

Better Climate, Better Community

WEST VANCOUVER COMMUNITY ENERGY & EMISSIONS PLAN

FULL TECHNICAL REPORT

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WEST VANCOUVER COMMUNITY ENERGY & EMISSIONS PLAN (CEE PLAN): FULL TECHNICAL REPORT

West Vancouver's CEE Plan was prepared by a citizen Working Group over a 24 month planning period. This Full Technical Report includes methodology, detailed modeling, comprehensive analysis and technical appendices. It is accompanied by a separate and much shorter Summary Report.

ACKNOWLEDGEMENTS

Mayor and Council, residents, businesses and local and provincial stakeholders provided critical input through a series of events. The planning process was driven by a citizen working group supported by staff, external advisors and funders. The plan was inspired by Climate Action Working Group recommendations in 2010.

Community Energy & Emissions Working Group

The Council-appointed Community Energy & Emissions Plan Working Group was comprised of eight members.

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Charlotte McLaughlin (Chair)
Peter Scholefield
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Council Liaison

Councillor Michael Lewis was liaison to the working group and a champion of the planning process. The working group, staff and all those involved in this project wish to acknowledge his political leadership and personal contribution to the plan.

Staff Project Team

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Advisors

A team of consultants headed by Boston Consulting provided strategic and analytical support. UBC's Collaborative for Advanced Landscape Architecture Planning contributed analysis and visualizations.



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Part I of this report establishes the context for West Vancouver’s Community Energy & Emissions Plan (CEE Plan)

It has four primary sections:

- *Introduction* with the objectives, vision, strategic policy context and report structure
- *Methodology* for developing the plan is described
- *Climate, Carbon and Community* outlines the rationale for action, briefly examining climate science and policy, local vulnerability and the critical role of local government in stabilizing the atmosphere
- *Snapshot and Outlook* briefly explores West Vancouver’s energy and emission activity currently and under a *Business-As-Usual* (BAU) future.

1. INTRODUCTION

OBJECTIVES

West Vancouver’s *better climate, better community* CEE Plan has six strategic objectives:

1. Outline clear and practical strategic directions to reduce greenhouse gases across key energy and emission sectors:
 - Neighbourhood and Community Planning
 - Transportation Systems
 - Housing, Buildings and Development
 - Solid Waste and Materials
2. Contribute to core community priorities of West Vancouver residents and businesses.
3. Inform and be informed by key District policy and planning agendas.
4. Provide short and long term Green House Gas (GHG) reduction targets, department level benchmarks to meet Provincial legislative requirements and support implementation and monitoring.
5. Inspire residents, stakeholders and implementation partners.
6. Support long-term risk management of; community and corporate infrastructure; the environment and personal health and safety through climate change mitigation and adaption.

VISION AND STRATEGIC POLICY CONTEXT

This Plan has a bold vision to advance atmospheric protection in a manner firmly rooted in the community:

a better climate for our prosperity, our health and nature

In addition to driving deep GHG reductions, strategic directions have been designed to advance core community priorities.

Strategic directions have been informed by and, similarly, aim to influence implementation of Council's top priorities and District policy and planning agendas:

- Official Community Plan Update*
- Strategic Transportation Plan implementation, including the Cycling Network and Greenway Plan, Pedestrian Network Study and TransLink's North Shore Area Transit Plan
- Built Form, Housing & Neighbourhood Character,* including the Housing Action Plan
- Village Activation, including Cypress Village initiation and Ambleside activation*
- Fiscal Sustainability*
- Natural Environment & Climate Action*
- Solid Waste Management Plan implementation.

*Council identified 2012-2018 term priorities.

Activities of earlier District Working Groups have similarly informed this plan, notably: Ambleside Town Centre (2007), Climate Action (2010), Fiscal Sustainability (2006), Neighbourhood Character and Housing (2008), Strategic Transportation Plan (2010) and Upper Lands Study Review (2015).

CEE PLAN: STRATEGIC HIGH LEVEL AGENDA

CEE Plan is a high level strategic agenda that will require further development through complementary policy and planning activity such as, the Official Community Plan update and implementation of the Strategic Transportation Plan and Waste Management Plan. Implementation planning will be phased into departmental work plans.

CEE Plan ventures into some non-traditional territory for local governments, (e.g. building retrofits and accelerating electric vehicle uptake.) Taking action on these priorities requires initiating completely novel tasks. External financing and innovative financial tools for building energy conservation can minimize resource requirements. Local non-profit partners can facilitate delivery.

CLIMATE ACTION AND COMMUNITY PRIORITIES

The CEE Plan has been informed by key community priorities that synergize with carbon management to establish a coherent mutually reinforcing agenda.



Congestion Management & Transportation Efficiency: Proximity to grocery stores, parks, transit and employment areas along with diverse, attractive transportation choices (transit, walking, cycling, cars) shape efficient transportation systems. An integrated transportation and land use system minimizes congestion and travel time and increases travel satisfaction and health. Transportation choice and transportation efficiency is a cornerstone to a low carbon community.



Neighbourhood Walkability & Health: People living in walkable neighbourhoods are, on average, more physically active and a healthier weight than those who live in less walkable neighbourhoods (CMHC , 2000) (Vancouver Coastal and Fraser Health Authorities, 2015).¹ Neighbourhood walkability is an important protection against physical inactivity and obesity, the top preventable causes of death and disease in Canada after smoking (Public Health Agency of Canada, 2007). Neighbourhood walkability is characterized by good sidewalks, safe crosswalks, access to key destinations and attractive streetscapes. Walking is the lowest carbon transportation mode and conducive for short trips.



Nature Protection: The District's interest in focusing growth in the Upper Lands can make an important contribution to maintaining natural areas that contribute to public and ecosystem health. This shift can also serve as a beacon of hope for slowing the rate of permanent forest loss in Canada. Urbanization is amongst the greatest drivers of permanent forest loss in BC and Canada.² Carbon emissions from deforestation are the source of 20% of GHGs added to the atmosphere, contributing to climate change. Avoiding the loss of forests and forest carbon is an important contribution to climate protection.



All Ages Housing & Transportation: As people move through life, priorities shift. Families with children tend to be attracted to larger single detached homes with larger lots. They also tend to be more automobile oriented. Empty-nesters and seniors have smaller families and typically desire less responsibility. This classic Canadian pattern is a shift towards duplexes, rowhouses, low rises and high rises. West Vancouver is no exception where a higher share of the older demographic occupy such homes (Statistics Canada, 2011). Transit and walking access to groceries and pharmacies also become more desirable to older age cohorts (Frank, 2014). Interestingly, young solos, couples and families share most of these same housing and transportation interests with the addition of shared cars. Communities with diverse transportation and housing options can better enable people to age in place. They also tend to be lower carbon communities.



Infrastructure, Energy Savings & Economic Development: Smart growth communities with more efficient land use systems require less extensive road, water and sewage infrastructure, minimizing taxes, levies and utility costs (BC Ministry of Community Development, 2015). Households, additionally, have lower personal transportation spending requirements (Littman, 2014). High efficiency new homes and building energy retrofits result in long term household savings. Managing infrastructure and energy spending with more efficient transportation, housing and land use and infrastructure systems contributes to the local and regional economy, as spending will be re-invested locally rather than leaving the community and region (NRCan, 2014b). High efficiency, smart growth communities are low carbon communities.



Community Liveability: "Liveability" means different things to different people. Many of the qualities associated with liveability also underpin low carbon communities: aging in place; traffic safety; public gathering spaces like parks and plazas; vibrant commercial areas; access to nature and green space and attractive urban design that supports walkability.



¹ Comprehensive analysis of health indicators across the region by Vancouver Coastal and Fraser Health Authorities (2015) shows healthy weight correlates with neighbourhood walkability. Only those in highly walkable neighbourhoods (characterized by walkscore.com scores of ≥90) are more than 50% likely of having healthy weights (i.e. not obese or overweight). Obesity rates in West Vancouver (19.0%) are close to the regional average (21.7%). See myhealthmycommunity.org

² Urbanization is Canada's 3rd biggest deforestation driver, accounting for 10% of permanent forest loss annually (NRCan, 2014a). The rate has been rising since 1990 while other deforestation activities, with the exception of oil and gas, have declined.

REPORT STRUCTURE

The Better Climate, Better Community (CEE Plan) is organized into four major parts.

Part I: Context

Part I establishes the context for West Vancouver's CEE Plan.

1. *Introduction* includes the objectives, vision and strategic policy context and report structure
2. *Methodology* for developing the Plan is described, including an overview of the modeling and mapping and key engagement activities
3. *Climate, Carbon and Community* outlines the rationale for action, briefly examining climate science and policy, local vulnerability and the critical role of local government in stabilizing the atmosphere
4. *Snapshot and Outlook* outline West Vancouver's energy and emissions today and under a Business-As-Usual Future

Part II: Strategic Directions

Part II outlines the strategic directions beginning with a summary of the collective GHG impact:

1. *Plan Projections & Community Targets* (Summary of the collective GHG impact)

Strategic directions are then organized under the four major inter-related energy and emission sectors:

2. *Places + Spaces* (Neighbourhood & Community Planning)
3. *Bricks + Mortar* (Housing, Buildings & Land Use)
4. *Roll + Stroll* (Transportation & Land Use)
5. *Trash + Treasure* (Solid Waste & Materials)

An additional strategic direction section outlines institutional priorities to support implementation.

6. *Cross Cutting Action*

Part III: Impact Analysis

Part III provides a more detailed account of the CEE Plan's major impacts.

1. *Impact Synopsis* provides an overview of the strategic directions' major impacts
2. *Energy & Emission Impact Analysis* details sector by sector the strategic directions' impacts on GHGs, energy use and associated key indicators such as energy and transportation spending and congestion-related activities
3. *2040 Spatial Snapshots* details key impacts of the CEE Plan with land use dimensions contrasted to Business As Usual.

Part IV: Implementation Framework

Part IV provides implementation and monitoring guidance:

1. *Key Recommendations* outline recommended immediate next steps and an approach for phased implementation across the organization, into the community and beyond
2. *a Prioritization Matrix* that ranks strategic directions with multiple criteria
3. *an Implementation Table* with high level resource and timeline information.

Insight, Action and Idea Vignettes

The CEE Plan features short vignettes that provide context and inspiration for the CEE Plan and strategic directions:

- *Taking Action* features climate solutions, big and small, by residents, businesses and institutions
- *Energy Insight* are facts and figures about strategic directions or associated technologies and practices
- *Big Ideas* are solutions conceived during the plan's engagement process or adopted in other jurisdictions that may be appropriate to explore during implementation planning and engagement or a CEE Plan update

The appendix includes *Energy and Emission Indicators and Targets* to support implementation and monitoring and a *Financial Tools Summary*.

2. METHODOLOGY

The Council-appointed Community Energy and Emissions Working Group guided the CEE Plan's development.

West Vancouver Community Energy and Emissions Working Group

Rick Amantea	Jennie Moore	Maciej Sobczyk
Michael Lewis (Councillor)	Freda Pagani	Tarah Stafford
Charlotte McLaughlin (Chair)	Peter Scholefield	David Van Seters

The Plan was inspired by earlier Climate Action Working Group recommendations from 2010. Mayor and Council, residents, businesses and local and provincial stakeholders provided critical input into the planning process.

Led by the Manager of Environment & Sustainability, District staff actively supported the planning process and key members formed a project staff team. A team of community climate and energy advisors provided strategic and analytical support.

PROJECT PHASES

The CEE Plan was developed over four phases.

Phase I: Assessing the Situation

The objective of Phase I was to understand the energy and emission context for the plan and develop an initial vision that would evolve through the planning process. The working group met with key staff from across the organization to better understand the existing policy and planning activities and their interaction with carbon management options. The working group identified a set of community priorities that could dovetail climate action and inform development of strategic directions. A key deliverable during this phase was the *Energy and Emission Situational Analysis*, providing baseline analysis of emission activity in 2010 and a Business-As-Usual projection to 2040.

Initial public engagement at large community events was used to raise awareness of the planning process and inform the core community priorities. The District's Executive was provided with a situational analysis briefing.

Phase II: Exploring Our Future

The objective of Phase II was to shape different futures that reduce GHGs and then quantify the GHG implications, along with the impact on community priorities. This involved extensive Working Group deliberations and meetings with staff. Two contrasting scenarios were developed that explored decarbonization of two classic West Vancouver neighbourhood types: Walkable Villages and Sustainable Suburbs. The working group and Staff defined the inputs that modeled these futures. An *Options Paper* showcased these futures with the modeled energy and emission implications and performance against other indicators, focusing on those that provide insight into the impact on key community priorities.

These futures were explored through a large workshop with diverse community organizations. Stakeholders external to the community also participated including utilities, UBC's Collaborative for Advanced Landscape Planning (CALP), TransLink, Metro Vancouver, Ministry of Transportation and Infrastructure. As well as a number of councilors and offices of provincial and federal elected officials also attended.



Exploring Solutions Workshop: A hundred people representing diverse community organizations, key regional and provincial agencies, elected officials from all levels of government and District staff met to explore community climate solutions.

Phase III: Choosing Our Future

The objective of Phase III was to define a preferred path. Select strategic directions from both the Walkable Village and Sustainable Suburbs futures were integrated into this preferred path.

The public was consulted through a series of Open Houses. Staff were consulted through meetings. The working group presented and discussed a preliminary preferred path with Council. Successive working group meetings refined and then prioritized strategic directions based on criteria that considered community priorities, feasibility and GHG reductions.

Phase IV: Finalizing the Plan

The final phase involved a series of iterations to strengthen the CEE Plan, confirm priorities, identify preliminary implementation recommendations and carry out review processes with the working group, staff, BC Hydro and Federation of Canadian Municipalities.

TECHNICAL ANALYSIS: MODELING AND MAPPING

The strategic and technical advisory team used two models to project future energy and emissions. The primary modeling engine was a set of Golder inspired tools that form part of Community Energy and Emissions Modeling and Planning tool (CEEMAP). At its core, it establishes baseline conditions and models future scenarios for growth (residential and commercial/institutional building) and travel activity based on residential and commercial location and neighbourhood form. Solid waste, vehicular tailpipe and forest carbon models were also applied. Additionally, BC Hydro’s Policy Impact Estimator model (PIE) was used to take building stock outputs from CEEMAP, layer on top changes to key energy characteristics and quantify the building energy and emission implications.

CEEMAP and PIE depend on quantitative assumptions about strategies to estimate energy use and greenhouse gas emissions across neighbourhoods and the community. CEEMAP and PIE integrate inputs from the following categories:

- Socio Economic Data, (e.g. residential and employment population)
- Land Use and Community Design, (e.g. location and density of commercial and residential buildings)
- Transportation Technology and Patterns, (e.g. number and type of automobiles, transit routes and frequency)
- Building Type and Performance, (e.g. single detached or multi family home type, building energy rating, retrofit rate)
- Heat and Electricity Supply, (e.g. source of electricity from the grid or locally, specific district energy technology)
- Solid waste management, (e.g. waste composition and mass, management practice.)

To start the process, baseline models were populated using values for the year for which the best data is available, in this case, 2010.

Values for these indicators are then projected into the future based on the type and intensity of strategies of interest to the District. For example, a building retrofit strategy would change the energy performance of a specific number of existing buildings per year by a specific amount. A new bike route would add lane kilometres along a linear path.³

CEEMAP and PIE then use empirically derived knowledge of the relationship (i.e. function) between these indicators (i.e. model inputs) to calculate energy and emissions changes (i.e. model outputs) at a future milestone year, in this

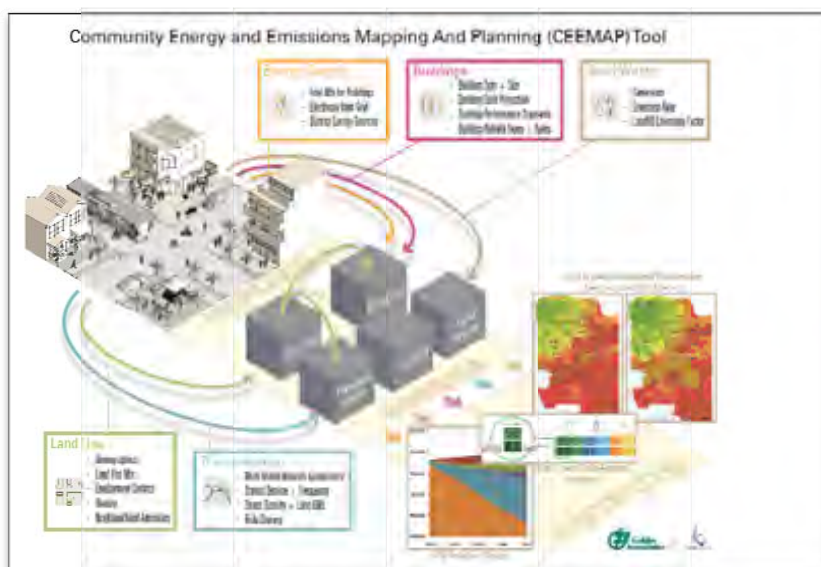


Figure 1 Golder Associates CEEMAP Tool (refer to blow up in Appendix 1)

³ CEEMAP also considers the impact of senior government policies on community activity. BC Building Code updates, for example, will change the energy rating of future buildings and vehicle Tailpipe Standards will change the performance of future vehicle stock.

case, 2040. In addition to changes to energy use and greenhouse gas emissions, CEEMAP generates other outputs such as vehicle kilometres travelled by neighbourhood and throughout the community and building energy consumption by neighbourhood.

Since so many indicators influencing energy and emissions in transportation and buildings as well as energy supply are influenced by location, current and future conditions are graphically shown using maps generated through Geographic Information Systems (GIS).

Targets

Targets help organizations meet their strategic priorities. They help muster the intellectual, financial and social resources necessary to advance a strategy as well as monitor progress and in turn, make course adjustments.

The *Local Government Act* requirements to include GHG reduction targets, policies and actions in Official Community Plans have given greater stature to community GHG targets. At the same time, the urgency of the climate stabilization challenge will ultimately demand more defensible and strategic quantitative evaluation of strategic directions by all levels of government.

This planning process has generated targets and indicator values through the CEEMAP and PIE modelling processes. These targets and the associated indicator values can be refined and updated over time as more detailed planning and implementation work is undertaken for specific strategic directions.

3. CLIMATE, CARBON AND COMMUNITY

Climate, Carbon and Community outlines the rationale for action, briefly examining climate science and policy, local vulnerability and the critical role of local government in climate action.

CLIMATE SCIENCE AND POLICY

A major impetus for developing West Vancouver's Community Energy and Emissions Plan falls out of the BC Government's commitment to reduce provincial GHG emissions 33% below current levels by 2020 and 80% by 2050. These targets and timetables reflect a dominant interpretation of the Intergovernmental Panel on Climate Change scientific analysis of the level of commitment necessary by high carbon jurisdictions to stabilize the atmosphere and prevent dangerous, run-away climate change.⁴ This science has driven similar targets and timetables across countries in Europe, many sub-national governments in North America, as well as thousands of local governments around the world. As part of its commitment in signing the Paris Climate Agreement in April 2016, the Canadian Federal Government is currently updating its targets and developing a more thoughtful plan. In a growing number of jurisdictions policy, planning and implementation is well underway with second and third generation plans on track to meet 80% reductions and deeper.

To begin progress towards its targets, the British Columbia provincial government (the Province) initiated a wide range of actions several of which are noteworthy for local governments:

- Major BC Building Code updates in 2008 and 2013, situating the Province amongst Canada's leaders in building energy efficiency. West Vancouver planning, permitting and inspection staff, local builders and developers are adapting to these changes.
- A Climate Action Charter signed jointly in 2007 by the Province and hundreds of BC municipalities, including the District of West Vancouver. Amongst other goals, local governments would take action to become "carbon neutral with respect to their operations," and create "complete, compact, more energy efficient rural and urban communities." West Vancouver is part of a small group of leadership municipalities that is carbon neutral.
- The Climate Action Revenue Incentive Program (CARIP) is a grant equivalent to the size of carbon tax paid by a municipality in its corporate activity conditional on signing and working towards its Climate Action Charter commitments and measuring and reporting on corporate and community GHG activity and actions. The District receives approximately \$80,000 annually in its CARIP grant.

⁴ Based on stabilization scenarios developed by the Intergovernmental Panel on Climate Change Working Group III on Mitigation in its 4th Assessment Report 4, section 13, see Box 13.7 (IPCC, 2007)

- A 2007 legislative requirement for Official Community Plans is to include “...targets for the reduction of GHGs... and policies and actions... [for] achieving those targets.” West Vancouver amended its OCP in 2010, matching the Province’s targets. A major impetus for this plan is establishing defensible targets underpinned by pragmatic, realistic actions that can be integrated into District business.

Taking Action: West Vancouver Corporate Carbon Management

The District has been intensifying climate action across its corporate operations. With significant support from BC Hydro, the District has hired an energy manager who has been steadily deepening conservation investments. These measures have resulted in over \$250,000 in savings since 2012 and GHG reductions of 7.5% across corporate operations. Corporate CEE Plan strategies are estimated to reduce District spending \$325,000 annually by 2030 and enable the District’s target of 30% emission reductions by 2020 to be met in its corporate operations. The District is amongst a small leadership group of BC municipalities that has completely offset its corporate operations with community emission reduction activities—see ***Taking Action: West Vancouver Carbon Neutral Local Government, page 47.***

LOCAL IMPACTS AND ADAPTATION

BC’s targets were announced in a 2007 throne speech: “The science is clear. It leaves no room for procrastination...The more timid our response, the harsher the consequences...”

The consequences for West Vancouver are significant. West Vancouver’s identity is intimately tied to a natural context that supports social, economic, cultural, recreational and public health priorities. Climate change is altering this natural context. Early impacts are already being felt. Others are projected:

- sea level rise and associated flooding, erosion and damage to natural systems, stormwater, sewage and roads; and residential, commercial and institutional buildings
- increased frequency and severity of rain and wind events causing flooding and damage of natural and built environments, including longer, more frequent power outages
- hotter, drier summers with more high temperature events and droughts impacting human health, water security and regional agriculture
- wetter, warmer winters with less precipitation falling as snow, reducing snow packs, compromising hydroelectric potential across the province, regional water quality and accessibility as well as local skiing, recreation and business viability
- combined changes in precipitation and temperature have many implications including increased regional forest fire risk, with consequences to property, air quality and habitat and reduced abundance and diversity of many local species, including the iconic Pacific salmon
- in addition, residents will experience the local implications from disruptions in other parts of the world such as rising prices and periodic constraints in agricultural production.

West Vancouver is establishing itself as a leader in managing the growing flooding risks to which sea level rise contributes. The District and key stakeholders are creating more resilient foreshore protection regimes that improve habitat and reduce the impact of wave energy on private and public infrastructure. The District will develop more fulsome plans and policies to effectively manage other climate change risks, this is a future phase of District climate action.



West Vancouver’s waterfront is increasingly prone to flooding during the convergence of high tides and high winds, layered on top of sea level rise. Image: Ambleside, winter 2012

Taking Action: West Vancouver Foreshore Protection

West Vancouver is committed to enhancing and preserving its waterfront and natural habitat in the face of sea level rise. Work is being done to the foreshore between Ambleside and Dundarave as part of the Shoreline Protection Plan and Shoreline Management Plan. Large boulders are being placed below the low tide (sub-tidal) and within the high and low tide (inter-tidal) zones. This creates reefs that reduce the impact of energy from waves and currents. The supply of sediment to the foreshore can be retained, restoring natural marine habitat both above and below high tide. The enhanced foreshore creates habitat for native marine life and protects waterfront infrastructure from sea level rise and storm surges.



LOCAL GOVERNMENT SIGNIFICANCE

There are three reasons local governments are central actors in the climate theatre: vulnerability, authority and opportunity.

Vulnerability

Of all social systems, cities are the most vulnerable to climate change, according to the Intergovernmental Panel on Climate Change, due to the extensive infrastructure, high concentrations of people and magnitude of economic activity. According to insurance company Munich Re, direct losses from large or globally significant natural catastrophes increased 14 times between the 1950s and 2000s.⁵ Insurance Bureau of Canada data shows losses doubling domestically every 5 to 10 years.⁶ Seeing a climate fingerprint in these rising losses, the global insurance industry has been calling for action for two decades.

Local governments operate more than half of the country's public infrastructure. With vast assets in facilities, roads, bridges, waterfronts, dikes, parks, water and sewage networks and a stake in the prosperity and safety of citizens that depend on this infrastructure, local governments could be on a collision course with climate change.

Many climate change impacts are abrupt events: fires, windstorms, intense precipitation and flooding, marine storm surges and flooding. When a disaster strikes, typically local governments are on the front line.

Deep emission reductions will reduce the severity of long term climate change impacts. Resilient communities with strong adaptation plans will be better equipped to confront climate change.

Authority

While much of their control is indirect, local government decisions influence almost half of the Province's greenhouse gas emissions concentrated in transportation, waste and buildings. These services start flowing each morning when British Columbians turn on their taps to brush their teeth. This is followed by the bus ride to work, walk to school or the drive down the street. The type of home they live in is strongly influenced by zoning and the permits and inspections for its construction are managed by local governments. Local governments shape waste management practices, neighbourhood form including lot sizes, parking space requirements and building permits. Their services end in the evening when the drain is pulled in the bathtub and in some cases only when the lights are switched off. Decisions about these services strongly define the GHG profiles of individual British Columbians, communities as a whole and the Province's total emissions.

In reality, many of these "authorities" are shared. Building codes, automobile fuel economy standards and transit spending are under the purview of senior governments. Greater coordination with senior government along with

⁵ While some losses can be attributed to more infrastructure in vulnerable areas, the insurance industry identifies climate change as the primary factor. (Munich Re, 2005)

⁶ Insurance Bureau of Canada. (May 4, 2003) Hurricane Juan insurance tab tops \$113 million: points to need for preventive measures.

innovative policy to enable investment in key priorities like public transit and energy retrofits will be necessary to meet shared deep emission reduction goals.

Opportunity

Many GHG reduction strategies at the community scale have immense co-benefit. Some of these are outlined above, *on page 2 under* Climate Action and Community Priorities:

- Congestion Management & Transportation Efficiency
- Physical Activity & Healthy Weight
- Forest & Farmland Protection
- All Ages Housing & Transportation
- Infrastructure, Energy Savings and Economic Development
- Community Liveability.

Growing evidence, including work by important economic luminaries, is revealing that within the context of broader senior government climate change mitigation policies, urban strategies can significantly reduce economy wide costs and the deeper the senior government action, the greater the benefit from urban policies (Global Commission on the Economy and Climate | Calderón + Stern, 2014). These studies assert that many of the urban measures are no regret strategies because the non-climate benefits are strong enough to warrant implementation on their own, including increasing the investor attractiveness, competitiveness and public health.

4. SNAPSHOT AND OUTLOOK

This section provides a snapshot of emissions in 2010 and a Business-As-Usual projection to 2040.⁷ This plan uses 2010 as the base year as it has the best available base line information for energy emission and demographic activity. 2040 is the primary long term CEE Plan horizon as it synchronizes with the Regional Growth Strategy and will serve as the planning horizon for the imminent Official Community Plan update.

2010 EMISSION SNAPSHOT

In 2010 GHG emissions in West Vancouver were 259,000 tonnes CO₂e.⁸ On a global and regional basis residential per capita emissions are high.⁹ The majority of West Vancouver's GHGs are from energy-related activity, primarily the combustion of natural gas for building energy and gasoline for transportation, generating carbon dioxide.

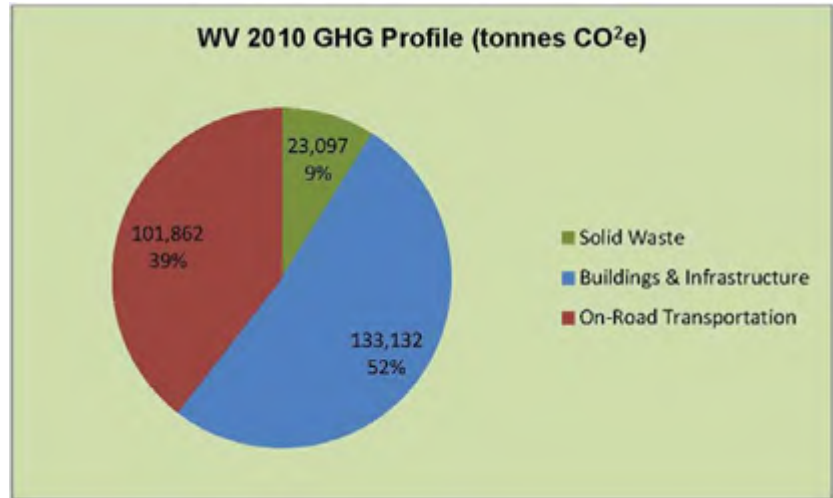
⁷ More comprehensive analysis of current and Business-As-Usual emissions can be found in the *West Vancouver Energy and Emissions Situational Analysis*.

⁸ Residential natural gas use has been weather adjusted in the 2010 baseline to normalize it, as it was an unusually warm year. This allows comparison with future years, which are based on average weather.

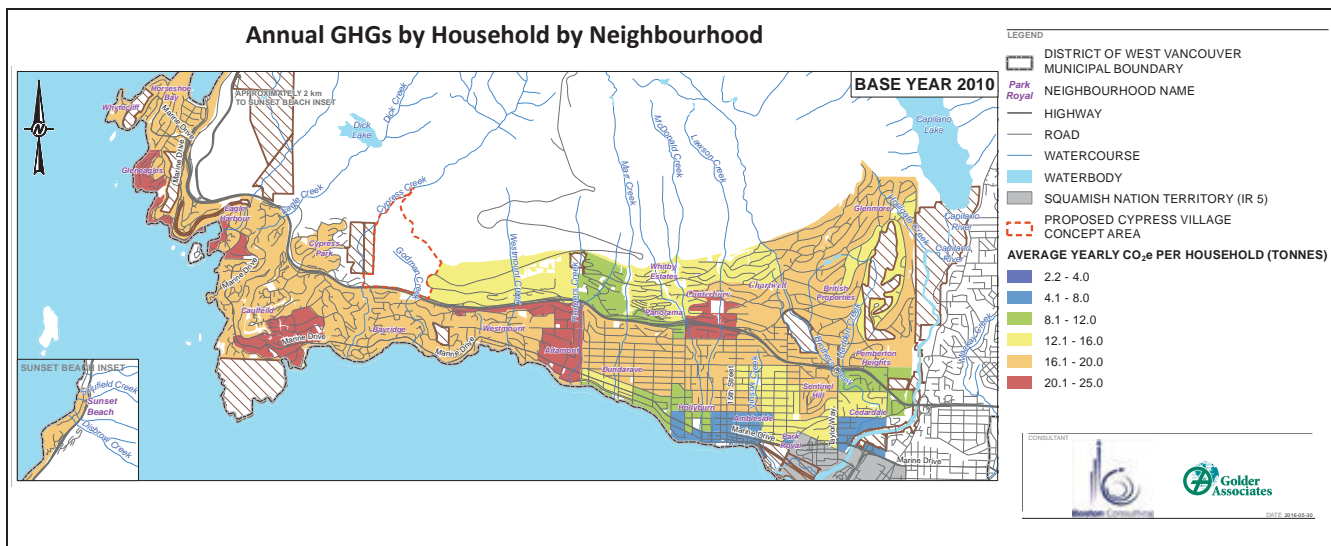
⁹ West Vancouver personal emissions in transportation, residential buildings and solid waste are 4.8 tonnes per person per year in contrast to 3.1 for Metro Vancouver. Average WV emissions are higher due to higher than average building emissions.

Half of current GHGs are in buildings. The vast majority of emissions are in the residential sector. This building-dominated emission profile is unusual in BC. It is primarily attributable to the high share of older and larger single detached homes, heated amenity spaces (e.g. pools) and lower household occupancies.¹⁰

Transportation is the second largest emission sector. Like other BC communities, transportation has been the fastest growing sector over the last twenty years due to the shift towards light trucks, mini vans and SUVs and longer driving distances. The larger vehicle trend has been plateauing, slowing transportation GHG growth. Average West Vancouver personal driving distances are similar to the region.¹¹ While downtown Vancouver, followed by North Vancouver and Burnaby are important destinations for the local work force, home-based employment is twice the regional average.



The smallest share of West Vancouver GHGs is from the waste sector.¹² Waste is a non-energy emission source, resulting from anaerobic decomposition of organic waste in landfills, producing methane. West Vancouver’s steady advances in recycling and curbside composting is rapidly shrinking this emission source.



Across the community, household emissions are lowest in mixed use, more compact village nodes and corridors with a diversity of housing types and transportation options and closer proximity to key destinations and primary commuting destinations. See *Annual GHGs by Neighbourhood* map, above. Household emissions are also lower in new neighbourhoods where recent advances in building energy codes have increased building energy efficiency.

¹⁰ Residential building emissions in West Vancouver are on average 2.4 tonnes per capita per year in contrast to 1.1 tonnes for the region.

¹¹ Per capita personal transportation GHGs are somewhat higher (2.2 v 1.8) due to lower vehicle stock fuel economy.

¹² Waste emissions have been calculated using a *Methane Commitment* methodology that is based on calculating total methane emissions that will be emitted from that mass of organic material that goes to a landfill over its life. This methodology effectively reflects year-to-year changes in organic diversion. This methodology is different than the BC MoE Community Energy and Emissions Inventory *Waste In Place* methodology that calculates methane emissions from a landfill in the year it was dumped. This methodology effectively reflects landfill management practices.

2040 EMISSION OUTLOOK

GHG emissions decline 22% by 2040 under the Business-As-Usual (BAU) projection primarily due to steady decarbonizing of personal vehicles, successful organics diversion and a shift towards smart growth. (See *Business-as-usual Assumptions* on page 13 below.)

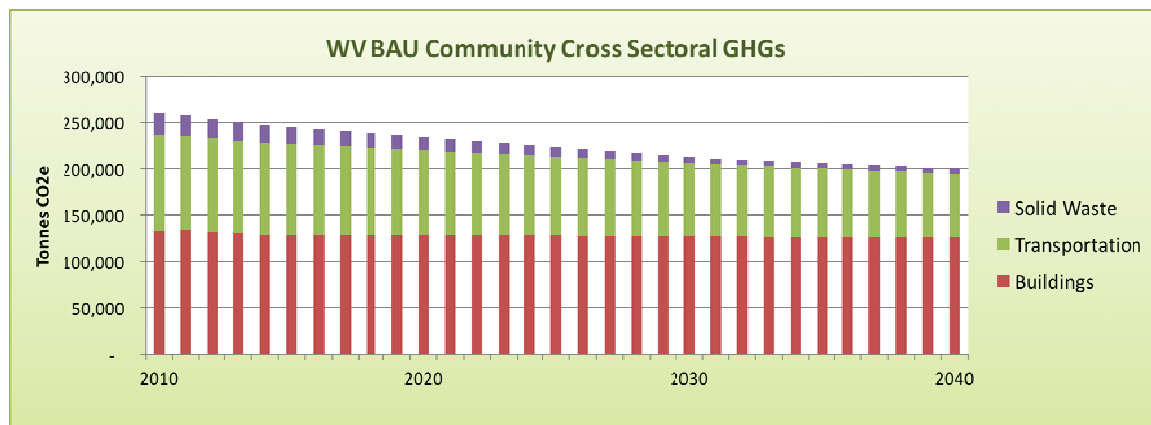
Under the BAU future, residential development in the Marine Drive Corridor, adjacent to Lions Gate Bridge, substantially increases transit use. The greatest transportation change, no less, is driven by slow but steady vehicle efficiency regulations and indeed electrification.

While low carbon innovation can almost completely transform a vehicle stock over a decade and a half, building stock turnover is much slower. The overwhelming majority of building emissions in 2040 will be from buildings standing today.

Building emissions drop 5% from 2010. Improved efficiency and a modest shift towards multi-family housing and steady building replacement more than offsets new growth. While large homes consume more energy and generate higher GHGs than smaller ones, building demolition and replacement in West Vancouver is improving overall building performance due to the inefficiency of pre 1970's homes that comprise more than half of the District's housing stock.

Emissions from solid waste almost disappear with the success of organic diversion, but as waste is a smaller part of overall emissions, its impact on overall emissions is not as great.

An important factor in GHG emission contraction is the modest population and employment growth rate, concurrent with improved building and transportation efficiency.



ENERGY, TRANSPORTATION AND HOUSING SPENDING

Personal spending on building and transportation energy in 2010 is \$108 million across the community. This is \$6,200 per household per year, about 8% of annual median household income estimates.¹³ This value excludes broader transportation and housing spending. Total household costs associated with transportation and housing are estimated at 44% of median household income. This includes 1.6 cars (the West Vancouver average) and a regional average for spending on housing.¹⁴

¹³ Values are in current dollars, based on approximate energy prices - \$0.09/kWh electricity, \$10/GJ residential natural gas, \$8/GJ commercial natural gas, \$1.25/L gasoline and diesel. Solid waste not included. Median West Vancouver annual household income is ~\$75,000 (\$97,000 for economic families and \$33,000 for 15% of single occupant households not in "economic families.").

¹⁴ BCAA estimates owning and operating a compact car costs \$10,400 a year. Statistics Canada estimates BC households spend 23% of income on housing.

“Business-As-Usual” energy and emission activity out to 2040 was modeled as a reference case against which different futures could be compared and a preferred path optimized that would iteratively evolve into the CEE Plan. Under all futures, the time horizons and residential and employment growth projections were held constant to facilitate critical comparison. Key assumptions are laid out by 1. Climate and Energy and Policy and 2. Demography and Development.

Climate and Energy Policy

- energy and emissions under the Business-As-Usual Future assume policy and planning will continue according to the historical trend with no dramatic measures to manage carbon and energy
- building and vehicle efficiency will steadily improve under senior government regulations
- DWV land use and transportation policy and planning supports ongoing improvements to transportation systems and urban development
- DWV and Metro Vancouver waste and materials management supports significant waste planning and investment.

Demographic and Development Assumptions

- population and employment growth projections of 0.5% per cent per annum align with the Regional Growth Strategy (RGS) accepted by Council¹⁵
- this 0.5% growth rate projection is slightly higher than the recent historical trend in West Vancouver, but would be the lowest in the region (less than 250 people a year, roughly what Surrey accommodates every month). This rate, moreover, is a projection not a target. It is an estimate to inform good long range planning for transportation, infrastructure and land use. Whether the projected population is achieved in 25 or 50 years is less important than understanding how it could optimally be accommodated. Inadequate or excessive sewage and water capacity, for example, has consequences
- the form of growth is most strongly influenced by current development trends, specifically:
 - share of infill, greenfield and building replacement development
 - location of population growth and new dwellings
 - Upper Lands West continues to develop on trend in residentially zoned and designated land
 - the split of dwelling types and respective floor areas
 - the multi-family share modestly increases to accommodate locational trends
- projections exclude the share allocated to Squamish Nation Capilano Territory under the Metro Vancouver Regional Growth Strategy.

II: STRATEGIC DIRECTIONS



Part II outlines the strategic directions that will set West Vancouver forth towards *a better climate for our prosperity, our health and nature*. *Plan Projections and Community Targets* provides a summary of the collective impact of all these actions and notably outlines the CEE Plan's targets.

