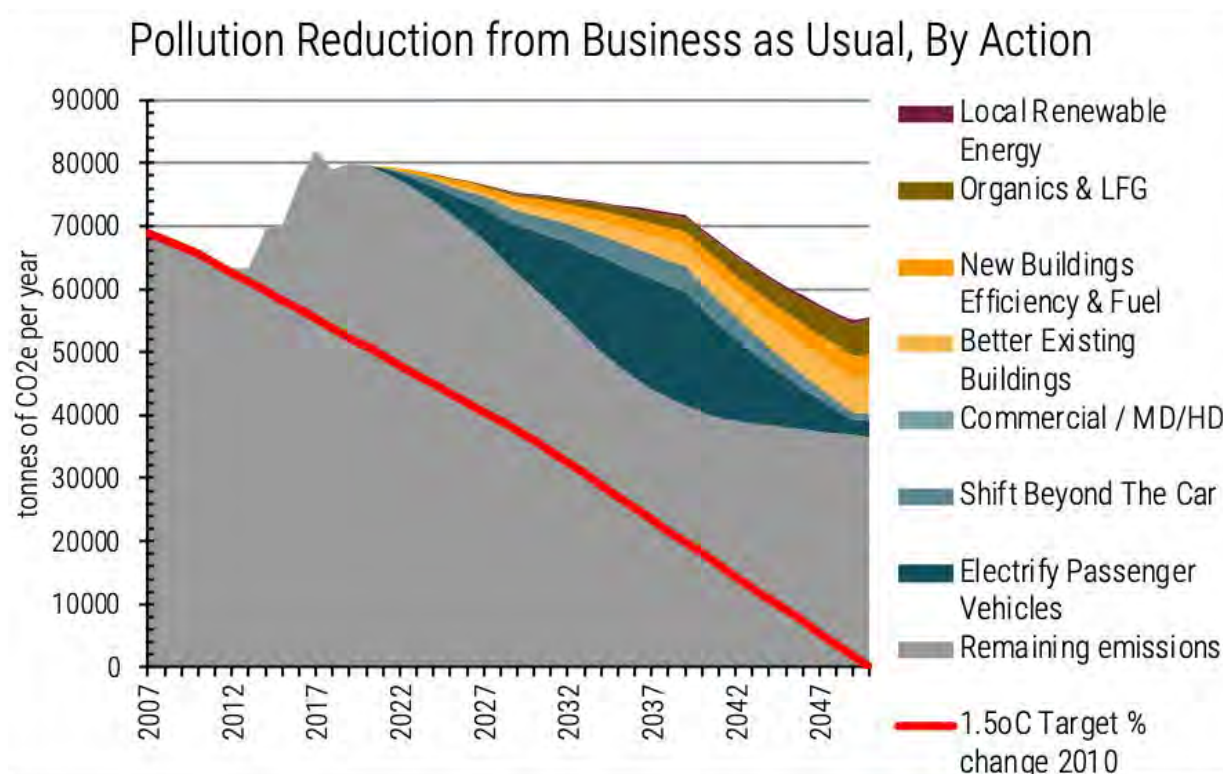


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Nelson is able to achieve a reduction of 19,100 tonnes CO₂e, equivalent to 34% of its 2050 emissions, with the Better Existing Buildings at 5,800 tonnes CO₂e, followed by Organics and LFG (Landfill Gas Capture) at 5,400 tonnes CO₂e, New Buildings Efficiency & Fuel at 3,600 tonnes CO₂e, and Electrify Passenger Vehicles at 2,600 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect,



allowing for the business-as-usual case to “catch up”. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.

Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a significant impact on GHG reductions for the City of Nelson, there are some gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.

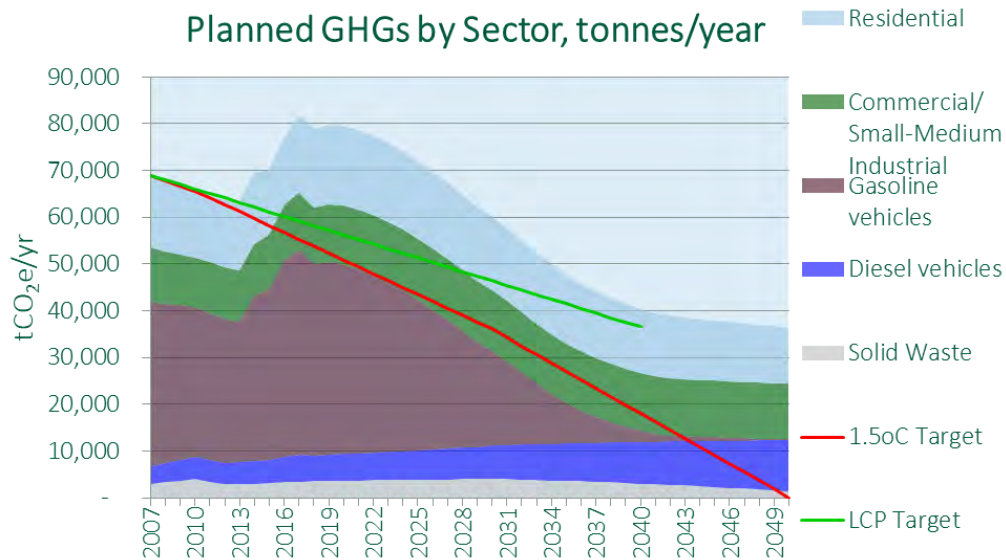


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted



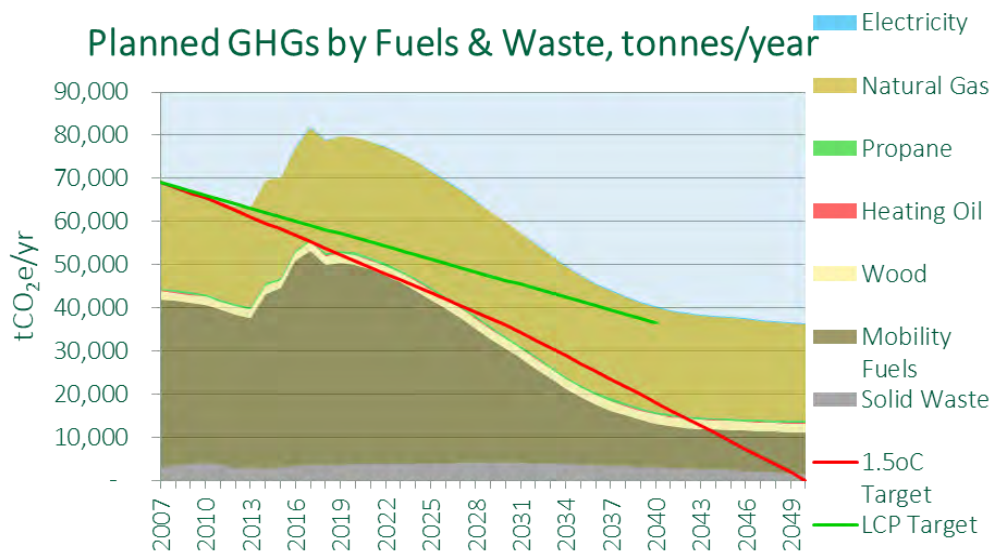


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Natural gas emissions in existing buildings
- Commercial vehicle emissions

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code and higher renewable natural gas requirements could reduce the natural gas emissions. Advocacy to the Province of BC to decarbonize natural gas and phase in commercial vehicles can accelerate these important changes.

Nelson-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the City of Nelson. For a list of general inventory and model methodology and assumptions, please consult Appendix I.



Inventory Assumptions

- 31% of homes have secondary wood heating, 1.7% have propane heating, and 0.3% have heating oil as per drive-by heating survey results
- As mentioned in Appendix I, transportation data for Nelson up to 2018 is provided by retail fuel consumption data provided by Kent Group

Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 4,342, and in 2050 they will be 3,753
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 54, and in 2050 they will be 132
- 1% annual reduction in emissions through residential organics diversion to 2030
- 10 year lag before landfill gas capture system is installed, accounting for time required to coordinate with RDCK, develop business cases, and acquire funding. Ramp up emission reduction to 80% by 2050
- Assumes that a district energy system capable of delivering 9,600 GJ of biomass energy (70,000 m² @ 75% efficiency and 40 kWh/m² heating load) and 3,200 GJ of electricity will be generated by 2040 to displace fossil fuel heating, according to Low Carbon Path to 2040



3.4: Village of New Denver



Located on the eastern shores of Slocan Lake, New Denver contains 2 local parks, is adjacent to a regional park and trail, and is within 40km of 12 provincial parks and protected areas. New Denver is steeped in history, some of which can be taken in at the Silvery Slocan Museum, the Nikkei Internment Memorial Centre, and the Kohan Reflection Garden. In 2018, New Denver’s population was 484. With 39% of the population employed in 2016, the largest industry was retail trade employing 21% of the workforce, followed by ‘health care and social assistance’ and ‘administrative and support, waste management, and remediation services,’ each employing 13.5%. Construction was the next largest employer.

New Denver Quick Facts	
Area & population (density)	.87 km ² , 473 (543.7 persons per km ²)
Average Age (portion of population 65 or over)	54.4 (38.9)
Total Private Dwellings (permanently occupied)	320 (243)
Median Household Income	\$40,576
Utility infrastructure	BC Hydro, BC Transit
Mean solar insolation per day**	5.77 kwh/m ²
Heating Degree Days 2018 (2050 projection)	3,627 (3,090)
Cooling Degree Days 2018 (2050 projection)	84 (173)
Walk/bike score	29/41
* Statistics Canada 2016 Census Data **Natural Resources Canada, Photovoltaic Potential and Insolation Dataset	

The Village’s electricity is supplied by BC Hydro and is not serviced by natural gas. New Denver’s governance structure consists of a mayor and four councillors, and had an annual operating budget of \$1.7M in 2020.

In 2020, residents of New Denver and Silverton participated in a joint in-person discussion about 100% renewable energy and an online survey about their community values, opportunities and barriers to 100% renewable energy. People generally said they value the close-knit, self-reliant



community surrounded by wilderness, and shared concerns about rising costs. As opportunities, they identified individual choices for lower-energy lifestyles along with leadership from local government and changes to policy. See Appendix IV for a complete summary of responses.

Where are we today?

The following summarizes the Village of New Denver’s current greenhouse gas emission inventory (2018 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 Village of New Denver, referred to as “corporate emissions”). Total greenhouse gas emissions for the community for 2018 are 3,400 tonnes of CO₂ equivalent (6.9 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the Village of New Denver come from mobility fuels.

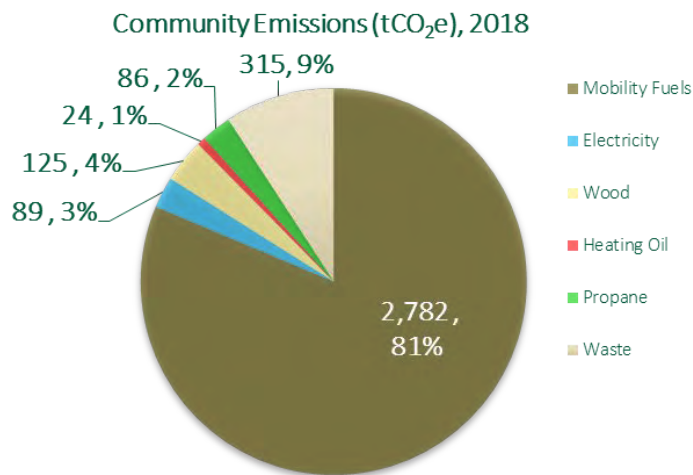


Figure 1 2018 Emissions Summary for Village of New Denver by Source

The distribution of energy consumption, emissions, and estimated energy expenditures of each sector is shown in Figure 2.



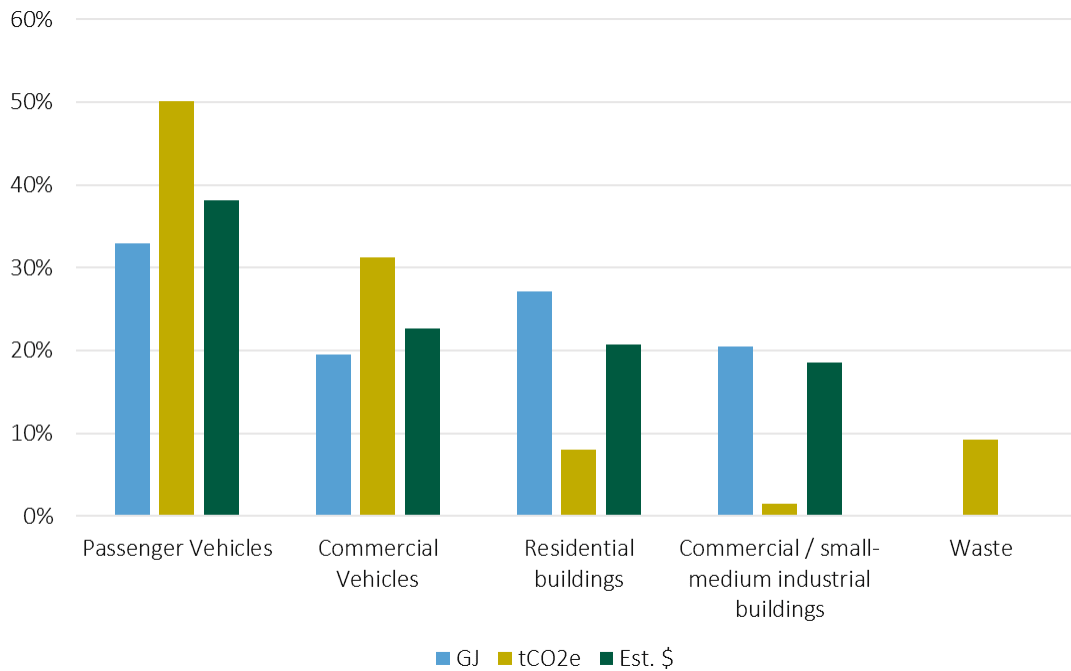


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for Village of New Denver

Passenger vehicles represent the largest source of emissions, energy, and cost at 50%, 33%, and 38% respectively. Commercial vehicles are the second largest source of emissions and energy costs at 31% and 23%, respectively, while residential buildings are the second largest source of energy consumption at 27%. Of note, residential buildings only contribute 8% of New Denver’s overall emissions. This is due to the lack of natural gas heating. Wood and propane contribute the majority of residential building emissions. Commercial buildings contribute 20% of energy and 19% of costs, but only 1% of emissions, as a result of 100% of energy consumption coming from electricity.

Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles dropped slightly from 2007 to 2018 (1,830 to 1,710 tCO₂e). Emissions from commercial vehicles also decreased slightly during the same period (1,160 to 1,070 tCO₂e). The significant drop in projected passenger vehicle emissions from 2030 to 2050 is attributed to the Province of BC’s zero emission vehicle mandate, which is part of the CleanBC Plan, requiring 30% of new vehicle purchases as electric in 2030, and 100% in 2040.



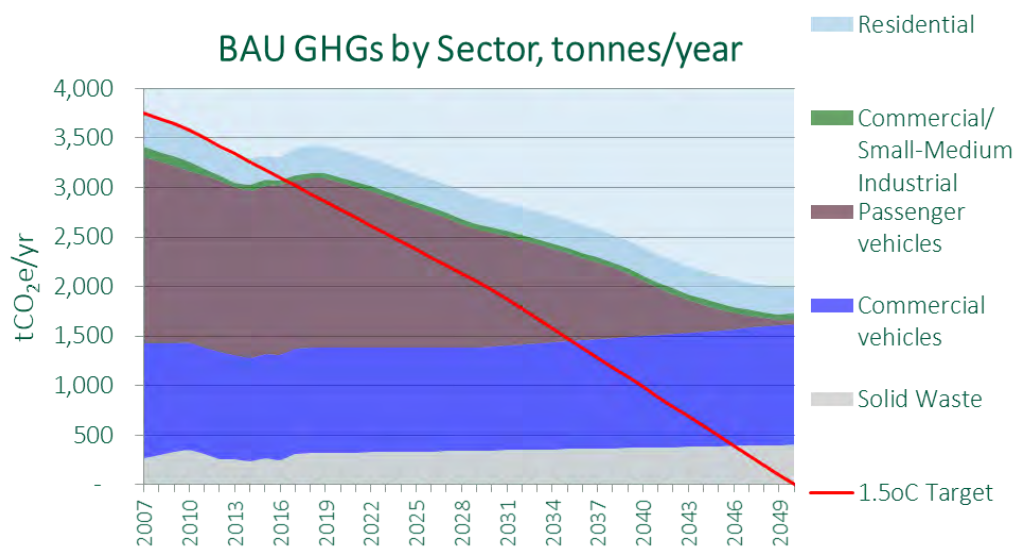


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection

Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change (IPCC) 1.5°C report, the Village of New Denver must reduce its GHG emissions from 2,900 tonnes CO₂e (2030 business as usual projection) to 2,000 tonnes CO₂e (2030 goal) by 2030. This equates to a total of 900 tonnes CO₂e emissions reductions, or about 32%. To align with goals congruent with the IPCC report by 2050, the Village of New Denver must reduce its GHG emissions from 2,000 tonnes CO₂e to 0 by 2050. New Denver’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting New Denver’s long-term emissions.

New Denver’s Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Mid-1	Minimal	Full	Mid-1	Full



New Denver's Actions

[Click here to see a spreadsheet of New Denver's actions toward renewable energy](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.

Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

- Electrifying Passenger Vehicles
- Organics & LFG
- Better Existing Buildings
- Shift Beyond the Car



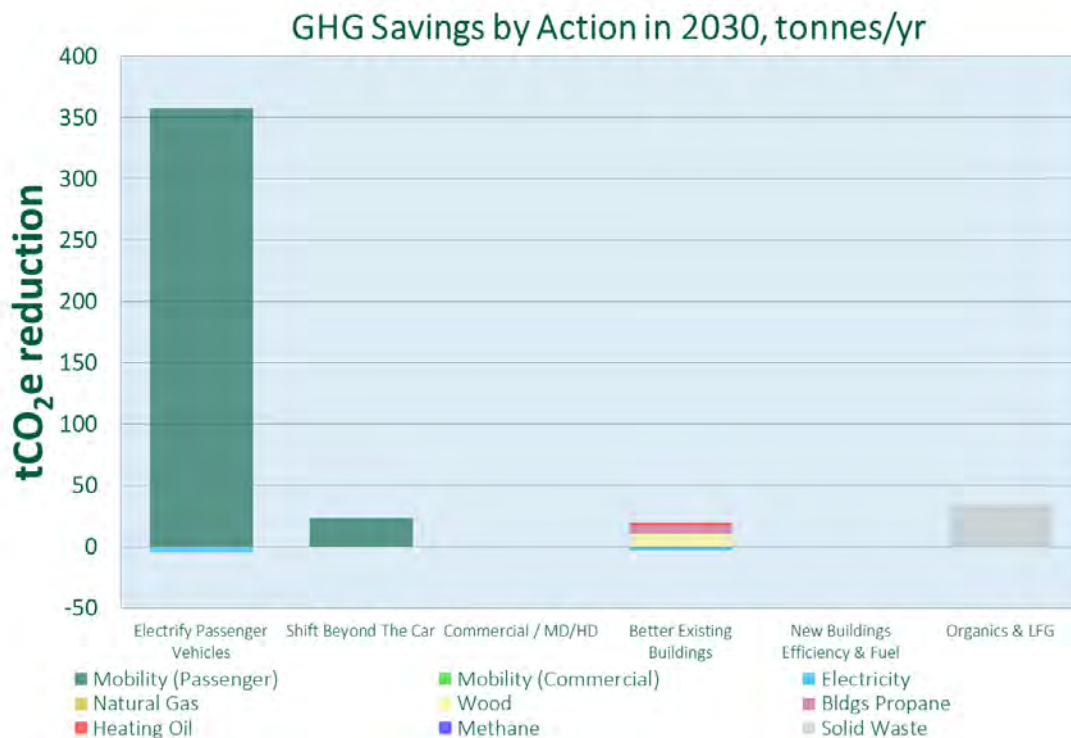


Figure 5 Emission Reductions from the Big Moves in 2030

In practical terms, New Denver can accomplish the following shifts by 2030:

- *Electrify Passenger Vehicles:* 90 conventional vehicles replaced with EVs
- *Shift Beyond the Car:* 20% of commutes eliminated through remote working policies
- *Better Existing Buildings:* 100 buildings (30%) undergoing energy retrofits to reduce energy use by 33%
- *Organics & LFG:* 23 kg/person of organics diverted per year, equivalent to about twenty 4 L milk containers per person

Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 420 tonnes CO₂e in 2030 vs. business as usual. This



reduction accounts for an overall reduction of 32% from 2010 levels, equal to over two-thirds of the 45% reduction required for New Denver to meet its 2030 IPCC goal.

With the Big Moves in place, projections can be made as to their impacts on New Denver’s overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are illustrated in Figure 6.

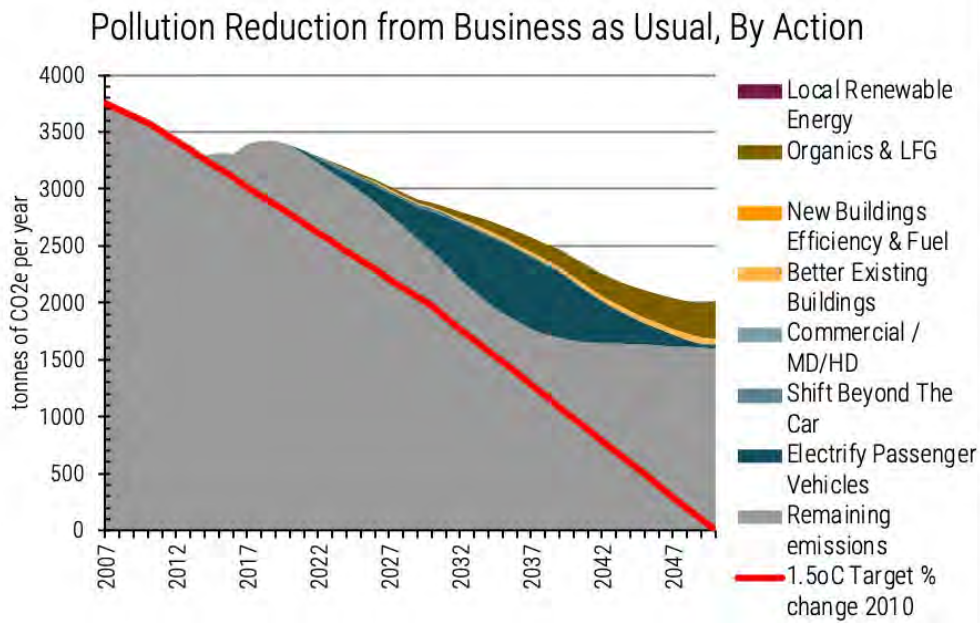


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050



At full implementation of all Big Moves, New Denver is able to achieve a reduction of 410 tonnes CO₂e, equivalent to 15% of its 2050 emissions, with Organics and LFG (Landfill Gas Capture) contributing the majority of reductions at 320 tonnes CO₂e, followed by Better Existing Buildings at 54 tonnes CO₂e and Electrify Passenger Vehicles at 33 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to “catch up”. This is the main reason why the net reductions in 2050 vs. BAU are roughly equivalent to those in 2030. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.

Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a moderate impact on GHG reductions for the Village of New Denver, there are some major gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.



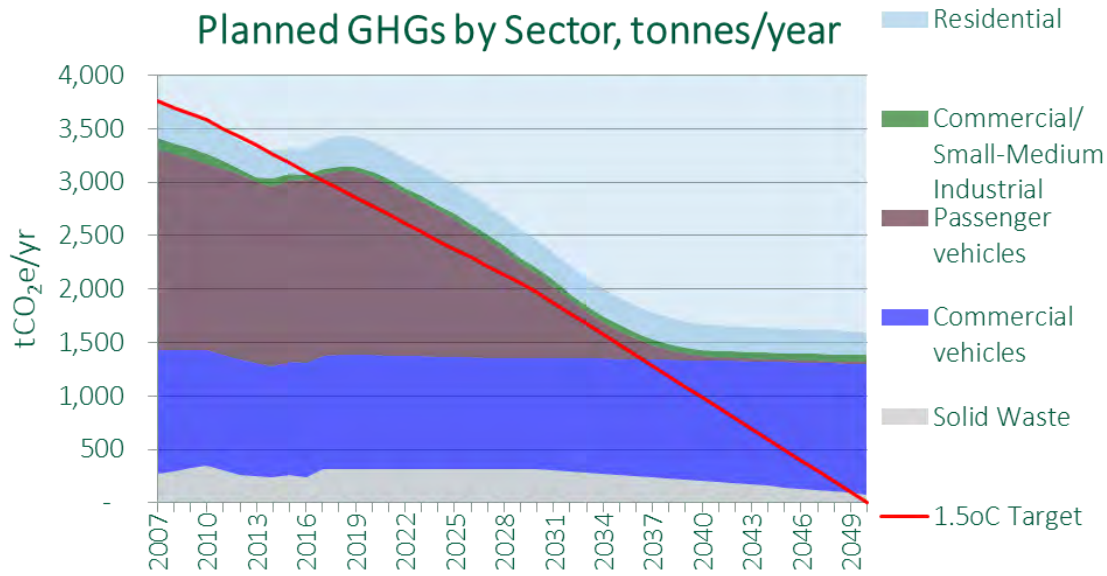


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted

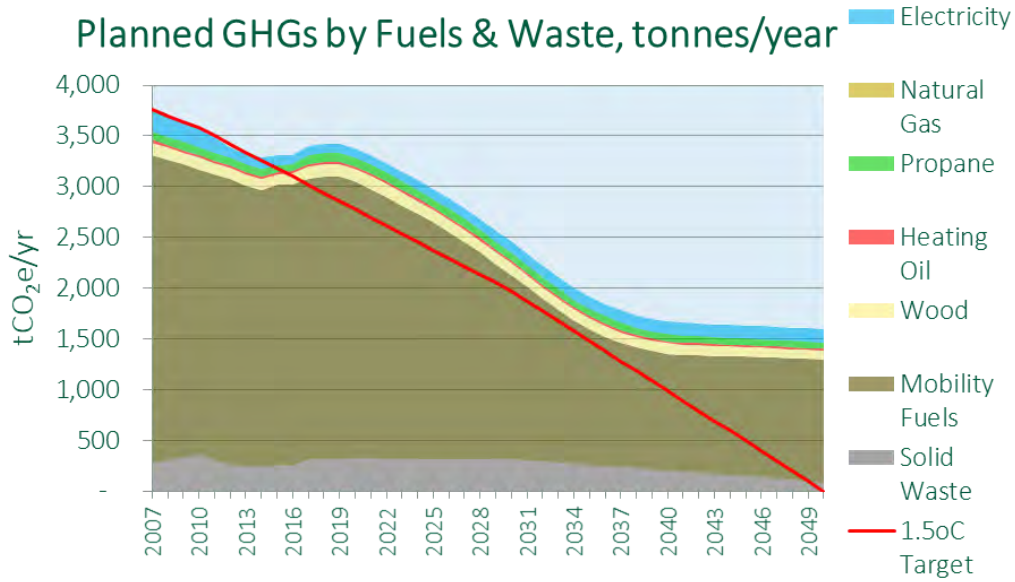


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Commercial vehicle emissions
- Non-electricity heating (propane and oil) in existing buildings



These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code could reduce the building emissions. Propane and heating oil heating are both expensive compared to natural gas, and are emission heavy, making them prime candidates for replacement with low-carbon heating such as heat pumps (air or ground source). Participation in regional energy efficiency retrofit programs could accelerate retrofit deployment, and advocacy to the Province of BC to adopt a retrofit code and phase in commercial vehicles can also accelerate these important changes.

