# District of West Vancouver

## CORPORATE ENERGY & EMISSIONS PLAN

# CORPORATE REPORT

KONSTANTIN DIMOPOULOS | THE BLUE TREES

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## ACKNOWLEDGEMENTS

### WEST VANCOUVER CORPORATE ENERGY & EMISSIONS PLAN

The Corporate Energy & Emissions Plan (the "Plan") is rooted in the District of West Vancouver's vision: *inspire excellence and lead by example.* The Plan aims to take action on urgent climate change mitigation imperatives while strengthening the District's long term fiscal performance and enhancing the value of its key corporate assets.


### ACKNOWLEDGEMENTS

#### District Staff

The planning process was led internally by David McKee (Corporate Energy Manager) in collaboration with John Wong (Manager of Facilities & Assets). Staff from across the organization actively contributed to the Plan, notably: Phil Bates (Manager of Engineering Services), John Calimente (Transportation Planning Analyst), Raymond Fung (Director of Engineering & Environment Services), Andy Kwan (Manager of Utilities), Peter Coles (Superintendent of Fleet & Equipment), Vanessa Garrett (Manager of Roads & Transportation), Ian Haras (Manager of Parks Operations) and Clay Nelson (Manager of Purchasing). The planning process was initiated by former staff Sandra Bicego and Brent Leigh.

#### Advisors

Boston Consulting and Enerficiency led strategic and analytical support.





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BC Hydro has provided ongoing support of corporate energy management.

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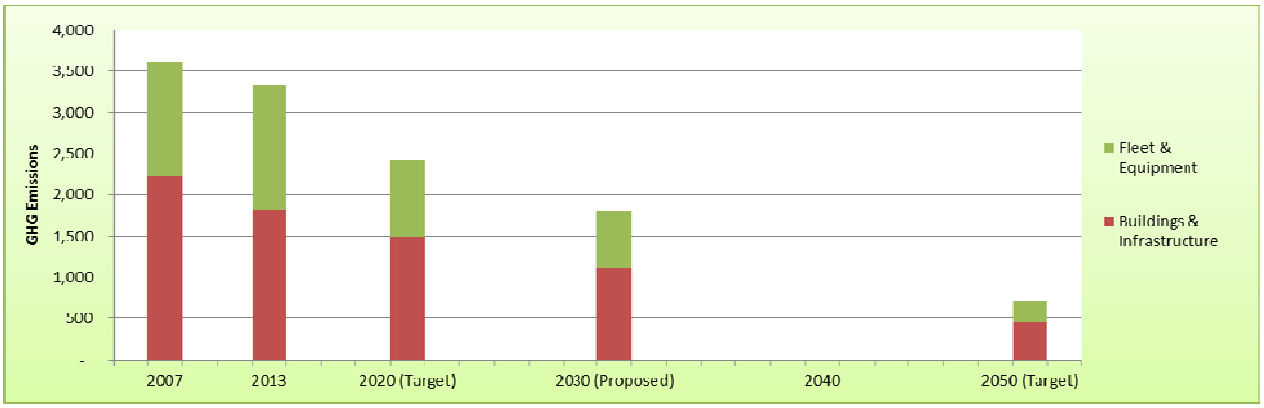
## EXECUTIVE SUMMARY

West Vancouver's vision is to *inspire excellence and lead by example*. In keeping with this vision, the District has taken a leadership role in reducing energy consumption and greenhouse gas (GHG) emissions within its own operations. This Plan supports the District's goals and commitments with regards to climate action, community sustainability and asset management; it is intended to:

- *inspire excellence and lead by example* on urgent climate change mitigation imperatives
- meet the District's commitment to the provincial-municipal Climate Action Charter
- strengthen long term fiscal performance
- enhance value of key corporate assets
- support employee opportunities to contribute to climate action and corporate sustainability
- maximize synergy with the Community Energy and Emissions Plan and complementary policy agendas
- foster interest in facility users, Council and staff to enhance the District sustainability commitment.

In 2012 the District adopted a GHG reduction target of 33% by 2020 and 80% by 2050, relative to 2007 levels. The District has had considerable success in reducing greenhouse gas emissions since 2007 in corporate operations while also increasing services. Total GHG reductions of 7.6% can be attributed to District driven conservation measures, economy-wide efficiency gains, as well as fuel changes driven by provincial policy. This is a notable achievement as there have been several new buildings constructed and considerable floor space increases since 2007. The District is one of a leading group of local governments that is 100% carbon neutral and efficiency projects initiated by the District have resulted in over $250,000 in savings since 2012.

**Table 1: DWV Corporate GHG Emissions, 2007 - 2050**




While significant progress has been made to date, the District will need to take further action to achieve its targets. This Plan has identified practical, achievable and cost effective actions to be implemented. These actions will bring the District close to its 2020 target, while laying the groundwork for future reductions. The proposed actions will result in annual GHG reductions of 750 - 850 tonnes CO2eq and energy cost avoidance of $300,000 - $350,000 annually, savings which will improve the District's bottom line.

**Table 2: Overall Implementation Budget and Expected Reductions (if all actions implemented)**

| Annual GHG Avoidance* | Annual Cost Avoidance** (in 2015$) | Estimated Implementation Budget |
|---|---|---|
| 750 - 850 tonnes CO2eq relative to 2013<br>1000 - 1100 tonnes CO2eq relative to 2007<br>(28 - 31% reduction) | $300,000 - 350,000 | $2,000,000 - 3,000,000 |

* GHG avoidance does not match sum of individual actions due to interactions and external impacts.
** Cost avoidance is a result of energy savings, minus any ongoing cost of actions.

Actions have been identified across the District's operations and include both policies and implementable projects. Many are drawn from other plans or initiatives, while others are introduced for the first time. Estimated budgets and staff responsibility are outlined and will need to be confirmed.