1. Plan Projections and Community Targets

Strategic directions are then organized under the four major inter-related energy and emission sectors:

2. *Places + Spaces* (Neighbourhood & Community Planning)
3. *Bricks + Mortar* (Housing & Land Use)
4. *Roll + Stroll* (Transportation & Land Use)
5. *Trash + Treasure* (Solid Waste & Materials)

An additional section outlines institutional priorities to support implementation:

6. Cross Cutting Action

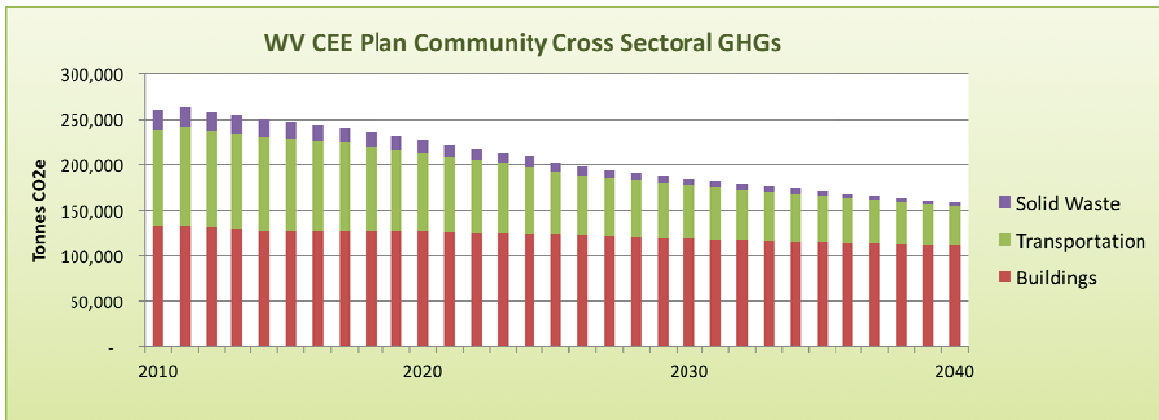
Each of these sectors outlines its carbon and energy significance and key objectives. The strategic directions are high level guidance, most of which will involve further definition. Some strategic directions, are already at various stages of development. They are documented to present the suite of actions undertaken, as they are reflected in the modeling and mapping work. And while they have informed the CEE Plan, further implementation may also be informed by this plan

Strategic directions include *Quick Win* and *Big Win* directions. *Quick Wins* are easier and less resource intensive. They tend to have lower GHG reduction potential, but not always. *Big Wins* are more complex and resource intensive. They also tend to have, but not always, higher GHG reduction potential. Most sections are concluded by *Mind the Gap*, which identifies additional opportunities for West Vancouver and senior governments to consider how to collectively achieve the deep emission reductions necessary to stabilize the atmosphere.

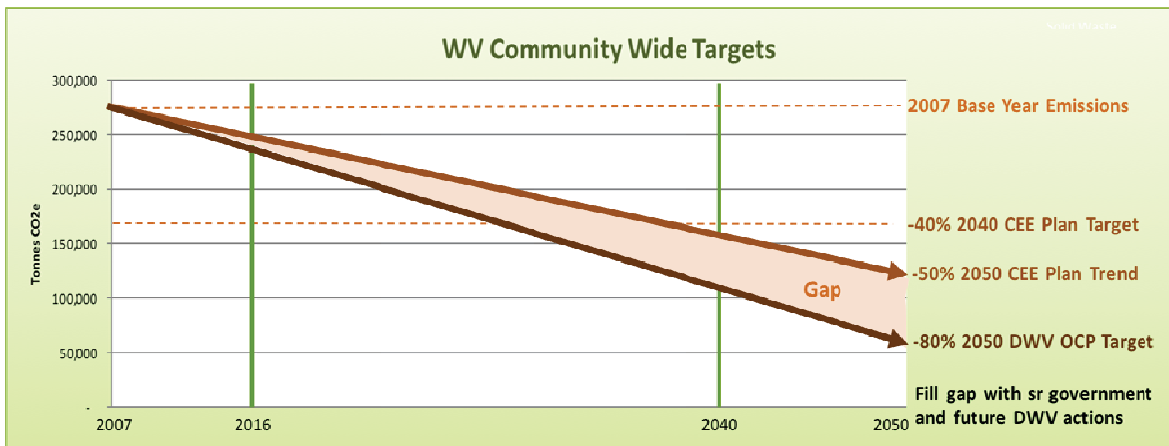
1. PLAN PROJECTIONS, TARGETS AND CROSS SECTORAL SYNOPSIS

The CEE Plan supports community GHG reductions of 40% below 2010 levels by 2040 with reductions across every sector:

- Buildings: -16%
- Transportation: -58%
- Waste: -83%



West Vancouver’s official target, is 80% reductions by 2050 from a 2007 base year. This plan will get the District most of the way towards this target adopted as part of a legislatively required Official Community Plan amendment in 2010.



West Vancouver’s target is ambitious and continues to serve as a benchmark of the reductions necessary by all levels of government to avoid dangerous, run-away climate change. The District will identify further local actions as well as senior government efforts necessary to fill this gap in a future CEE Plan update. Initial concepts for these deeper reductions are outlined in *Mind the Gap—Additional Opportunities* under each energy and emission sector below.

A series of interim targets and timelines guide implementation. The first interim target is -5% by 2020. Reduction intensity would intensify and then ease off to achieve a 50% reduction by 2050.¹⁶

¹⁶ GHGs can fluctuate a couple percent per year due to weather, energy price and economic fluctuations. These *general* targets should help track *general* trends. Between 2007 and 2010 West Vancouver GHGs dropped about 10,000 tonnes. This can be explained by weather, economic downturn and building/vehicle stock turnover. Some gains have been recently lost.

CEE Plan Targets and Timelines				
Type	Milestone	Reduction Target	GHGs	Reduction/Year [∞]
Base Year	2016	–	260,000	–
Interim	2020	5%	247,000	2600
Interim	2025	10%	234,000	2600
Interim	2030	20%	208,000	5200
Interim	2035	30%	182,000	5200
CEE Plan Target	2040	40%	156,000	5200
2045 Trend	2045	45%	143,000	2600
2050 Trend	2050	50%	130,000	2600
Official Community Plan Target Reference				
OCP Target*	2050	80%	54,000	5000

[∞]Reduction intensity based on 5 year reporting interval average (or 43 years for official target)

*OCP targets are from a 2007 base year of 270,000 tonnes of GHGs

SECTORAL SYNOPSIS

This plan includes sectoral targets to support implementation, quantified community co-benefits and GHG reductions across all major energy and emission sectors.

SECTORAL TARGETS

The following key interim sectoral targets will be used to help guide and monitor implementation. An annual climate action report to Council will report out on progress against a more comprehensive set of targets and indicators, see *Cross Cutting Action* section below and the *Monitoring and Continuous Improvement* strategic direction.

Indicator	2020 Target	2025 Target	Current
Neighbourhood & Community Planning[†]			
Share of <i>New Growth</i> within Walking Distance of Villages*	70%	80%	45% of current population
Housing & Buildings[†]			
Housing Options: High Rise Share of <i>New Growth</i> *	30%	35%	22% of current stock
Housing Options: Missing Middle Share of <i>New Growth</i> *‡	15%	25%	10% of current stock
Annual Single Detached Energy Retrofit Rate (Homes)	1.25% (125)	2% (200)	.75% (75) background rate
Transportation Systems			
New Sidewalks	10 km	20 km	90 km existing
New All Ages and Abilities Bike Routes	15 km	20 km	<5 km existing
Solid Waste & Materials Management			
Annual Waste Per Single Detached Home ^Δ	225 kg	200 kg	250 kg
Cross Cutting Action			
Climate Action Report to Council [∞]	Annual	Annual	BC Climate Action Report

[†]Neighbourhood + Community Planning and Housing + Buildings targets may be revised during the OCP process

**New growth* excludes housing replacements (i.e. demolition and replacement of single detached homes)

‡“Missing Middle” includes duplex, rowhouse, low/mid-rise housing of which there is very little in West Vancouver

^ΔWaste excludes compost and recyclables

[∞]The District annually reports to the BC Government on Climate Action to receive its carbon tax rebate/grant (CARIP); this reporting can be enhanced

More comprehensive indicators support this plan. *Part III: Impact Analysis* includes a high level description of key indicators and the *Prioritization Matrix* in *Part IV: Implementation Framework* uses performance indicators to identify priority actions. A more comprehensive set is included in *the Energy and Emission Indicator* appendix.

SPATIAL SNAPSHOTS: 2010 AND 2040

A series of spatial snapshots, maps, comparing activity currently (2010) and CEE Plan's final horizon (2040) illustrates some of the plan's major impacts. Maps following the brief descriptions.

Map II.A: Annual Emissions by Household by Neighbourhood CEE Plan 2040 and Base Year 2010

GHGs are reduced 40% by 2040 from 2010 levels, or 100,000 tonnes per year. This map represents typical transportation and building GHGs per household by neighbourhood. Village areas have the lowest GHGs with more housing sharing walls and smaller floor areas and diverse travel options, including short walking trips to key destinations. There are unique opportunities in residential areas including home renovations, retrofit strategies and lot splitting that can cut GHGs and create new housing options for empty-nesters and seniors. Newer neighbourhoods with more energy efficient housing also have lower GHGs. All neighbourhoods benefit from a shift towards electric vehicles. All major strategic directions require further analysis and engagement.

Map II.B: Congestion Generation by Household by Neighbourhood CEE Plan 2040 and Base Year 2010

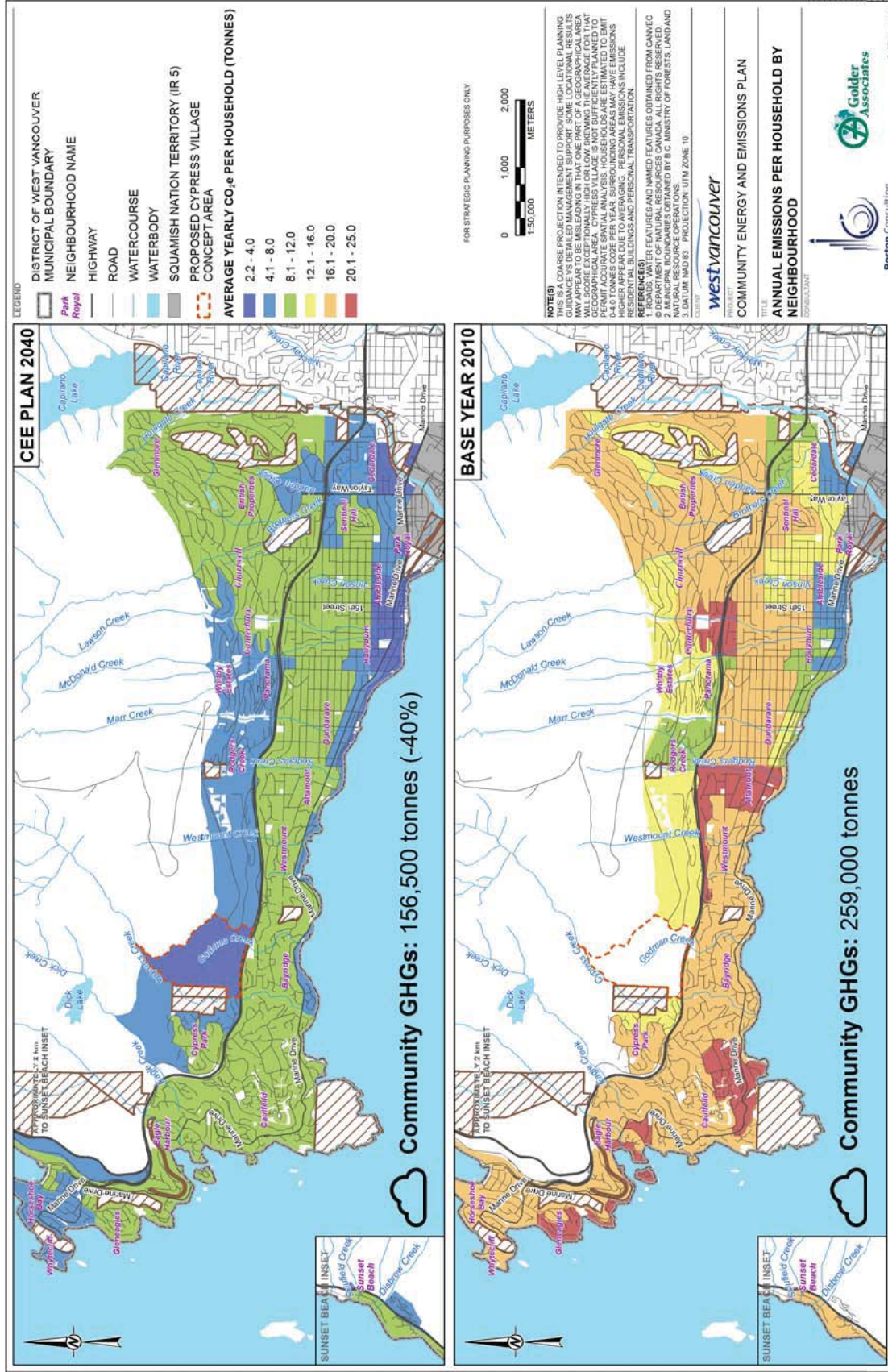
Households in neighbourhoods with access to more diverse transportation options and closer key destinations (e.g. groceries, cafés, employment) drive shorter distances. In 2040, there are more trips by foot and bike, enabled by infrastructure in, around and between villages to accommodate all ages and abilities safely. While there is a modest increase in community-wide driving distances with the higher population, there are fewer cars per household and fewer cars across the entire community. Car share becomes readily available in villages, reducing second or third underutilized cars in some cases. Car sharing enables a larger share of residents access to cars than today. Senior government and TransLink financed rapid transit is extended to Park Royal, Ambleside and Dundarave.

Map II.C: Neighbourhood Walkability CEE Plan 2040 and Base Year 2010

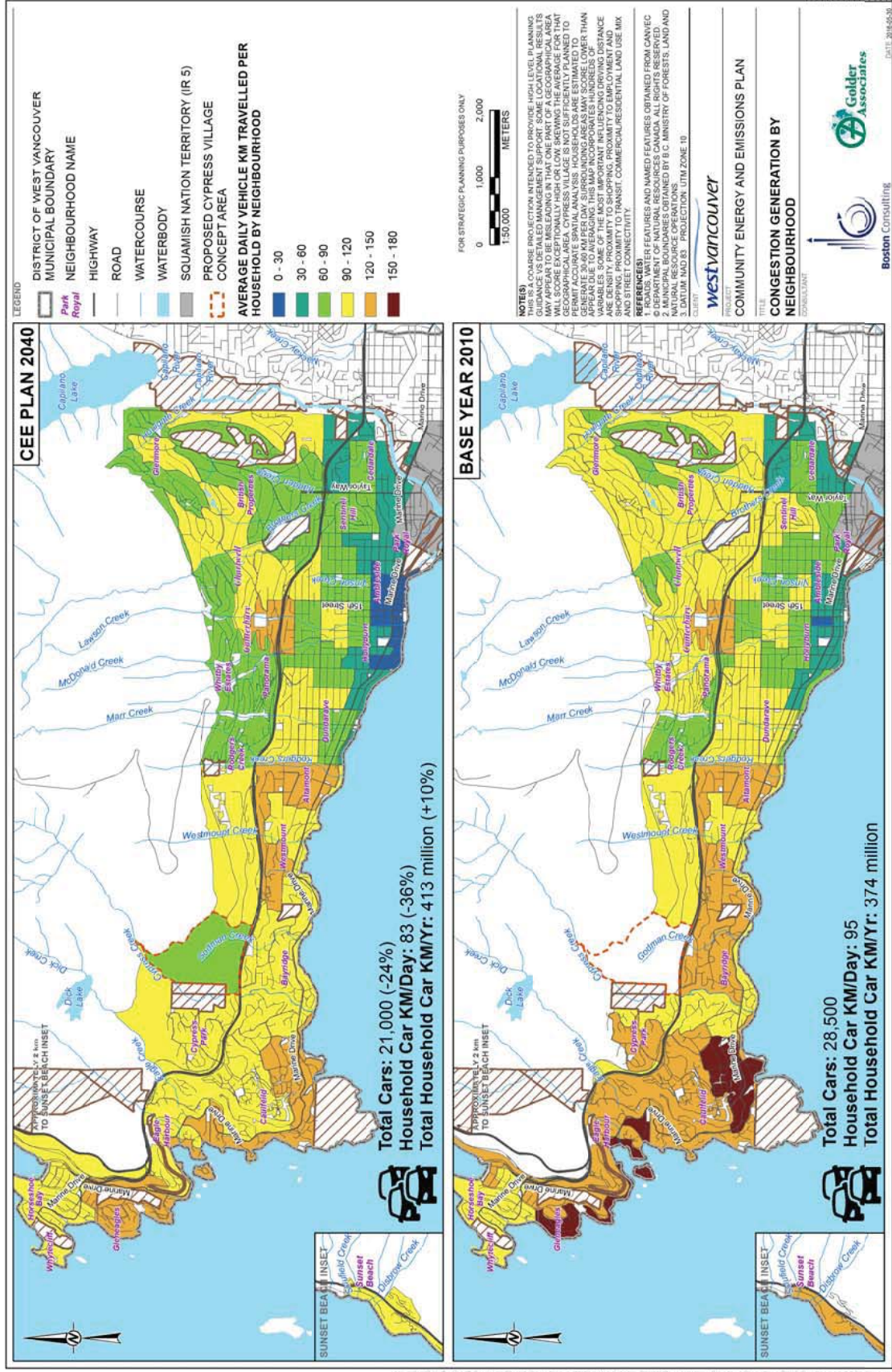
More residents will have access to more walkable neighbourhoods with good sidewalks and diverse proximate key destinations such as groceries, pharmacies, libraries, recreation centres and parks. Sufficient residential densities make these commercial and public amenities viable. As people age, neighbourhood walkability rises in importance. Neighbourhood walkability is amongst the greatest determinants of physical activity rates and healthy weight.¹⁷

¹⁷ Comprehensive analysis of health indicators across the region by Vancouver Coastal and Fraser Health Authorities (2015) shows healthy weight correlates with neighbourhood walkability. Only those in highly walkable neighbourhoods (i.e. "Walkers Paradise" neighbourhoods with walkscore.com scores ≥90) are more than 50% likely of having healthy weights (i.e. not obese or overweight). Obesity rates in West Vancouver (19.0%) are close to the regional average (21.7%). See myhealthmycommunity.org

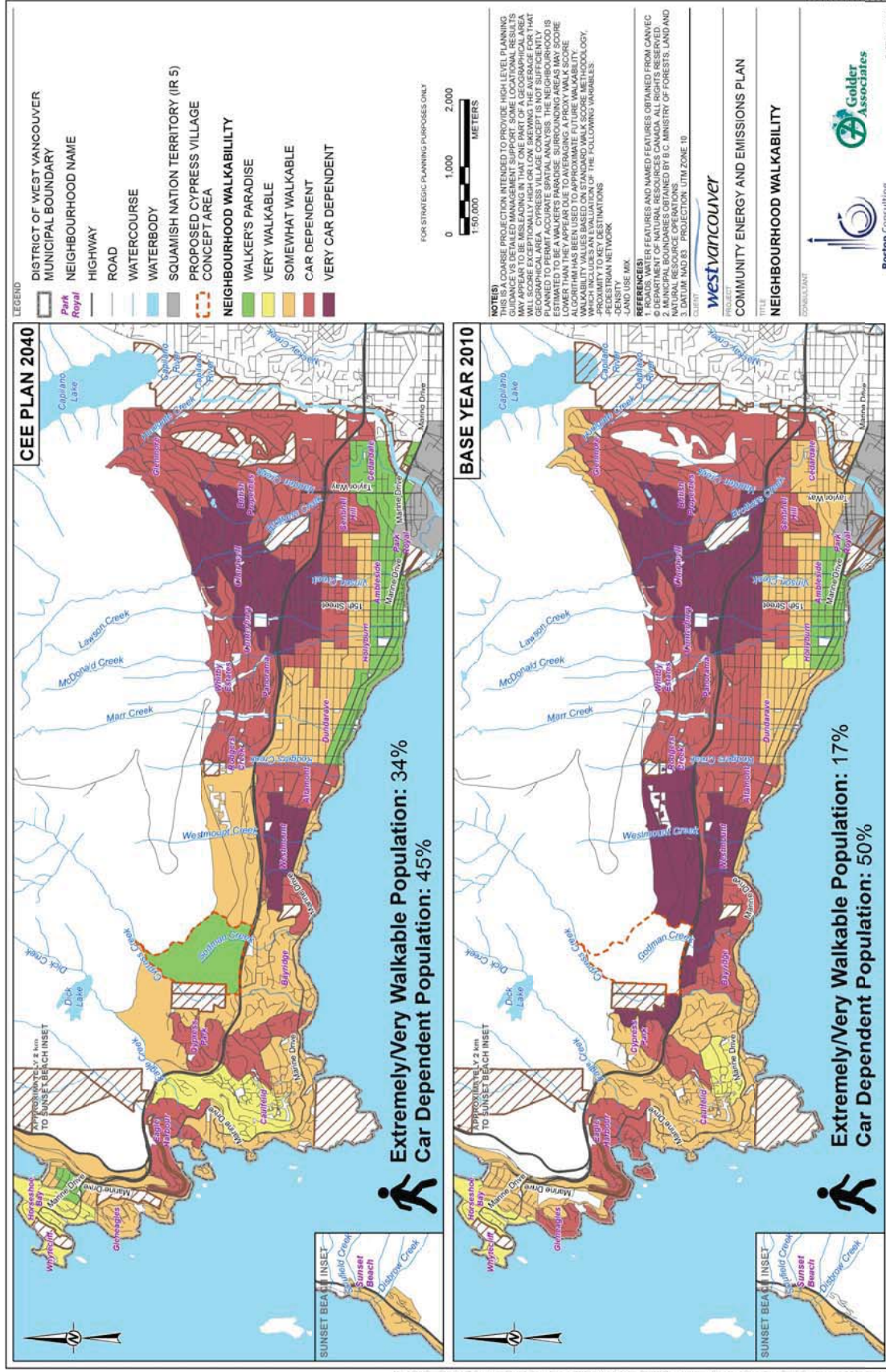
MAP II.A: ANNUAL EMISSIONS BY HOUSEHOLD BY NEIGHBOURHOOD CEE PLAN 2040 AND BASE YEAR 2010



MAP II.B: CONGESTION GENERATION BY NEIGHBOURHOOD CEE PLAN 2040 AND BASE YEAR 2010



MAP II.C: NEIGHBOURHOOD WALKABILITY CEE PLAN 2040 AND BASE YEAR 2010



2. PLACES + SPACES (COMMUNITY & NEIGHBOURHOOD PLANNING)



Places + Spaces focuses on long range community-wide and neighbourhood land use planning. Specifically, it addresses the overarching land use and development approach for current and future neighbourhoods, including the basic form, intensity and type of use, general character, height and location of growth. This section is closely linked to *Bricks + Mortar*, outlining housing options.

Land use planning is not only local government’s primary authority; it is also the biggest determinant of community energy and emission activity. Building size and type influence building energy use as much as classic

energy codes. Similarly, neighbourhood location and proximity to diverse destinations influences transportation energy use as much or more than automobile energy efficiency, notably a senior government authority. Land use decisions also strongly influence a wide range of important socioeconomic and environmental priorities in which West Vancouver residents are keenly interested, such as managing civic infrastructure costs (taxes and levies), housing options for diverse ages and families and convenient access to grocery stores, pharmacies and forests.

West Vancouver’s current land use regime has shaped lower carbon villages with housing and commercial activity and higher carbon general urban residential areas. As well as building on the inherent social, economic and carbon benefits of villages, CEE Plan creates options for technologies, practices and development that can facilitate emission reductions in lightly populated neighbourhoods with large homes.

Places + Spaces strategic directions support the following key objectives:

- focus residential and commercial growth in hubs and nodes and along corridors to support active travel, successful public transit and car share
- support housing choices for empty-nesters, solo seniors and young people
- support continued activation of villages and regeneration of general urban areas
- protect ecosystem services such as carbon storage, stormwater management and access to forestland
- improve access to basic services for people unable to drive and those who prefer active travel or transit
- constrain rising civic infrastructure costs, particularly road, water and sewage, through more efficient land use, reducing unnecessary tax increases and stimulating reinvestment in the local and regional economy.

STRATEGIC DIRECTIONS

Strategic directions are organized across three sub-sectors. The first two outline attractive, low carbon options for two types of classic West Vancouver neighbourhoods: *Walkable Village Activation* and *Residential Neighbourhood Regeneration*. The third is the natural implication; by focusing growth in villages and gentle residential intensification, greater *Forest Stewardship* can be exercised. These priorities build on the District’s strategic planning agenda, notably the Housing Action Plan, the emerging Official Community Plan update and current Council Priorities (i.e. Infrastructure Cost Management, Built Form, Housing & Neighbourhood Character)

WALKABLE VILLAGE ACTIVATION

A1 Existing Village Activation	<ul style="list-style-type: none">• Activate existing large and small walkable villages with modest new residential and commercial growth of a similar scale, strong public realm and infrastructure to support strong transportation choice, notably walking and cycling.
A2 New Village Initiation	<ul style="list-style-type: none">• Focus upper lands growth in a village near the base of Cypress Bowl Road. Mixed use, strong transportation choice, notably walking and cycling, parks and plazas should define the village.
A3 Micro Market Stabilization	<ul style="list-style-type: none">• Support viability of existing micro markets with modest intensification, active travel, pocket plazas and pocket parks.• Enable new micro market opportunities in amenable neighbourhoods with conducive regulatory and fiscal policies.

These three strategic directions would be implemented in parallel. This form of growth helps address the rising demand from the community’s aging populations for more diverse housing choices and services that can be easily accessed by foot and transit.

Big Wins

- review and revise land use, development and urban design planning tools to accommodate these strategic directions, notably Official Community Plan and Zoning Bylaw updates and Neighbourhood Character and Building Bulk policies
- engage with British Pacific Properties on Cypress Village Neighbourhood Plan, including a neighbourhood climate and energy plan; and implement the Upper Lands Working Group recommendations
- engage with the community to refine these strategic directions
- explore policies to retain existing businesses and attract diverse new businesses to support the success of these strategic directions and community vitality
- to facilitate the survival of neighbourhood businesses, explore diverse policy tools such as sliding taxes and commercial uses of churches.

RESIDENTIAL NEIGHBOURHOOD REGENERATION

B Residential Neighbourhood Regeneration	<ul style="list-style-type: none"> • Create new market options for homeowners that help meet the needs of empty-nesters, solo seniors and young people and protect neighbourhood character. • Sustain home-based employment opportunities in residential areas.
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Big Wins

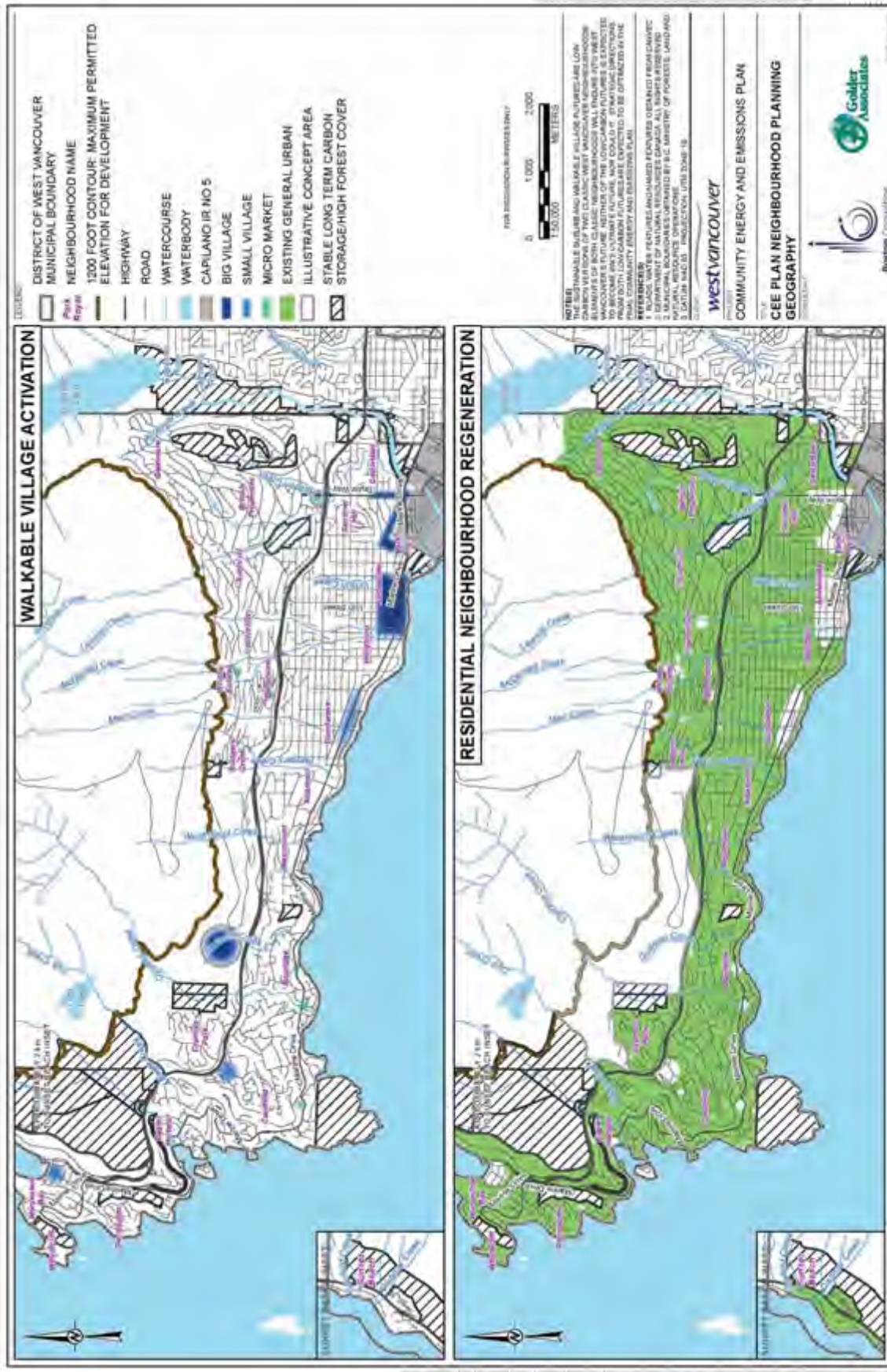
- review and revise land use, development and urban design planning tools to accommodate these strategic directions, notably Official Community Plan and Zoning Bylaw updates, Neighbourhood Character and Building Bulk policies and Subdivision and Infrastructure Servicing bylaw
- engage with the community to refine strategic directions.

Energy Insight: Community Planning and Civic Infrastructure Costs

Placing a greater share of growth in villages and existing residential areas reduces civic infrastructure costs financed by taxpayers almost 10% per year by 2040. See Section III, below, *2040 Spatial Snapshots, Coarse Infrastructure Costs*.

MAP II.D: WALKABLE VILLAGE AND RESIDENTIAL REGENERATION GEOGRAPHIES

The following maps approximate the geographies where “Walkable Village” and “Residential Regeneration” strategies predominate.



FOREST STEWARDSHIP

C Urban Forest & Tree Stewardship

- Focus growth in villages and gentle residential intensification to protect mature forests in the upper lands.
- Protect and enhance trees and forests in public realms (parks and streets) and private realms (developed land and land in development).

Big Wins

- advance strategic directions through the Official Community Plan update, the Parks Master Plan and Tree Bylaw process
- engage with British Pacific Properties on the Cypress Village Neighbourhood Plan and implement Upper Lands Working Group recommendations
- engage with community groups to refine strategic directions.

Energy Insight: Forest Carbon and Community Planning

About 20% of carbon that humans have added to the atmosphere is from forest loss (Intergovernmental Panel on Climate Change, 2014). After energy and mining activities, urbanization is Canada's biggest driver of permanent forest loss (Natural Resources Canada, 2014). In West Vancouver, focusing growth in villages and existing general urban areas would avoid the loss of about 45 hectares of forest and avoid the release of 8,800 tonnes of carbon. See Section III, below, *2040 Spatial Snapshots, Forest Carbon*.

MIND THE GAP-ADDITIONAL OPPORTUNITIES

The following opportunity by the District and BC Government would help the municipality fill its emission reduction gap.

District and Senior Government

- enable local governments to shift local taxes away from households based on property value assessments towards actual costs for delivering services (e.g. building, operating, maintaining and replacing road, water and sewage services and providing fire protection.)¹⁸

3. BRICKS + MORTAR (HOUSING & LAND USE)



Bricks + Mortar focuses on improving carbon and energy performance in new and existing housing and commercial and institutional buildings. Conventional conservation and low carbon heating practices are supplemented by new attractive, low carbon housing choices and home renovations.

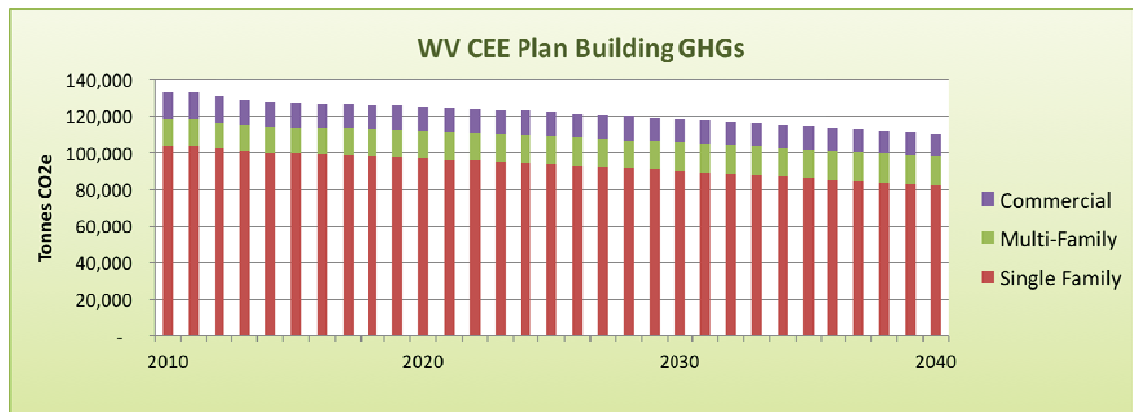
West Vancouver building emissions comprise half of total emissions. They are also large on a per capita basis relative to other BC communities. Given the small commercial stock, building emissions are dominated by housing. Large housing emissions are attributable to the relatively older, larger, single detached form with greater amenity space particularly swimming pools and low occupancy rates.¹⁹ Reducing emissions in existing single detached homes is West Vancouver's greatest challenge and greatest opportunity.

¹⁸ Property assessments are an arbitrary and poor reflection of the actual costs accrued by a municipality to serve a household. Infrastructure and service costs better reflect a municipality's budgetary requirements and core business activities. Household characteristics such as housing type and lot size could be used as a basis to calculate these infrastructure and service costs. The GHG co-benefit of such a calculation is that it begins to address the inadvertent subsidies to roads and highly distributed residential development characteristic of high energy and emission households. By phasing out these accidental subsidies, senior governments' interest in high carbon taxes can be moderated.

Bricks + Mortar strategic directions support the following key objectives:

- improve carbon and energy performance in existing buildings by facilitating energy retrofits and innovative renovations that meet local housing priorities
- create new market options for current homeowners that help meet the needs of empty-nesters, solo seniors and young people while protecting neighbourhood character
- support new building designs and forms that reduce energy use and GHG emissions and meet local housing and transportation priorities
- reduce resident and business energy spending, stimulating reinvestment in the local and regional economy
- strengthen District and private sector capacity to build resilience, high performance housing
- contribute to provincial conservation efforts to reduce demand for new, higher cost energy supply infrastructure, particularly electricity generation.

STRATEGIC DIRECTIONS AND SECTORAL REDUCTIONS



Strategic directions are organized across three sub-sectors: *Existing Buildings*, *New Buildings* and *Cross-Cutting Capacity Development*. These priorities generally build on the District’s strategic planning agenda, e.g. Infrastructure Cost Management and Built Form, Housing & Neighbourhood Character Council priorities, the Housing Action Plan and the emerging Official Community Plan Update. Like other municipalities taking action on climate change, building energy retrofit and high efficiency new construction strategic directions would be new agendas for the District.

Building emissions are reduced 16% by 2040 while the number of homes and commercial floor area modestly grows.

EXISTING HOMES AND BUILDINGS: RETROS AND RENOS

A Empty-Nester Home Renos & Revitalizations

- Expand market options for interested homeowners wanting to downsize in their own homes and neighbourhoods, diversifying housing options for empty-nesters, solo seniors and young people. Explore options that respect neighbourhood character such as allowing for stratified coach houses or large lot splitting and continue to encourage secondary suites and coach houses.

Big Wins

- review and revise land use and development planning tools to accommodate these strategic directions, notably Official Community Plan and Zoning Bylaw updates and Neighbourhood Character and Building Bulk policies
- engage with community groups to explore location, housing type and character considerations and complementary strategic directions to optimize implementation such as parking and congestion management, minimum onsite parking spaces, or proximity to high quality transit and commercial areas engage with utilities and the Province to explore new incentives.

¹⁹ The rise in empty-nester and solo senior households – a Canada-wide phenomenon – is a growing factor in the country’s emission intensity and particularly significant in West Vancouver due to its demographic structure.

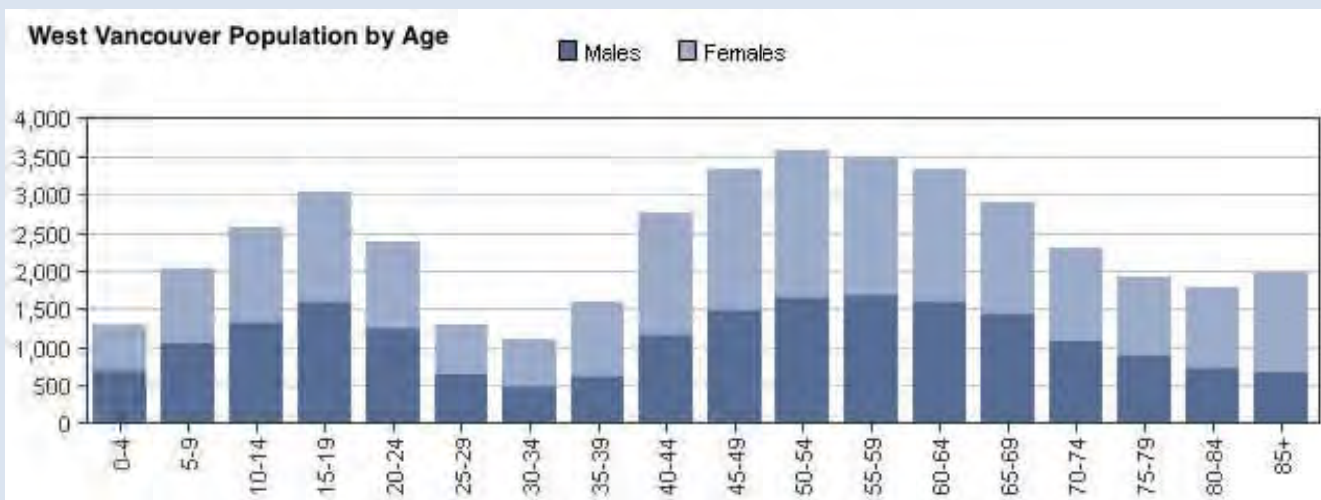
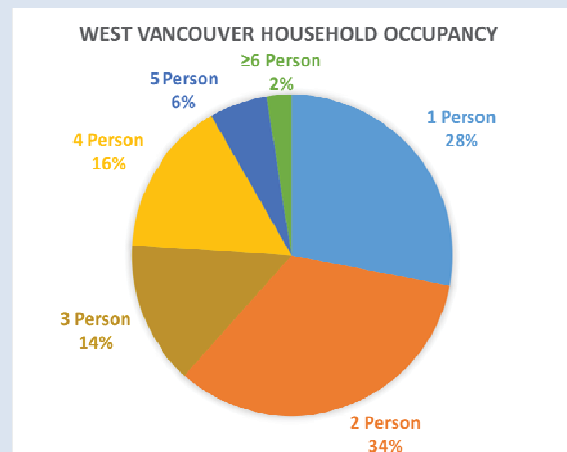
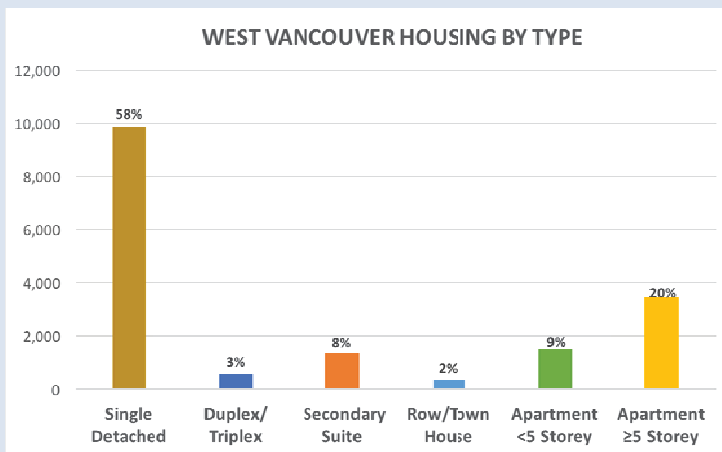
Energy Insight: West Vancouver Households, Housing and Home GHGs

Major historic drivers to rising home energy intensity in Canada has been shrinking household occupancy and rising floor area per occupant. This trend is becoming even more acute given Canada's aging demographic and dominant household size, the vast majority of households today are older one and two person households—and the nature of its housing stock—single detached oriented. West Vancouver is illustrative of these trends and it speaks to one of Canada's biggest challenges to achieve deep emission reductions in housing.

