



The Corporation of Delta

*Community Energy and
Emissions Plan*



Final Report
September 18, 2013

Delta

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The preparation of this sustainable community plan was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

Summary

Context

Climate change is one of the principal issues of our time. The consensus of global scientific opinion is that:

- Warming of the climate system is unequivocal;
- Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human-caused GHG concentrations, and;
- There is agreement and evidence that even with current climate change mitigation policies and practices, global greenhouse gas (GHG) emissions will continue to increase over the next few decades.¹

All communities worldwide are vulnerable to the impacts of climate change and for the municipality of Delta this includes extreme weather events and sea level rise. At the same time, the Corporation of Delta has the ability and opportunity to influence community-wide GHG emissions primarily through land use policy and planning, but also by using other levers (e.g. outreach, incentive, and regulatory measures) in the delivery of programs and services, and by building partnerships to implement reduction measures more broadly and influence behavioural change.

This Community Energy and Emissions Plan (CEEP) examines energy consumed within the community of Delta and the corresponding carbon emissions produced. The CEEP is the Corporation of Delta's plan to work with staff and community stakeholders to develop a strategic path towards a 'low carbon' future for the community of Delta. Specifically, the CEEP answers the following questions for Delta:

- **Where are we now?** A baseline inventory of Delta's community-wide energy use and GHG emissions.
- **Where are we heading?** A business-as-usual forecast that projects energy and GHG emissions 25-years into the future assuming current consumption patterns and behaviour.
- **Where do we want to be?** A vision and set of goals – developed in collaboration with key stakeholders – that articulate a low carbon future. GHG reduction targets which provide a quantitative measure of that future are also defined in the CEEP.
- **How will we get there?** A series of actions are proposed that create a reduction scenario.

Where are we now?

In 2007, the residents & businesses of Delta consumed over **13 million GJ of energy** and generated approximately **680,000 tonnes of CO₂e** or about 7 tonnes CO₂e per person.²

¹ IPCC 4th Assessment Report (2007). http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

This energy use required an expenditure of approximately **\$275 million in 2007**.³ As is typical for most communities, virtually all of this expenditure leaves the community.

Where are we going?

By 2040, Delta's community-wide energy consumption and GHG emissions are projected to be roughly the same as today. This will occur if senior levels of governments maintain their current initiatives. Specifically, energy performance improvements in the BC Building Code and increased Federal vehicle fuel efficiency standards will at best hold the line on emissions if fully implemented.

Where would we like to go?

The strategic direction for Delta with respect to energy and carbon emissions is captured in an energy vision:

The communities in Delta will make the transition to an energy efficient, sustainable future. Our community members will be engaged and committed to reducing our contributions to climate change. We are focused on creating vibrant, compact and affordable neighbourhoods.

Six key goals have been developed to achieve the vision. Goals focus on neighbourhood planning, mobility, economy, efficient buildings, low carbon energy supply, and waste management. Specifically these are:

Our Neighbourhoods: To plan and develop compact, complete and connected neighbourhoods that minimize energy consumption.

The plan identifies actions focused on land use policy and planning tools available to local governments. These consider growth management, transit-oriented development, development permit areas to promote energy efficiency and renewable energy, and more efficient and sustainable development. These actions have a goal to improve the viability of commercial businesses, enhance mobility choice, support district energy systems, etc. While these actions focus on the built environment, they do so to the benefit of the natural environment and rural character of Delta. By concentrating development in focused areas, we create opportunities for natural areas and agricultural land to be preserved and to thrive, providing additional benefits to the community such as recreation.

Our Mobility: To reduce vehicle travel and provide opportunities for low carbon mobility.

The plan identifies 11 actions – building upon the land use planning actions. These focus on the need to get around (i.e. mobility), rather than one particular mode of transportation. These actions promote changes in driving habits and transportation needs, and provide viable and attractive opportunities for walking, cycling, transit and other modes of travel.

² A GJ is a unit of energy measurement (1 GJ of energy is about the energy contained in a vehicle tank of gasoline), CO2e means CO2 equivalents – the measure of carbon emissions. All Greenhouse gases (GHGs) are converted to an equivalent carbon dioxide amount.

³ The energy and GHG inventory has been developed by the Province on behalf of local governments in BC. Some major industrial operations are excluded from this inventory – primarily for privacy or other regulatory reasons. For more information on this please see the Community Energy and Emissions Inventories (CEEI) at: <http://www.env.gov.bc.ca/cas/mitigation/ceei/index.html>

Our Economic Prosperity: To transition our local business community towards a low carbon economy.

This goal works to develop a local economy that may benefit from energy conservation and the alternative energy sector. The plan identifies actions to encourage local businesses and entrepreneurs to improve efficiency and considers policies to support the revitalization of commercial areas and home-based businesses. Collaboration and partnerships with the business community are intended to develop ‘catalyst projects’ – i.e. implemented examples of energy efficient and low carbon technologies and services.

Our Homes: To have efficient, healthy and affordable homes.

The majority of homes in Delta are single family dwellings, yet a range of building types also exist in the community. To improve the efficiency of residential buildings, the plan investigates opportunities to increase the number of home energy audits and retrofits, encourage high energy performance for new homes, and encourage behavioural changes in the way we use energy in our homes.

Our Energy Supply: To capture and re-use waste heat and maximize the use of renewable energy.

Actions in this goal area look at opportunities to facilitate the transition to alternative and renewable energy sources and distributed energy systems, where identified as feasible. The plan actions focus on a role of encouragement and identify areas for further feasibility study.⁴

Our Waste: To reduce, reuse, recycle, and recover materials from waste.

Actions are defined to create opportunities to reduce waste, and to divert waste from disposal. Priority areas are organics, multi-family residential, construction and demolition, and business and institution. Local opportunities to redefine waste as a resource are also explored.

How will we get there?

Focusing new growth as infill development in key corridors and nodes in Ladner, Tsawwassen and North Delta, will help to create opportunities for improved housing and mobility choice, as well as for renewable and district energy systems. Compact land use and complete communities (i.e. a range of services) are the foundation of reducing building energy and transportation energy use – and their associated carbon emissions.⁵

A reduction scenario was created based on energy reduction best practices and an assumed level of community uptake. The reduction scenario breaks the actions into three phases from 2013 to 2040 in order to realize the following community-wide reductions. Based on a 2007 baseline the actions are expected to achieve:

- **Total GHG emissions:** by 2020 a 0% change, and by 2040 a 12% reduction.

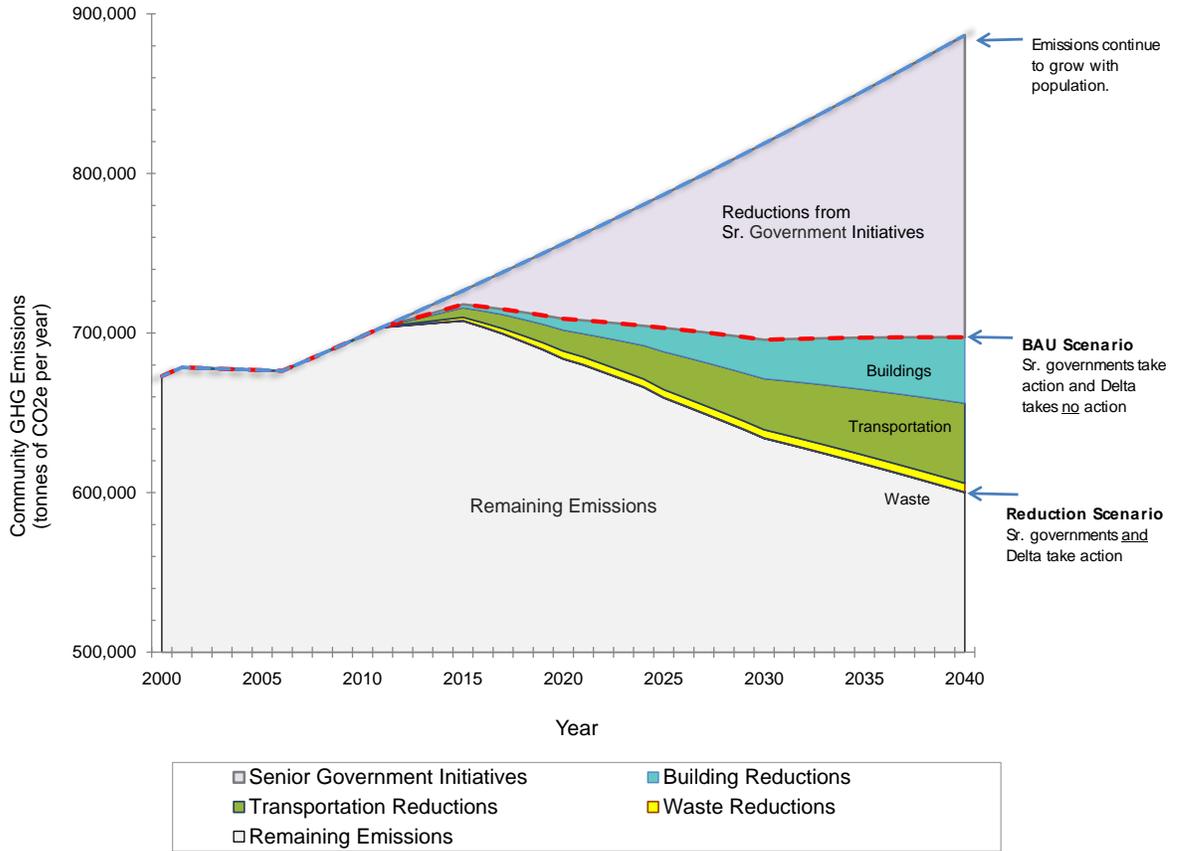
⁴ The Corporation has already made steps in this area by signing on to the voluntary Solar Hot Water Ready Regulations of the BC Building Code, and developing a Renewable Energy Systems bylaw to address height issues from rooftop solar panels.

⁵ As well this development form has many benefits beyond energy and emissions – including more inclusive neighborhoods, a range of housing options for seniors and families, local business opportunities, and more community and pedestrian-focused neighborhoods.

- **Per capita GHG emissions:** by 2020 a 10% reduction, by 2040 a 32% reduction. ⁶

These reductions are illustrated by a ‘carbon wedge’ diagram – which shows the impact over time of the Sr. government and the plan actions according to sector. (Figure S-1).

Figure S-1: Energy and Emissions Plan: Total GHG Reduction Wedge



Implementation

An implementation strategy is defined in the plan and includes the roles for each relevant department, estimated staff and disbursement costs, estimated GHG reductions, and potential partners for each action.

A process for developing outreach and engagement strategies to assist in implementation is also provided and includes some initial guidance around community stakeholders, and their level of interest in and influence on CEEP implementation.

⁶ As the community grows, the total emissions are generated by a larger population. Thus to achieve a modest total reduction, a greater per capita reduction is required.

Finally, a monitoring framework provides criteria and indicators for tracking progress on CEEP implementation, and performance against the ultimate goal of reducing community energy use and GHG emissions.

Summary List of Actions (2013-2040)

Short term 2013-2019 Medium Term 2019-2025 Long Term 2025 +

Our Neighbourhoods: To plan and develop compact, complete and connected neighbourhoods that minimize energy consumption.

- Action 1 Review existing areas designated for residential infill and identify opportunities to focus density in corridors and nodes.
- Action 2 Amend OCP (Schedule A) and Zoning Bylaw to align with updated area plans
- Action 3 Review Delta's framework for evaluating energy efficiency and greenhouse gas reductions in new development
- Action 4 Make pedestrian, cycling and transit access a priority at existing and new municipal facilities
- Action 5 Provide incentives to encourage more complete communities
- Action 6 Review and update Development Permit Area Guidelines
- Action 7 Communicate with partners about locating new institutional facilities in focused growth areas
- Action 8 Promote minimum densities in appropriate areas in the Zoning Bylaw

Our Mobility: To reduce vehicle travel and provide opportunities for low carbon mobility.

- Action 9 Identify opportunities to improve pedestrian connectivity
- Action 10 Establish a Community Idling Reduction Program
- Action 11 Update the subdivision bylaw to accommodate a range of transportation users
- Action 12 Promote Translink efforts to encourage alternative transportation
- Action 13 Work with partners to develop car sharing program / opportunities
- Action 14 Promote electric vehicle charging infrastructure
- Action 15 Work to explore opportunities for a community shuttle
- Action 16 Improve connectivity for cycling between and within Delta communities
- Action 17 Review parking management opportunities

Our Economic Prosperity: To transition our local business community towards a low carbon economy.

- Action 18 Continue Climate Smart program for local businesses
- Action 19 Develop a Climate Leaders Network for major energy consumers
- Action 20 Promote commuter trip reduction amongst large employers
- Action 21 Encourage energy audits and retrofits
- Action 22 Work with partners to coordinate a Fleet Logistics program

Our Homes: To have efficient, healthy and affordable homes.

- Action 23 Encourage home energy efficiency
- Action 24 Provide training to building inspections staff
- Action 25 Promote energy efficiency to builders and renovators
- Action 26 Support adaptive reuse of buildings and incorporate into policy

- Action 27 Promote energy efficient and 'passive house' design
- Action 28 Investigate incentives for home energy audits and retrofits

Our Energy Supply: To capture and re-use waste heat and maximize the use of renewable energy.

- Action 29 Provide education on alternative energy options for buildings
- Action 30 Study alternative energy options that show potential in Delta
- Action 31 Evaluate district energy feasibility for select development areas
- Action 32 Explore use of Local Service Area Bylaws
- Action 33 Establish a renewable energy standard for buildings

Our Waste: To reduce, reuse, recycle, and recover materials from waste.

- Action 34 Encourage resource sharing amongst industrial operations
- Action 35 Support implementation of the regional Integrated Solid Waste and Resource Management Plan (ISWRMP)
- Action 36 Promote the 4Rs (reduce, reuse, recycle, recover) amongst residents
- Action 37 Implement further activities in support of the ISWRMP

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1. Introduction

1.1 What is a Community Energy and Emissions Plan?

A Community Energy and Emissions Plan (CEEP) is a strategic plan to guide a community in reducing overall energy use and the associated carbon emissions. It defines the role of the municipal government – working in partnership with others – to facilitate energy efficiency in the community, develop local energy sources, and to reduce carbon (i.e. GHG) emissions.⁷ Most GHG emissions are a direct result of our use of fossil fuel energy. Energy consumption is from buildings (residential and commercial) and vehicles (commercial and private vehicles). As well, a small amount of GHG emissions arise from the decomposition of the solid waste we generate.

The CEEP is both a strategic plan and an action plan. As a strategic plan it provides the vision and goals to guide future decisions about community energy and emissions. The vision and goals will be applied to future ideas and proposals as they are brought forth. As an action plan it defines a number of specific actions to be initiated over the next several years.

The CEEP answers the following questions for our community:

Where are we now?

Chapters 1 and 2 provide the rationale and context for taking action to reduce community-wide energy use and GHG emissions. Chapter 3 presents our 2007 baseline energy consumption and carbon emissions. This is drawn from the provincial Community Energy and Emissions Inventory (CEEI), which provides inventories for all local governments in British Columbia.

Where are we heading?

Chapter 4 provides a business-as-usual (BAU) forecast of our energy and electricity consumption, and the resulting GHG emissions to 2040. The BAU forecast shows the trajectory that our community's emissions will take if we, as a community, take no action to reduce our energy demand. The BAU forecast accounts for actions that senior levels of government have committed to implement such as building code improvements and vehicle fuel efficiency standards.

Where do we want to be?

Chapter 5 outlines the vision and goals which articulate where Delta sees itself in the future in terms of energy and carbon emissions. These were developed in consultation with stakeholders. Existing community-wide GHG reduction targets, which have been adopted within Delta's Official Community Plan (OCP), are also highlighted in this Chapter.

⁷ A number of terms are commonly used to describe the emissions that create climate change including: greenhouse gases –abbreviated as GHGs, carbon emissions, and the carbon 'footprint' of our energy use. For the purposes here, these all refer to the greenhouse gas emissions of the community and can be used interchangeably. While the term GHG is more technically accurate, carbon emissions and carbon footprint are more commonly used in popular communication.

How do we get there?

Chapter 6 presents a reduction scenario, corresponding actions, including detailed actions and an implementation schedule. The reduction scenario is based on what we know today about reducing energy demand and mitigating climate change and quantifies the reductions that can be expected in the short, medium and long term.

Chapter 7 provides guidance around CEEP implementation and monitoring, stakeholder roles and responsibilities, partnerships, resource needs, engagement strategy development, and indicators for monitoring progress and tracking performance.

1.2 Why have a CEEP?

A CEEP can assist the community in realizing the following benefits:

- Reduce energy costs through more efficient energy use;
- Mitigate climate impacts – reducing local GHG emissions reduce the community's contribution to global climate change;
- Improve air quality – reducing the use of fossil fuels, especially in transportation, reduces the amount of air pollutants released into the air we breathe;
- Reduce vulnerability to energy markets – having a variety of energy sources and alternatives enhances resiliency to fluctuating energy prices;
- Create new jobs and business opportunities – promoting a green economy can open up new job and business opportunities;
- Sustainable communities – the activities that support energy conservation are aligned with other sustainable community objectives in the Official Community Plan such as building compact, complete communities, efficient infrastructure, walkable neighbourhoods, and protecting farmland and natural areas.

1.3 Input to the CEEP

The CEEP was created through a combination of analysis and consultation. The technical analysis included GIS mapping and engineering analysis of the effectiveness of various measures. The consultation was used to define suitable actions relevant to the community.

Table 1 summarizes the activities undertaken during the development of the CEEP to capture input from staff, stakeholders and the public. Components of the activities were also intended to increase the general awareness of the public about climate change and opportunities for the community to take action.

Table 1. CEEP Outreach and Engagement Activities

Activity	Date	Objectives
CEEP Brochure	May 2011	To raise public awareness about the CEEP and build support for implementation.
Staff Working Group Meetings	May, June and November 2011; February 2012	To solicit input towards the development of the various elements of the CEEP (i.e. vision, themes, goals, actions, reduction scenario, implementation, etc.).
Stakeholder Focus Group Workshops	November and December 2011	To gather feedback on the draft vision and goals and to generate ideas for action that would form the basis of a reduction scenario.
Presentation to Department Heads	March 2012	To provide an update on the CEEP development process and gather feedback at the draft stage.

2. Context for Action

2.1 Global Climate Change

There is increasing evidence that global climate change resulting from emissions of carbon dioxide and other greenhouse gases is having an impact on the climate system of the planet. The Fourth Assessment Report (2007) of the Intergovernmental Panel on Climate Change (IPCC), states the consensus of scientific opinion that:

- Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level;
- Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human-caused GHG concentrations, and;
- There is high agreement and much evidence that with current climate change mitigation policies and practices, global GHG emissions will increase over the next few decades.⁸

In addition, climate change impacts are expected to have serious negative effects on global economic growth and development. In 2005, the UK government commissioned an independent economic review called The Stern Review, which concluded that *“the benefits of strong and early action far outweigh the economic costs of not acting.”*⁹ Using results from economic models, the Review estimated that if we don’t act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global Gross Domestic Product (GDP) annually – potentially as much as 20% of GDP. In contrast, the costs of implementing actions to reduce GHG emissions and mitigate the impacts of climate change could be limited to around 1% of global GDP annually.

2.2 Areas of Action By Higher Governments

Globally Coordinated Action

On a global scale GHG reduction policies are managed through the United Nations Intergovernmental Panel on Climate Change (IPCC). This process has resulted in a number of protocols and accords (the best known is the “Kyoto Protocol”) which define each country’s commitment to make reductions. Subsequent policy commitments have been made at a number of meetings of this body.

⁸ IPCC 4th Assessment Report (2007). http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

⁹ Nicholas Stern. *The Economics of Climate Change: The Stern Review*. Cambridge University Press, January 2007. http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

In Canada, senior levels of government have made commitments to reducing GHG emissions, and have developed policies, programs and initiatives to meet those commitments. Actions that affect community emissions within Delta include:

Federal Initiatives

- In January 2010, the federal government set a national target to reduce GHG emissions by 17 percent, relative to 2005 levels, by 2020.
- In 2010, the federal government announced proposed Passenger Vehicle and Light Truck Greenhouse Gas Emission Regulations under the Canadian Environmental Protection Act (CEPA) to create national vehicle efficiency standards that harmonize with the US standards by 2011. If implemented, new vehicles sold in 2016 are expected to be 40% more efficient than vehicles sold in 2008. They also announced upcoming Heavy Duty Vehicle regulations which are not yet defined.