**Table 3: Table of Actions***

| Action | Description |
|---|---|
| **GO1** | Update the Corporate Energy and Emissions Plan for 2020 to confirm progress and establish actions beyond 2020. Include a medium term target of reducing corporate GHGs by at least 50% below 2007 levels by 2030. |
| **BI1** | Implement list of identified energy efficiency projects to reduce utility costs and energy use. |
| **BI2** | Conduct combined energy study for the Main Community/Aquatic Centres. |
| **BI3** | Work with BC Hydro and Metro-Vancouver to accelerate LED streetlight adoption and advanced controls. |
| **BI4** | Review equipment and energy use in water and wastewater pumping stations to identify energy efficiency opportunities for planned equipment upgrades. |
| **BI5** | Identify and implement additional efficiency projects in buildings and infrastructure 2018 - 2020. |
| **FM1** | Increase the percentage of bio-diesel used for fleet vehicles. |
| **FM2** | Expand driver training programs focused on fuel efficient driving. |
| **FM3** | Analyze vehicle use and route and trip planning for efficiencies in fleet operation. |
| **FM4** | Make emissions reductions part of the criteria for selecting a contracted services company. Require annual reporting on fuel consumption and actions taken to reduce emissions. |
| **RE1** | Investigate and implement renewable energy projects such as district energy, solar water heating, or geo-exchange and maximize public profile. |
| **PU1** | Increase recycled content of printing paper to 100% where possible and partial recycled content elsewhere. |
| **PU2** | Identify ways to further reduce paper consumption. |
| **SW1** | Complete and implement the corporate solid waste plan that is currently underway. |
| **WC1** | Undertake a water use inventory and opportunity assessment. Implement appropriate measures. |
| **CP1** | Establish a Corporate Green Buildings Policy for new buildings and major renovations. Includes investigation of operational savings from energy efficiency and renewable energy options. |
| **CP2** | Establish a Streetlight Policy to ensure new streetlights are energy efficient. |
| **CP3** | Establish a Green Fleet Policy that incorporates carbon and life cycle costing for new vehicles. |
| **CP4** | Include green purchasing policies within the new District purchasing policy. |
| **CP5** | Establish a Climate Action Strategic Planning Lens to manage carbon and costs. |
| **SE1** | Develop a staff engagement strategy to support conservation and climate action. |
| **CN1** | Evaluate continuation of the District's corporate carbon neutrality by developing carbon credits from investment in innovative emission reduction projects. |

***Table of Actions Abbreviations**

| Actions |
| --- |
| **GO**: Goals<br>**BI**: Buildings & Stationary Infrastructure<br>**FM**: Fleets and Mobile Activity<br>**RE**: Renewable Energy Supply<br>**PU**: Paper Use<br>**SW**: Solid Waste & Material Management<br>**WC**: Water Conservation<br>**CP**: Corporate Policies<br>**SE**: Staff Engagement<br>**CN**: Carbon Neutral Local Government |

# 1 COMMITTING TO LEAD

Green buildings, green fleets and cost effective management of corporate assets are highly visible indicators of an organization's values. West Vancouver's vision is to *inspire excellence and lead by example*. In keeping with this vision, the District has taken a leadership role in reducing energy consumption and greenhouse gas (GHG) emissions within its own operations. Through its mission statement the District strives to protect the natural environment while balancing the effective, long-term use of resources for current and future generations. The District is committed to matching the provincial government's greenhouse gas emission reduction targets across its corporate operations and has made climate action a council priority for the 2015-2018 term.

This Plan integrates and enhances commitments and actions the District has undertaken. After careful consideration, the District signed the provincial-local government Climate Action Charter and set GHG reduction targets of 33% by 2020 and 80% by 2050 through its Official Community Plan (OCP). In 2010 the District's Climate Action Working Group presented an initial Community Climate Action Plan that included recommendations for corporate operations. In 2012 a full time corporate energy manager was hired with funding assistance from BC Hydro. In 2014 a comprehensive energy and emissions management program was undertaken, including this Corporate Energy and Emissions Plan, as well a Community Energy and Emissions Plan (CEE Plan-Community).

## GOALS AND OBJECTIVES

### 1.1.1 GOALS

This Plan supports the District's goals and commitments with regards to climate action, community sustainability and asset management. This Plan is intended to:

- inspire excellence and lead by example on urgent climate change mitigation imperatives
- meet the District's commitment to the provincial-municipal Climate Action Charter
- strengthen long term fiscal performance
- enhance value of key corporate assets
- support employee opportunities to contribute to climate action and corporate sustainability
- maximize synergy with the Community Energy and Emissions Plan and other complementary policy and planning agendas
- foster interest in facility users, Council and staff to enhance the District sustainability commitment

### 1.1.2 OPERATIONAL OBJECTIVES

As considerable progress has already been made reducing corporate emissions, this Plan is focused on integration and enhancement. The Plan has several operational objectives:

- align current and baseline inventories and confirm progress to date on reducing energy consumption and emissions
- bring together related documents and actions into a single coherent plan
- identify gaps and opportunities in actions currently underway
- update targets and objectives
- establish actions for moving forward, with budgets, timeline and responsibility
- recommend best practices for ongoing measurement, reporting and updating of the Plan
- establish a policy framework to support ongoing carbon and energy management excellence.

This Plan should not be considered a one-time exercise. The focus is on a foundational policy framework and short-term actions through 2020, with longer-term goals and direction. As 2020

approaches, the Plan will need to be revisited to examine progress made towards targets and establish more concrete actions beyond 2020.

### 1.1.3 STRATEGIC OBJECTIVES

A set of strategic objectives provides specific direction to the Plan and links it to a broader set of corporate priorities beyond climate change mitigation that already have strong Council and community support. The OCP and Environmental Strategy both have objectives that address and complement climate action. To support institutional alignment, this Plan's objectives have been drawn from many existing plans.

These specific objectives are by supported by a set of indicators that can be used to guide implementation and track progress towards targets.

The existing policy references identified for each objective may be found in Appendix 1. Indicators are provided for each objective, as well as the actions which help achieve the objective. Actions are in Section 3.