More than 60% of West Vancouver households are occupied by one to two people. The majority are solo seniors and empty-nesters. A large share live in single detached homes, 25% and 60% respectively. The vast majority were once home to children and spouses who have moved on. The trend for aging households in Canada is downsizing. West Vancouver is no exception. Older demographics that have been able to move in West Vancouver over the last couple of decades have downsized. Since there are few options for downsizing with the vast majority of housing stock comprised of single detached houses, many move out of the community. The majority of residents who move out of West Vancouver move into some kind of attached housing (e.g. duplex, row/townhouse, apartment/condo) nearby. Most stay on the North Shore, followed by Vancouver.

Innovations to the existing housing stock and increasing housing choice can allow West Vancouver residents to remain in the community they call home and make significant contributions to reducing GHGs.

(Statistics Canada 2011, 2006, 2001)



Taking Action: Appliances for the Atmosphere

In the summer of 2013, a West Vancouver property management services company undertook an electrical appliance replacement program for 20-year-old stock in a local apartment building. 68 of 83 fridges and 79 of 83 stoves and hood fans were replaced. Electricity consumption dropped 16% over the replacement period: February 2012–1621 kWh; February 2013–1535 kWh; and February 2014–1355 kWh.



Taking Action: Bright Ideas

When Smart Meters were introduced, a local resident, began to closely monitor the Kilowatt Hours on a Hydro usage chart. LED light bulbs were becoming popular, so he slowly switched over all of his interior and some of his exterior lighting to LEDs. One of the bulbs was a 9.8 W LED bulb which provides the equivalent of 60 W, outputs 800 lumens and lasts 25,000 hours. The LED bulb uses up to 84% less energy than standard incandescent bulbs. He kept filling out the Hydro usage chart and could see small incremental bill reductions as a dozen or so bulbs were changed out each month. He also replaced an old energy guzzler TV with an LED replacement. With no change in convenience or lifestyle his household electricity consumption dropped 12%.



Taking Action: Solar Steward

In 2011, a West Vancouver engineer, helped owners of a multi-residential building in Vancouver BC upgrade an aging heating system and as a result reduce gas consumption and related GHG emissions. New condensing boilers were carefully sized for the existing building in conjunction with a domestic water heating system using solar panels and associated instrumentation. The heating system was commissioned and adjusted to the building's unique needs. The system reduced annual gas consumption from 2080 to 980 gigajoules and CO₂, by more than half, from 103.5 to 48.8 Tonnes per annum. The system cut energy bills by more than \$10,000 annually and paid for itself in less than 5 years.

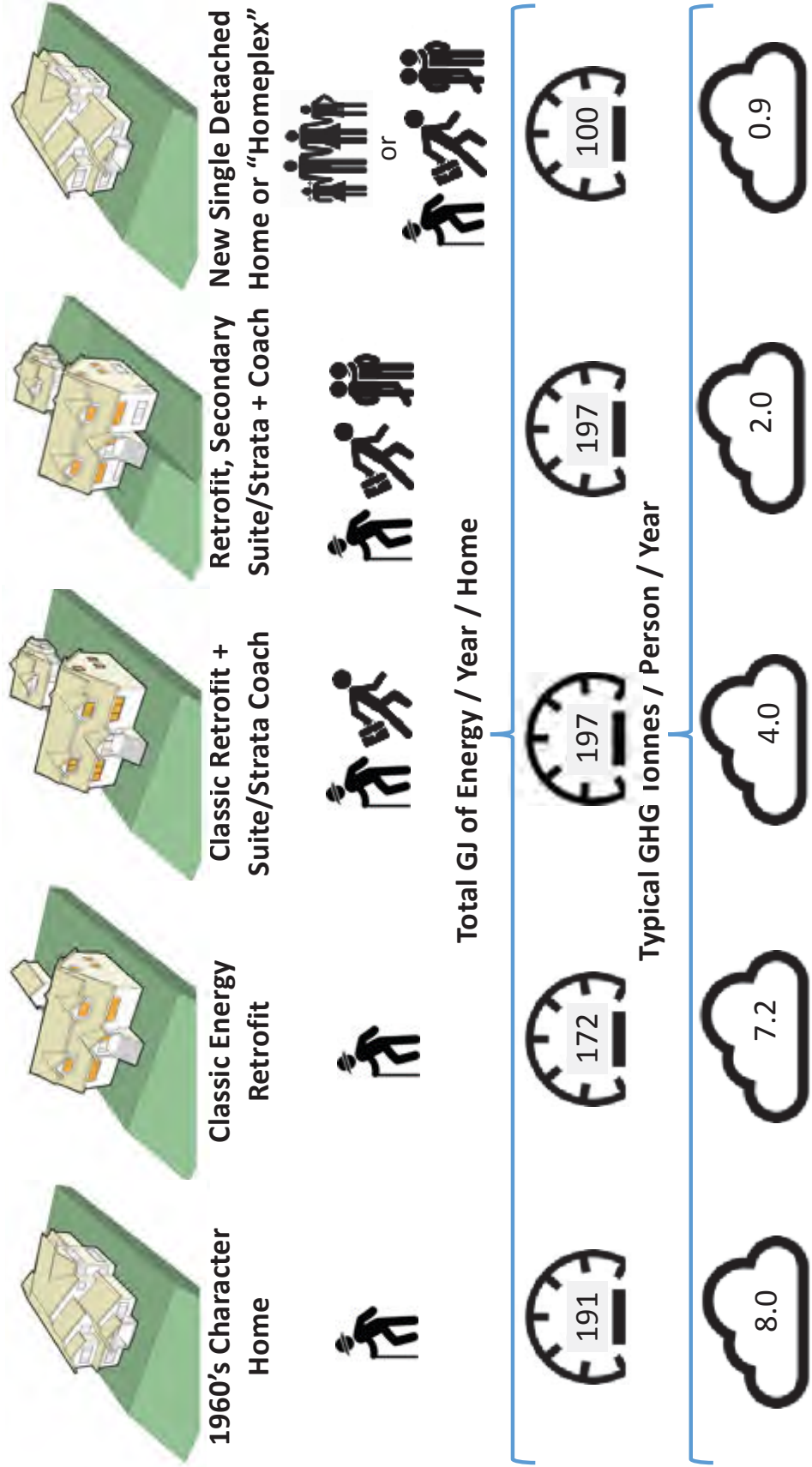


Taking Action: Seeing the Light

A new digital energy metering system in a West Vancouver Mall will be useful for assessing both mall and tenant energy usage as well as work towards a common goal of reducing energy use and costs for the mall and its tenants. Its recent redevelopment projects were built incorporating an energy standard which is significantly more stringent than required. LED lighting technology was used to improve energy efficiency and reduce landfill waste. Lighting power density in mall common areas is approximately 50% lower than the maximum standard. Parkade lighting operates on bi-level lighting control to reduce lighting levels and energy usage after hours. Areas with high ambient daylight from skylights or windows have daylight reactive automatic dimming control which reduces lighting levels during times of high sunlight.



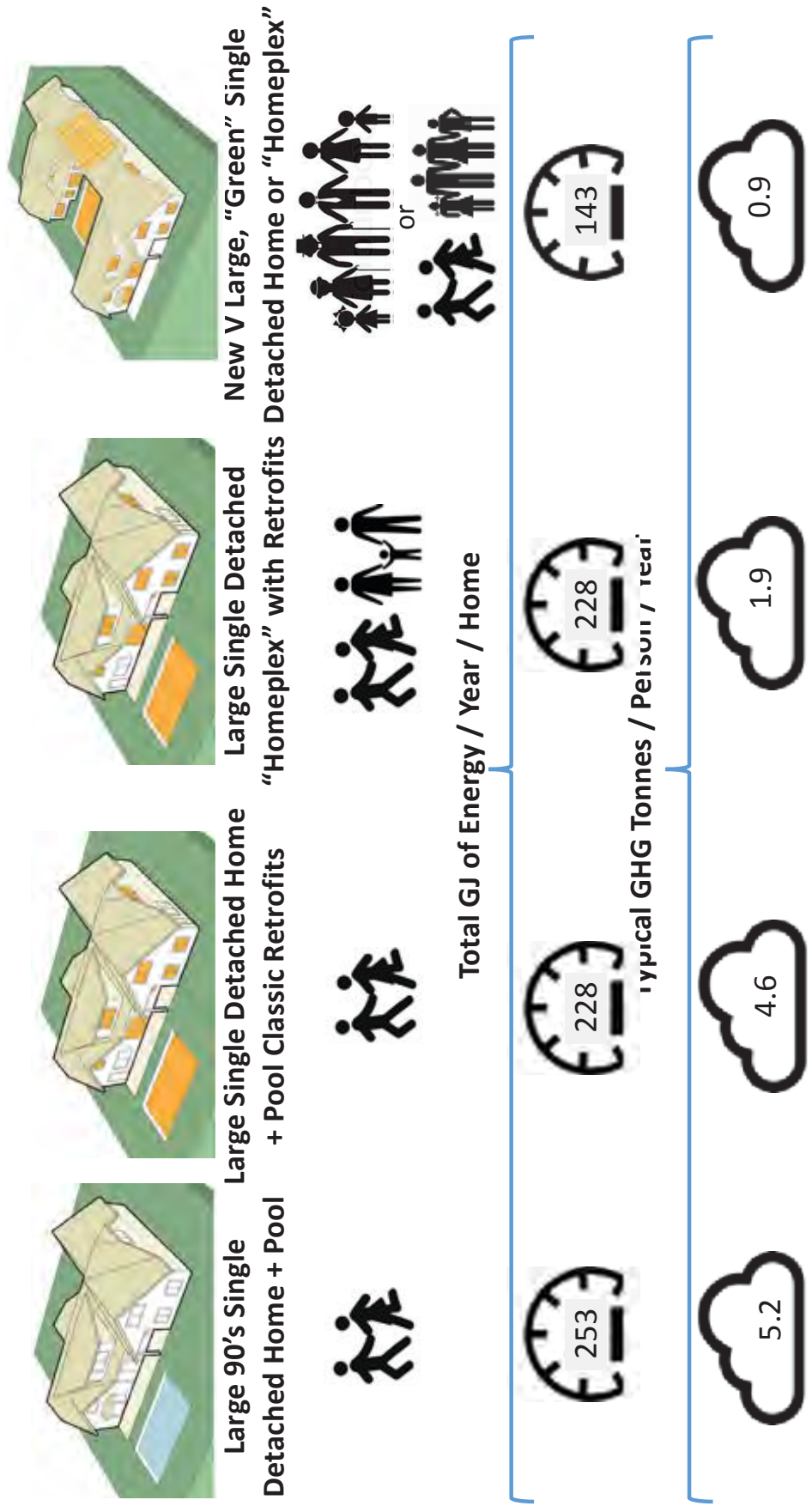
Figure II.A: Climate Action 3 Rs for A 60's Home: Retrofit, Renovate, Rebuild



These home renovation, retrofit and rebuild concepts illustrate diverse options for carbon management for a 1950s/60s home and lot, of which there are a large share in West Vancouver. These options can be advanced through several strategic directions (2A Empty-Nester Home Renos, 2B1 Low Carbon, Low Cost Home Retrofits and a new at-code single detached home with pre-built multi-unit resilience.) Diverse housing types and tenures can help meet the needs of West Vancouver's diverse and dynamic demography. Some provide attractive options for downsizers and young people. *Solo Sam Senior* is illustrative of 30% of West Vancouver households occupied by only one person. Three decades ago, most homes were occupied by larger families. Viability of such options will be explored in future processes.

Conceptualization and Modeling: Boston Consulting + EnerEfficiency | Housing Illustrations: UBC CALP

FIGURE II.B: CLIMATE ACTION 3 RS FOR A 90'S HOME AND POOL: RETROFIT, RENOVATE, REBUILD



These home renovation, retrofit and rebuild concepts illustrate diverse options for carbon management in a 1980s/1990s home and lot, of which there are many in West Vancouver. These options can be advanced through several Strategic Directions (2A Empty-Nester Home Renos, 2B1 Low Carbon, Low Cost Home Retrofits and a D1 Stretch Code Single Detached Home with pre-built multi-unit resilience.) Diverse housing types and tenures can help meet the needs of diverse and dynamic households. Collectively they provide options for downsizers, young families and large families. Jo + Jan empty-nester are illustrative of >30% of West Vancouver households, occupied by two people. Three decades ago, most homes were occupied by larger families. The large new home was built to higher performance with very good paybacks. Viability of such options will be explored in future processes. Conceptualization and Modeling: Boston Consulting + Enerificity | Housing Illustrations: UBC CALP

B1 Low Carbon, Low Cost Home Retrofits	<ul style="list-style-type: none"> Facilitate home and pool energy retrofits in single detached homes and other small freehold and simple strata homes (e.g. duplexes, row houses).
B2 Low Carbon, Low Cost Apartment Retrofits	<ul style="list-style-type: none"> Facilitate energy retrofits in strata and rental apartment buildings.
B3 Commercial Building Carbon & Cost Management	<ul style="list-style-type: none"> Facilitate energy retrofits in commercial buildings.

Staged implementation, starting with single detached homes. This is West Vancouver’s single largest source of emissions today and will continue to be in mid-century. Carbon and energy costs can be easily cut 10% in most older homes with a basic bundle of measures that yield a return on investment in several years and provide long term savings, (e.g.: smart thermostats, LED lights, low-flow water fixtures, solar thermal home hot water systems and air sealing.) Homes with pools offer deep carbon and cost cutting potential with fences or hedges to prevent evaporative cooling, insulated covers and smart heating systems like solar thermal. Really deep cuts can be realized in many contexts, often with attractive paybacks, particularly when timed with major capital upgrades. As well as balancing household and carbon budgets, retrofits improve home and pool comfort value and reduce water utility costs.

Quick Wins

- promote and integrate into permitting existing retrofit incentives from utilities and senior governments
- engage with key service providers—non-profit and for profit—to scale up a building energy retrofit program.

Big Wins

- phase in a more comprehensive program that leverages utility and senior government incentives and is focused on West Vancouver’s unique housing, socio-economic and institutional conditions.
 - secure grants for policy and program development.
 - Consider unique housing and demographic conditions including, low carbon downsizing renovations (e.g. suitification), low occupancy rates, high swimming pool ownership and market and demographically driven high sales rates
 - engage with other local governments on policy and program development for information sharing, joint program development and/or implementation
 - sustain engagement with BC Hydro (including the Net Metering Program), as well as senior governments on program development and financing, including on-bill financing pilot to capitalize retrofits (see below).
 - explore local revenue options that can leverage additional utility and senior government financing and support any necessary program administration, e.g.
 - the District’s annual Climate Action Revenue Incentive Program grant may be an appropriate source of revenue for residential energy retrofits that could also help sustain the District’s corporate carbon neutral commitment
 - a one-time levy on homes with a guaranteed 5 year return on investment with an opt out clause is another option
 - local philanthropy.
 - Engage non-profit groups such as Cool North Shore, the local construction sector, other private and social sector service providers on design and implementation.
 - As progress is made and new resources secured, diversify into apartment and commercial sectors. (Diversification, however, may not be prudent if resources are re-allocated from the single detached sector.)
 - Integrate unique sectoral characteristics into apartment and commercial sector roll out.
 - Collaborate with Condo Homeowners Association, Building Owners and Manager’s Association and other business groups, (e.g. West Vancouver Chamber of Commerce.)
 - Consider business licensing processes to engage and incentivize the commercial sector.
- (N.B. Apartment and commercial retrofits may be best bundled with other measures intended for these sub-sectors, such as apartment and commercial composting and EV charging infrastructure deployment.)

Big Idea: Pay As You Save - On-Bill Financing

On bill financing involves a loan extended to a utility customer, such as a homeowner or a commercial building owner, typically from a utility to finance energy retrofits or high efficiency, low carbon improvements in new construction. The loan is paid back through a small charge on regular utility bills, often equivalent to energy savings. The "loan" is transferable on title, reducing the barrier for legions of homeowners who think they may sell and not benefit on the savings. The City of Nelson has one of BC's most successful residential retrofit programs. Nelson Hydro uses an on bill financing model. As part of BC Climate Leadership Plan deliberations, the Province is once again evaluating on bill financing for residential and commercial building owners.

HIGH QUALITY, LOW CARBON NEW HOMES

C Missing Middle Housing

- Facilitate high demand, low supply "missing middle" housing options: "single detached homeplex" (duplex, triplex, quadplex), row/town house and low rise. Continue to encourage secondary suites and coach houses.

Missing middle housing is so named for its market shortage in many jurisdictions. West Vancouver is illustrative with 60% single detached and 20% high rise and then 20% comprising all other housing types, (i.e. duplex/triplex, row/town house, six storey wood apartments, laneway homes.) Empty-nester and solo senior downsizers are generally very attracted to these housing types. This housing also features some or all the principle characteristics that inherently minimize energy use, especially heating requirements, the primary emission source in housing:

- smaller building square footage and more importantly occupants per ft²
- shared walls between units
- lower window to wall ratio.

Amongst the missing middle, six storey wood apartments are the lowest carbon and lowest cost construction of all housing. Missing middle housing provides sufficient population densities to support successful high frequency, high quality transit and commercial diversity. Replacing a share of traditional single detached housing growth with missing middle housing reduces forest loss and associated forest carbon emissions.

Big Wins

- review and revise land use and development tools to accommodate this strategy, notably the Official Community Plan and Zoning Bylaw, Neighbourhood Character and Building Bulk policies.

Taking Action: Downsize Duplexes

In West Vancouver, a newer, village-like development is in a highly walkable area. The cluster of six cottage-style duplexes and three coach houses are located near a church, recreation centre, bowling green, library, small retail shops and restaurants. The architect and developer designed it for people who want to downsize but not downgrade. The development fits three units onto a standard 50-foot lot. The coach houses are 1,800 square feet and on three levels. The interiors and green technologies are state-of-the-art.



D1 Stretch Code Single Detached & Semi-Attached Advanced Efficiency

- Facilitate higher efficiency wood frame construction in single detached and semi-attached homes: thermal, passive, low carbon heating and comprehensive adaptable design. Encourage premium performance for very large homes.
- Advance measures to support low carbon transportation and forest carbon storage and sequestration.
- Remove barriers to green building innovation.

D2 Stretch Code Apartment & Commercial Buildings

- Facilitate higher efficiency new apartments and commercial buildings: thermal, passive, low carbon heating.
- Advance measures to support low carbon transportation, forest carbon storage and sequestration and diversion of organic and recyclable materials.
- Prioritize wood low/mid-rise. Focus high rise proximate to current and future frequent transit/rapid transit stations.

While some local government regulatory latitude will soon be narrowed (see *Energy: High Performance Buildings, the BC Building Act and Stretch Codes below*), the District has a variety of options to facilitate higher carbon and energy performance in transportation, solid waste and most significantly in the construction of new buildings.

Quick Wins

- promote and integrate into permitting existing new home and multi-unit housing incentives from BC Hydro, FortisBC and senior governments
- review building-related policies, notably the Zoning Bylaw, to remove barriers to green building innovation such as height and setback encroachments to accommodate extra thick high R value roofs and walls or green roofs and walls, as well as other passive designs and renewable heating systems.

Big Wins

- develop a new construction green building framework to facilitate higher efficiency, lower impact new buildings that integrate a diversity of educational, financial and regulatory tools. The framework should consider West Vancouver's unique housing, socio-economic and institutional conditions, including managing the administrative burden in permitting and inspections
 - evaluate the opportunity to use emerging BC Government "stretch codes" to require higher efficiency for new home construction, focusing opportunities on building typologies with the greatest potential for reducing carbon emissions and advancing efficiency. (Large single detached homes and high rise apartments have immense potential. Low-rise wood apartments and laneway homes are already highly efficient.) See *Energy: High Performance Buildings, the BC Building Act and Stretch Codes* on page 33 below
 - explore opportunities for linking efficiency and carbon performance to home size
 - examine how green building solutions may be brought into the calculus for addressing Neighbourhood Character and Building Bulk, e.g. in exchange for density, higher efficiency/lower impact construction is procured, or as per *Figure II.A: Climate Action 3 Rs for A 60's Home: Retrofit, Renovate, Rebuild* on page 28 above, large heritage homes are stratified to improve home carbon/energy performance on an occupant basis, protect neighbourhood character and increase seniors housing options
 - update checklists to encourage low carbon practices at each stage of development, permitting and inspection
 - encourage resiliency in new construction, e.g. home office/secondary suite-ready units with conduits for kitchens /bathrooms, additional sound/fire proofing, two exits, separate electrical panels.
 - evaluate diverse opportunities for incentive development including permitting fee adjustments/feebates, sustainable development fast tracking, utilization of the District's corporate carbon offset purchase
 - Incentive development should consider BC Hydro, FortisBC and senior government incentive design and integration with the sustainable development checklist
 - evaluate the opportunity to phase in building labeling for single detached and small multifamily homes and benchmarking for large buildings
 - enable developers to sub-meter domestic hot water, e.g. install meters on hot water and hydronic space heating systems in multi-unit residential buildings (Space and hot water heating are the first and second largest building energy demands and GHG sources)
- update building-related policies where necessary to advance opportunities for active travel, smart parking, car share, EV parking, solid waste & materials management, tree retention (notably the Zoning Bylaw, Tree Bylaw process)
- engage with key constituencies, notably builders and developers, to inform strategic direction development.

ENERGY: HIGH PERFORMANCE BUILDINGS, THE BC BUILDING ACT AND STRETCH CODES

Two parallel provincial developments will have a decisive influence over local governments' authority to advance construction beyond code.

The BC Government is aiming to more clearly centralize building regulation under its authority through the *Building Act*. The Province intends to define clearer standards for construction, repair and demolition of buildings that are consistent across BC. This will terminate some innovative regulatory interventions local governments have enacted to improve building performance. Beyond regulation, local governments will retain latitude to encourage and incentivize higher performance.

Simultaneously, the BC Government has been actively engaging with diverse stakeholders to develop "stretch codes" for Part 3 (large multi-family/commercial) and Part 9 (small wood frame mostly residential) buildings. While not finalized, the intention is to create a more energy efficient building standard that leadership local governments may opt into. This opt in policy is similar to the solar ready bylaw dozens of BC local governments, including the District of West Vancouver, have already adopted.

Taking Action: Renewable Retirement Residence

A retirement residence developer has achieved LEED Gold certification at their newest retirement residence in West Vancouver. Green initiatives include green roofs, thermal exterior brick cladding and solar collectors to reduce energy usage and GHGs. They have also installed efficient lighting, recycle paper, batteries, bulbs, bags and cartridges, use green housekeeping products and encourage their staff to take transit.



Taking Action: High Tech Rec

At their Gambier Island log cabin, a West Vancouver family has 9 LED 12-volt light fixtures using a total of 15 watts and a Sundanzer 12-volt, 8 cubic foot chest fridge operating 24/7. The power for the lights, fridge and charging rechargeable batteries comes from an 80-watt solar panel and two 6-volt golf cart batteries. They also have a 5-watt solar panel powering the composting toilet ventilation fan. Additionally, they have solar-powered motion detection lights and basement lighting.



E1 District Utility Development

- Enable distributed renewable heating systems in higher density new apartment and commercial neighbourhoods.

Big Wins

- encourage low carbon district energy in nodes with new mid to high rise construction, notably where scale is extensive and build out reasonably rapid. Cypress Village and Park Royal areas may have the greatest potential
 - strengthen District and prospective developer knowledge of district energy opportunities, risk management considerations and planning and design considerations
 - if a district energy network is established, explore retrofitting adjacent large buildings.

CROSS-CUTTING ACTION

F Advanced Efficiency Capacity Building

- Strengthen capacity of District staff, builders and developers to meet and exceed BC Building Code and advance retrofit, renovations and core community priorities.

Big Wins

- integrate and/or make available materials for builders and developers (and where appropriate staff) on incentive programs, best practices, regulatory changes and building-related District policy and program developments
 - use diverse media such as literature from third parties and periodic briefings.

MIND THE GAP-ADDITIONAL OPPORTUNITIES

West Vancouver's single greatest GHG reduction challenge is managing carbon in its existing building stock. Despite strategic directions that aim to ramp up the single detached retrofit rate to double the existing rate, additional efforts will be necessary and require increased collaboration with senior governments to reach shared goals to achieve 80% reductions by mid-century.

The following opportunities by the District and senior governments would help the District fill its emission reduction gap. Senior government actions, naturally, would contribute to broader provincial and national emission reduction agendas.

District of West Vancouver

- Home Efficiency Tax Shift: Replace a portion of assessed value property tax with a levy on building carbon emissions, see below
- Next Generation Home Retrofit Program: extensive retrofit agenda financed by a special one-time levy with guaranteed savings, see below
- Micro Conservation Utility: establish local micro utilities that manage conservation at the scale of large buildings, see below
- maintain an adaptive management approach to senior government and utility policy and programs to take advantage of new opportunities to advance renewable energy, building codes and building energy retrofits

Senior Government

- accelerated passive home standards
- deep retrofit financial tools, e.g. on bill financing and conservation incentives
- conservation/affordability incentives for single detached suites and stratas, e.g. tax credits for landlords with secondary suites or incentives for fire and safety upgrades
- building professionals, trades + local government staff capacity building
- prefab home construction market transformation, e.g. moving home construction—single detached to multifamily homes—onto assembly lines
- strengthened policy environment for small scale renewable energy, notably renewable heating options for existing buildings to reduce natural gas consumption such as heat pump technologies and solar thermal.

Big Idea: Home Efficiency Tax Shift

A local government has the authority to eliminate a portion of tax from assessed home value and replace it with an equivalent portion on home energy consumption in the form of a levy. The energy levy could be based on typical energy consumption for a home of its era and size and serve as an incentive to invest in energy conservation measures to reduce property taxes and energy costs. To qualify for a rebate, homeowners could present the District bills showing energy consumption below the standard benchmark. An innovative concept like this would require substantial study to understand its feasibility and full costs and benefits.

Big Idea: Next Generation Home Retrofit Program

A local government has the authority to raise a one-time levy on homes to invest in basic conservation measures that pay for themselves in 5 years through reduced energy use and provide long term savings after that. The modest levy could be used to leverage additional financing from utilities and senior governments to increase the energy retrofit investment and homeowner savings. The levy could theoretically be amortized over five years, so that in the event a homeowner sells, the subsequent homeowner also contributes to the investment, as well as deriving the benefit from the energy savings. Homeowners could potentially opt out if, for example, they have already invested in such measures.

A basic home savings package might include air sealing, LED lights, smart thermostats and low-flow water fixtures and cut a home's energy and carbon budget by 10%. Such a program would allow a qualified energy professional to speak with homeowners about deeper retrofit measures they may be interested in or help set up a capital replacement plan for aging heating systems and major appliances.

A program like this could be scaled up to hundreds of homes a year and move neighbourhood by neighbourhood across a community with a team of young conservation specialists delivering the retrofits; literally the *next generation* providing the *next generation* of energy, (i.e. efficiency), to safeguard the interests of the *next generation*. An innovative concept like this would require substantial study to understand its feasibility and full costs and benefits.

Big Idea: Building-Scale Energy Conservation Utility

The BC Utilities Commission recently created a new Utility Stream that, unlike traditional utilities, can be operated at a building level. This has created an exciting opportunity for companies to operate in-building utilities, provided that their energy prices are no higher than what the traditional regulated utilities charge and that they do not sell the energy to energy beyond the building's occupants. Unlike traditional utilities which by law have to charge a mark-up on costs, thereby compromising the incentive to reduce consumption (as that reduces their profits), the in-building utility makes its money by maximizing the difference between how much it spends on energy and how it charges occupants. The in-building utility can be set up by the building developer, the building owner (or owners in the case of a strata building), or an outside firm. Scale is required to justify such an innovation, e.g. >50,000 square feet. Because it maintains ownership of the energy system for the life of the building, it suddenly makes financial sense to introduce technologies that cumulatively can reduce GHG emissions by up to 80% at no extra cost to the building developer, owner, or occupants. This model can be implemented entirely without any government financial support, however, local governments can facilitate this opportunity through education and engagement with large building developers.

4. ROLL + STROLL (TRANSPORTATION & LAND USE)



Roll + Stroll focuses on managing carbon and energy in transportation systems. Low carbon, energy efficient transportation is underpinned by efficient land use. When schools, services and jobs are closer to homes, people spend less time in cars and drive fewer kilometres. With the right infrastructure, short distances can be covered by foot or bike. When destinations and origins are focused around hubs, nodes and along corridors, high quality, high frequency cost effective transit is viable. These same land use determinants support car sharing business models. Carbon emissions can be significantly reduced through vehicular efficiency and electrification.

Transportation is West Vancouver's second largest source of GHG, comprising 38% of emissions. While these emissions have recently been plateauing due to efficiency gains, transportation emissions have been the fastest growing GHG sector over the last several decades due to the shift to larger personal vehicles (light trucks and mini vans) and rising distances travelled. This trend is consistent across most BC communities. West Vancouver's

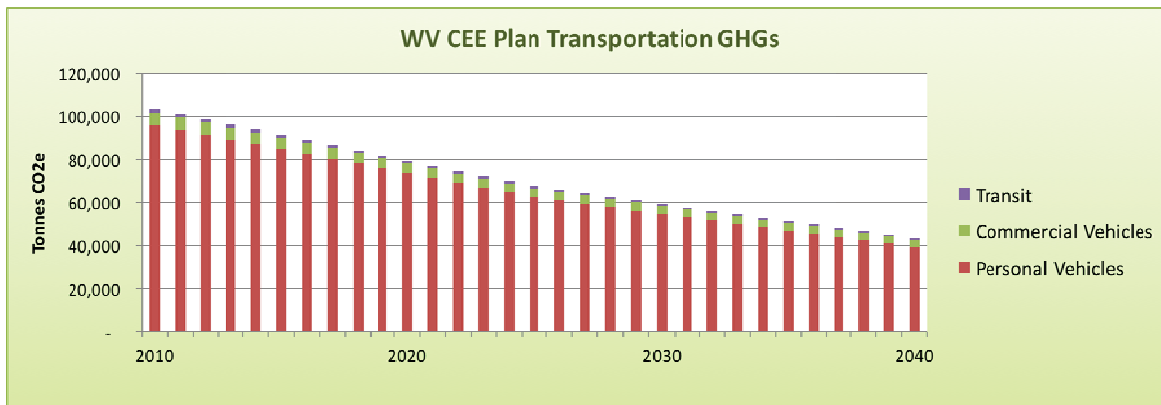
transportation emissions, distances travelled and congestion generation are likewise similar to other residentially-oriented Metro Vancouver communities.

Roll + Stroll strategic directions support the following key objectives:

- improve attractive transportation choices, facilitate walking, cycling, transit, car/ride sharing, as well as travel by car and integrate these diverse travel modes
- reduce household congestion generation, (i.e. annual per capita vehicle kilometers traveled)
- reduce household and government transportation spending requirements
- strengthen access to services, schools and jobs for those unable to drive because of age or disability and those seeking transportation options that support healthy lifestyles
- facilitate low carbon personal car options including car sharing and self-driving cars.

STRATEGIC DIRECTIONS & SECTORAL REDUCTIONS

Strategic directions are organized across three sub-sectors: *Transit, Active Travel* and *Clean Cars & Smart Parking*. These priorities generally build on the District’s strategic planning agenda, (i.e. Strategic Transportation Plan, Cycling Network and Greenway Plan, Pedestrian Network Study and emerging Official Community Plan update, as well as TransLink’s North Shore Area Transit Plan.) Clean Car strategic directions are new agendas for the District.



TRANSIT DIVERSIFICATION & EXPANSION

A1 Rapid & Express Transit

- Attract high quality, high speed, high frequency transit infrastructure and enable success with conducive land use, engineering and urban design plans. (Rapid Transit: Dundarave-Downtown-Phibbs and enhanced Express Bus: Horseshoe Bay-Cypress Village-Park Royal-Downtown).

A2 Bus Service Extension

- Enhance existing bus service and continue to extend into new neighbourhoods focusing on routes with higher resident and employee concentrations.

Quick Wins

- work with TransLink to enhance regular bus service, e.g. Whytecliff Park shuttle and extend to new neighbourhoods, e.g. Cypress Village

Big Wins

- collaborate with North Shore municipal neighbours and TransLink to strengthen support for a Dundarave-Downtown-Phibbs rapid transit system and establish the preconditions for its success
 - consolidate support for investment within the region and by senior governments in North Shore rapid transit.
 - establish long term plans with short term actions to support successful rapid transit in West Vancouver (and across the North Shore), e.g. establish rights of way, queue jumper lanes, multi/intermodal connections, station design concepts, focused/mixed-use growth characteristics and public realm investments
- work with TransLink to strengthen support for Horseshoe Bay Express Bus enhancement

- consolidate support for frequency and stop enhancements
- strengthen long-term plans to enhance express bus success, e.g. establish rights of way, queue jumper lanes, multi/intermodal connections, transit stop/node design concepts, focused/mixed-use growth characteristics, public realm investments and conducive new neighbourhood (Cypress Village) design concepts.

A3 Electric Passenger Ferry

- Facilitate electric passenger ferry service from West Vancouver to key Vancouver destinations.

Big Wins

- facilitate private sector electric passenger ferry service for routes from West Vancouver, e.g. Ambleside, Dundarave and Horseshoe Bay, to key Vancouver destinations, e.g. downtown, Kitsilano area, UBC
 - facilitate docking, wayfinding and transportation network connectivity for a service provider.

COMPLETE STREETS & ACTIVE TRAVEL

B1 Pedestrian Infrastructure Extension

- Strengthen pedestrian infrastructure in and around walkable villages and micro markets and key destinations.

B2 Triple A & Double B Cycling Infrastructure

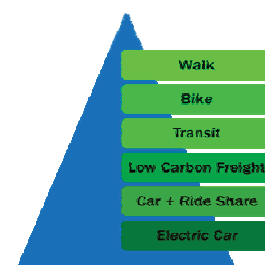
- Strengthen *All Ages and Abilities* (Triple A) and *Better than Basic* (Double B) cycling infrastructure in and around and between walkable villages and micro markets and to key destinations, e.g. schools.

Quick Wins

- complete the District's Pedestrian Network Study to identify short, medium and long term priorities
- complete the Cycling Network's fourth phase, including development of the District's first on-street, separated cycling lanes
- complete the District's portion of the Spirit Trail multi-use greenway
- strengthen end-of-trip facility requirements in municipal bylaws for residents, employees and visitors in new residential, commercial and institutional buildings and standards for public amenities like plazas and parks
- integrate active travel infrastructure improvements into road maintenance and replacement work plans

Big Wins

- apply the District's pedestrian-first transportation planning hierarchy to transportation planning and development, prioritizing low carbon, low energy transportation and congestion management with an emphasis on pedestrians
- strengthen active travel network plans, focusing in and around villages and connectivity amongst them, followed by other key destinations, e.g. schools and micro market areas
 - strengthen active travel connectivity across geographical barriers, through natural areas and in neighbourhoods without grid street networks
 - as part of major developments, explore potential for further pedestrianization of lanes and passages in villages and micro markets and introduction of inter-block walk through on long blocks
 - evaluate innovative approaches for re-allocating lost parking spaces where separated cycling lanes are introduced, e.g. introducing laneway parking, expanding visitor parking in nearby public parking lots
- update street design standards to accommodate active travel infrastructure, accommodating Triple A active travel infrastructure in new neighbourhoods; consider minimum pedestrian intersection connectivity standards
- evaluate costs and benefits of integrating Triple A pedestrian and cycling infrastructure costs into development cost charges for new developments and redevelopments across all building types, notably where sidewalk and roadwork is associated with projects.



Taking Action: Cutting Your Carbon Wheelprint

One West Vancouver resident has owned an electric bike for 3 years and it has changed his life. It has allowed him to greatly reduce car use and related greenhouse gas emissions while at the same time increase his physical exercise. (His e-bike only provides energy while he's pedaling.) Better still, he can get from Dunderave to downtown as fast or faster than he can by car and arrive without feeling sweaty and in need of a shower. On top of that, he gets great pleasure riding along bike paths and through tree lined local streets that he would never travel through by car or bus. This has dramatically cut his transportation spending.



C Community Bike Share

- Explore feasibility and impact of a community bike share, starting in the Ambleside, Dunderave, Marine Drive Corridor. Explore collaboration with North Shore municipalities and interaction with City of Vancouver.

Big Wins

- monitor City of Vancouver bike share implementation, including the business model, costs and benefits, trip types, origins and destinations, usage by neighbourhood typology and user profiles (demographics, residents vs visitors), etc
- evaluate the business case for introducing a bike share into key West Vancouver locations, e.g. Park Royal, Ambleside beach and commercial zones, either as an extension of the City of Vancouver program or new one potentially in cooperation with the other North Shore municipalities
 - collaborate with potential implementation players in the study, e.g. Park Royal, Ambleside and Dunderave BIA.

D Safe Routes to Schools, Rec & Leisure

- Expand the Safe Routes to Schools Program and extend it to community recreation and leisure programs and include ride sharing.

About 15% of North Shore car trips are “escort”-related, meaning the driver’s purpose is escorting a passenger (TransLink, 2013). While trips for seniors comprise a large and growing share, school, recreation and leisure program-related trips for young people remain the majority. West Vancouver’s successful “Safe Routes to Schools” program has rich partnerships and a model on which further carbon and congestion management and public health advances can be built. The program involves a combination of planning, infrastructure upgrades, education and outreach, active parent and school staff involvement and traffic enforcement by police.

Quick Wins

- as a carbon and congestion management and safety intervention, expand “Safe Routes to Schools” program to include ride sharing. Integrate this transportation option into an active travel initiative by establishing multi-block drop-and-walk locations
- extend Safe Routes to Schools to new schools as resources permit and school commitment is demonstrated
 - In prioritizing schools, consider the magnitude of local trip reductions co-benefits in areas where there are other key destinations and significant residential populations likely to make use of active travel infrastructure improvements.