Provincial Initiatives

- **Greenhouse Gas Reduction Targets Act (Bill 44, 2007):** establishes a province wide reduction of GHG emissions of 33% by 2020, and 80% by 2050 below 2007 levels. Interim reductions targets were subsequently established as 8% by 2012 and 18% by 2016.
- **BC Climate Action Plan:** Developed to support Bill 44, the plan's actions are estimated to achieve 73% of the reductions required to meet the reduction target. The plan and subsequent legislation included the BC carbon tax that in 2012 will reach \$30 per each tonne of GHG emissions.
- **Clean Energy Act:** In 2010 BC adopted the Clean Energy Act defining several energy objectives for BC.
- **Local Government (Green Communities) Statutes Amendment Act (Bill 27, 2008):** which amends the Local Government Act to read:

“LGA 877 (3) - An official community plan must include targets for the reduction of greenhouse gas emissions in the area covered by the plan, and policies and actions of the local government proposed with respect to achieving those targets (by May 31, 2010)”
- **BC Climate Action Charter:** A provincial initiative introduced in September 2007 to encourage local governments to become carbon neutral in their local government operations beginning in 2012.¹⁰

2.3 Regional Context

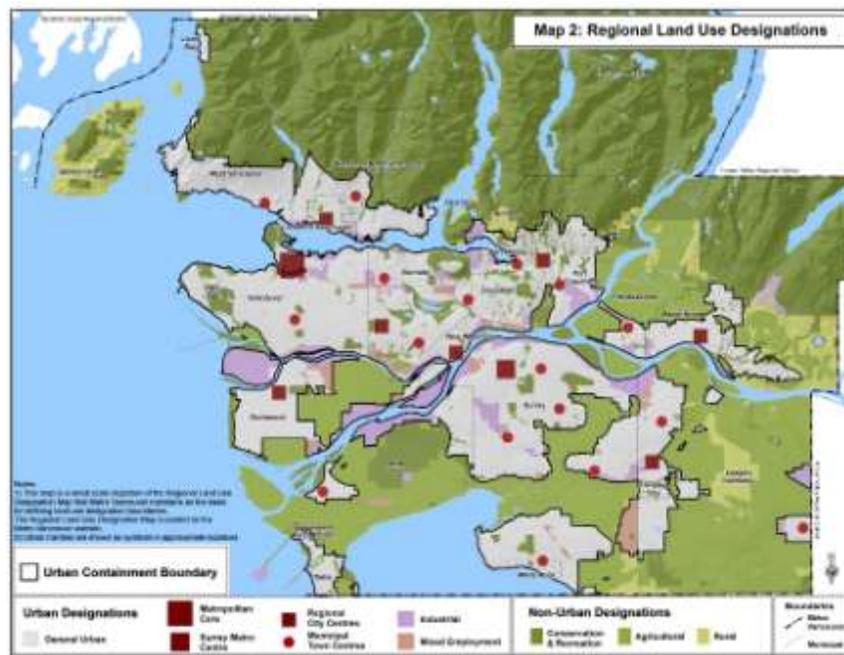
In 2011, Metro Vancouver adopted a new Regional Growth Strategy (RGS) that provides guidance for land use policies and development across the region to 2040. The RGS delineates urban growth boundaries to focus growth, so that agricultural, industrial, and natural areas may be preserved.

¹⁰ Carbon neutrality means that efforts are made to reduce emissions, and that any emissions that cannot be reduced are 'neutralized' through purchase of carbon offsets.

Planning

Figure 1 shows the location of metropolitan, regional and municipal town centres that Metro Vancouver is planning for in the RGS. Overall, Delta is projected to have low population growth relative to other municipalities in the region. The majority of future growth in Delta is projected for North Delta. Ladner is identified as a municipal town centre and further south, adjacent to Tsawwassen is the Tsawwassen First Nation, which is expected to grow substantially between now and 2040. Delta also has an important role in maintaining the region’s industrial land base with industrial areas along River Road east and on Annacis Island.

Figure 1. Metro Vancouver Regional Land Use Designations



Source: Metro Vancouver Regional Growth Strategy

Relevance to Delta’s CEEP: A substantial portion of Delta’s community-wide energy use and emissions are related to transportation. Implementing the RGS land use policies and containing new growth within the defined boundaries will reduce the need for travel trips and increase transportation efficiency. Strategically locating job centres in the region will also have an impact on transportation emissions. By preserving and enhancing Delta’s industrial land, local employment opportunities would also improve, benefitting the community.

Transportation

Delta contains major regional routes to support linkages between two key gateways – the Tsawwassen ferry terminal and Deltaport – and the rest of the region. The major routes are shown in blue and red in Figure 2; the new South Fraser Perimeter Road is shown as planned.

Figure 2: Major Roads, Highways and in Metro Vancouver

Source: *Transport 2040, TransLink*¹¹

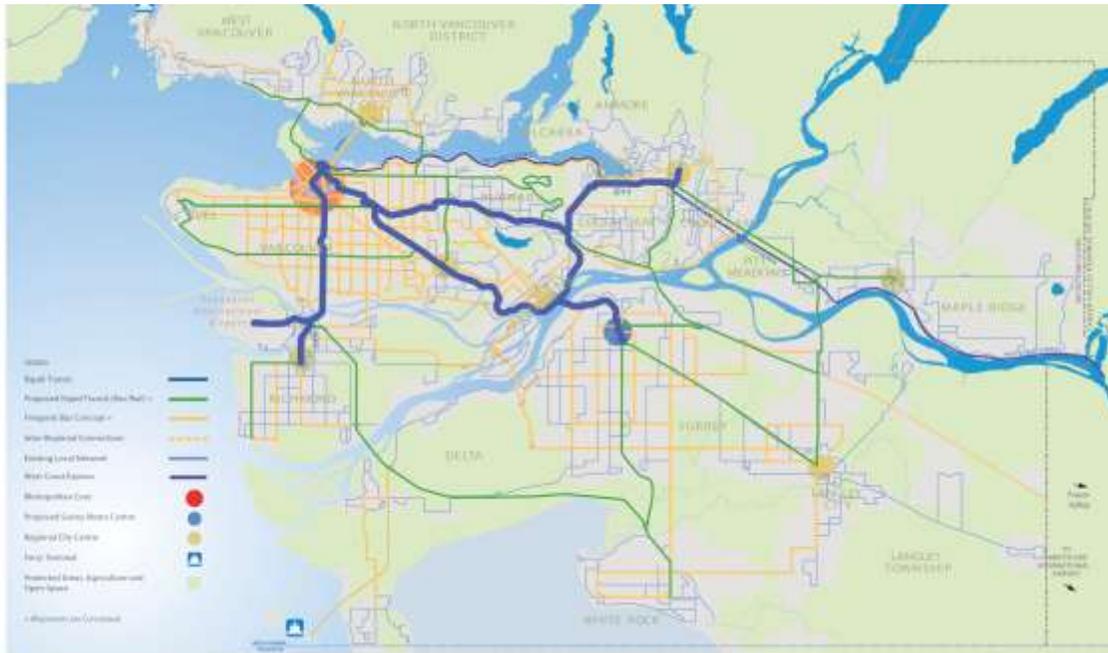
TransLink, the South Coast BC Transportation Authority, prepared “Transport 2040” in 2008 to define goals and strategies to create a transportation system to meet the needs of Metro Vancouver residents, businesses and goods movers. The plan aims to support regional economic, social and environmental protection objectives including reducing GHG emissions, increasing non-auto trips, and aligning new housing and jobs with areas serviced by the Frequent Transportation Network, while facilitating efficient goods movement.

Based on growth projections for the region, TransLink has defined current and proposed routes for the Frequent Transit Network (see Figure 3). There is a proposed Rapid Transit (rail/bus) line through Delta connecting from Richmond to South Surrey. The proposed Frequent Bus Concept will link Ladner, Tsawwassen and North Delta to this rapid transit line.

Relevance to Delta’s CEEP: Transport 2040 goals align with community energy planning objectives with respect to reducing GHG emissions from transportation. In order to achieve these goals, TransLink will need to work closely with municipalities – including Delta - to ensure land use planning and transit planning are aligned. The reality is that over the 10-30 year time horizon, while connections from Delta to other locations are expected to improve, development patterns are not expected to become dense enough to support extensive or frequent internal transit systems. Therefore, Delta will continue to be a community that relies heavily on personal vehicle usage. This will make reductions in transportation energy use a challenge.

¹¹ See www.translink.ca/~media/documents/bpotp/transport_2040/transport%202040.ashx

Figure 3. Potential Frequent Transit Network in Metro Vancouver



Source: Transport 2040, TransLink¹²

Waste Management

Metro Vancouver is responsible for regional waste management and in 2010 completed an Integrated Solid Waste and Resource Management Plan (ISWRMP). The primary goal of the ISWRMP is to reduce waste by way of further diversion and energy recovery. The ISWRMP has set a target to increase the quantity of waste diverted from disposal to 80% by 2020. This target will only be achieved through collective commitment to waste reduction by Metro Vancouver and member municipalities.

Relevance to Delta’s CEEP: Waste diversion – particularly decomposable organic material – reduces landfill gas generated at the landfill. (NB When waste is deposited in a landfill it decomposes and releases methane – a strong greenhouse gas). Implementing strategies to reduce and divert waste from the landfill, as proposed in the ISWRMP, will help Delta reduce its carbon footprint.

¹² See www.translink.ca/~media/documents/bpotp/transport_2040/transport%202040.ashx

2.4 Delta Context

Geography

The municipality of Delta is situated in the south east portion of the lower Fraser Basin, and is bound by water to the north (the Fraser River south arm), west (Georgia Strait) and south (Boundary Bay). The municipality of Surrey shares the eastern boundary with Delta and to the north, the community of Richmond is located on opposite side of the Fraser River. Delta's population largely resides within three contained communities – North Delta, Ladner and Tsawwassen. Delta is located on the Fraser River delta, and thus has features of a river delta such as flat terrain and fertile soil.

The municipality of Delta is geographically the largest municipality in Metro Vancouver, covering over 360 square kilometres. The area includes the Burns Bog Ecological Conservancy Area, Agricultural Land Reserve, industrial areas, and other rural properties. Along the western and eastern boundaries are large tracts of wetland habitat. These areas are part of the Province's Wildlife Management Area (WMA) system comprising of the South Arm Marsh, Roberts Bank and Boundary Bay WMAs. Together they are part of the Pacific Flyway.

Population

In 2011, the municipality had a total population estimated at 99,863¹³. Over half of the total population resides in North Delta. Table 2 provides the population distribution among the three town centres and rural areas, based on data maintained by the planning department.

Table 2. Distribution of Delta's population (2006)

Location	Population (2006)	Population (2011)	Change 2006 to 2011 (%)
North Delta	51,623	53,940	4.5 %
Tsawwassen	20,933	21,181	1.2 %
Ladner	21,542	22,204	3.1 %
Rural areas	3,304	3,263	-1.2 %
Total	96,635	99,863	3.3 %

The municipality's population has grown at a rate slower than the region overall. Between 2006 and 2011, Delta's population grew by approximately 3.3%, while the population in all of Metro Vancouver increased by 9.4% over the same period. The trend of slower growth in Delta relative to the region is projected to continue over the next 25 years.

Land Use and Development

Delta's land use is governed by the Official Community Plan (OCP) which includes area plans for Riverside, East Ladner, Ladner, North Delta and Tsawwassen. These plans provide the vision for

¹³ Based on Census data and neighbourhood data provided by planning department staff.

Delta’s communities and guide planning issues related to the environment, housing, agriculture, heritage, and more.

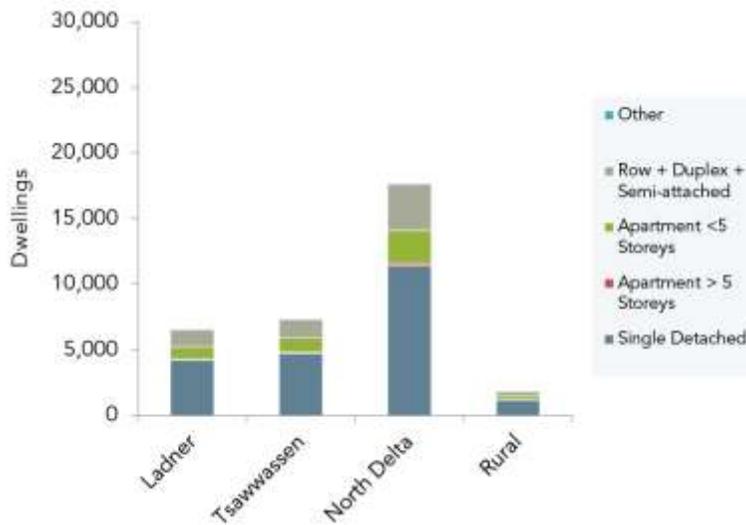
Anticipating future development that will occur along Scott Road in North Delta (which borders Surrey), the Corporation undertook a Development Incentives Study to identify development trends and opportunities, illustrate economic realities, and determine incentives and strategies to facilitate new development along Scott Road.¹⁴ The study made a number of specific recommendations to encourage redevelopment. A Revitalization Tax Exemption Bylaw was enacted in November 2012 for the Scott Road corridor which provides tax incentives for low environmental impact projects which includes energy efficiency and measures to promote green transportation options.

The Corporation has recognized the development permitting and approval process as an important trigger point for encouraging and requiring more sustainable (e.g., energy efficient, low carbon, etc.) forms of development. To take advantage of this, the Corporation of Delta has developed the "Green Growth Index" (GGI). The GGI is a voluntary checklist developers may use to guide their development applications in Delta.¹⁵

Dwellings

Generally, the amount of energy required to heat and power a home is directly related to its size, and in Delta, the majority of dwellings are single family detached homes. Figure 4 shows the distribution of the different dwelling types within each community, based on 2006 Census data.

Figure 4. Types of dwellings in Delta by community, 2006

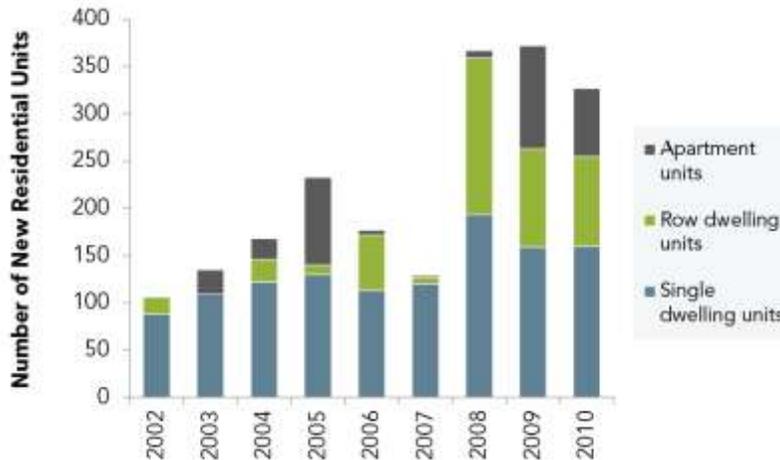


¹⁴ Scott Road Development Incentives Study, July 2011. Prepared by G.P. Rollo and Associates, Land Economists

¹⁵ Green Growth Index: http://www.corp.delta.bc.ca/assets/CPD/PDF/green_growth_index_2008.pdf

In order to accommodate growing populations within contained urban boundaries, the forms of new dwellings have changed over time to include more row and apartment dwellings (see Figure 5). In 2010, less than half of new dwellings constructed in Delta were single family homes. In addition to reducing energy demand, smaller, more compact and mixed use developments can support local services and amenities, and improve housing choice for residents.

Figure 5. New residential units in Delta, 2002 - 2010



The age of homes affects energy demand; the older the home, generally speaking, the higher the energy demand. This is due primarily to improvements in energy performance standards within the building code over time. Today, almost three quarters of the homes in Delta are over 25-years old, which is higher than the provincial average (62%).



74% of homes in Delta are over 25 years old.



62% of homes in B.C. are over 25 years old.

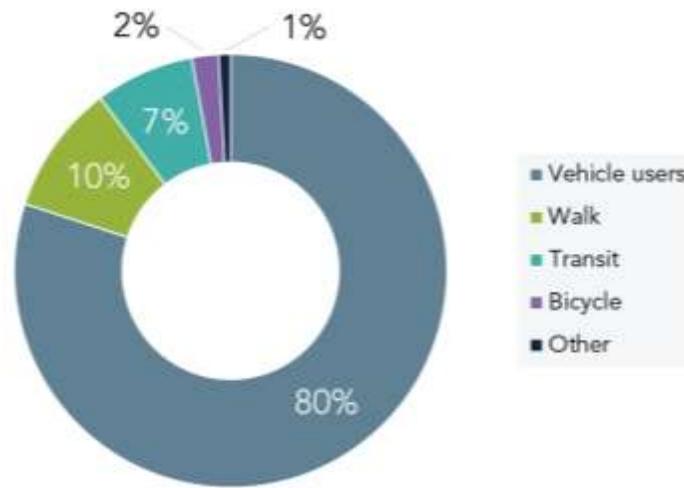
Mobility

Residents of Delta overwhelmingly use vehicles to get to work, school, shopping, recreation and other places. Delta residents use vehicles for 80% of all trips. Walking and taking transit are the secondary modes chosen at 10% and 7%, respectively (Figure 6).

24% of residents work within Delta.

In B.C., an average of **38%** of people work within the municipality where they reside.

Figure 6. Mode of transportation for all trips in Delta



Source: TransLink Trip Diary Data

Transportation choice is influenced by a number of factors; one of which is the location of jobs. Table 3 highlights the distribution of jobs within Delta, though it is important to note that the majority of residents (76%) commute outside the municipality for work.

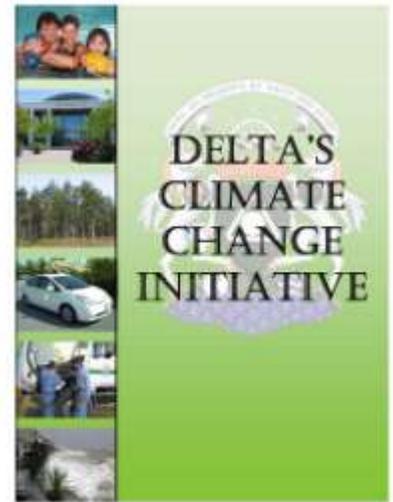
Table 3. Distribution of jobs in Delta, 2006

Location	Number of Jobs	Proportion of Total Jobs
North Delta	13,191	24%
Tsawwassen	5,074	9%
Ladner	5,646	10%
Rural areas	31,100	57%

Climate Change Planning

Planning for the mitigation of and adaptation to the impacts of climate change is a relatively new area of practice for local governments. The Corporation of Delta has demonstrated early leadership in this area and continues to take steps to reduce GHG emissions resulting from municipal operations and services, as well as steps to adapt to the impacts of climate change, including:

- 1996: Joined the Partners for Climate Protection program.
- 2007: Created the *Climate Change Initiative* and developed a *Corporate Framework for Action* to move initiatives forward (e.g., Building efficiency, Green Fleet Management Plan, etc.).
- 2007: Developed a 2006 baseline inventory of energy use and GHG emissions for municipal operations, and set a target to reduce GHG emissions from municipal operations by 20% below 2006 levels by 2015. The Corporation of Delta continues to update, monitor and publicly communicate its corporate GHGs every two years.
- 2007: Signed the *BC Climate Action Charter*, making a commitment to achieve carbon neutrality in municipal operations beginning in 2012.
- 2008: Established the *Office of Climate Action and Environment* to profile climate action initiatives and to implement supporting initiatives.
- 2009: Installed a solar hot water system on the roof of municipal hall which provides over 60% of the building's hot water needs.
- 2010: Endorsed community-wide GHG emission reduction targets of 33% below 2007 levels by 2020 and 80% below 2007 levels by 2050.
- 2010: Joined the *Climate Change Adaptation Pilot Project* to assess Delta's vulnerability to climate change and to initiate steps for increasing the community's resilience.
- 2010: Signed the *Mexico City Pact* in November 2010, which acknowledges local government's role in addressing climate change, and requires signatories to make a voluntary commitment to develop mitigation and adaptation initiatives.
- 2011: Became a *Solar Community* to further promote the use of solar hot water systems and signed on to the new provincial regulation requiring that new homes in Delta be "solar hot water ready" (effective June 21, 2011).



Supportive Initiatives in the Community of Delta

- Tilbury Eco-Industrial Partnership (TEIP): an advisory committee that devises strategies for the exchange or sharing of resources among Tilbury Park industries. This initiative aims to reduce costs while contributing to a healthier ecosystem.
- Also on Tilbury Island, a Transportation Management Association was formed with a focus on reducing commuter vehicles. Initiatives have included a TransLink Employer Pass program and a ride share program.
- Lehigh Cement is currently exploring opportunities to convert waste heat from its plant into electricity to power its operations.

3. Where are we now?

3.1 Energy and GHG Emissions Baseline: 2007

We consume energy to heat and power buildings, and to move goods and people around. These activities result in the release of greenhouse gas (GHG) emissions. This section describes how much energy is currently used in our community on an annual basis, as well as the estimated GHG emissions that result from our use of energy, and from other activities.

The Province of BC has developed the Community Energy and Emissions Inventory (CEEI) initiative to provide inventories of community-wide energy consumption and GHG emissions for all municipalities and regional districts in BC. The CEEI reports provide the total amount of building energy consumed (electricity and natural gas) as well as modelled estimates of consumed propane, heating oil, wood and vehicle fuels. The associated GHG emissions are calculated from energy consumed as well as from disposed waste.¹⁶ A summary of Delta's baseline inventory is shown on the following page. Details of the inventory are provided in Appendix A.

Energy consumption is an expenditure to the community. The 2007 energy consumption equates to approximately \$275 million annually – almost \$2,800 per capita. The vast majority of this spending leaves Delta. This figure highlights the economic opportunity available to the community if energy demand can be reduced, energy efficiency improved, and local, renewable energy sources are developed.

What is a gigajoule? What is a carbon dioxide equivalent?