**Table 4: Corporate Objectives**

| Objective | | Indicators | Supporting Actions* | Existing Policy References (see Appendix 1 for objectives) |
|---|---|---|---|---|
| **1** | Lead by example | • # of showcase projects<br>• # of public communications<br>• # of corporate/community partnerships | BI3, FM2, RE1 | OCP (O3, O7), Env. Strategy (E1) |
| **2** | Increase staff awareness | • # staff awareness sessions | FM2, SE1, CP5 | Env. Strategy (E3, E55) |
| **3** | Develop a regular report for indicators of sustainability | • Initial indicators will be corporate GHGs, annual fleet kilometres, office paper usage, a solid waste summary, and building energy use. | IN1, TA1 | OCP (O8, O12) |
| **4** | Reduce buildings and infrastructure energy consumption | • annual energy savings | BI1, BI2, BI3, BI4, BI5 | OCP (O9), Env. Strategy (E2) |
| **5** | Construct new buildings and infrastructure with energy efficiency beyond code requirements | • adopt green buildings policy | CP1, CP2, CP5 | OCP (O6), Env. Strategy (E2) |
| **6** | Increase the use of renewable energy | • % of energy from renewable sources<br>• # of renewable energy projects | RE1, FM1 | OCP (O7) |
| **7** | Increase fleet efficiency | • average fleet L/100km | FM2, FM3, CP3 | Env. Strategy (E4) |
| **8** | Reduce fleet kilometres travelled | • total fleet kilometres | FM3, CP5 | (OCP) O4, O11 |
| **9** | Reduce paper consumption and increase recycled content | • total kg of paper purchased<br>• average % recycled content | PU1, PU2, CP4 | OCP (O10) |
| **10** | Reduce solid waste | • total mass of solid waste sent to landfill | SW1, CP4 | OCP (O10) |

***Legend for Corporate Objectives Policy and Action Abbreviations**

| *Supporting Action | |
|---|---|
| **TA**: Targets \| Section 1.1.4<br>**IN**: Inventory \| Section 2.1.3<br>**BI**: Buildings & Stationary Infrastructure \| Section 3.1<br>**FM**: Fleets and Mobile Activity \| Section 3.2<br>**RE**: Renewable Energy Supply \| Section 3.3<br>**PU**: Paper Use \| Section 3.4 | **SW**: Solid Waste & Material Management \| Section 3.5<br>**WC**: Water Conservation \| Section 3.6<br>**CP**: Corporate Policies \| Section 3.7<br>**SE**: Staff Engagement \| Section 3.8<br>**CN**: Carbon Neutral Local Government \| Section 3.9 |

## 1.1.4 TARGETS

The District adopted GHG reduction targets in 2012, as required under provincial legislation. These targets are as follows:

> *The District of West Vancouver commits to reducing our greenhouse gas emissions by at least 33% below 2007 levels by 2020 and at least 80% below 2007 levels by 2050.*

These targets were established as "*aspirational*" targets, meaning they were adopted without a detailed assessment of how reductions would be achieved and in the order of magnitude necessary to equitably contribute to collective climate stabilization efforts. It was anticipated that actions would be selected to achieve the "*aspirational*" targets. The District remains committed to these targets and based on progress to date (see *"Taking Stock"* below) is within reach of meeting the 2020 target in its corporate operations.

Although the short-term target, 33% reductions from 2007 by 2020, is a challenge, focused commitment will allow this target to be met corporately. Meeting this target will *inspire excellence and lead by example* for community reductions. With commitment and planning, the long term target, 80% reductions by 2050, is conceivable given current understanding of finance, asset management and technological change.

As the 2020 horizon approaches, medium-term targets and actions are necessary to guide direction. Extrapolating between the 2020 and 2050 targets provides a 2030 target of 50%, which it is recommended that the District adopt. Targets for 2030 in the two main sectors, buildings and fleet, should also be developed.

**Table 5: Recommended Actions – Targets**

| Action | |
|---|---|
| **GO1** | Update the Corporate Energy and Emissions Plan for 2020 to confirm progress and establish actions beyond 2020. Include a medium term target of reducing corporate GHGs by at least 50% below 2007 levels by 2030. |

### Climate Science and Policy

A major impetus for West Vancouver's Corporate Energy and Emissions Plan falls out of the BC Government's commitment to reduce provincial GHG emissions 33% below current levels by 2020 and 80% by 2050. These targets and timetables reflect a dominant interpretation of Intergovernmental Panel on Climate Change scientific analysis of the level of commitment necessary by high carbon jurisdictions to stabilize the atmosphere and prevent dangerous, run-away climate change.[1] This science has driven similar targets and timetables across countries in Europe, many sub-national governments in North America, as well as thousands of local governments around the world. The Federal Government is currently updating its targets and developing a coherent plan to achieve them. In many jurisdictions policy, planning and implementation is well underway.

To begin progress towards its targets, the BC government initiated a wide range of actions, notably relevant for local governments:

- major *BC Building Code* updates in 2008 and 2013, situating BC amongst Canada's leaders in building energy efficiency.
- a *Climate Action Charter* signed jointly in 2007 by the BC Government and hundreds of BC municipalities, including the District of West Vancouver. Amongst other goals, local governments would take action to become "carbon neutral with respect to their operations," and create "complete, compact, more energy efficient rural and urban communities"
- the Climate Action Revenue Incentive Program (CARIP) is a grant equivalent to the size of carbon tax paid by a municipality in its corporate activity conditional on signing and working towards Charter commitments, and measuring and reporting on corporate and community GHG activity and actions. The District receives approximately $80,000 annually in its CARIP grant
- a 2007 legislative requirement for Official Community Plans to include "…targets for the reduction of GHGs… and policies and actions... [for] achieving those targets." This was a major impetus for the West Vancouver's new Community Energy and Emissions Plan.

West Vancouver amended its OCP in 2010 to match the BC Government's targets and developed a Community Energy and Emissions Plan, parallel to this Corporate Energy and Emissions Plan, to meet its commitment.