Big Wins

- extend a simplified version of the Safe Routes to Schools program for teens at high schools, as well as all ages in community recreation and leisure programs, notably including the ride sharing option
 - financing for the community recreation and leisure programming could come from a very modest service charge on top of program costs, as well as other grants. Program administrators, coaches, instructors and parents would play active roles promoting and providing active travel and ride sharing options. Work through key institutions like Parks and Community Services and the West Vancouver Community Centres Services Society

- evaluate the potential of using or developing an app to facilitate communication, coordination and operationalization of group active travel and ride shares.

CLEAN CARS & SMART PARKING

E Car & Ride Sharing

- Enable car sharing in walkable villages and eventually micro markets through parking allowances and collaborating with key institutional, commercial and large residential partners

Big Wins

- explore short and long-term opportunities to expand car sharing through multi-family residential and commercial development parking requirement reductions, participation by businesses and institutions (including the District) with fleets or locations that serve as major regional destinations (e.g. Park Royal) (N.B. Car 2 Go already has successful locations at Horseshoe Bay and Cypress Mountain.)
- explore ride sharing potential including self-driving cars to manage congestion and GHGs for strategic trips, (i.e. major distant destinations with single access routes, e.g. Cypress Mountain and Whistler.)
 - Facilitate conversations with key players regarding digital technologies to support planning and security (e.g. Spare Rides App), infrastructure requirements (e.g. parking, pick up locations), transit/active travel connectivity
- take advantage of developments in hydrogen fuel cell technology to power electric vehicles.

Energy Insight: Car Share Costs and Carbon

An average car is parked 95% of the time and costs more than \$10,000 a year to own and operate. Car sharing allows households with a marginally used 2nd or 3rd car to get rid of it and young and old people to access cars on an as need basis. As well as lower GHGs and travel costs, car share users have lower obesity rates than the average population.

Car share operator ZipCar took the keys from 250 heavily habitual car drivers in a study across 13 US cities (News Medical, 2009). They had to bike, walk, train, bus or if needed, use car share. After one month, personal bike distances rose 132%, walking distances rose 93% and collectively they lost 413 pounds. Transportation spending declined 67% and 100 of the 250 habitual drivers elected not to take their keys back.

F EV & LEV Leadership

- Enable deep Electric Vehicle and Low Emission Vehicle penetration through charging infrastructure policy and programs in new and existing buildings and collaboration with commercial/institutional partners.

Quick Wins

- strengthen EV charging infrastructure bylaws in new residential and commercial developments.
 - liaise with Metro Vancouver, developers and other North Shore municipalities to establish appropriate standards.
- integrate senior government EV charging infrastructure grants into development and building permitting process and into outreach to key commercial and institutional destinations.

Big Wins

- reinforce EV charging infrastructure preconditions with parking incentives—see *Smart Parking* below.

Energy Insight: Electric Vehicles, Carbon and Our Community

An electric car in BC, with its low carbon electricity, generates 50 times less GHGs per km than an equivalent internal combustion car. Electric buses, a little bit further out on the horizon, will have even greater performance along with congestion management benefits. While still low, West Vancouverites have amongst Canada's highest EV ownership rates.

G Smart Parking

- Establish smart parking policies for on street and off street parking that optimize supply, constrain unnecessary car and congestion implications and incentivize electric and low emission cars.

Quick Wins

- study regulatory and non-regulatory options for new and existing buildings to allocate premium parking spaces to electric car, hybrid, ultra-compact and car share drivers
- require large new developments to undertake comprehensive neighbourhood parking analysis as part of their transportation demand management plans that can be used broadly by the District, including post occupancy parking utilization activity

Big Wins

- evaluate supply and demand for on-street and off-street parking in commercial and residential buildings focusing in major villages to inform revisions to parking bylaws. Meeting personal and commercial vehicle parking demands with sufficient parking supply should be balanced with street systems that maximize safe, attractive active travel and transit. On street physical supply may be reinforced with pricing and time limitations
- explore short and long-term opportunities to incentivize electric vehicles, hybrids, ultra compacts, car sharing and other low emission vehicle personal transportation through parking bylaws:
 - if, for example, pay parking is introduced in commercial areas and parks, car sharing (which cuts carbon and congestion) could be free for the first 60 minutes and EVs and LEVs could be free for the first 30
 - if/where resident parking passes are introduced, EVs and LEVs could pay the administration costs and standard cars could pay at high, or much higher rates. Car shares would not require on street parking passes

MIND THE GAP-ADDITIONAL OPPORTUNITIES

The following opportunities by the District and senior governments would help the District fill its emission reduction gap. Senior government actions, naturally, would contribute to provincial and national emission reduction agendas.

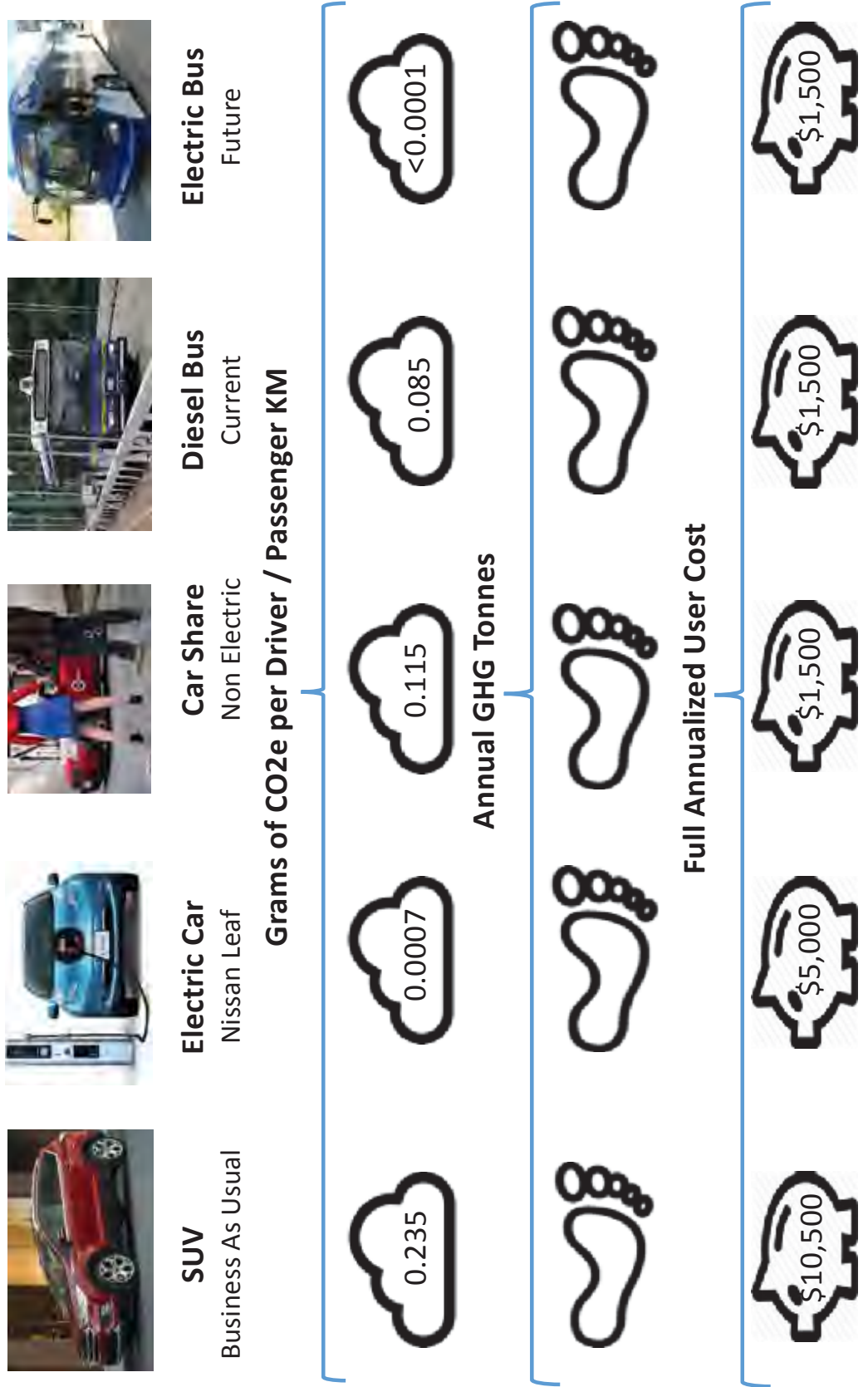
District

- explore the use of funiculars along steep, focused, mixed-use corridor segments
- develop a campaign to encourage local/regional low carbon recreation and leisure activities:
(ie *Think Global. Hike Local. Drink Local. Dine Local. Travel Local*)

Senior Government

- deepen active travel infrastructure investment
- incentivize car sharing through mechanisms such as tax credits
- establish an electric bus market transformation strategy
- deepen vehicular efficiency standards, phase out internal combustion engine vehicles
- invest deeply in public transit
- strengthen electric car market transformation, focusing on charging infrastructure, including building code performance standards
- supplement carbon tax to account for the full socio-economic and environmental cost of transportation
- work with TransLink and CN on implementation of passenger rail service on the Sea-to-Sky corridor, linking West Vancouver, North Vancouver and the rest of Metro Vancouver to Squamish and Whistler.

FIGURE II.C: CLIMATE ACTION TRANSPORTATION PRINCIPLES: DIVERSIFY, ELECTRIFY, HUMANIFY (VEHICULAR OPTIONS)



Two principles for a low carbon transportation are diversifying and electrifying options. There are many vehicular choices with dramatically lower carbon footprints than today's standard internal combustion engine cars, including: electric cars, car share and public transit. To be viable, car share and good quality transit requires minimum residential and employment thresholds. Carbon intensity assumptions are based on the following vehicles: Ford Escape, Nissan Leaf Electric Car, Mini Cooper Five Door Car Share, a common Vancouver diesel bus and a New Flyer electric bus (Xcelisior XE40). Costs are based on high driver/passenger utilization. Relatively low electric cars life cycle costs are attributable to low fuel and maintenance costs.

FIGURE II.D: CLIMATE ACTION PRINCIPLES FOR TRANSPORTATION: DIVERSIFY, ELECTRIFY, HUMANIFY (ACTIVE TRAVEL OPTIONS)



The lowest carbon, lowest cost transportation options are human powered. Walking and cycling are viable for short to medium distance trips. Walking and cycling are viable when infrastructure is safe, attractive and convenient and key destinations such as grocery stores, pharmacies and cafés are nearby. Walking and cycling can be integrated into longer multi modal trips involving cars or transit.

5. TRASH + TREASURE



Trash + Treasure focuses on maximizing value from materials and waste through enhanced recycling, re-use and energy recovery systems, notably eliminating organics from landfills. Initial efforts are also taken to begin managing GHGs in purchased goods.

West Vancouver’s composting and recycling rates are amongst the highest in the country. Like the rest of the region, there are significant opportunities for increasing composting and recycling rates in apartments and the commercial sector where greater barriers exist. Demolition, construction and land clearing waste is the District’s and Region’s greatest source and an emerging area of focus.

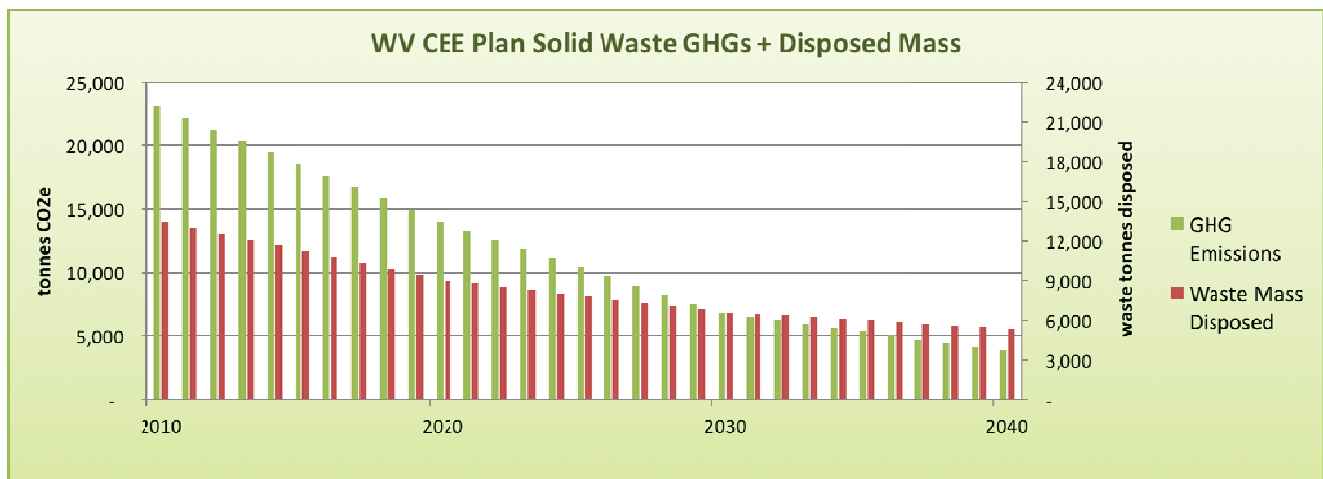
Trash and Treasure strategic directions support the following key objectives:

- support Metro Vancouver’s Solid Waste and Material Management Plan and District implementation
- reduce and eventually eliminate organics sent to landfill from the District
- reduce resident spending on tipping fees and extend landfill life for residents, businesses and institutions
- reduce demand for raw resources and processing and associated GHGs.

STRATEGIC DIRECTIONS

Strategic Directions are organized across three sub-sectors: *Smart Goods & Material Management*, *Deconstruction & Construction Material Management* and the *Shared Economy*. Strategic directions build on Metro Vancouver’s Solid Waste and Material Management Plan and the District’s implementation strategy. Reducing GHGs in purchased goods and the collaborative economy are novel municipal initiatives.

Solid waste GHGs are reduced 83% by 2040 from 2010 under this plan. This 83% diversion is driven overwhelmingly by continuing West Vancouver’s recycling and composting success in the single family sector and extending it to multi-family and the institutional/commercial sector.



RESIDENTIAL/COMMERCIAL SMART GOODS & MATERIAL MANAGEMENT

A. Smart Goods & Resource Recovery

- Seek opportunities to advance community purchasing practices that reduce GHGs embedded in purchased goods and waste reduction, re-use and recycling to minimize raw resource inputs.

There are twice the GHGs embedded in the goods and services consumed in local homes and offices compared to GHGs emitted from a community’s buildings, transportation activities and waste and material management systems.

Big Wins

- explore opportunities to reduce GHGs embedded in purchased goods and services across single family, multi-family and institutional/commercial sectors, e.g.:
 - collaborate with Metro Vancouver on a West Vancouver “Create Memories not Garbage” campaign to promote giving experiences (restaurants, recreation and leisure services, special outings, etc) rather than giving materials for holidays and special events. (This may be integrated into a broader business sustainability initiative locally or regionally.)
 - support and collaborate with the Metro Vancouver-initiated National Zero Waste Council on local implementation efforts.
 - examine opportunities for advancing the shared economy as per *Shared Economy on page 46*.
 - encourage the purchase of locally grown and produced food products as well as grow-your-own food initiatives, including expanding the use of community garden plots.
- explore potential to encourage local restaurants, institutional meal services and food retailers to establish systems to avoid the disposal of high-value prepared and unprepared food currently going into waste or composting streams. (This may be integrated into a broader business sustainability initiative locally or regionally.)
- explore opportunities to deepen recycling and re-use of items not currently accepted in curbside collection nor potentially effectively managed within broader material and waste systems with enhanced resource recovery efforts, e.g.
 - permanent or periodic local stop and drop locations
 - targeted education and outreach in print, digital media and special events and with key constituencies like K-12 students
 - intensified collaborations with Metro Vancouver, Multi-Material BC, Return It depots and retailers (grocery, hardware, drug store, malls). Key materials to target include:
 - DIY home renovation waste and materials
 - styrofoam
 - plastic bags
 - mattresses
 - tools
 - electronic goods
- integrate into the 2025 update of West Vancouver’s CEE Plan analysis of upstream and downstream GHGs associated with goods and services from residential, commercial and institutional sectors and identify any high impact management strategies

B Sustained Single Detached Leadership

- Sustain the District's Single Detached/Semi Attached composting and recycling success.

With the combined efforts of well-designed recycling and composting systems by the District and the commitment of residents, West Vancouver is diverting 75% of waste as of 2016 in the Single Family Sector which includes duplexes and other small multi-family homes. (This amounts to 250 kg of residual waste per household per year.) This is the highest diversion rate in the region and surpasses Metro Vancouver’s targets and timelines for the sector.

Quick Wins

- collaborate with Metro Vancouver and Multi-Materials BC to reduce residual waste collection in single family homes to 200 kg per single family household per year by 2025
 - focus attention on opportunities outlined in *Resource Recovery Strategic Direction A*, above.

C Apartment & Commercial Diversion

- Facilitate deeper composting and recycling diversion in multi-family and commercial sectors.

Diversion in the Multi-Family Sector (foremostly apartments) and Industrial, Commercial, Institutional Sector (notably commercial in West Vancouver) is considered significantly lower than the Single Family Sector, according to Metro Vancouver (Metro Vancouver, 2015, 2013). It is West Vancouver’s largest source of *community* waste GHGs. Inadequate space, inconvenience; complexity and institutional inertia are some of the challenges. In contrast to the Single Family Sector, the District has less authority over multi-family and commercial sectors where

diverse private operators generally manage waste and material management. Standards vary across private operators and buildings and monitoring data is less reliable. The District also has fewer resources to support activity in these sectors.

Quick Wins

- Ensure zoning bylaws specify appropriate space and climate controls (e.g. ventilation and temperature) in new commercial and residential construction to accommodate current and anticipated solid waste and material management requirements.

Big Wins

- collaborate with key players provincially (e.g. Condominium and Homeowners Association of BC, Multi-Material BC, Recycling Council of BC), regionally (e.g. Metro Vancouver) and locally (Ambleside and Dundarave BIA, West Vancouver Chamber of Commerce, Park Royal, strata councils) on education and outreach and enhanced waste and material management system design
 - apply limited resources to key sub-sectors of the commercial sector, e.g. grocery retailers, large restaurants and institutional food services, large retail operators and malls
 - explore low cost options for increased diversion rates in the Multi-Family Sector, e.g. volunteer zero waste stewards in rental and strata buildings, decommissioning waste chutes
- collaborate with Metro Vancouver and the province to require better data collection and standards of operation by waste and material management companies operating in these sectors
- focus on opportunities outlined in *Resource Recovery Strategic Direction A*, above that apply broadly to multi-family, single family and commercial sectors.

DECONSTRUCTION & CONSTRUCTION MATERIAL MANAGEMENT

D Zero Waste Construction & Deconstruction

- Strengthen source separation in construction and deconstruction.

Demolition, Land Clearing and Construction Sector Waste (DLC) is technically not considered a “community” emission source based on the provincial government’s approach to community energy and emission inventory systems. DLC waste, however, is the region’s largest source by volume. Building demolition is the single greatest contributor. A typical single family home generates ~50 tonnes of waste and materials.

Good deconstruction and material management practices in construction source separate and recover materials for re-use and recycling. A large share of construction “waste” has enduring value. Ideally, it can be re-used in construction. Minimally, waste wood can be combusted to recover its energy value. Deconstruction is more labour and time intensive yet can be equivalent in cost due to re-sale value of salvaged materials.

Quick Wins

- build on existing efforts through permitting and inspections to strengthen waste and material management in demolition and construction.

Big Wins

- sustain collaboration with Metro Vancouver and regional municipalities to strengthen policies to support diversion in construction and deconstruction
 - consider financial mechanisms to incentivize better waste and material management practices, e.g. a “feebate” that raises cost of conventional demolition permits and significantly reduces costs for adopting a deconstruction standard
- collaborate with Metro Vancouver and the province to require better data collection and standards of operation by waste and material management companies operating in this sector.

SHARED ECONOMY

- | | |
|---|---|
| E The Sharing Community Initiative | <ul style="list-style-type: none">• Facilitate shared economy activities that reduce carbon and material throughout the economy and advance community priorities. |
|---|---|

There are many goods sitting idle and for which there are immense duplications. A typical drill is used 13 minutes over its life. Most homes have one. An average car is used 5% of the time. The embedded GHGs in this redundancy is immense. Digital networking is driving collaboration across society with many co-benefits such as community building.

Local governments are not strangers to the shared economy. They were the earliest pioneers with institutions like libraries and utilities. The current shared economy wave focuses on sharing underutilized goods and services owned privately by individuals and businesses, as well as public goods and services. Prices reflect use versus the entire capital costs.

The shared economy also has risks and unintended consequences that should be considered in any active public support.

Big Wins

- Explore opportunities through various departments and planning processes and with community-based groups to support the shared economy, e.g.:
 - car and ride sharing and potentially bike sharing through transportation engineering, see Strategic Directions *C Community Bike Share C* and *E Car & Ride Sharing*, in the *Roll + Stroll*, above
 - share sheds and office sharing through the Official Community Plan update and neighbourhood planning, particularly in new areas like Cypress Village
 - diversified lending of resident goods, such as high tech equipment and tools, through Library Services or Parks and Recreation
 - repair cafés through Library Services or Parks and Recreation or privately
 - resident, business and District art sharing through the Art Gallery
 - boat sharing and lending through local marinas and yacht clubs.

MIND THE GAP-ADDITIONAL OPPORTUNITIES

The following opportunities by the District and senior governments would help the District fill its emission reduction gap. Senior government actions, naturally, would contribute to provincial and national emission reduction agendas.

District

- shopping bag for life, phase out plastic and paper shopping bags in West Vancouver retail stores and replace them with high quality bags for life
- good climate cuisine, engage with local restaurants, institutional meal services and food retailers to promote good climate cuisine, (i.e. low carbon foods and beverages) this may be integrated into a broader business leaders in sustainability initiative locally or regionally.

Senior Government

- minimalist, low impact packaging policies
- circular Economy Policies, notably for resource intensive, short-shelf life products such electronic goods.

6. CROSS CUTTING ACTION



These strategic directions cut across traditional energy and emission sectors and municipal departments and extend out into the community. They are designed to foster alignment within the municipality and consolidate support internally within the District, stakeholders in the community and the broader public. These measures help ensure the District’s ongoing business supports a low carbon agenda and helps to advance the core community priorities CEE Plan aims to address.

Cross Cutting strategic directions support the following key objectives:

- strengthen the District’s institutional capacity to support implementation
- help mainstream climate change into District decision making
- effectively engage key constituencies to deepen strategy uptake.

STRATEGIC DIRECTIONS

Strategic directions are organized across three sub-sectors: *CEE Plan Resourcing*, *Climate Action Mainstreaming* and *Engagement & Outreach*. These strategic directions build on the District’s corporate carbon neutral leadership, fiscal sustainability accomplishments and social marketing success.

CEE PLAN RESOURCING

A Corporate-Community Carbon Neutral Offset Fund	<ul style="list-style-type: none">• Sustain the District's carbon neutral status by investing in community emission reduction projects that can be used to offset the District's corporate carbon emissions.
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West Vancouver is part of a leadership group of BC municipalities that is 100% “carbon neutral,” offsetting all GHGs from District operations through innovative community projects that push reductions significantly beyond Business-As-Usual GHG reduction efforts—see *Taking Action: West Vancouver Carbon Neutral Local Government*, below. The magnitude of these projects offsets all District’s corporate emissions in buildings, facilities, waste and its vehicle fleet until close to 2020. To sustain this leadership, the District could support other community projects such as residential energy retrofits and renovations, car sharing and electric vehicle market transformation whereby the emission reductions are used to continue offsetting the District’s operations.

Taking Action: West Vancouver Carbon Neutral Local Government

Most BC local governments have signed a charter with the BC Government that includes a commitment to carbon neutrality in corporate operations. For BC Government ministries and crown corporations, this commitment is mandatory. For local governments, it is voluntary.

As of 2015, 40 local governments achieved 100% carbon neutral status. The District of West Vancouver is amongst these leaders. The District has achieved carbon neutrality through individual and collective participation in a number of innovative projects that have reduced community-wide GHGs and used them to offset the District’s corporate GHGs.

As part of an agreement between Metro Vancouver, the City of Vancouver and the Corporation of Delta, the District receives an allotment of reductions from the Vancouver Landfill Gas Capture Optimization Project. This amounted to 2,300 tonnes CO₂e in 2013 and similar amounts are expected for 2014 and 2015. In 2016 landfill gas collection becomes mandatory for the Vancouver Landfill and no more credits will be available.

Also through an agreement with Metro Vancouver, the District is allotted offsets for residential compost collection. This amounted to 361 tonnes CO₂e in 2013. A similar amount is expected for 2014. Beginning in 2015 the amount of offset is expected to be reduced as Metro Vancouver will be phasing in an organics ban.

In 2014 the BC Climate Action Secretariat approved carbon credits from avoided deforestation in Whyte Lake Park. This will provide a carbon credit of 19,000 tonnes CO₂e to offset corporate emissions for several years.

Big Wins

- explore a framework for investing in community emission reduction projects that can be used to continue the District’s leadership in offsetting its corporate emissions
- evaluate the viability of establishing a Corporate Carbon Neutral Offset fund with the District’s annual Climate Action Revenue Incentive Program (CARIP) grant (carbon tax rebate)—see *Big Idea: Carbon Neutral Reserve Fund*, below.

Big Idea: Carbon Neutral Reserve Fund

Seventy-five BC local governments have Climate Action Reserve Funds seeded by their Climate Action Revenue Incentive Program grant. The Climate Action Revenue Incentive Program (CARIP) is a grant equivalent to the amount of carbon tax paid by a municipality for purchased goods and services across its operations. This grant is conditional on signing and working towards its Climate Action Charter commitments and measuring and reporting on corporate and community GHG activity and actions.

This Fund is being used to support a variety of emission reduction projects in their own community or in corporate operations. BC’s Carbon Tax is an effort to begin internalizing the cost of climate change impacts into price of goods and services. Allocating this financing towards GHG reduction can make a modest contribution to mitigating these impacts.

B Community Climate & Energy Human Resources

- Seek external financing to support community energy planning Human Resources support.

A number of BC institutions support local governments through community energy planning human resource investment. The District can take advantage of these opportunities by staying abreast of opportunities and application processes. BC Hydro offers some of the most attractive opportunities.

Quick Wins

- work closely with BC Hydro to identify shared high impact power conservation priorities and targets and in turn financial support for a community energy planner.

Big Wins

- integrate third party human resource investment opportunities with CEE Plan planning and implementation priorities and District work planning and annual budget processes.

C Planning & Implementation Third Party Financing

- Secure external financing to support planning and implementation of community climate and energy priorities.

Utilities, the Province, federal government, foundations, non-profits and the private sector offer an array of financing to local governments for community climate and energy planning and implementation.

Quick Wins

- identify top CEE Plan opportunities and compatible third party funding sources and integrate into short term work plans and budgets.

Big Wins

- integrate third party finance opportunities with CEE Plan planning and implementation priorities and District work planning and annual budget processes.

CLIMATE ACTION MAINSTREAMING

- | | |
|--|--|
| D Climate & Community Strategic Planning Lens | <ul style="list-style-type: none">• Incorporate a strategic planning lens into key planning processes to facilitate progress towards deep reductions and community priorities. |
|--|--|

Taking comprehensive, coherent action on big, new agendas like climate change is challenging. Forging a low carbon pathway requires a course correction to traditional public policies at all levels of government. Fortunately, at the local level, the co-benefits can be immense with a good plan. Advancing GHG management across a community's residential, commercial and institutional sectors, has implications horizontally across and vertically through many municipal departments.

Making headway on discreet, one-off projects is a start. Systemic change that drives low carbon development across buildings, transportation, waste and materials requires more fundamental adjustments. Systemic change can be supported through a decision making lens with the aim of managing GHGs and also maximizing core community priorities tomorrow and far into the future, including congestion management, public health and tax rate management. The lens may be broadened to include management of climate change impact risks, too.

Big Wins

- craft a climate action strategic planning lens that can be integrated into key district planning processes that support low carbon community development and may include priority co-benefits:
 - the decision making support tool would phase in quantification of community GHG implications, management strategies and alternative strategies to meet policy objectives for major projects and proposals. The tool may start with qualitative assessments and then introduce more detailed quantitative assessments
 - the climate action lens would be applied to key district planning processes, (e.g. the annual budget process, infrastructure planning, Official Community Plan and major special projects such as Cypress Village neighbourhood plan and the housing strategy)

- | | |
|---|---|
| E Climate Action Monitoring & Continuous Improvement | <ul style="list-style-type: none">• Establish an ongoing process to continuously monitor, report and strengthen climate action planning and implementation. |
|---|---|

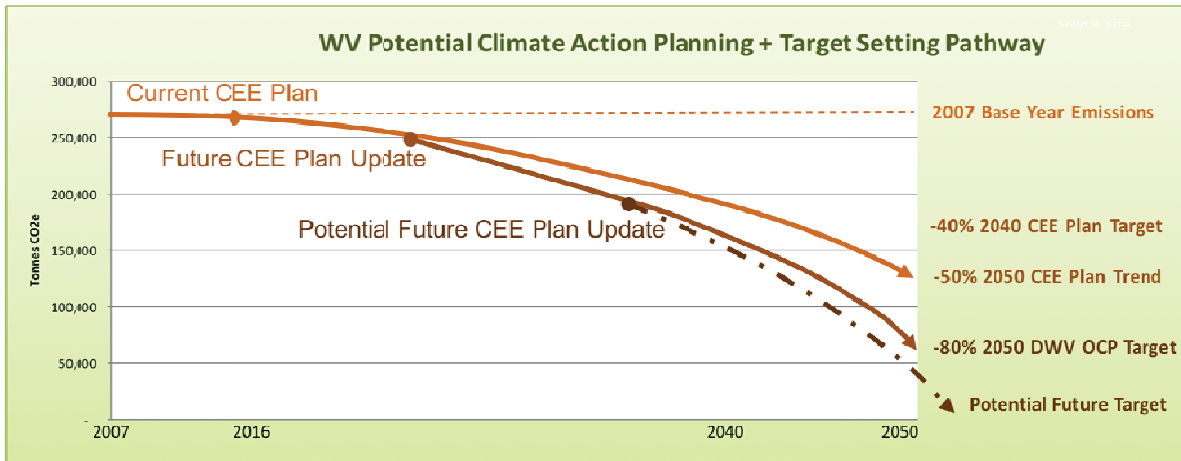
Big Wins

- integrate key actions, indicators and targets into departmental work plans, see *IV: Implementation Framework*, below
 - use the initial set of sectoral targets and update as appropriate, see *Sectoral Targets*, above
- establish an annual climate action report to Council that builds on the annual Climate Action Revenue Incentive Program report submitted annually to the province
 - the report will identify progress on actions, including current, completed and future actions along with key performance metrics at the community and sectoral level and adaptive management strategies, see *IV: Implementation Framework*, below
 - a major report will be generated every 5 years to report on progress towards the District's official targets.
 - sectoral actions, performance and adaptive management strategies will be emphasized, along with estimates of community GHG performance based on trends established in the Community Energy and Emission Inventory reports and internal analysis²⁰
 - this report will make recommendations on major planning priorities, including a CEE Plan update and actions locally, provincially and federally to fill the District's emission reduction gap
 - the climate action section should be updated during the Official Community Plan update to take into consideration this CEE Plan.

²⁰ Progress against community wide (interim) targets should emphasize trends and averages rather than precise performance. Emissions can fluctuate a couple of per cent per year due to weather, energy price and economic fluctuations. Targets should help track general trends over several years.

F CEE Plan Update

- Update the CEE Plan by 2025, renewing efforts and filling the gap between actions in this plan and its associated 50% emission reductions by 2050 and the OCP 80% reduction target by 2050.



To continue to provide meaningful direction for the day, the CEE Plan will require an update. One task of such an update will be identifying District and senior government opportunities for filling this gap. The next 2025 CEE Plan update may not completely conclude how to fill the emission reduction gap, but future plans could and they may establish yet deeper reduction targets, potentially on longer timelines.

Big Wins

- carry out a 10 Year CEE Plan Update, (e.g. 2025/2026), to refresh and recalibrate strategies and targets, take into account the dynamic senior government policy context, climate change science and notably new opportunities to fill the gap between the CEE Plan's 50% 2050 reduction trend and the official 80% reduction target.
 - integrate analysis of upstream and downstream GHGs associated with goods and services procured by residential, commercial and institutional sectors and identify high impact management strategies that may be developed.

ENGAGEMENT & OUTREACH

G Business of Climate Action

- Evaluate potential for a climate action program for local businesses and institutions.

Local businesses and institutions comprise about 10% of local emissions. Some are large concentrated sources, (e.g. food waste in restaurants and grocery stores, or demolition waste in the construction sector.) Local business decisions can also measurably impact emissions of employees, customers and residents, (e.g. facilitating sustainable employee transportation choices, reducing retail packaging, building low carbon homes.)

Big Wins

- evaluate the viability of an initiative to advance climate action with local businesses and institutions through a thoughtfully branded comprehensive program that focuses on District priorities and promoting other programs
 - evaluate the rationale for such a program to strengthen support for:
 - district priorities, (e.g. organics diversion from grocery stores and restaurants, demolition waste in the construction sector, electric vehicle charging infrastructure grant take up)
 - third party programs, (e.g. TransLink's Travel Smart program; BC Hydro and FortisBC's building energy conservation incentives in new construction and BC Hydro's Net Metering Program)
 - explore interest with the local BIA and Chamber of Commerce

- liaise with Metro Vancouver about their ongoing efforts to support climate action for small and medium sized businesses and commercial and residential building retrofits.

H Ultra-Cool Neighbourhood Pilot

- Explore viability of a comprehensive cool neighbourhood pilot project that facilitates early and advanced climate action across all sectors, (i.e. buildings, transportation, waste and materials, through rich engagement.)

Several neighbourhood scale citizen climate action initiatives across the country have achieved deep GHG reductions across multiple sectors through rich engagement that fosters awareness, incentive take up, personal action and social diffusion. As well as improving performance on GHGs and personal health, these initiatives have strengthened neighbourhood relationships. Local governments have played supportive roles in these exercises. The local, citizen-driven Cool Neighbourhoods program situates West Vancouver as a potential jurisdiction for an intensified initiative to explore the full potential of this approach, broader applications across West Vancouver and beyond.

Taking Action: Cool Neighbours

In 2010, a resident in West Vancouver approached her neighbour to see if she was interested in helping their neighbourhood reduce its carbon footprint. The neighbour responded enthusiastically. They invited the rest of their neighbours to come together and have some fun while improving the world. They figured the easiest way to do that was through home energy conservation. When she started, the resident had 3 children under 6 and was deeply concerned for their future. She hoped the idea could catch on and make a real difference in her children’s lives. It started with one neighbourhood and has spread to 20 across five municipalities.



Big Wins

- support Cool Neighbourhoods in soliciting funding for a multi-year, neighbourhood level comprehensive climate action pilot project that can be used to ascertain cost effectiveness, strengths and limitations of scaled up neighbourhood scale action.

I Social Marketing Leverage

- Integrate a social marketing dimension into major strategic directions to strengthen resonance and response.

The District has a well-established and successful approach to integrating sophisticated education and outreach to enhance take up of programs that depend on more sustainable behaviours by residents and businesses, such as water conservation, curb-side organics diversion and active travel to school. This approach is, ideally, extended into implementation of relevant CEE Plan actions.

Big Wins

- ensure social marketing is integrated into the implementation of CEE Plan actions through budgets and work plans to strengthen take up on policies and programs
 - strengthen the District’s community climate action brand building on the CEE Plan vision: *a better climate for our prosperity, our health and nature.*

J Cool Community Leaders Award

- Establish a community climate leaders award to promote and profile notable climate action by local residents and businesses.

Profiling climate action leadership can help establish new norms, promote policies and programs of the District and other institutions advancing climate action.

The entire process promotion, soliciting nominations, judging, awards—could be undertaken in a manner to foster interest, awareness and active participation. For administrative efficiency, the awards may be appropriate to integrate into a broader community awards programs.

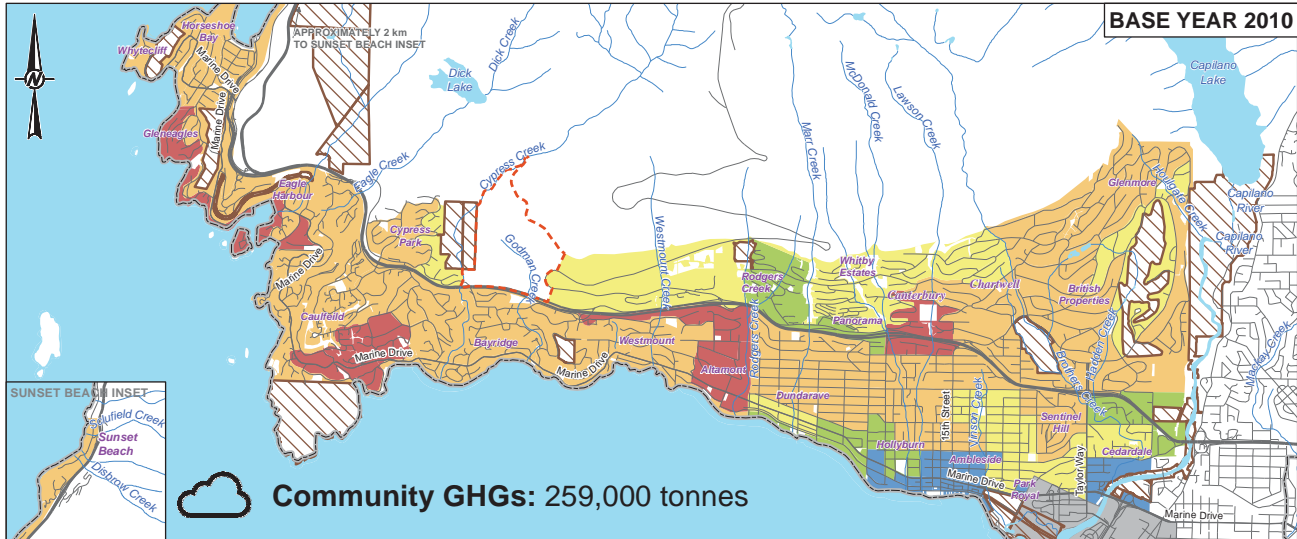
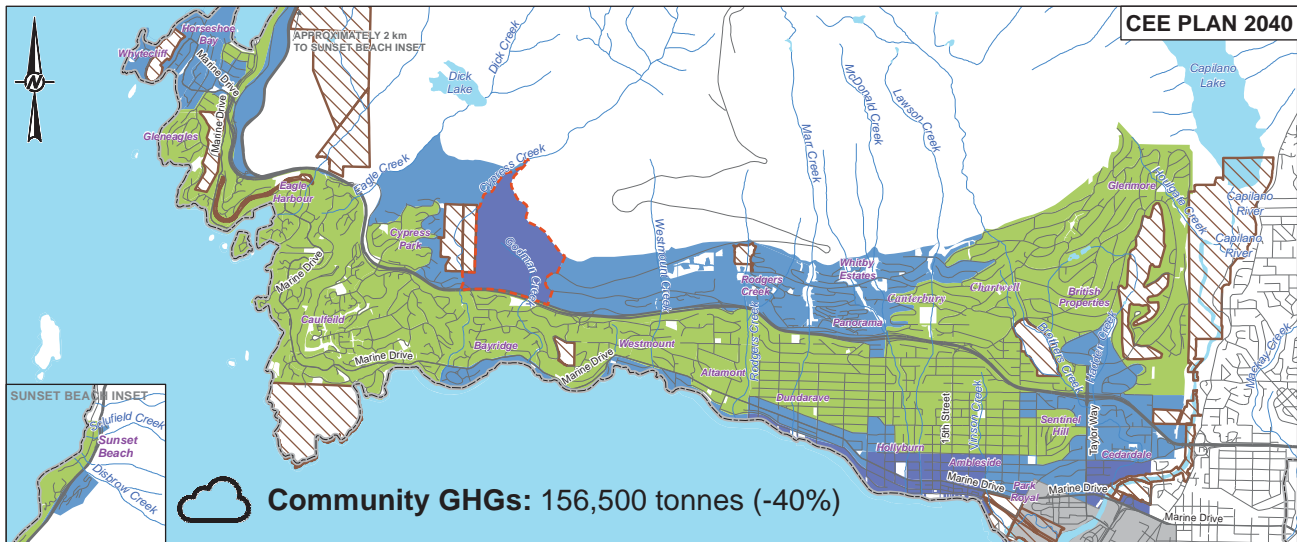
Quick Wins

- Establish a community climate leaders award program that promotes, profiles and celebrates climate action by local residents, businesses and institutions, and raises awareness of District policies and priorities on climate action:
 - retrofits and renovations
 - new construction
 - climate action business (in food service, retail, etc)
 - employee engagement and action
 - apartment engagement and action
 - school engagement and action
 - climate change adaptation (e.g. water conservation, foreshore protection, habitat restoration)
 - sustainable transportation (e.g. personal active travel commuting, office ride share).
- While some categories may be constant, some may change based on short term District priorities.