A **gigajoule (GJ)** is a metric term used for measuring energy use. **1 GJ** is equivalent to the amount of energy available in a vehicle tank of gas, or 2 barbeque propane tanks. It's also the amount of electricity a typical homes uses in 10 days.

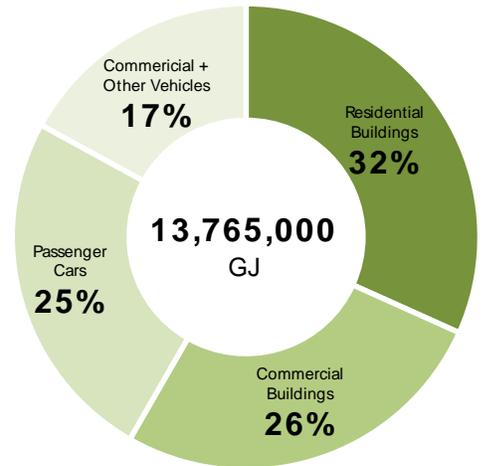
Greenhouse gas emissions are measured in **tonnes of carbon dioxide equivalents** or **tonnes CO₂e**. A carbon dioxide equivalent is a way of expressing any given greenhouse gas as a functionally equivalent amount of carbon dioxide (CO₂). **1 tonne CO₂e** is created when you consume 10 tanks of gas.

¹⁶ Revised inventories for 2007 are available at www.env.gov.bc.ca/epd/climate/ceei/index.htm and were last updated September 2010. It is expected that 2010 inventories will be released by the end of 2011, and bi-annually after that.

Community Energy Use Baseline (2007)

Buildings (58%): Energy is consumed to heat, cool and power our buildings using natural gas and electricity. In residential buildings (houses, townhomes, apartments) about 10% of the energy is electricity and 90% is natural gas. In commercial and small/medium industrial buildings, about 16% is electricity and 84% is natural gas.

Transportation (42%): Energy is consumed by vehicles to move people and goods. This energy primarily comes from burning gasoline, diesel and propane. Passenger vehicles account for the majority of the community's estimated transportation fuel use.

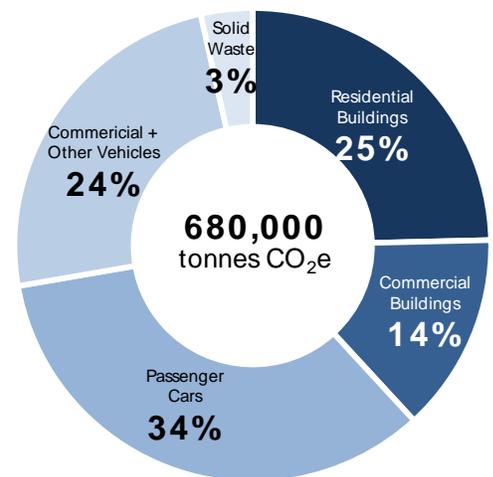


Community GHG Emissions Baseline (2007)

Buildings (39%): Using electricity and natural gas to heat and cool buildings leads to 39% of the community's GHG emissions. Most of the GHGs result from natural gas use.

Transportation (58%): Using gasoline, diesel and propane for transportation leads to approximately 58% of the community's GHG emissions. This community inventory includes only vehicles registered in Delta.

Solid waste (3%): Delta's waste goes to landfills where it decomposes and releases methane gas, a potent GHG.



4. Where are we heading?

4.1 Business-as-usual Forecast

Energy consumption and GHG emissions are not static – they increase as the population and economy expand. In the future, they will continue to increase as Delta grows. If the community of Delta continues with its current pattern of development - a “business as usual” (BAU) scenario - we can expect our energy use and emissions will also increase with our population and economy.

The BAU forecast is driven initially by population growth rate. This growth will be tempered somewhat by natural and regulated efficiency improvements including building code improvements (Provincial jurisdiction) and vehicle fuel efficiency standards (Federal jurisdiction). These policy actions will evolve regardless of action taken by the Corporation of Delta.¹⁷

The results of the BAU forecast (see Table 4) indicate that energy consumption and GHG emissions will remain relatively constant from now through to 2040, with electricity use increasing only slightly.¹⁸ The fact that the population growth is more or less tempered by future improvements in efficiency is coincidental – indicating that the rate of growth is about the same as the expected rate of efficiency improvements in vehicles and buildings.

The BAU forecast (total and per capita) by sector for electricity, energy and GHG emissions is shown in Figure 7, Figure 8, and Figure 9, respectively. Note that details of the forecast are provided in Appendix A.

¹⁷ The assumed senior government improvements included in the modeling are:

- New residential building energy demand is reduced by 25% from 2011 to 2020 (BC Buildings plan target), and a further 20% from 2021 to 2040 (estimated energy code targets).
- New commercial building energy demand is reduced by 12% from 2011 to 2020 (BC buildings Plan target), and a further 17% from 2021 to 2040 (estimated energy code targets).
- Existing residential building energy demand is reduced by 7.5% from 2011 to 2020, and a further 10% from 2021 to 2040. (estimates of equipment stock turnover).
- Existing commercial building energy demand is reduced by 5% from 2011 to 2020, and a further 5% from 2021 to 2040. (estimate of equipment turnover).
- Passenger vehicle fleet average fuel economy improves by 25% from 2016 to 2030 (representing the gradual fleet turnover that includes the currently announced requirements for 2016 model year fleet average fuel efficiency improvements), and a further 10% from 2031 to 2040 (estimation of future potential).
- Commercial vehicle fleet average fuel economy improves by 10% from 2016 to 2030 (representing the gradual fleet turnover that includes the currently anticipated measures for fuel efficiency improvements), and a further 5% from 2031 to 2040 (estimation of future potential).

¹⁸ Given the uncertainties of predicting 25 years into the future, these estimates are indicative only – small forecasted increases or decreases should be considered not statistically different and all be thought of as “about the same”

Table 4. BAU forecast for energy and GHG emissions

Sector	2007	2020	2030	2040
Population	97,400	108,100	117,000	123,700
Total Energy Consumption (GJ)	13,765,000	14,189,000	14,000,000	13,996,000
Energy per capita (GJ)	141	131	120	113
Change from 2007	--	+ 3.1%	+ 1.7%	- 1.7%
Electricity consumption (GJ)	3,441,000	3,549,000	3,650,000	3,711,000
Electricity per capita (GJ)	35	33	31	30
Change from 2007	--	+ 3.1%	+ 6.1%	+ 7.8%
Total GHG emissions (tonnes CO ₂ e)	682,000	709,000	696,000	697,000
GHG emissions per capita (tonnes CO ₂ e)	7.0	6.6	5.9	5.6
Change from 2007	--	+ 4%	+ 2.1%	+2.2%

Figure 7. BAU forecast for total and per capita ELECTRICITY consumption

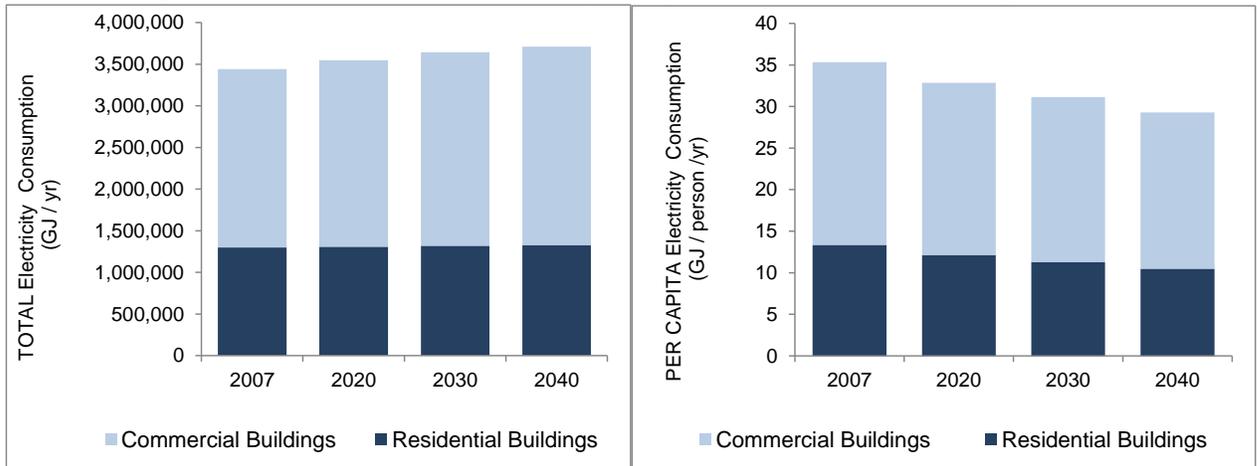


Figure 8. BAU forecast total and per capita ENERGY consumption (by end user)

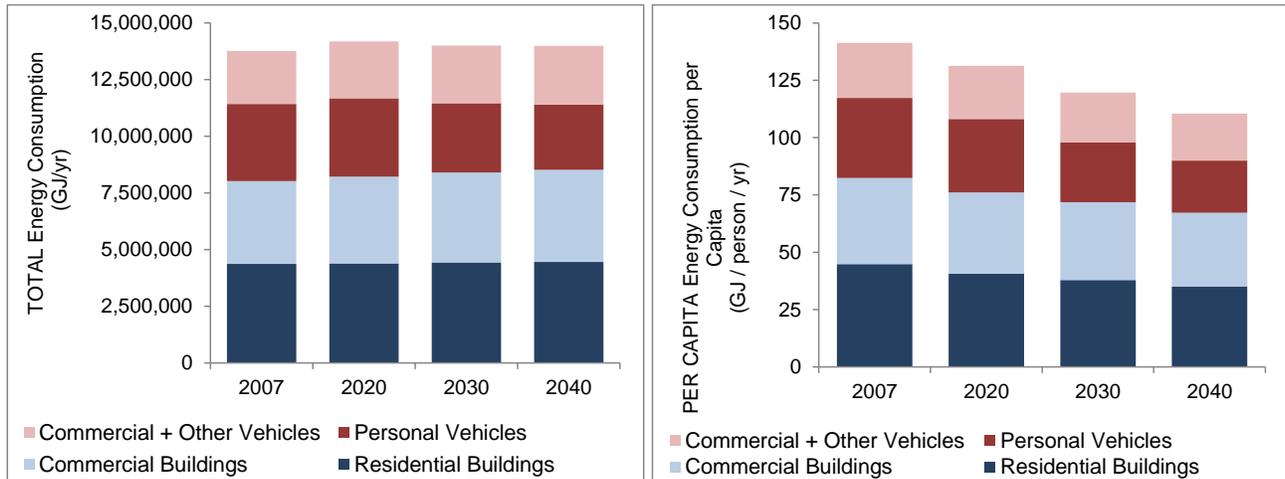
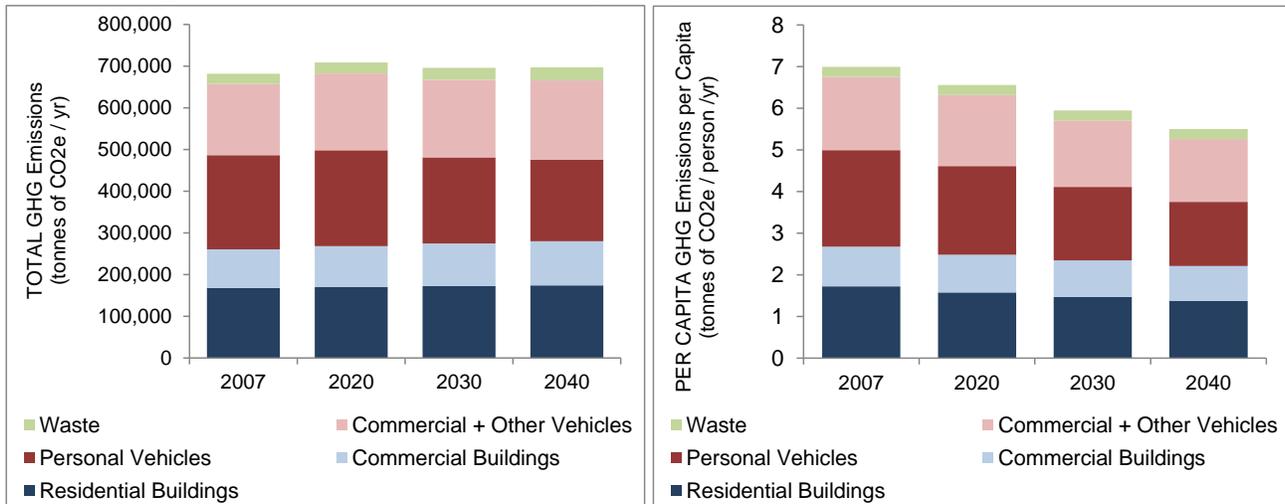


Figure 9. BAU forecast for total and per capita GHG emissions (by end user)



5. Where do we want to be?

5.1 CEEP Alignment with other Municipal Objectives

Traditional areas of municipal activity are guided by the Official Community Plan (OCP), an overarching document that provides the policy direction to guide future growth and development in the community. Table 5 highlights how energy and emissions planning relates to the goals within Delta’s OCP.

A pyramid structure (see Figure 10) describes the framework of the plan. The framework increases in detail and from top to bottom. Shorter-term actions (that are subject to change over time) are aligned with the long-term vision (that should remain relevant well into the future).

The objectives and activities contained within a Community Energy and Emissions Plan (CEEP) are very consistent with broader municipal objectives and activities. More traditional areas of municipal activity are guided by the Official Community Plan (OCP), an overarching document that provides the policy direction to guide future growth and development in the community. Table 5 highlights how energy and emissions planning relates to the goals within Delta’s OCP.

Figure 10. Pyramid Plan Structure



5.2 CEEP Vision

The CEEP vision for moving forward is expressed as:

The communities in Delta will make the transition to an energy efficient, sustainable future. Community members will be engaged and committed to reducing their contributions to climate change. We are focused on creating vibrant, compact and affordable neighbourhoods.

The Corporation of Delta’s role in realizing this vision is to help the community manage its energy consumption and reduce its contributions to climate change. By using local government tools to promote and support action on energy efficiency, conservation and climate change we will work towards meeting our goals. To this end, we are motivators, collaborators, facilitators, partners, planners, instigators, educators, and leaders. The Corporation of Delta cannot succeed on its own. Residents, businesses, community organizations and institutions also have key roles in realizing this vision.

The CEEP is a plan that supports the features of the OCP that are energy and GHG related. It works to support the OCP – not to set a different direction. Table 5 describes the relationship between the CEEP and the goals in the OCP.

Table 5. Relation between energy and emissions planning and OCP goals

	OCP Goal	What does this mean for the CEEP?
Livable	Delta will be sustainable, healthy and safe, and a place in which today’s quality of life will also be enjoyed in the future.	Creating a livable community (healthy, safe, etc.) that allows future generations to enjoy our current quality of life means using energy resources in a sustainable manner and creating local energy supply to ensure the long-term resiliency of the community.
Complete	Delta will be a community in which people of all ages, family structures, backgrounds and interests can live, work and play.	Complete communities allow us to live more of our lives closer to home, which reduces the amount of energy consumed for travel (to work/school, to run errands, etc.). Higher densities and more diverse housing options can help to sustain local businesses. In these mixed use neighbourhoods, alternative and active forms of transportation become more viable.
Green	Delta will protect the natural environment, agricultural lands, and heritage features.	Taking care of our natural heritage will ensure that ecosystems continue to function properly, providing habitat, clean water and securing carbon. Local agricultural production reduces dependence on imported (travel miles) and processed (high energy input) foods. Properly managed urban green spaces remove carbon from the atmosphere and help to reduce the urban heat island effect.

	OCP Goal	What does this mean for the CEEP?
Planned	Delta will foster development in a planned and integrated manner that respects natural systems, manages urban growth, preserves built and natural heritage, provides transportation choices and reinforces neighbourhood identity.	Land use planning is a powerful tool for managing energy use and emissions in a community. It can be used to: (i) concentrate growth in certain areas, thereby preserving natural and agricultural lands, creating vibrant mixed use neighbourhoods, and creating viable opportunities for transit and other alternative modes, and; (ii) guide how development occurs (e.g., energy efficient, low carbon, etc.).
Prosperous	Delta will provide a wide range of economic opportunities and sustain a healthy and diverse economy.	A transition to a low carbon economy will require new knowledge, skills, goods and services. This introduces business and economic opportunities for Delta's business community and land base, as well as the potential for new partnerships to demonstrate energy efficiency, alternative energy and other relevant initiatives to the community.
Involved	Delta will balance competing interests and values, maintain fairness and equity and involve all residents and stakeholders in decision-making processes.	Reducing energy and emissions will require the active involvement of everyone in the community. CEEP development provides an opportunity to engage residents and stakeholders in creating the plan, which can help to ensure buy-in and support through the implementation stage.

5.3 CEEP Goals

These following goals were developed in consultation with staff and stakeholders.

Our Neighbourhoods	To plan and develop compact, complete and connected neighbourhoods that minimize energy consumption.
Our Mobility	To reduce vehicle travel and provide opportunities for low carbon mobility. ¹⁹
Our Economic Prosperity	To transition our local business community towards a low carbon economy.
Our Homes	To have efficient, healthy and affordable homes.
Our Energy Supply	To capture and re-use waste heat and maximize the use of renewable energy.
Our Waste	To reduce, reuse, recycle, and recover materials from waste.

5.4 Delta’s GHG Reduction Targets

The Corporation of Delta has adopted the following community-wide GHG emissions reductions targets in its OCP. These targets align with the province-wide targets, which support the scientific consensus around the need to dramatically reduce global GHG emissions, and demonstrate a strong commitment to climate change mitigation.

- **33% below 2007 levels by 2020**
- **80% below 2007 levels by 2050**

The CEEP provides a framework and an action plan to move towards achieving these target reductions.

¹⁹ Low carbon refers to having a minimal output of GHG emissions.

6. How will we get there?

This section presents a summary of the reduction scenario results, followed by a detail of the actions that comprise the scenario.

6.1 Reduction Scenario Summary

A reduction scenario was developed as an alternate to the BAU scenario. It is based on a land use scenario that focuses new higher density growth over the next 25 years into corridors and nodes in Ladner, Tsawwassen, and North Delta. In addition, through consultation and analysis, measures are defined that can augment these land use actions – such as providing support and encouragement for more efficient building design.

The reduction scenario outlines actions to be implemented in three phases – which indicate the timeline for the implementation of the action. The reductions themselves will ramp up to full strength through the implementation period and then endure following implementation.

The timelines defined are approximately:²⁰

- **Phase 1 (short term):** 2013 to 2018(1-to-5 years) – This phase builds the foundation for change and focuses on actions to ensure that appropriate land use policies and plans are in place to support energy and emissions reductions.
- **Phase 2 (medium term):** 2019 to 2025 (6-to-10 years) – With the foundation in place, the Corporation of Delta can make infrastructure improvements, develop outreach programs to build awareness, and offer incentives to encourage action in the community.
- **Phase 3 (long term):** 2025 to 2040 (over ten years) – Over the longer term, the Corporation of Delta will continue to build strong working relationships with key partners in order to affect change in the broader community.

Altogether, this reduction scenario is estimated to achieve reductions in energy, electricity and GHG emissions (see Table 6). An interesting observation is the difference between the changes in total and per capita values. While the total energy use and GHG emissions changes are relatively small, these occur while the population will grow by 25% (2007 to 2040). As a result the “per person” reductions are much more dramatic than the total reductions.

A “scenario dashboard” summarizes key information about the reduction scenario (see Figure 11). This scenario illustrates that even with these measures, Delta will fall short of meeting the targets endorsed in the OCP. In light of this, the plan should be considered as a starting point for action. It is acknowledged that further action may be required in the future depending on whether technology changes or development activities occur faster or slower than anticipated.

²⁰ Some actions are implemented in these phases but take longer than the Phase period to achieve their full impact.

Finally, the details describing the uptake and impact of each of the measures are defined in Table 7.

Table 6. Reduction Scenario Summary

	2007	2020	2030	2040
Population	97,400	108,100	117,000	126,700
GHG Emissions (tonnes of CO2e)				
Total GHG Emissions	681,750	684,000	634,300	600,300
Change from Baseline (2007)	-	2,260	-47,450	-81,400
% change from Baseline (2007)	-	0%	-7%	-12%
Per Capita Emissions (t/person)	7.0	6.3	5.4	4.7
% change per capita from Baseline (2007)	-	-10%	-23%	-32%
Electricity Consumption (GJ)				
Total Electricity Consumption (GJ)	3,441,334	3,500,700	3,483,500	3,558,100
Change from Baseline (2007)	-	59,370	42,150	116,700
% change from Baseline (2007)	-	+2%	+1%	+3%
Per Capita Electricity Consumption (GJ/person)	35.3	32.4	29.8	28.1
% change per capita from Baseline (2007)	-	-8%	-16%	-21%
Total Energy Consumption (GJ)				
Total Energy Consumption (GJ)	13,764,607	13,795,400	12,867,400	12,272,800
Change from Baseline (2007)	-	30,744	-897,250	-1,491,900
% change from Baseline (2007)	-	0%	-7%	-11%
Per Capita Energy Consumption (GJ/person)	141.3	127.7	110.0	96.9
% change per capita from Baseline (2007)	-	-10%	-22%	-31%

Note: Values may not add precisely due to rounding.