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

### Local Impacts and Adaptation

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

The consequences for West Vancouver are significant. West Vancouver's identity is intimately tied to a natural context that supports social, economic, cultural, recreational, and public health priorities. Climate change is altering this natural context. Impacts being experienced or projected include:

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

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

This Corporate Energy and Emission Plan, recent progress on managing greenhouse gas emissions across its operations and completely offsetting its corporate emissions with community emission reduction initiative places the District amongst a leading group of carbon neutral local governments in BC. The Community Energy and Emissions Plan, undertaken parallel to this Corporate Plan, will guide further leadership on climate change mitigation by the District, implementation partners, residents and businesses.

## 2 TAKING STOCK

This section focuses on current energy and emissions activity and management actions. The GHG calculations were modelled using the consumption and accepted emission factors for various energy types used in West Vancouver's operations and are detailed in Appendix 2.

### INVENTORY: 2007 AND 2013

Since 2007 the District has had considerable success in reducing greenhouse gas emissions, in spite of increased services. Total GHG reductions of 7.6% can be attributed to District driven conservation measures, economy-wide efficiency gains, as well as fuel changes driven by provincial policy. This is a notable achievement as there have been considerable floor space increases from new buildings constructed in the past 25 years. These include the Main Community Centre building (2009), Fire Hall #2 (2005) and the Gleneagles Community Centre (2003). All of the facilities were built to high efficiency standards which, combined with additional reduction efforts, have managed to stabilize energy consumption and reduce emissions.

The majority of emissions are a result of energy use in buildings and infrastructure, particularly natural gas. While energy use in buildings has remained the same, there has been a shift from natural gas to electricity, partly through the use of heat pumps. Since electricity has a lower emissions factor than natural gas and heat pumps are highly efficient, this has resulted in a significant 16% drop in building emissions. The reduction has been helped by a lower emissions factor for electricity from BC Hydro, which has fallen from 25 to 14 tonnes CO2eq/GWh between 2007 and 2013.

Vehicle energy and emission activity is considerably smaller. Energy consumption has increased somewhat since 2007, rising 11%. Vehicle emissions have risen slightly less than energy consumption due to the use of ethanol in gasoline, although offset slightly by a reduction in the amount of bio-diesel being used following a period of testing.

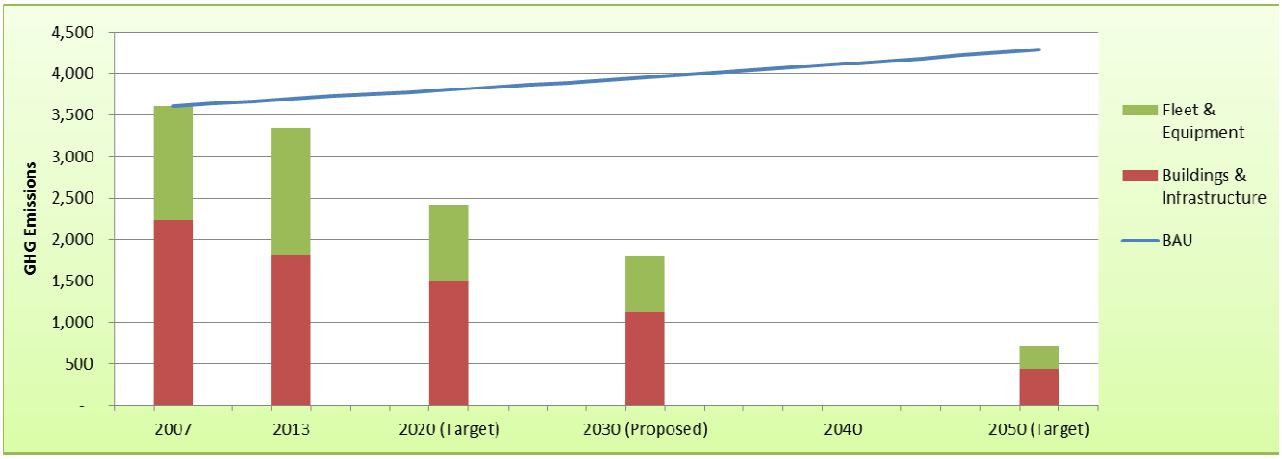
**Table 6: DWV Corporate Energy and Emissions, 2007 and 2013**

| Sector | 2007 | | 2013 | | Change Since 2007 | |
|---|---|---|---|---|---|---|
| | GJ | Tonnes CO2eq | GJ | Tonnes CO2eq | GJ | Tonnes CO2eq |
| **Buildings & Stationary Infrastructure** | **77,726** | **2,231** | **76,866** | **1,825** | **-1.1%** | **-18.2%** |
| Electricity | 38,426 | 267 | 43,912 | 176 | 14.3% | -34.2% |
| Natural Gas | 39,300 | 1,965 | 32,954 | 1,649 | -16.1% | -16.1% |
| **Fleet & Mobile Activity** | **20,155** | **1,379** | **22,285** | **1,512** | **10.6%** | **9.6%** |
| Gasoline | 8,940 | 617 | 8,702 | 578 | -2.7% | -6.4% |
| Diesel | 11,215 | 762 | 13,584 | 934 | 21.1% | 22.6% |
| **Total** | **97,882** | **3,611** | **99,151** | **3,336** | **1.3%** | **-7.6%** |

N.B. This inventory reflects BC Carbon Neutral requirements. Additional sectoral coverage i.e. paper, solid waste and water are discussed below.