III: IMPACT ANALYSIS

Part III provides a more detailed account of the CEE Plan's major impacts over three sections.

1. *Impact Synopsis* provides an overview of the strategic directions' major impacts
2. *Energy & Emission Impact Analysis* details sector by sector the strategic directions' impacts on GHGs, energy use and associated key indicators such as energy and transportation spending and congestion-related activities
3. *2040 Spatial Snapshots* details key impacts of the plan with "spatial" or land use dimensions.



1. IMPACT SYNOPSIS: BETTER CLIMATE, BETTER COMMUNITY

The Better Climate Better Community CEE Plan drives deep carbon reductions and simultaneously advances multiple core community priorities. Highlights are enumerated below.



Community Greenhouse Gases

-40% by 2040

GHGs cut 100,000 tonnes annually with big reductions in every sector: buildings (-16%) transportation (-58%), waste (-83%)^X



Housing Diversity

+33%

Diverse mix of new town/row house, low, mid and high rise, for downsizers and young families^X



Forest Protection

50 Hectares

Avoid 50 hectares of forest loss and 9,000 tonnes forest carbon emissions with smart growth^Y



Traffic

-30%

Reduce cars and total yearly community kilometres driven while improving access to all transportation choices^{Y,Z}



Frequent Transit Access

+100%

Double the share of population with access to transit operating every 15 minutes 7 am to 7 pm^X



All Ages Walking + Cycling

20 km by 20 km by 2025
Extend sidewalks 20 km and ultra-safe bike routes 20 km by 2025^X



Active Walker, Healthy Weight Residents +1300%

Increase share of residents in extremely walkable neighbourhoods with low obesity/overweight likelihood^X



Energy Savings

\$2500/Household/Year

Reduce average household transportation and building energy spending 45%^X



Transportation Savings

\$3230/Household/Year

Reduce average household transportation spending 20% due to attractive transportation choices and reduced car ownership requirements^Z



Infrastructure Savings

\$500/Household/Year

Avoid \$11.5 million annually in new infrastructure spending across the community (\$500 per household) through smart growth^Y



Community Savings + Economic Development

\$463.5 million

2010-2040 community savings on energy, transport + infrastructure, a high share would be re-spent regionally^{X+Y}

^X 2040 performance relative to today | ^Y 2040 performance relative to Business As Usual

^Z Many households shed marginally used second cars in village areas where access to cars rises through car share which becomes extensively utilized. There is significant growth in active travel, transit and car share trips.

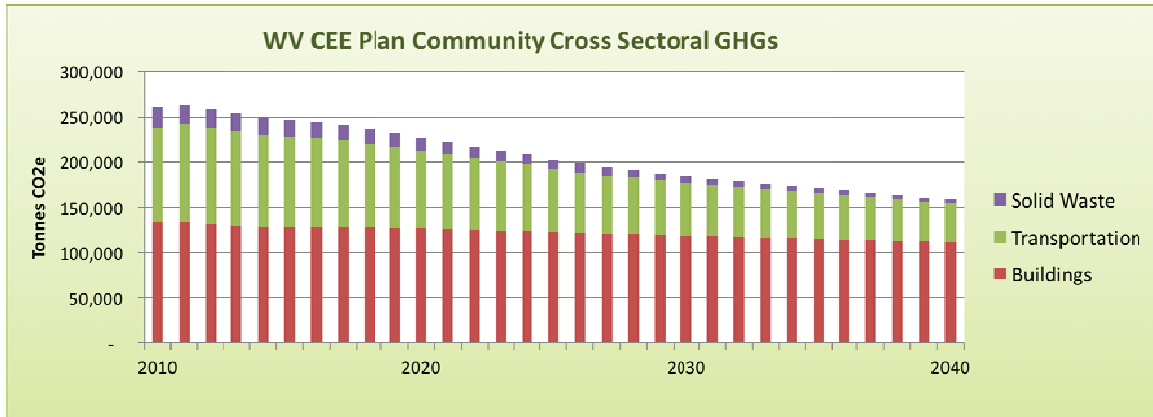
The following two sections provide details on these impacts. The *Energy and Emission Indicators* appendix includes more extensive performance details about the plan.

2. ENERGY AND EMISSION IMPACT ANALYSIS

GHG, energy and electricity activity, including community and household spending, changes measurably between 2010 and 2040. Comparing the base year, CEE Plan 2040 and the Business-As-Usual 2040 future provides insight into how this plan is creating *a better climate for our prosperity, our health and nature*.

COMMUNITY GHGS, ENERGY AND ELECTRICITY

Total GHG Synopsis



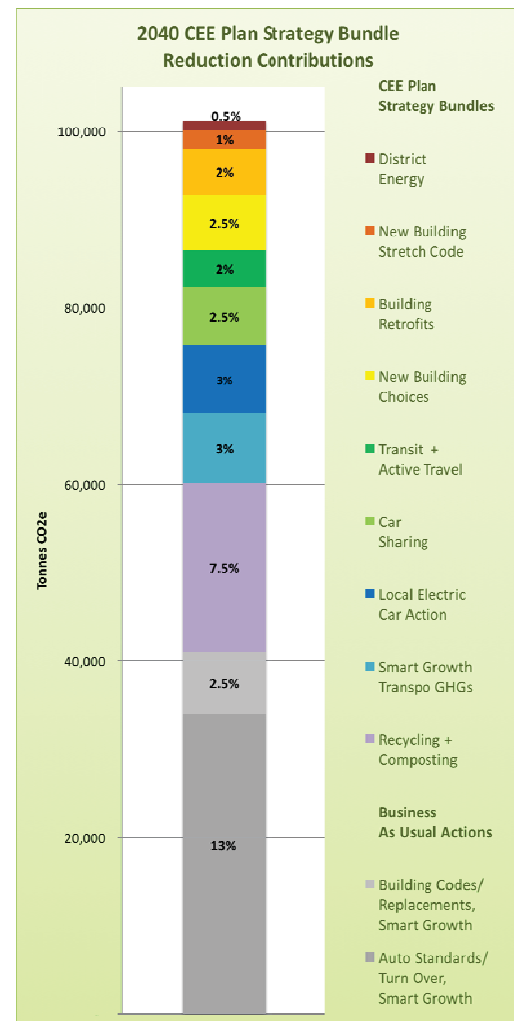
CEE Plan’s strategic directions reduce GHGs 100,000 tonnes per annum by 2040, a 40% reduction while population grows 16% and local jobs grow 20%. Three quarters of reductions are from energy conservation and fuel switching. The remainder is from solid waste diversion from landfills and waste to energy combustion.

Reductions are greatest in transportation, followed by solid waste and then buildings.

Reductions are driven by a suite of strategic direction bundles across the community’s key energy and emission sectors, on top of Business-As-Usual (BAU) activity:

- Building Sector Strategic Directions
 - New Building Choices
 - Building Retrofits
 - New Building Stretch Code
 - District Energy
- Transportation Sector Strategic Directions
 - Smart Growth
 - Local Electric Car Action
 - Car Share in Villages
 - Transit and Active Travel
- Solid Waste + Materials Sector Strategic Directions
 - Recycling + Composting

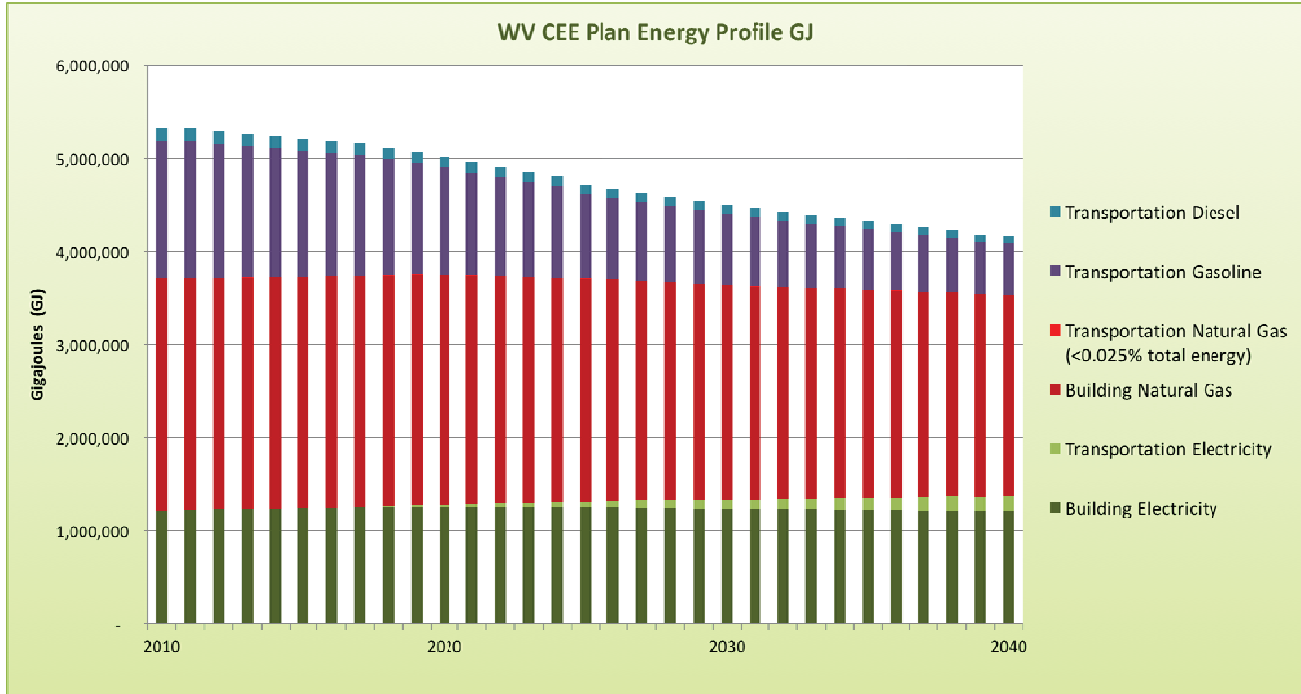
BAU activity takes into account current senior government commitments, notably improvements in vehicle efficiency, building code recent BC Hydro grid decarbonization commitments. Local building and vehicle stock turnover, then realizes those GHG reductions and smarter growth also results in building and transportation emission reductions.



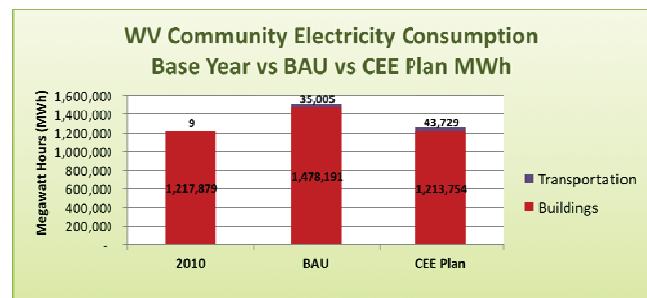
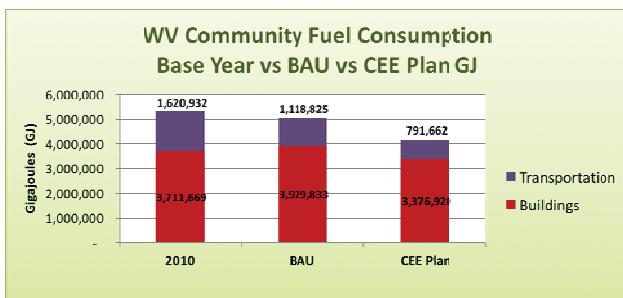
Total Energy and Electricity Synopsis

CEE Plan’s strategic directions result in a 22% reduction total energy consumption (GJ) across the community.

Buildings comprise a much greater share of total energy use relative to transportation: a 70/30 split in 2010 and 80/20 split in 2040 under CEE Plan. While building energy consumption improves dramatically on a household basis, these gains are largely offset by growth in commercial and residential buildings.



Energy reductions are greatest in the transportation sector (-51%) mostly due to the very significant take up of personal electric vehicles (40% share) which are highly efficient relative to internal combustion engines and reduced personal driving distances due to the attractiveness of car share, transit and active travel in walkable villages. Energy consumption in 2040 under BAU was also considerable (-31%) mostly due to significant take up of personal electric vehicles (30% share) followed by increased transit use.



Total energy consumption also drops in the building sector (-9%) under CEE Plan. This can be attributed to shifts in building typologies, building stock replacements with more energy efficient buildings, energy retrofits and new construction stretch codes. Building energy consumption rises 6% under BAU due to the growth in the number of buildings and floor area. In the absence of energy code improvements that reduce energy consumption in replacement and new buildings, growth in energy consumption under BAU would have been much greater.

Total electricity consumption is essentially stable between 2010 and CEE Plan 2040 (growing a modest 3.5%). Electricity consumption, in fact, drops slightly in the building sector but rises dramatically in the transportation sector (from 10 MWh in 2010 to 43,730 in 2040). The transportation sector, remains a small share of total electricity consumption (3.5%) by 2040. Stable electricity consumption in the building sector reflects significant growth in electricity for heating in multi-family buildings offset by more significant electricity conservation due to a shift towards more energy efficient building types (replacements and new), building energy retrofits and stretch code.

Relative to BAU, CEE Plan electricity reductions are significant, -17% and 256,000 MWh annually.

Total Energy Related Spending

Despite growth in the number of homes and businesses and increased transportation mobility, community-wide energy spending between 2010 and 2040 drops 30% under CEE Plan relative to 2010 (\$112 million per year to \$79 million per year based on 2015 dollars and energy prices).²¹ Cuts in energy spending at the household level are even more dramatic, dropping 45%, saving households \$2446 per year. Significant savings are accrued in homes (-20%) and really significantly in transportation (-65%). Households save an additional \$3,200 annually on transportation costs, due to a measureable increase in active travel and modest increase in transit and car share spending and, large reductions in personal automobile spending.

Cumulatively between 2010 and 2040, transportation and energy savings amount to \$33,500 per household and \$290 million across the community. These savings are further discussed in *Cumulative Savings and Community Economic Development*, below.

Community and Household Energy + Transportation Spending

Community Energy Spending Per Annum	Base Year 2010	BAU 2040	CEE Plan 2040	Δ fr 2010
Buildings	\$ 55,077,873	\$ 61,773,960	\$ 62,080,319	
Transportation	\$ 57,013,028	\$ 39,284,646	\$ 26,734,084	
Total Community	\$ 112,090,901	\$ 101,058,596	\$ 78,814,402	
Community Savings over 2010	-	\$ 11,032,305	\$ 33,276,499	-30%
Average Household Energy Spending Per Annum				
Residential Building Energy Per HH	\$ 2,436	\$ 2,268	\$ 1,926	-21%
Personal Transportation Energy (Auto fuel) Per HH	\$ 3,012	\$ 1,662	\$ 1,076	-64%
Total Household Energy Spending	\$ 5,448	\$ 3,928	\$ 3,001	
Household Energy Savings over 2010	-	\$ 1,520	\$ 2,446	-45%
Combined Avg Household Energy + Transpo Savings Per Annum				
Additional HH Transpo Savings Over 2010*	-	\$ 953	\$ 3,229	-19%
Total HH Energy + Transpo Savings Over 2010	-	\$ 2,473	\$ 5,675	-26%
Cumulative Transportation + Energy Savings				
Community Wide Savings 2010-2040			\$ 291,052,769	
Household Savings 2010-2040			\$ 33,480	

All costs (e.g. energy prices, additional transpo costs) held constant in 2015 dollars for comparison purposes.

DWV Household Assumptions: 17,428 (2010) | 20,992 (2040 under BAU + CEE Plan)

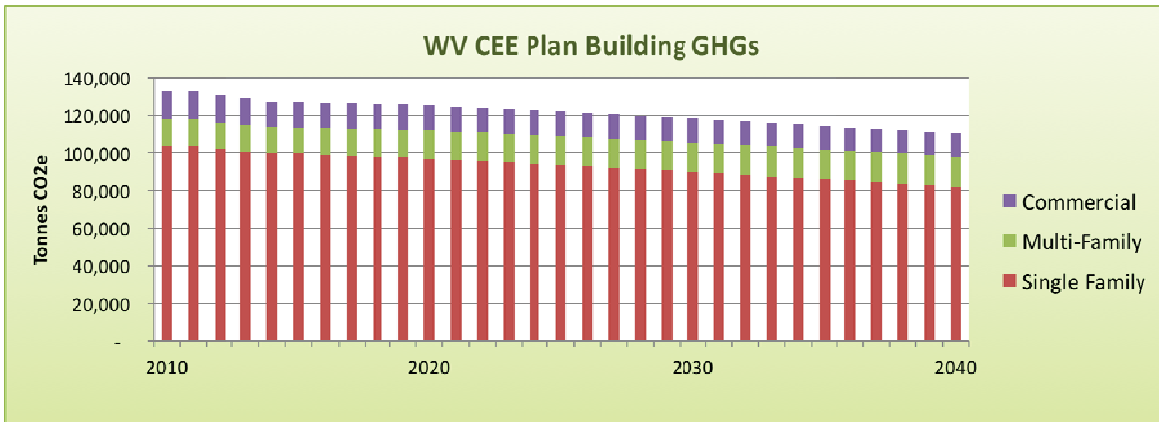
*Additional transportation savings result from the difference between reduced personal automobile (ownership) spending, and increased spending on transit + car share (CEE Plan). Cost differentials exclude transportation fuel savings, already accounted for. Total annual average transportation savings under CEE Plan relative to 2010 amount to \$5,165, including \$1936 in fuel savings (\$3012 in 2010-\$1076 under CEE Plan).

²¹ Current and future amounts are in 2015 Canadian dollars and energy prices. These amounts do *not* consider changes in energy prices. While gasoline, diesel and natural gas prices have dropped recently, they are projected to rise over the long term. Electricity prices have been steadily rising. Actual conservation savings in the future, therefore, would need to consider energy prices changes.

BUILDING & LAND USE GHGS, ENERGY AND ELECTRICITY

Building GHG Synopsis

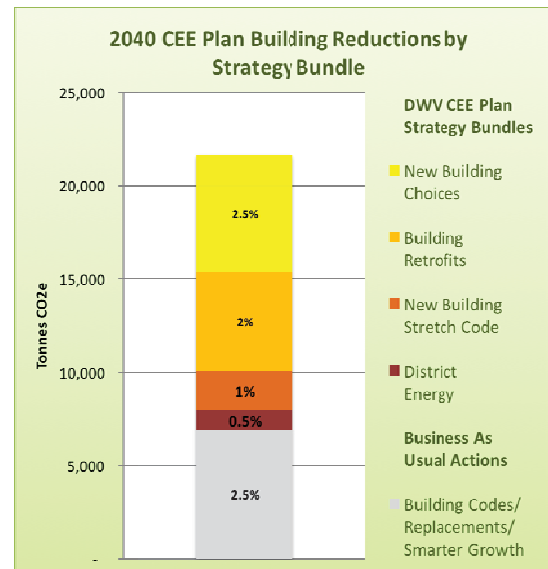
CEE Plan's strategic directions reduce GHGs 16% by 2040 from 2010 in the building sector.



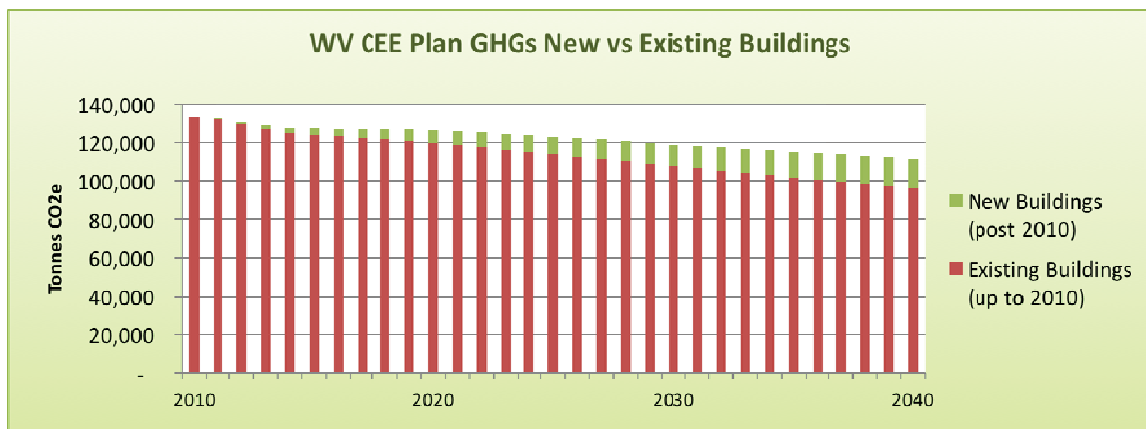
The greatest cuts are accrued from diversifying choices in new housing, with a small contribution from modest growth in suites or stratified units in large homes (2.5% of total GHG reductions).

An energy retrofit initiative delivered with community partners accrues the next greatest share (2%). While this strategic direction ambitiously doubles the background energy retrofit rate (.75% to 1.5% of existing homes per year), many homes standing today do not see dramatic performance improvements. The implication is the vast majority of building carbon in 2040 is still from existing homes, see *GHG New vs Existing Buildings* chart, below.

Requiring larger homes and apartment high rises to meet soon-to-be-introduced provincial stretch codes reduces GHGs another 1% of total GHGs. District energy in a select few areas of focused, higher intensity growth yields another 0.5%.



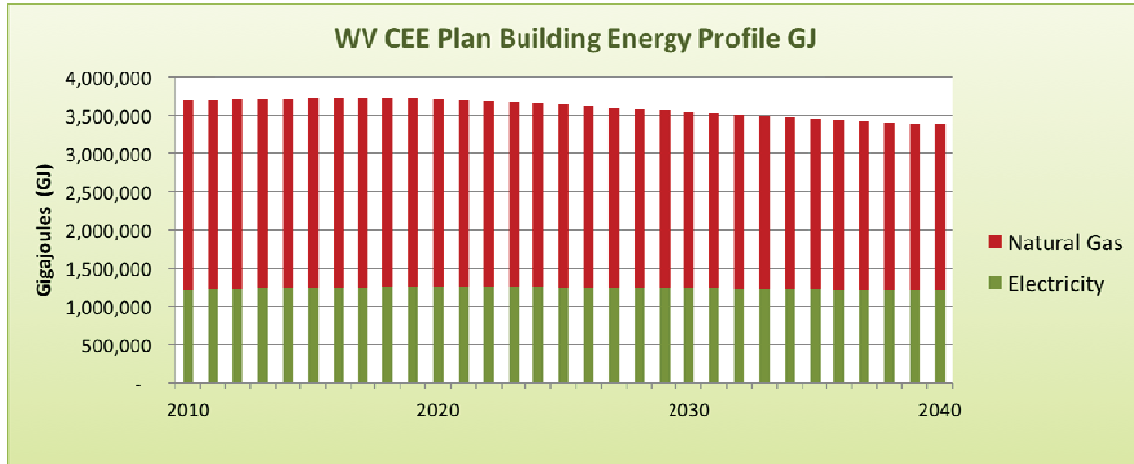
These strategic directions are layered on top of provincial government building code improvements, a turnover of the existing building stock with higher efficiency new homes and a trend towards smaller, multifamily homes.



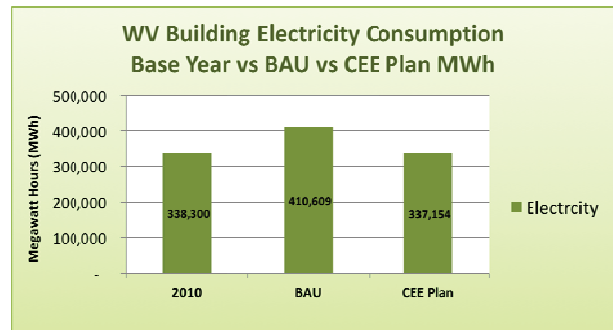
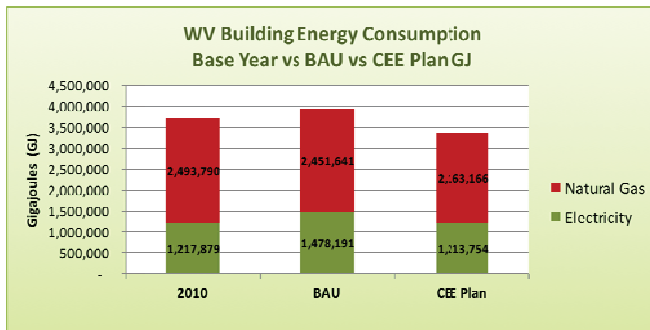
Building Energy and Electricity Synopsis

CEE Plan’s strategic directions result in a 9% reduction in building energy consumption (GJ) between 2010 and 2040.

From a fuel consumption perspective, this reduction is entirely due to reduced natural gas consumption (-13%), as electricity consumption remains essentially stable (dropping less than 1%). Under BAU, natural gas consumption drops slightly (2%) while electricity grows significantly (21%). Electricity consumption rises due to growth in new buildings (and total floor area) and the use of electricity as a heating fuel in multi-family housing, shifting away from natural gas.



Under CEE Plan, growth in building electricity use relative to 2010 is offset by residential energy retrofits and stretch code, amounting to stable electricity demand (less than 1% or 4,000 MWh per annum). Relative to BAU, however, building electricity consumption under CEE Plan is reduced significantly (-18%, 265,000 MWh per annum). Increased electricity demand as a heating fuel in multi-family under CEE Plan is offset by energy retrofits and stretch code and modest district energy development in a couple focused growth nodes.



Building Energy Spending

Average household spending on electricity and natural gas drops 20% under CEE Plan (~\$500 per year), see Detailed Building Sector Energy and Emissions 2010, BAU + CEE Plan table below. Total community wide building energy spending under CEE Plan drops 5% (~\$3 million). The explanation behind measurable household energy savings and modest community wide savings is the growth in building floor area. Total community wide energy spending includes commercial buildings. Over the plan’s horizon, roughly a generation, cumulative average household savings amount to \$7,500 and community savings \$45 million.

Detailed Building Sector Energy and Emissions 2010, BAU + CEE Plan

	Base Year	BAU 2010	CEE Plan 2040					Change fr 2010	
	2010	2018 Code Stock Δ, BG Retro	Smart Growth Building Choices	Additional Code Improvements*	Stretch Code	District Energy	Modest Local Retrofits		
N.B. strategy bundles are layered on top of one another									
GHGs Per Annum by Sector (t CO2e)									
Single Family	103,928	96,272	89,974	89,385	88,130	86,130	83,220		
Multi-Family	14,095	16,005	17,909	17,596	17,216	16,183	15,772		
Commercial	15,108	14,396	12,556	12,995	12,516	12,516	12,516		
Total	133,132	126,672	120,439	119,976	117,862	116,829	111,508		
CO2e Reduction Contribution fr 2010	-	6,459	6,234	463	2,114	1,033	5,321		
% Reduction Contribution fr 2010	-	-5%	-5%	-0.3%	-2%	-1%	-4%		
							CEE Plan Total Reduction fr 2010 (t CO2e)	21,624	-16%
							CEE Plan Total Reduction fr BAU (t CO2e)	15,168	-12%
Elec Per Annum by Sector (MWh)									
Single Family	185,311	229,697	191,471	188,516	182,441	182,441	173,473		
Multi-Family	45,619	58,760	70,906	68,022	66,225	66,225	64,857		
Residential	230,930	288,457	262,377	256,538	248,666	248,666	238,330		
Commercial	107,570	122,152	104,779	102,321	98,824	98,824	98,824		
Total	338,300	410,609	367,156	358,859	347,490	347,490	337,154		
							CEE Plan Total Reduction fr 2010 (MWh)	1,146	-0.3%
							CEE Plan Total Reduction fr BAU (MWh)	73,455	-18%
Gas Per Annum by Category (GJ)									
Single Family	1,986,300	1,879,875	1,781,535	1,750,351	1,726,464	1,726,464	1,630,030		
Multi Family	259,147	308,407	344,071	338,381	331,148	310,477	302,599		
Residential	2,245,447	2,188,282	2,105,606	2,088,732	2,057,611	2,036,941	1,932,629		
Commercial	248,536	263,533	230,203	239,483	230,597	230,597	230,597		
Total	2,493,993	2,451,814	2,335,809	2,328,215	2,288,209	2,267,538	2,163,166		
							CEE Plan Total Reduction fr 2010 (GJ)	330,817	-13%
							CEE Plan Total Reduction fr BAU (GJ)	288,649	-12%
GHGs Per Annum Existing vs New (t CO2e)									
Existing Buildings	133,132	97,459	103,858	103,856	103,856	103,856	98,535		
New Buildings	0	29,213	16,583	16,120	14,006	12,973	12,973		
Total	133,132	126,672	120,439	119,976	117,862	116,829	111,508		
							Existing vs New Building Ratio 2040 (t CO2e)	88.12	
GHGs Per Annum Elec vs Gas (t CO2e)									
Elec	8,457	4,106	3,672	3,589	3,475	3,475	3,372		
Gas	124,674	122,566	116,767	116,387	114,388	113,354	108,137		
Energy Per Annum Elec vs Gas (GJ)									
Elec	1,217,879	1,478,191	1,321,760	1,291,591	1,250,964	1,250,964	1,213,752		
Gas	2,493,963	2,451,814	2,335,809	2,328,215	2,288,209	2,267,538	2,163,166		
Total	3,711,862	3,930,006	3,657,569	3,620,106	3,539,173	3,518,503	3,376,918		
Energy Per Annum by Sector (GJ)									
Residential	3,076,795	3,226,727	3,050,162	3,012,269	2,952,810	2,932,139	2,790,555		
Commercial	635,067	703,279	607,407	607,837	586,363	586,363	586,363		
Total	3,711,862	3,930,006	3,657,569	3,620,106	3,539,173	3,518,503	3,376,918		
Energy Cost Per Annum (2015\$)									
Community Wide Elec	\$ 32,756,294	\$ 39,839,387	\$ 35,667,801	\$ 34,862,676	\$ 33,760,800	\$ 33,760,800	\$ 32,727,126		
Community Wide Gas	\$ 22,321,579	\$ 21,834,503	\$ 20,907,182	\$ 20,834,194	\$ 20,478,579	\$ 20,292,548	\$ 19,353,193		
Total Community	\$ 55,077,873	\$ 61,773,890	\$ 56,574,983	\$ 55,696,870	\$ 54,239,378	\$ 54,053,348	\$ 52,080,319		
							CEE Plan Total Community Savings fr BAU	\$ 9,693,632	-16%
							CEE Plan Total Community Savings fr 2010	\$ 2,997,534	-5%
							Cumulative CEE Plan Community Savings 2010-2040	\$ 44,963,312	
Residential Elec	\$ 22,360,068	\$ 27,987,594	\$ 25,213,117	\$ 24,643,985	\$ 23,865,082	\$ 23,865,082	\$ 23,134,391		
Residential Gas	\$ 20,097,143	\$ 19,576,932	\$ 18,678,440	\$ 18,613,233	\$ 18,295,527	\$ 18,129,525	\$ 17,290,109		
Total Residential Costs	\$ 42,457,209	\$ 47,564,526	\$ 43,891,557	\$ 43,257,218	\$ 42,160,609	\$ 41,994,607	\$ 40,424,300		
Residential Cost Per Household (HH)	\$ 2,436	\$ 2,265.84	\$ 2,090.87	\$ 2,080.65	\$ 2,008.41	\$ 2,000.50	\$ 1,926		
							CEE Plan Household Savings fr BAU	\$ 340	-15%
							CEE Plan Household Savings fr 2010	\$ 310	-21%
							Cumulative CEE Plan Household Savings 2010-2040	\$ 7,657	

*Additional code includes 1% per annum improvements after 2018 through to 2040 (This is not committed to but assumed)

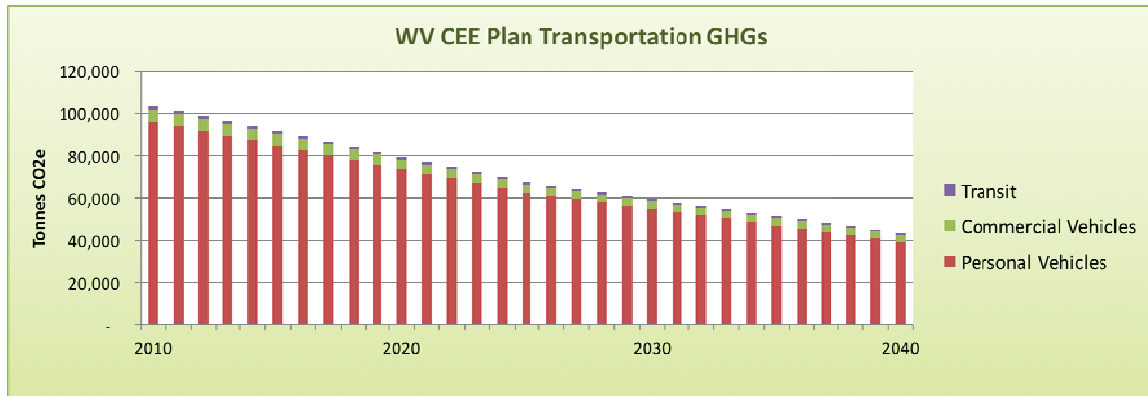
DWY Household Numbers: 17,428 (2010) | 20,992 (2040 under BAU + CEE Plan)

All costs (energy prices) held constant in 2015 dollars for comparison purposes.

TRANSPORTATION & LAND USE GHGS, ENERGY AND ELECTRICITY

Transportation GHG Synopsis

CEE Plan's strategic directions contribute to 58% GHG reductions by 2040 from 2010 in the transportation sector.

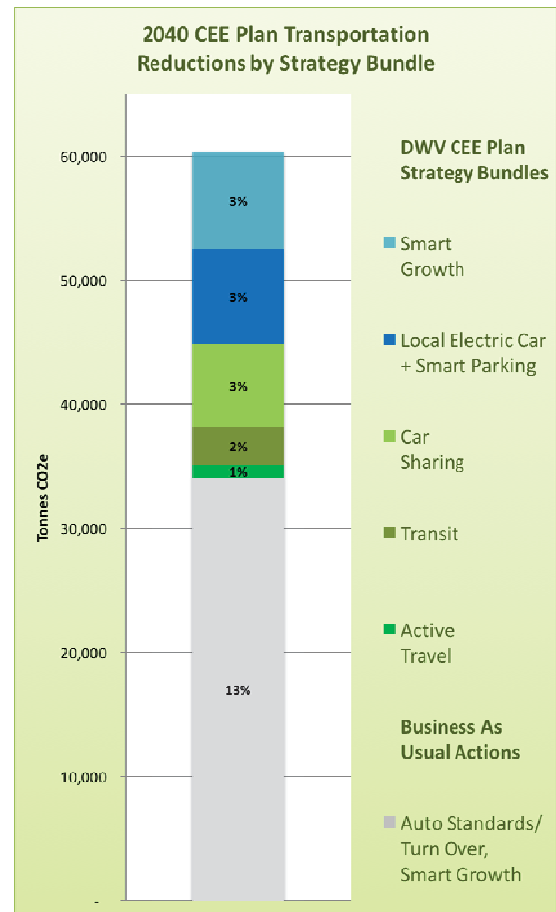


Smart growth and local EV action both contribute 7.5% reductions in GHGs and are the highest impact strategic direction bundles in this sector. Specifically, this entails creating more attractive housing options in more walkable, transit and car share friendly neighbourhoods close to key services like grocery stores, pharmacies and parks. Actions to support EVs involve ensuring more widely accessible charging infrastructure and parking incentives. Car sharing in villages increases active travel and transit, reduces driving distances and, in turn GHGs 6.5%.

Transit and active travel (cycling and walking) drive 4% and 2% reductions. (A share of active travel and transit reductions is also represented in Smart Growth.)

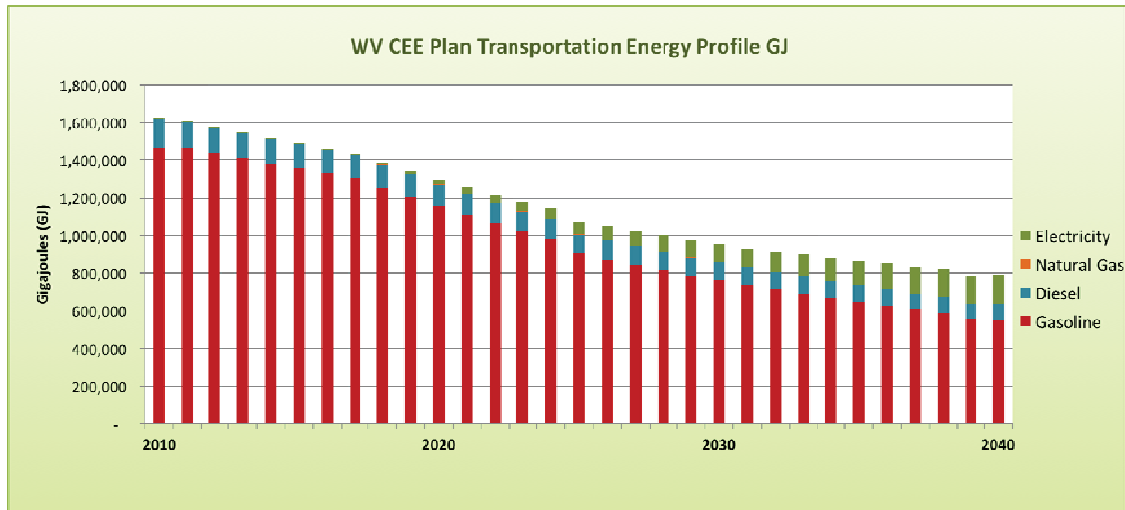
These strategic directions are layered on top of senior government vehicular efficiency regulations, market forces and a shift towards local smart growth and transit measures part of current trends.

The contribution of Electric Vehicles to reducing GHGs and energy use is exceptional in both BAU (current commitments and stock turnover) and CEE Plan. The combined energy efficiency improvement of electric cars in BC, four-fold superior to internal combustion engines, combined BC's low carbon electricity, results in electric cars generating 50 times less GHGs per km than an equivalent internal combustion car.