Figure 11. Reduction Scenario Dashboard

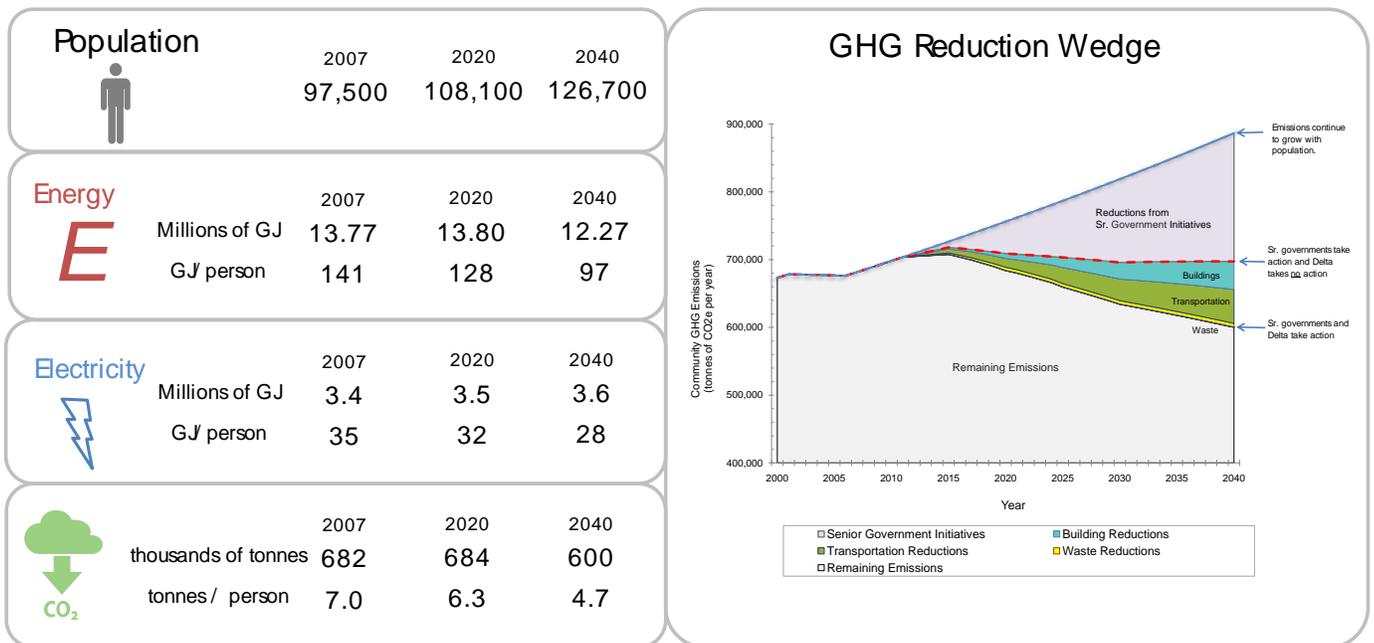


Table 7: Reduction Scenario Outcomes Descriptors

Goal	Phase	Assumed Outcomes (as a result of implementation of CEEP actions)	Timeframe for Reductions
Our Neighbourhoods	Phase 1	25% of new residential development is infill in identified growth nodes / corridors. This results in a reduction of in vehicle kilometres traveled (VKT) equivalent to 2% of the total passenger vehicle kilometers, and a 25% reduction in energy demand for those new residential units (typically smaller and more MF units).	2013 – 2018
	Phase 2	50% of new residential development is infill in identified growth nodes / corridors (an increase from 25% in Phase 1). This results in a reduction of in a VKT reduction of 3% of the passenger vehicle kilometers (an increase from 2% in Phase 1), and a 25% reduction in energy demand for those new residential units.	2019 – 2025
	Phase 3	100% of new residential development is infill in identified growth nodes / corridors (an increase from 50% in Phase 2), resulting in a 5% reduction in VKT (an increase from 3% in Phase 3) and a 25% reduction in energy demand for those new residential units.	2025 – 2040
Our Mobility	Phase 1:	2% reduction in overall passenger vehicle emissions as a result of decreased idling. 1% reduction in VKT as a result of transit service improvements (applicable to 1/5 of the population). ²¹	2013 – 2025 2013– 2018
	Phase 2	3% reduction in VKT as a result of improvements to cycling infrastructure (applicable to ½ the population) 2% penetration of electric vehicle use in passenger vehicles overall ²² 2% reduction in VKT as a result of parking management activities (applicable to ¼ of the population)	2013– 2025 2013 – 2040 2013– 2040
	Phase 3	1% reduction in VKT as a result of efforts to improve road efficiency and routing for all users. 2% reduction in VKT as a result of improvements to the pedestrian environment (for ½ the population). 6% reduction in commercial VKT as a result of efforts to reduce road congestion overall	2022 – 2040 2022 – 2040 2022 – 2040
Our Economic Prosperity	Phase 1	5% of existing commercial buildings undertake energy retrofits 5% reduction in personal VKT due to corporate carpool or reduction programs (reaching 1/20 residents)	2013 – 2020 2013 – 2020
	Phase 2	A further 20% of existing commercial buildings undertake energy retrofits. A further 10% reduction in personal VKT due to alternative commuting methods and reduced commuting distances (reaching 1/10 residents)	2020 – 2030 2020 – 2030
	Phase 3	20% reduction in commercial fleet VKT due to efforts to coordinate fleet logistics (reaching 1/5 commercial vehicles)	2030 – 2040

²¹ Some actions do not reach all members of the community. Where a subset of the population will take up a measure it has been identified by a fraction.

²² Electric vehicle use results in a reduction of vehicle fuels, but increased electricity consumption. This increase in electricity consumption is allocated to residential buildings. It is assumed that a majority of vehicle charging will occur at residential buildings.

Goal	Phase	Assumed Outcomes (as a result of implementation of CEEP actions)	Timeframe for Reductions
Our Homes	Phase 1	5% of existing homes undertake energy retrofits	2013 – 2017
	Phase 2	A further 10 % of existing homes undertake energy retrofits 5% of new homes exceed energy performance standards in the building code	2018 – 2025 2015 – 2025
	Phase 3	30% of existing homes undertake energy retrofits	2025 – 2040
Our Energy Supply	Phase 1	5% of existing homes and commercial buildings have installed solar hot water systems. 5% of new homes and new commercial buildings have installed geexchange systems.	2013 – 2025 2013 – 2025
	Phase 2	A further 10% of existing homes and commercial buildings have installed solar hot water systems. 10% of new homes and new commercial buildings have installed geexchange systems. 10% of new commercial buildings are connected to a district energy system.	2025 – 2040 2025 – 2040 2025 – 2040
	Phase 3	A total of 30% of new homes have installed geexchange systems.	2025 – 2040
Our Waste	Phase 1	20% of organic waste is diverted as a result of efforts to implement the Regional Solid Waste Management Plan (SWMP).	2013 – 2040
	Phase 2	60% of organic waste is diverted as a result of efforts to implement the Regional SWMP.	2018 – 2040
	Phase 3	No actions currently identified for period beyond 2023.	

6.2 Reduction Scenario – Detail by Goal Area

OUR NEIGHBOURHOODS: TO PLAN AND DEVELOP COMPACT, COMPLETE AND CONNECTED NEIGHBOURHOODS THAT MINIMIZE ENERGY CONSUMPTION.

Land use planning is the focus of “Our Neighbourhoods” and is a foundational activity. It enables the other goals of energy efficiency to be achieved. Actions to address this goal focus on land use policy and planning tools available to local governments. By concentrating development in focused areas, the community will create opportunities for natural areas and agricultural land to be preserved providing additional benefits to the community including recreation and economic opportunities.

The approach presented is one of promotion and incentives first, and then to consider regulation after uptake becomes widespread. This type of transitional strategy will help the development community, residents, and the Corporation evolve development in Delta.

PHASE 1 (Short term actions 2013-2018)

Action 1 **Review existing areas designated for residential infill and identify opportunities to focus density in corridors and nodes.**

As Area Plans are reviewed and updated, the Corporation of Delta will work with residents to further define and focus areas (corridors and nodes) for higher density residential development and commercial uses (mixed use). These corridors and nodes should coincide with areas that are currently serviced by transit or areas identified by TransLink as part of the Frequent Transit Network (FTN).²³ Outcomes from this review may require updates to Area Plans, the Schedule A of the OCP.

Action 2 **Amend OCP (Schedule A) and Zoning Bylaw to align with updated area plans**

To support Action 1, the Corporation of Delta will amend the OCP and where appropriate the zoning bylaw to define appropriate higher density housing forms and commercial uses. Greater density development is often a contentious issue in communities, however, opportunities for more dense, mixed use developments exist to suit every type and scale of neighbourhood and can help to improve the viability of commercial businesses, district energy systems, as well as walking and biking. These revisions will directly follow the consultation derived in the area planning work of Action 1.

²³ For Delta, the potential FTN defined in Transport 2040 (TransLink’s most current long-term plan) includes Scott Road, Nordel Way, Ladner Trunk Road and a link between Ladner and Tsawwassen at 56th Street.

Action 3 **Review Delta's framework for evaluating energy efficiency and greenhouse gas reductions in new development**

The Corporation will review the Green Growth Index and available tools such as Development Permit Areas to reflect new best management practices, technology and commitment from developers to implement sustainable building practices.

Review existing DPAs guidelines to include energy and water conservation considerations for new development. This can include guidelines for landscaping, the siting of buildings (such as solar orientation) and exterior aspects of buildings.

Incentives should be subject to delivery or implementation of sustainable development features.

Action 4 **Make pedestrian, cycling and transit access a priority at existing and new municipal facilities**

The Corporation of Delta will investigate opportunities to retrofit existing municipal facilities to improve pedestrian and cycling amenities (e.g., sidewalks and bike lanes leading to facilities, secure bike lock-up, end-of-trip facilities, etc.). Additionally, the Corporation of Delta will make pedestrian, cycling and transit access a priority when locating new municipal facilities so as to ensure accessibility for all residents and to demonstrate Delta's commitment to alternative transportation choice.

PHASE 2 (Medium term actions 2019-2025)

Action 5 **Provide incentives to encourage more complete communities**

The Corporation of Delta will investigate opportunities to create incentives that further encourage greater density, and mixed use development in identified corridors and nodes. This action acknowledges that area planning and identification of mixed-use areas may not be sufficient by itself, and that some incentives might be required.

An opportunity exists to use a scoring framework whereby Mayor and Council can consider projects and identify appropriate incentives. This may be via the Green Growth Index (GGI) or other mechanism or tools as listed below. Scoring on this index could be used as a basis some of these incentive measures. Promising measures identified include:

- **Development Permit Areas:** Review existing DPAs guidelines to include energy and water conservation considerations for new development. This can include guidelines for landscaping, the siting of buildings (such as solar orientation) and exterior aspects of buildings, but not any guidelines contained within a building (such as low flow fixtures and efficient appliances).
- **Building Permit Fee Rebates / Waivers:** Use the Green Growth Index (or other system) to evaluate / score development permit applications and to recommended reductions in development permit fees based on the results of the evaluation. Incentives are intended to reward developers for extra effort and cost that may be required to incorporate green features in a development.

- **Density Bonus:** Allow higher density in exchange for green development features. This tool allows developers to increase the density beyond what is normally allowed under existing zoning, in return for providing desired amenities within the development. Density bonusing was recommended in the Scott Road Development Incentives Study²⁴ as a way of encouraging the emerging market for concrete apartments in North Delta.
- **Revitalization Tax Exemptions (RTEs):** RTEs provide a reduction in property taxes to a property owner for a defined term.²⁵ The Community Charter allows RTEs to be offered for the purposes of energy and water conservation. The objective of this incentive would be to create financial value for sustainable buildings that stays with the property – helping to overcome a barrier of (real or perceived) by owners and buyers that energy efficient features require greater cost.²⁶
- **Development Cost Charge (DCC) Reductions:** Establish a rebate program for development of that may be evaluated on a case by case basis. Scoring on the GGI (or other system) could be used to quantify the reductions.

Action 6 Review and update Development Permit Area Guidelines

The Corporation will review and update existing Development Permit Area guidelines to ensure they address recycling, pedestrian and cycling amenities for urban areas such as the Tsawwassen Town Centre, entrance to Tsawwassen, Scott Road Corridor, Nordel Social Heart and the Ladner Village. It is noted that pedestrian oriented guidelines already exist for several of these development permit areas.

Action 7 Communicate with partners about locating new institutional facilities in focused growth areas

Similar to Action 4, the Corporation of Delta will work with other institutional partners in the community (i.e. School District, Health Authority, secondary institutions) to encourage the retrofit of existing facilities to promote pedestrian and cycling access. The Corporation of Delta should also make institutional partners aware of corridors and nodes that have been identified for higher density and mixed use development and encourage partners to locate new facilities and services in or around these areas which are pedestrian, cycling and transit accessible.

Action 8 Promote minimum densities in appropriate areas in the Zoning Bylaw

Through Area Plan reviews and updates as noted in Action 1 areas for higher density residential, mixed use and commercial areas will be identified. In the future – as the development of complete communities becomes commonplace, the Corporation of Delta can move away from providing incentives for density and work to regulate minimum densities.

²⁴ *Scott Road Development Incentives Study*, July 2011. Prepared by G.P. Rollo & Associates for the Corporation of Delta

²⁵ Foregoing property tax revenue is generally challenging for most municipalities to justify. The RTE can be structured to provide a reduction of a portion of the property tax, and can apply only to the increase in property taxes for a development. In this way pre-development tax revenue is not affected

²⁶ RTEs have traditionally been used to encourage historic preservation. Delta recently implemented an RTE for the Ocean Trailer brownfield redevelopment. The developer provided a new building with green features and closed the Delta Shake and Shingle Landfill.

Requirements for minimum density may be appropriate in the Area Plan land use designations and/or the Zoning Bylaw. Minimum density zoning could potentially be applied first in corridors and nodes that are identified for focused density and where growth is encouraged.

PHASE 3 (Long term actions 2025 and beyond)

A present, all actions identified were felt needed to be implemented prior to 2023. Efforts in this time period will be focused on implementation of these actions. Future review may identify actions suitable for this time period.

CASE STUDY | 20-MINUTE NEIGHBOURHOODS

City of Portland, Oregon

The City of Portland is developing The Portland Plan which aims to ensure, among other things, that 90% of Portlanders live within a quarter to a half mile of sidewalk accessible complete neighbourhoods. This concept, referred to as the “20-minute neighbourhood,” is realized when services and other destinations are clustered in compact areas, thereby strengthening economic viability and making walking, transit and bicycling more practical. As a result, residents have easier access (i.e. a 20-minute round trip on foot) to centres of community life and activity. <http://www.portlandonline.com/portlandplan/index.cfm?c=56527&>

OUR MOBILITY: TO REDUCE VEHICLE TRAVEL AND PROVIDE OPPORTUNITIES FOR LOW CARBON MOBILITY.

This goal area focuses on emissions from personal vehicles, and considers ways to reduce vehicle travel, and promote alternative and active forms of transportation.

Actions to address this goal are strongly linked to and supported by the land use policy and planning actions detailed in Our Neighbourhoods. “Our Mobility” examines the need for mobility, rather than on the need for any one particular mode of transportation. Actions in this goal area are intended to promote behavioural changes in driving habits in order to reduce vehicle kilometres travelled (VKT), and to provide viable and attractive opportunities for low emissions vehicles, carpooling, walking, cycling, transit and other modes of travel.

PHASE 1 (Short term actions 2013-2018)

Action 9 Identify opportunities to improve pedestrian connectivity

The Corporation of Delta will continue to identify opportunities to improve pedestrian connectivity with particular emphasis on corridors and nodes that connect to schools and recreation centres, and that are identified for higher density and mixed use development serviced by transit.

Revisions and updates to the zoning bylaw, development guidelines and area plans will provide opportunities to include more robust provisions for pedestrian amenities and connections.

Infrastructure that enhances the pedestrian environment could range from wider shoulders on more rural roads to sidewalks, pedestrian signals, benches, landscaping, and sidewalk cafés in villages or downtown areas. Capital planning will need to follow to ensure that this infrastructure is properly planned for and resourced over the longer term.

Action 10 Establish a Community Idling Reduction Program

The Corporation of Delta will explore opportunities to establish a community idling reduction program. This would include: community education, establishment and posting of idle-free zones in the (starting with municipal facilities and other public institutions). This could include working with partners to promote a program collaboratively.

A regulatory approach (e.g. a bylaw with ticketing powers etc.) is not recommended at this time, though could be a suitable tool to increase compliance. This would be evaluated in the future.

Action 11 Update the subdivision bylaw to accommodate a range of transportation users

Traditionally, streets have been designed for vehicles, limiting mobility choice by making other transportation inconvenient, unattractive and at times, unsafe. Developing streets designed for all users will ensure that all forms of transportation are promoted in infrastructure development.

To accomplish this, the Corporation of Delta will revise and update the Subdivision Bylaw. Revision efforts will examine infrastructure and operation requirements and guidelines as well as identify appropriate planning tools to promote low carbon mobility as development and redevelopment opportunities occur.

Action 12 Promote Translink efforts to encourage alternative transportation

Delta provides much of the infrastructure for alternative and transportation (e.g. sidewalks, transit support infrastructure, bikeways and pathways, etc.). Translink provides regional transportation planning and transit services. As well they have developed a number programs to assist residents to make alternative transportation choices.

The Corporation can support and enhance the efforts of Translink by:

- Promoting Translink's Travel Smart program,
- Improving municipal transit infrastructure (e.g., benches, shelters, lighting, signage, etc.), and
- Promoting the application of Translink's transit oriented communities design guidelines in development applications.²⁷

Action 13 Work with partners to develop car sharing program / opportunities

The Corporation of Delta will work with partners in the community such as other large employers and business associations to investigate opportunities to develop car sharing program targeted at employees commuting within Delta.

Action 14 Promote electric vehicle charging infrastructure

A challenge for the uptake of electric vehicles is the availability of vehicles charging stations. In this action the Corporation will work to promote the implementation of electric vehicle charging stations in the community. This measure could include:

- Leadership: Installation of electric vehicle charging stations at high profile municipal facilities. These could be for the use of corporation vehicles (e.g. at Municipal Hall for a staff pool vehicle) or for the public (e.g. a station at a swimming pool for the public to use).
- Demonstration: Working with other groups to promote the installation of charging station infrastructure on their sites.

²⁷ Translink has developed a set of design guidelines for transit oriented development available at: www.translink.ca/en/Be-Part-of-the-Plan/Transit-Oriented-Communities/Resources.aspx

- Promotion: Encouragement for electric charging station ‘ready’ facilities in new developments.²⁸

Action 15 Work to explore opportunities for a community shuttle

Another approach to improving transit service within Delta is to investigate opportunities to work with partners to offer a micro transit service or community shuttle within the community. An example of a community shuttle already implemented in Delta is the North Delta Seniors Bus. Examples of successful community shuttles implemented in other municipalities include the Town of Ladysmith Trolley²⁹, the City of Langford Trolley³⁰ and the District of Mission Shopper Shuttle.³¹

PHASE 2 (Medium term actions 2019-2025)

Action 16 Improve connectivity for cycling between and within Delta communities

The Corporation of Delta will continue to make efforts to improve the connectivity of cycling routes within and between the three communities. This will include the creation of trails and/or bike lanes, and wider shoulders on rural roads. Additionally, Delta will work to attract visiting cyclists from elsewhere in Metro Vancouver by connecting Delta bike routes to bike routes in neighbouring communities.

Continued promotion of Delta’s bike routes with outreach materials and campaigns will raise awareness amongst residents and visitors about cycling opportunities in Delta.

Action 17 Review parking management opportunities

In the medium term (6 – 10 years) revised area plans will be in place (see Action 1), and likely some developments will have been made to start fulfilling those plans. At that time, there will likely be a need to develop public parking management strategies in some locations.

Ideas to explore at that time from a parking perspective are to encourage: the use of low and zero emission vehicles; car sharing; car pools and van pools. This could be achieved by providing priority public parking spaces, reviewing time limitations, and conducting site specific parking management strategies.

²⁸ New developments could be made ‘charging station ready’ by including 240 volt wiring to the parking areas during construction at a minor cost. Later, when owners or tenants decide, a charging station could be installed.

²⁹ The Town of Ladysmith established a community trolley service in August 2009 (<http://www.ladysmith.ca/our-services/ladysmith-trolley>).

³⁰ The City of Langford has 2 trolleys servicing the community. The trolleys were purchased with funds donated by the development community. Ongoing operations and maintenance, as well as driver’s salaries are paid for through Gas Tax funds and advertisement space on the trolleys. The service is free to the public (donations are accepted).

³¹ Mission Shopper Shuttle: http://www.bctransit.com/regions/cfv/schedules/shopper_shuttle.cfm

A key objective of this effort will be to ensure that the development of mixed use and compact centers does not adversely affect public parking in these areas – which could be a negative outcome of intensified development if not managed properly.

OUR ECONOMIC PROSPERITY: TO TRANSITION OUR LOCAL BUSINESS COMMUNITY TOWARDS A LOW CARBON ECONOMY.

This goal area focuses on our commercial and industrial sector including commercial and industrial buildings, commercial vehicle fleets, and the efficient movement of goods through our community.