New Denver Public Survey Results

New Denver residents were asked to complete a survey rating the potential impact and feasibility of potential actions. Based on 32 responses, the weighted average of the actions are shown in the chart below. The potential score ranges from 1 to 5 for both measures. The distinctions among many of the actions fall within the margin of error (+/- .68) due to the small sample size.

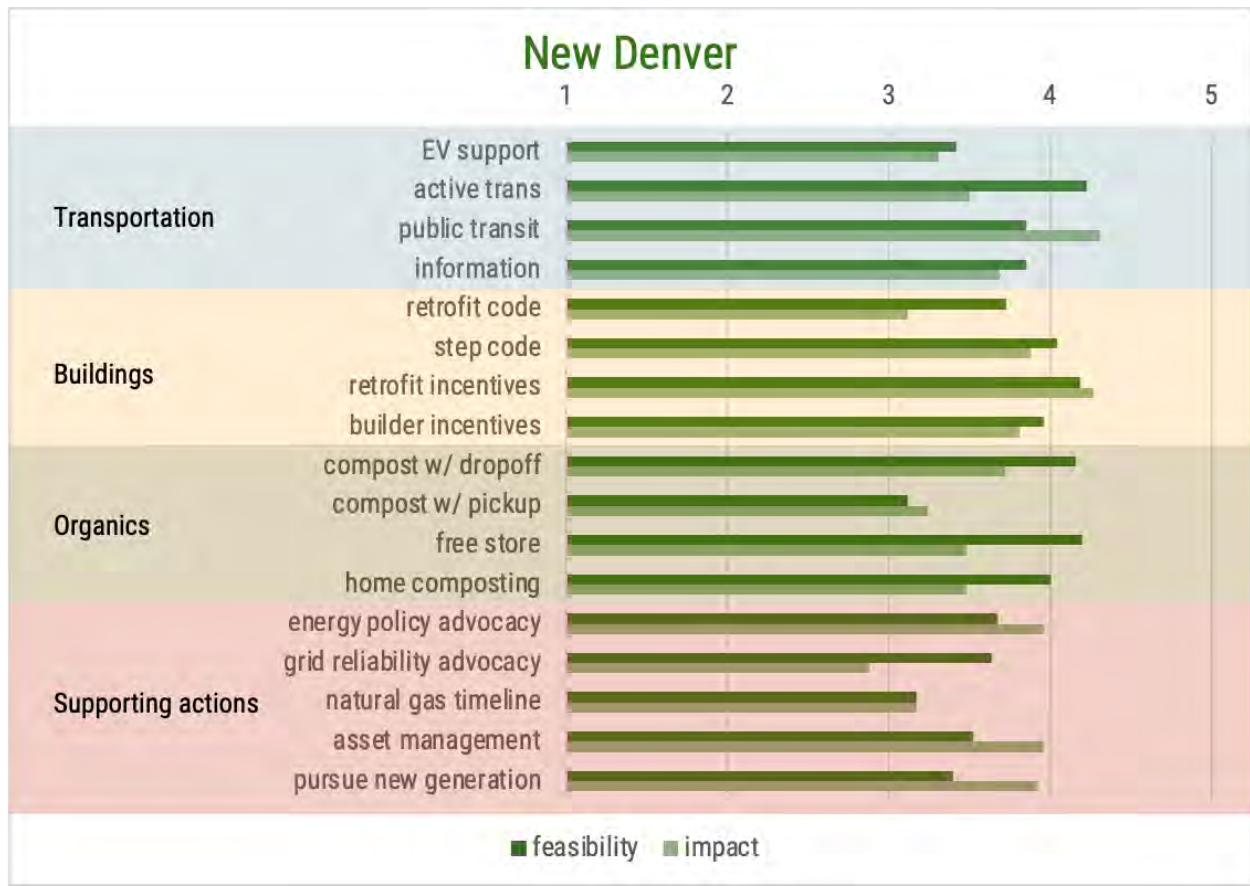
The highest impact ratings were for public transit (4.31), retrofit incentives (4.27), and asset management (3.96), while the lowest ratings were for grid reliability advocacy (2.88), voluntary retrofit code (3.12), and advocacy for renewable natural gas timeline (3.17).

The highest feasibility ratings were for active transportation support (4.23), free store (4.20), and retrofit incentives (4.19). The lowest feasibility ratings were for compost with pickup (3.12) and advocacy for renewable natural gas timeline (3.17).

Proposed Actions	feasibility	impact
Promoting electric vehicles with charging stations & incentives	3.42	3.31
Adding more trails, paths and routes for walking, cycling etc	4.23	3.5
Adding more transit routes, stops, and rides	3.85	4.31
Providing more information about alternatives to car trips	3.85	3.69
Adopting a voluntary energy efficiency standard for building renovations	3.73	3.12
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step	4.04	3.88



Code)		
Providing incentives and support for home energy efficiency retrofits	4.19	4.27
Providing incentives for builders to meet higher efficiency standards	3.96	3.81
Centralized compost facilities with drop off locations	4.16	3.72
Centralized compost facilities with curbside pickup	3.12	3.24
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	4.2	3.48
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	4	3.48
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.67	3.96
Advocate for a more reliable electrical grid	3.64	2.88
Ask the province to set a timeline to move to 100% renewable gas	3.17	3.17
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.52	3.96
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.4	3.92



New Denver-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the Village of New Denver. For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions

- 23% have secondary wood heating, 8% of homes use propane for their primary heating source, and 1% use heating oil for their primary heating source, as per drive-by heating survey results

Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 3,627, and in 2050 they will be 3,090
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 84, and in 2050 they will be 173
- Shift Beyond the Car impacts reduced to 2% due to the remote nature of the community. Reductions are based on 20% of commuters working one day a week from home, and assuming that commuting accounts for 50% of all vehicle kilometers travelled (VKTs). This reduction would commence in 2022 with a 1% reduction (10% commuters), followed by 2% in 2023 (20% commuters)
- New Buildings Efficiency & Fuel will be following the approach set out by the Regional District of Central Kootenay (RDCK). Based on the ambition level of “Mid 1” for RDCK, reductions are expected to be within the margin of error, and therefore negligible.



3.5: Regional District of Central Kootenay - Unincorporated



About RDCK

RDCK includes 11 electoral areas and 9 incorporated municipalities across more than 22,000 square kilometres. In general, the rural residents of the RDCK face challenges that city-dwellers do not, including longer driving distances to services, employment and amenities, less reliable electricity, and fewer choices in both communications and energy infrastructure.

RDCK Quick Facts	
Area & population (density)*	22,084.94 km ² , 59,517 (2.7 persons per km ²)
Average Age (portion of population 65 or over)*	42.3 (23.5%)
Total Private Dwellings (permanently occupied)*	30,726 (27,016)
Median Household Income*	\$55,532
Utility infrastructure	Varies
Mean solar insolation per day	ND
Heating Degree Days 2018 (2050 projection)	3,555 (3,037)
Cooling Degree Days 2018 (2050 projection)	34 (95)
* Includes incorporated areas. Statistics Canada 2016 Census Data	

Energy costs are an important consideration for rural residents. A recent assessment found that a significant portion of the region spends 6% or more of household income on energy, compared to the Canadian average of less than 3%. When transportation cost is included, eleven communities within the RDCK have energy costs greater than 10% of median income. Overall, RDCK owner households allocate 9.5 percent of their after-tax income to total energy expenses, 12.8 percent for renter households, and 10.0 percent for overall households.³² Energy efficiency in rural RDCK means not only less carbon pollution but significant improvements in well-being, especially for the one in five families living in poverty.

Despite the consistent need for more secure and efficient energy throughout the rural RDCK, the opportunities, obstacles, and current energy use patterns vary considerably. Nevertheless,

³² RDCK 2020. Housing Needs Assessment Report - DRAFT. June 2020 Board report.



subregions have shared characteristics that make it useful to consider them together in developing steps to reach 100% renewable energy.

Although in-person consultation was not possible due to the COVID-19 pandemic, 71 RDCK residents participated in an online survey about their community values, opportunities and barriers to 100% renewable energy. In general, people love the clean air and water, low population density, natural beauty, and sense of community found throughout the region. They are concerned about logging, raising cost of living, and population growth. Advocating for sustainable forest practices, community utilities like micro-hydro and solar, and building an electric vehicle charging network can mitigate these risks. See Appendix IV for a complete summary of responses.

Regional District Governance and the Renewable Energy Pledge

The Regional District Board of Directors includes eleven members who are directly elected by the residents of their rural districts, and nine members who are assigned from the ranks of each elected municipal council. The RDCK board therefore represents both rural and urban residents. When the RDCK board adopted the 100% Renewable Energy pledge, they committed the region to 100% renewable energy, including municipalities who have not yet adopted the pledge independently (the Town of Creston, the Village of Nakusp, and the Village of Salmo). Although every municipal council retains authority over their own plans and bylaws, RDCK's collaborative role with municipalities creates opportunities to move toward 100% renewable energy as a region.

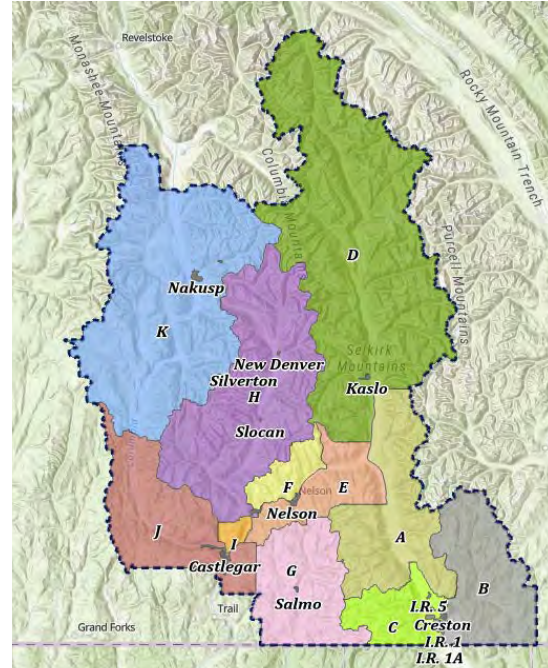
In addition, in 2016 RDCK completed a regional Strategic Community Energy and Emissions Plan which evaluated the existing climate-related policies in each municipality as well as of the sub-regions. The [Regional District of Central Kootenay Strategic Community Energy & Emissions Plan of 2016](#) provides useful insight and analysis regarding the climate-related policies and actions throughout the region.

[A summary of the actions from the 2016 SCEEP for Creston, Nakusp, and Salmo and for the three subregions can be found here.](#)



Opportunities:

- Switching from propane, oil and wood to electricity could save residents money in heating costs.
- Air sealing, insulation, and windows can make major improvements to home comfort and energy cost regardless of fuel source.
- Future hybrid electric vehicles could operate as generators when electricity is out.
- Widespread existing knowledge of solar and micro hydro power makes new installations easier.



Obstacles:

- Electricity is not reliable enough to be the sole form of energy for most households in winter. Wood supplemental heating is important in areas where electricity is not reliable.
- High-speed internet is not available in many areas, limiting options for remote work and schooling
- Low population density means that where transit exists, it includes more transit stops (longer bus trips) or longer distances to travel to bus stops.
- Public transit is not currently available throughout the region.
- EV Charging infrastructure is sparse and due to less reliable grid power access, it would present risks of incapacitating EVs in the more rural regions.
- Electrical heating can be cost prohibitive due to the low efficiency of electric baseboards and space heaters, and due to the high initial cost of installing a new heat pump system.



Subregion 1 – Areas A, B and C

Includes: Boswell, Sirdar, Sanca, Wynndel, Gray Creek, Kootenay Bay, Riondel, Twin Bays, Kuskanook, Pilot Bay and Crawford Bay, Canyon, Erickson, Lister, Huscroft, Rykerts, Arrow Creek, Yahk, Goatfell, Kingsgate, Kitchener, Glenlily, Goat River Bottom and the Yaqan Nukiy Indian Reserve lands, Duck Lake, Lakeview, West Creston (Flats) and South Reclamation.

In addition to these unincorporated communities,

Subregion 1 includes the Town of Creston. Geographically, this subregion follows Goat River through Yahk to the community of Yaqan Nukiy (Lower Kootenay Band) then up the Kootenay River to Kootenay Lake and Riondel. It includes productive farm and orchard land and several small hamlets along the East Shore that are bounded by the Purcell Mountains. The character of many parts of this subregion will need to be taken into consideration when implementing the actions in this plan in order to accommodate the unique needs and challenges of rural residents.

Transportation: The lower part of Area A, Areas B and C are served by BC Transit; however, there is no public transit on the East Shore from Wynndel to Riondel, though there are community efforts underway to create a shuttle to Creston and to Nelson. The Creston public transit system and surrounding area system is being redesigned to be an on-demand system. There are efforts underway to create a community-led shuttle along the East Shore, and there are challenges with identifying pick up spots and park and ride locations.

Energy: Natural gas is available in part of Area B and C but not in Area A. Residents rely on electricity, propane, oil or wood for their household energy needs. Residents along the East Shore often experience extended power outages, mostly due to tree falls, which are a function of the terrain and heavily forested nature of the areas. The Kootenay Lake/East Shore electrical grid is on a loop feed, which means that outages occur because of tree strikes on both sides of the lake at the same time. There is interest in exploring how district energy systems could leverage sustainable bioenergy to promote clustered housing development, which would encourage transit access and commercial development. In Area A near Riondel, there is an active investigation underway to examine the potential to access deep geothermal energy.

Population*	8,005
Median Income	
• Owners	\$56,170
• Renters	\$39,582
Percent low income*	21.7%
Average Home Energy Costs**	
• Owners	\$2,884
• Renters	\$1,664
* Statistics Canada, 2016	
**Draft RDCK Housing Needs Assessment, 2020	



Subregion 2 – Areas D, E, F & G

Includes: Lardeau, Argenta, Howser, Gerrard, Cooper Creek, Poplar Creek, Ainsworth, Mirror Lake, Marblehead, Johnson's Landing, Shutty Bench and Meadow Creek, Blewett, Balfour, Queens Bay, Longbeach, Harrop/Procter, Sunshine Bay, Bealby/Horlicks, Taghum Beach and Nelson to Cottonwood Lake, Beasley, Taghum, Willow Point, Nasookin, Grohman, Crescent Beach, Sproule Creek, Six Mile and Bonnington, Hall Siding, Ymir, Ross Spur, Airport Road, Erie, Porto Rico, Nelway and Salmo North.

Population*	10,695
Median Income	
• Owners	\$62,290
• Renters	\$36,973
Percent low income*	23.8%
Home Energy Costs**	
• Owners	\$3,012
• Renters	\$1,715
* Statistics Canada, 2016	
**Draft RDCK Housing Needs Assessment, 2020	

In addition to these unincorporated communities, Subregion 2 also includes the Village of Kaslo, the City of Nelson, and the Village of Salmo. Geographically, this subregion stretches from the US border at Nelway moving north through Ymir towards the north arm of Kootenay Lake and the communities of Beasley and Blewett. The region continues along the north shore to Harrop-Procter and then turns left at Balfour to the north end of Kootenay Lake and the small communities of Argenta and Johnson's Landing. The region stretches northward to include Duncan Lake and surrounding areas. The rural character of many parts of this subregion will need to be taken into consideration when implementing the actions in this plan in order to accommodate the unique needs and challenges of rural residents.

Transportation: BC Transit provides services to this sub region; however, the community of Harrop-Procter does not have transit service, and Area G has inadequate transit for the purpose of the community's ability to use it for regular commuting. The majority of the subregion does not have sufficient access to transit to use it for daily or regular needs, and Blewett currently has no service from BC Transit.



Energy: Natural gas is not available north of Balfour Area E and Area D, and Harrop-Proctor of Area E. Residents rely on electricity, propane, oil or wood for their household energy needs. Electrical heating can be cost prohibitive due to the low efficiency of electric baseboards and space heaters, and due to the high initial cost of installing a new heat pump system. The communities of Harrop-Proctor and those at the north end of Kootenay Lake often experience extended power outages, mostly due to tree falls, which are a function of the terrain and heavily forested nature of the areas. The electrical grid for Kootenay Lake is on a loop feed, which means that outages occur because of tree strikes on both sides of the lake at the same time.



Subregion 3 – Areas H, I, J And K

Includes: South Slocan, Crescent Valley, Slocan Park, Passmore, Winlaw, Red Mountain, Vallican, Perry Siding, Appledale, Hills, Summit Lake, Playmor Junction, Krestova, Brandon, Lemon Creek, Sandon, Rosebery and New Settlement, Pass Creek, Thrums, Tarrys, Shoreacres, Glade, Brilliant and the Voykin Subdivision, Ootischenia, Robson, Renata, Deer Park, Brooklyn, Shields, Raspberry, Syringa and Fairview, Applegrove, Edgewood, Fauquier, Burton, Arrow Park, Crescent Bay, Whatshan Lake, Brouse/Glenbank, Box Lake, Needles, Halcyon and Inonoaklin Valley.

Population*	11,850
Median Income • Owners • Renters	\$65,770 \$36,089
Percent low income*	20.35%
Home Energy Costs** • Owners • Renters	\$2,951 \$1,730
* Statistics Canada, 2016 **Draft RDCK Housing Needs Assessment, 2020	

In addition to these unincorporated communities, Subregion 3 also includes the Villages of Nakusp, New Denver, Slocan, and Silverton, and the City of Castlegar.

Geographically, this subregion begins on the north shore of the Kootenay River and Playmor Junction and then splits north into the Slocan Valley and also continues west to join the Columbia River at Brilliant and Raspberry. From there it moves north through the Arrow Lakes to Halcyon and connects again with the Slocan Valley at Rosebery. Area H is not adjacent to any municipality. Many residents of this subarea have more restricted access to services such as garbage pickup and transit, to utilities such as high speed internet, cell phone, and natural gas, and to employment and retail services. These rural residents may face higher living expenses and higher costs for home building and renovation than residents living in more urbanized areas. The rural character of many parts of this subregion will need to be taken into consideration when implementing the actions in this plan in order to accommodate the unique needs and challenges of rural residents.

Transportation: BC Transit provides services to this sub region, though some areas have infrequent service or no service.

Energy: Natural gas is not available in the Slocan Valley (Area H) nor along the Arrow Lakes (Area K). Residents rely on electricity, propane, oil or wood for their household energy needs. Residents in the Slocan Valley often experience extended power outages, most often due to tree strikes, which are a function of the terrain and heavily forested nature of the areas. The Slocan Valley is a



definition of key indicators for the State of Climate Action required by the RDCK Board. Some additional items from the climate action strategy include creating a Climate Action Reserve Fund, adopting Step Code, identifying energy recovery opportunities, and more. The RDCK is committed to supporting bold advancement, and has already installed 13 fast charging stations along highways 1, 3, and 95 as well as running the 2-year Regional Energy Efficiency Program (REEP, see Section 2.2).

The following summarizes RDCK Unincorporated Areas' current greenhouse gas emission inventory (2018 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 RDCK, "corporate emissions"). Total greenhouse gas emissions for the community for 2018 are 192,000 tonnes of CO2 equivalent (6.0 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions from RDCK Unincorporated Areas come from mobility fuels.

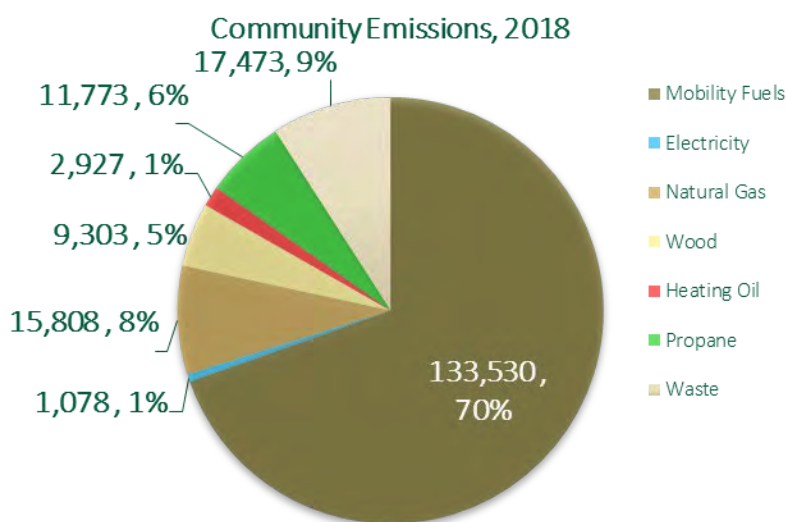


Figure 1 2018 Emissions Summary for RDCK Unincorporated Areas by Source

The distribution of energy consumption, emissions, and estimated energy expenditures for each sector is shown in Figure 2.



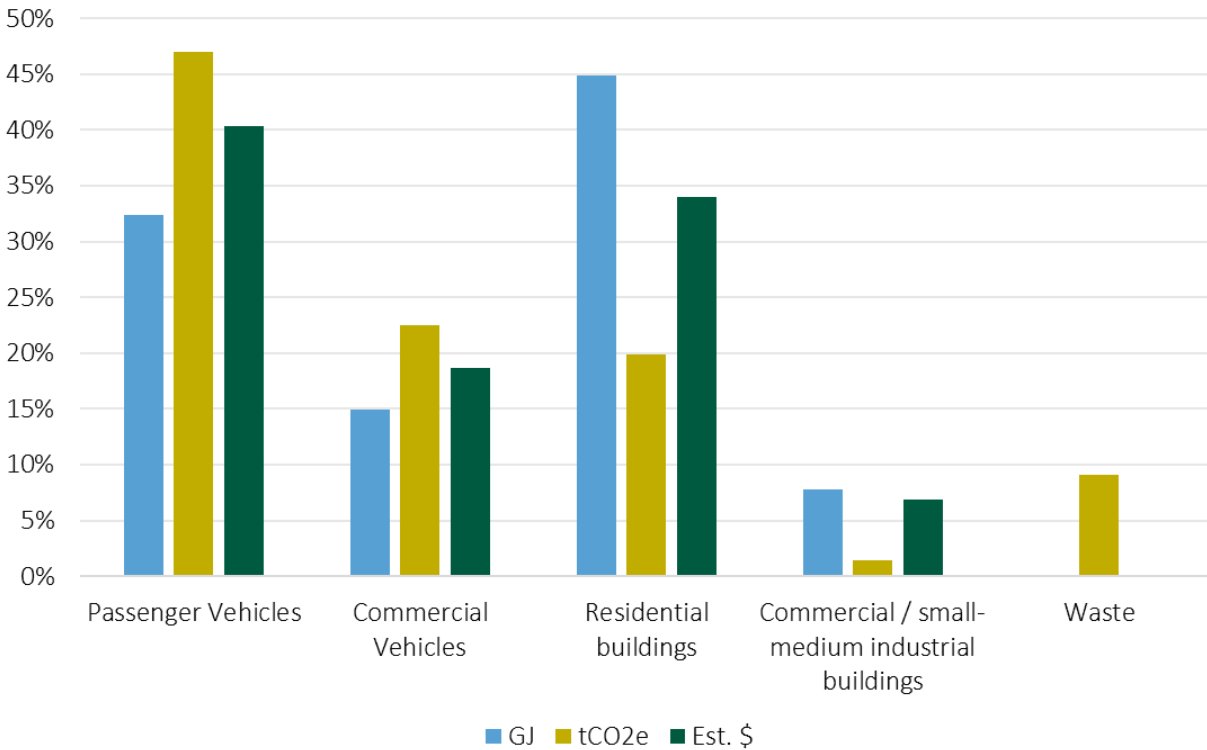


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for RDCK Unincorporated Areas

Passenger vehicles represent the largest source of emissions and energy costs at 47% and 40%, respectively, while consuming the second largest proportion of energy at 32%. Residential buildings are the largest source of energy consumption at 45%, and energy costs at 34%, with natural gas and propane contributing the majority of emissions. Commercial buildings contribute 8% of energy and 7% of costs, but only 1% of emissions, owing to 86% of energy consumption as electricity.

Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles rose moderately from 2007 to 2018 (83,000 to 90,000 tCO₂e), while emissions from commercial vehicles increased considerably during the same period (35,000 to 43,000 tCO₂e).



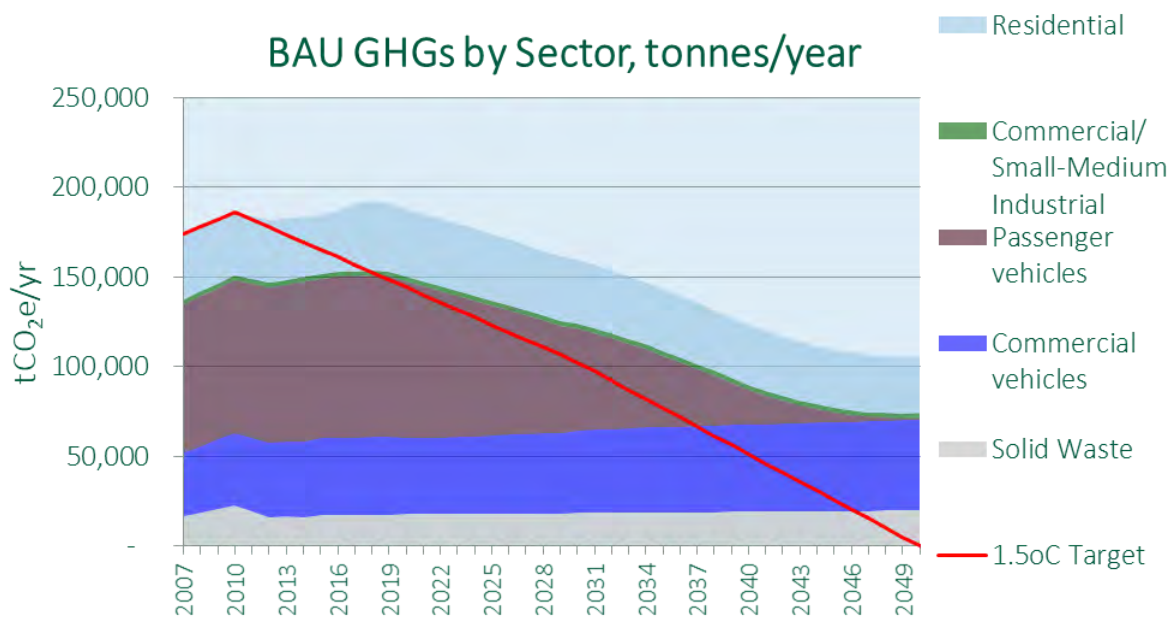


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection

Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, RDCK Unincorporated Areas must reduce their GHG emissions from 160,000 tonnes CO₂e (2030 business as usual projection) to 102,000 tonnes CO₂e (2030 goal). This equates to a total of 58,000 tonnes CO₂e emissions reductions, or about 27%. For 2050, RDCK Unincorporated Areas must reduce GHG emissions from 105,000 tonnes CO₂e to 0.

RDCK’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting RDCK’s long-term emissions.

RDCK’s Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Mid-1	Minimal	Full	Mid-1	Full



RDCK's Actions

[Click here to see a spreadsheet of RDCK's actions toward renewable energy.](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.

Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

- Electrifying Passenger Vehicles
- Better Existing Buildings
- Shift Beyond the Car
- Organics & LFG



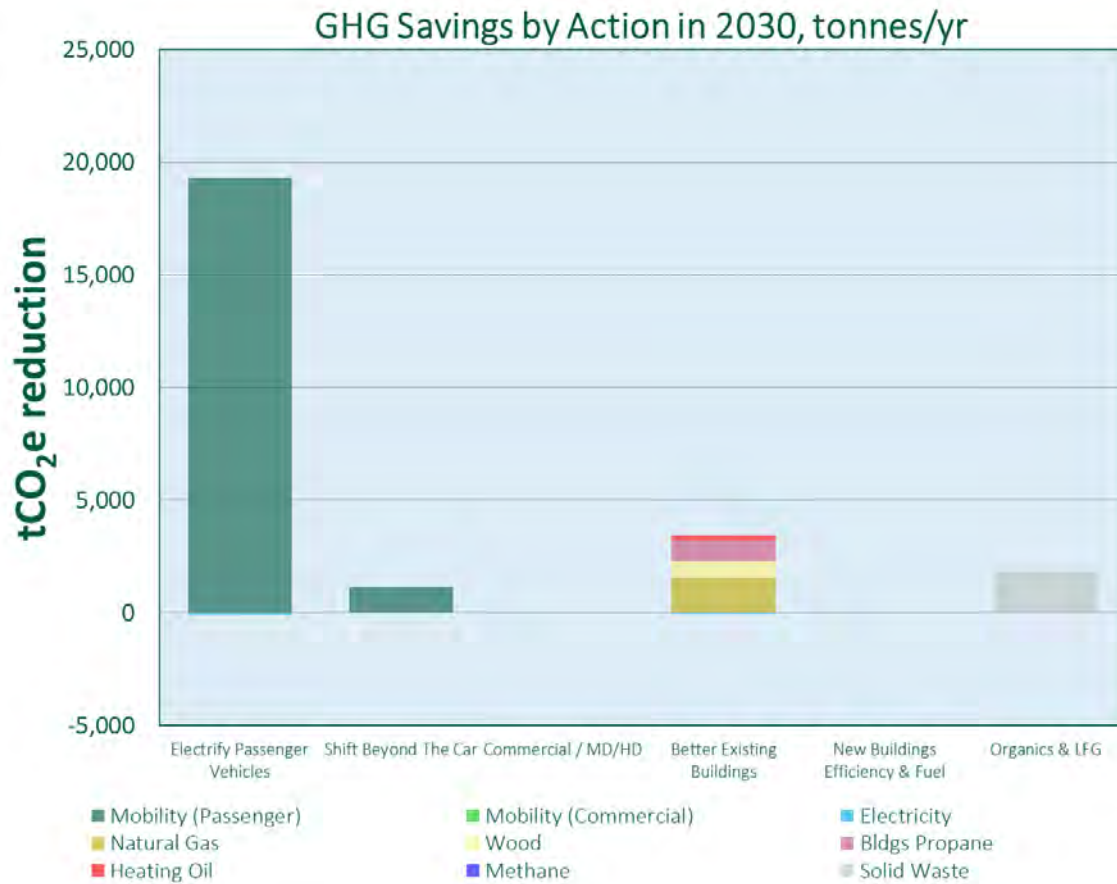


Figure 5 Emission Reductions from the Big Moves in 2030

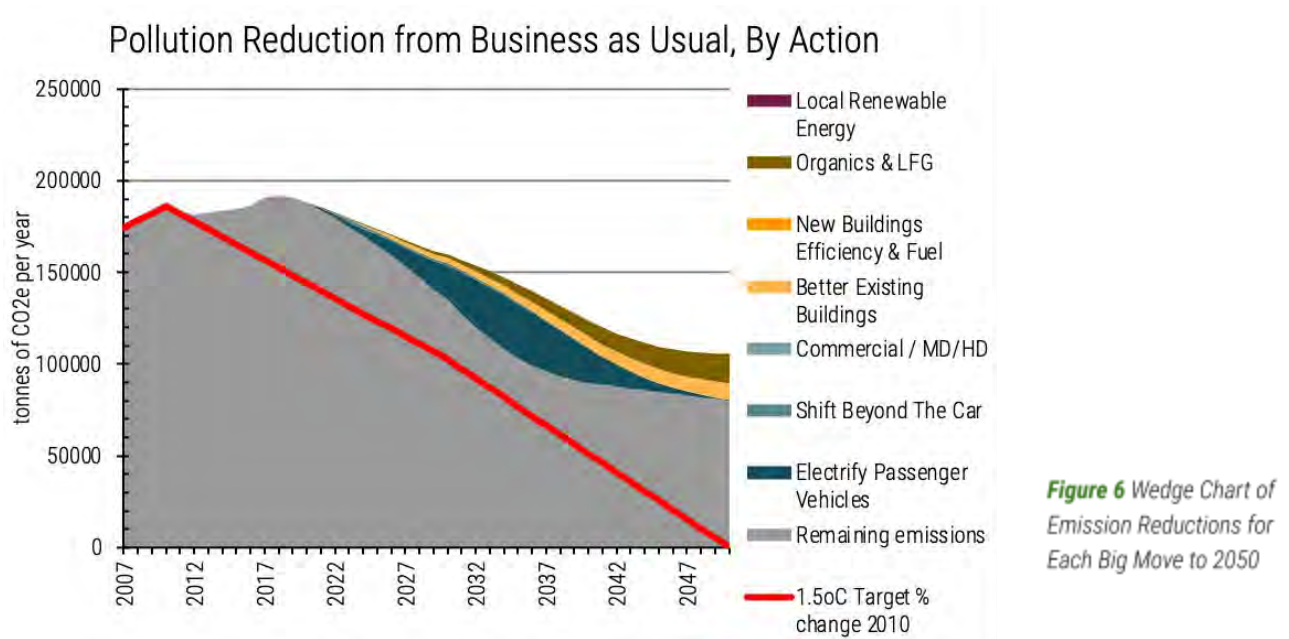
In practical terms, RDCK can accomplish the following shifts by 2030:

- *Electrify Passenger Vehicles:* 4980 conventional vehicles replaced with EVs
- *Shift Beyond the Car:* additional 20% of commutes eliminated through remote working policies
- *Better Existing Buildings:* 5540 buildings (30%) undergoing energy retrofits to reduce energy use by 33%
- *Organics & LFG:* 22 kg/person of organics diverted each year, equivalent to about twenty 4 L milk containers.



Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 25,000 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 28% vs. 2010 levels, nearly two-thirds of the 45% reduction necessary for RDCK Unincorporated Areas to meet its 2030 IPCC goal.

With the Big Moves in place, projections can be made as to their impacts on RDCK Unincorporated Areas' overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are illustrated in Figure 6.



At full implementation of all Big Moves, RDCK Unincorporated Areas are able to achieve a reduction of 26,000 tonnes CO₂e, equivalent to 24% of its 2050 emissions, with Organics and LFG (Landfill Gas Capture) and Better Existing Buildings contributing the majority of reductions at 15,800 tonnes CO₂e and 9,000 tonnes CO₂e, respectively. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to “catch up”. This is the main reason why the net reductions in 2050 vs. BAU are smaller than in 2030. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions from all RDCK-operated landfills by 2050.



Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a moderate impact on GHG reductions for RDCK Unincorporated Areas, there are some major gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.



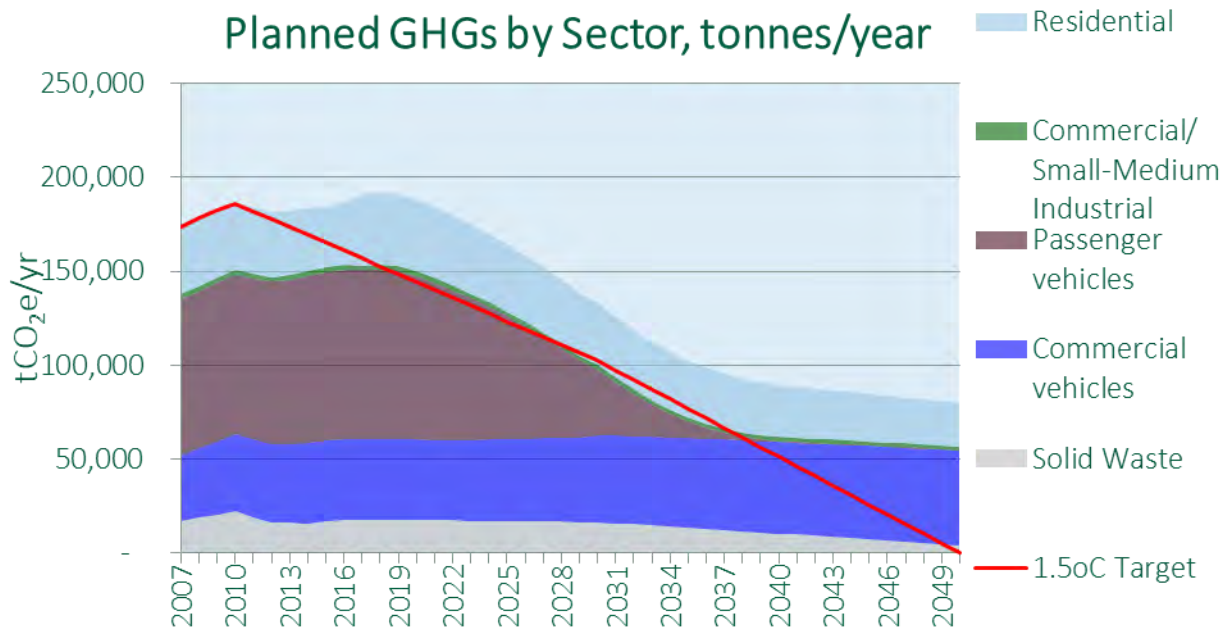


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted

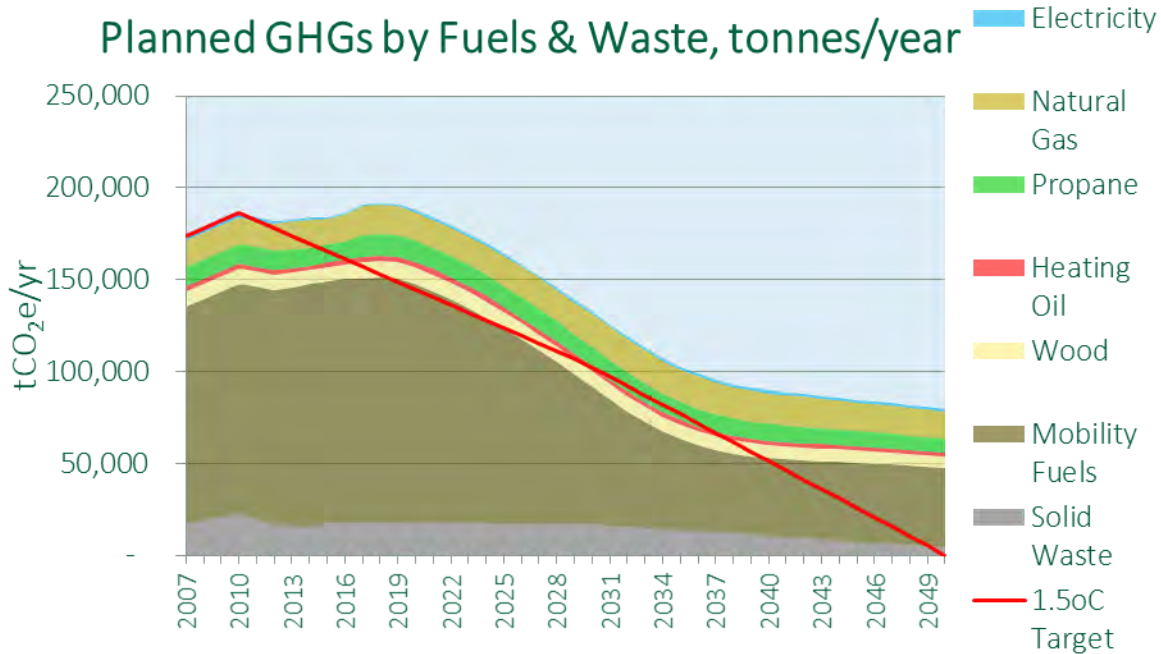


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:



- Commercial vehicle emissions
- Non-electricity heating (propane and oil) in existing buildings

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code could reduce the building emissions. Propane and heating oil heating are both expensive compared to natural gas, and are emission heavy, making them prime candidates for replacement with low-carbon heating such as heat pumps (air or ground source). Participation in proposed inter-regional energy efficiency retrofit programs could accelerate retrofit deployment, and advocacy to the Province of BC to adopt a retrofit code and phase in commercial vehicles can also accelerate these important changes.

RDCK Unincorporated Survey Results

RDCK residents were asked to complete a survey rating the potential impact and feasibility of potential actions. Based on 148 responses, the weighted average of the actions are shown in the chart below. All of the actions received average feasibility and impact ratings greater than the midpoint. The potential score ranges from 1 to 5 for both measures. The distinctions among many of the actions fall within the margin of error (+/- .32).

The highest impact ratings were for public transit (4.39), retrofit incentives (4.26), and transportation information (4.18), while the lowest ratings were for compost with pickup (2.98), compost with drop-off (3.09), and retrofit code (2.96).

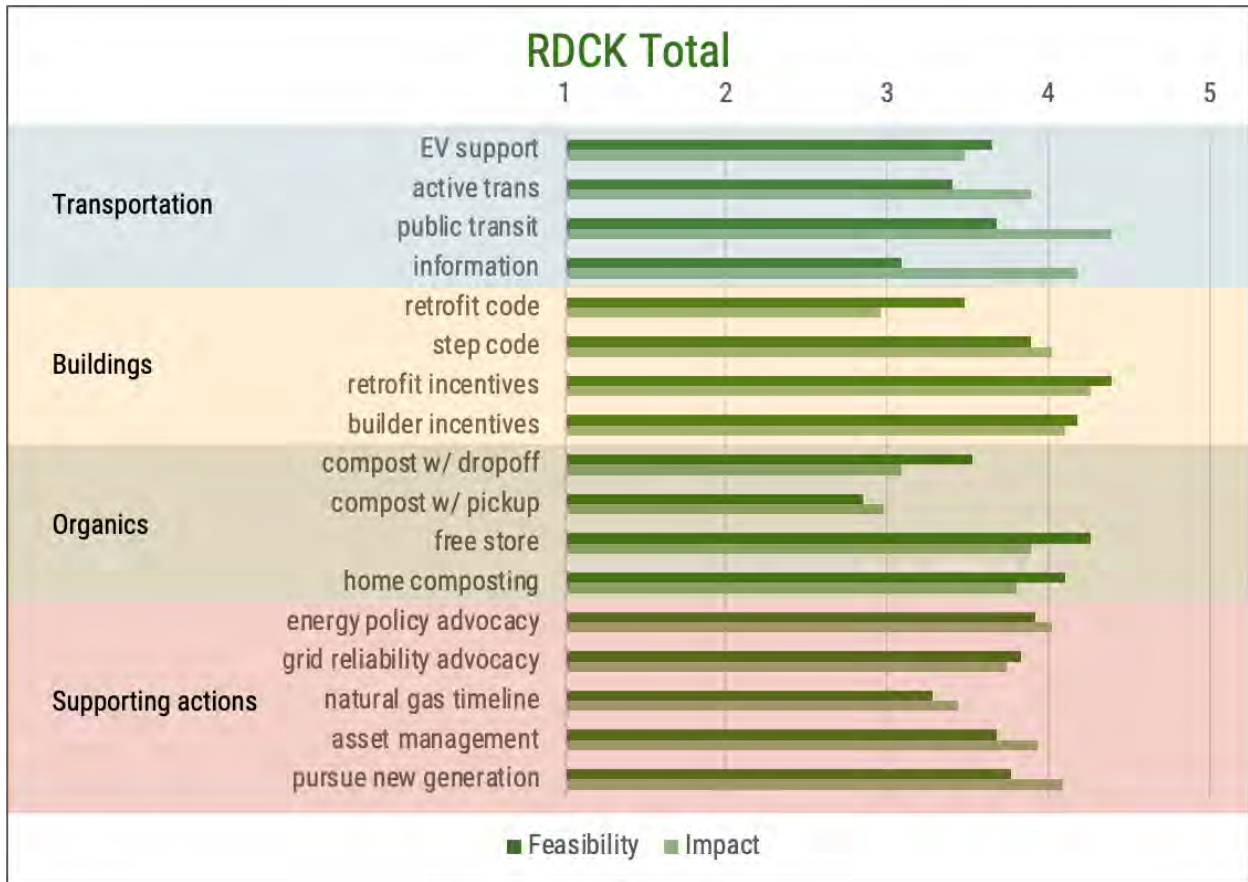
The highest feasibility ratings were for retrofit incentives (4.39), free store (4.26), and builder incentives (4.18). The lowest feasibility ratings were for compost with pickup (2.85) and transportation information (3.09).

RDCK residents were also asked to share which subregion they reside in. The table shows the breakdown by subregion.



Proposed Action	RDCK ABC		RDCK DEFG		RDCK HIJK		RDCK Aggregate	
	Feasibility	Impact	Feasibility	Impact	Feasibility	Impact	Feasibility	Impact
Promoting electric vehicles with charging stations & incentives	3.75	3.63	3.37	3.59	3.6	3.77	3.65	3.48
Adding more trails, paths and routes for walking, cycling etc	4.29	3.71	4.07	3.42	3.82	3.2	3.4	3.89
Adding more transit routes, stops, and rides	3.26	3.71	3.99	3.72	3.88	3.6	3.68	4.39
Providing more information about alternatives to car trips	3.57	3.13	3.76	3.03	3.58	3.17	3.09	4.18
Adopting a voluntary energy efficiency standard for building renovations	3.38	2.9	3.67	2.93	3.19	3.05	3.48	2.96
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step Code)	3.67	3.57	3.75	3.97	4.27	4.38	3.89	4.02
Providing incentives and support for home energy efficiency retrofits	4.57	4.62	4.26	4.11	4.54	4.32	4.39	4.26
Providing incentives for builders to meet higher efficiency standards	4.29	4.33	4.09	4.03	4.3	4.11	4.18	4.1
Centralized compost facilities with drop off locations	3.95	3.6	3.38	2.97	3.57	3.03	3.53	3.09
Centralized compost facilities with curbside pickup	2.95	2.9	2.72	2.87	3.03	3.24	2.85	2.98
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	4.65	4.2	4.18	3.84	4.19	3.81	4.26	3.89
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	4.4	3.9	4.07	3.8	3.97	3.76	4.1	3.8
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.78	4.22	3.82	3.96	4.17	4.03	3.92	4.02
Advocate for a more reliable electrical grid	3.94	3.94	3.88	3.78	3.68	3.57	3.83	3.74
Ask the province to set a timeline to move to 100% renewable gas	3.56	3.61	3.15	3.35	3.38	3.5	3.28	3.44
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.89	4.06	3.6	3.85	3.71	4.03	3.68	3.93
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.83	4.11	3.6	4	4.09	4.26	3.77	4.09





RDCK Unincorporated Area-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for unincorporated areas within the Regional District of Central Kootenay (RDCK). For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions

47% have secondary wood heating, 15% of homes use propane for their primary heating source, and 4% use heating oil for their primary heating source, as per drive-by heating survey results. Survey data was taken from a cross-section of unincorporated areas including Balfour-Ainsworth, Erickson-Kitchener, and Crawford Bay/Boswell/Wyndell



Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 3,555, and in 2050 they will be 3,037
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 34, and in 2050 they will be 95
- Shift Beyond the Car impacts reduced to 2% due to the remote nature of the region. Reductions are based on 20% of commuters working one day a week from home, and assuming that commuting accounts for 50% of all vehicle kilometers travelled (VKTs). This reduction would commence in 2022 with a 1% reduction (10% commuters), followed by 2% in 2023 (20% commuters)
- New Buildings Efficiency & Fuel will be following the approach set out by the Regional District of Central Kootenay (RDCK). Based on ambition level of “Mid 1” for RDCK, reductions are expected to be within the margin of error, and therefore negligible.



3.6: City of Rossland



Rossland is a municipality in the Regional District of Kootenay Boundary located 6 km from the Canadian/US border. Rossland’s resident population increases significantly in the winter season due to sports-related tourism and employment, primarily at Red Mountain Resort, which is located 3km from Rossland’s commercial centre.

Rossland’s tourism offers employment in the hospitality and retail sectors, and nearby Teck Metals provides heavy industrial employment. As in other West Kootenay communities, there is a strong culture of entrepreneurship and commitment to lifestyle. Rossland is somewhat younger (40.3) and has fewer people in retirement age (13%) than BC overall (average age 43; 18% 65 or older). Despite its low gross density compared to other municipalities, Rossland’s urban form is relatively compact; the municipal boundary includes the Red Mountain Resort ski area, where the majority of the community's high density development is concentrated. Bus service passes through the community approximately once every 75 minutes on weekdays and primarily serves trips to and from nearby Trail.

With a population of 3,729, Rossland’s three largest industries are manufacturing, healthcare and social services, and retail, employing 16%, 16% and 13% of the population respectively. The City’s electricity and natural gas services are supplied by FortisBC. Rossland’s governance structure consists of a mayor and six councillors, and has an annual operating budget of \$7.4 M as of 2015.

Rossland Quick Facts	
Area & population (density)*	59.79 km ² , 3729 (62. persons per km ²)
Average Age Portion of population 65 or over*	40.0 (12.9%)
Median Household Income*	\$81,897
Total Private Dwellings (permanently occupied)*	1,949 (1,591)
Utility infrastructure	BC Hydro, Municipal Sewer, BC Transit
Mean solar insolation per day**	5.9 KwH/m ²
Heating degree days 2018 (2050 projection)	4,061 (3,502)
Cooling degree days 2018 (2050 projection)	93 (306)
Walk/Bike Score	70/41
* Statistics Canada 2016 Census Data **Natural Resources Canada, Photovoltaic Potential and Insolation Dataset	



Where is Rossland today?

Rossland has taken significant steps to reduce carbon pollution from community sources.