Transportation Energy and Electricity Synopsis

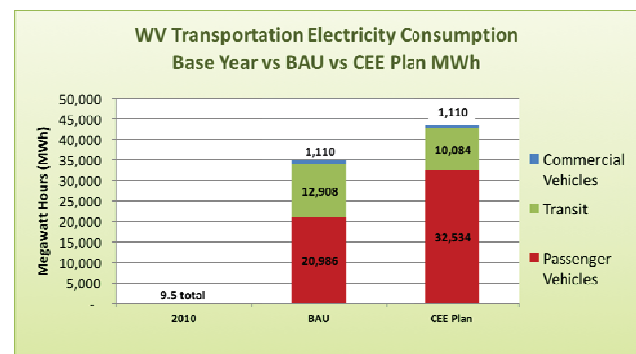
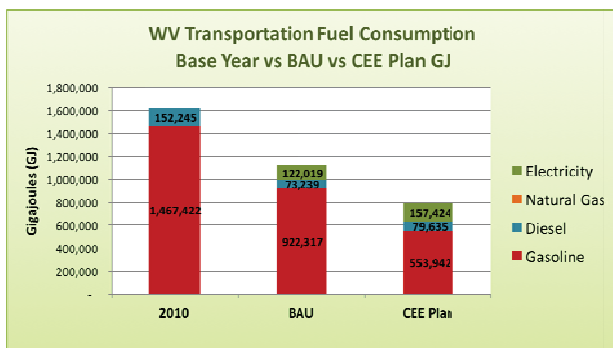
CEE Plan's strategic directions result in a dramatic 45% reduction in transportation energy consumption (GJ) between 2010 and 2040.



The biggest transformation is the electric vehicle share of overall vehicle stock in 2040 concentrated in the personal vehicle subsector (40% of total stock). This sector comprises >90% of energy use in transportation. Electric vehicles use 75% less energy relative to internal combustion engines due to efficiency, notably reduced waste heat generation.

The BAU Future still resulted in dramatic reductions energy use (-26%) due mostly to electric vehicle share of overall vehicle stock in 2040 (30% of total stock).

Layered on top of the electric vehicle shift are several other important dynamics. Under CEE Plan, despite 16% population growth, community wide car ownership shrinks 24% by 2040 (27,836 cars to 21,200) with a 35% per capita reduction (0.66 cars per capita in 2010 to 0.42 per capita in 2040). Reduced ownership is due to greater active travel access to key destinations, access to and use of good quality transit and car share availability in walkable village areas. While per household driving distances drop significantly under CEE Plan, individual car share automobiles accumulate much higher distances travelled per year to personally owned cars, contributing to 10% higher total driving distances across the community (412.5 million km in 2040 under CEE Plan vs 373.5 million in 2010). Household driving distances drop from 95 km/day in 2010 to 83 km/day in 2040 under CEE Plan.



The BAU Future does not have car share, resulting in significantly higher vehicle distances travelled over 2010 and CEE Plan (574 million or 54% higher than 2010). This largely explains the higher total energy consumption in 2040 under BAU vs CEE Plan. BAU, nevertheless, has greater public transit use (9.4 km/day vs 9.3 km/day for CEE Plan and just more than 8 km/day in 2010). The BAU Future has higher transit use because more growth is situated around Park Royal which provides excellent transit access to downtown Vancouver and North Vancouver—the principle work destinations for West Vancouver's workforce. Other important distinctions with the CEE Plan future that

contribute to higher driving distances under the BAU Future: residents across the community do not have as great active travel (notably walking) access to key destinations, (e.g. grocery stores, parks, pharmacies) and they do not have car sharing options.

Electricity consumption in transportation rises dramatically under CEE Plan (from 10 MWh in 2010 to 43,700 MWh in 2040). This large growth, still accounts for a very small share of total community electricity consumption (3.5%) by 2040. CEE Plan electricity consumption is 25% greater than BAU due, to the additional 10% share of electric vehicles (amount to an additional 8,700 MWh per year) and a higher share of multi-family units.

Energy Insight: Car Share - Cutting Carbon, Costs and Carbohydrates

Households with car share access and utilization have lower car ownership rates. Under CEE Plan, most households maintain the same car ownership levels, however, some households in village areas with an infrequently used 2nd or 3rd car are the most likely candidates to shed one. The car share business model is only viable in village areas where there is high car demand based on a proximate market of users and, ideally, two-way traffic (i.e. car share users are coming and going throughout the day from and to businesses, residents, work places and other key destinations such as recreation centres and libraries). The business case for owning marginally used cars is not good. An *average* West Vancouver car costs more than \$10,000 per year to own and operate. An average car is parked 95% of the time. Many cars are used even less than this, but only cost fractionally less to own and operate.

Car share users get the personal mobility services they need when they need it, but spend a fraction of what car owning households spend on transportation. They also have improved health outcomes, specifically increased physical activity and healthier weights. Car share users use cars as part of a suite of transportation choices (i.e. car, transit, walk and sometimes bike) which are optimized by a trip's unique characteristics.

Car share operator ZipCar took the keys from 250 heavily habitual car drivers in a study across 13 US cities (US News Medical, 2009). They had to bike, walk, train, bus or if needed, use car share. After one month, personal bike distances rose 132%, walking distances rose 93% and collectively they lost 413 pounds. Transportation spending declined 67% and 100 of the 250 habitual drivers elected *not* to take their keys back.

Transportation Energy Related Spending

Total community-wide transportation fuel spending drops 50% under CEE Plan relative to 2010 and 65% per household (from \$3000 of transportation fuel in 2010 to \$1100 in CEE Plan 2040), see *Detailed Transportation Energy Activity and Spending* table, below. This drop in transportation spending is mostly attributable to the fuel sipping performance of electric vehicles and low cost of electricity relative to gasoline per energy unit. Other factors include diverse attractive transportation options that are less expensive, (i.e: easy active travel e.g. walking and some cycling) to key services, better, high-quality transit access and car share access. Under CEE Plan, some households in village areas shed marginally used second cars and thus spend less per year on automobile operation and ownership (\$9590 per year per auto in 2040 under CEE Plan).²² They spend more annually, however, on transit (\$1500 for an annual pass) and car share (\$1500 for high annual use of 3,000 km). The net result is that on average households across the community reduce transportation spending by more than \$5000 per year, savings of up to 30% per household. Over the plan's horizon, roughly a generation, cumulative savings are significant, amounting to \$26,000 for an average household and \$246 million across the community.

²²CEE Plan 2040 average annual car ownership cost (\$9590) is less than current ownership costs (\$10,400) due to reduced fuel spending.

Detailed Transportation Energy Activity + Spending 2010, BAU, CEE Plan

	Base Year 2010		BAU 2040		CEE Plan 2040		vs 2010	
Total transportation energy and GHGs (GJ CO2e)	1,622,246	108,713	1,118,824	68,285	868,707	46,616	-46%	-57%
-Personal Vehicles	1,412,323	96,033	1,028,293	63,113	660,196	37,730		
-Commercial Vehicles	136,835	8,694	61,682	3,778	131,466	6,063		
-Transit	63,088	3,986	28,849	1,394	77,045	2,823		
Total community personal automobiles	1,548,446	108,713	1,118,824	68,285	868,707	46,616		-74%
Total personal automobile KM travelled/yr	373,590,674		573,999,957		412,504,496			10%
Avg daily personal driving distances per capita	95		90		83			
Household car share use								
-Park Royal, Armbleside, Dundarave	-1%		-1%		70%			
-Counfield, Cypress, Horseshoe Bay	-1%		-1%		85%			
-Micro Markets	0%		0%		15%			
Personal electric automobile share	-15%		30%		40%			
Avg personal automobile CO2e intensity/km	257		110		91			
Personal automobile ownership per capita	0.66		0.61		0.42			
Personal automobile ownership per HH	1.62		1.46		1.01			-37%
Population 400 m to key transpo amenities								
-Basic Bus (5 min walk)	85%		93%		91%			
-Frequent Transit (every 15 mins, 7 to 7)	31%		N/A		68%			
-Basic Bike Network	70%		81%		86%			
-Triple A Bike (All Ages + Abilities)	8%		N/A		51%			
Total community transit passenger km/yr	373,590,674		573,999,957		412,504,496			10%
Average daily transit passenger km per household	8.0		9.4		9.3			
Total community fuel consumption/yr	\$ 57,013,028		\$ 39,284,646		\$ 26,734,084			-53%
-Gasoline (litres / \$)	42,167,302 \$ 52,118,785		27,033,438 \$ 33,413,330		15,917,878 \$ 19,674,497			
-Diesel (litres / \$)	3,944,182 \$ 4,867,121		1,898,424 \$ 2,342,655		2,063,087 \$ 2,545,849			
-Natural Gas (litres / \$)	31,888 \$ 26,148		49,941 \$ 40,952		17,128 \$ 14,045			
-Electricity (kW-h / \$)	9,470 \$ 974		33,894,167 \$ 3,487,710		43,728,788 \$ 4,499,692			
Personal automobile fuel consumption/yr	\$ 52,485,570		\$ 34,887,886		\$ 22,577,743			
-Gasoline (litres / \$)	41,055,284 \$ 50,744,331		25,750,919.68 \$ 31,828,137		15,162,703 \$ 18,741,101			
-Diesel (litres / \$)	1,333,149 \$ 1,719,516		358,970.96 \$ 442,970		380,107 \$ 481,392			
-Natural Gas (litres / \$)	25,955 \$ 21,283		26,787.04 \$ 21,965		9,187 \$ 7,533			
-Electricity (kW-h / \$)	4,270 \$ 439		25,216,852.08 \$ 2,594,814		32,535,692 \$ 3,347,717			
Avg fuel cost per car/yr	\$ 1,886		\$ 1,137		\$ 1,076			
Avg automobile fuel costs per household/yr	\$ 3,014		\$ 1,662		\$ 1,076			-64%
Avg cost per auto with fuel/yr	\$ 10,400		\$ 9,651		\$ 9,590			
Average HH automobile costs/yr	\$ 16,610		\$ 14,104		\$ 9,883			
Community automobile spending/yr	\$ 289,481,274		\$ 296,072,611		\$ 203,268,954			
Additional HH mobility costs (transit/car share)/yr			\$ 204		\$ 1,762			
Additional community mobility costs (transit/car share)/yr			\$ 4,276,999		\$ 36,994,428			
Total community transportation savings over 2010/yr			\$ (10,868,336)		\$ 49,217,891			
Cumulative community transportation savings 2010-2040					\$ 246,089,457			
Average household transportation savings over 2010/yr			\$ 2,302		\$ 6,265			-31%
Cumulative household transportation savings 2010-2040					\$ 25,873			

*This % savings is up to 31% as current transportation costs beyond the automobile are not accounted for e.g. transit and car share.

Key Assumptions: Fuel/Car Costs, Households

For comparison purposes, all transportation costs (fuels, transit passes, automobile ownership, etc.) are held constant in 2015 dollars.

Average automobile cost per year excluding fuel (BCAA, 2015)	\$ 8,514.00
Capital Depreciation	\$ 3,688.00
Insurance	\$ 2,619.00
Financing	\$ 1,041.00
Maintenance	\$ 1,020.00
Registration/License	\$ 146.00
Fuel	Varies-see table
High transit household spending/yr (annual pass)	\$1,500
High car share household spending/yr (3,000 km)	\$1,500
2010 Households	17,428
2040 Households (BAU + CEE Plan)	20,992

Average 2015 Fuel Price	
Gasoline	\$ 1.236
Diesel	\$ 1.234
CNG	\$ 0.820
Electricity \$/kWh	\$ 0.103
(Stats Can, BC Hydro)	

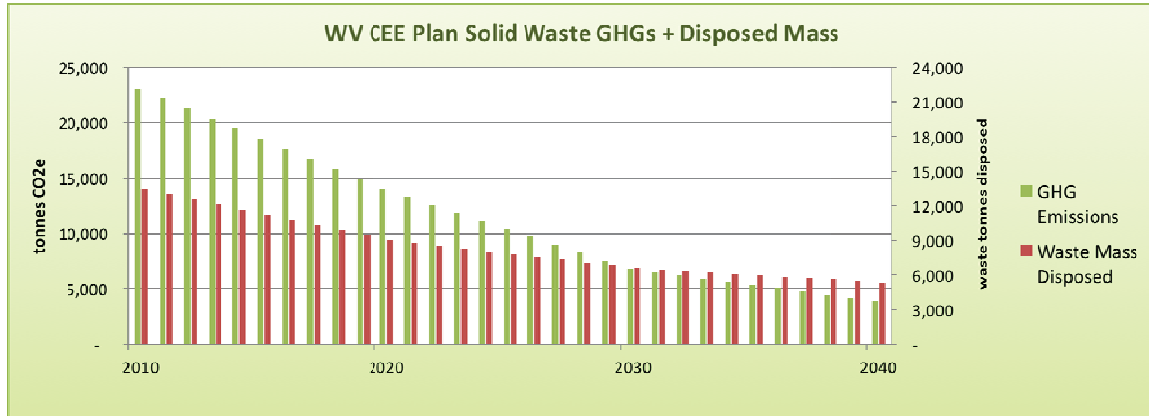
Under BAU + CEE Plan, every car reduction is replaced with an annual transit pass.

Under CEE Plan, every car reduction per household is replaced with high use car sharing costs.

SOLID WASTE AND MATERIAL GHGS

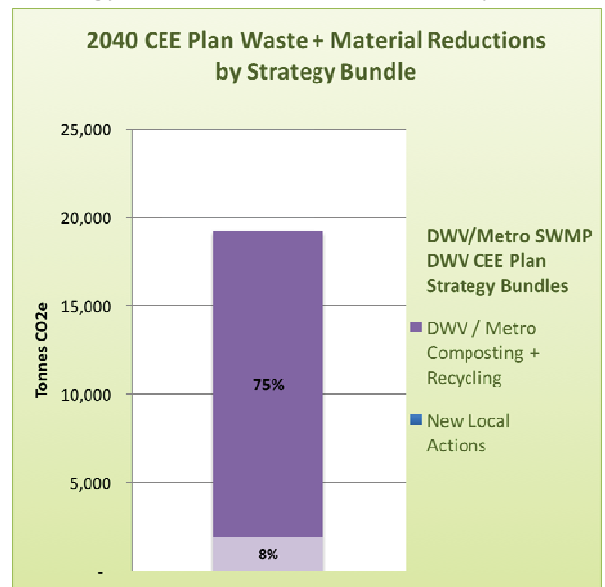
Solid Waste & Material GHG Synopsis

Solid waste GHGs are reduced 83% by 2040 from 2010 under CEE Plan.²³ This 83% diversion is driven overwhelmingly by continuing West Vancouver’s recycling and composting success in the single family sector and extending it to multi-family and the institutional/commercial sector.



The waste and material emission sector is different from the transportation and building sectors in two ways:

1. In contrast to building and transportation sectors, where emissions are energy related, solid waste GHGs are predominantly the result of organic waste decomposing anaerobically in landfills emitting methane—a highly potent GHG. While there is a very small GHG share (2%) from waste combustion at the Burnaby energy recovery from waste facility, which are energy-related, this management strategy results in net GHG reductions by reducing landfill methane emissions, see *Solid Waste and Material Tonnage & GHGs* table, below.
2. District of West Vancouver (and Metro Vancouver Regional District) progress in solid waste GHG management is quite advanced and anything but Business As Usual. The District, Metro Vancouver and other local governments in the region, have amongst Canada’s most advanced programs and policies aimed at diverting waste from landfills, with a notable emphasis on organic diversion (the source of waste GHGs). An ambitious regional Integrated Solid Waste and Resource Management Plan (ISRMP) was adopted in 2011, around the same time the District established its official GHG reduction target through an Official Community Plan amendment. It is for this reason, that under CEE Plan, there are no “Business As Usual” activities. The District’s intensified solid waste and material management activity are the essence of the CEE Plan strategic directions in this sector.



²³ Waste GHGs have been calculated using a *Methane Commitment* methodology based on calculating total methane GHGs that will be emitted from that mass of organic material that goes to a landfill over its life. This methodology effectively reflects year-to-year changes in organic diversion at the community level. This methodology is different than the BC MoE Community Energy and Emissions Inventory *Waste In Place* methodology that calculates methane GHGs from a landfill in the year it was dumped. This latter methodology reflects actual methane GHGs at a landfill during a given year, which are based on decomposition of the entire waste volume in a landfill, most of which is from previous years. While not instructive for community waste or community GHG management, it is a useful landfill management indicator.

While most GHG reductions are the result of meeting the District’s ambitious solid waste diversion targets and implementing strategies under the shared Metro Vancouver Plan, there is a modest incremental effort, about 8%, that goes beyond these commitments. These incremental reductions are the result of sustained incremental efforts in the same sub-sectors beyond the ISRMP which will have expired over the CEE Plan horizon. (ISRMP focused on meeting targets by 2020.)

The large GHG reductions in solid waste are due to organics diversion from landfill. While one quarter of landfill waste by tonnage goes to the Burnaby energy recovery from waste facility in 2010, GHGs from this facility comprise just 2% of 2010 waste emissions due to the relatively low GHG intensity of this management strategy relative to landfill management. GHG reductions in energy recovery from waste facilities are predominantly from fossil fuel combustion (mostly plastics). GHG reductions also result from improved landfill management.

In West Vancouver, the deepest diversion by weight over the CEE Plan horizon is in the single family sub-sector.²⁴ This happens for two reasons. First, the District, itself, manages waste and organics pick up in this sub-sector and, thus, has greater influence. It does not have the same level of influence in the other sub-sectors (i.e. multifamily and institutional/commercial/industrial). Second, the single family sub-sector is by far the largest sector, comprising 60% of households in a community with modest commercial and no industrial activity. The District is diverting 75% of waste as of 2016 in the Single Family Sector which includes many duplexes and other small multi-family homes. This amounts to 250 kilograms of residual waste per household per year. The District is aiming to reduce residual household waste to 200 kg by 2025 and 190 kg by 2025.

Solid Waste + Material Tonnage + GHGs

	Base Year 2010	CEE Plan 2040	Δ fr 2010
Total community disposed wide waste (excluding recyclables+compost)	13,436	5,360	-60%
Waste per capita	314	107	-66%
Waste Landfilled (tonnes)	10,258	2,120	
Waste to Energy Recovery Facility - combusted (tonnes)	3,240	3,240	
GHGs Landfill (tCO2e)	22,665	3,454	-85%
GHGs Energy Recovery (tCO2e)	432	432	0%
Total GHGs (tCO2e)	23,097	3,886	-83%
Single Family Disposed Waste (t)	5,482	2,419	-56%
Disposed waste Per Person kg	156	63	
Disposed waste per household kg	453	190	-58%
Diversion Rate	58.2%	-	
Multi Family Disposed Waste (t)	1,670	942	-44%
Disposed Per Person kg	222	74	
Disposed Per HH kg	342	114	-67%
Diversion Assumption	15%	-	
Institutional/Commercial Disposed Waste (t)	6,284	1,999	-68%
Total Jobs*	18,201	21,900	
Non-Home-Based Jobs*	15,107	18,177	
Disposed Per Non-Home-Based Job	416	110	-74%
Diversion Assumption	42%	-	

-Single Family 2010 values are based on actual DWV data. Multi-Family + Institutional/Commercial are Metro Vancouver estimates.

-DWV "single family" waste pick up includes some small multi-family

*17% of West Vancouver's workforce is home based. Waste from home-based employment is low and integrated into residential streams, therefore, only non-homebased jobs are used for estimating waste. (Home-based employment is treble the regional average.) There is also negligible West Vancouver "industrial" waste which generally has higher tonnage per employee.

The commercial/institutional sector is the second most important sub-sector by size and GHG reduction effort. Progress in this sector will be more challenging given lower District influence and authority. This sector,

²⁴ At the scale of the community, rates of diversion relative to overall landfill tonnage are becoming less meaningful as indicators (and targets) for solid waste and material management. This is because of the dramatic drop in some traditional curbside recycling volumes. Newsprint weight by volume has dropped 50%, reflecting the drop in hardcopy newspaper demand. This sizeable drop in curbside recycling volume has rendered diversion rates as a share of total weight less useful. Rather than diversion by total weight, CEE Plan uses per household or per employee weights depending on the sub-sector.

nevertheless, has a number of larger point sources, (e.g. food waste from grocery retail and restaurants), which if mobilized can result in big reductions.

The multi-family sector will also be more challenging due to the limited influence over waste and materials pick up contracted by private haulers. Some of the greatest opportunities will be in requiring sufficient space in new multi-family and intensifying residential diversion programs that meet single and multi-family sub-sectors.

There is a considerable volume of waste from demolition and construction, notably the former. While this is not technically considered a source of “community” emission by the BC Government, this is the largest source of waste by volume in Metro Vancouver and local governments have some measure of influence over it through permitting.

CIVIC INFRASTRUCTURE AND SERVICES SPENDING

The greatest determinant of the size and growth of municipal spending in Canada is civic infrastructure development, operation, maintenance and replacement and locational functions related to service delivery, (e.g. fire department service areas.) West Vancouver is no exception.

Roads, sewers, water mains, stormwater facilities cost more per household to serve in lightly populated residential neighbourhoods—Canada’s dominant urban form—than focused smart growth villages. Focused smart growth villages are not only lower cost, they are also lower carbon. The CEE Plan process coarsely estimated infrastructure life-cycle costs of different land use futures based key neighbourhood characteristics using precedent studies that applied a Ministry of Community Development infrastructure costing tool, including one North Shore study.²⁵

The *Civic Infrastructure and Service Costs by Neighbourhood* map, below, (Part III, Section III, Map III.E) graphically shows these results. Under CEE Plan modest new growth is focused in a new village at the base of Cypress Bowl Road and in existing villages with very modest gentle intensification of existing areas to increase local downsizing opportunities. The CEE Plan future reduces per household infrastructure requirements over today and a Business-As-Usual Future that would continue highly distributed development westwards across the upper lands.

Civic infrastructure and servicing costs to support CEE Plan are \$11.5 million less annually for the District or \$500 less per household over Business As Usual. Cumulatively over the plan’s life, the community would avoid \$172.5 million in costs and household would avoid \$7,400.

Community + Household Civic Infrastructure + Service Costs

Infrastructure and Services Costs	BAU 2040 Cost	CEE Plan 2040 Cost	CEE Plan Annual Savings Over BAU	CEE Plan Cumulative Savings Over BAU
Average household	\$ 5,770	\$ 5,280	\$ 490	\$ 7,350
Community-wide	\$ 121,591,000	\$ 110,092,500	\$ 11,498,500	\$ 172,477,500

For comparison purposes, all costs are held constant based on current prices and 2015 dollars. (Interest and inflation is not accounted.)

CUMULATIVE SAVINGS AND COMMUNITY ECONOMIC DEVELOPMENT

The vast majority of spending on energy (gasoline, diesel, natural gas, electricity) and cars leaves the region.²⁶ Money *not* spent on energy and transportation is more likely to be spent on goods and services with a greater propensity to be recirculated locally, specifically other large household expenditures such as food from restaurants and grocery stores, household operation, recreation, clothing, health and personal care and education.²⁷ While civic

²⁵ These studies made use of the BC Ministry of Community Development Community Lifecycle Infrastructure Costing (CLIC) Tool (2015) and its case studies, see: http://www.cscd.gov.bc.ca/lgd/greencommunities/sustainable_development.htm A dozen West Vancouver neighbourhoods were sampled and compared to neighbourhoods in precedent studies in BC. There was overwhelming agreement between neighbourhood design and infrastructure costs.

²⁶ The vast majority of energy spending leaves the community. A study by CEOs for Cities cites US Internal Revenue Service analysis showing 75% of retail gas prices and 85% of retail car prices also immediately leaves the community (Cortright, 2010).

²⁷ After transportation and housing, these are other top BC household expenditures according to Statistics Canada’s 2014 Household Spending Survey

infrastructure spending has greater local benefits, the aforementioned household expenditures also generate more regional jobs and economic activity.²⁸

Total cumulative savings and avoided spending over the life of the Better Climate Better Community Plan- approximately one generation-amounts to \$40,000 per household and \$463.5 million. These savings will increase the quality of life of West Vancouver households. A large share of these savings will also be spent and re-spent locally and regionally, increasing jobs and economic activity in West Vancouver and Greater Vancouver.

Annual and Cumulative Household + Community Savings Summary	Household Savings		Community Savings	
	2040 Annual	Cumulative 2010-2040	2040 Annual	Cumulative 2010-2040
Buildings (energy spending only)	\$ 510	\$ 7,657	\$ 2,997,554	\$ 44,963,312
Transportation (inclusive of energy car, transit, car share spending)	\$ 5,165	\$ 25,823	\$ 49,217,891	\$ 246,089,457
Civic Infrastructure + Services	\$ 490	\$ 7,350	\$ 11,498,500	\$ 172,477,500
Total	\$ 6,165	\$ 40,830	\$ 63,713,946	\$ 463,530,269

For comparison purposes, all costs are held constant in current energy, transportation prices and 2015 dollars. (Interest and inflation is not accounted.) Building and transportation savings are relative to 2010 consumption. Civic infrastructure and service costs are relative to business as usual.

²⁸ Local/regional economic and employment multipliers for “utility” activities are lower than these other sectors, according to BC Stats guidance of economic multipliers (Home, 2008)

3. 2040 SPATIAL SNAPSHOTS: CEE PLAN AND BUSINESS AS USUAL

A series of spatial snapshots compares activity between a Business-As-Usual future and CEE Plan at the final horizon (2040) to illustrate some of the plan's major impacts. Maps following the brief explanations.

MAPPING ANALYSIS

Map III.A: Annual GHG by Household by Neighbourhood CEE Plan 2040 and BAU 2040

Under CEE Plan GHGs are reduced 40% by 2040 from 2010 levels, or 100,000 tonnes per year. GHG reductions would be reduced under a Business-As-Usual future 22% over the same period. This map shows transportation and building GHGs by household by neighbourhood. Under both futures, significant reductions are due to more efficient, notably electric, personal automobiles and increased transit use. Building stock replacements and new construction are more efficient, making additional modest contributions. CEE Plan has greater electric personal automobile share, walkability and car share in the transportation sector and additionally increased retrofit and renovation activities and higher performance new construction in the building sector. GHGs are lowest in villages with more transportation choices and closer key destinations and lower GHG building types. New neighbourhoods have lower GHGs due to newer, more-efficient buildings.

Map III.B: Congestion Generation by Household by Neighbourhood CEE Plan 2040&and BAU 2040

Households in neighbourhoods with access to more diverse transportation options and closer key destinations (e.g. groceries, cafés, employment) drive less. Under CEE Plan, there are more trips by foot and bike, enabled by infrastructure in, around and between villages to accommodate all ages and abilities safely. While there is a modest increase in community wide driving distances with the higher population, there are fewer cars per household and fewer cars across the community. Car share becomes readily available in villages, reducing underutilized 2nd or 3rd cars in some households. Senior government and TransLink financed rapid transit is extended to Park Royal, Ambleside and Dunderave. The Business-As-Usual future has dramatically more personal driving distances than today, however, transit use is also much higher than today or under CEE Plan. This is because of high population growth assumptions under BAU around Park Royal. Transit is very attractive in the Park Royal area because of the diversity of routes and proximity to downtown and North Vancouver—the principle destinations of West Vancouver's work force. Active travel opportunities under BAU have not been strengthened in the same way.

Map III.C: Walkability by Neighbourhood CEE Plan 2040 and BAU 2040

Walking is the lowest carbon travel mode. Neighbourhood walkability is determined by good pedestrian infrastructure (e.g. sidewalks, crosswalks) and proximity to key destinations like grocery stores, pharmacies, libraries, recreation centres, parks and transit. Sufficient residential densities make these commercial and public amenities viable. Average walking propensity is very high for destinations up to 400 m and tapers right off at approximately 1 km. West Vancouverites <40 and >65 are more likely to walk for errands than those 41-64 (Vancouver Coastal and Fraser Health Authorities, 2015). Younger and older generations value walkability more than middle aged people (Frank, 2014). In concert with other planning agendas like the Strategic Transportation Plan, CEE Plan creates more walkable neighbourhoods and more housing options in these areas. The Official Community Plan update will also examine these opportunities in greater depth.

Map III.D: Healthy Weight Neighbourhoods CEE Plan 2040 and BAU 2040

Comprehensive analysis of health outcomes across the region by Vancouver Coastal and Fraser Health Authorities (2015) shows healthy weight correlates with neighbourhood walkability. Only those in highly walkable neighbourhoods (i.e. “Walkers Paradise” neighbourhoods with walkscore.com scores ≥90) are more than 50% likely of having healthy weights (i.e. not obese or overweight). Obesity rates in West Vancouver (19.0%) are near the regional average (21.7%). Local governments can play an important role in shaping neighbourhood walkability which will, in turn, improve health outcomes. In concert with other planning agendas, CEE Plan creates more walkable neighbourhoods and more housing options in these areas. The Official Community Plan update and implementation of the Strategic Transportation Plan will strongly determine how the CEE Plan future is operationalized.

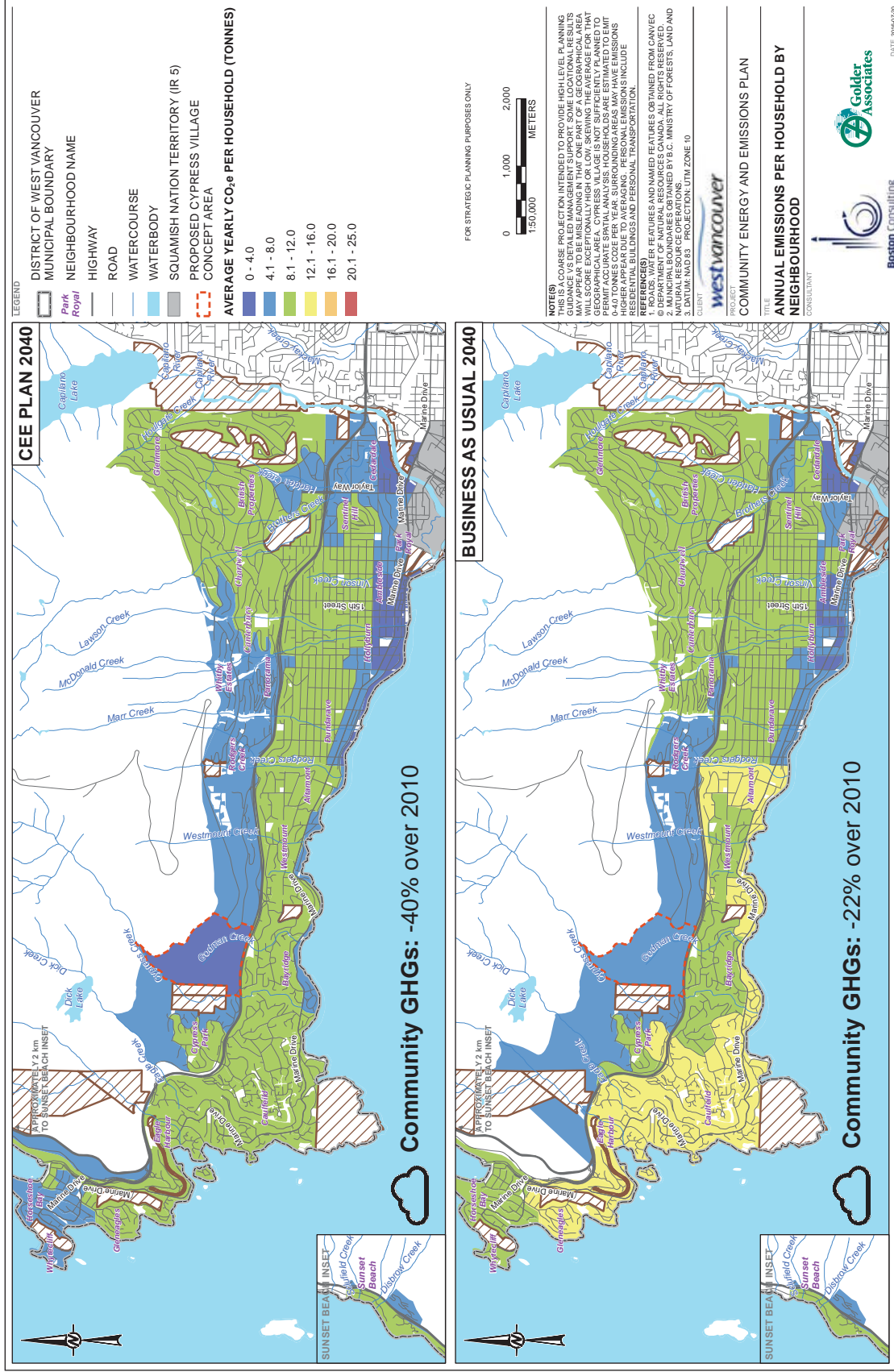
Map III.E: Civic Infrastructure and Service Costs by Neighbourhood CEE Plan 2040 and BAU 2040

Smart growth communities manage household carbon and household costs. Most municipalities’ greatest costs are associated with traditional civic infrastructure: road, potable water, sewage, stormwater. Costs are borne in the form of property taxes, utility rates and fees such as development cost charges and utility hook-ups. Costs for operating, maintaining and replacing infrastructure are greater than the initial capital cost. Lifecycle costs vary significantly across a community. Some West Vancouver neighbourhoods require about five metres of linear infrastructure per household and incur lower costs, others require about 50 metres per household and incur higher costs. A major CEE Plan co-benefit is reducing average household infrastructure costs by focusing modest new growth in existing villages and a new village near the base of Cypress Bowl Road and very modest intensification of residential areas with coach houses or stratifying heritage homes that increase housing options and protect neighbourhood character. Under CEE Plan, the District avoids \$110 million annually on infrastructure and service costs, equivalent to \$500 per household, relative to a Business-As-Usual future. While the BAU future assumed focused growth around Park Royal, it also assumed a traditional build out of the Upper Lands West of Cypress Bowl Road. The CEE Plan future will be subject to greater engagement and analysis through the Official Community Plan update as well as neighbourhood planning.

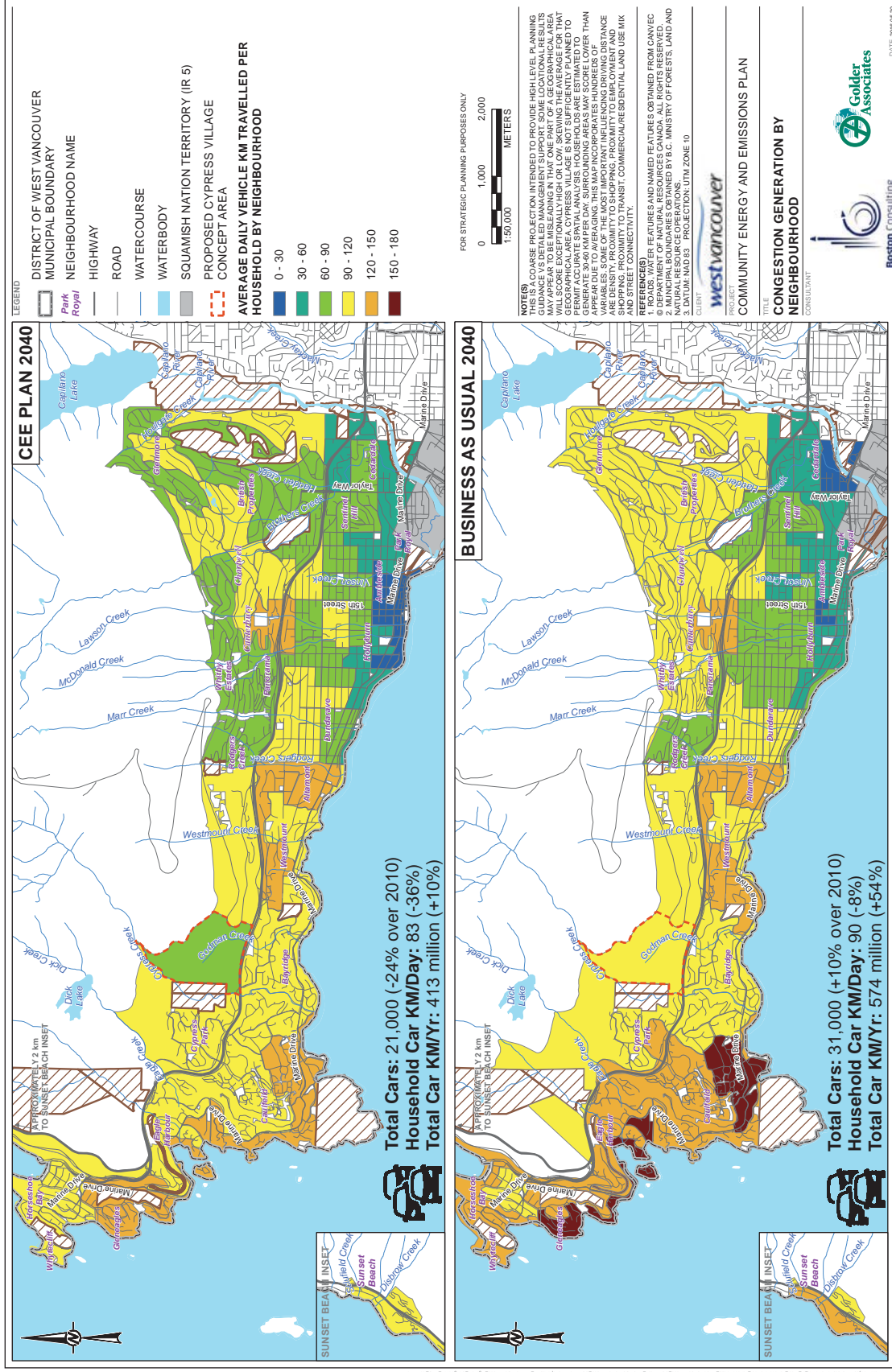
Map III.F: Forest Carbon Emissions by Neighbourhood CEE Plan 2040 and BAU 2040

CEE Plan avoids the loss of about 45 hectares of forest and the release of 8,800 tonnes of carbon—this is equivalent to the annual GHGs of 2,500 West Vancouver cars. Forest loss is a significant contributor to climate change and urban growth plays a big role. About 20% of carbon humans have added to the atmosphere since the industrial revolution is from forest loss (IPCC, 2013). After energy and mining activities, urbanization is Canada’s biggest driver of permanent forest loss (NRCan, 2014a). West Vancouver’s interest in focusing Upper Lands growth in a complete, compact village would protect a large tract of mature forest. Recent bylaws protecting healthy trees on private lands and plans for sustaining street and park trees also minimize permanent tree loss. One implication of human settlement, is forest loss. Under CEE Plan, 21 hectares of forest is lost across the entire community. This is focused around the conceptual Cypress Village area and also occurs at lower rates in other conceptual growth areas, (e.g. around Park Royal and Horseshoe Bay, notably around the proposed Sewells development.) A Business-As-Usual future, in contrast, would result in the loss of three times more forest—66 hectares—also focused in the Upper Lands, but more extensive. The Official Community Plan update and neighbourhood, development and environmental planning exercises will evaluate opportunities and engage with the community more comprehensively on these opportunities.