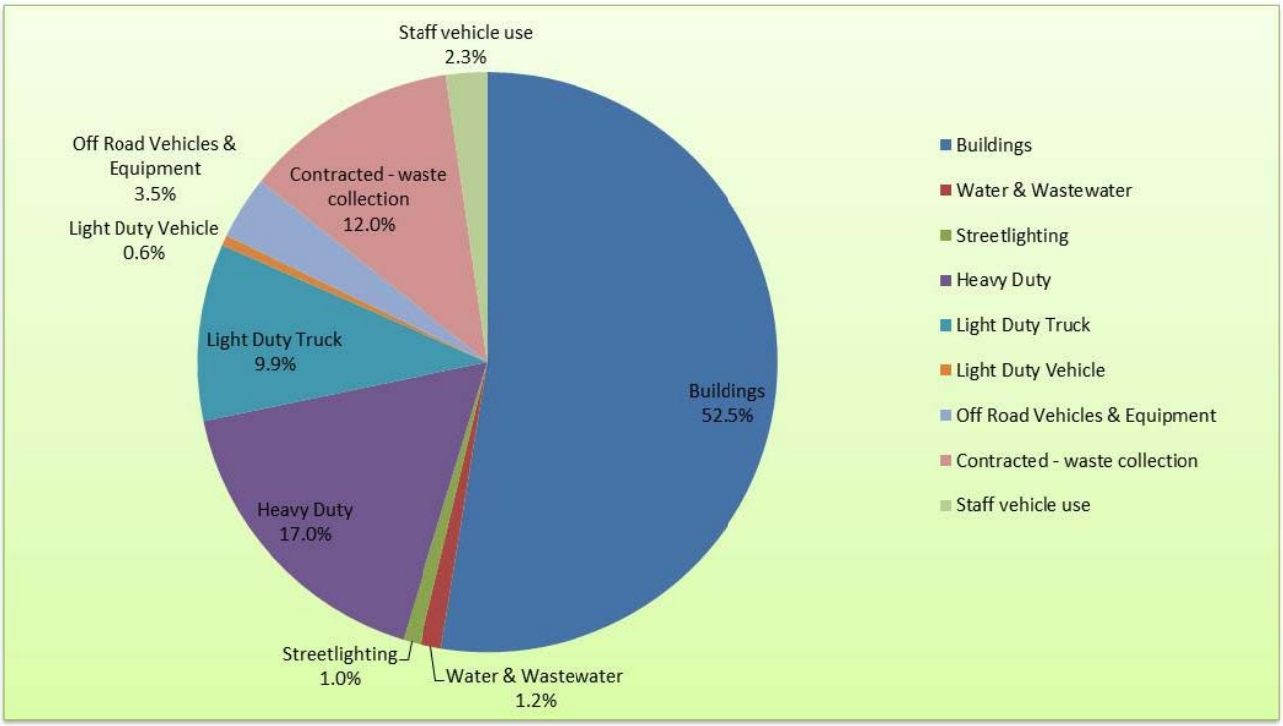
The District's carbon neutral commitment offsets 100% of these emissions through collaboration with other local governments in sustainable solid waste management, and avoided forestry emissions from Whyte Lake Park protection, see *Carbon Neutral Local Government* below.

**Figure 1: DWV Corporate GHG Emissions, 2007 - 2050**




Note: Business as Usual (BAU) projection based on population growth of 0.4%.

**Figure 2: Breakdown of 2013 GHG Emissions by Sub-sector**



### 2.1.1 PROGRESS TO DATE

While emission reductions are not fully on track to meet 2020 targets (7.6% reduction at roughly the half-way point), progress is considerable given most climate actions did not get underway until 2010 and large projects take time to implement. However, future reductions will require more significant savings in energy consumption, as further improvements to emissions factors are expected to be smaller.

### 2.1.2 ENERGY COSTS

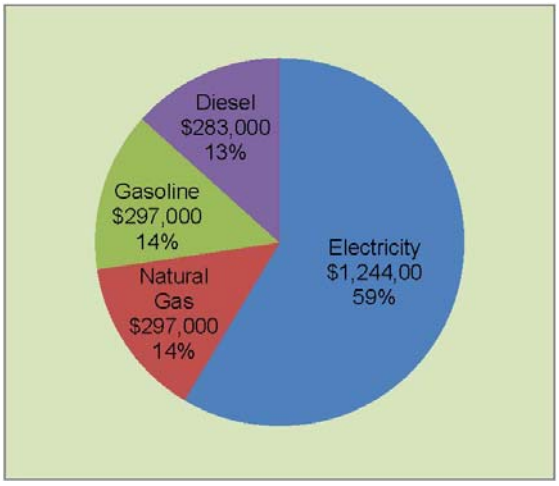
While the Plan's focus is on *GHG emissions* and *energy consumption*, *energy spending* is an important consideration. While community emissions reduction strategies may offer diverse benefits to residents and businesses, corporate reductions can result directly in reduced operational spending for the District. This means that the cost of implementing actions can be paid back over time through lower energy bills. It also means that some actions that do not result in large emissions reductions may still have attractive paybacks, depending on the cost of fuel. Likewise, fuel switching to reduce emissions may result in higher operating costs.

Electricity accounts for most of the energy cost, even though it results in relatively small emissions. Natural gas accounts for more than half of emissions but only 14% of energy spending. However, natural gas prices are subject to greater market volatility exposing the District to significant unpredictability for annual operating budgets and overall cost.

**Table 7: DWV Corporate Energy and Cost Breakdown, 2013**

| Sector | Fuel Type | Energy Consumption (GJ) | % | Energy Cost ($) | % |
|---|---|---|---|---|---|
| **Buildings & Stationary Infrastructure** | Electricity | 43,912 | 44.3% | $1,244,000 | 58.7% |
| | Natural Gas | 32,954 | 33.2% | $297,000 | 14.0% |
| **Fleet & Mobile Activity** | Gasoline | 7,579 | 7.6% | $297,000 | 14.0% |
| | Diesel | 7,688 | 7.8% | $283,000 | 13.3% |
| **Total** | | **99,151** | **100%** | **$2,120,000** | **100%** |

**Figure 3: Energy Cost Breakdown, 2013**



### 2.1.3 OTHER SECTORS

The official corporate inventory is based on the Carbon Neutral Local Government (CNLG) guidelines set out by the BC Government. Under CNLG, some sectors do not need to be included in the inventory, yet are important to measure and take action on. The District has direct control over some of these sectors and actions are essential to contribute to climate change stabilization and meet the Plan's broader social and economic objectives.