Actions in this goal area consider tools such as outreach and incentives in order to encourage local businesses and entrepreneurs to improve efficiency (related to energy and material throughput), and will look at policies to support the revitalization of commercial areas and encourage home-based businesses. Collaboration and partnerships with the business community could lead to catalyst projects that provide tangible examples of energy efficient and low carbon technologies and services.

PHASE 1 (Short term actions 2013-2018)

Action 18 **Continue Climate Smart program for local businesses**

The Corporation of Delta will continue to encourage local businesses to participate in the Climate Smart program. The program, which is aimed at small-to-medium sized businesses, cultivates business leadership, action and innovation around climate action. With guidance from Climate Smart staff businesses identify GHG emission reduction opportunities, and develop internal capacity and analytical tools to reduce energy and emissions as well as improve their bottom line.

Action 19 **Develop a Climate Leaders Network for major energy consumers**

The Corporation of Delta will explore the development of a Climate Leaders Network to encourage major institutional and commercial energy consumers. The purpose of a Climate Leaders Network is to bring together industry leaders in an effort to share business cases, best practices and lessons learned that encourage energy efficiency improvements, alternative energy use and GHG emission reductions

Support for a Climate Leaders Network would be provided by the Corporation of Delta in the form of the provision of meeting space and information sharing about best practices. Other agencies and programs like BC Hydro, Natural Resources Canada's ecoENERGY program, BC's LiveSmart program would also be called upon to support a Climate Leaders Network.

Action 20 Promote commuter trip reduction amongst large employers

The Corporation of Delta will consider promoting activities to reduce commuter trips amongst large local employers. Such a campaign would raise awareness of local opportunities for alternative workplace commuting in Delta, such as:

- Participation in TransLink's employer transit pass program (ProPASS),
- Flexible work schedules and greater allowance for telecommuting,
- Information on bicycle routes, bicycle safety and maintenance,
- Carpooling and vanpooling opportunities, including promotion of the Corporation's existing fleet vehicle carpool program.

The campaign could be modeled on, for example, the City of New Westminster's Major Employer Auto Trip Reduction Program.

PHASE 2 (Medium term actions 2019-2025)

Action 21 Encourage energy audits and retrofits

In the next phase of the Climate Leaders Network (see Action 19), the Corporation will encourage local businesses to become more energy efficient through building energy audits and retrofits. The program could be structured to include:

- Education, and outreach measures – likely delivered through a third party or contracted resource.
- Grants or building permit fee rebates to those Climate Leaders that commit to implementing energy conservation measures with reasonable payback periods (as identified through an audit)
- Revitalization Tax Exemptions (RTE) for large scale energy performance improvements or for the installation of renewable energy systems (see Action 3 for more information on RTEs).

This action outlines a targeted approach to offering incentives and ensures that the Corporation of Delta's efforts are focused on achieving reductions from major consumers that have a much bigger impact on community energy consumption and GHG emissions.

PHASE 3 (Long term actions 2025 and beyond)

Action 22 Work with partners to coordinate a Fleet Logistics program

The Corporation of Delta will work with other business associations to encourage greater coordination of fleet activity and energy efficiency. A starting point would be goods movement and fleet logistics for local businesses.

The purpose of this initiative would be to ensure more efficient movement of goods while reducing truck traffic and congestion, noise pollution and GHG emissions. Other benefits include improved air quality, fuel consumption and lower business costs. Possible activities identified might include the establishment of delivery nodes or consolidation centres or the alignment of delivery schedules across businesses.

This activity would be best aligned with any future transportation plan reviews.

OUR HOMES: TO HAVE EFFICIENT, HEALTHY AND AFFORDABLE HOMES.

This goal area encompasses existing and new homes (including multi-unit residential buildings) in Delta. To meet this goal, actions focus on increasing the number of home energy audits and retrofits, promoting high energy performance standards for new homes, and encouraging behavioural changes in the way energy is used in homes.

PHASE 1 (Short term actions 2013-2018)

Action 23 Encourage home energy efficiency

The Corporation of Delta will package and promote information on existing programs and incentives for home energy audits and retrofits. This information will be made available online (via Delta's website) and at the planning and development service areas to increase awareness about programs such as:

- **BC Hydro PowerSmart:** offers an Energy Conservation Assistance Program for qualifying low-income households, including a free home energy evaluation and upgrades;
- **Natural Resources Canada's EcoENERGY program:** offers incentives for energy efficiency improvements, equipment and appliances;
- **LiveSmart BC:** provides information including tips for reducing personal energy consumption and GHG emissions at home.

Action 24 Provide training to building inspections staff

The Corporation of Delta will provide training on energy efficiency and energy management to their staff – particularly building inspectors and permit reviewers. This effort will increase their capacity to handle inquiries and inspections with respect to current and emerging practices and technologies for energy use and efficiency, and alternative energy supply systems.

Action 25 Promote energy efficiency to builders and renovators

The Corporation of Delta will explore opportunities to facilitate energy efficiency in the local development and renovations sectors. As a first step, outreach in the form of a workshop or workshop series would be considered. Workshops would focus on energy efficient practices and technologies. As well, they provide the Corporation of Delta with opportunities to communicate relevant community goals, and build awareness of programs and incentives available to industry practitioners.

Action 26 Support adaptive reuse of buildings and incorporate into policy

Adaptive reuse of buildings is an architectural method for meeting current demands through conversion of existing buildings. This avoids the need to tear down and replace existing buildings. Through adaptive reuse, buildings continue to be used for a longer lifecycle (100 years +), leading to reduced waste, as well as providing opportunities to preserve historically and culturally significant buildings.

Delta currently encourages the adaptive reuse of heritage buildings through policies in the OCP and provision of incentives. These measures could be expanded to include consideration of energy use and/or other green features. Examples might include revitalization tax exemptions, development checklist and incentive measures.³²

PHASE 2 (Medium term actions 2019-2025)

Action 27 Promote energy efficient and 'passive house' design

Emerging design philosophies such as the European 'passive house' design standard have demonstrated that highly energy efficient buildings are technically and economically viable.³³ Specific design requirements vary, but include items such as orientation for solar aspect, guidance around maximum glazing, air tight building envelopes, building overhangs, etc.

In the medium term, these design approaches will become more familiar, with examples available more broadly through the lower mainland. As this sector evolves, the Corporation of Delta should consider adopting passive design or other high-efficiency guidelines.³⁴ An example strategy is that these guidelines could be evolved into the Green Growth Index (or other) checklist system developed under the "Our Neighbourhoods" goals area.

PHASE 3 (Long term actions 2025 and beyond)

Action 28 Offer incentives for home energy audits and retrofits

In an effort to increase uptake of home energy audits and retrofits, the Corporation of Delta will investigate opportunities to provide the following some form of direct incentive for home owners. Examples include:

- Free building inspections for home energy retrofits that attain current BC Building Code (BCBC) energy performance standards or better.
- Building permit fee rebates for home energy retrofits that attain current BCBC energy performance standards and waive building permit fees for home energy retrofits that go beyond the energy performance standards in the BCBC. This could be verified through a third party system such as EnerGuide, for example.

³² For example Port Moody has a policy for revitalization tax exemptions for historic preservation which can be extended if there are substantial energy efficiency and green features included.

³³ 'Passive house' is a standard for extreme energy efficiency of housing. For more information see www.passivehouse.us/passiveHouse/PHIUSHome.html

³⁴ For example Delta is one of the BC's "Solar Communities" and these guidelines would be consistent with this initiative.

- Grants for homeowners that undertake energy audits and retrofits on their homes.³⁵

This action is a long term activity. In the interim, other community’s programs can be studied and reviewed.

CASE STUDY | HAT SMART

City of Medicine Hat, Alberta

The HAT Smart program was developed by the City of Medicine Hat in response to the energy sustainability targets set by the Community Environmental Roadmap. The first phase of the program provided information and resources –over 3,000 incentives and \$2 million were distributed – to assist residents in improving home energy efficiency. Free Energy Conservation Seminars were delivered monthly at City Hall and engaged 1 out of every 10 residents in Medicine Hat. The Seminar has since been turned into a video that is offered for free on the Hat Smart website. Phase 2 of the program began in 2011 and includes information and incentives related to energy conservation and renewable energy for both residential and industrial buildings. <http://www.hatsmart.ca/index.asp>

³⁵ A grant program could be structured in a number of different ways. For example, the Corporation of Delta might want to start small and cap the grant program at a limited number of applicants. This would allow the Corporation of Delta to test the interest in the community without committing to a large grant program. Recent experiences (e.g. Saanich, Banff) indicate that local governments are initially fearful of an over subscription of such a program . In practice, these initiatives are usually under-subscribed early on, and require some marketing and outreach to achieve reasonable uptake.

OUR ENERGY SUPPLY: TO CAPTURE AND RE-USE WASTE HEAT AND MAXIMIZE THE USE OF RENEWABLE ENERGY.

This goal area focuses on the emissions that result from the type of fuel we use to heat and power our buildings and to drive our vehicles. As part of the CEEP, a scoping level assessment of renewable and district energy opportunities was conducted. This assessment helped to inform the actions in this goal area and is provided in Appendix C.

Currently, almost all of our energy comes from hydro-electricity and fossil fuels (e.g., natural gas, gasoline, and diesel). Actions in this goal area look at opportunities for accelerating the transition to alternative energy sources and distributed energy systems, where identified as feasible. The Corporation of Delta has already taken some initial steps in this regard with the installation of a solar hot water system at Municipal Hall, and the development of a Solar Energy Bylaw to encourage installation of solar energy systems (for power or heat) in the community.

PHASE 1 (Short term actions 2013-2018)

Action 29 Provide education on alternative energy options for buildings

The Corporation of Delta will identify opportunities to promote building scale alternative energy systems for residential and commercial applications (e.g., geothermal, small scale wind, etc.). Promotion could be done in partnership with Metro Vancouver and neighbouring municipalities using existing information and materials from programs and organizations including: Solar BC, Canadian Wind Energy Association, BC Sustainable Energy Association, Community Energy Association, etc. The Corporation will share its lessons learned and business cases for technologies installed in municipal facilities through tours, lunch and learns and information posted on the Corporation's website and social media.

As a demonstration of leadership, the Corporation of Delta will endeavour to demonstrate and pilot technologies at municipal facilities as part of its efforts to reduce its own energy use.

Action 30 Study alternative energy options that show potential in Delta

The Corporation of Delta will consider undertaking a study to determine alternative energy sources that show potential for implementation in Delta (e.g., tidal; biogas at compost facilities, Annacis Island, geoexchange; solar, etc.). The CEEP provides an initial high level overview of a number of these alternative energy sources (see Appendix C), which may serve as a starting point for a more in-depth the study on alternative energy.

Action 31 Evaluate district energy feasibility for select development areas

The low density of existing development, and the high cost of retrofitting existing buildings for district energy indicate that the best DE opportunities arise would arise from new

developments. The Corporation has already evaluated the opportunities for connecting municipal buildings precincts.³⁶

To ensure that future development does not exclude district energy opportunities for existing development the Corporation of Delta will undertake a district energy feasibility study to:"

- Understand where potential opportunities exist for district energy and identify where specific opportunities exist (Appendix C provides a scoping level assessment of these opportunities);
- Identify potential energy supply sources, and;
- Investigate partnerships, financing and governance models to advance potential district energy systems.

A district energy system is a substantial investment and to be viable for an operator requires sufficient heating loads, growth in development, and a relatively compact development area. This inherently requires either a major institutional customer (school or hospital) or sufficient multi-family residential development. The scoping review (appendix C) indicates that some potential might exist for the completion of the Marina Landing neighbourhood, as the developer is evaluating whether to seek a rezoning to allow for some apartment buildings in the project.

PHASE 2 (Medium term actions 2019-2025)

Action 32 Explore use of Local Service Area Bylaws

Depending on the outcomes of the district energy feasibility study (Action 31), the Corporation of Delta may explore the creation of *Local Service Area Bylaws* for zones that demonstrate the technical and financial potential for district energy system development. The Bylaw would require all new buildings in the identified zone to be built with a hydronic heating system to facilitate future connection to a district heating system.

PHASE 3 (Long term actions 2025 and beyond)

Action 33 Establish a renewable energy standard for buildings

The Corporation of Delta will consider establishing a renewable energy requirement for new buildings. A well-known example is the "Merton Rule" (see text box).

At present, requiring renewable energy use in buildings is not currently possible for a local government. This area of jurisdiction is regulated by the B. C. Building Code (BCBC). However, in the long term, future revisions may allow some flexibility, or may be included in

³⁶ The Corporation has conducted district energy precinct studies to evaluate the potential for connecting blocks of municipal facilities. In 2009 a district energy feasibility study was conducted for the Delta Municipal Precinct including Municipal Hall, Ladner Leisure Centre, Delta Hospital, Delta Police. In 2012, a study of the North Delta Civic Precinct which includes the North Delta Recreation Centre, North Delta Outdoor Pool, Public Safety Building and Firehall Centre for the Arts was undertaken.

the code itself. More likely the Corporation can use its planning tools to initially encourage this action, then move to solidify it in OCP and development permit area guidelines.

CASE STUDY | MERTON RULE

Merton Council, United Kingdom

The Merton Rule is a planning policy, developed by Merton Council a borough of London , England, which requires that 10% of a building's energy must come from on site renewable sources. Merton adopted the rule in 2003 and its impact was so great that the Mayor of London and many councils have also implemented it; it has since become part of national planning guidance in UK. The rule is credited with not only leading to large reductions in GHG emissions, but also with helping to create an industry that respond to the needs for affordable renewable energy

<http://www.merton.gov.uk/environment/planning/planningpolicy/mertonrule.htm>

OUR WASTE: TO REDUCE, REUSE, RECYCLE, AND RECOVER MATERIALS FROM WASTE.

This goal area deals with the emissions that result from the decomposition of waste generated by the community in landfill. Metro Vancouver's *Zero Waste Challenge* strategy provides the overarching direction for this theme area. In the past few years Metro Vancouver has initiated organics diversion programs to increase diversion.

Actions in this goal area encourage opportunities to create less waste and opportunities for waste diversion in the following priority areas: organics, multi-family residential, construction and demolition, and business and institution. Local opportunities to redefine waste as a resource (e.g., through eco-industrial networking, free-cycling, etc.) are also considered.

PHASE 1 (Short term actions 2013-2018)

Action 34 Encourage resource sharing amongst industrial operations

"Eco industrial networking" is the exchange of materials/resources between industrial operations, where one industry's waste becomes another industry's resource. When permitting new industrial development, the Corporation of Delta will consider working with developers to investigate opportunities to make use of waste resources from other industrial operations and to consider how the waste resources from their operations might benefit another industry.

Action 35 Support implementation of the regional Integrated Solid Waste and Resource Management Plan (ISWRMP)

The Corporation of Delta will continue to support implementation of the regional Integrated Solid Waste and Resource Management Plan (ISWRMP), by creating an action plan and implementation strategy to outline how staff will advance action to deliver on regional ISWRMP goals (i.e. 70% waste diversion by 2015).³⁷

Action 36 Promote the 4Rs (reduce, reuse, recycle, recover) amongst residents

The Corporation of Delta will look for opportunities to promote reduction, reuse, recycling and recovery of waste in the community. This can be done through outreach activities, such as the "RED Dot" campaigns to reduce junk mail and community scale garage sales and exchange fairs.

³⁷ Additionally, the Corporation has been working with the City of Vancouver through a Technical Liaison Committee to increase the landfill gas collection efficiency at the City of Vancouver Landfill in Delta. The City of Vancouver's goal is to meet and exceed the regulatory requirements. Delta will continue to work with the City of Vancouver to ensure that there is continuous improvement in landfill gas collection and the beneficial use of the gas.

PHASE 2 (Medium term actions 2019-2025)

Action 37 Implement further activities in support of the ISWRMP

The Corporation of Delta will implement the regional solid waste plan which includes tasks policies, programs and initiatives such as:

- Implement community-wide curbside collection of organic waste (i.e. composting). Delta implemented a full scale food waste curbside collection program for single family homes in 2012.
- Require on-site facilities for recycling and composting in multi-family buildings.
- Create a policy to require on-site construction / demolition waste recycling for large institutional, commercial, and industrial developments, and for multi-family residential (new developments and major renovations).

PHASE 3 (Long term actions 2025 and beyond)

It is anticipated that waste reduction efforts outlined in Phase 2 will continue in support of regional waste diversion goals. These efforts will provide GHG emissions reductions over the long-term. As such, no actions have yet been identified for Phase 3 of this goal area.

CASE STUDY | CONSTRUCTION WASTE MANAGEMENT

Metro Vancouver

Metro Vancouver, as part of its Build Smart program, has developed the “*Demolition, Land Clearing and Construction Waste Management Toolkit: A Guide for the Building Construction Industry.*” The toolkit is a reference guide for contractors, design professionals and building owners, to help them maximize the amount of construction and demolition waste diverted from disposal through salvage, reuse and recycling. It also helps to make the business case for construction waste management, including: compliance with the materials that have been banned from Metro Vancouver’s landfill and other disposal facilities, opportunities to reduce costs including for materials and tipping fees, the positive reputation and marketing opportunity for businesses that have environmentally sound business practices, and the ability to pursue credits for green building certification systems.

<http://www.metrovancouver.org/about/publications/Publications/dlctoolkit08web1.pdf>

7. Implementation

7.1 Governance and Management

Council plays an important leadership role in promoting the value of reducing energy demand and GHG emissions in Delta. Having adopted GHG reduction targets in Delta's OCP, Council has already demonstrated a commitment to make real reductions that lends support to the energy and emissions planning efforts of staff.

By endorsing the CEEP, council conveys to the community that Delta is ready to support its targets with a strategic plan. Endorsement of the CEEP provides staff with the mandate they need to be able to incorporate energy and GHG emissions considerations in the planning and delivery of municipal programs, services and infrastructure. Council may also play a role in assisting staff in developing partnerships to pursue further opportunities to reduce energy demand and GHG emissions in the community.

The Corporation has managed climate change issues by creating an Office of Climate Action and Environment. The key responsibilities of the Office are to provide support to Council and other departments regarding climate change and environmental initiatives through directed work programs, and to liaise with other municipal departments and relevant committees, as well as external agencies at the regional, provincial and federal levels.

The Office of Climate Action and Environment should fulfill the role of plan sponsor; overseeing implementation of the CEEP and assisting staff in the coordination and delivery of CEEP actions. To aid this effort, BC Hydro can provide cost-shared funding to support local governments in hiring a Community Energy Manager (CEM). A CEM would oversee implementation of the CEEP, monitor performance and progress and report on results.

Individual CEEP actions will be delivered by different departments and it will be important that these departments take 'ownership' of these actions. For example, leads may be Community Planning and Development (actions related to land use policy and planning), Engineering (actions related to transportation and alternative energy infrastructure). Where an action requires broad partnerships (e.g. delivering outreach and education campaigns), it may make the most sense for the Office of Climate Action to act as the delivery agent.

7.2 Action Implementation

The implementation plan provided in Appendix D details implementation of each of the actions within the CEEP, including:

- the lead department;
- an estimate of staff resource needs;
- an estimate of disbursement costs, including operating and capital costs;
- an estimate of the reductions (in energy, electricity and GHGs) by strategy and phase

The implementation plan also includes a *qualitative assessment* of the co-benefits and consequences that may result from implementation of the actions, including: improved public health, social well-being, economic resiliency, etc. Moving forward, the implementation plan is intended to assist Delta in prioritizing actions and furthering reductions in energy and GHG emissions.

7.3 Outreach and Engagement

The objective of many of the actions in the CEEP is to catalyze change in the way Delta residents use energy. Some of these actions are enabled through the Local Government Act and the Corporation is able to move forward with these types actions more or less immediately as they fall under existing mandate and jurisdiction of local government (though often they will require some degree of consultation).

Other CEEP actions fall outside the Corporation's ability to directly control or influence. For these actions, successful implementation will be dependent on the Corporation's ability to form strong partnerships and develop collaborative opportunities with local businesses, organizations, residents and other partners.

This shared responsibility for reducing community energy demand and GHG emissions is a key message of the CEEP. For this reason, the CEEP provides some guidance on when and how to go about developing outreach and engagement strategies to advance CEEP actions and attain the broader CEEP goals, targets and vision. Whether changing the Corporation's land use policies and plans, offering incentives for green development, or appealing to residents to change their behaviours with respect to energy use, effective outreach and engagement is required to bring the various target audiences on side. This is an essential step in implementing lasting energy and climate change action in support of a resilient community.

Where outreach or engagement is needed, the key steps to defining a strategy include:

- Identify a budget and timeline
- Define the objectives to be achieved
- Define and understand the target group(s)
- Identify supporting stakeholders
- Define the key messages
- Identify communication products, dissemination channels and milestones

The sections that follow describe each of these steps in more detail.

Identify a budget and timeline

The availability of funds and time create the constraints. The activities should match what is possible within these limits. Steps required are to identify the critical timeline and what budget is available. Is there opportunity for more funding down the road? Are there other funding partners that can be approached? Are there opportunities to leverage off other initiatives?

Define the objectives

Before initiating a strategy, it is necessary to reflect on the objectives to be achieved through outreach and engagement. The objectives may range from simply sharing information (one-way flow of information) to soliciting input (two-way flow of information), to working with stakeholders to develop a program, project or initiative (collaboration). Objectives should be clear, specific, measurable, and realistic within the timeframe, budget and resources.