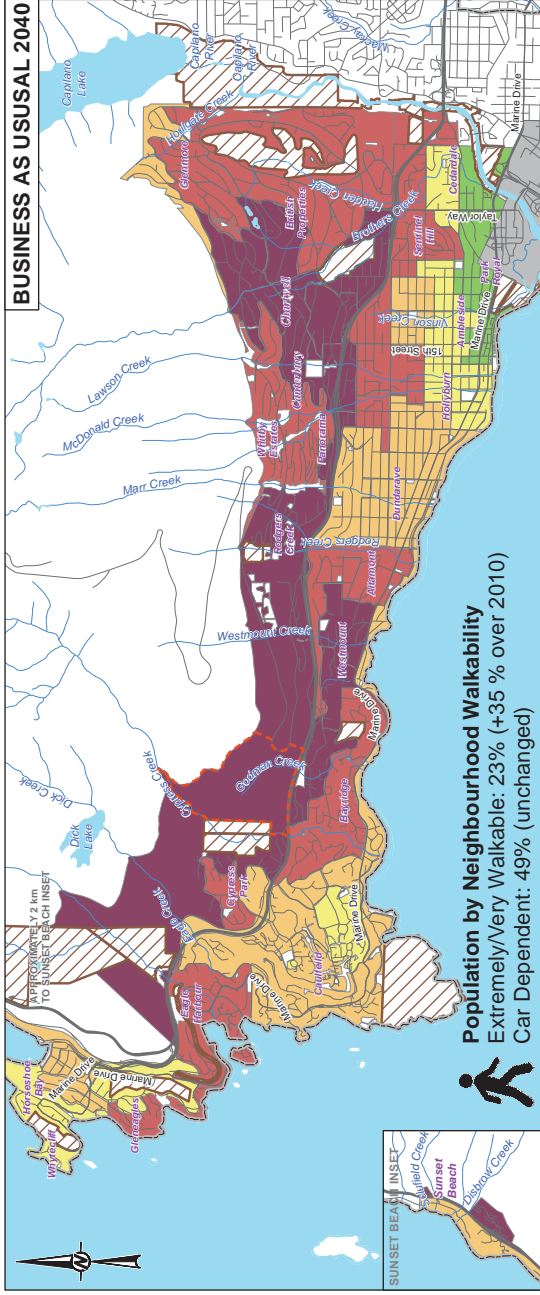
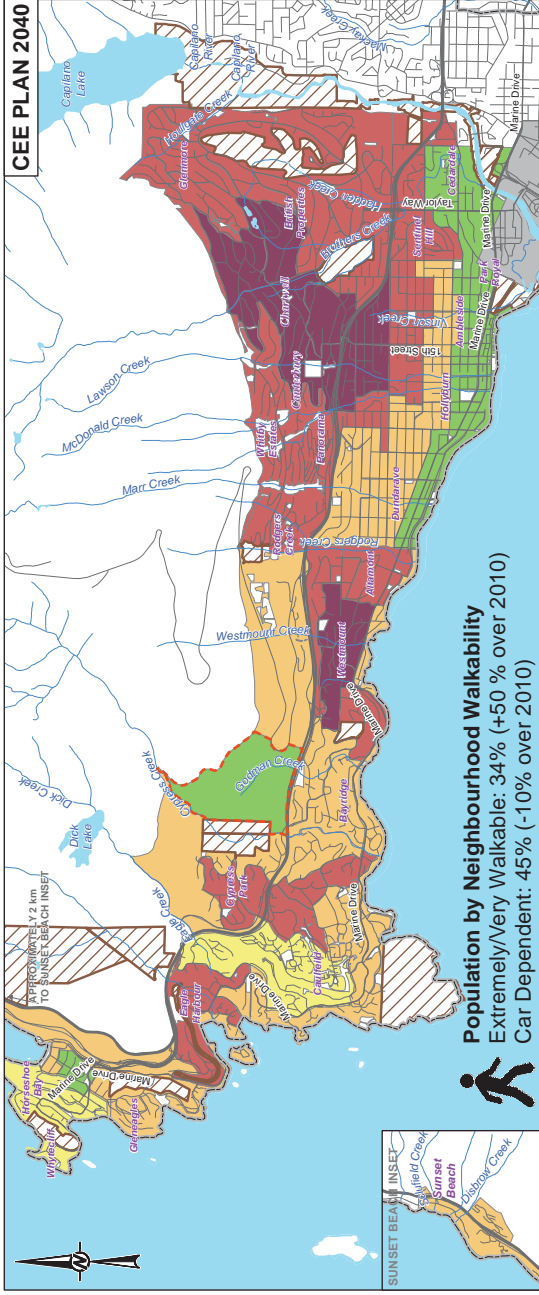
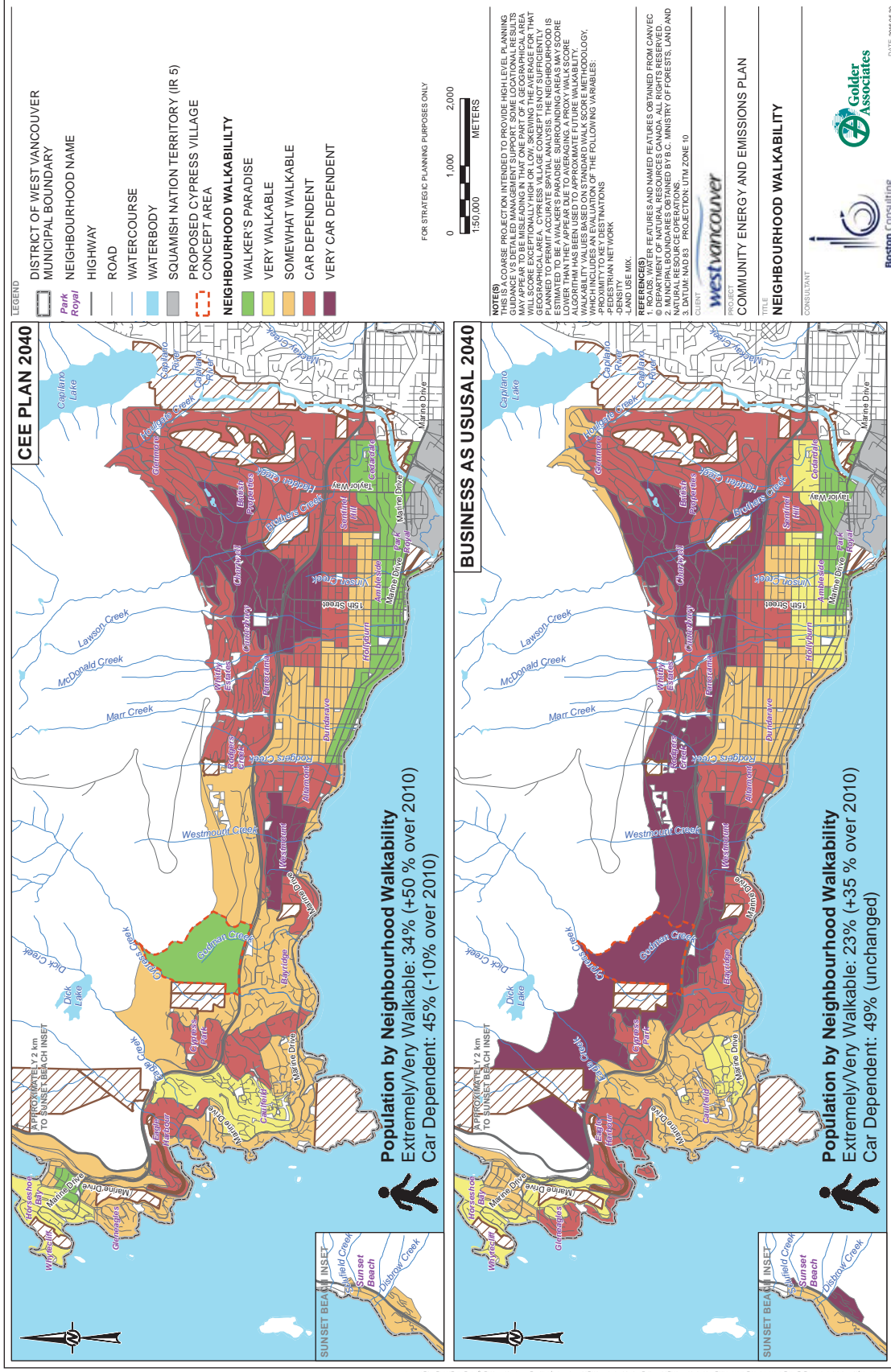
MAP III.A: ANNUAL GHGS BY HOUSEHOLD BY NEIGHBOURHOOD



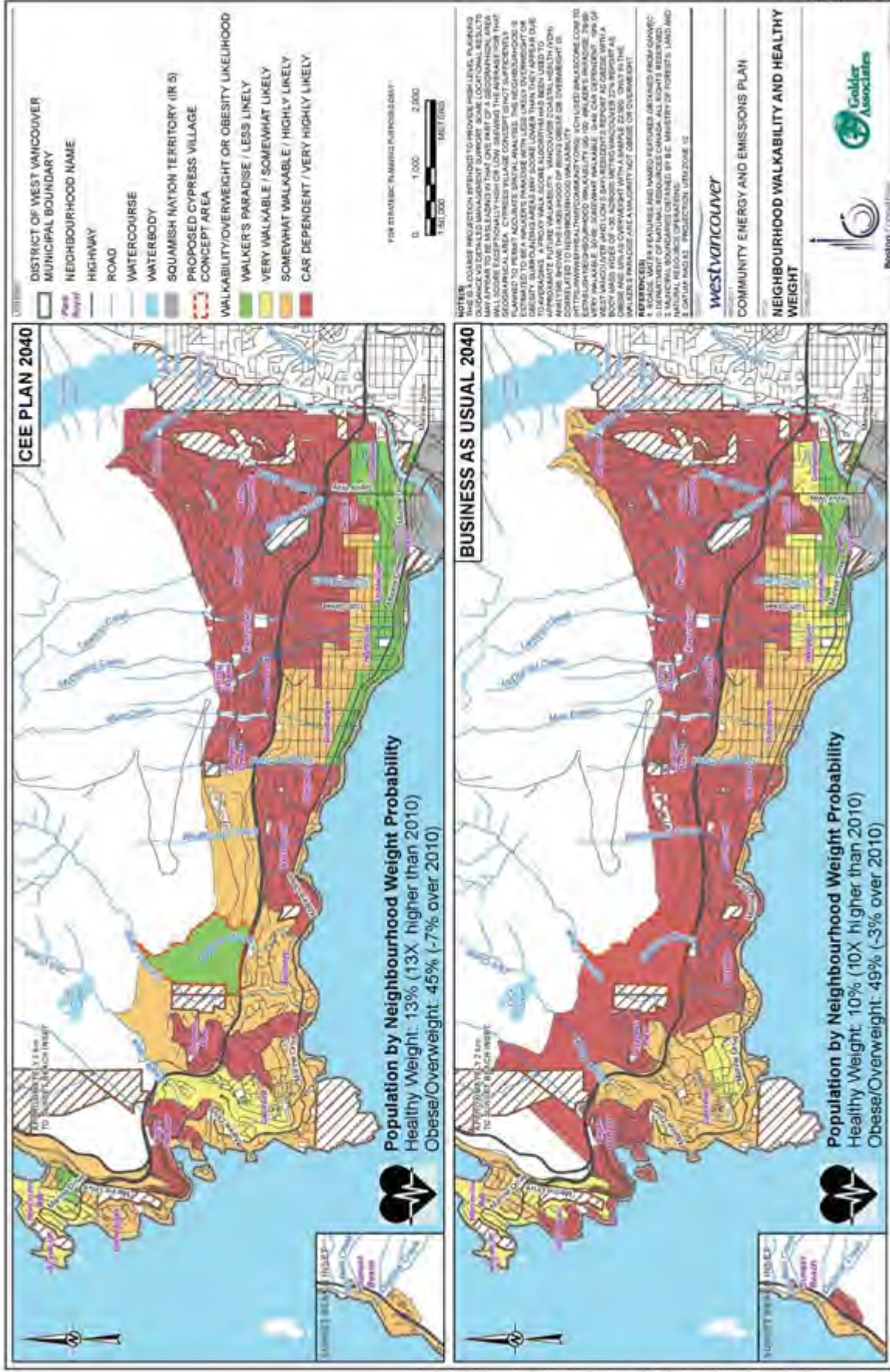
MAP III.B: CONGESTION GENERATION BY HOUSEHOLD BY NEIGHBOURHOOD



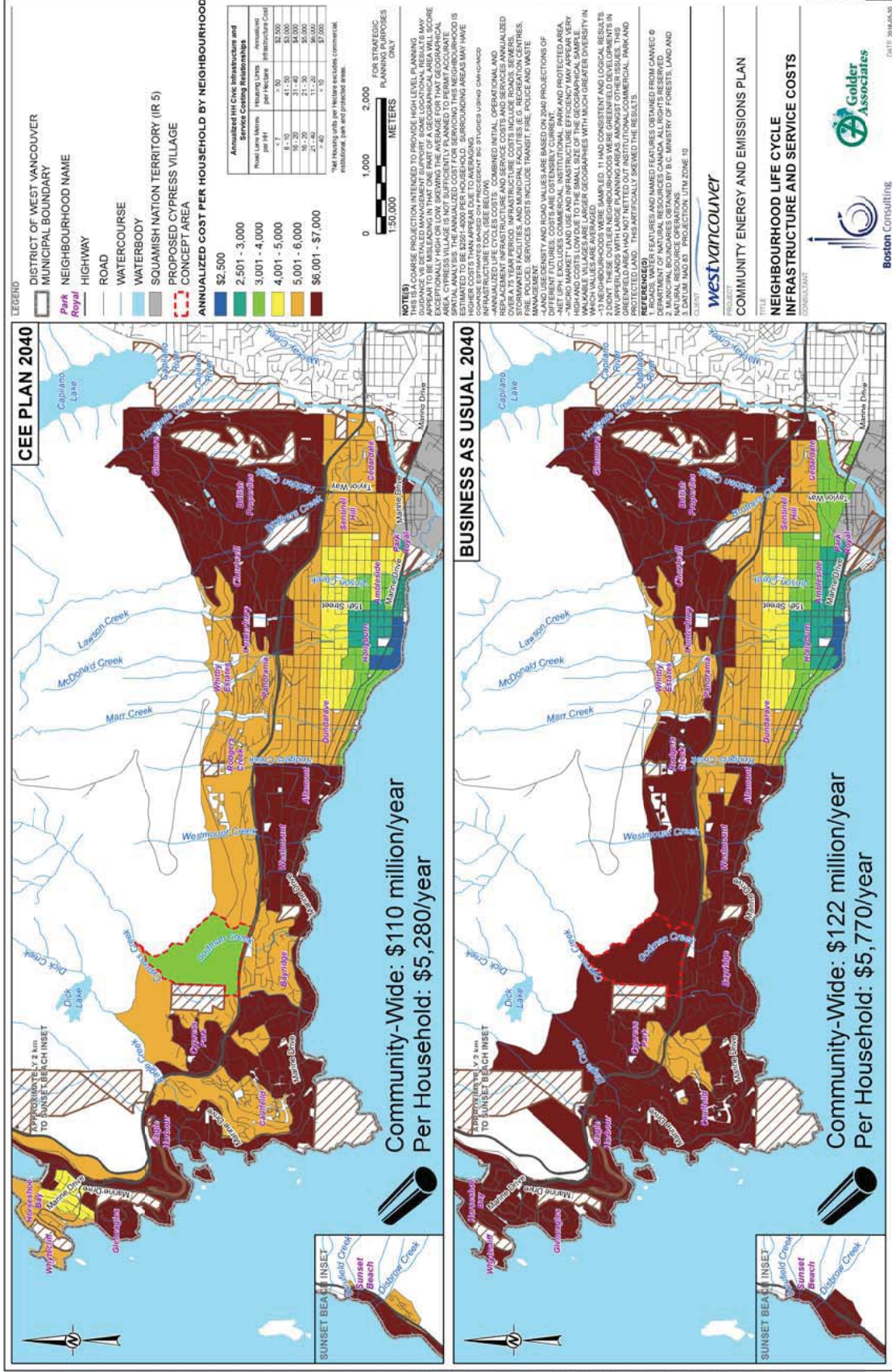
MAP III.C: WALKABILITY BY NEIGHBOURHOOD



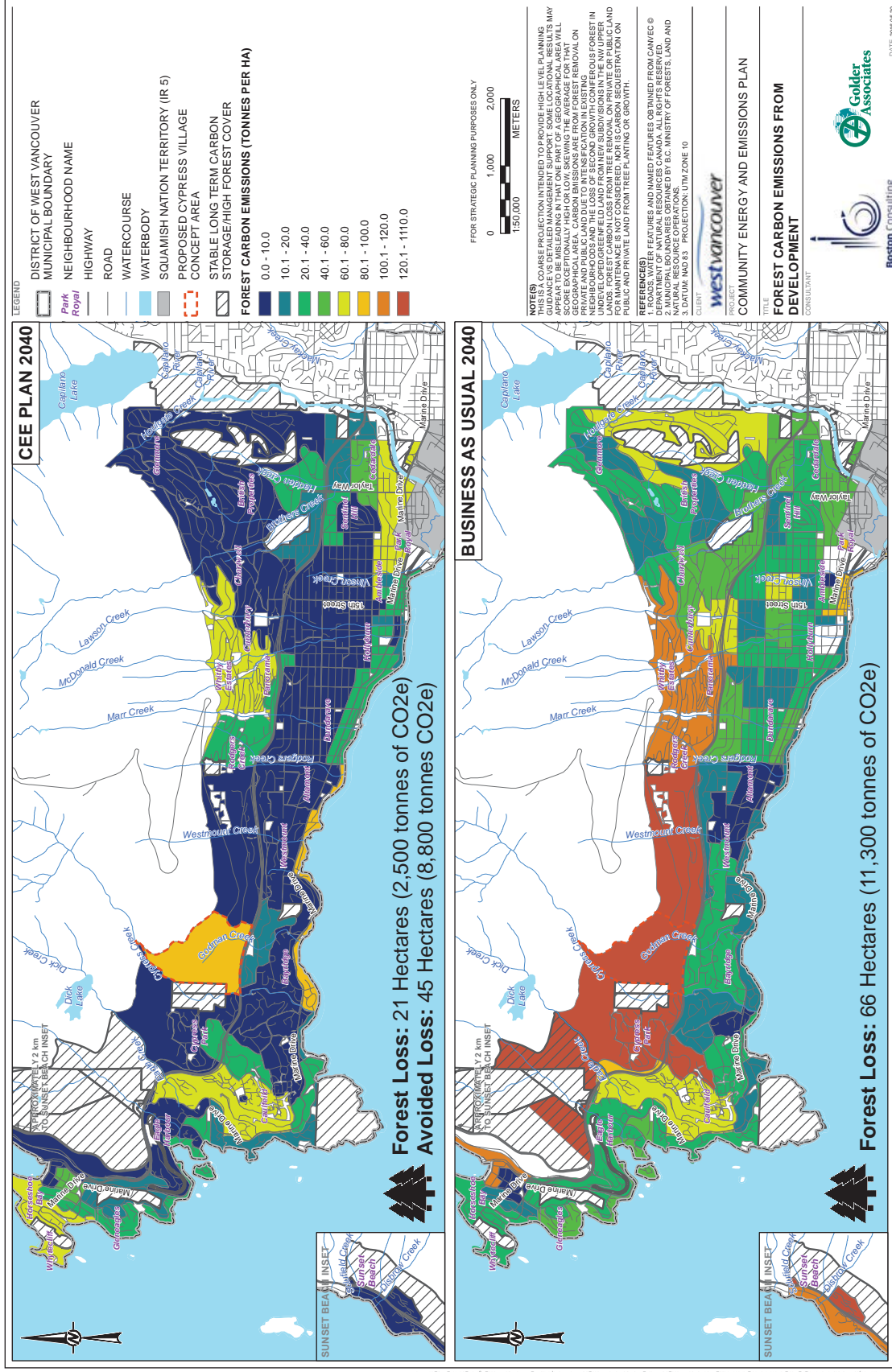
MAP III.D: HEALTHY WEIGHT NEIGHBOURHOODS



MAP III.E: CIVIC INFRASTRUCTURE AND SERVICE COSTS BY NEIGHBOURHOOD



MAP III.F: FOREST CARBON EMISSIONS BY NEIGHBOURHOOD





Part IV has three sections to support implementation:

1. *Key Recommendations* outlines recommended immediate next steps and an approach for phased implementation across the organization, into the community and beyond
2. *Prioritization Matrix* identifies top priorities based on critical consideration of key criteria
3. *Implementation Table* provides timelines, departmental leads and preliminary budget estimates for the strategic directions

1. KEY RECOMMENDATIONS

This is a high level strategic plan. Implementing the strategic directions and achieving the Official Community Plan and CEE Plan targets will require engagement across departments and integration into work plans. It will involve collaboration and partnership with senior levels of government, utilities, the local transit authority, other local governments, philanthropic organizations and local private, public and social sector organizations. It depends on active participation by local citizens and businesses. Many of these constituencies were consulted developing this Plan.

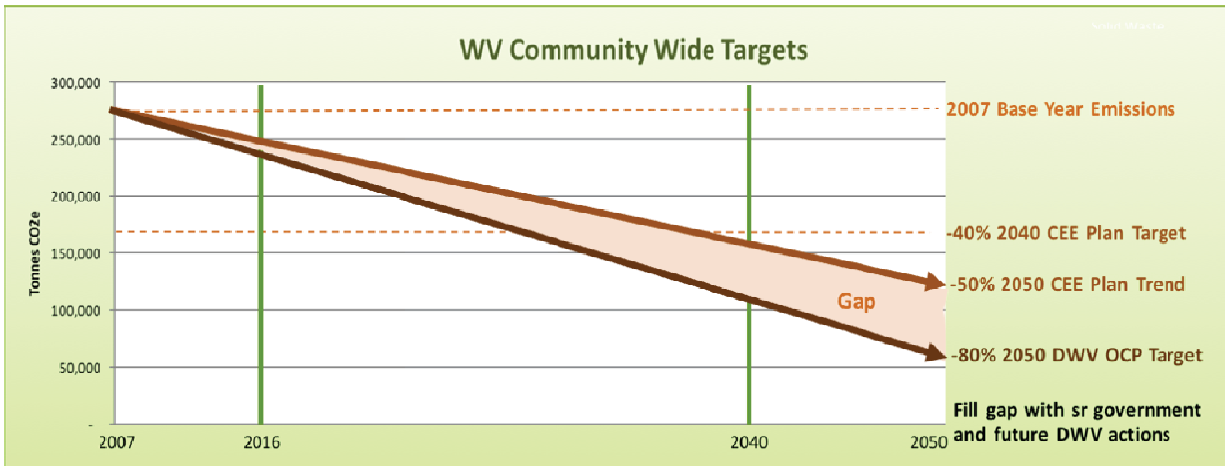
Targets and Timetables

1. adopt CEE Plan Community Targets: establish stretch targets that demonstrate the District of West Vancouver’s commitment to climate action and are within its means of meeting them

CEE Plan Targets and Timelines			
Type	Milestone	Target	GHGs*
Interim Target	2020	-5%	247,000
Interim Target	2025	-10%	234,000
Interim Target	2030	-20%	208,000
Interim Target	2035	-30%	182,000
CEE Plan Target	2040	-40%	156,000
2045 Trend	2045	-45%	143,000
2050 Trend	2050	-50%	130,000

*Reductions from 2010

2. confirm existing OCP long term target of 80% reductions by 2050: Maintain this ambitious target as a benchmark of reductions necessary to avoid dangerous, run-away climate change and create a window for additional actions the District and senior governments may undertake, along with technological and socio-economic change considerations



Continuous Improvement

3. establish a continuous improvement regime to monitor progress and strengthen and update policies and actions
 - A. deliver an annual climate action progress report to Council that summarizes actions and progress against a set of key performance indicators, key sectoral performance targets and identifies any new opportunities to fill the gap between the CEE Plan and Official Community Plan Targets
 - B. update the Community CEE Plan by 2025 to refresh efforts and reduce the gap between CEE Plan and Official Community Plan Targets with deepened local action that takes into consideration new and further actions required by senior governments, technological and socio-economic change
4. work cross departmentally to develop a strategic planning lens to help manage GHGs that can be incorporated into major district planning processes such as the annual budget process, infrastructure plans, OCP Update

Local Action

5. incorporate CEE Plan strategic directions into long range departmental work plans over the next year that include sectoral targets and indicators to guide implementation, monitor progress and strengthen actions

Planning & Development Services

- A. integrate energy and emission management strategic directions into Council priorities and plans for advancing major policy agendas, specifically:
 - Official Community Plan update
 - Built Form, Housing and Neighbourhood Character with an emphasis on housing options for seniors and young people

Engineering & Environment Services

- B. advance the District's plans to implement short and long term infrastructure priorities to support active travel and public transit, taking full advantage of senior government grants such as BikeBC funding
- C. extend policy and planning opportunities to advance car sharing and electric vehicles collaborating with Planning and Development Services.
- D. maintain the District's plans to increase waste diversion in the single family sector and extend this leadership to the multi-family and commercial sector within operational constraints, working collaboratively with Metro Vancouver
- E. initiate implementation planning on building energy conservation with an emphasis on residential building retrofit policy and program development and leveraging collaboration with key strategic partners, specifically:

- initiate negotiations with BC Hydro on human resource and implementation funding partnerships
 - engage with Cool North Shore to deepen their residential retrofit program
- F. integrate CEE Plan's cross cutting priorities into the Sustainability Division's long range plans

Financing

6. prepare a report to Council on innovative financial tools that may be used to advance CEE Plan strategic directions and would be useful for integrating into advancing strategic directions in departmental work plans
7. prepare a proposal for the annual budget process that includes establishing a Climate Action Reserve Fund that can be used to sustain the District of West Vancouver's corporate carbon neutral leadership. This fund would be seeded by the annual Climate Action Revenue Incentive Program (CARIP) grant

Senior Government Action

8. write to key senior government ministers and local elected officials Federally and Provincially to share the CEE Plan and underscore the need for collaboration with and support for local governments to achieve shared goals for deep emission reductions and maximize co-benefits from climate action, notably:
 - all ages housing and transportation
 - public health
 - congestion management
 - prosperity.

2. PRIORITIZATION MATRIX

The CEE Plan’s strategic directions are prioritized according to a set of decision making criteria. These criteria helped shape strategic directions and inform overall priority:


- **GHG reductions:** contribution to GHG reductions i) across the entire community from base year and ii) reductions from Business-As-Usual and Base Year in that sub-sector of activity
- **incremental cost:** cost to the District to develop and administer the strategy over and above what would be undertaken in the absence of this plan
- **general “ease of implementation”:** considers diverse success factors (e.g. complexity, policy alignment/feasibility, partnership co-delivery, traditional authority intersection)
- **community priority alignment:** contribution to core community priorities across the entire community.

Strategies are afforded 0 (weak) to 3 (strong) points on each criteria, using 0.5 point increments. Criteria are weighted based on their relative importance. GHG Reductions are the primary objectives and as such scores are weighted 2.5 times their value for their contribution to reductions from Base year and the Business-As-Usual trend. Community Priority scores are weighted 1.5 times their value as the District aims to strengthen core community priorities through the Plan. Contribution to community priorities is scored adjacent to each strategic direction. Ease of Implementation scores are weighted 1.5 times their value.


Priorities are preliminarily prioritized by score: Very High ≥ 3 | High 2.5-2.9 | Medium 2.0-2.4. Priorities can be adjusted in light of future developments, (e.g. senior government funding and complementary local policy and planning developments.)

1. Places + Spaces Community + Neighbourhood Planning	Criteria					Overall Score - Avg -	Qualitative Ranking	Community Priorities Summary†							
	GHG Reductions From Base Year	GHG Reductions from BAU Future + Base Yr	Low Incremental District Cost	General Ease of Implementation	Community Priorities			All Ages Housing + Transportation	Congestion Management, Transportation Efficiency	Nature Protection	Physical Activity + Healthy Weight	Community Vitality + Connectedness	Energy + Infrastructure Savings + Economic Dev.	Overall Score	
Weighting ->	1.5	1	1	1.5	1.5	/3.9									
Walkable Village Activation	/3	/3	/3	/3	/3			/3	/3	/3	/3	/3	/3	/3	/3
A1. Existing Village Activation	3.0	3.0	2.5	2.0	3.0	3.7	VH	3	3	3	3	3	3	3	3.0
A2. New Village Initiation*	0.0	3.0	3.0	2.5	2.7	2.8	HI	3	2	2.5	2.5	3	3	3	2.7
A3. Micro Market Stabilization	0.5	0.5	2.5	1.5	1.5	1.7		1.5	1.5	1	1	2	2	2	1.5
Residential Neighbourhood Regeneration															
B. Residential Neighbourhood Regeneration	1.0	1.5	2.5	2.0	2.1	2.3	MD	2.5	1.5	1.5	1.5	2.5	3	3	2.1
Forest Stewardship															
C. Urban Forest + Tree Stewardship	0.0	1.5	2.5	2.0	1.8	1.9	MD	1.5	1.5	3	1.5	2	1.5	1.5	1.8

*GHGs grow by establishing a new village, however, GHGs are low relative to BAU subdivision †Priorities qualitatively scored relative to BAU or Base Year, whichever is greater.


2. Bricks + Mortar  Building + Housing	Criteria					Overall Score - Avg -	Scored Priority
	GHG Reductions from Base Year	GHG Reductions from BAU Future + Base Yr	Low Incremental District Cost	General Ease of Impementation	Community Priorities		
Weighting -->	1.5	1	1	1.5	1.5	3.9	
Existing Homes + Buildings: Retros + Renos							
A. Empty Nester Home Renos + Revitalizations	1.5	1.5	2.5	2.0	2.1	2.5	Hi
B1. Low Carbon, Low Cost Home Retrofits	3.0	3.0	1.5	1.0	1.3	2.5	Hi
B2. Low Carbon, Low Cost Apartment Retrofits	1.0	1.5	1.0	1.0	0.8	1.3	
B3. Commercial Building Carbon and Cost Management	1.0	1.5	0.5	1.0	0.5	1.2	
High Quality, Low Carbon New Homes							
C. Missing Middle Housing (Duplex to Low Rise)	1.0	1.5	2.5	2.0	2.5	2.5	Hi
D1. Stretch Code Single Detached Homes	2.0	2.0	2.5	2.5	0.8	2.5	Hi
D2. Stretch Code Apartments + Commercial Buildings	1.5	1.5	2.5	2.0	0.7	2.1	Md
E. District Energy Development	1.0	1.0	2.5	2.0	0.3	1.7	
Cross-Cutting Strategies							
F. Advanced Efficiency Capacity Building	1.0	1.0	2.5	2.5	1.5	2.2	Md

Community Priorities Summary						
All Ages Housing + Transportation	Congestion Management, Transportation Efficiency	Nature Protection	Physical Activity + Healthy Weight	Community Vitality + Connectedness	Energy + Infrastructure Savings + Economic Dev	Overall Score
2.5	1.5	1.5	1.5	2.5	3	2.1
1	-	1	-	3	3	1.3
0.5	-	-	-	2	2	0.8
-	-	-	-	1	2	0.5
3	2.5	2.5	2	3	2	2.5
0.5	0.5	0.5	0.5	0.5	2	0.8
0.5	0.5	0.5	0.5	0.5	1.5	0.7
-	-	-	-	-	2	0.3
2	1	1	1.5	1.5	2	1.5

3. Roll + Stroll  Transportation Systems	Criteria					Overall Score - Avg -	Scored Priority
	GHG Reductions from Base Year	GHG Reductions from BAU Future + Base Yr	Low Incremental District Cost	General Ease of Impementation	Community Priorities		
Weighting -->	1.5	1	1	1.5	1.5	3.9	
Transit Diversification + Expansion							
A1. Rapid + Express Transit *	2.0	2.0	2.5	1.0	2.7	2.6	Hi
A2. Bus Service Extension	0.5	0.5	3.0	2.0	1.2	1.8	
A3. Electric Passenger Ferry	0.5	0.5	2.5	1.5	1.3	1.6	
Complete Streets + Active Travel							
B1. Pedestrian Infrastructure*	1.0	1.0	2.5	2.0	2.4	2.3	Md
B2. Triple A Cycling Infrastructure*	1.0	1.0	2.5	2.0	2.4	2.3	Md
C. Community Bike Share*	0.5	0.5	1.0	1.0	1.8	1.3	
D. Safe Routes to Schools + Community Rec + Leisure Program*	0.5	0.5	2.0	2.5	1.5	1.9	
Clean Cars + Smart Parking							
E. Car + Ride Sharing*	1.5	2.0	2.5	2.5	2.0	2.7	Hi
F. EV + LEV Leadership	3.0	3.0	3.0	1.5	0.7	2.8	Hi
G. Smart Parking*	3.0	3.0	3.0	1.0	1.4	2.8	Hi

Community Priorities Summary						
All Ages Housing + Transportation	Congestion Management, Transportation Efficiency	Nature Protection	Physical Activity + Healthy Weight	Community Vitality + Connectedness	Energy + Infrastructure Savings + Economic Dev	Overall Score
3	3	2.5	2.5	2.5	2.5	2.7
2	1	0.5	1	1	1	1.1
2	0.5	0.5	1	2.5	1	1.3
2.5	1.5	2	3	3	2.5	2.4
2.5	1.5	2	3	3	2.5	2.4
3	1	1.5	1.5	2	1.5	1.8
2.5	1.5	-	2.5	2.5	1.5	1.8
2	2	1.5	2	2	2.5	2.0
-	-	-	-	1	3	0.7
1	1.5	0.5	1.5	2	2	1.4


*Where strategy success is inherently tied to land use, land use changes are also considered in scoring.

4. Trash + Treasure  Solid Waste + Materials Management	Criteria					Overall Score - Avg -	Scored Priority
	GHG Reductions from Base Year	GHG Reductions from BAU Future + Base Yr	Low Incremental District Cost	General Ease of Impementation	Community Priorities		
Weighting -->	1.5	1	1	1.5	1.5	/3.9	
Smart Goods + Materials Management							
A. Smart Goods + Resource Recovery*	1.5	1.5	2.0	1.0	0.8	1.7	
B. Sustained Single Detached Leadership	2.5	2.5	3.0	2.5	0.3	2.7	Hi
C. Apartment + Commercial Diversion	2.5	2.5	3.0	1.0	0.5	2.3	Md
D. Zero Waste Construction & Deconstruction*	2.5	2.5	2.5	1.0	0.5	2.2	Md
Shared Economy							
E. The Sharing Community Initiative*	1.5	1.5	2.0	1.5	1.8	2.1	Md

*Some GHG reductions are beyond typical "community" inventories.

Community Priorities Summary						
All Ages Housing + Transportation	Congestion Management, Transportation Efficiency	Nature Protection*	Physical Activity + Healthy Weight	Community Vitality + Connectedness	Energy + Infrastructure Savings + Economic Dev	Overall Score
-	-	2	-	1	1.5	0.8
-	-	1.5	-	-	-	0.3
-	-	1	-	-	-	0.2
-	-	2	-	-	1	0.5
1.5	1.5	1.5	1.5	2.5	2	1.8

*Nature protection includes upstream resource reduction.

5. Cross Cutting Strategies 	Criteria					Overall Score - Avg -	Scored Priority
	GHG Reduction POTENTIAL from Base Yr	GHG Reduction POTENTIAL from BAU + Base Yr	Low Incremental District Cost	General Ease of Impementation	Community Priorities		
Weighting -->	1.5	1	1	1.5	0	/3.9	
CEE Plan Resourcing							
A. Corporate Carbon Neutral Community Offset Fund	2.0	2.0	1.5	2.5	0.0	2.6	Hi
B. Community Climate + Energy Planner/Analyst	2.5	2.5	2.0	2.5	0.0	3.0	Hi
C. Planning + Implementation Financing	2.5	2.5	2.5	2.5	0.0	3.1	V Hi
Climate Action Mainstreaming							
D. Climate + Community Strategic Planning Lens	2.0	2.0	2.5	2.5	0.0	2.8	Hi
E. Climate Action Monitoring, + Continuous Improvement	2.0	2.0	2.5	2.5	0.0	2.8	Hi
F. CEE Plan Update	2.5	2.5	2.5	2.5	0.0	3.1	V Hi
Engagement + Outreach							
G. Cool Community Leaders Award	1.0	1.0	2.5	2.5	0.0	2.2	Md
H. Business of Climate Action - Business Outreach	1.5	1.5	1.5	1.5	0.0	1.9	
I. Ultra Cool Neighbourhood Pilot	2.0	2.0	1.0	1.0	0.0	1.9	
J. Social Marketing Leverage	2.0	2.0	1.5	2.0	0.0	2.4	Md

Community Priorities Summary						
All Ages Housing + Transportation	Congestion Management, Transportation Efficiency	Nature Protection	Physical Activity + Healthy Weight	Community Vitality + Connectedness	Energy + Infrastructure Savings + Economic Dev	Overall Score
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	

3. IMPLEMENTATION TABLE

This framework outlines preliminary time horizons and coarse incremental costs (in staff time or additional dollars) for implementing CEE Plan strategic directions over the next decade, at which point there will be a CEE Plan Update. CEE Plan is a high level strategic plan. More rigorous costing, timelines and resourcing approaches will be integrated into departmental work plans and / or budget requests as implementation occurs and will be considered by Council at that time.

Strategic directions are initially prioritized based on the decision making criteria outlined in the Prioritization Matrix. Many have already been initiated, as indicated by the "completion status" and in many instances applying a more specific "GHG lens" implies an "integration" into ongoing work as opposed to the "initiation" of something new.

Resource implications of the plan's Strategic Directions have been estimated in terms of incremental costs or staff resources as follows: Minimal (<\$25,000); Modest (\$25,000-\$150,000); and High (>\$150,000). As stated, many aspects of strategic directions are already being undertaken by the District so only the additional climate and energy related costs are delineated. The strategic directions with the greatest incremental costs are retrofits and several cross cutting actions, novel areas of work for municipalities. All costs are necessarily rough estimates as the ultimate design of policies and actions is undetermined. The information is a starting point for preliminary planning purposes and should be updated and revised as actions are further defined, new budget and funding sources become available and project timing is confirmed.

There are diverse options for financing many strategic directions, including grants from senior government, utilities (notably BC Hydro) and philanthropic organizations. (Strategic advising and analysis for this Plan was financed by grants from the FCM Green Municipal Fund and BC Hydro Sustainable Communities.) While some financing for implementation will likely come from general revenue, there is also considerable scope for innovative District financial tools and fees that do not compete for existing resources. Revenue projections have not been estimated.

A prudent low carbon, sustainable energy future, moreover, is ultimately an investment. Energy is a strategic asset that with sound investment offers handsome paybacks. District conservation investments in its own operations have already resulted in over \$250,000 in savings since 2012 and Corporate CEE Plan strategies are preliminarily estimated to reduce District spending \$325,000 annually by 2030. This Community CEE Plan identifies a number of innovative financial tools that may be used to enable residents to take advantage of such investments. Additionally, the focused growth future outlined in this Plan can help reduce civic infrastructure costs of the District on a per household basis, as roads, water and sewage infrastructure -- the District's largest share of capital assets-- are increasingly optimized.

Completion Status	Preliminary Priority
To Initiate	Very High Priority
In Play	High Priority
Complete	Medium Priority

Integration-Initiation Continuum

Deep Integration	This strategic direction is fundamentally about integrating climate into ongoing business and doing business differently rather than primarily adding new work it requires limited additional resourcing.
Integration+Initiation	This strategic direction involves some initiation of new work being integrated into ongoing business. This strategy requires some new resourcing.
Deep Initiation	This strategic direction is fundamentally about initiating new work. This is a novel agenda for most municipalities. This strategy involves new resourcing.