Rossland is a signatory to the provincial Climate Action Plan, and adopted their Strategic Community Energy and Emission Plan in 2015. In 2016, Rossland adopted the Corporate GHG Reduction Plan to reduce pollution from the city's operations in 2016. Rossland has also committed to an aggressive timetable for adopting the BC Step Code, with Step 1 already in place, and Steps 2 and 3 planned for 2021 and 2022, respectively. The most recent Active Transportation Plan was developed in 2009; xx% of trails have been completed to date. Rossland has three EV charging stations in the commercial core operated by FortisBC.

Rossland residents had the opportunity to participate in an in-person meeting at the Rossland Miners' Hall, and also took part in an online survey. In general, people love their easy access to nature, small town and friendly community as well as clean air and water. They are concerned about the rising cost of living, climate change effects such as wildfire and food insecurity, as well as job security and increased tourism. Advocating for alternate transportation options like bike trails and e-bike subsidies would help avoid carbon pollution. Respondents identified cost as a major obstacle considering the prevalence of older buildings and gasoline vehicles, and looked for leadership from elected officials and experts. See Appendix IV for a complete summary of responses.

The following summarizes the City of Rossland's current greenhouse gas emission inventory (2018 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 City of Rossland, "corporate emissions"). Total greenhouse gas emissions for the community for 2018 are 25,500 tonnes of CO2 equivalent (6.2 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the City of Rossland come from mobility fuels.



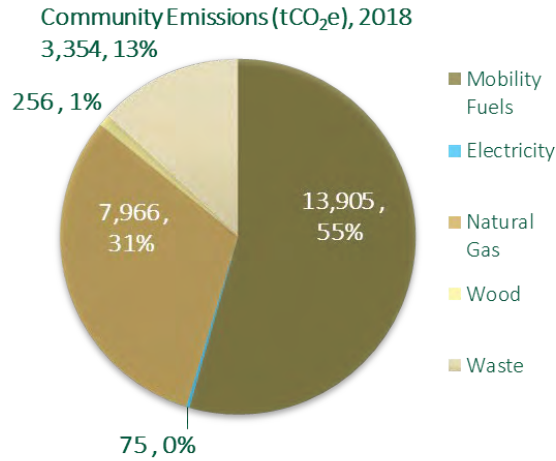


Figure 1 2018 Emissions Summary for City of Rossland by Source

The distribution of energy consumption, emissions, and estimated energy expenditures or each sector is shown in Figure 2.

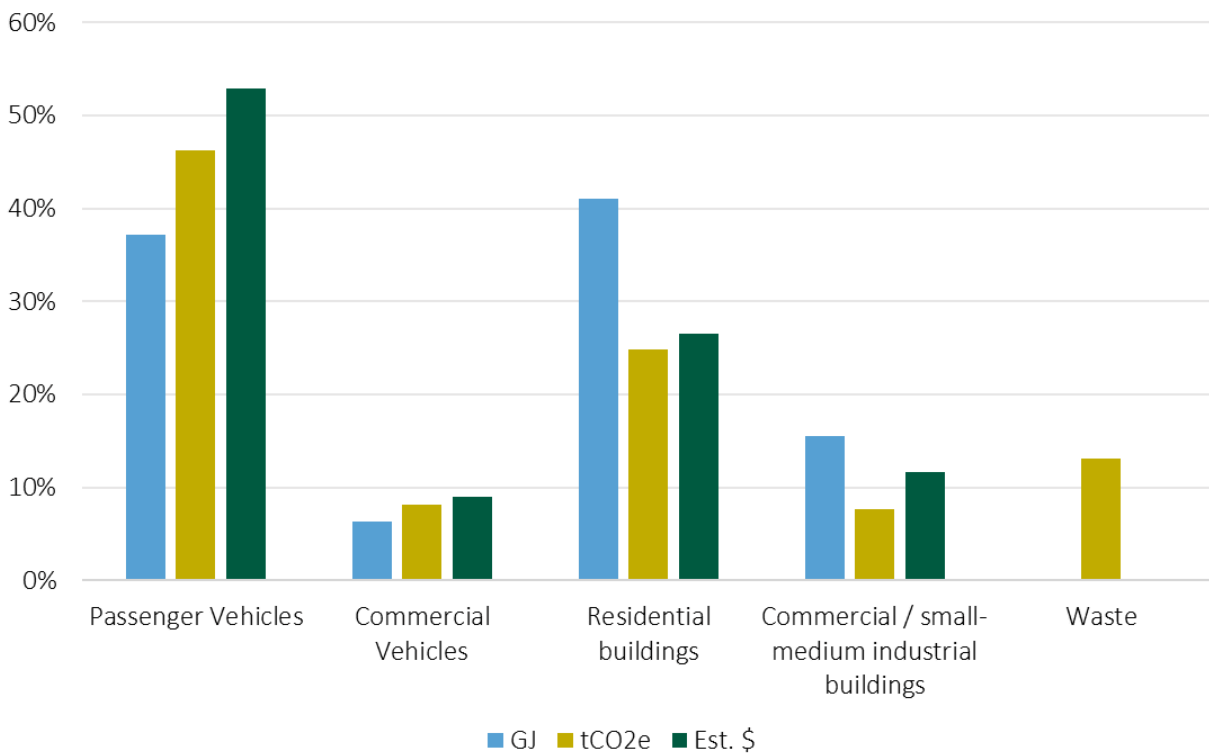


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for City of Rossland



Passenger vehicles represent the largest source of emissions and cost, whereas residential buildings are the largest user of energy. Waste contributes 13% of Rossland’s emissions, which is similar to nearby Warfield (19%), but significantly higher than other communities analyzed (e.g. Nelson – 4.4%, Kaslo 3.8%). This discrepancy is due to the characteristics (e.g. wetness, size, material composition, existence of landfill gas capture) of the specific landfill where waste is disposed of. Though waste emissions contribute a higher proportion in Rossland versus other communities analyzed in this plan, there is a significant opportunity for GHG reductions moving forward.

Figure 3 shows the 2007-2018 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 natural gas emissions for residential buildings. Emissions from passenger vehicles were only slightly higher in 2017 as they were in 2007, but emissions from commercial vehicles increased by about 30%.

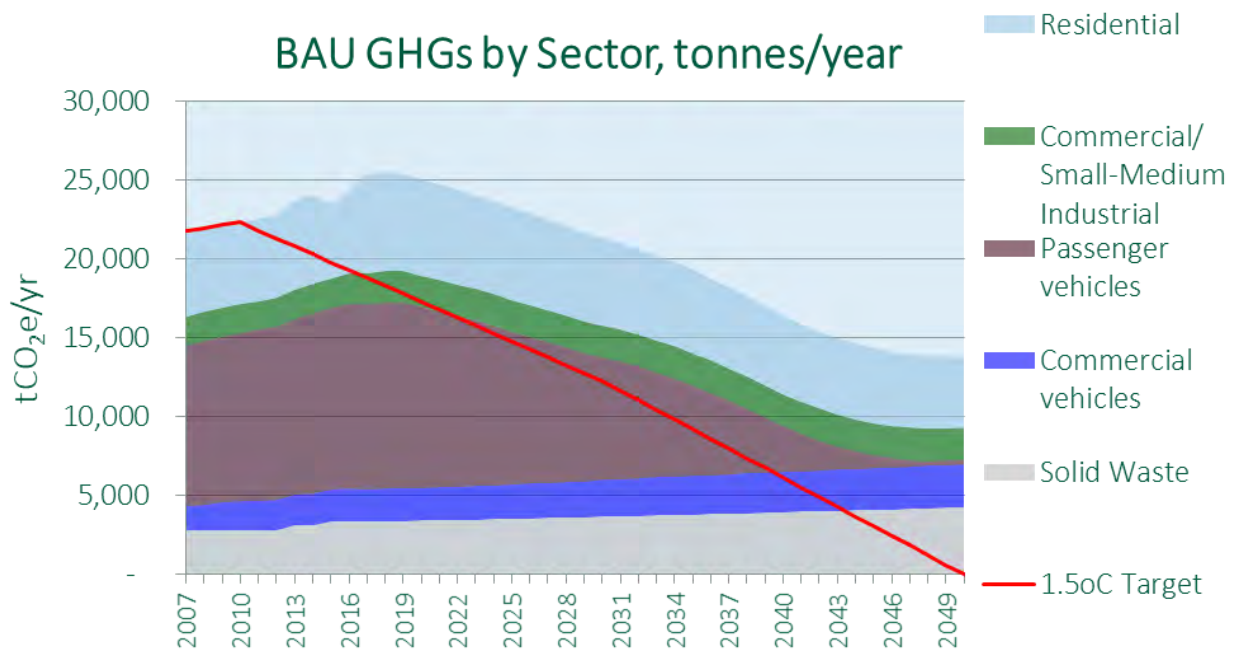


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection



Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the City of Rossland must reduce its GHG emissions from 23,900 tonnes CO2e (2030 business as usual projection) to 13,300 tonnes CO2e (2030 goal). This equates to a total of 10,600 tonnes CO2e emissions reductions. For 2050, the City of Rossland must reduce its GHG emissions from 18,600 tonnes CO2e to 0.

Kaslo’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Kaslo’s long-term emissions.

Rossland’s Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Full	Mid-1	Full	Full	Full

Rossland’s Actions

[Click here to see a spreadsheet of Rossland’s actions toward renewable energy.](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.



Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four strategies by impact will be:

- Electrifying Passenger Vehicles
- Better Existing Buildings
- Shift Beyond the Car
- Organics & LFG

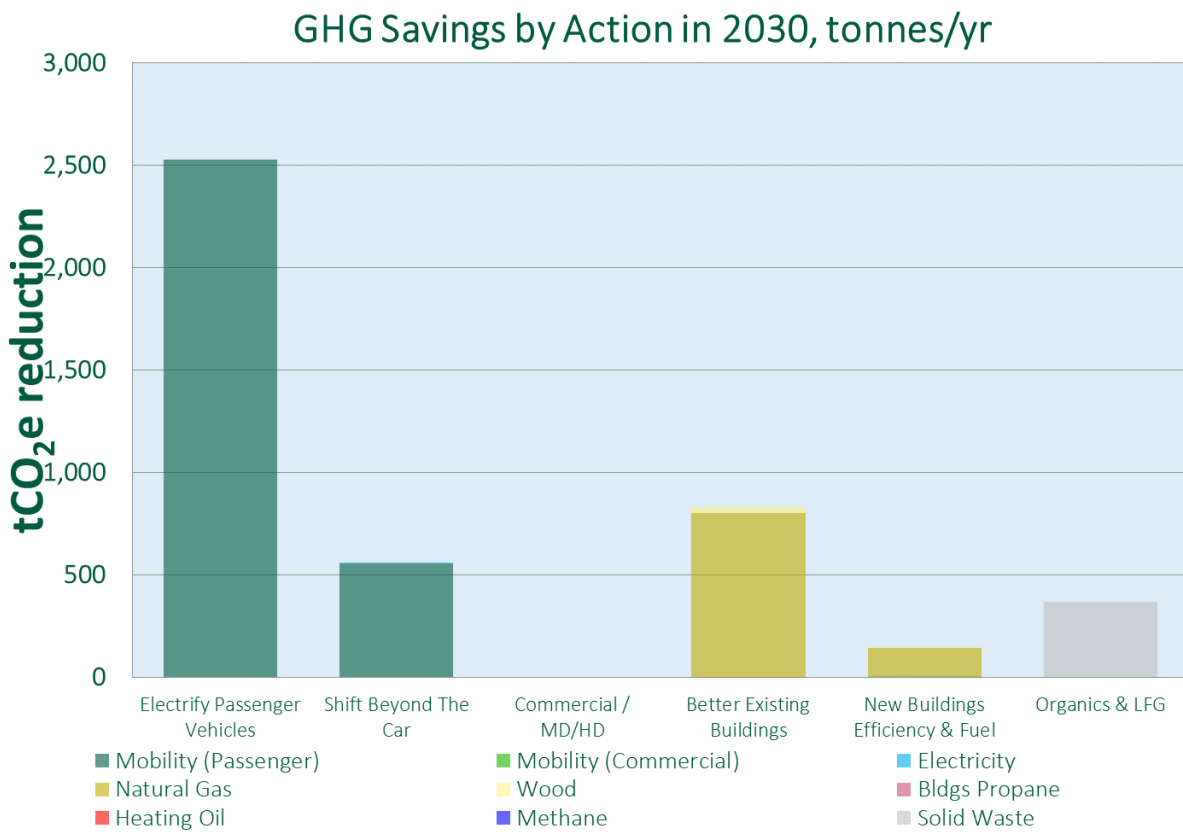


Figure 5 Emission Reductions from the Big Moves in 2030



In practical terms, Rossland can achieve the following shifts by 2030:

- *Electrify Passenger Vehicles:* 460 conventional vehicles replaced with EVs
- *Shift Beyond the Car:* 870 km/person vehicle travel avoided/shifted to active transportation per year
- *Better Existing Buildings:* 880 buildings (40%) undergoing energy retrofits to reduce energy use by 33%
- *New Buildings Efficiency & Fuel:* All new buildings built to 20% more efficient than BC Building Code, and 40% adopt zero or low-carbon heating systems
- *Organics & LFG:* 21 kg/person of organics diverted per year, equivalent to about twenty 4 L milk containers

Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 4,100 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 22.5% vs. 2010 levels, half of the reductions to be congruent with the IPCC's 1.5°C goal of 45% reduction.

With the Big Moves in place, projections can be made as to their impacts on Rossland's overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are illustrated in Figure 6.



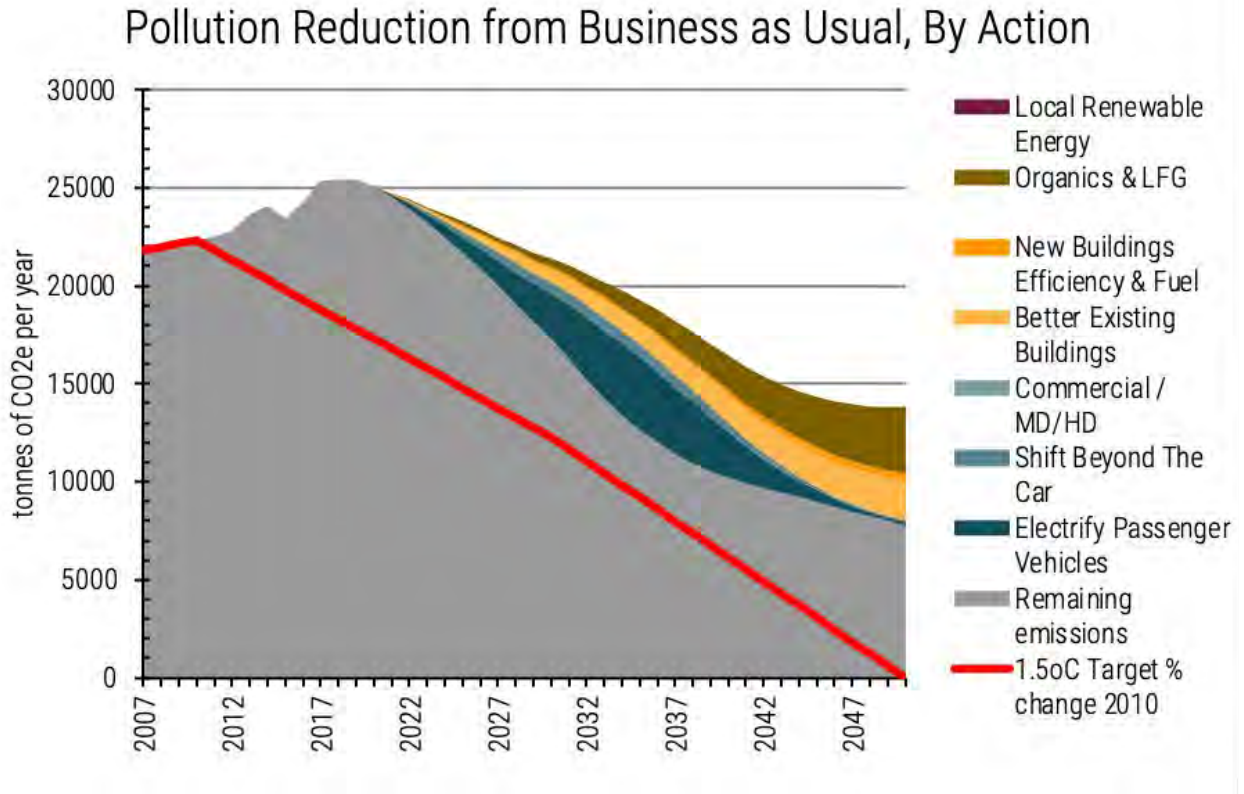


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Rossland is able to achieve a reduction of 6,000 tonnes CO₂e, equivalent to 44% of its 2050 emissions, with the majority of emission reductions due to Organics and LFG (Landfill Gas Capture) at 3,400 tonnes CO₂e, followed by Better Existing Buildings at 2,000 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to “catch up”. Note that for Organics & LFG, emission reductions in 2030 were considerably smaller. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.



Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a significant impact on GHG reductions for the City of Rossland, there are some gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.

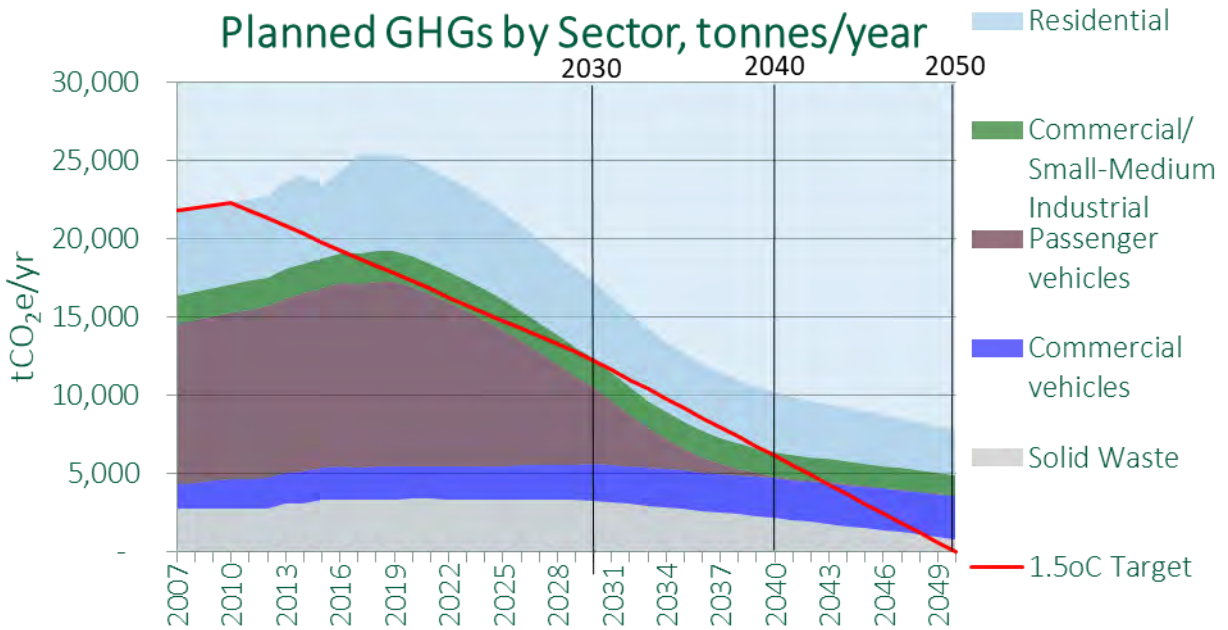


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted



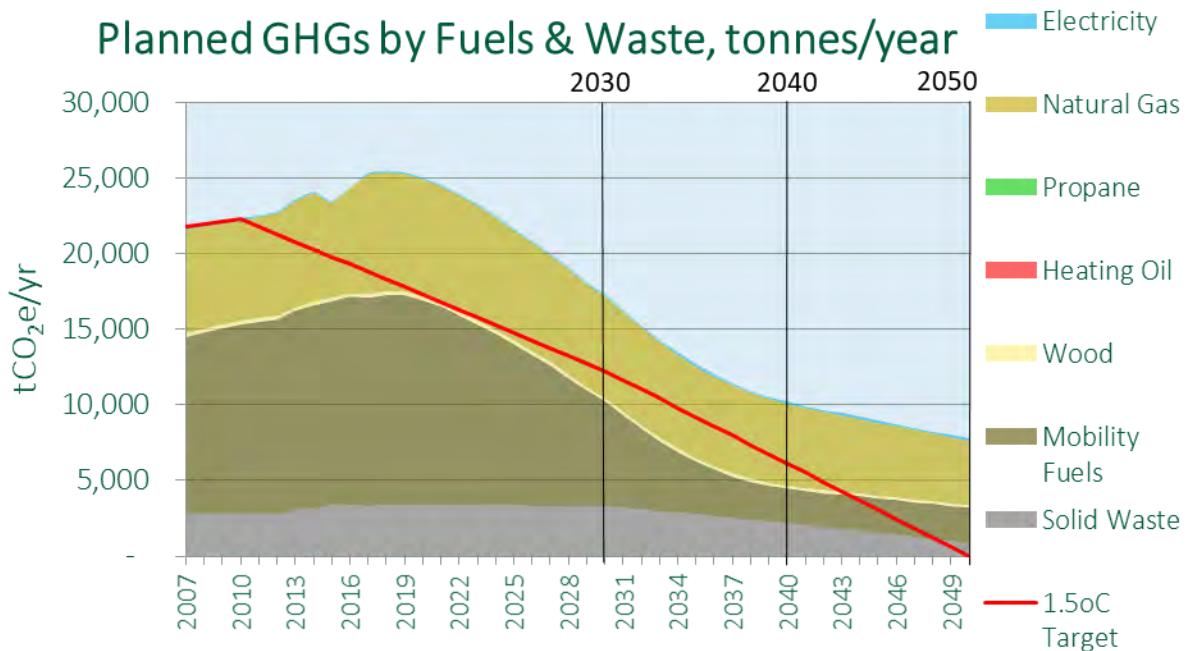


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Natural gas emissions in existing buildings
- Commercial vehicle emissions

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code and higher renewable natural gas requirements could reduce the natural gas emissions. Advocacy to the Province of BC to decarbonize natural gas and phase in commercial vehicles can accelerate these important changes.

Rossland Public Survey Results

Rossland residents were asked to complete a survey rating the potential impact and feasibility of potential actions. Based on 110 responses, the weighted average of the actions are shown in the



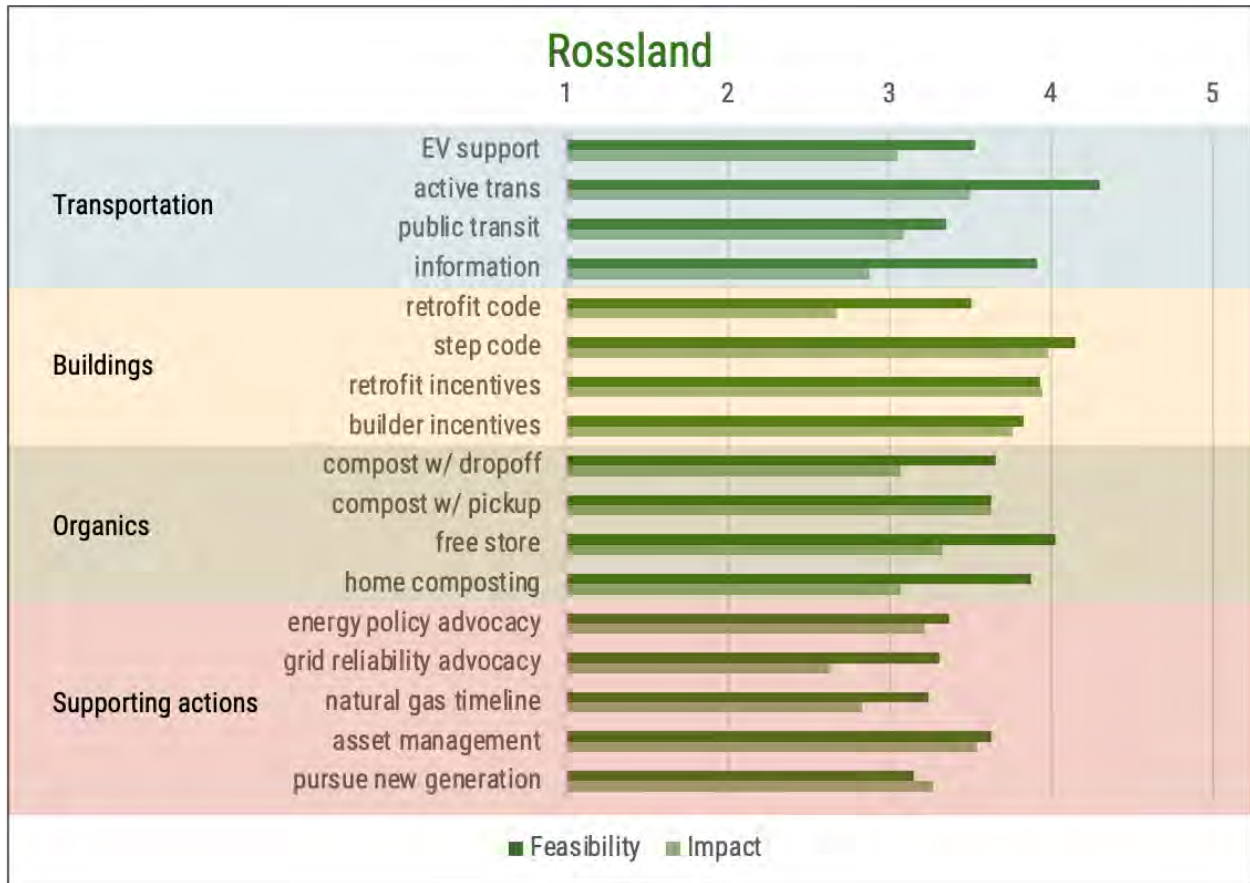
chart below. All of the actions received average feasibility and impact ratings greater than the midpoint. The potential score ranges from 1 to 5 for both measures. The distinctions among many of the actions fall within the margin of error (+/- .36).