Define and understand the target groups

For each action to succeed, it is important to understand which target group(s) the action is intended to reach. Who are we targeting with this action? Who will be directly impacted by this action or who has the ability to influence the success of this action? What level of understanding or knowledge does the target audience currently have about the issue? What motivates the target audience?

There are basically three types of motivators:

- Rational motives: self-interested or safety-related motives such as saving money or better health
- Social motives: societal motives such as having a sense of belonging, fitting in with a group or being respected by others
- Emotional motives: moral or self-actualizing motives such as saving the environment or care for family, friends or grandchildren

The better we understand our target groups, mutually work together, and gain trust, the better our chances to influence change.

Identify supporting stakeholders

Change in behaviours is often part of a larger change in the target audience's environment. Individuals may find it difficult to change if their environment does not support the change or if they run into social, technical, and organizational barriers.

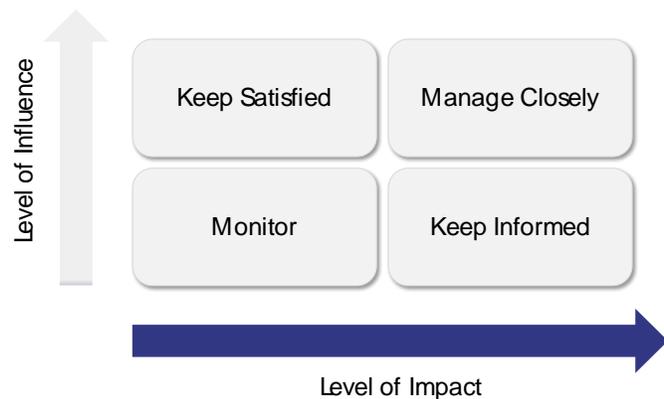
To support the target audience(s) in making the necessary changes and/or accepting the required action(s), it might be necessary to involve external organizations and people. Who will be indirectly impacted by this action? Who can help facilitate the action's success? These may include stakeholders in some of the following roles:

- Stakeholders that can provide resources and competencies (e.g., funding partners)
- Stakeholders that influence the target group and their possibilities to save energy (e.g. utilities, property managers, developers, etc.)
- Stakeholders who are indirectly influenced by the action and may support or oppose it

Successful outreach and engagement programs involve not only end-user target audiences, but other relevant stakeholders as well. These stakeholders can be viewed as 'indirect target audience'. Their participation can be crucial for achieving and sustaining change over time.

It can be helpful to conduct a stakeholder mapping exercise to identify the relative level of influence and impact that a stakeholder has over the success of any particular action. Stakeholders can be placed on a graph similar to the one presented below in an effort to identify whether they should be:

- Work with closely on implementation
- Kept satisfied (but not compromise with too much)
- Kept informed on a regular basis
- Monitor



Developing an understanding of potential CEEP stakeholders at the outset, will help the Corporation in defining and understanding the target groups and in identifying supportive stakeholders when it comes time to develop outreach strategies for particular actions. A stakeholder register is a tool that can assist in this regard. An initial stakeholder register has been developed for the CEEP and can be found in Appendix E.

Define the key message

To effectively reach the target group(s) with the call to action, it is important to have a clear message that resonates. What is our message? Do we have one message for one audience or multiple messages tailored for multiple audiences?

The message should be framed around three parts: problem – solution – action. There are various ways to get the target group(s) on board and engaged with the call to action. Understanding the target group(s) and what motivates them (as described above) will help to inform framing the message in the right context and with the right balance of rational, emotional and social motivators.

Identify communication products, dissemination channels and milestones

Once the message is defined, how can we best capture and disseminate it? Our message must be seen and heard in order to have value. What's more, it must be seen and heard by the right people to have impact. The choice of our communications tactics depends on the type and content of the message, available resources, and also – most crucially – on how the audience likes to receive information. It can cover a wide range of tactics, including:

- Print (newspapers, magazines, press releases, brochures, reports, posters, etc.)
- Online (social marketing websites, email, websites, podcasts, webinars, etc.)
- Radio and TV (news, interviews, documentary, etc.)
- Public Relations (events, phone calls, conference, competitions, etc.)
- Interactive (conference calls, meetings, workshops, webinars, etc.)

7.4 Monitoring Framework

Primary indicators directly track progress towards the desired outcome of reductions in electricity and energy use and GHG emissions. These indicators are provided in Delta’s Community Energy and Emissions Inventory (CEEI). As such, it is recommended that the Corporation of report on these indicators every 2 years, to coincide with provincial plans to update the CEEI reports.

Secondary indicators are linked to the on-the-ground outcomes (e.g., number of commuters taking transit to work), which contribute to the broad goals of the CEEP (e.g., reduction in electricity and energy use and GHG emissions). Potential secondary indicators for Delta’s CEEP are outlined in Table 8.

Table 8. Secondary Indicators for Delta’s CEEP

Goal Area	Indicators	Data Sources
Our Neighbourhoods	Compact development: Residential density; and residential density within a 400m area around bus routes	Census Data (GIS format)
	Transit-oriented development: Average trip length	Trip Diary Data (TransLink)
	Land in Agricultural Land Reserve: Net change in land area (hectares) of Agricultural Land Reserve (ALR) in Delta	Agricultural Land Commission
Our Mobility	Pedestrian Environment: Kilometres of sidewalk Walking mode share	Corp of Delta GIS Data; Census Data
	Cycling Environment: Kilometres of designated cycling lanes and routes Cycling mode share	TransLink, Corp of Delta data
	Transit Quality: Percent of bus arrivals being on-time Percent of bus stops with shelters and seats	
	Transit Use: Transit mode share; Transit service hours per capita	Census Data, TransLink
	Parking Management: Average parking occupancy rate; Percent of new developments that have unbundled parking	Specific studies
	Alternative Fuel Vehicles: Percent of community facilities with electric vehicle plug-ins Percent of new private developments with electric vehicle plug-ins	Corp of Delta Building Permit data
Our Economic Prosperity	Existing Energy Efficient (Commercial) Buildings: Percent of existing commercial buildings renovated to high energy performance standards (e.g., exceeding ASHRAE 90.1).	Corp of Delta Building Permit data
	New Energy Efficient (Commercial) Buildings: Percent of new commercial buildings exceeding energy performance standards in the current building code (validated through third party rating systems such as LEED®, ASHRAE 90.1)	

Goal Area	Indicators	Data Sources
Our Homes	Existing Energy Efficient (Residential) Buildings: Percent of existing residential buildings renovated to high energy performance standards (e.g., EnerGuide for Homes 80 or higher). New Energy Efficient (Residential) Buildings: Percent of new residential buildings exceeding energy performance standards in the current building code (validated through third party rating systems such as EnerGuide, LEED®)	Corp of Delta Building Permit data (NB: This would require new tracking beyond data that is currently collected)
Our Energy Supply	Connections to Alternative Energy Supply: Percent of homes connected to alternative energy supply Percent of commercial buildings in connected to alternative energy supply	Corp of Delta Building Permit data (NB: This would require new tracking beyond data that is currently collected)
Our Waste	Total Solid Waste Disposal: Total tonnes of solid waste disposed at the landfill Per Capital Solid Waste Disposal: Total tonnes of solid waste disposed at the landfill divided by the population.	Corp of Delta Solid Waste Management Dept data

Appendix A: Inventory and Forecast

Baseline Inventory: 2007

The table below provides a summary of community-wide electricity consumption, energy consumption, and GHG emissions for 2007 (these figures are taken from the Province of BC's Community Energy and Emissions Inventory (CEEI) report for Delta.

Component	Electricity Consumption (kWh)	Energy Consumption (GJ)	GHG Emissions (tonnes CO ₂ e)
Residential Buildings	361,214,350	4,367,951	167,122
Commercial Buildings	594,711,676	3,654,821	91,877
Transportation	n/a	5,741,832	395,729
Solid Waste	n/a	n/a	23,867
Total	955,926,026	13,764,607	678,595
Total per Capita	-	142	7.0

Source: Province of BC Community Energy and Emissions Inventory (CEEI)

The table below compares the 2007 CEEI data to other data sources and provides notes on the level of agreement between the two sources.

CEEI Value (2007)	Comparative Value	Notes
Number of residential electricity accounts: 32,493	Total occupied private dwellings from Stats Canada (2006): 33,550	Good agreement. Some private dwellings in multi-unit buildings may have shared accounts.
Average residential electricity use: 11,117 kWh/dwelling	BC Hydro Conservation Potential Review (CPR) 2007. Average electricity consumption for Lower Mainland regions are provided by dwelling type and age. Based on Stats Can housing split data (2006), approximate residential electricity use: 9,369 kWh/dwelling	CEEI indicates 20% higher than expected electricity use. This may be due to a high number of larger, older homes. Note: assumed apartments are all electrically heated and non-apartments are natural gas heated (which is supported by the data comparison for natural gas accounts below). Used this to calibrate mapping estimates for residential buildings.
Number of residential natural gas accounts: 26,162	Number of non-apartment dwellings 2006 (e.g. single family, semi-detached, row, duplex): 28,150	Good agreement, assuming most non-apartment dwellings use natural gas and most apartments use electricity. Some non-apartment dwellings use heating oil or propane. Also, some are multi-family units that may have a shared connection.

CEEI Value (2007)	Comparative Value	Notes
Average residential natural gas use: 112 GJ/account	FortisBC (formerly Terasen) average usage statistics for lower mainland detached dwellings (1998 to 2004): 112 GJ/dwelling	Relatively good agreement because the majority of dwellings are detached.
Number of personal vehicles registered (58,723) per occupied dwelling: 1.8	National vehicle use survey (Stats Canada) estimated vehicles per household: 1.1 in major urban centres 1.3 overall average for Canada	Indicates high level of vehicle ownership relative to the Canadian average.
GHG Emissions from light-duty vehicles ³⁸ : 232,305 CO ₂ e	Metro Vancouver's 2005 Lower Fraser Valley Air Emissions Inventory & Forecast and Backcast estimates emissions from light-duty vehicles as: 357,875 CO ₂ e	
GHG Emissions from heavy-duty vehicles ³⁹ : 163,424 CO ₂ e	Metro Vancouver's 2005 Lower Fraser Valley Air Emissions Inventory & Forecast and Backcast estimates emissions from heavy-duty vehicles as: 74,325 CO ₂ e	Poor agreement. Difference likely attributed to Metro Vancouver's use of TransLink's VKT data, which was found to be considerably lower for heavy-duty vehicles than the EPA's VKT estimates that were used in the CEEI calculations.
Tonnes of solid waste disposed (65,593) per capita: 0.68	Tonnes of solid waste disposed per capita (2005) from Recycling and Solid Waste Management 2005 Summary: 0.71	Good agreement.

Business-as-usual Forecast Assumptions: 2040

The following population growth projection was used as the basis for developing a business-as-usual (BAU) forecast of electricity, energy, and GHG emissions for Delta.

Year	Projected Population
2007	97,500
2020	108,100
2040	126,700
Average Annual Growth Rate	0.8%

*Source: Adapted from Metro Vancouver's Regional Growth Strategy population projections
Note that population values and forecasts differ from source to source and are frequently updated.*

³⁸ Light duty vehicles include "small passenger cars", "large passenger cars", "light trucks, vans and SUVs" and "motorcycles, mopeds".

³⁹ Heavy duty vehicles include "commercial vehicles", "tractor trailer trucks", "motorhomes", and "bus".

Business-as-usual Forecast Results: 2040

The table below presents the community-wide electricity consumption, energy consumption, and GHG emissions by sector in 2040.

Sector	Electricity Consumption (GJ)	Total Energy Consumption (GJ)	GHG Emissions (tonnes CO ₂ e)
Residential Buildings	1,327,000	4,457,500	174,200
Commercial/ Small-Medium Industrial Buildings	2,384,050	4,069,800	106,100
Transportation	--	5,464,360	386,000
Solid Waste	--	--	31,050
Total	3,711,070	13,991,622	697,350
Total per capita	29.3	110.4	5.5

Note: Values displayed may not add precisely due to rounding

Estimated Thermal Loads for residential units and non-residential floor space for the lower mainland climate zone are”

2006		Total Thermal	Unit
Residential	single semi	29,529	kWh/yr
	row	13,675	kWh/yr
	low rise suite	5,832	kWh/yr
	low rise common	70,259	kWh/yr
	high rise suite	4,425	kWh/yr
	high rise common	412,200	kWh/yr
NEW		Total Thermal	Unit
Residential	single semi	22,147	kWh/yr
	row	10,256	kWh/yr
	low rise suite	4,374	kWh/yr
	low rise common	52,694	kWh/yr
	high rise suite	3,319	kWh/yr
	high rise common	309,150	kWh/yr

Source: 2007 BCHydro Conservation Potential Review

Non-residential

Actual Use Description	Total Floor Area by Use - sq ft	Thermal Load 2006
Shopping Centre (Neighbourhood)	662,381	15.36
Shopping Centre (Community)	654,951	15.36
Recreational & Cultural Buildings (Includes Curling)	621,814	9.29
Storage & Warehousing (Cold)	602,475	5.5
Office Building (Primary Use)	484,565	10.1
Churches & Bible Schools	430,133	12.8
Store(S) And Service Commercial	392,595	7.15
Sea Food	283,535	6.5
Soft Drink Bottling	258,450	5.5
Food Market	202,111	6.5
Automobile Paint Shop, Garages, Etc.	185,175	5.5
Miscellaneous (Food Processing)	157,349	5.5
Storage & Warehousing (Open)	147,618	5.5
Self Storage	143,282	5.5
Distillery	137,087	5.5
Hospitals (Nursing Homes Refer To Commercial Section).	126,836	30.5
Bakery & Biscuit Manufacturing	119,682	5.5
Store(S) And Offices	119,009	9.825
Dairy Products	102,052	6.5
Group Home	90,189	16.8

Actual Use Description	Total Floor Area by Use - sq ft	Thermal Load 2006
Industrial (Vacant)	86,721	0
Motel & Auto Court	82,513	16.8
Store(S) And Living Quarters	77,504	8.2
Hotel	75,552	15.1
Hall (Community, Lodge, Club, Etc.)	71,735	8.2
Schools & Universities, College Or Technical Schools	68,810	9.29
Retail Strip	63,090	19.65
Service Station	54,639	13.7
Golf Courses (Includes Public & Private)	53,703	26.05
Government Buildings (Includes Courthouse, Post Office)	48,949	11.8
Parks & Playing Fields	46,178	5.5
Restaurant Only	39,985	38.4
Marine Facilities (Marina)	39,180	12.8
Works Yards	38,432	5.5
Convenience Store/Service Station	37,431	10.1
Fast Food Restaurants	31,372	38.4
Confectionery Manufacturing & Sugar Processing	29,180	5.5
Bed & Breakfast Operation Less Than 4 Units	28,176	16.8
Bank	26,853	8.2
Neighbourhood Pub	26,316	38.4
Seniors Independent & Assisted Living	24,047	12.3
Civic, Institutional & Recreational (Vacant)	20,317	0
Brewery	18,758	5.5
Recreational Clubs, Ski Hills	18,672	11.4
Automobile Sales (Lot)	12,575	13.7
Bed & Breakfast Operation 4 Or More Units	12,138	16.8
Lumber Yard Or Building Supplies	11,395	5.5
Stores And/Or Offices With Apartments	11,074	13.25
Car Wash	6,491	5.5
Government Reserves (Includes Greenbelts (Not In Farm	5,597	5.5
Garbage Dumps, Sanitary Fills, Sewer Lagoons, Etc.	5,335	12.8
Neighbourhood Store	2,941	10.1
Self-Serve Service Station	2,609	13.7
Cemeteries (Includes Public Or Private).	456	12.8

Source: 2007 BCHydro Conservation Potential Review

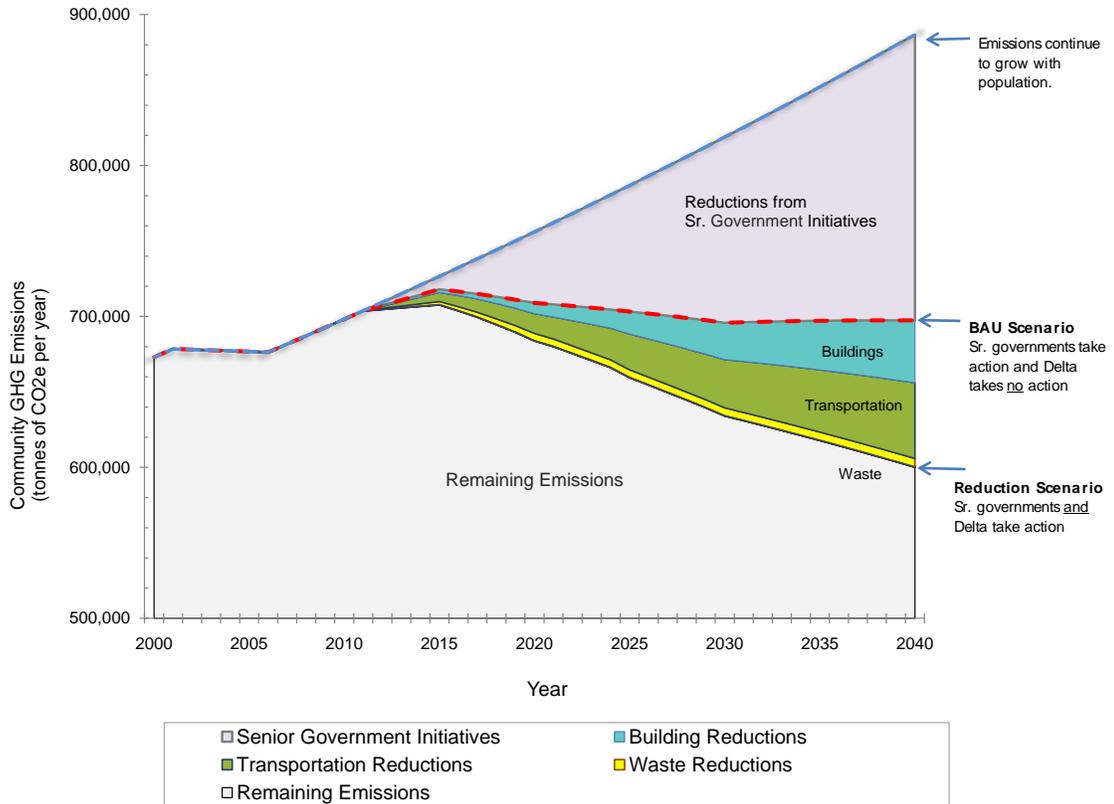
Appendix B: Scenario Detail

This appendix provides additional detail on the estimated reductions in energy and GHG emissions for the reduction scenario. The table below outlines the estimated reductions to 2040 by goal area and phase.

Goal Area	Phase	Estimated Annual Reductions to 2040		
		GHGs (tonnes CO ₂ e / yr)	Energy (GJ / yr)	Electricity (GJ / yr)
Our Neighbourhoods	1	-5,570	-110,835	-15,888
	2	-7,386	-139,568	-15,888
	3	-12,956	-250,402	-31,777
Our Mobility	1	-3,994	-63,212	0
	2	-7,261	-101,521	13,410
	3	-14,764	-212,931	0
Our Economic Prosperity	1	-1,496	-56,523	-28,903
	2	-5,984	-226,093	-115,612
	3	-3,711	-51,822	0
Our Homes	1	-1,572	-35,733	-5,364
	2	-4,395	-94,095	-9,177
	3	-11,788	-243,860	-16,092
Our Energy Supply	1	-2,270	-23,300	20,785
	2	-5,199	-68,674	32,426
	3	-3,073	-40,304	19,066
Our Waste	1	-1,863	0	0
	2	-3,725	0	0
	3	0	0	0
Total by Phase	1	-16,764	-289,603	-29,371
	2	-33,951	-629,950	-94,842
	3	-46,292	-799,318	-28,803
Total of All phases		-97,007	-1,718,871	-153,016

Figure B-1 shows the GHG reductions achieved under this scenario.

Figure B-1: Total GHG Reductions as a result of the Scenario



Appendix C: Renewable and District Energy Opportunity Assessment

Renewable Energy Potential

A scan of alternative energy technologies and their applicability to the Delta context is presented in the table on the following page. This includes both heat technologies and electricity generation technologies.

The scan examines these technologies based on:

- Energy Type: Does it supply heat or electricity?
- Scale of Implementation: Is this technology implemented at the building scale, the neighbourhood scale, community scale or utility scale?
- Implementing Agent: Which player would implement this technology – the developer, the owner, a third party, etc.?
- Status of Technology: Established, evolving, or experimental?
- Relative Costs: Is the energy provided more expensive, less expensive, or equivalent to conventional technologies (conventional technology is utility supplied electricity and natural gas)?
- Opportunity for Delta: Is there an opportunity for the Corporation of Delta to move this technology forward through the municipal toolkit?
- Potential Partners: What other players could be leveraged to assist with this project?

Key observations from this table include:

- An ideal alternative technology to pursue would have a cost rating of “low” and an opportunity for Delta rating of “high.” None of the technologies identified in the table meet these criteria.
- Delta has the least influence for utility scale energy supply, but has the ability to influence action at the building scale and development scale.

Key areas for Delta to pursue are:

- Encourage alternative scale technologies at the buildings scale, and
- Work with potential project partners to leverage their expertise for implementation.