1. Places + Spaces: Community + Neighbourhood Planning

Priority	Status % Complete	Strategy	Integration Continuum	Key Implementation Tasks & Notes	Incremental Cost Estimate and Potential Revenue Sources						Time Horizon	Philan thropy											
					Incremental \$ or Staff Need	DWV Gen	DWV Innovation	DWV Fees	Sr Gov	Utility			Private										
V HI	5	Walkable Village Activation A1. New Village Initiation	Integration	-E+E integration + adaptation, modest incremental work -Neighbourhood E+E Plan, ideally developer financed -N.B. low carbon land use reduces infrastructure costs	Minimal							-0.5 yrs initial policy & planning -5-25 yr implementation											
													HI	5	A2. Existing Village Activation	Integration	-E+E integration + adaptation, modest incremental -OCP Opportunity: maximize E+E synergies -N.B. low carbon land use reduces infrastructure costs	Minimal					-0.5 yrs initial policy & planning -Followed by L term implementation
Residential Neighbourhood Regeneration																							
Mid	5	B. Residential Neighbourhood Regeneration	Integration + Initiation	-See 2A. Empty Nester Home Renos + Revitalizations -OCP Opportunity: maximize E+E synergies -N.B. low carbon land use reduces infrastructure costs	Minimal								-0.5 yrs initial policy & planning -Followed by L term implementation										
Mid	50	Forest Stewardship C. Urban Forest + Tree Stewardship	Integration	-Maintain current activities and planning priorities in Parks + Engineering Services -Continue compact neighbourhood planning in Upper Lands	Minimal								-Maintain course										

2. Bricks + Mortar: Housing + Buildings

Priority	Status % Complete	Strategy	Integration Continuum	Key Implementation Tasks & Notes	Potential Revenue Sources						Time Horizon	Philan thropy										
					Min Incremental Staff Need	DWV Gen	DWV Innovation	DWV Fees	Sr Gov	Utility			Private									
HI	5	A. Empty Nester Home Renos + Revitalizations	Integration + Initiation	-OCP Opportunity: maximize E+E synergies -E+E integrated into new policy work and engagement with some new revenue options for studies <small>E+E integrated into new policy work and engagement with some new revenue options for studies</small>	Modest							-0.5 yrs initial policy & planning, feasibility										
													HI	0	B1. Low Carbon, Low Cost Home Retrofits	Initiation	-Implement with non-profit and utility partners -New policy and program studies and engagement -Investment financing from innovative DWV mechanism, utilities, plus	High				-0.5 yrs initial planning, programming -Followed by phased implementation
0	B3. Commercial Building Carbon and Cost Management	Initiation	-Post 2025 priority -Unless program piggy backs metro municipal initiative	Minimal					-Post 2025 priority													
										High Quality, Low Carbon New Home Construction												
HI	5	C. Missing Middle Housing (Duplex to Low Rise)	Integration	-OCP Opportunity: maximize E+E synergies -E+E integrated into new policy work and engagement with some new revenue options	Minimal							-0.5 yrs initial policy & planning -Followed by L term implementation										
HI	0	D1. Stretch Code Single Detached Homes	Initiation	-New policy studies and engagement	Modest							-0.5 yrs initial policy & planning -Followed by L term implementation										
	0	D2. Stretch Code Apartments + Commercial Buildings	Initiation	-Key tasks, and costing part of D.1. above	Minimal							-Lower priority, no current timeline -If precedes, 1-2 yrs initial policy & planning, followed by L term										
	5	E. District Energy Utility Development	Initiation	-Integrated into major mid/high rise development clusters only, overwhelmingly developer financed, some incremental staff work -District policy precedes major new development activity	Minimal							-Lower priority, no current timeline -Linked to large clustered development (Policy should precede development app)										
Cross-Cutting Strategies																						
Mid	0	F. Advanced Efficiency Capacity Building	Initiation	-Training for staff, info sessions for developers/builders, process enhancements	Modest							-1-3 yrs to establish a strategy -Followed by L term implementation										

3. Roll + Stroll: Transportation Systems

Priority	Status % Complete	Strategy	Integration Continuum	Key Implementation Tasks & Notes	Potential Revenue Sources							Philan thropy	Timeline
					Min Incremental Staff Need	DWV Gen	DWV Innovation	DWV Fees	Sr Gov	Utility	Private		
Transit Diversification + Expansion													
Hi	10	A1. Rapid + Express Transit	Integration	-TransLink-North Shore Municipal Long Range Plan (external financing) -Transit station E+E studies (transpo & buildings, district energy) - optional	Minimal								-Contingent on external financing and timelines (estimate 10-15 yrs) -Follows development
	55	A2. Bus Service Extension	Integration	-TransLink-North Shore Municipal Long Range Plan (external financing)	Minimal								-Contingent on external financing, private sector service provider
	5	A3. Electric Passenger Ferry	Integration	-Private sector service provider	Minimal								
Complete Streets, Active Travel + Congestion Management													
Md	20	B1. Pedestrian Infrastructure	Integration	-Planning work is almost complete -Short, med and long term infrastructure development plans in development	Minimal								-Network plan in completion -5-10 yrs full implementation
Md	20	B2. Triple A + Double B Cycling Infrastructure*	Integration	-Planning work is almost complete	Minimal								-Network plan complete -5-10 yrs full implementation
	0	C. Community Bike Share	Integration + Initiation	-Project is contingent on cost-benefit, feasibility analysis (if feasible, full roll out would involve .5 FTE and \$500,000-\$750,000 approx)	Minimal								-Lower priority, no current timeline
	50	D. Safe Routes to Schools + Community Rec + Leisure Program	Integration + Initiation	-Expansion contingent on additional resources (staff, program and one time studies)	Minimal								-Lower priority, no current timeline (if proceeds, expansion contingent on new financing)
Clean Cars + Smart Parking													
Hi	5	E. Car + Ride Sharing	Integration + Initiation	-Car sharing incentives/support into zoning/bylaw for new development -Evaluate car share preferential parking in high traffic areas and major employers -Ride sharing route feasibility studies (e.g. Cypress Mt w Resort, \$25 w other LGs), implementation financing modest	Modest								-Phased policy and planning -Phased implementation
Hi	5	F. EV + LEV Leadership	Initiation	-Strengthen charging infrastructure requirements in zoning/bylaw -Integrate incentives into permitting -Expanded DWV role in EV infrastructure deployment (optional \$50-100,000 per) -N.B. high interest Metro Vancouver priority	Modest								-Phased policy and planning -Phased implementation
Hi	5	G. Smart Parking	Integration + Initiation	-Phase EV/Car Share parking discounts into parking price policies -Cost recovery bylaw enforcement implications -N.B. high interest Metro Vancouver priority	Modest								-Phased policy and planning -Phased implementation

4. Trash + Treasure: Solid Waste + Materials Management

Priority	Status % Complete	Strategy	Integration Continuum	Key Implementation Tasks & Notes	Potential Revenue Sources							Philan thropy	Timeline
					Min Incremental Staff Need	DWV Gen	DWV Innovation	DWV Fees	Sr Gov	Utility	Private		
Smart Goods + Materials Management													
	30	A. Smart Goods + Resource Recovery*	Integration + Initiation	-Evaluate potential for new programming to facilitate deeper diversion in SF and MF sectors, and extend Metro Vancouver education and outreach locally -If cost-benefit/feasibility analysis shows merit, implementation costs would be additional	Minimal								-Lower priority, no current timeline (if proceeds, 1.2 yrs planning followed by 10 yrs implementation)
Hi	65	B. Sustained Single Detached Leadership	Integration	-Sustain current course	Minimal								-0-10 yrs implementation
Md	15	C. Apartment + Commercial Deep Diversion	Integration	-Verify MF/Commercial zoning bylaws maximize diversion potential -Sustain basic education, outreach, enforcement in collaboration with Metro Vancouver to advance MF composting + recycling focussing on key sub-sectors -Leverage SF efforts, and Smart Goods + Resource Recovery (above) into MF -Additional resources could support communications + outreach material/strategy	Modest								-0-5 yrs initial planning -Followed by L Term implementation
Md	15	D Zero Waste Construction & Deconstruction*	Integration + Initiation	-Sustain collaboration with Metro Vancouver to divert DLC waste, and evaluate additional policy approaches, including financial instruments (additional resources could support analysis of further policy if not considered by Metro Vancouver)	Modest								-0-5 yrs planning -Followed by L Term implementation
Shared Economy													
Md	0	E. The Sharing Community Initiative*	Initiation	-Evaluate potential for shared economy initiatives to strengthen District priorities through appropriate departments and planning processes -District role (and long term budget implications, if any) will differ depending on initiative	Modest								-0-5 yrs planning -0-10 yrs implementation

5. Cross Cutting Action

Priority	Status % Complete	Strategy	Integration Continuum	Key Implementation Tasks & Notes	Potential Revenue Sources						Min Incremental Staff Need	Philan thropy	Timeline
					DWV Gen	DWV Innovation	DWV Fees	Sr Gov	Utility	Private			
CEE Plan Resourcing													
Hi	15	A. Corporate Carbon Neutral Community Offset Fund	Initiation	-Identify opportunities for seeding a corporate carbon neutral offset fund, including seeding it with CARIB grant.	Modest							-1-2 years strategy development (implementation contingent on financing)	
Hi	0	B. Community Climate + Energy Planner / Planning Analyst	Initiation	-Solicit support from BC Hydro for a community energy planner/planning analyst. (Costs shown is an estimate of DWV contribution.) -Seek additional community energy planning support from other sources, e.g. PICS.	Modest							-0-1 yr initial application, followed by ongoing opportunistic efforts -HR support projected for 5 years	
V Hi	0	C. Planning + Implementation Financing	Initiation	-Secure external financing to support planning and implementation of community climate and energy priorities. -Top prospects include: West Vancouver Community Foundation, Van City, Real Estate Foundation of BC, BC Hydro, Fortis BC. Applications can be prepared by staff or externally.	Modest							-0-2 yrs initial applications, followed by ongoing opportunistic efforts	
Climate Action Mainstreaming													
Hi	0	D. Climate + Community Strategic Planning Lens	Initiation	-Craft a climate action strategic planning lens that can be integrated into key district planning processes	Modest							-1-2 yrs framework development	
Hi	0	E. Climate Action Monitoring, + Continuous Improvement	Initiation	-Establish an annual climate action report to Council with key actions, indicators and targets that have been integrated into departmental work plans, building on Provincial Carbon Neutral Report -Update climate section of OCP during Update to take into consideration CEE Plan and implementation planning (potential costs integrated into Community Planning, Additional Tasks: OCP Update, above) -CEE Plan Update by 2025	Modest							-1-2 yrs initial reporting regime established -Annual reporting to follow	
V Hi	0	F. CEE Plan Update	Initiation		High							-Year 10 (~2025-2026)	
Engagement + Outreach													
Md	0	G. Cool Community Leaders Award	Initiation	-Establish a community climate leaders award to support implementation of key CEE Plan strategic directions	Minimal							-1-3 years	
	0	H. Business of Climate Action - Business Outreach	Initiation	-Evaluate costs and benefits of a climate action (or sustainability) business leaders program (necessitates partnerships, e.g. Metro Vancouver regionally, local business partner) -Full costs contingent on study results.	Minimal							-Lower priority, no current timeline -Implementation contingent on partnership and feasibility	
	0	I. Ultra Cool Neighbourhood Pilot	Initiation	-Evaluate viability of a comprehensive climate action neighbourhood pilot that facilitates early and advanced action across all sectors, supporting the leadership of Cool North Shore (Project may be driven by Cool North Shore with DWV support.)	Minimal							-Lower priority, no current timeline -If prioritized and funding secured, 1 yr planning, 2 yr pilot	
Md	0	J. Social Marketing Leverage	Initiation	-Integrate a social marketing dimension into relevant strategic directions (This objective can be met through additional social marketing staff or integrating social marketing into relevant strategic directions as implemented.) (Social marketing budgets would exist within their own strategic direction.)	Modest							-Integrated into strategic directions as implemented (Determine need for dedicated PT staff as climate action program expands)	

FINAL WORD FROM THE WORKING GROUP

After two years, 24 meetings, numerous subcommittees, community events and workshops, an online survey and Earth Month at the Library, the Community Energy and Emissions Plan (CEE Plan) has come together with recommendations for West Vancouver to reduce its GHG emissions over the next 25 years. The eight resident members of the CEE Plan Working Group have ardent hopes:

- that the CEE Plan will not linger on a book shelf
- that the challenge of reducing GHG emissions will become a consideration in all planning and decision making in the District
- that Council will take advantage of the strengths of the community and the power of its concerned citizens to enable West Vancouver to become a model, low carbon community
- that the CEE Plan will constitute a base for stronger action on environmental issues in the future that includes collaboration with other municipalities in Metro Vancouver
- that staff will be directed and / or assigned to implement the plan
- that funding will be sought to implement the CEE Plan from senior governments and public/private partnerships
- that Council will look beyond their four-year tenure, to make decisions that have lasting impact for the health of the local community and environment within a global context
- that the CEE Plan will become a legacy for future generations.

The CEE Plan Working Group requests that the District of West Vancouver Council adopts the Community Energy and Emissions Plan and moves forcefully to implement the recommendations.

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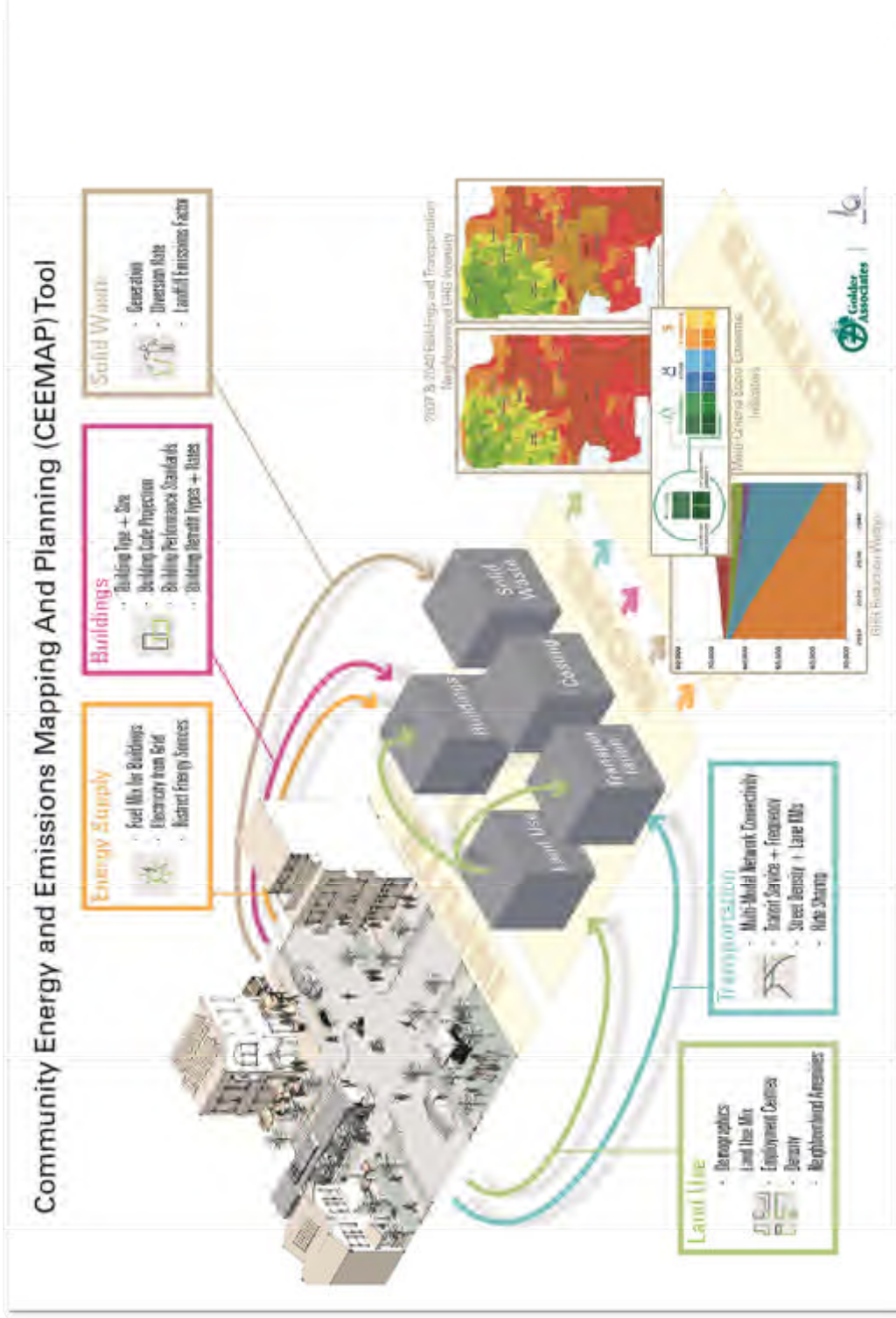
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APPENDIX 2: ENERGY & EMISSION INDICATORS & TARGETS

The following indicators serve as a record of key inputs and outputs used in the modeling of this Plan (see "In" and "Out" in the table below), as well as key assumptions. Many can also support climate action planning, implementation and monitoring.

This Appendix includes:

- CEE Plan's Community Wide Interim & Long Term Targets
- Provisional Sectoral Targets
- Comprehensive Energy & Emission Indicators & Assumptions

While community wide GHG reductions are the Plan's ultimate objective. GHG reductions are a lagging indicator. GHG reduction (or growth) follows energy and emission activities that can be measured with leading indicators. A combination of good leading and lagging GHG indicators can help guide policy and planning, implementation and monitoring. Moreover, many would be useful to support other District objectives.

The District will develop a short list of key performance indicators (KPIs) to report out on annually to staff, council and the public and integrate into work plans. Some KPIs have targets already associated with them. Criteria that may help screen a small set of Key Performance Indicators, include:

- **Resonant** to Staff, Council and/or the public (meaningful, understandable)
- **Relevant** (important indicator of GHG growth/reduction)
- **Reliable** (supported by good quality data that is readily accessible or cost effective/efficient to collect)

CEE Plan Community-Wide Targets + Timelines					
Type	Year	Target	GHG	5 Yr Reduction	Reduction/Yr
Base Year	2010	—	260,000	—	—
Interim	2020	5%	247,000	13,000	2,600
Interim	2025	10%	234,000	13,000	2,600
Interim	2030	20%	208,000	26,000	5,200
Interim	2035	30%	182,000	26,000	5,200
CEE Plan Target	2040	40%	156,000	26,000	5,200
Trend	2045	45%	143,000	13,000	2,600
Trend	2050	50%	130,000	13,000	2,600
Official Community Plan Target Reference		Target	GHG	11 Yr Reduction	Reduction/Yr
OCP Target*	2050	80%	54,000	216,000	5,023

↔Reduction intensity based on average over 5 year reporting interval
 *OCP target reduction intensity based on 43 years from 2007 base year 270,000

Provisional Sectoral Targets	2020 Target	2025 Target	Current
Community + Neighbourhood Planning*			
Share of New Growth in Walkable Villages*	70%	80%	45%
Housing + Buildings			
Housing Options: High Rise Share of New Growth*	30%	35%	22% of current
Housing Options: Missing Middle Share of New Growth*†	15%	25%	10% of current
Annual Single Detached Energy Retrofit Rate (Homes)	1.25% (125)	2% (200)	.75% (75)
Transportation Systems			
New Sidewalks	10 km	20 km	90 km existing
New All Ages and Abilities Bike Routes	15 km	20 km	<5 km existing
4. Trash + Treasure: Solid Waste + Materials Management			
Annual Solid Waste Disposed Per Household	225 kg	200 kg	250 kg
5. Cross Cutting Strategies			
Climate Action Council Report↔	Annual	Annual	BC Climate

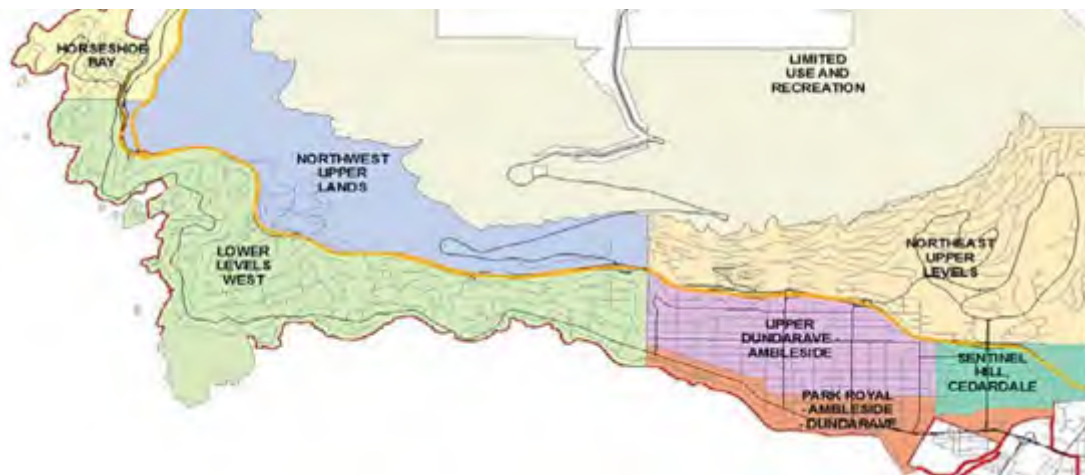
*Neighbourhood + Community Planning and Housing + Buildings targets may be revised during the OCP process.

*New growth excludes housing replacements (i.e. demolition and replacement of single detached homes)

†"Missing Middle" includes duplex, rowhouse, low/mid-rise housing of which there is very little in West Vancouver.

↔The District annually reports to the BC Government on Climate Action to receive carbon tax rebate/grant (CARIP). This reporting can be enhanced.

Land Use, Cross Sectoral + Community		2010	2025	2040	Change		Model In/Output
* Community Wide GHGs CO2e t	Transportation, Buildings, Waste	259,000	199,000	156,500	-40%	Net Change	Out
	Business As Usual			200,000	-23%		
Per Capita GHGs CO2e tonnes	Total w commercial, institutional	6.05		3.14	-48%	Net Change	Out
Population		42,800		49,900	<1%	Annual Growth	In
WV jobs	Standard Workplace	15,106		18,177	<1%	Annual Growth	In
	Homebased	3,094		3,723	<1%	"	
	Total	18,200		21,900	<1%	"	
* Resident to Employee Ratio	Local Residents/Local Jobs	2.35		2.28			In
Share of population by area	Park Royal-Ambleside-Dundarave	19%		20%	25%	Growth Share	In
	Sentinel Hill-Cedardale	7%		7%	5%	"	
	Upper Dundarave-Ambleside	11%		9%	2%	"	
	Lower Levels-West	24%		23%	15%	"	
	Horseshoe Bay (w Sunset Marina)	5%		6%	15%	"	
	Northeast Upper Lands	30%		27%	8%	"	
	Northwest Upper Lands	4%		8%	30%	"	
* Housing split	Single Detached	67%		55%	-5%	Growth Share	In
	Town/Rowhouse (+Duplex, Coach)	6%		11%	25%	"	
	Low / Mid Rise Wood	4%		11%	50%	"	
	Mid / High Rise Concrete	22%		22%	30%	"	
Housing Occupancy	Single Detached	2.93		2.78	-5%	Net Change	Out
	Town/Rowhouse	2.30		2.19	-5%	"	
	Low / Mid Rise Wood	1.20		1.14	-5%	"	
	Mid / High Rise Concrete	1.50		1.43	-5%	"	
* Population share by neighbourhood walkability category - CEE Plan (Car dependent neighbourhoods >60% obesity/overweight likelihood)	Walker's Paradise Walkscore 90-100	0.9%		13%	1429%	Net Change	Out
	Very Walkable Walkscore 70-89	16%		21%	31%	"	
	Somewhat Walkable Walkscore 50-69	31%		21%	-32%	"	
	Car Dependent Walkscore 0-49	52%		45%	-13%	"	
* Population share by neighbourhood walkability category - BAU Future (Car dependent neighbourhoods >60% obesity/overweight likelihood)	Walker's Paradise Walkscore 90-100	0.9%		10%	1076%	Net Change	Out
	Very Walkable Walkscore 70-89	16%		13%	-19%	"	
	Somewhat Walkable Walkscore 50-69	31%		28%	-10%	"	
	Car Dependent Walkscore 0-49	52%		49%	-6%	"	
* Population 400 m to key transportation amenities	Basic Bus (5 min walk)	85%		91%	7%	Net Change	Out
	Frequent Transit (every 15 mins 7 to 7)	31%		66%	111%	"	
	Basic Bike Network	70%		86%	22%	"	
	Triple A Bike (All Ages + Abilities)	8%		51%	573%	"	
Annual civic infrastructure and services cost - community	CEE Plan			\$110,092,500	9%	Savings over BAU	Out
	Business As Usual			\$121,591,000			
Annual civic infrastructure and services cost - per household	CEE Plan			\$5,280	8%	Savings over BAU	Out
	Business As Usual			\$5,770			
* Forest Loss Hectares (ha)	CEE Plan			21	68%	Savings over BAU	Out
	Business As Usual			66			
	Avoided Forest Carbon Loss			45			
Forest Carbon Loss tonnes (t)	CEE Plan			2,500	78%	Savings over BAU	Out
	Business As Usual			11,300			
	Avoided Forest Carbon Loss			8,800			



Buildings + Land Use continued		2010	2025	2040	Change	Model Input/Output	
Energy use GJ	Electricity	1,217,879		1,213,754	-0.34%	Net Change	
	Natural Gas	2,493,790		2,163,166	-13.26%	"	
	Total	3,711,669		3,376,920	-9.02%	"	
Building replacement rate	Annual rate	1.15%	0.75%	0.75%	-35%	Net Change	
Note - Emission Factors: Natural Gas kg/GJ: 49.99 (2010-2040); Electricity kg/GJ: 5.944 (2010) 2.777 (2015-2040)							
Recommended Data Collection		Renewable energy installation					Integrate into permitting data collection: Geoechange/air/water heat pump, solar thermal/PV...
		Building energy retrofit					Integrate into permitting data collection: retrofit type/intensity, ideally EnergyGuide rating Δ
		Buildings beyond code					Integrate into permitting data collection: LEED, Built Green, Energy Star, Passive, Stretch Code
Transportation + Land Use		2010	2025	2040	Change	Model Input/Output	
Total Transportation GHGs Tonnes CO2e	Personal Vehicles	96,000	61,400	37,700	-61%	Net Change	
	Commercial Vehicles	5,800	4,900	4,600	-21%	"	
	Transit	1,800	1,000	900	-50%	"	
	Total	103,600	67,300	43,200	-58%	"	
Car share access + participation households	Park Royal, Ambleside, Dundarave	<1%	20%	70%	Households may shed marginally		
	Caulfield, Cypress, Horsehoe Bay	<1%	10%	45%	used 2nd cars. Overall access to cars rises.		
	Micro Markets	0%	5%	15%			
Electric automobile share	Passenger Vehicle (CEE Plan)	<1%	15%	40%			
	Business As Usual (Passenger Vehicles)	<1%					
	Transit Bus Share	0%	0%	0%			
Total personal automobiles Community wide	With Car Share (CEE Plan)	27,836		21,197	-24%	Net Change	
	Without Car Share			25,700	7%	"	
	Business As Usual	27,836		30,677	10%	"	
Automobiles per capita	Avg # with Car Share (CEE Plan)	0.66		0.42	-36%	Net Change	
	Without Car Share	0.66		0.52	-21%	"	
	Business As Usual	0.66		0.61	8%	"	
Average daily personal driving km	Household	95		82.7	-13%	Net Change	
	Business As Usual	95		80.1	-2%	"	
Total community personal vehicle distances travelled per year km	Total km with Car Share (CEE Plan)	373,590,674		412,504,496	10%	Net Change	
	Without Car Share	373,590,674		482,021,573	29%	"	
	Business As Usual	373,590,674		513,968,957	34%	"	
Average daily transit passenger distances per household (km)	Household	8.0		9.3	16%	Net Change	
	Business As Usual	8.0		9.4	18%	"	
Total community transit passenger km per year	Total km by transit	45,615,900	45,139,273	55,621,800	22%	Net Change	
	Business As Usual	45,615,900		57,900,547	27%	"	
Transportation network km	Road	374		396	6%	Net Change	
	Basic Bus	117		150	28%	"	
	Frequent Transit (every 15-7 to 7)	5		23	369%	"	
	Electric Ferry	-		Vancouver		"	
	Pedestrian	90		117	30%	"	
	Basic Bike	70		115	64%	"	
	Triple A Bike (All Ages + Abilities)	7		37	469%	"	
Fuel use Volume	Total Gasoline (l)	41,055,284	41,055,284	15,162,703	-63%	Net Change	
	Total Diesel (l)	1,393,449	1,393,449	390,107	-72%	"	
	Total Other (l)	25,955	25,955	9,187	-65%	"	
	Total Electricity (kW-h)	4,270	4,270	32,533,692	761813%	"	
Fuel use (GJ)	Gasoline (GJ)	1,467,422	903,703	552,155	-62%	Net Change	
	Diesel (GJ)	152,245	97,783	72,896	-52%	"	
	CNG (GJ)	1,231	950	661	-46%	"	
	Electricity (GJ)	34	65,016	149,816	439371%	"	
Strategy bundle reductions Tonnes CO2e reduced in sector	Senior Gov Vehicle Standards, Stock Turn Over, Smarter Growth			30.0%	30%	Reduction Share	
	Local Electric Car, Low Emission Vehicle Action			7.5%	8%	"	
	Smart Growth			7.5%	8%	"	
	Car Sharing			6.5%	7%	"	
	Transit			4.5%	5%	"	
	Active Travel			2.0%	2%	"	
	Total			58.0%	59%	"	
Vehicular carbon intensity CEE Plan g CO2e / km Weighted avg for vehicle/fuel mix	Passenger Vehicles	257	156	91	-65%	Net Change	
	Transit (vehicle km passenger km)	358 87	277 67	208 51	-72%	"	
	Commercial Vehicles	440	282	201	-54%	"	
	Tractor Trailers	1,012	714	715	-29%	"	
Vehicular carbon intensity Business As Usual g CO2e / km Weighted avg for vehicle/fuel mix	Passenger Vehicles	257	171	110	-57%	Net Change	
	Transit (vehicle km passenger km)	358 87	313 76	313 76	-14%	"	
	Commercial Vehicles	440	308	243	-45%	"	
	Tractor Trailers	1,012	714	715	-29%	"	
Recommended Data Collection		EV Charging Stations Count					Transportation or Sustainability (Level II Chargers / 100,000 sq foot institutional/commercial)
		Car Share Count					Transportation or Planning collect
		EV Count					Transportation collect through ICBC

Solid Waste - Material Management		2010	2025	2040	Change	Model Input/Output
Community Solid Waste GHGs Tonnes CO2e	CO2e from solid waste landfill decomposition or combustion in energy recovery facility	23,100	10,400	3,900	-83% Net Change	Out
Community Solid Waste Disposed	Total SW tonnes to landfill or energy recovery from waste facility	13,400	7,900	5,400	-60% Net Change	In
Disposed Solid Waste Per Capita/ Per Employee (i.e. NOT composted or recycled)	Single Detached: kg per capita	156	69	65	-58% Net Change	In
	Multi Family: kg per capita	222	100	75	-66% "	
	Commercial: kg per employee	416	150	110	-74% "	
SW Tonnage and GHGs By Management Type (Cell Plan = BA1)	Waste Landfilled (t)	10,258	4,560	2,120	-79% Net Change	In
	GHGs Landfill (tCO2e)	22,665	9,968	3,454	-85% "	Out
	GHGs / tonne	2,209	2,186	1,629	-26% "	Out
	Waste to Energy Recovery Facility (t)	3,240	3,240	3,240	0% "	In
	GHGs Energy Recovery (tCO2e)	432	432	432	0% "	Out
	Tonne of GHGs / tonne of waste	0.13	0.13	0.13	0% "	Out

APPENDIX 3: FINANCIAL TOOLS SUMMARY

CEE Plan implementation depends on pragmatic, innovative and tenacious financing approaches. Community energy and emission management is a novel municipal agenda for which there are no established budgets. This summary highlights key opportunities to finance detailed planning and implementation of the strategic directions.

Time sensitivity is preliminarily identified:

- **High:** Up to 1 Year
- **Medium:** 1-3 Years
- **Low:** 4-5 Years
- **Very Low:** >5 Years

The District’s legislative authority and administrative capacity is preliminarily assessed. While some opportunities are characterized as “no” or “low,” the District’s authority may change over the life of this Plan.

While this summary focuses on financial policy tools, several key grant opportunities are also identified. There are many others.

*Time Sensitivity	Strategic Direction	Financial Tool	Key Agency	Authority + Capacity	Notes
Low	1. Places + Spaces: Community + Neighbourhood Planning				
	A3. Micro Market Stabilization	–Business Property Tax Adjustment	–DWV	No-Low	–Reduce business property tax in micro market areas to increase retention. –Currently not feasible for statutory reasons.
	2. Bricks + Mortar: Housing + Buildings				
Medium-Low	A. Home Renos + Revitalizations	–Retrofit Incentive –Pay As You Save On Bill Financing	–DWV, Energy Utilities, Sr Govs –Energy Utilities, BC Govs	Medium	–Incentives would be used to “buy down” energy audit price, stack onto existing incentives, or create new ones (e.g. pool) –Revenue sources for DWV incentive must be evaluated (e.g. 1-time home energy investment levy). New special incentives from utilities and senior governments would be contingent on DWV contributions. –On Bill Financing under evaluation by BC Government
	B1. Low Carbon, Low Cost Home Retrofits				
Very Low	B2. Low Carbon, Low Cost Apartment Retrofits	–Retrofit Incentive –Pay As You Save On Bill Financing	–DWV, Energy Utilities, Sr Govs –Energy Utilities, BC Govs	Medium	–Longer term opportunity to be informed by single detached home “program”
Very Low	B3. Commercial Building Carbon and Cost Management	–Retrofit Incentive –Pay As You Save On Bill Financing	–DWV, Energy Utilities, Sr Govs –Energy Utilities, BC Govs	Medium	–Longer term opportunity to be informed by single detached home “program”
Medium-Low	D1. Stretch Code Single Detached Homes D2. Stretch Code Apartments + Commercial Buildings	–Third Party Incentive Promotion –Density Bonusing	–DWV –DWV	High	–Promoting third party incentives is possible. –A density bonusing regime used to require higher performance requires further feasibility analysis, including legal review.

*Time Sensitivity	Strategic Direction	Financial Tool	Key Agency	Authority + Capacity	Notes
3. Roll + Stroll: Transportation Systems					
Medium-Low	B1. Pedestrian Infrastructure	–Development Cost Charge financed pedestrian and bike facilities	–DWV	Low-Medium	–Would need to be evaluated within context of a broader DCC review that balances competing priorities.
Medium-Low	B2. Triple A + Double B Cycling Infrastructure	–User Fee (Community Rec + Leisure)	–DWV	High	–Financing to extend safe routes to schools into community rec and leisure programming could come from a modest service charge on top of program costs (as well as other grants). –Further study necessary.
Medium-Low	D. Safe Routes to Schools + Community Rec + Leisure Program	–Parking supply management incentive	–DWV	High	–Incentivize residential/commercial developers to reduce spaces in off street parking lots by providing car share services (e.g. memberships, spaces, cars, etc.). Alternatively, this may be "voluntarily required" in specific locations of building types/land uses. –Further study necessary.
Medium-Low	F. Car + Ride Sharing	–Third Party Incentive Promotion	–DWV	High	–Promoting third party incentives is possible. –Any density bonusing regime used to require higher performance require further feasibility analysis.
Medium-Low	G. Local EV + LEV Leadership	–Pay Parking / Discounted Pay Parking	–DWV	Medium	–If pay parking is introduced in commercial, residential or park areas, EVs and LEVs could have discounted rates or free time. –Further study necessary, notably evaluating administrative burden.
Medium-Low	H. Smart Parking (EV, LEV, Car Share Promotion)	–Demolition / Construction Permit Fee Adjustment	–DWV	High	–A feebate could be introduced that raises cost of conventional demolition permits and significantly reduces costs for adopting a deconstruction standard. –Further study necessary.
4. Trash + Treasure: Solid Waste + Materials Management					
Low	D. Zero Waste Construction + Deconstruction				
5. Cross Cutting Strategies					
Medium	A. Corporate Carbon Neutral Offset Fund	–DWV fund to invest in community GHG reduction projects "offset" corporate carbon liability –Potential DWV revenue source(s)	–DWV	Medium	–Financing community GHG reduction projects with the municipal carbon tax rebate grant is permitted and practiced by many local governments. –This opportunity should be evaluated in tandem with Corporate CEE Plan financing which is also a priority that carbon tax refunds could
Medium	D. Climate + Community Strategic Planning Lens	–Risk Management Assessment	–DWV	High	–A climate action strategic planning lens could be applied to key District processes and decisions to manage the growth/reduction of GHGs.

*Time Sensitivity	Strategic Direction	Financial Tool	Key Agency	Authority + Capacity	Notes
Additional Opportunities: Key Grant Applications + "Big Ideas"					
1. Places + Spaces: Community + Neighbourhood Planning					
High-Medium	A1. Existing Village Activation A2. New Village Initiation	-Neighbourhood climate plan grant, leveraging developer contribution	-Senior Govs, Energy Utilities, Philanthropic Grant Makers	Medium	-Grant could finance a neighbourhood climate/energy plan with specific policy, planning and design guidance. Such a Plan could be requested unilaterally from a master planned neighbourhood (Cypress Village) and potentially other neighbourhood planning updates (e.g. Marine
5. Cross Cutting Action					
High-Medium	B. Community Climate + Energy Planner	-Grant	-BC Hydro	High-Medium	-Engage with BC Hydro to secure financing for community energy planning support. (Stronger DWV commitment/readiness will strengthen funding opportunity.)
High-Medium	C. Planning + Implementation Financing	-Grants	-Senior Govs, Energy Utilities, Philanthropic Grant Makers	High-Medium	-Engage with BC Hydro to secure financing for community energy plan implementation. (Stronger DWV commitment/readiness will strengthen funding opportunity.)
Low-Very Low	F. CEE Plan Update	-Grant	-Senior Govs, Energy Utilities, Philanthropic Grant Makers	Medium	-Longer term opportunity.
Low-Medium	I. Ultra Cool Neighbourhood Pilot	-Grant	-Senior Govs, Energy Utilities, Philanthropic Grant Makers	Medium	-Low-med priority scoping opportunity
"Big Ideas"					
Low-Very Low	-Building Sector	-Home Efficiency Tax Shift	-DWW, BC Government	No-Low	-Phase out a portion of property tax and phase in an equivalent portion on home energy consumption. Homeowners could reduce their tax burden by improving home energy efficiency. -Currently not feasible for administrative cost and statutory reasons.
Low-Very Low	-Building Sector	-Building Scale Energy Utility	-DWW	No-Low	-Facilitate utility development of an in-building utility that can be set up by the building developer, building owner(s), or third party. The utility would purchase grid energy at market prices and deliver conservation programs, generating revenue through the differential between actual energy consumed and typical building energy consumption.
Low-Very Low	-Community Planning + Building (Housing) Sectors	-Infrastructure Utilization Tax Shift	-DWW, BC Government	No-Low	-To better reflect service utilization, shift taxes away from property value assessments towards actual household service delivery costs (e.g. operating/replacing road, water, sewage, stormwater, fire protection) -Currently not feasible for statutory reasons.



- *“Blue Trees” was an installation by Konstantin Dimopoulos in 14 locations around the world, including West Vancouver and Squamish First Nations Capilano Territory.*
- *“The Blue Trees takes an urban landscape with which you are familiar and changes it for a brief period of time so that it becomes surreal, unfamiliar, even uncomfortable,”*
- *Dimopoulos states. “We are creatures who like certainty and we become disconcerted when our environment changes. Yet we have altered and destroyed much of the global environment.”*
- *Dimopoulos is optimistic that his art generates discussion and inspires solutions.*