The highest impact ratings were for retrofit incentives (3.95), step code (3.98), and builder incentives (3.76), while the lowest ratings were for advocacy on grid reliability (2.63), retrofit code (2.67), and renewable natural gas advocacy (2.83).

The highest feasibility ratings were for step code (4.15) and active transportation support (4.3). The lowest feasibility ratings were for natural gas advocacy (3.24), renewable generation (3.15), and grid reliability advocacy (3.31).

Proposed Action	Feasibility	Impact
Promoting electric vehicles with charging stations & incentives	3.53	3.05
Adding more trails, paths and routes for walking, cycling etc	4.3	3.5
Adding more transit routes, stops, and rides	3.35	3.09
Providing more information about alternatives to car trips	3.91	2.88
Adopting a voluntary energy efficiency standard for building renovations	3.51	2.67
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step Code)	4.15	3.98
Providing incentives and support for home energy efficiency retrofits	3.93	3.95
Providing incentives for builders to meet higher efficiency standards	3.83	3.76
Centralized compost facilities with drop off locations	3.66	3.07
Centralized compost facilities with curbside pickup	3.63	3.63
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	4.03	3.33
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	3.88	3.07
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.37	3.22
Advocate for a more reliable electrical grid	3.31	2.63
Ask the province to set a timeline to move to 100% renewable gas	3.24	2.83
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.63	3.54
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.15	3.27





Rossland-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the City of Rossland. For a list of general inventory and model methodology and assumptions, please consult Appendix I.

Inventory Assumptions

11% of homes have secondary wood heating, and no heating oil or propane heating, as per drive-by heating survey results



Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 4,061, and in 2050 they will be 3,502
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 93, and in 2050 they will be 306
- Increased reductions for Better Existing Buildings from 1% annual emission reduction to 1.33% annual emission reduction due to prior momentum on retrofit programs (e.g. Energy Diets)
- 1% annual reduction in emissions through residential organics diversion to 2030
- 10 year lag before landfill gas capture system is installed, accounting for time required to coordinate with RDKB, develop business cases, and acquire funding. Ramp up emission reduction to 80% by 2050



3.7: Village of Silverton



With a population of 195, Silverton’s three largest industries are agriculture and resource industries, construction, and business services, employing 25%, 16.7%, and 16.7% of the working population respectively. The Village’s electricity is supplied by BC Hydro. The Village has no natural gas service. Silverton’s governance structure consists of a mayor and four councillors, and has an annual operating budget of \$0.9 M as of 2015.

Silverton Quick Facts	
Area & population (density)*	.35 km ² , 195 (550.7 persons per km ²)
Average Age (portion of population 65 or over)*	55.9 (35.9%)
Total Private Dwellings (permanently occupied)*	147 (107)
Median Household Income*	\$46,976
Utility infrastructure	BC Hydro, Municipal Sewer, BC Transit
Mean solar insolation per day**	5.79 kwh/m ²
Heating Degree Days 2018 (2050 projection)	3,627 (3,090)
Cooling Degree Days 2018 (2050 projection)	114 (227)
Walk/Bike Score	0/26
* Statistics Canada 2016 Census Data **Natural Resources Canada, Photovoltaic Potential and Insolation Dataset	

Residents of New Denver and Silverton participated in a joint in-person discussion about 100% renewable energy. In addition, residents participated in an online survey about their community values, opportunities and barriers to 100% renewable energy. Fourteen people participated in the in-person meeting, and two people from Silverton completed the survey. People generally said they value the close-knit, self-reliant community surrounded by wilderness, and shared concerns about rising costs. As opportunities, they identified individual choices for lower-energy lifestyles along with leadership from local government and changes to policy. See Appendix IV for a complete summary of responses.



Where are we today?

The following summarizes the Village of Silverton’s current greenhouse gas emission inventory (2018 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 Village of Silverton, “corporate emissions”). Total greenhouse gas emissions for the community for 2018 are 720 tonnes of CO₂ equivalent (3.6 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the Village of Silverton come from mobility fuels.

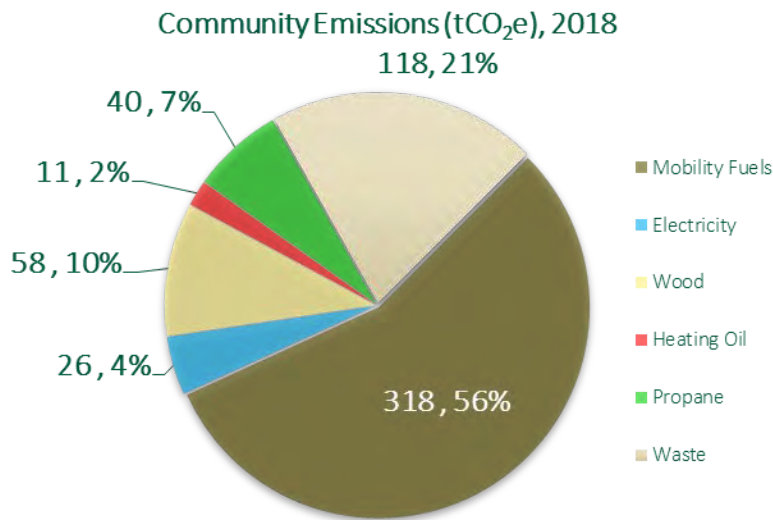


Figure 1 2018 Emissions Summary for Village of Silverton by Source

The distribution of energy consumption, emissions, and estimated energy expenditures or each sector is shown in Figure 2.



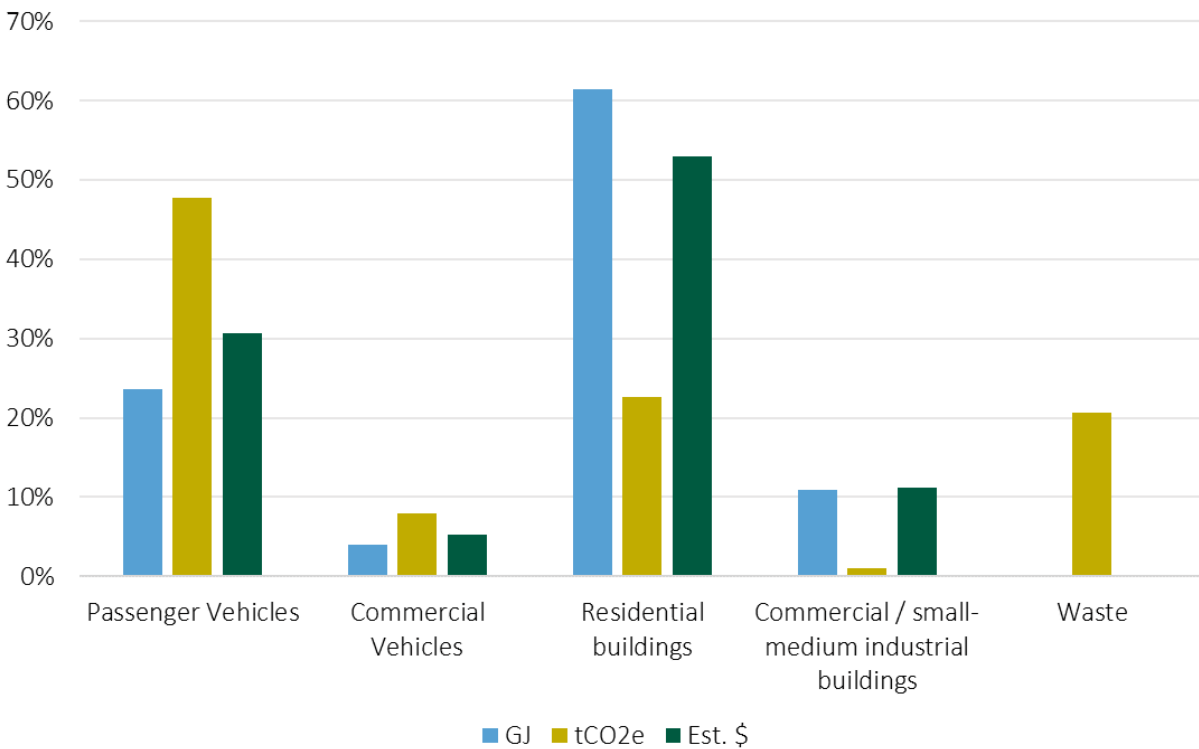


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for Village of Silverton

Passenger vehicles represent the largest source of emissions at 48%, and second in energy consumption and energy costs, at 24% and 31%, respectively. Residential buildings represent the largest source of energy consumption and energy costs, at 61% and 53%, respectively, while contributing 23% of emissions. This is due to the lack of natural gas heating. Wood, electricity, and propane contribute the majority of residential building emissions. Waste contributes 21% of emissions, which is considerably higher than other communities in the Slocan Valley (5.0% for Slocan, 9.2% for New Denver), owing to significantly lower vehicle emissions vs. that of neighbouring New Denver (320 tCO₂e vs. 2,800 tCO₂e). Commercial buildings contribute 11% of energy consumption and costs, but only 1% of emissions, owing to 100% of energy consumption as electricity.

Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles rose slightly from 2007 to 2018 (253 to 272 tCO₂e). Emissions from



commercial vehicles decreased moderately during the same period (69 to 46 tCO₂e). The significant drop in passenger vehicle emissions from 2030 to 2050 is attributed to the Province of BC's zero emission vehicle mandate as part of the CleanBC Plan, requiring 30% of new vehicle purchases as electric in 2030, and 100% in 2040.

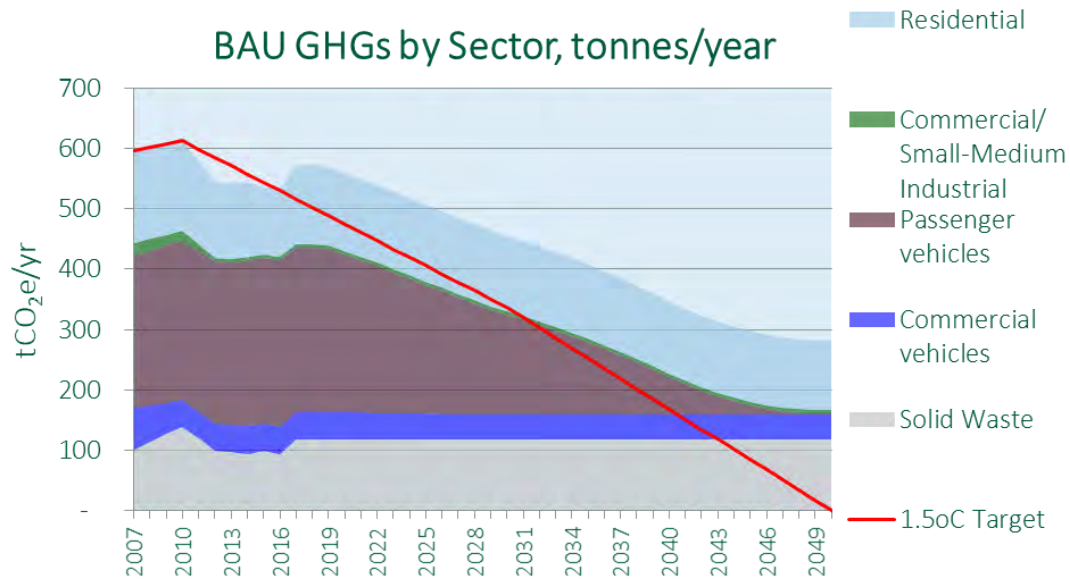


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection

Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the Village of Silverton must reduce its GHG emissions from 450 tonnes CO₂e (2030 business as usual projection) to 340 tonnes CO₂e (2030 goal). This equates to a total of 110 tonnes CO₂e emissions reductions, or about 26%. For 2050, the Village of Silverton must reduce its GHG emissions from 280 tonnes CO₂e to 0.

Silverton's selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Silverton's long-term emissions.



Silverton Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Mid-1	Minimal	Full	Mid-1	Full

Silverton's Actions

[Click here to see a spreadsheet of Silverton's actions toward renewable energy](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.

Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

- Electrifying Passenger Vehicles
- Organics & LFG
- Better Existing Buildings
- Shift Beyond the Car



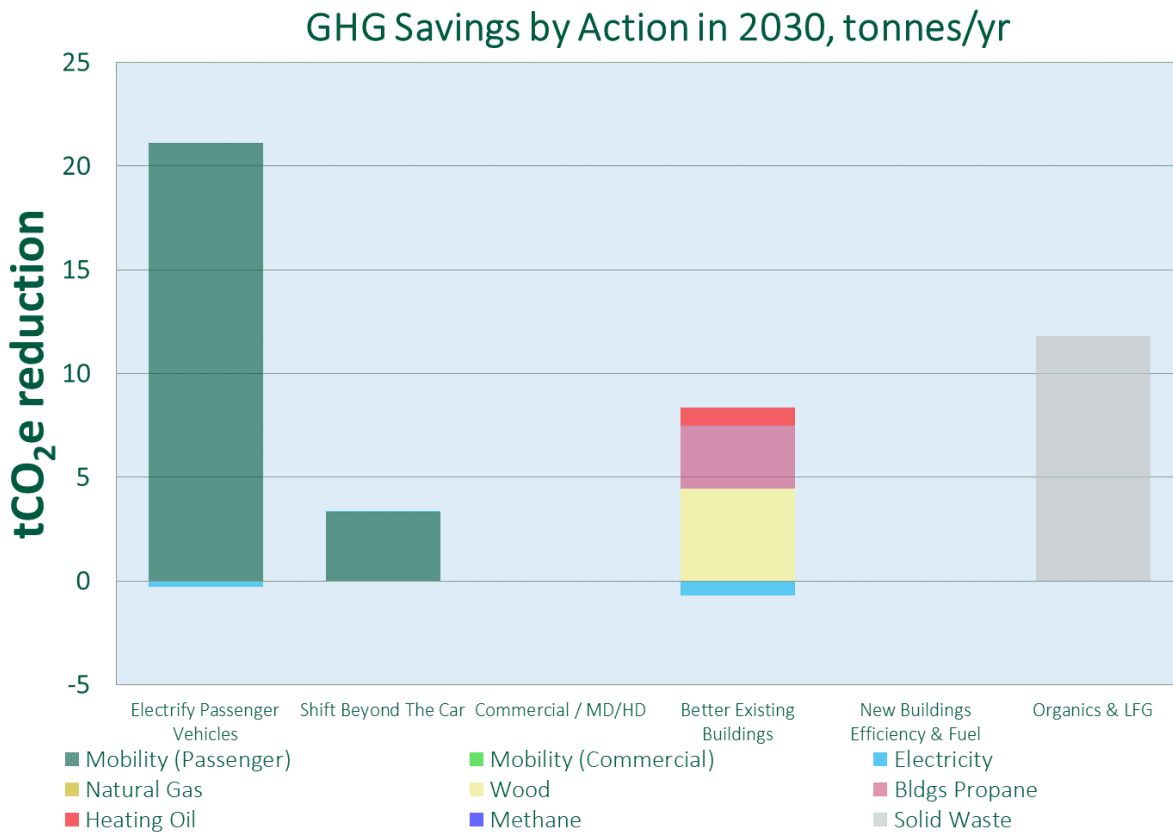


Figure 5 Emission Reductions from the Big Moves in 2030

In practical terms, Silverton can accomplish the following shifts by 2030:

- *Electrify Passenger Vehicles*: 10 conventional vehicle replaced with EVs
- *Shift Beyond the Car*: additional 20% of commutes eliminated through remote working policies
- *Better Existing Buildings*: 50 buildings (30%) undergoing energy retrofits to reduce energy use by 33%
- *Organics & LFG*: 21 kg/person of organics diverted, equivalent to about twenty 4 L milk containers



Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 40 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 33% vs. 2010 levels, over two-thirds of the 45% reduction required for Silverton to meet its 2030 IPCC goal.

With the Big Moves in place, projections can be made as to their impacts on Silverton’s overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are illustrated in Figure 6.

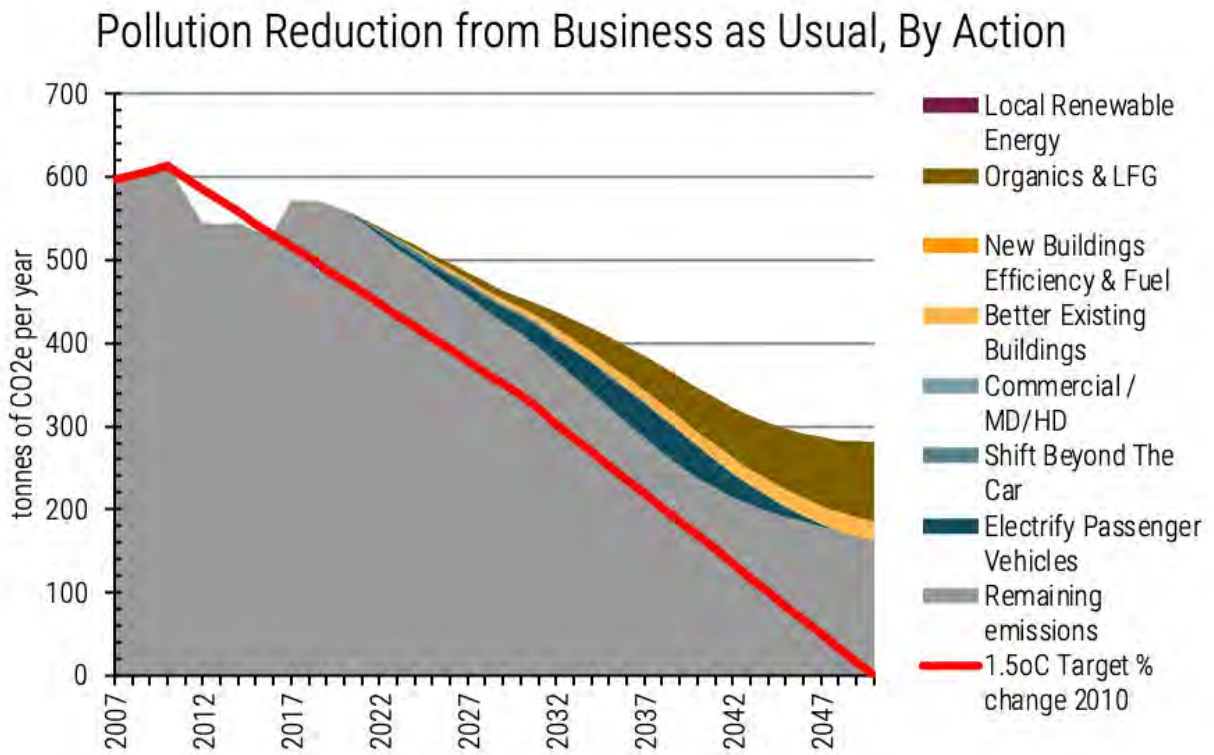


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Silverton is able to achieve a reduction of 120 tonnes CO₂e, equivalent to 42% of its 2050 emissions, with Organics and LFG (Landfill Gas Capture) and contributing the majority of reductions at 95 tonnes CO₂e. Better Existing Buildings is second, at 24 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in



2040 comes into effect, allowing for the business-as-usual case to “catch up”. This is the main reason why the net reductions in 2050 vs. BAU are lower than those in 2030. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.

Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a moderate impact on GHG reductions for the Village of Silverton, there are some major gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.

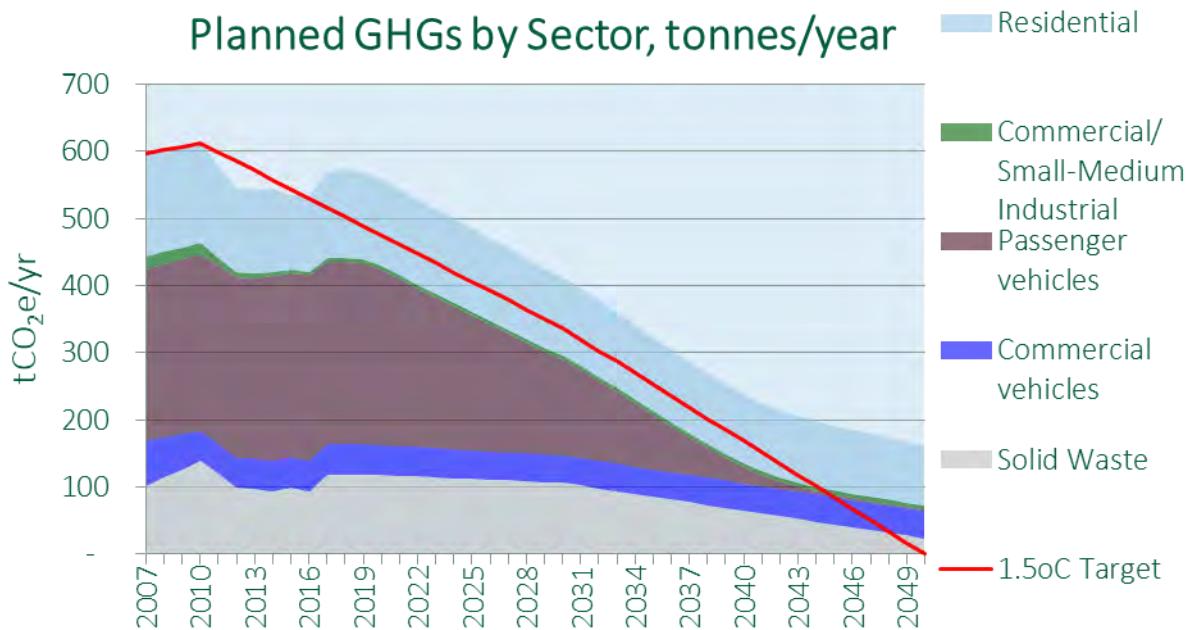


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted



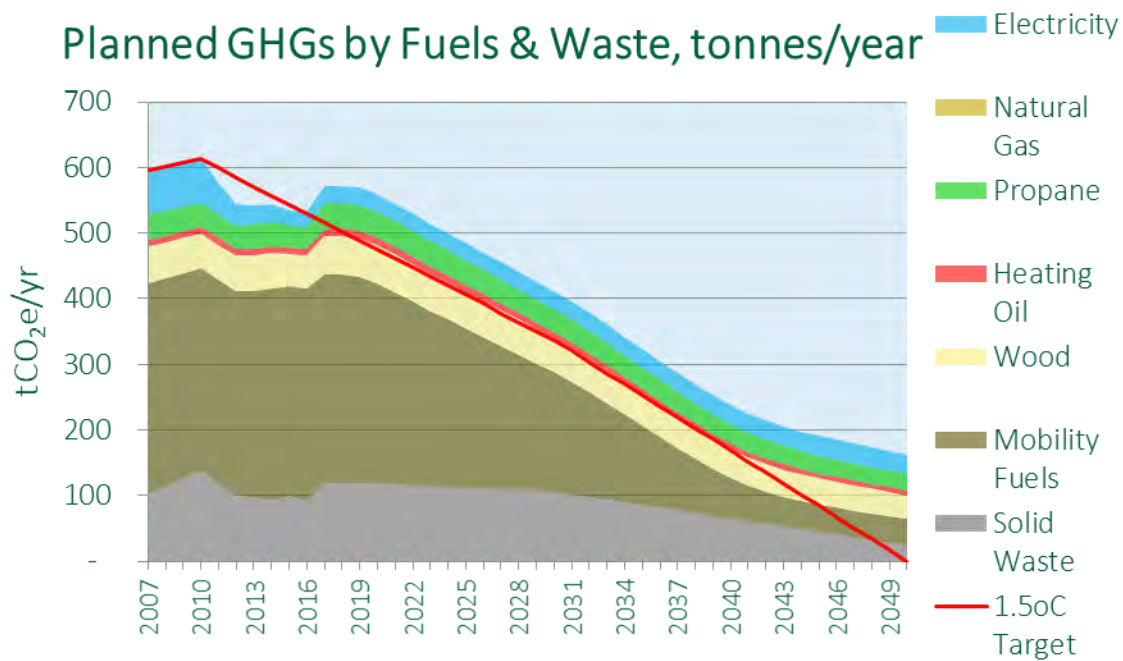


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Natural gas emissions in existing buildings
- Commercial vehicle emissions

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code and higher renewable natural gas requirements could reduce the natural gas emissions. Advocacy to the Province of BC to decarbonize natural gas and phase in commercial vehicles can accelerate these important changes.



Silverton-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the Village of Silverton. For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions

- 27% have secondary wood heating, 5% of homes use propane for their primary heating source, and 1% use heating oil, as per drive-by heating survey results. **Note that no heating survey was conducted specifically for Silverton, therefore the survey for the nearest community (New Denver) was used instead

Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 3,627, and in 2050 they will be 3,090
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 114, and in 2050 they will be 227
- Shift Beyond the Car impacts reduced to 2% due to remote nature of community. Reductions are based on 20% of commuters working one day a week from home, and assuming that commuting accounts for 50% of all vehicle kilometers travelled (VKTs). This reduction would commence in 2022 with a 1% reduction (10% commuters), followed by 2% in 2023 (20% commuters)
- New Buildings Efficiency & Fuel will be following the approach set out by the Regional District of Central Kootenay (RDCK). Based on ambition level of “Mid 1” for RDCK, reductions are expected to be within the margin of error, and therefore negligible.



3.8: Village of Slocan



With a population of 272, Slocan's three largest industries are business services, retail, and manufacturing employing 17%, 17% and 14% of the population respectively. The Village's electricity is supplied by FortisBC, and it has no natural gas service. Slocan's governance structure consists of a mayor and four councillors, and has an annual operating budget of \$0.7 M as of 2014.