Table C-1: Alternative Energy Screening

Alternative Technology	Description	Energy Type	Scale of Implementation [a]	Implementing Agent	Status of Technology	Costs [b]	Opportunity for Delta [c]	Potential Partners
Solar Thermal	Solar panels provide hot water to building systems.	Heat	Building	Builder / Owner	Established	High	Med	SolarBC (Delta is a Solar Community)
Solar Photovoltaic (PV)	Electric solar panels provide a portion of a buildings electricity	Electricity	Building	Builder / Owner	Established	High	Med	SolarBC (Delta is a Solar Community)
Geoexchange	A field of boreholes circulates water into the ground and back out to equalize the temperature.	Heating and cooling	Building, utility	Builder / Owner	Established	Med	Med	GeoExchangeBC (as an info provider)
Small scale wind	Small windmills provide electricity for remote applications	Electricity	Building	Builder / Owner	Established	High	Med	BC Hydro (has standing offer for purchase)
Utility scale wind	Uses turbines to convert the energy of surface winds to electrical energy	Electricity	Electric Utility	Utility or private developer	Established	Med	Low	BC Hydro (through IPP acquisitions)
Small hydro	Uses the energy of falling water to generate electricity	Electricity	Electric Utility	Utility or private developer	Established	Med	Very Low (insufficient gradients or flows)	Developers (Independent Power Producers)
Landfill Gas	Methane gas collected to produce electricity (already underway at regional landfill)	Biogas, or heat	Facility or utility	Local Government or private sector partner	Established (LFG capture and combustion) Evolving (gas clean-up and resale).	Med	Med	FortisBC; Pacific Carbon Trust
Biomass Combustion (commercial)	Biomass boilers	Heat	Facility or Utility	Facility owner or DE system operator	Established	Med	Med	Developers

Alternative Technology	Description	Energy Type	Scale of Implementation [a]	Implementing Agent	Status of Technology	Costs [b]	Opportunity for Delta [c]	Potential Partners
Biomass Gasification	Wood waste is gasified to produce a syngas that may generate heat or electricity.	Heat and sometimes electricity (developing)	Large facility or Utility	Facility owner or DE system operator	Emerging	Very High	Med	Industrial operations
Biomass (small scale)	High efficiency and wood pellet stoves are used for single building heat.	Heat	Building	Building owner	Established	Similar	Medium (wood stove promotion)	Province
Sewer Heat Recovery	Heat pumps extract heat from the sewage system	Heat	Utility	DE system operator	Emerging commercialization	High	Low	None identified
Ocean or River Loop Heat Recovery or Exchange	A loop from the river provides temperature regulation to the DE system water (via a heat exchanger).	Heat	Building or Utility	Building owner or DE system operator	Emerging	High	Medium	None identified (Individual homeowners have pursued this in Delta)
Water Current Turbines (In-River Turbines)	Turbine systems that convert hydro kinetic energy from flowing waters into electricity, mechanical power, or other forms of energy.	Electricity	Electric Utility	Utility or private developer	Experimental	High	Low	None identified
Wave Power	Mechanical systems capture the energy from waves as electricity	Electricity	Electric Utility	Utility or private developer	Experimental	Very High	Very Low	None identified
Tidal Power	Mechanical systems capture the energy from rising and falling tides and convert this into electricity	Electricity	Electric Utility	Utility or private developer	Experimental	Very High	Very Low	None identified
Waste Heat Recovery	Waste heat from an industrial process (pulp mill, cement plant, etc.) is captured at a low or no cost.	Heat	Building, or utility	Building owner or DE system operator	Established	High	Medium	Industrial operations (see DE section for more info)

Notes to Table C-1:

[a] Scale of Implementation (typical)

Building = can be implemented on a single building (e.g. a multi-family development)

Facility = applicable to a large institutional or educational facility – possible a municipal facility (e.g. rec center).

Utility = generally requires a utility level investment and would include a number of buildings or a precinct area.

[b] Costs (refers to costs compared to current energy sources):

Similar = cost is similar to the utility provided energy it replaces

Low = cost is lower than the energy it replaces.

High = cost is greater than other sources but is possibly competitive, or acceptably priced.

Very High = Cost dramatically exceeds conventional sources.

[c] Opportunity for Delta (refers to the Corporation of Delta's ability to influence action in this area).

High = regulatory or strong policy tools available

Medium = opportunity for incentive

Low = opportunity for encouragement or education

None = not an area of municipal authority or not a viable opportunity.

District Energy

A district energy system provides heating (and potentially cooling services) to a group of buildings that can be used by each one to provide space and water heating within the building. Some of the features that can make a DE system attractive include:

- **A source of affordable heat or cooling is available.** For example, waste heat from power plants or waste-to-energy (WTE) facilities can be captured for DE systems. In Toronto, a system uses cool water from deep in Lake Ontario to provide cooling to a number of office buildings in the downtown core.
- **Economies of scale can be achieved.** This results from combining all the heating and cooling in a centralized location. The Central Heat Distribution System (CHDL) in downtown Vancouver uses large centralized boilers to provide steam heat to almost 300 buildings in the downtown core, thus avoiding them each having their own boiler and hot water heater.

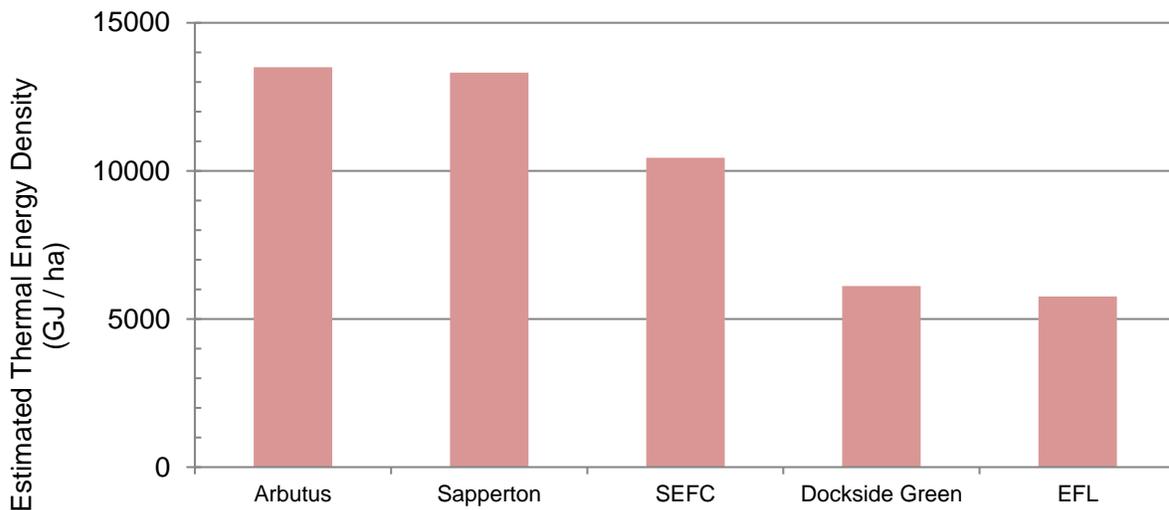
In British Columbia, DE systems have been in place for decades in downtown Vancouver, and on the University of British Columbia (UBC) campus. More recent systems have been implemented in Revelstoke, Docks Green (Victoria), Lonsdale (North Vancouver), the Whistler Athlete's Village, East Fraser Lands (EFL), and South East False Creek (SEFC) in Vancouver. There has been recent, renewed interest in DE systems in BC as they offer opportunities to:

- Reduce carbon emissions by implementing DE systems with renewable energy supply (biomass, or electricity), and;
- Reduce the growth of electric resistance heating in buildings, which increases the electric load growth on BC Hydro's system.

District Energy systems require substantial investments in distribution infrastructure including piping, metering, and heat exchangers within buildings. Higher density developments provide more customers for the DE system for a given amount of infrastructure. The customer base can be evaluated as the amount of heat energy required (GJ or MWh) for each hectare of developable land, known as energy density. The energy density of a selection of district systems studied in Metro Vancouver is shown in the figure below. This shows a range of loads that have been assessed as potential district energy study areas (note that not all of these study areas have been developed to date). The figure indicates that district energy systems have been used for developments with a range of energy densities, but those in the range of 5000 GJ/ha and higher are the ones implemented in the lower mainland / south coast climate zone.

It is important to note that energy density is only one of several factors that affect the viability of district energy systems.

Figure C-1: Thermal Energy Density for Selected DE Study Areas



Factors that affect the viability of District Energy

A number of factors affect the technical and financial viability for implementing district energy systems. Factors that affect the viability of a district energy system include:

- Cost of the energy source:** District energy systems have to acquire the energy they provide. This can be a mixture of conventional and renewable sources. In order to be competitive, the DE system must obtain its energy at a lower cost than the “business as usual” (BAU) alternative so that the extra costs of capital infrastructure can be recovered through customer rates. This has made DE an attractive option where there is a supply of ‘waste’ or low cost energy.
- Scale and rate of development:** Some technologies require a minimum size to be economically viable. This may require an anchor tenant or first phase of development to establish a minimum load at the outset of operation. The build out rate defines how quickly new customers join the system – which helps pay for the initial investment sooner.
- Type of development:** Heating based DE systems desire to have load throughout the year. For commercial only developments, the heating load can be small in the summer months – comprising only a small amount of hot water heating. Residential development within the DE system will ensure that there is a substantive heating load through the entire year.

Scoping level review of district energy potential in Delta

The table that follows provides a scoping level review of potential DE opportunities in Delta. The table includes thermal energy density data (baseline, projected and new development load) for six neighbourhoods that have been identified as key growth areas for Delta.

For this screening the key consideration is whether the development scenario will create sufficient new load to justify the level of infrastructure investment. Based on the energy density mapping none of the new growth area appears promising. The Scott Road area might have some potential but would need to include consideration of the loads in Surrey on the other side of Scott Road.

Overall, the low level of growth and limited densification do not appear to support a neighbourhood District Energy utility model.

Table C-2: District Energy Screening

	NEIGHBOURHOOD / AREA					
	Ladner Core	Ladner Marina Gardens	Tsawwassen Core	Tsawwassen G&C Club	North Delta Scott Road	North Delta Delsom
Description	Existing residential and small scale commercial in Village Centre	New residential single family and semi-detached development.	Development along 56 St. defined in the area plan.	Development of available lands surrounding the golf course.	Existing multi-family residential and large format commercial bordering Surrey	Existing mixed use area
Features	Mostly infill development in mixed use area	New waterfront development in close proximity to Fraser River	Includes mixed use buildings.	Primarily residential 300 units in 4-6 story MF & 200 SF/duplex units.	Scott Road is shared with Surrey and is targeted as a growth area	A number of institutional buildings are located here
Approximate land area (ha)	42	54.0	66.1	60.1	123.0	50.1
Approximate number of dwelling units (to 2006)	947	134	1,464	0.0	1,546	80
Approximate baseline thermal load (at 2007) (GJ / ha) [note a]	1785	250	1790	0	1465	170
NEW Load from New Development (2007 – 2040) (GJ/ha)	359	465	500	262	710	475
Approximate thermal load under scenario (2040) (GJ/ha) [note b]	1866	675	2005	262	1950	615
Municipal Facilities or other anchor tenants	--	--	South Delta & Winskill Rec Centres	--	--	North Delta Police, North Delta Pool, Sungod Rec Center
Likely viability for a future DE system	Weak: New load may support De and high existing load may support retrofit opportunities.	Initially weak due to Insufficient new load. See note [c]	Weak/Possible: Load appears poor. Development timing may be important.	Weak: New load insufficient, however a small cluster of buildings might create an opportunity.	Possibility: New load might be just sufficient. Consider further evaluation with the City of Surrey	Weak: In sufficient new load appears unattractive. Opportunity would be created through the incorporation of the municipal facilities.

Notes to Table C-2:

[a] Thermal load values are estimated from GIS mapping.

[b] 2040 thermal load includes the new load from development + the effect of improved efficiencies on existing buildings (reduces the "current load slightly). As a result of these efficiencies, the future load is less than the sum of (current load + new load).

[c] The Ladner Garden development was initially screened to be a low opportunity due to the low density of load. However there may be potential for this development to change it's zoning to allow for 4 story apartment blocks. If this application proceeds, then an evaluation of the DE potential would be justified.