Two sectors which are not required under CNLG but are often included by other organizations are paper use and solid waste. Paper consumption emissions are required for public sector organizations (e.g. schools, hospitals) while solid waste is required to be included under the Federation of Canadian Municipalities' Partners for Climate Protection (PCP) program.

**Table 8: GHG Emissions - Paper**

| Sector | Avg. recycled content % | # Packages | Tonnes CO2eq | Cost |
|---|---|---|---|---|
| Paper - 2013 | 39.2% | 4,135 | 20.5 | $16,197 |

**Table 9: GHG Emissions – Solid Waste**

| Sector | Mass (kg) | Tonnes CO2eq[2] | Cost |
|---|---|---|---|
| Solid Waste - 2013 | 320,023 | 152 | $54,000 |

Water consumption can affect GHG emissions as most of the portion of the water used as domestic hot water is heated with natural gas. From an impact point of view recent drought conditions around BC have emphasized the connection between water supply and climate change, and encouraging water conservation encourages a broader conservation ethic.

**Table 10: GHG Emissions – Water**

| Sector | Total Consumption - ($m^3$) |
|---|---|
| Water (buildings) - 2014 | 68,219 |

CNLG does not require policing services to be included. While the Police Department operates independently, the District has some influence over emissions from police department buildings and vehicles. This data should be collected and tracked for information purposes.

**Table 11: Recommended Actions: Inventory**

| Action | |
|---|---|
| **IN1** | Continue to track and report regularly on indicators and progress for all sectors, including sectors not required under CNLG guidelines, i.e. paper, corporate waste, and water. |

[2] Emissions from solid waste calculated at 0.474 tonnes CO2eq per tonne mass, based on 2010 CEEI community solid waste emissions for West Vancouver.

## DISTRICT LEADERSHIP - ALREADY CUTTING CARBON AND COSTS

While the District has not had a comprehensive carbon management plan, this has not prevented action. The District is one of a leading group of local governments that is 100% carbon neutral, and energy management projects initiated by the District have resulted in over $250,000 in savings since 2012. Recent new buildings have been constructed to high levels of efficiency, achieving LEED Gold and Silver certifications.[3] A number of significant building retrofits have been undertaken, and audits and plans are in place to continue this retrofit agenda. Renewable energy is being used in fleet vehicles and generated through District infrastructure. Campaigns have raised staff awareness and action in energy conservation, smart vehicle operation, and recycling. The following list highlights key corporate actions taken to date:

**Table 12: Corporate Action Highlights to 2015**

| Action |
|---|
| West Vancouver Aquatic Centre – geo-exchange heating system, LEED Gold rating. |
| Gleneagles Community Centre – designed with sustainable features – "2030 Challenge". |
| West Vancouver Memorial Library – received LEED EBOM (Existing Buildings: Operations and Maintenance) Silver in 2011. |
| The Eagle Lake Water Filtration Plant (2011) incorporated several LEED design standards. |
| Fortis BC assessments performed for four buildings in 2011, and a natural gas energy study performed on the Aquatic Centre in 2015. |
| Energy Efficiency Projects: Aquatic Centre Pool lighting retrofitted to LED, Operations Centre lighting retrofits, Seniors' Activity Centre lighting upgrades, Ice Arena lighting upgrades and occupancy sensors. |
| Water metering introduced in 2007, allowing enhanced leak detection and reduced water pumping energy. |
| Eagle Lake generating station has been set up to feed energy back into the BC Hydro grid |
| Study of potential electricity generating stations at Pressure Reducing Valve (PRV) sites across the District's water supply system. |
| 10% ethanol use (above provincial mandate of 5%). |
| Installation of six EV charging stations at three corporate sites – available to both public and staff. |
| Green fleet policies (e.g. anti-idling policy) for District vehicles. |
| Over 40% average recycled content for paper purchases. |
| Corporate solid waste management plan (draft 2016). |
| Staff awareness campaigns - Turn It Off Challenge (2013), Close The Window Campaign (2013), Sweater Day (2014/15), Paper Towel Campaign (2014), Paper Cup Reduction Pledge (2015). |
| Dedication of Whyte Lake as a park led to the protection of a forested area and generation of carbon credits that will be used to achieve corporate carbon neutrality for several years. |

[3] LEED (Leadership in Energy and Environmental Design) is a rating system that certifies advanced performance in buildings.

This Plan features a number of Climate Action vignettes that illustrate the District's success to date in reducing greenhouse gas emissions.

### Climate Action Vignette - Aquatic Centre Efficiency Improvements

LED lighting - After an assessment of electricity for lighting at the aquatic centre, the corporate energy manager saw many opportunities to move to more efficient LED lights. After initial testing, all underwater pool lights were converted from 500 W halogens to 80 W LEDs followed by conversion of the main pool overhead lights from 400 W to 160 W. These resulted in electricity savings of 150,000 kWh and $10,000 annually.

### Climate Action Vignette - Building Automation Controls

Heating and cooling of larger buildings are controlled with computerized systems. When the maintenance department and the energy manager teamed up to find efficiencies in schedules and temperatures after hours, the result was a 40% drop in natural gas use, annual cost reduction of $5,000 and an annual 50 tonne reduction in GHG emissions for the Municipal Hall.

### Climate Action Vignette - Electric Vehicle

The need for a new vehicle, the availability of a provincial grant and a desire to reduce emissions all came together and the engineering department purchased the District's first electric road vehicle in 2015. It displaces almost all of the GHGs that would have been burned by purchasing a standard vehicle and also lowers operating costs. An average light duty vehicle would burn 3,000 L of gas per year so an electric vehicle for that travel reduces GHGs by 7 tonnes annually and $3,000 in fuel costs. While electric cars tend to be more costly, savings in fuel and maintenance brings down life cycle costs to approximately the same of a comparable internal combustion engine vehicle.