Although in-person consultation was not possible due to the COVID-19 pandemic, nine residents of the Village of Slocan participated in an online survey about their community values, opportunities and barriers to 100% renewable energy. In general, residents said they love the natural beauty of Slocan, the small-town feel and sense of community. They are concerned about impacts of climate change and food security, and the resulting higher cost of living due to population growth. Advocating for things like local food production and community run micro-hydro and solar projects would promote community resilience and togetherness. See Appendix IV for a complete summary of responses.

Where are we today?

The following summarizes the Village of Slocan's current greenhouse gas emission inventory (2018 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

Slocan Quick Facts	
Area & population (density)*	.78 km ² , 272 (381.7/km ²)
Average Age (portion of population 65 or over)*	45.8 (20.0%)
Median Total Household Income*	37,888
Total Private Dwellings (permanently occupied)*	183 (140)
Utility infrastructure	BC Hydro, BC Transit
Mean solar insolation per day**	5.76 Kwh/m ²
Heating Degree Days 2018 (2050 projection)	3,975 (3,412)
Cooling Degree Days 2018 (2050 projection)	77 (169)
Walk/Bike Score	8/44
* Statistics Canada 2016 Census Data **Natural Resources Canada, Photovoltaic Potential and Insolation Dataset	



Village of Slocan, “corporate emissions”). Total greenhouse gas emissions for the community for 2018 are 2,100 tonnes of CO₂ equivalent (7.1 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the Village of Slocan come from mobility fuels.

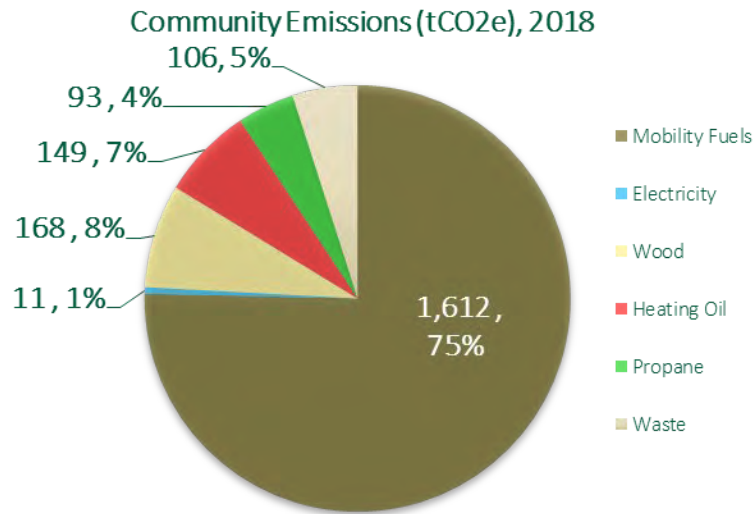


Figure 1 2018 Emissions Summary for Village of Slocan by Source

The distribution of energy consumption, emissions, and estimated energy expenditures or each sector is shown in Figure 2.



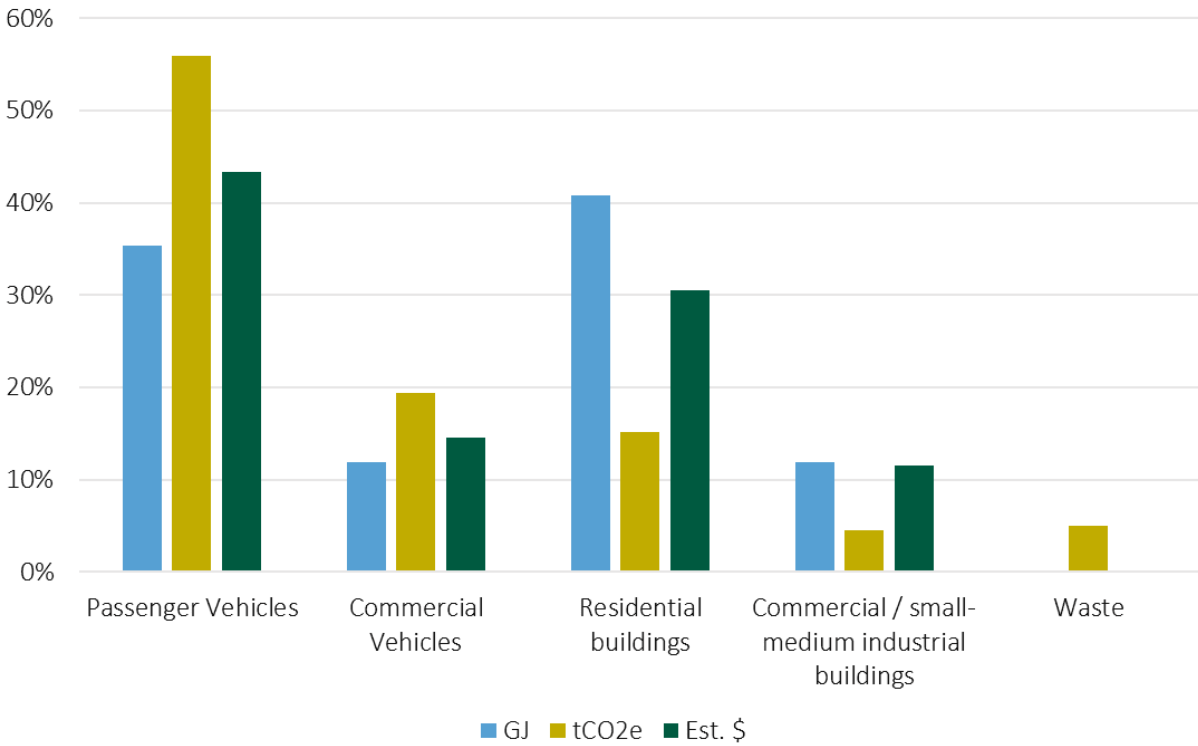


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for Village of Slokan

Passenger vehicles represent the largest source of emissions and energy costs at 56% and 43% respectively. It also consumes the second-most quantity of energy at 35%. Residential buildings consume the most energy at 41%, and is second in energy costs at 31%. Of note though, residential buildings only contribute 15% of Slokan's overall emissions. This is due to the lack of natural gas heating. Wood and heating oil contribute the majority of residential building emissions. Commercial buildings contribute 12% of energy consumption and costs, but only 4% of emissions, owing to 76% of energy consumption as electricity.

Figure 3 shows the 2007-2018 emission inventories and the changes in emissions over that timeframe, as well as projected emissions in a business as usual scenario out to 2050. Emissions from passenger vehicles rose slightly from 2007 to 2018 (1,170 to 1,190 tCO₂e). Emissions from commercial vehicles decreased slightly during the same period (431 to 416 tCO₂e). The significant drop in passenger vehicle emissions from 2030 to 2050 is attributed to the Province of



BC's zero emission vehicle mandate as part of the CleanBC Plan, requiring 30% of new vehicle purchases as electric in 2030, and 100% in 2040.

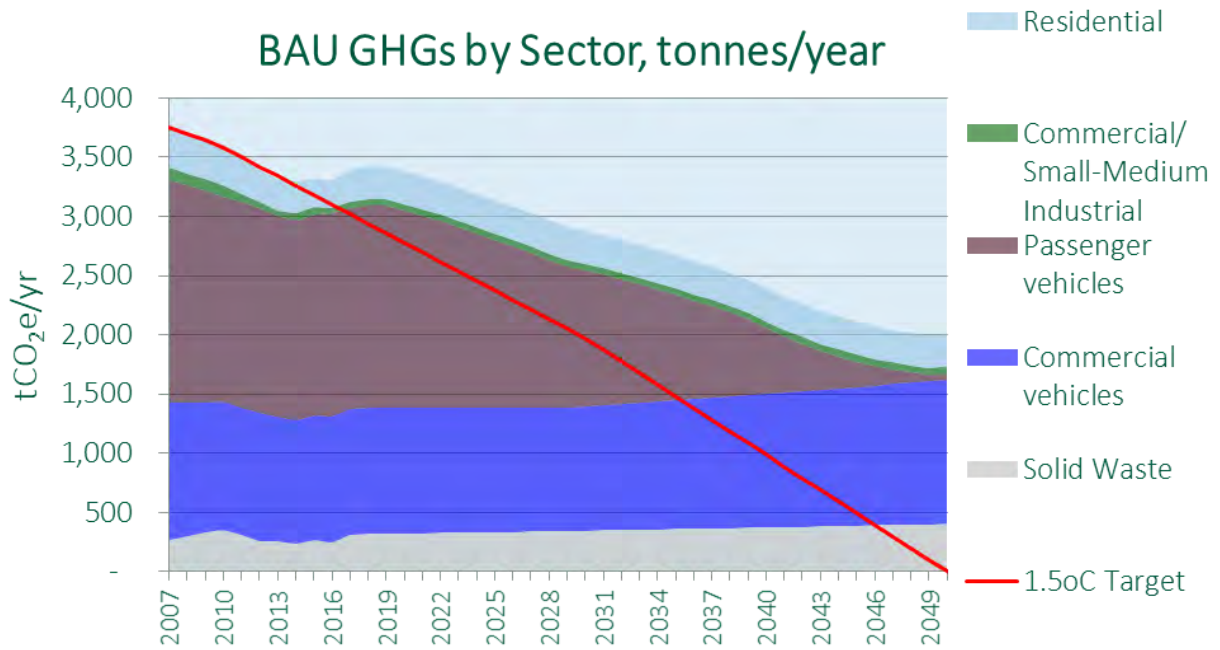


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection

Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the Village of Slokan must reduce its GHG emissions from 1,750 tonnes CO₂e (2030 business as usual projection) to 1,170 tonnes CO₂e (2030 goal). This equates to a total of 580 tonnes CO₂e emissions reductions, or about 33%. For 2050, the Village of Slokan must reduce its GHG emissions from 2,000 tonnes CO₂e to 0.

Slokan's selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Slokan's long-term emissions.



Slocan's Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Mid-1	Minimal	Full	Mid-1	Full

Slocan's Actions

[Click here to see a spreadsheet of Slocan's actions toward renewable energy](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.

Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

1. Electrifying Passenger Vehicles
2. Organics & LFG
3. Better Existing Buildings
4. Shift Beyond the Car



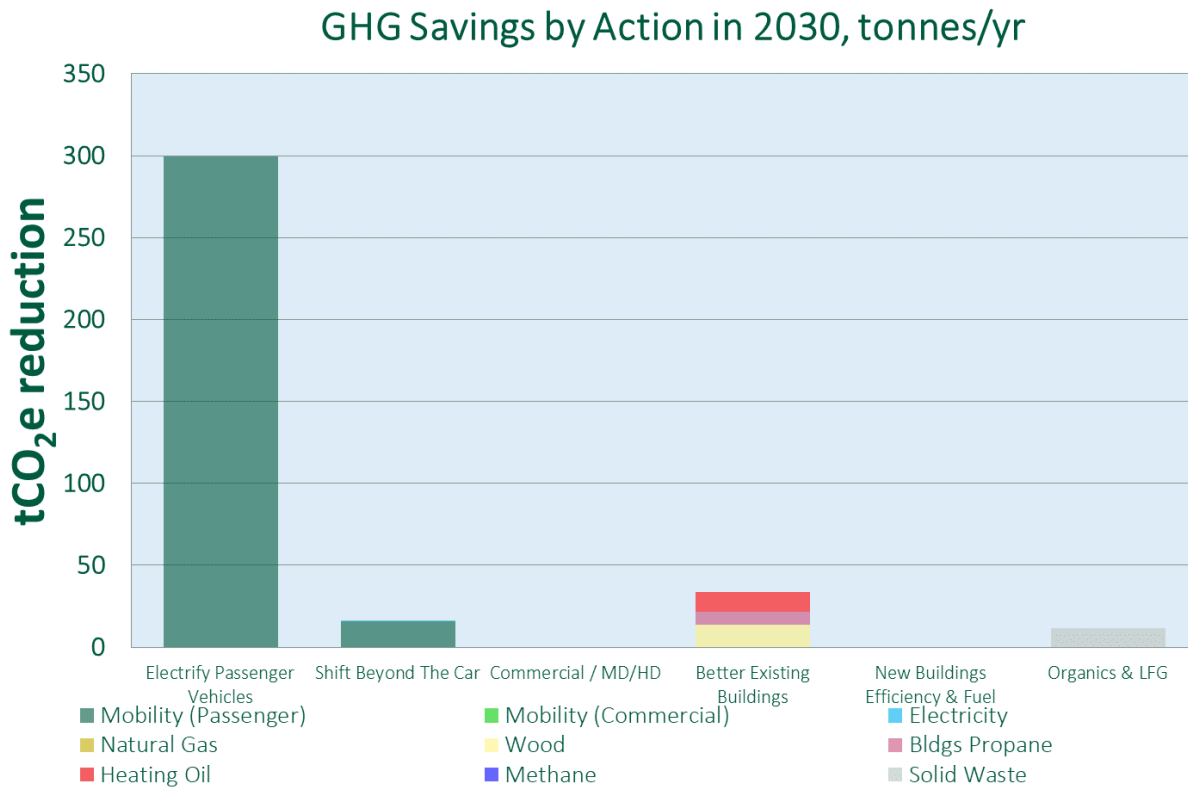


Figure 5 Emission Reductions from the Big Moves in 2030

In practical terms, by 2030 Slocan can achieve the following shifts:

- Electrify Passenger Vehicles: 80 conventional vehicles replaced with EVs
- Shift Beyond the Car: 20% of commutes eliminated through remote working policies
- Better Existing Buildings: 60 buildings (30%) undergoing energy retrofits to reduce energy use by 33%
- Organics & LFG: 26 kg/person of organics diverted each year, equivalent to about twenty 4 L milk containers



Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 350 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 34% vs. 2010 levels, over two-thirds of the 45% reduction required for Slokan to meet its 2030 IPCC goal.

With the Big Moves in place, projections can be made as to their impacts on Slokan's overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are shown in Figure 6.

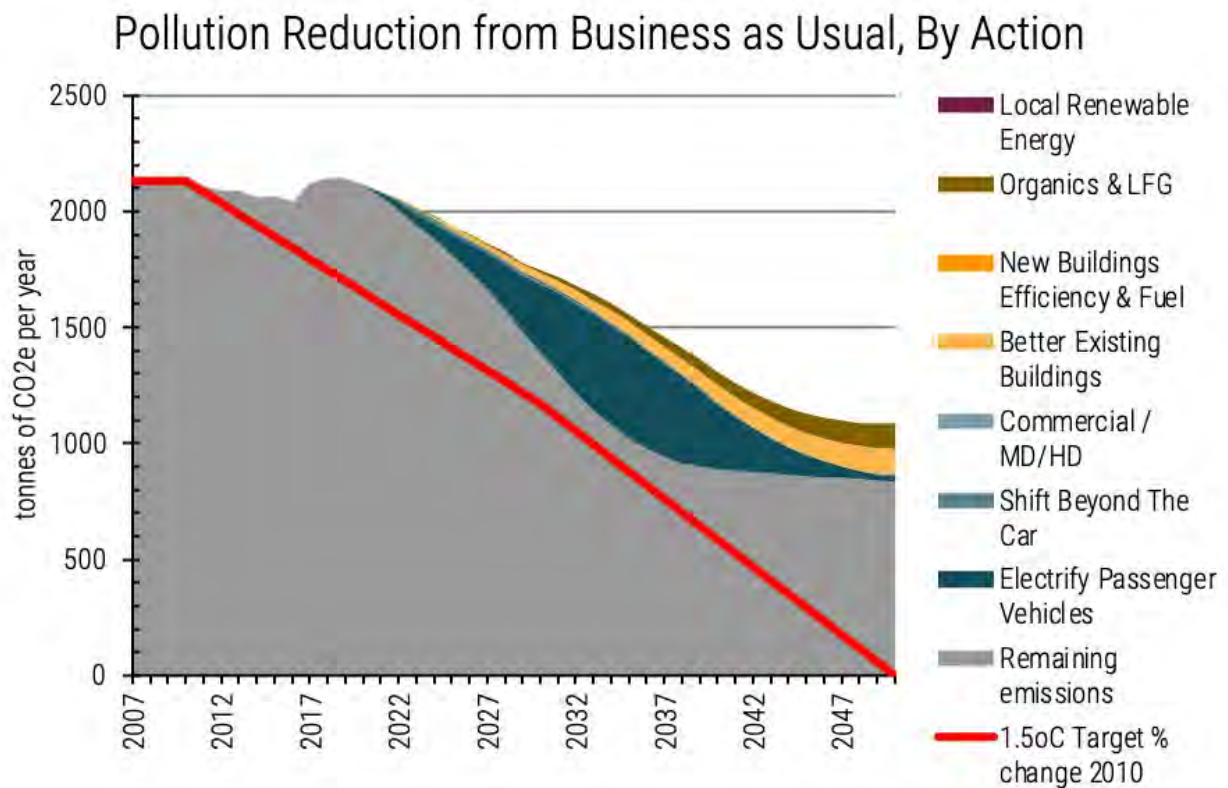


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Slokan is able to achieve a reduction of 260 tonnes CO₂e, equivalent to 23% of its 2050 emissions, with Organics and LFG (Landfill Gas Capture) and Better Existing Buildings contributing the majority of reductions at 110 tonnes CO₂e each. Electrify Passenger Vehicles followed at 30 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to



“catch up”. This is the main reason why the net reductions in 2050 vs. BAU are lower than those in 2030. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.

Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a moderate impact on GHG reductions for the Village of Slocan, there are some major gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.

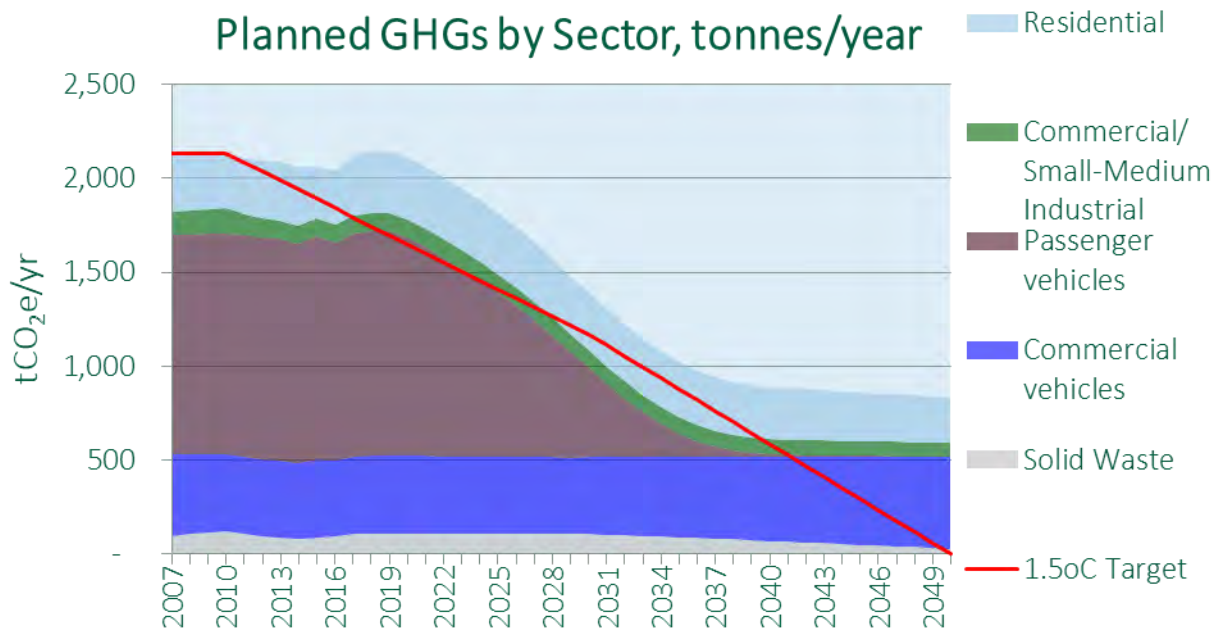


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted



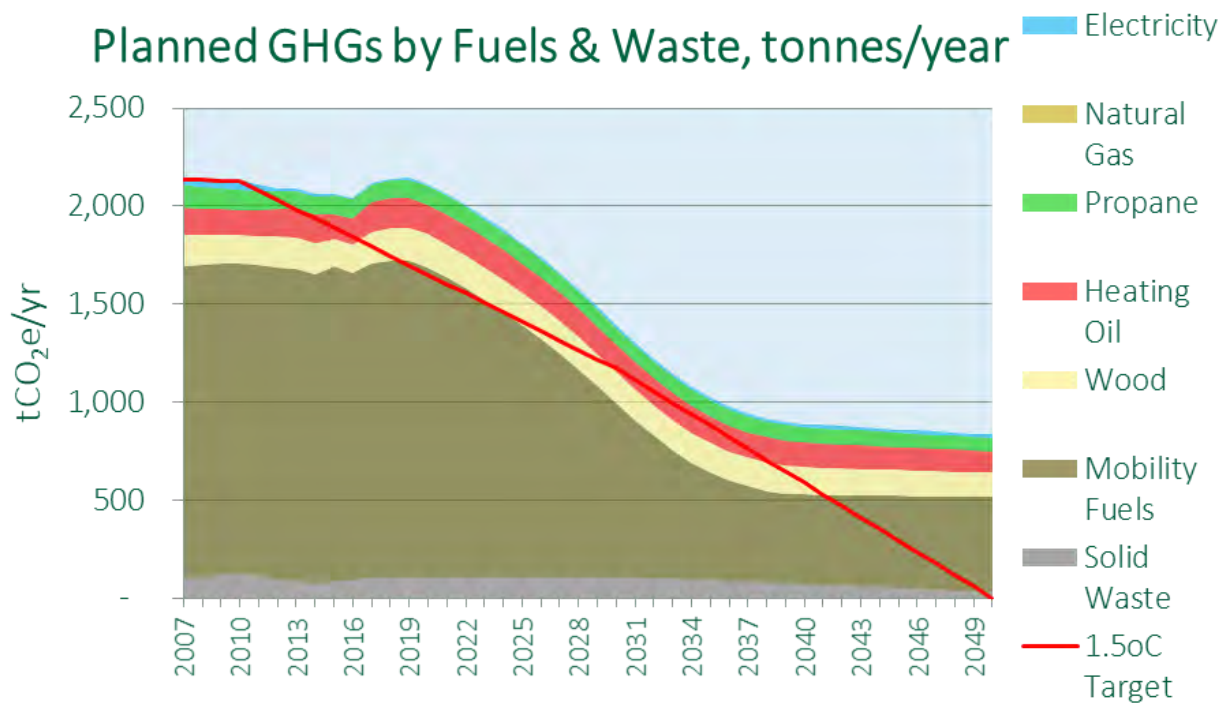


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Commercial vehicle emissions
- Non-electricity heating (propane and oil) in existing buildings

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code could reduce the building emissions. Propane and heating oil heating are both expensive compared to natural gas, and are emission heavy, making them prime candidates for replacement with low-carbon heating such as heat pumps (air or ground source). Participation in regional energy efficiency retrofit programs could accelerate retrofit deployment, and advocacy to the Province of BC to adopt a retrofit code and phase in commercial vehicles can also accelerate these important changes.



Slocan-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the Village of Slocan. For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions

- 63% have secondary wood heating, 13% of homes use heating oil for their primary heating source, and no propane heating is used, as per drive-by heating survey results

Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 3,975, and in 2050 they will be 3,412
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 77, and in 2050 they will be 169
- Shift Beyond the Car impacts reduced to 2% due to remote nature of community. Reductions are based on 20% of commuters working one day a week from home, and assuming that commuting accounts for 50% of all vehicle kilometers travelled (VKTs). This reduction would commence in 2022 with a 1% reduction (10% commuters), followed by 2% in 2023 (20% commuters)
- New Buildings Efficiency & Fuel will be following the approach set out by the Regional District of Central Kootenay (RDCK). Based on ambition level of “Mid 1” for RDCK, reductions are expected to be within the margin of error, and therefore negligible.



3.9: Village of Warfield



Residents of Warfield participated in an in-person discussion about 100% renewable energy. In addition to the seven in-person participants, 13 residents participated in an online survey about their community values, opportunities and barriers to 100% renewable energy. Participants said love their natural environment and outdoor recreation options as well as their sense of community. They are concerned about the increases to the cost of living and wildfires. To help mitigate these risks, supporting the move to clean energy use could create jobs and help mitigate climate change. See Appendix IV for a complete summary of responses.

Warfield Quick Facts	
Area & population (density)*	1.89 km ² , 1680 (890.0/km ²)
Average Age (portion of population 65 or over)*	43.3 (19.0%)
Total Private Dwellings (permanently occupied)*	809 (768)
Median Household Income*	\$79,360
Utility infrastructure	Natural Gas (Fortis BC), BC Hydro, Municipal Sewer, BC Transit
Solar Potential **	5.79 kwh/m2
Heating Degree Days 2018 (2050 projection)	3,573 (3,048)
Cooling Degree Days 2018 (2050 projection)	169 (304)
Walk/Bike Score****	29/14
* Statistics Canada 2016 Census Data **Natural Resources Canada, Photovoltaic Potential and Insolation Dataset	

Where are we today?

The following summarizes the Village of Warfield’s current greenhouse gas emission inventory (2018 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 Village of Warfield, “corporate emissions”). Total greenhouse gas emissions for the community for 2018 are 11,700 tonnes of CO₂ equivalent (6.7 tonnes per capita). As Figure 1 shows, the majority of greenhouse gas (GHG) emissions in the Village of Warfield come from mobility fuels.