Figure C-2: Thermal Load Map 2006

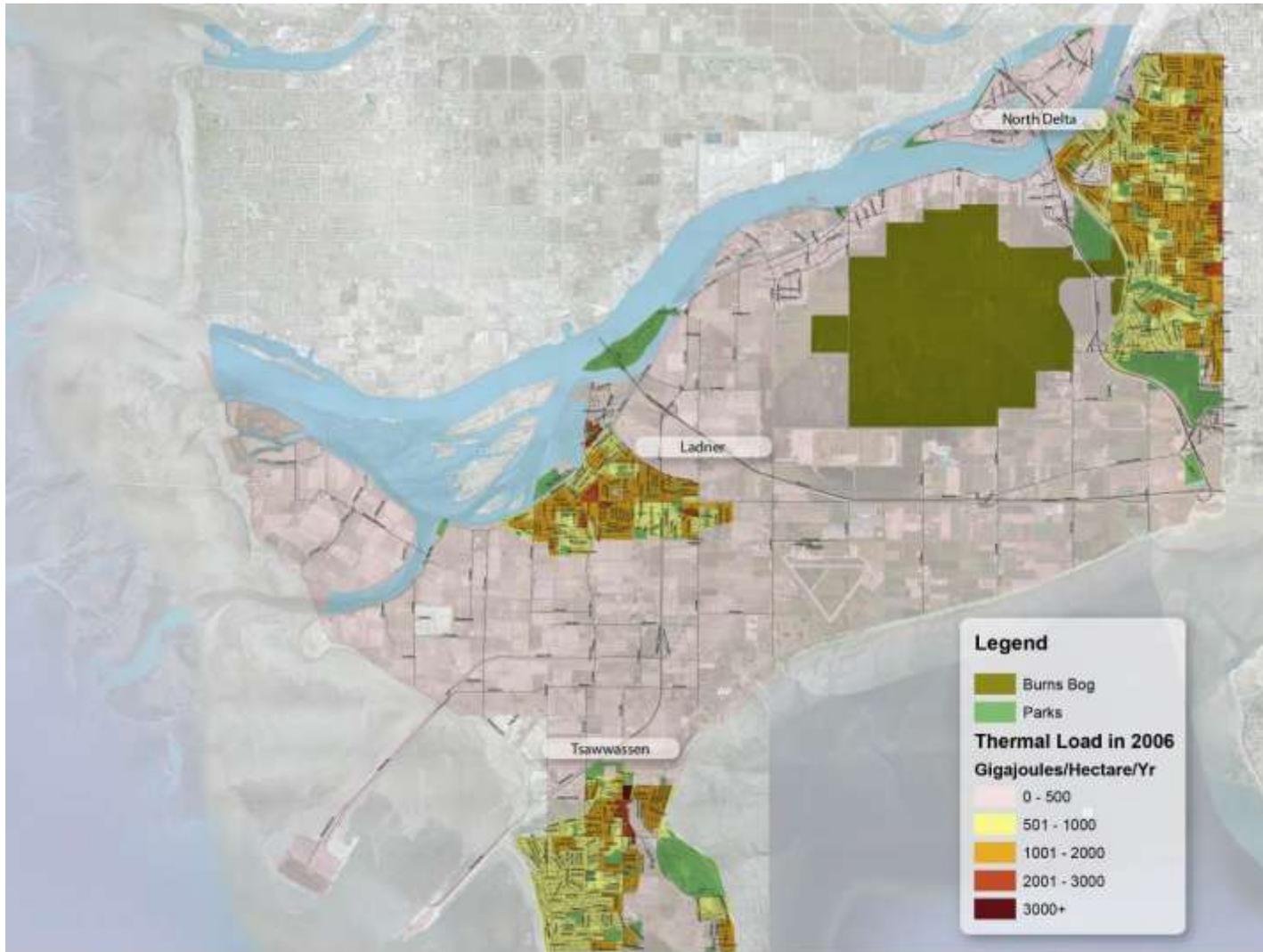


Figure C-3: Thermal Load Map 2040

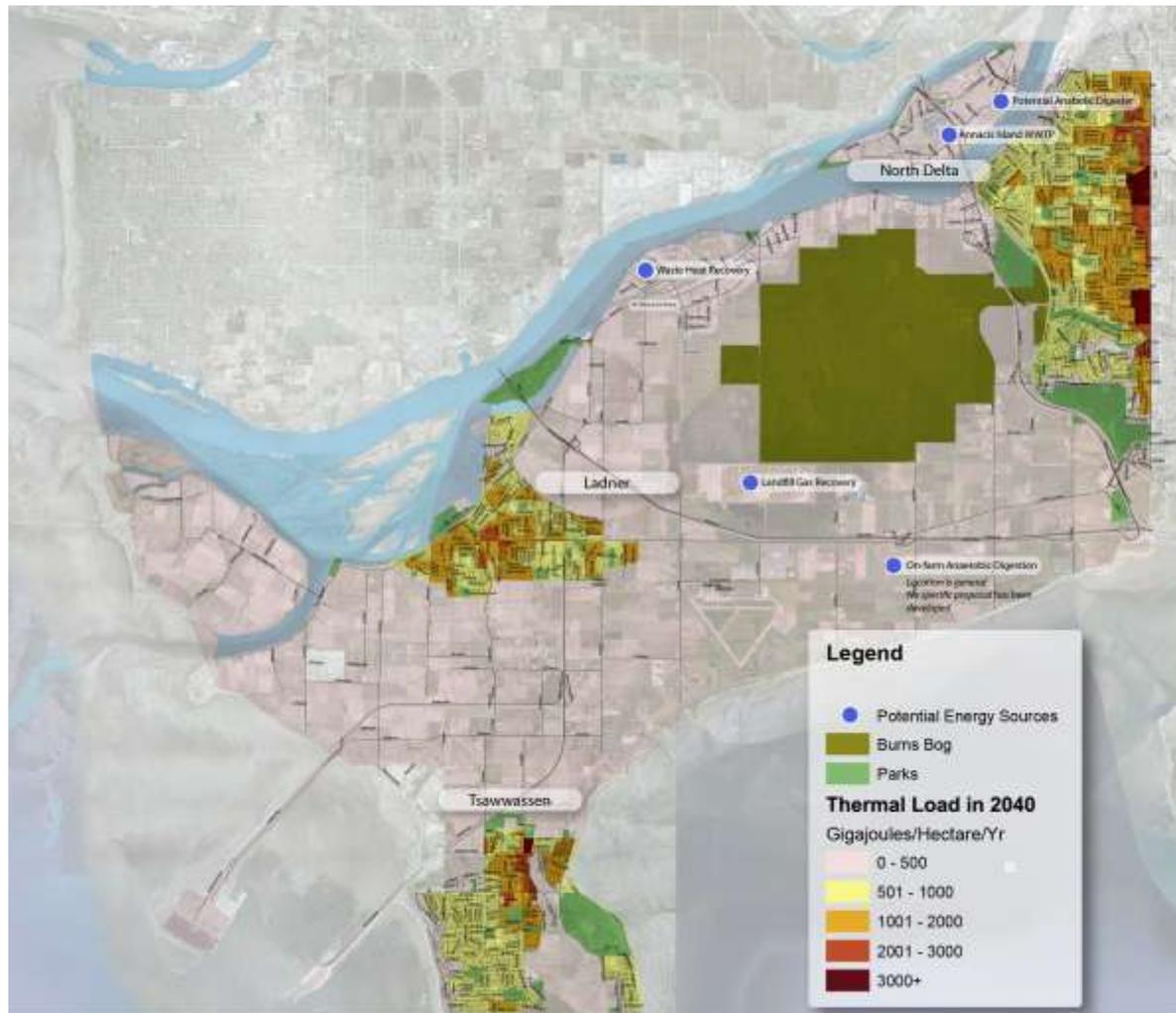


Figure C-4: CHANGE of Thermal Load 2006 - 2040

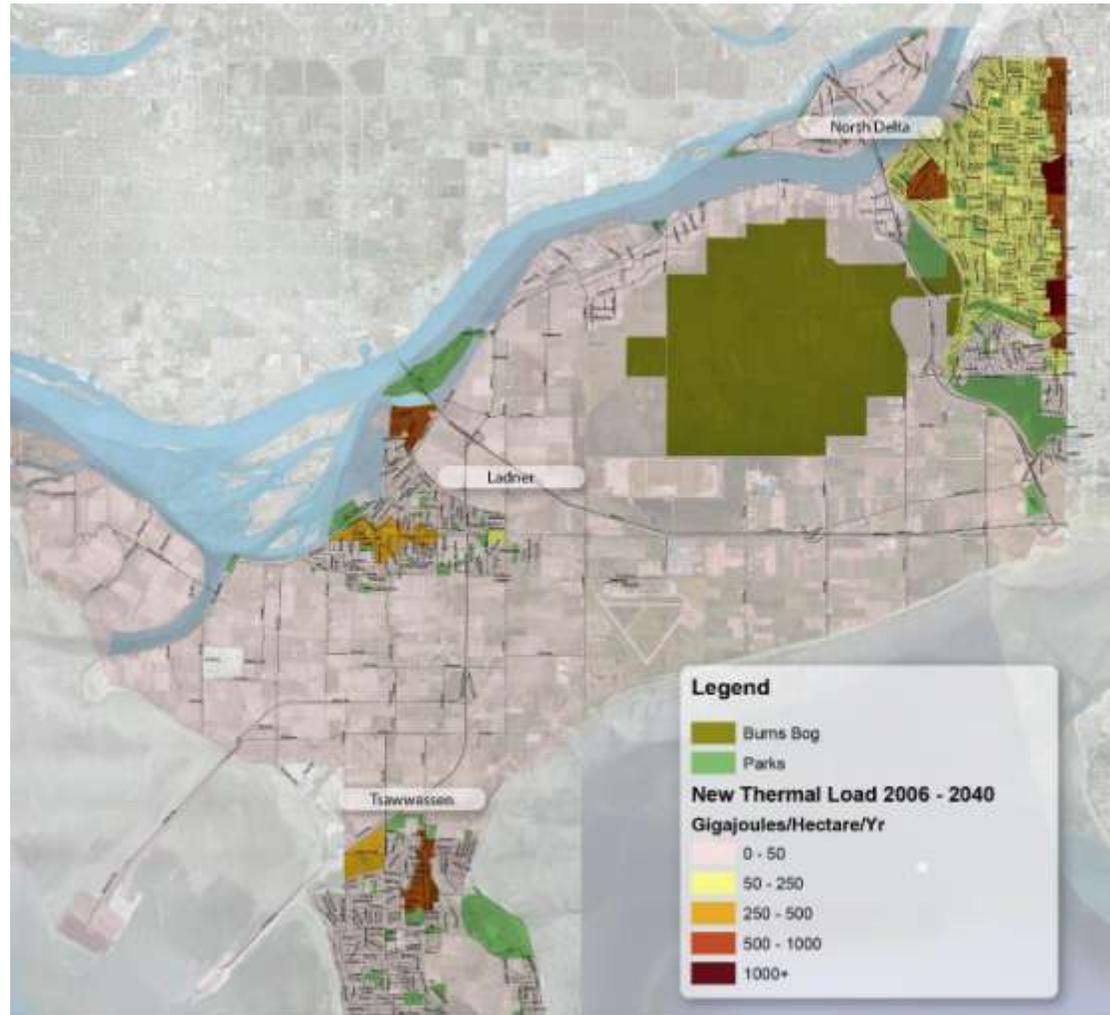


Figure C-5: Ladner Neighbourhood Thermal Load 2040

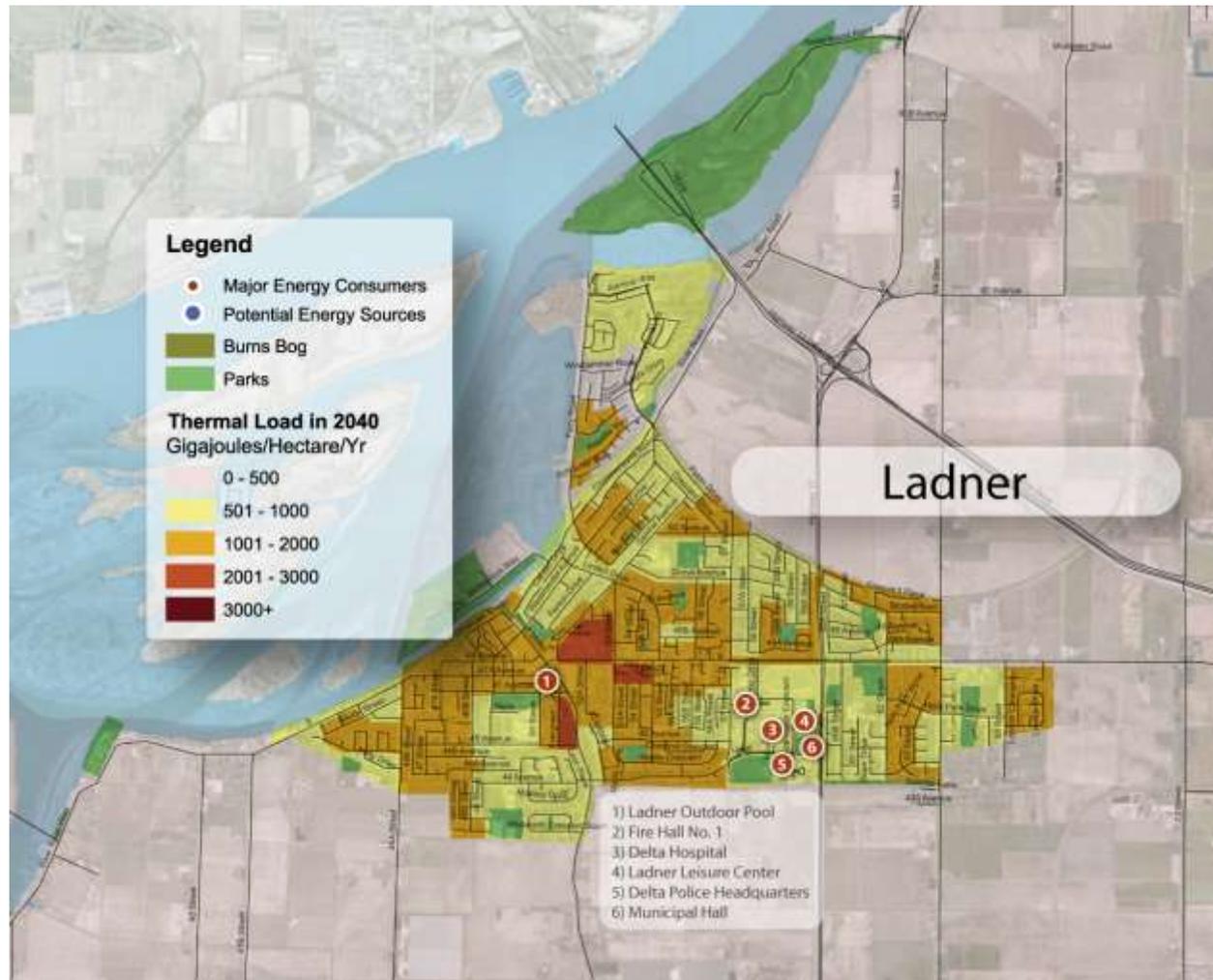


Figure C-6: Tsawwassen Neighbourhood Thermal Load 2040

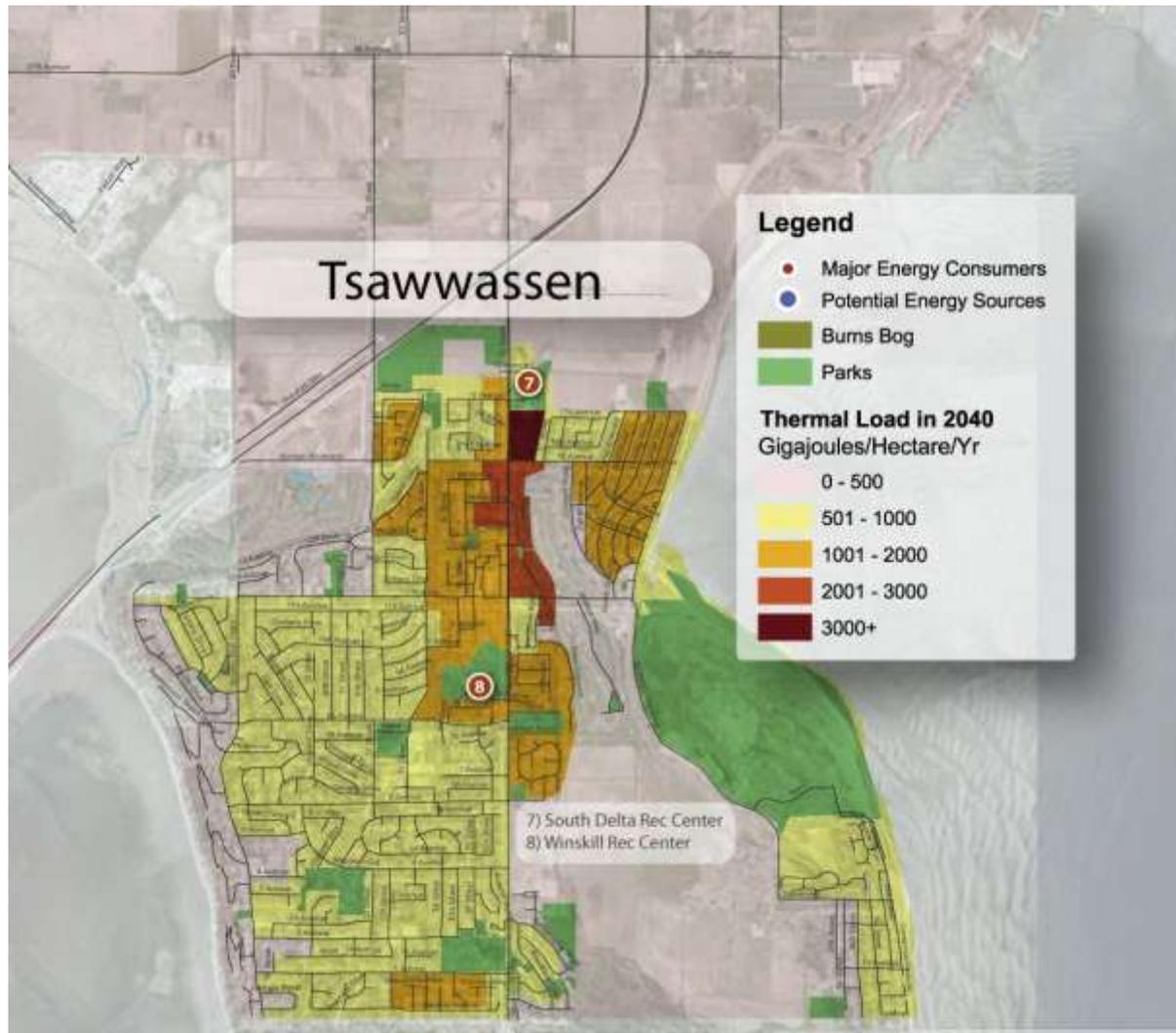
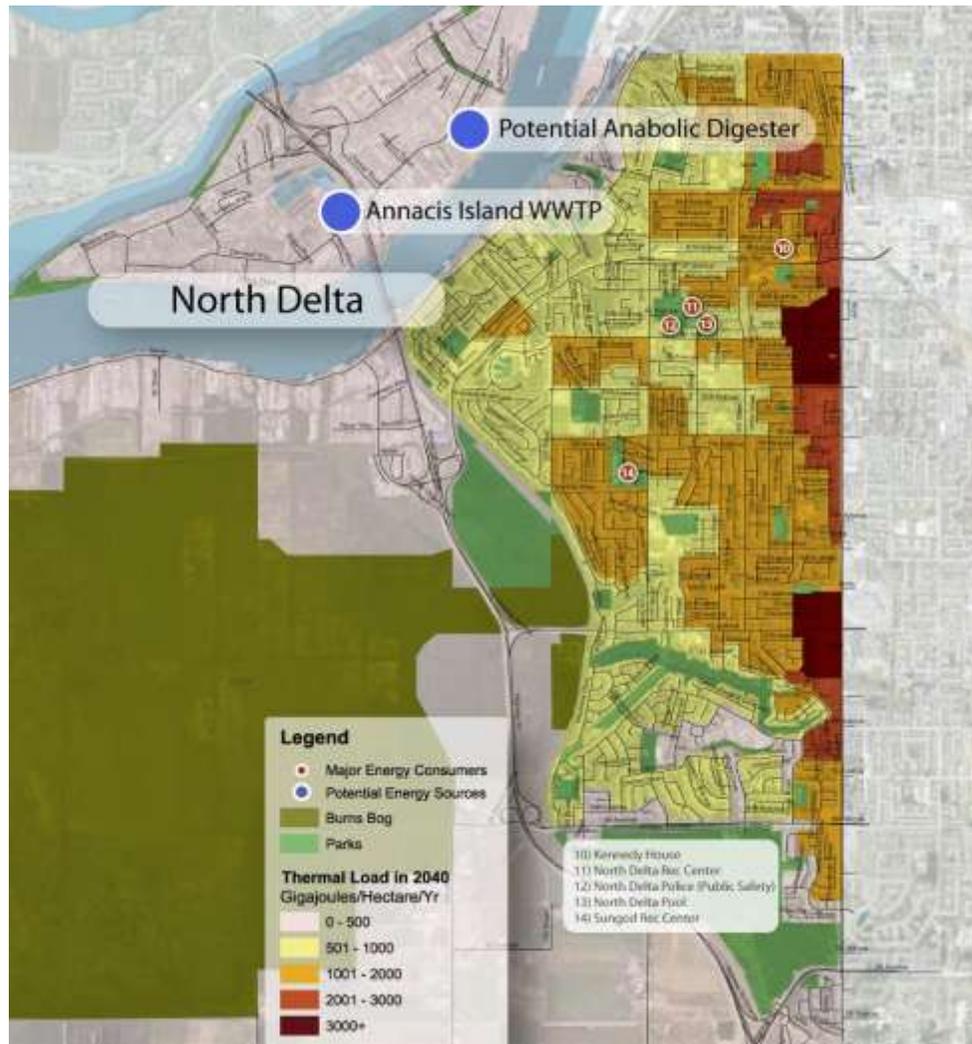


Figure C-7: North Delta Neighbourhood Thermal Load 2040



Appendix D: Implementation Plan

The table on the following page provides detail on the implementation of CEEP actions, including lead, staff resources, disbursements and GHG reductions. Each action was estimated as to the staff time and external resources that would be required to implement the activity.

Table D-1 Implementation Summary

Phase 1 2 3	#	Action	Lead	Outreach plan (Y/ N)	Staff Resources (\$)			Disbursements (\$)			GHG Reductions (Tonnes CO ₂ e)		
					Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
Our Neighbourhoods													
GOAL To plan and develop compact, complete and connected neighbourhoods that minimize energy consumption													
◆	1	Review existing areas designated for residential infill and identify opportunities to focus density in corridors and nodes.	Community Planning and Development										
◆	2	Amend OCP (Schedule A) and Zoning Bylaw to align with updated area plans	Community Planning and Development	Y									
◆	3	Review Delta's framework for evaluating energy efficiency and greenhouse gas reductions in new development	Community Planning and Development										
◆	4	Make pedestrian, cycling and transit access a priority at existing and new municipal facilities	Community Planning and Development and Engineering		\$ 75,000	\$ 53,333	\$ -	\$ 10,000	\$ 260,000	\$ -	2,443	4,886	5,002
◆	5	Provide incentives to encourage more complete communities	Community Planning and Development	Y									
	6	Review and update Development Permit Area Guidelines	Community Planning and Development										
◆	7	Communicate with partners about locating new institutional facilities in focused growth areas	Community Planning and Development										
◆	8	Promote minimum densities in the Zoning Bylaw	Community Planning and Development	Y									
Our Mobility													
GOAL To reduce vehicle travel and provide opportunities for low carbon mobility													
◆	9	Identify opportunities to improve pedestrian connectivity	Engineering										
◆	10	Establish a Community Idling Reduction Program	Climate Action & Environment	Y									
◆	11	Update the subdivision bylaw to accommodate a range of transportation users	Engineering										
◆	12	Promote Translink efforts to encourage alternative transportation	Engineering										
◆	13	Work with partners to develop car sharing program / opportunities	Climate Action & Environment	Y	\$ 60,000	\$ 75,000	\$ 20,000	\$ 10,000	\$ 750,000	\$ -	5,401	9,336	2,705
◆	14	Promote electric vehicle charging infrastructure	Engineering										
◆	15	Improve connectivity for cycling between and within Delta communities	Engineering										
◆	16	Review parking management opportunities	Engineering	Y									
◆	17	Work with partners to explore opportunities for a community shuttle	Community Planning and Development	Y									

Phase 1 2 3	#	Action	Lead	Outreach plan (Y/ N)	Staff Resources (\$)			Disbursements (\$)			GHG Reductions (Tonnes CO ₂ e)			
					Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	
Our Economic Prosperity														
GOAL To transition our local business community towards a low carbon economy														
◆	18	Continue Climate Smart program for local businesses	Climate Action & Environment	Y										
◆	19	Develop a Climate Leaders Network for major energy consumers	Climate Action & Environment	Y										
◆	20	Promote commute trip reduction amongst large employers	Climate Action & Environment	Y	\$ 70,000	\$ 20,000	\$ 20,000	\$ 10,000	\$ 200,000	\$ -	3,612	5,802	3,628	
◆	21	Encourage energy audits and retrofits	Climate Action & Environment	Y										
◆	22	Work with partners to coordinate a Fleet Logistics program	Climate Action & Environment	Y										
Our Homes														
GOAL To have efficient, healthy and affordable homes														
◆	23	Encourage home energy efficiency	Climate Action & Environment	Y										
◆	24	Provide training to Building inspections staff	Community Planning and Development											
◆	25	Promote energy efficiency to builders and renovators	Climate Action & Environment	Y										
◆	26	Support adaptive reuse of buildings and incorporate into policy	Community Planning and Development		\$ 64,500	\$ 25,000	\$ 50,000	\$ 50,000	\$ 10,000	\$ 2,000,000	2,063	2,912	5,712	
◆	27	Promote energy efficient and 'passive house' design	Community Planning and Development	Y										
◆	28	Offer incentives for home energy audits and retrofits	Community Planning and Development	Y										

Phase 1 2 3	#	Action	Lead	Outreach plan (Y/ N)	Staff Resources (\$)			Disbursements (\$)			GHG Reductions (Tonnes CO ₂ e)			
					Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	
Our Energy Supply														
GOAL To capture and re-use waste heat and maximize the use of renewable energy														
◆		29	Provide education on alternative energy options for buildings	Climate Action & Environment	Y									
◆		30	Study alternative energy options that show potential for Delta	Engineering										
◆		31	Evaluate district energy feasibility for select development areas	Community Planning and Development and Engineering		\$ 30,000	\$ 12,500	\$ 25,000	\$ 80,000	\$ 10,000	\$ 20,000	946	2,731	168
◆		32	Explore use of Local Service Area Bylaws	Community Planning and Development										
	◆	33	Establish a renewable energy standard for buildings	Community Planning and Development	Y									
Our Waste														
GOAL To reduce, reuse, recycle, and recover materials from waste														
◆		34	Encourage resource sharing amongst industrial operations	Community Planning and Development	Y									
◆		35	Support implementation of the regional Integrated Solid Waste and Resource Management Plan (ISWRMP)	Climate Action & Environment	Y									
◆		36	Promote the 4Rs (reduce, reuse, recycle, recover) amongst residents	Climate Action & Environment	Y	\$ 15,000	\$ -	\$ -	\$ 30,000	\$ -	\$ -	860	6,020	0
	◆	37	Implement further activities in support of the ISWRMP	Climate Action & Environment	Y									
CEEP Implementation														
◆	◆	◆	Management, Monitoring and Reporting on CEEP Implementation Efforts	Program Manager / Community Energy Manager	Y	\$ 10,000	\$ 10,000	\$ 10,000	\$ -	\$ -	\$ -	-	-	-
Resource Totals						\$ 324,500	\$ 195,833	\$ 125,000	\$ 190,000	\$ 1,230,000	\$ 2,020,000	15,325	31,687	17,215

Appendix E: Stakeholder Register

Table E-1 provides some initial ideas around stakeholders to be engaged in CEEP implementation, including their anticipated level of interest in and influence on reducing energy and GHG emissions.

Table E-1: Stakeholder Register

Target Group	Agency	Type of Stakeholder	Interest in Implementation	Influence on Implementation
Institution	RCMP	External	Low	Low - support
Institution	Delta School District	External	Medium	Medium - influence
Not-for-profit organizations	Rotary Club of Ladner	External	Low	Medium - influence
Not-for-profit organizations	Rotary Club of Tsawwassen	External	Low	Medium - influence
Not-for-profit organizations	Rotary Club of North Delta	External	Low	Medium - influence
Tenants	Tenants	External	Medium	Medium - influence
Homeowners and Stratas	Homeowners	External	Medium	Medium - influence
Businesses	Business Improvement Associations	External	Medium	High - deliver
Senior Government Agencies	Ministry of Environment	External	Medium	Medium - influence
Senior Government Agencies	Department of Fisheries and Oceans	External	Medium	Medium - influence
Businesses	Port Metro Vancouver	External	Medium	Medium - influence
Businesses	Boundary Bay Airport	External	Medium	Low - support
Senior Government Agencies	BC Ferries	External	Medium	High - deliver
Senior Government Agencies	TransLink	External	Medium	High - deliver
Senior Government Agencies	BC Rail	External	Medium	Medium - influence
Businesses	BC Greenhouse Growers	External	Low	Medium - influence
Developers	Canadian Home Builders' Association (Local Chapter) and members	External	Medium	High - deliver
Not-for-profit organizations	Community Energy Association	External	Medium	Low - support
Not-for-profit organizations	BC Sustainable Energy Association	External	Medium	Low - support
Utilities	FortisBC	External	High	High - deliver
Businesses	BC Agriculture Council	External	Medium	Medium - influence
Local Governments	Council Committees	External	High	High - deliver
Local Governments	Delta Council	Internal	High	High - deliver
Utilities	Corix	External	High	High - deliver
Businesses	Lehigh Cement	External	Medium	High - deliver