### Climate Action Vignette - District Bike Fleet

Employees have traditionally travelled by car between the main community centre and nearby municipal hall for meetings. Parks, culture and community services staff came up with the idea to purchase second hand bikes and provide them as alternatives to driving. With the help of a former bike shop mechanic who works for the engineering department a couple of bikes were purchased and made ready for staff, cutting a large number short car trips and contributing to employee health and productivity.

# 3 ADVANCING ACTION

This section focuses sector by sector on new actions to advance energy and emission management:

1. Buildings & Stationary Infrastructure
2. Fleet & Mobile Activity
3. Renewable Energy Supply
4. Paper Use
5. Solid Waste & Material Management
6. Water Conservation
7. Corporate Policies
8. Staff Engagement
9. Carbon Neutral Local Government

## BUILDINGS & STATIONARY INFRASTRUCTURE

### 3.1.1 BUILDINGS

Buildings account for most of the District's energy consumption and GHG emissions and where most reduction actions have accrued. As part of the funding agreement with BC Hydro, the corporate energy manager produces a Strategic Energy Management Plan (SEMP) each year. This SEMP outlines the status of current energy management actions and recommended actions going forward across the District's facilities, with budgets and timelines.

As the SEMP provides a detailed energy plan for buildings, the primary action in this sector is implementation and enhancement of the SEMP. Key projects identified in the SEMP include:

- LED lighting conversions
- weekend computer shutdown
- pool exhaust heat recovery
- building controls upgrades and re-commissioning
- building envelope sealing and weather stripping
- low flow shower head and faucet installations
- capital replacement projects for key boilers and HVAC units.

The SEMP only identifies projects through mid-2018 as required by BC Hydro. However, additional measures will need to be identified beyond this date in order to continue to reduce energy use and meet the District's targets.

The SEMP identifies projects in the West Vancouver Community Centre site - which includes the Main Community Centre, Aquatic Centre, Arena, and Seniors' Activity Centre which range in ages. A small scale study for the Aquatic Centre took place but no comprehensive investigation of the complex has been undertaken. One key feature of a study would be examination of opportunities to reclaim waste heat for pool heating. Conducting a thorough energy study of the complex by a qualified consultant would deepen conservation opportunities. BC Hydro and/or Fortis BC funding would likely be available to help cover the cost of such a study.

### 3.1.2 STREETLIGHTS

Streetlights and traffic lights account for about 12% of the District's electricity consumption. Though electricity for all streetlights is paid by the District, many streetlights are actually rented from BC Hydro. This makes improving efficiency difficult, as BC Hydro has not yet begun to undertake wide-ranging retrofits. Increased pressure from local governments may help accelerate upgrades.

Traditionally streetlights have used high intensity discharge light sources but the industry is rapidly moving to LED. Traffic lights have already been converted to LED, and some are now being upgraded a second time to more efficient LEDs. With LED light sources, streetlights also have more opportunities for advanced controls, such as reducing light levels in early morning hours. This is being investigated by the Engineering Department.

### 3.1.3 WATER AND WASTEWATER INFRASTRUCTURE

Water and wastewater infrastructure accounts for about 28% of electricity consumption. This is primarily pumping energy. Although some pump systems, particularly any that are throttled to reduce flow, may have good opportunities for energy savings, others may not have room for improvement. Undertaking a comprehensive energy review of the water and wastewater systems will help identify what improvements could be made. BC Hydro could provide funding for a pumping systems audit.

The District is currently undertaking a drinking water master plan to be completed in 2016. Any energy audit of water systems should take place once the master plan is completed, as the operation of some stations may be revised.

**Table 13: Buildings & Stationary Infrastructure - Recommended Actions Summary**

| Action | |
|---|---|
| **BI1** | Implement identified energy efficiency projects listed in SEMP to reduce utility costs and energy use. |
| **BI2** | Conduct combined energy study for the Main Community/Aquatic Centres. |
| **BI3** | Work with developers, BC Hydro, Metro-Vancouver and neighbouring municipalities to accelerate adoption of LED streetlights and advanced controls, and ensure LED streetlights are used in all new developments. |
| **BI4** | Review equipment and energy use in water and wastewater pumping stations to identify energy efficiency opportunities for planned equipment upgrades. |
| **BI5** | Identify and implement additional energy efficiency projects in buildings and infrastructure. |

## FLEET & MOBILE ACTIVITY

Although the fleet only consumes 20% of energy, it contributes over 40% of GHG emissions due to the high emissions factors of gasoline and diesel. Since 2007 vehicle emissions have increased slightly due to the reduction in bio-diesel use. This has been somewhat offset by use of gasoline with 10% ethanol.

### 3.1.4 VEHICLE EFFICIENCY AND USAGE

Municipalities often have difficulty in reducing vehicle emissions, as efficiency is often limited by vehicle requirements. Recent federal legislation has mandated significantly more efficient vehicles to be sold in Canada, for both light and heavy vehicles. This means the District's fleet will improve over time as vehicles are retired and replaced with more efficient ones. Turnover alone should improve fleet efficiency by about 10% by 2020. This improvement can be helped by choosing the most fuel efficient vehicles whenever possible (see *Corporate Policies,* below).

Maximizing fleet emissions reductions requires a clear understanding of vehicle efficiency and use. Tracking fuel efficiency of individual vehicles can help identify which vehicles are performing poorly and should be replaced. Vehicle kilometres will help identify underutilized vehicles that can be assessed for viability for replacement with alternatives (such as car-shares or electric vehicles), improving fleet cost-effectiveness. The District has the appropriate systems in place to collect this information and should begin reporting on both individual vehicle and fleet kilometres and fuel efficiency.

Common driving habits such as rapid acceleration, speeding, and intensive braking can result in significantly higher fuel consumption. The District conducted some staff engagement around driving practices, particularly in the area of anti-idling, but further driver training programs could help reduce consumption while also reducing vehicle maintenance requirements. In addition to driver training, there are technical measures that can be taken to improve driving habits, such as speed limiters and fuel consumption feedback to the driver. The District is looking to participate in a driving monitoring study through Metro Vancouver that would provide information on both community and corporate driving habits.