Community Emissions (tCO2e), 2018

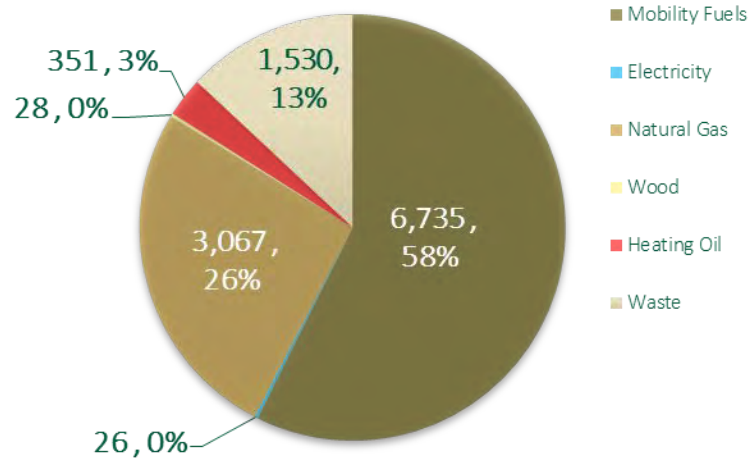


Figure 1 2018 Emissions Summary for Village of Warfield by Source

The distribution of energy consumption, emissions, and estimated energy expenditures of each sector is shown in Figure 2.

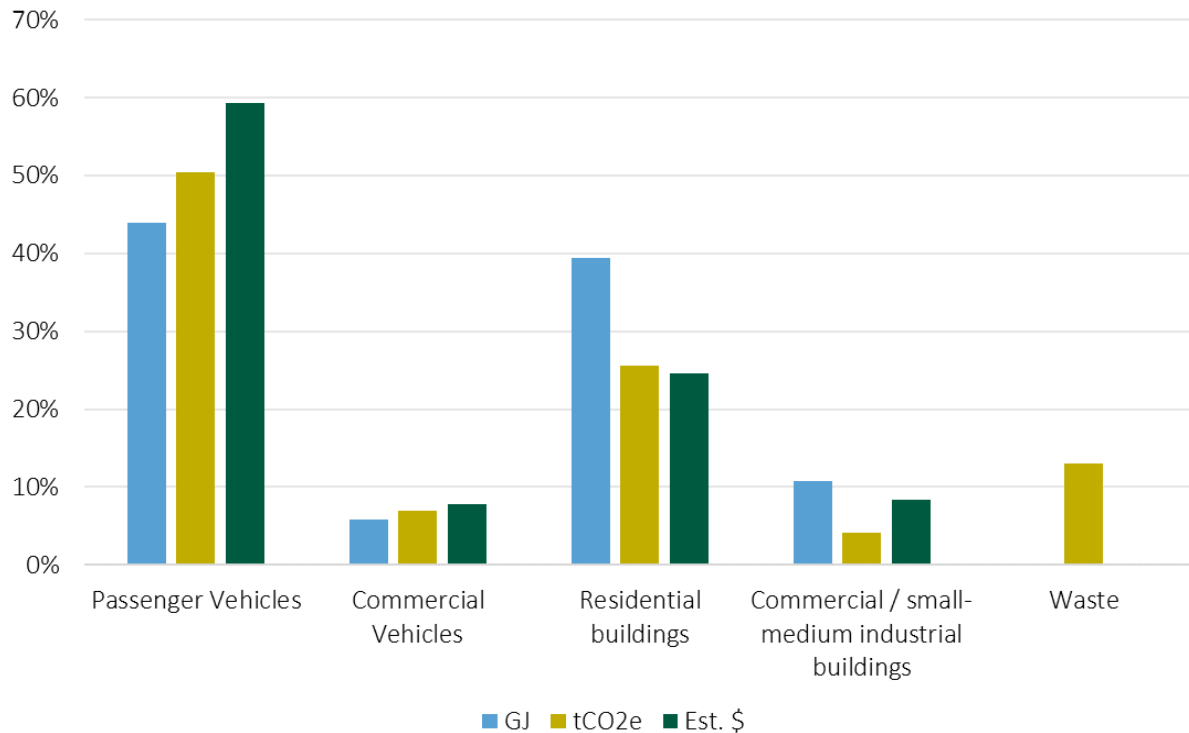


Figure 2 2018 Energy, Emissions, and Expenditures split by sector for Village of Warfield



Passenger vehicles represent the largest source of emissions and cost, whereas residential buildings are the largest user of energy. Waste contributes 13% of Warfield’s emissions, which is similar to nearby Rossland (19%), but significantly higher than other communities analyzed (e.g. Nelson – 4.4%, Kaslo 3.8%). This discrepancy is due to the characteristics (e.g. wetness, size, material composition, existence of landfill gas capture) of the specific landfill where waste is disposed of. Though waste emissions contribute a higher proportion in Warfield versus other communities analyzed in this plan, there is a significant opportunity for GHG reductions moving forward.

Figure 3 shows the 2007-2018 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 natural gas emissions for residential buildings. Emissions from passenger vehicles dropped 23% from 2007 to 2013 (6,000 to 4,700 tCO₂e), before rebounding to 5,900 tCO₂e by 2018. Emissions from commercial vehicles increased by about 22%.

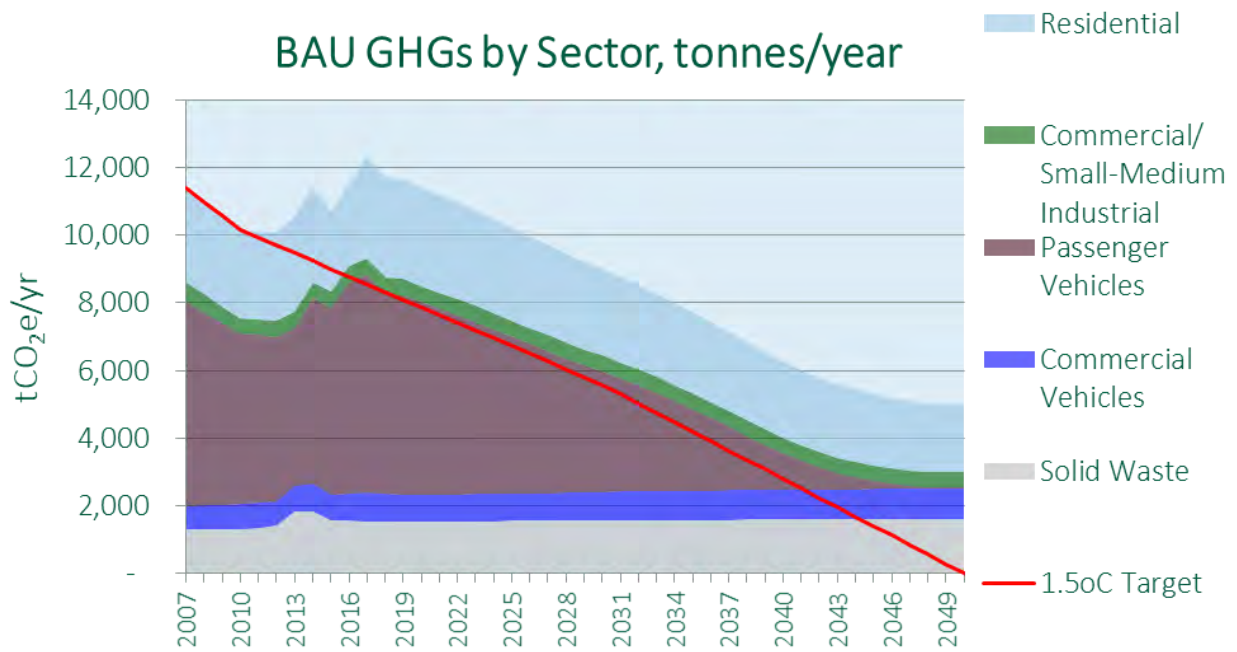


Figure 3 2007-2018 Emission Summary by Sector and Business as Usual Projection



Getting to 2030 & 2050 – Impacts from the Big Moves

In order to align with goals congruent with the Intergovernmental Panel on Climate Change 1.5°C report, the Village of Warfield must reduce its GHG emissions from 9,000 tonnes CO₂e (2030 business as usual projection) to 5,600 tonnes CO₂e (2030 goal). This equates to a total of 4,400 tonnes CO₂e emissions reductions. For 2050, the Village of Warfield must reduce its GHG emissions from 5,000 tonnes CO₂e to 0.

Warfield’s selected ambition levels for policy, infrastructure, and outreach actions for each of the big moves determined the parameters for projecting Warfield’s long-term emissions.

Warfield’s Selected Ambition Levels

Big Move	Electrify Passenger Vehicles	Shift Beyond the Car	Commercial Vehicles	Better Existing Buildings	New Buildings	Organics and Landfill Gas
Selected Ambition Level	Full	Full	Mid-1	Full	Full	Full



Warfield's Actions

[Click here to see a list of the Village of Warfield's proposed actions.](#)

Overall, the sample actions included in Part 2 are intended to be examples of actions that communities could pursue – not all actions are appropriate for all communities. In addition, the tables in Part 2 use somewhat simpler language than the full list of actions, which use more technical planning terms. The intent in Part 2 is to give the casual reader an idea of what some actions could look like; the intent in Part 3 is to list the appropriate actions for each community.

Figure 5 shows the estimated impact that each Big Move / action will have in 2030, and clearly shows that the top four Strategies by impact will be:

1. Electrifying Passenger Vehicles
2. Better Existing Buildings
3. Shift Beyond the Car
4. Organics & LFG



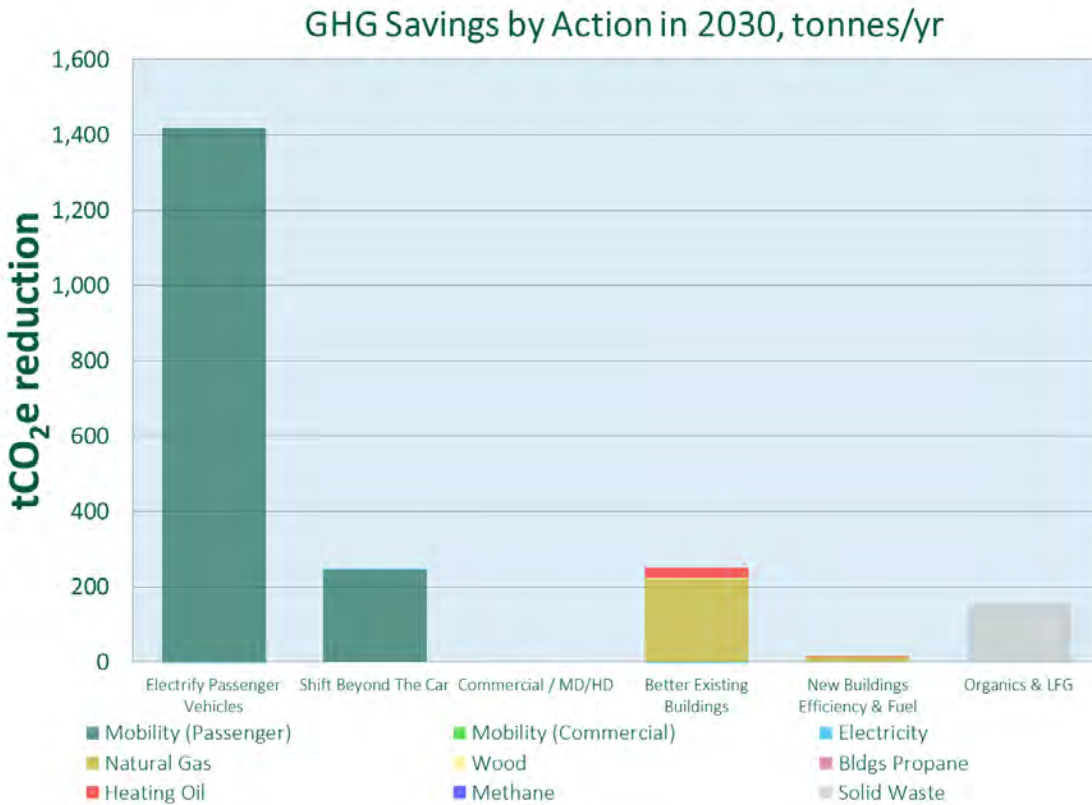


Figure 5 Emission Reductions from the Big Moves in 2030

In practical terms, the annual shifts for each Big Move to 2030 are summarized as follows:

- Electrify Passenger Vehicles: 31 conventional vehicles replaced with EVs
- Shift Beyond the Car: 82 km/person vehicle travel avoided/shifted to active transportation
- Better Existing Buildings: 21 buildings (3%) undergoing energy retrofits (33% reduction in consumption)
- New Buildings Efficiency & Fuel: All new buildings built to 20% more efficient than BC Building Code, and 40% adopt zero or low-carbon heating systems
- Organics & LFG: Additional 21 kg/person of organics diverted, equivalent to about two 4 L milk containers



Overall, the Big Moves in conjunction with existing provincial and federal emission reduction policies, will reduce GHG emissions by 2,000 tonnes CO₂e in 2030 vs. business as usual, accounting for an overall reduction of 21% vs. 2010 levels, nearly half of the reductions to be congruent with the IPCC’s 1.5°C goal of 45% reduction.

With the Big Moves in place, projections can be made as to their impacts on Warfield’s overall GHG profile to 2050. Emission reduction impacts to 2050 from each Big Move are illustrated in Figure 6.

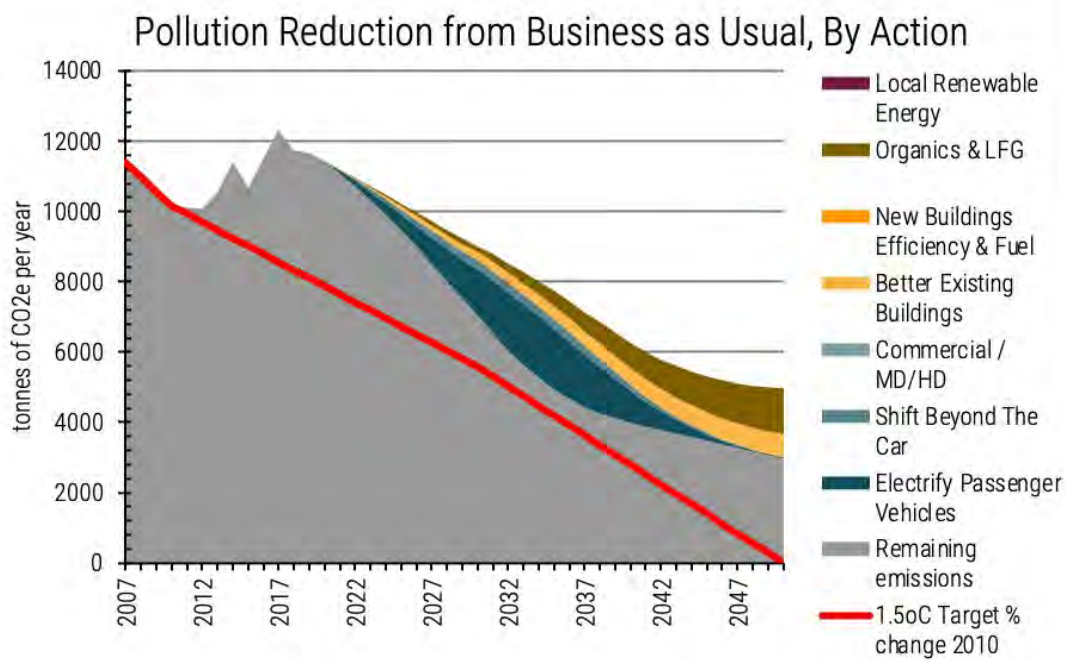


Figure 6 Wedge Chart of Emission Reductions for Each Big Move to 2050

At full implementation of all Big Moves, Warfield is able to achieve a reduction of 2,000 tonnes CO₂e, equivalent to 40% of its 2050 emissions, with Organics and LFG (Landfill Gas Capture) at 1,300 tonnes CO₂e, followed by Better Existing Buildings at 630 tonnes CO₂e. Note that for Electrify Passenger Vehicles, the reduction in 2050 is reduced considerably relative to 2030 and 2040, as the 100% of new vehicles as electric requirement in 2040 comes into effect, allowing for the business-as-usual case to “catch up”. Note that for Organics & LFG, emission reductions in 2030 were smaller than for 2050. This is due to the assumption of a 10 year lag before landfill gas capture technology can be incorporated in 2030, eventually ramping up to capture 80% of landfill gas emissions by 2050.



Next Steps - Addressing Remaining Gaps

Though the implementation of the Big Moves will have a significant impact on GHG reductions for the Village of Warfield, there are some gaps remaining, identified through the projection of residual emissions to 2050 below in Figure 7 by sector, and Figure 8 by source.

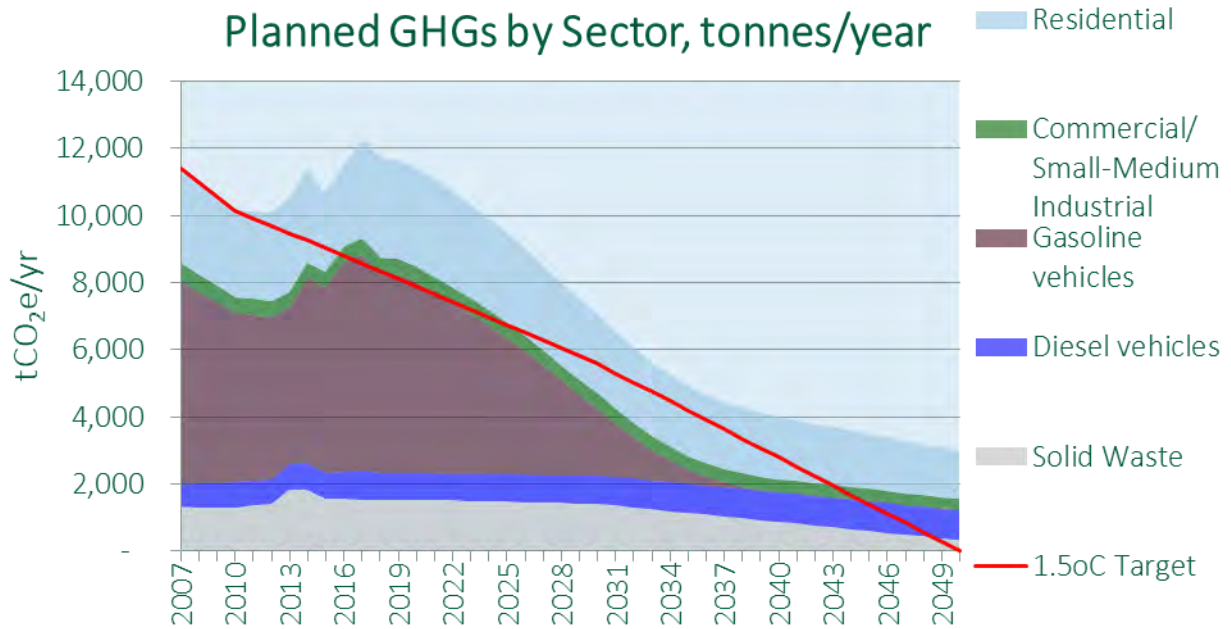


Figure 7 Remaining Emissions to 2050 by Sector if Big Moves are Adopted



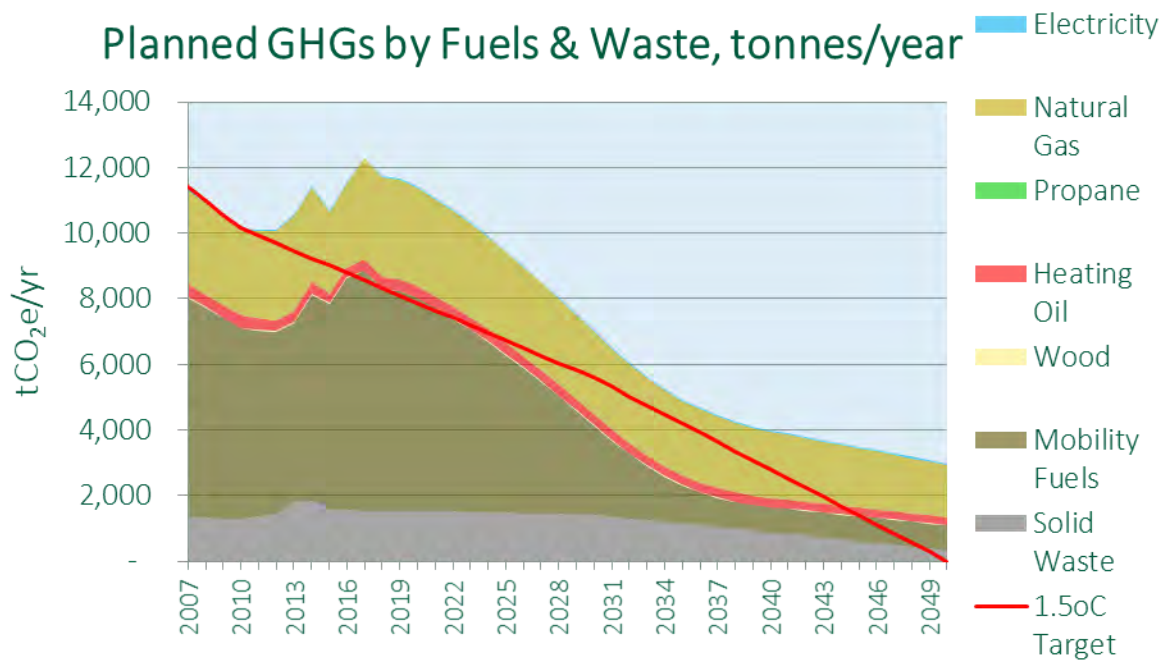


Figure 8 Remaining Emissions to 2050 by Source if Big Moves are Adopted

In summarizing Figure 7 and Figure 8, two gaps are evident:

- Natural gas emissions in existing buildings
- Commercial vehicle emissions

These gaps are in line with the lack of direct policy levers that individual municipalities have for these areas, and reflect a conservative approach based on the lack of proven technologies in these areas. As discussed in Part 2, however, electrification of commercial vehicles is on the horizon, potentially reducing commercial vehicle emissions. A provincial retrofit code and higher renewable natural gas requirements could reduce the natural gas emissions. Advocacy to the Province of BC to decarbonize natural gas and phase in commercial vehicles can accelerate these important changes.

Warfield Public Survey Results

Warfield residents were asked to complete a survey rating the potential impact and feasibility of potential actions. Based on 17 responses, the weighted average of the actions are shown in the



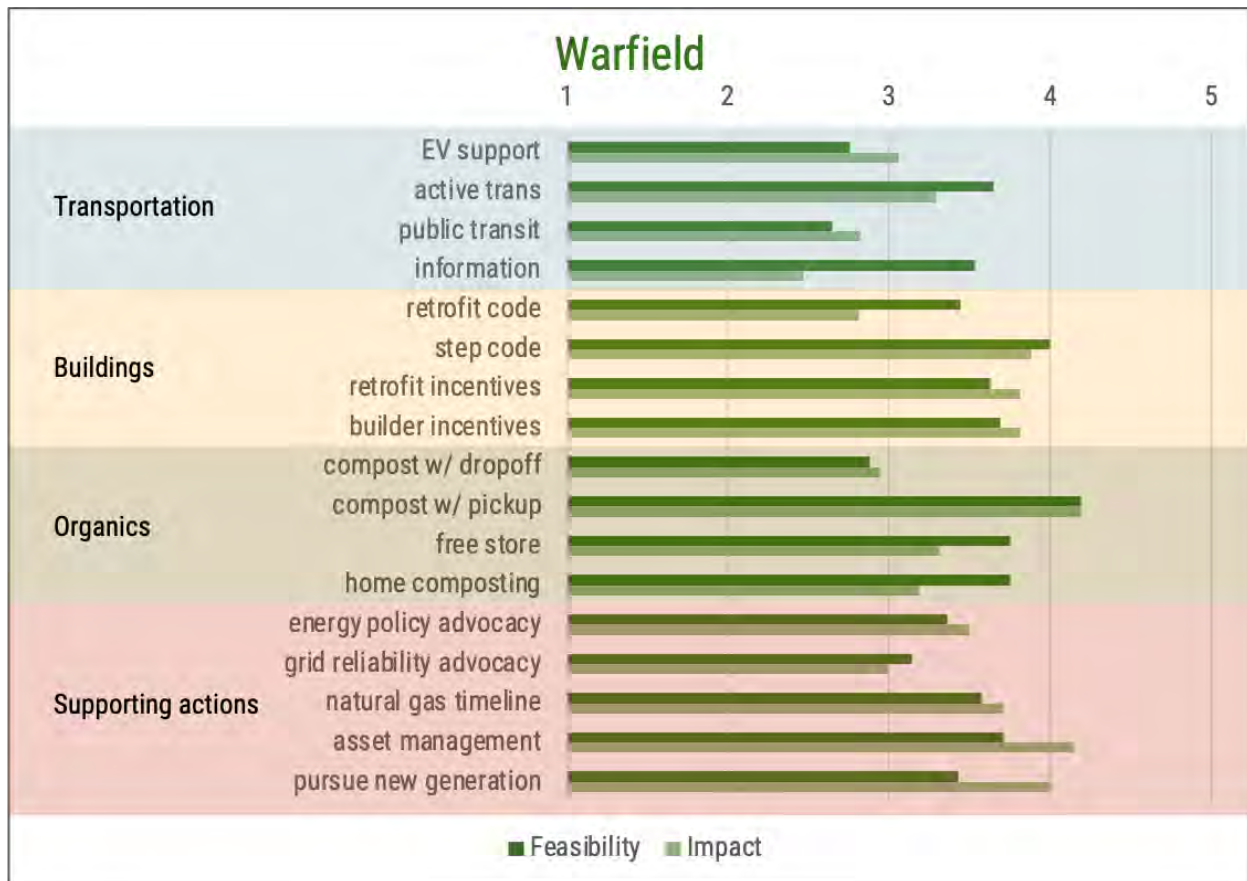
chart below. The potential score ranges from 1 to 5 for both measures. The distinctions among many of the actions fall within the margin of error (+/- .96).

The highest impact ratings were for compost with pickup (4.19), asset management (4.14), and new energy generation (4.00), while the lowest ratings were for transportation information (2.47), voluntary retrofit code (2.81), and public transit (2.82).

The highest feasibility ratings were for compost with pickup (4.19), step code (4.00) and free store (3.75). The lowest feasibility ratings were for public transit (2.65), EV support (2.76), and compost with drop off (2.88).

Proposed Action	Feasibility	Impact
Promoting electric vehicles with charging stations & incentives	2.76	3.06
Adding more trails, paths and routes for walking, cycling etc	3.65	3.29
Adding more transit routes, stops, and rides	2.65	2.82
Providing more information about alternatives to car trips	3.53	2.47
Adopting a voluntary energy efficiency standard for building renovations	3.44	2.81
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step Code)	4	3.88
Providing incentives and support for home energy efficiency retrofits	3.63	3.81
Providing incentives for builders to meet higher efficiency standards	3.69	3.81
Centralized compost facilities with drop off locations	2.88	2.94
Centralized compost facilities with curbside pickup	4.19	4.19
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	3.75	3.31
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	3.75	3.19
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.36	3.5
Advocate for a more reliable electrical grid	3.14	3
Ask the province to set a timeline to move to 100% renewable gas	3.57	3.71
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.71	4.14
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.43	4





Warfield-Specific Inventory & Model Assumptions

The following assumptions were made, specific to the inventory and action modelling for the Village of Warfield. For a list of general inventory and model methodology and assumptions, please consult Appendix X.

Inventory Assumptions

- 9% of homes use heating oil for their primary heating source, 3% have secondary wood heating, with no propane heating, as per drive-by heating survey results
- As mentioned in Appendix 1, transportation data for Warfield up to 2018 is provided by retail fuel consumption data provided by Kent Group



Modelling Assumptions

- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Heating Degree Days around 2018 are 3,573, and in 2050 they will be 3,048
- Based on ClimateData.ca RCP 4.5 median values, the 30 year average of Cooling Degree Days around 2018 are 169, and in 2050 they will be 304
- 1% annual reduction in emissions through residential organics diversion to 2030
- 10 year lag before landfill gas capture system is installed, accounting for time required to coordinate with RDKB, develop business cases, and acquire funding. Ramp up emission reduction to 80% by 2050





Part 4: Conclusion & Next Steps

The participating governments of the West Kootenays have an important task ahead of them to achieve the next milestone toward 100% Renewable Energy. Only decisive action will protect the well-being and safety of West Kootenay communities and reduce carbon pollution. Although the framework can't forecast a path to 100% renewable energy at this point, the big moves set the region on the path. After local governments adopt the West Kootenay Renewable Energy Plan, they will:

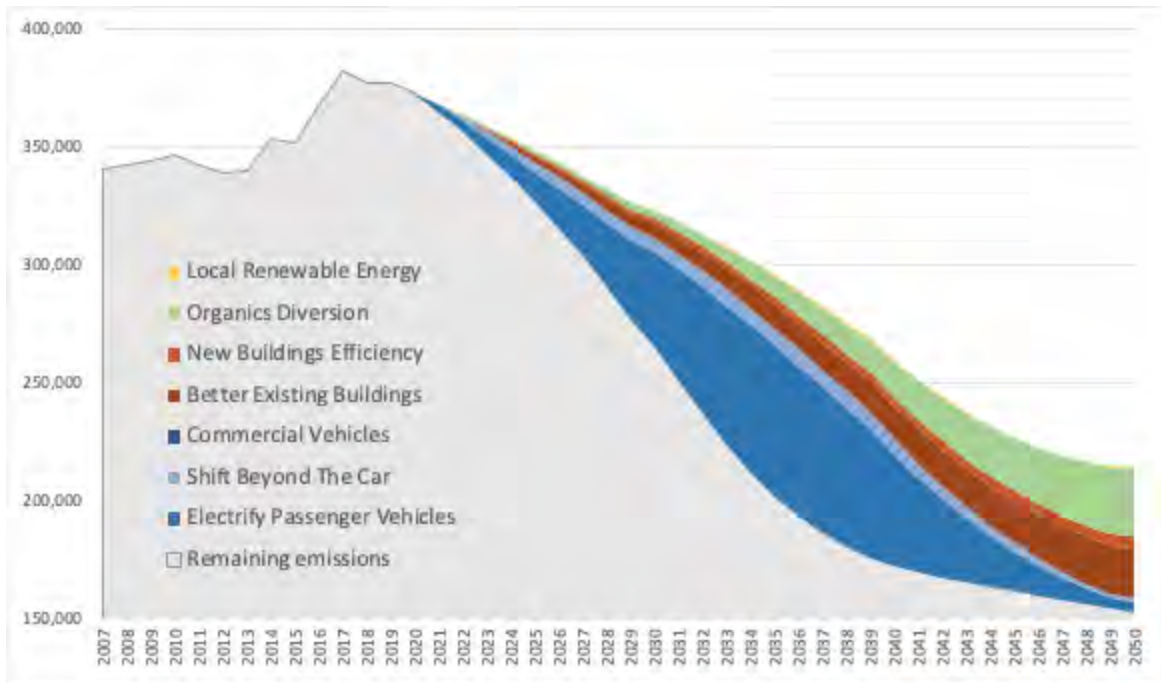
- 1. Update official community plans and bylaws;**
- 2. Develop new infrastructure and investments that support renewable energy and energy efficiency;**
- 3. Engage community members in actions to encourage and facilitate renewable energy choices;**
- 4. Work together with other local governments to open doors at provincial and federal levels and leverage funding; and**
- 5. Periodically review progress toward goals and set new goals.**

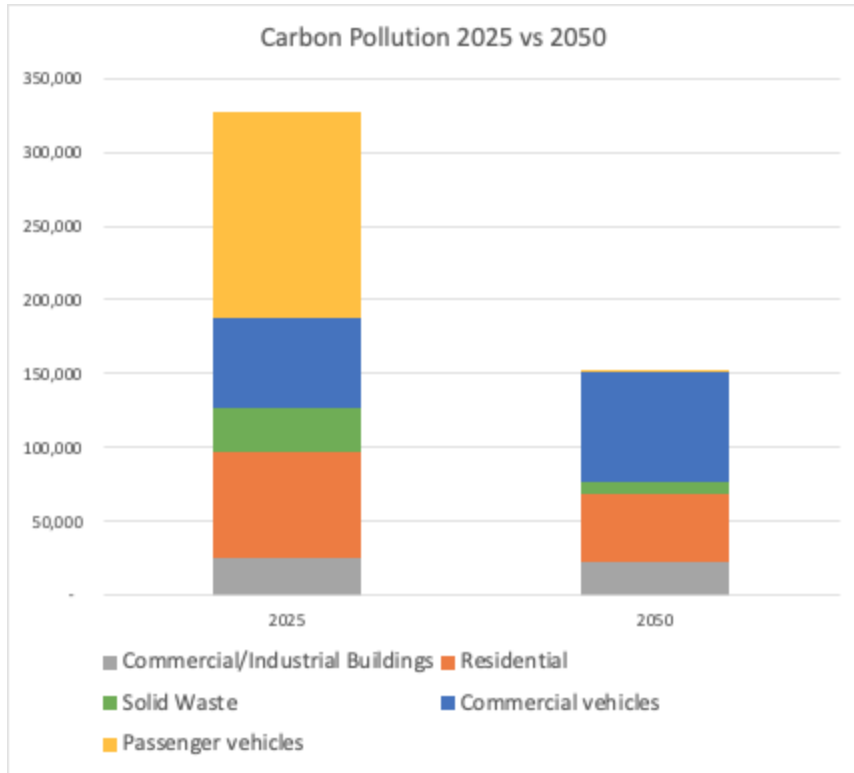
Implementing the actions in the West Kootenay 100% Renewable Energy Plan will improve the lives of community members. Residents will save money, enjoy better health, and contribute to a



more thriving local economy. Although the transition to renewable energy is a big project, everyone stands to benefit.

The analysis of the Big Moves and local actions show a consistent trend from local government to local government: transitioning to electric vehicles has the greatest ability to accelerate the transition to renewable energy. It comes as no surprise considering how much driving people do in our region, and how difficult it is to provide efficient public and active transportation options for rural residents. Nevertheless, once electric cars become widespread, the importance of organic waste and building retrofits become more important. As technology and culture evolve, it will be very important for local governments to review and update these models and then to take action to adapt their policies accordingly.





Appendix I: Methodology & Assumptions

This appendix contains details on the methodology and assumptions for creating the community energy & emissions inventories and projections for communities within the 100% Renewable Energy Plan.

Inventories

Community inventories were created using data for buildings, transportation, and waste obtained from the Province of BC. Data on gasoline and diesel sales from gas stations obtained from Kent Group was available to populate passenger and commercial vehicle data for the communities of Nelson, Castlegar, and Warfield. Based on the data compiled, full inventory years were able to be compiled for 2007, 2010, and 2012-2018.

West Kootenay EcoSociety (WKES) also conducted a heating usage survey in 2019 that captured heating fuel information, which was used to determine the fraction of home owners that used wood, heating oil, and propane, and was also incorporated into the inventory. Determining heating oil, wood, and propane consumption for each year was based on annual natural gas consumption to estimate average building heating load. Energy conversion efficiencies were then applied (85% for heating oil and propane furnaces, 50% for wood stoves) in conjunction with the survey results to determine energy consumption for each fuel source. Heating oil and propane data was also collected, where available, for buildings associated with each community's:

- Municipal/regional buildings
- Health facilities (through Interior Health)
- Schools (Through School Districts 8, 10, and 20)

Emissions factors for inventory years are shown in the following table, and are sourced from the Province of BC. These apply to all communities except for Nelson, which has their own utility, and the Regional District of Central Kootenay (RDCK) Unincorporated Areas, as their electricity grid is a combination of BC Hydro and FortisBC Electric.



Table 1 – Emissions factors used for inventory years

GHG/GJ, by Year	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
LDV	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
HDV	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
Mobility fuels	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069
Electricity	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
Natural gas	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Wood	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019
Heating oil	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
Propane	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061
Electricity - Nelson Hydro	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008
Electricity - RDCK Unincorporated	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022

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

The data sources for buildings and waste emissions have been the Province of BC’s Community Energy & Emissions Inventory (CEEI) data,³³ and utilities and landfill waste data at the utility level.³⁴

Additional data for electricity was sourced directly from the City of Nelson.

The heating data provided through the WKES Heating Survey provided a glimpse of local heating fuel consumption. Note that a limitation of the survey is that determination of whether any wood, propane, or heating oil equipment was present, was based on brief visual examinations alone, and may not be entirely representative of the community. Nevertheless, it is more granular than estimates provided by the Province as part of the 2017 Provincial inventory. To determine fuel consumption by the three fuels, an average heating load for a typical house was required. This was determined by using natural gas consumption for each year, divided by the number of connections (houses), and incorporating the efficiency of a natural gas furnace (estimated at 85%). For example, in 2017, natural gas consumption per house was estimated at 82.8 GJ/year. Incorporating natural gas efficiency, this equates to 70.4 GJ/year heating load. The proportion of houses that used each fuel in the survey, was multiplied by the number of houses in each community, to determine the equivalent number of houses in each community using each fuel. Heating oil and propane were estimated to provide 100% of heating in the homes where they were used, while wood was considered secondary heating, and estimated to provide 50% of heating.

³³ <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei>

³⁴ <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory>



With respect to solid waste, tonnage and emissions estimates were derived from Provincial sources. Of note, emissions to tonnage ratios varied widely from community to community, ranging from 0.55-2.59 tonnes CO₂e/tonne waste in 2018. The wide range in emission ratios is likely due to the characteristics of the landfills in which waste is disposed of in each community, particularly whether the landfill has any landfill gas capture measures in place. Queries have been to the Climate Action Secretariat for clarification on this discrepancy, and we are currently awaiting reply.

Emissions from Land Use, Land Use Change, and Forestry are not included in the community profile as per the Province's methodology for their 2017 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 for 2007, 2010, and 2012 which are outlined on the CEEI webpage: <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei>.
- The Province of BC made other assumptions for the post-CEEI data for additional 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>. Note that the 2017 Provincial Inventory incorporated updated assumptions including backcasting, which incorporated new or improved methodologies to current and prior years as applicable. This is why updated CEEI data may be different from the original CEEI data.
- In creating the inventories, CEA made other assumptions in addition to these:
 - Though FortisBC gas data was included with the new Provincial inventory up to 2017, only residential numbers were incorporated, as commercial/industrial data for 2012 and beyond included large industrial. FortisBC commercial/industrial gas data post-2012 is prorated with population growth. Natural gas data was obtained for the 2018 year as well, however the data appeared to use different community boundaries, as about 45% more connections were included vs. the Provincial data,



resulting in a 28% increase in consumption. We decided to not use the data due to the discrepancy in the number of connections and the subsequent rise in emissions and instead projected based on population growth to populate the 2018 year for natural gas.

- For Nelson, Castlegar, and Warfield only - For all years of fuel data (2007-2018), Kent Group data was used as described below. This is because the most recent year that the Province provided transportation data for Nelson was 2010. CEA uses Kent Group data for inventories where data is available. Note that new ICBC data was available at the 3-digit postal code level, up to the 2018 year. However, due to data quality issues, particularly discrepancies relative to the CEEI data provided, it was decided to not use that data over Kent Group data.
- CEA now uses Kent Group data for inventories as a best practice where data is available and representative of the community, since CEEI transportation data is outdated (last data point is 2010). The Kent Group data was corroborated against the CEEI transportation estimate, and in doing so an assumption was made that all vehicle sizes up to and including medium duty trucks from CEEI data would be within the service boundary for Kent Group gas stations. Heavy duty trucks were excluded, as they are assumed to be fuelled by commercial card lock fuel stations, which are outside the service boundary for Kent Group. Using the aforementioned methodology and assumptions for quantifying consumption, the Kent Group data yielded a difference of 31% for gasoline, and -14% for diesel vs. our estimated consumption numbers in 2018 using 2010 CEEI and scaled by population growth. Though the gasoline component from the Kent Group methodology is considerably higher than the CEEI/population growth methodology, the CEEI data is 8 years out of data. The underestimate for diesel from the Kent Group data also makes sense since card lock stations are not included, and would likely account for a fair proportion of diesel consumption.
- In addition to some methodological challenges to using fuel sales data, a major drawback is the lack of information on fuel sales through card lock stations, which



are not included with the data.³⁵ This means that many commercial diesel vehicles are excluded. For example for Nelson, based on a previous release of the CEEI data, and making assumptions based on population growth, commercial card lock vehicles may have accounted for 5,260 tonnes in 2010. If that is approximately accurate, then that would constitute a small but not inconsiderable omission, as Nelson's 2010 GHG emissions are estimated at 66,600 tonnes of CO₂e excluding most commercial vehicles. 5,260 tonnes would be about 8% of this.

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 BAU 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. Only policies that have already been 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 & low carbon transportation fuel standards. 20% by 2030, as in CleanBC Plan

³⁵ 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 GHG 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>



- HDD and CDD numbers will vary considerably for each community. See each community's section for specific historical and projected HDD and CDD numbers
- Decreases in residential and commercial electricity consumption are 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

Action Modelling

Unless otherwise specified in the community-specific sections, modelling projections for each Big Move will follow the following template.

Electrify Passenger Vehicles

New electric vehicle purchased were modelled using CEA's in-house model, drawing upon the accelerated uptake from the Accelerate Kootenays project, as well as more recent fast charger networks from Fortis and BC Hydro. At full implementation, increased EV sales from Big Move actions were represented by increasing the Compound Annual Growth Rate (CAGR) above the BAU rate by 30% in the first 2 years, 15% for the next 3 years, and 10% for the next 2 years. Note that the BAU scenario recognizes the minimum requirements for EV sales in the Province as per the CleanBC Plan (10% in 2025, 30% in 2030, 100% in 2040).

Overall, this amounts to:

- 11% of all passenger vehicles as EVs in 2030
- 56% of all passenger vehicles as EVs in 2040
- 97% of all passenger vehicles as EVs in 2050



Appendix II: Actions tables

To view each community's list of proposed actions, visit the appropriate link below. Although there is substantial overlap and opportunity for collaboration, each community made substantial modifications to their version of the action list to account for differences in social and political context, infrastructure, and community needs. For more about community needs and how they were assessed, visit Appendix IV.

[Click here to see a spreadsheet of Castlegar's actions toward renewable energy](#)

[Click here to see a spreadsheet of Kaslo's actions toward renewable energy](#)

[Click here to see a spreadsheet of New Denver's actions toward renewable energy](#)

[Click here to see a spreadsheet of RDCK's actions toward renewable energy](#)

[Click here to see a spreadsheet of Roseland's actions toward renewable energy](#)

[Click here to see a spreadsheet of Silverton's actions toward renewable energy](#)

[Click here to see a spreadsheet of Slokan's actions toward renewable energy](#)

[Click here to see a spreadsheet of Warfield's actions toward renewable energy](#)



Appendix III: Adopting the 100% Renewable Energy Goal

In late 2017, the village of Slocan was the first local government in the West Kootenays to pass a motion to reach 100% renewable energy by 2050. Then in early 2018, the City of Nelson, and the Regional District of Central Kootenay joined in; and the movement started to gain momentum. Six more local governments made the commitment in 2019, starting with Rossland and New Denver at the start of the year, followed by Silverton, Castlegar, Warfield and Kaslo passing similar council motions as the year progressed.

- Village of Slocan: November 13, 2017
- City of Nelson: Jan 8, 2018
- Regional District of Central Kootenay: April 22, 2018
- City of Rossland: January 21, 2019
- Village of New Denver: January 22, 2019
- Village of Silverton: July 9, 2019
- City of Castlegar: Nov 18, 2019
- Village of Warfield: December 4, 2019
- Village of Kaslo: December 10, 2019



Appendix IV: Community and stakeholder feedback

Community and stakeholder engagement for the West Kootenay 100% Renewable Energy plan has been robust, as community support is critical for implementation of the action items.

Community engagement

The COVID-19 pandemic interrupted the initial plan for in-person engagement sessions with each community, but in-person sessions were held in Castlegar, Silverton/New Denver (14), Slocan (16), Warfield (7) and Rossland (27). An online survey helped engage a broader audience as well as reaching communities where in-person meetings were not safe. See Table below for the number of participants in each community.

Community	In-person	Online
Castlegar	29	30
Kaslo	NA	32
Nelson	NA*	123
New Denver	14**	7
RDCK	NA	71
Rossland	27	126
Silverton	14**	2
Slocan	16	11
Warfield	7	13

* The City of Nelson also conducted a suite of engagements as part of its Climate Action Planning
 ** New Denver and Silverton shared a single in-person engagement session



Experts provided direct feedback on a draft of the plan as well as participating in a discussion. Their insight has been invaluable to ensuring the plan is accurate and complete.

Alex Love, Nelson Hydro	Jeremy Eisenhauer, Jeremy Eisenhauer Woodworks	Michele Deluca, 3West Building Energy Consultants Inc.
Alyssa Nebel, Kootenay Coop	Jim Jacobsen, Empower Energy	Mike Severin, Severin Built Ltd.
Anne Heard, Kaslo Climate Action Team	John Cathro, (did a biomass feasibility study - recommended by Jessie Spiers in Kaslo)	Morag Carter, Skill Centre-Trail & Area
Carmen Proctor, Nelson Hydro	John Christie, REN Energy	Paul Faulkner, RDCK Community Sustainability
Colleen Doyle, Kootenay Carshare Co-op	John McArthur, Silica Renewables	Phil Morley, Morley Mountain Homes
Dan Ashman, AM Ford Trail	John Severen, Severen Build	Randolph Seibold, CDN Renewable Energy Markets Consultant
David Westmacott, Selkirk College Students Union	Julia Greenlaw, Healthy Community Society/ North Slokan Food Program	Randy Morse, BC Rural Centre
Doug Brackett, Downtown Automotive	Kady Hunter, Interior Health	Ray Neto, BGIS Selkirk Alum (biomass)
Eden Yesh, Kootenay Employment Services / Kootenay Clean Energy Transition	Ken Holmes,	Rebecca Richards, LCIC
Eleanor Stacey, Civic Theatre	Kevin Suggitt, Kootenay Rideshare	Rob Macrae, Selkirk College
Elizabeth Scarlett, Kaslo Climate Action Team	Lorna Louise, Kaslo Climate Action Team	Sam Thomas, Prism Engineering
George Chandler, Nelson at it's Best	Lukas Armstrong, Cover Architecture	Scott LaMont, City of rossland
Goran Denkovski, RDKB-Environmental Services Dept.	Lyne Chartier, Slimmer Waste (blog)	Steven Cretney, theforest.ca
Janine Dougall, RDKB-Environmental Services Dept.	Marc Brillon, Ellenwood Homes	Trish Dehnel, CEA
Jennie Barron, Mir Centre for Peace	Menush Akbari, Harmony Engineering	Victoria Morley, Morley Mountain Homes



Appendix V:

The planning process

The Community Energy Association developed conceptual “Big Moves” based on best practices and analysis of opportunities within the region that are actionable at the local level.

Each local government reviewed the Big Moves to adjust them to fit their jurisdiction. For example, in Castlegar, sidewalks are an important tool for encouraging people to walk more, but in Silverton, there is so little traffic that sidewalks are not an important consideration. Each local government chose actions that best match their community's needs. Ultimately, the action plans will be adopted and integrated into each community's Official Community Plans and bylaw in a series of “small moves.”

Action/outcomes methodology

Each Big Move encapsulates a range of actions addressing aspects of either transportation, buildings, waste, or other supportive measures. Communities can choose from a range of implementation intensities from “Minimal”, “Mid 1”, “Mid 2”, to “Full Implementation”, with customization to fit the size/capacity of the community. Each Big Move has associated emission reduction projections based on template scenarios integrating current best practices, provincial and federal mandates, and availability of technology and industry capacity. It's important to note that available technology and industry capacity may limit the current potential of a Big Move, however it's important to recognize its contribution and establish appropriate policies and measures now to prepare for when technology and capacity catches up. This is especially true for commercial vehicles where electric trucks are not yet available at a large scale, and building retrofits which do not yet have a province-wide mandate similar to the Step Code, nor the industry capacity for large-scale heat pump installations.

To determine the impact of each Big Move on a community's carbon profile, the following steps are taken:



Partial Control: Waste

The Regional District of Central Kootenay, in partnership with the Regional District of Kootenay Boundary have partnered to form the only cross-regional composting program of its kind in BC, will divert thousands of kilograms of food and kitchen waste from landfills in these two regional districts.

The regional districts also run several landfill sites and transfer stations in the West Kootenay, which are subject to regulations of the regional districts and the provincial government.

Limited Control: Provincial and Federal Lands

Rail lines are under federal jurisdiction, while the highways that cross the West Kootenay are under provincial control. For these lands, and other lands owned by the provincial and federal governments within the West Kootenay, our local governments will advocate for development that supports a 100% renewable future by 2050.



Appendix VII: Public Survey

An online survey was conducted from October 20 to November 20. The survey was publicized on social media, through print advertising, social media advertising, and email from West Kootenay EcoSociety. The City of Rossland also mailed postcards to each household and business. Other local governments also shared the survey on their websites, social media, and email lists.

Which 100% Renewable Community do you live in*?

Answer Choices		Responses
Castlegar	17.43%	84
Kaslo	8.30%	40
New Denver	6.64%	32
Rossland	22.82%	110
RDCK Areas ABC	6.22%	30
RDCK Areas DEFG	17.43%	84
RDCK Areas HIJK	9.13%	44
Slocan	1.66%	8
Silverton	1.24%	6
Warfield	3.53%	17
Other (please specify)	5.60%	27
	Answered	482
	Skipped	0

*The City of Nelson conducted a separate survey. Results are included in the City of Nelson Climate Action Plan.



Respondents were asked to rate 17 potential actions in terms of potential impact and feasibility. The table below shows the weighted average feasibility score and impact score for each proposed action. The range of possible scores was 1 to 5. Community-specific results are reported in Part 3.

Proposed Action	Feasibility Score	Impact Score
Promoting electric vehicles with charging stations & incentives	3.47	3.43
Adding more trails, paths and routes for walking, cycling etc	4.13	3.5
Adding more transit routes, stops, and rides	3.65	3.58
Providing more information about alternatives to car trips	3.71	3.09
Adopting a voluntary energy efficiency standard for building renovations	3.58	3
Adopting a higher energy efficiency standard for new buildings (the Clean BC Step Code)	3.91	3.95
Providing incentives and support for home energy efficiency retrofits	4.22	4.12
Providing incentives for builders to meet higher efficiency standards	4.04	3.95
Centralized compost facilities with drop off locations	3.63	3.25
Centralized compost facilities with curbside pickup	3.26	3.39
Designated locations for exchange of unwanted goods (eg "free store," Trash to Treasures)	4.13	3.63
Education and materials for home composting (eg free classes, subsidized containers and bear fences)	3.92	3.5
Ask the province to make it easier to generate community-scale renewable electricity in our region	3.7	3.69
Advocate for a more reliable electrical grid	3.63	3.29
Ask the province to set a timeline to move to 100% renewable gas	3.13	3.12
When improving or repairing community-owned infrastructure, include components that support renewable energy even if it increases cost	3.58	3.71
Build or invest in renewable energy facilities (eg solar farms, heating plants, etc)	3.46	3.79



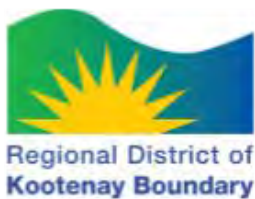
Appendix VIII: Acknowledgements

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- Participants in the Expert Panels
- West Kootenay EcoSociety
- Sustainable Kootenays
- Community Energy Association
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