The District has location capability available for several of its vehicles that could be used to help improve vehicle dispatching and for emergency callouts. Enhanced route planning can also help reduce the kilometres driven on regularly scheduled routes. Scheduling and coordinating tasks can help reduce the number of trips required or the number of vehicles used. Staff may be able to carpool to job sites, or avoid return trips to the works yard.

### 3.1.5 VEHICLE FUELS

Most District vehicles use either gasoline or diesel. Both have some renewable fuel content as legislated by the provincial government (10% ethanol in gasoline, 5% bio-diesel in diesel). The District undertook a pilot using up to 20% bio-diesel, but stopped after an isolated problem with fuel contamination. Although fuel quality must be carefully monitored, a return to higher bio-diesel is being trialed and will help reduce emissions. The District also has some vehicles that can use E85 (85% ethanol) fuel, and there may be opportunities to increase ethanol for these vehicles. (Note: The feedstock, origin and processing of a fuel can have a significant effect on the level of environmental benefit. These considerations should be evaluated prior to any transition.)

The District has purchased a limited number of hybrid and electric vehicles (EV) and taken advantage of the provincial electric vehicle incentive. This is supported with the installation of EV charging stations by the District at key facilities. This technology switch not only reduces

emissions and operating costs, but shows leadership and support for community-wide vehicle electrification. Most cars and some light trucks and vans will be candidates for replacement by electric alternatives, depending on kilometres driven. To support change in fleet technology and efficiency, the District should set emission reduction targets for its fleet for 2020 and 2030.

The District also used compressed natural gas (CNG) vehicles in the past, but stopped due to technical and cost issues. Natural gas fleet vehicles are currently growing in popularity, with improved technology and low natural gas prices. There is currently no public CNG fuelling station in West Vancouver and the cost of building one is very high. But there may be opportunities to partner with other organizations that would be interested in using CNG vehicles. Potential partners include Blue Bus/Translink, waste management companies, gas station operators, and other North Shore municipalities.

### 3.1.6 CONTRACTED SERVICES

Traditional contracted services are included in local government inventories. For the District this includes residential waste collection, which accounts for one-third of fleet emissions and 14% of overall emissions. While it might seem difficult to control emissions from a private company, the District has considerable influence. Company efforts to reduce emissions can become one of the criteria in selecting a waste management company. Many waste management companies have been pro-actively reducing their emissions by using alternative fuels, more efficient vehicles, and careful route planning, motivated by corporate sustainability and bottom-line objectives. For example, the current recycling contractor has purchased several CNG trucks for its fleet.

**Table 14: Fleet & Mobile Activity - Recommended Actions Summary**

| Action | |
|---|---|
| **FM1** | Increase the percentage of sustainable bio-diesel used in fleet vehicles. |
| **FM2** | Expand driver training programs focused on fuel efficient driving. |
| **FM3** | Analyze vehicle use and route and trip planning for efficiencies in fleet operation. |
| **FM4** | Make emissions reductions part of the criteria for selecting a contracted services company. Require annual reporting on fuel consumption and actions taken to reduce emissions. |

## RENEWABLE ENERGY SUPPLY

The District already has a number of renewable energy systems, including geo-exchange at the West Vancouver and Gleneagles Community Centres, and the Eagle Lake C2 Micro-Hydro Turbine. The District can take a leadership role by continuing to install renewable energy supply where appropriate. Renewable energy is becoming increasingly common, although high upfront costs remain a barrier.

The most likely renewable energy supplies in the District at this time are geo/ocean exchange, solar energy, and micro-hydro power generation from pressure reducing stations.

Best incorporated into new buildings, *geo-exchange* extracts heat from the earth using heat pumps. Usually a large site area is required for the ground fields, although they can be used in urban areas. If close by, the ocean can take the place of the earth as the source of heat, with lower cost and space requirements.

*Solar thermal* is used to heat hot water, most often for year round loads such as domestic hot water or swimming pools. *Solar photovoltaics* generate electricity from the sun and have seen a surge of interest recently as prices have plummeted. While historically very expensive, paybacks may now be comparable to solar thermal. Pools are an ideal load, as the water temperature is relatively low, and the Aquatic Centre might be a good candidate.

Water system pressure reducing valves (PRVs) can sometimes be used as *micro-hydro* generating stations. The C2 Turbine is an example of this. Once the water master plan is complete new locations should be investigated in more detail.

**Table 15: Renewable Energy Supply - Recommended Actions Summary**

| Action | |
|---|---|
| **RE1** | Investigate and implement renewable energy projects such as district energy, solar water heating, or geo-exchange and maximize public profile. |

## PAPER USE

Although paper is not included in the provincial Carbon Neutral inventory or the FCM corporate inventory, it is an area with emission reduction potential over which the District has control over. Emissions from paper depend on consumption volumes and post-consumer recycled (PCR) content. Currently (2013) the District is using a mix of paper, ranging from no PCR content to 100%, with an average of 41%. It should be possible to increase PCR content for much of the paper used, with the potential to reduce emissions by 20% or more.

The District has recently introduced a two-sided printing policy and is starting to replace some paper towel dispensers with hand dryers. Continuing to look for ways to reduce paper consumption and increased employee awareness will help reduce paper emissions, contribute to the District's waste and material management goals, and improve record keeping and document management systems.

**Table 16: Paper Use - Recommended Actions Summary**

| Action | |
|---|---|
| **PU1** | Increase recycled content of printer paper to 100% where possible and partial recycled content elsewhere. |
| **PU2** | Identify ways to further reduce paper consumption, including advanced digital record and document management. |

## SOLID WASTE AND MATERIAL MANAGEMENT

Like paper, corporate solid waste is not directly included in the provincial Carbon Neutral inventory but contracted fuel emissions are included. However corporate solid waste is part of the FCM corporate inventory. High impact opportunities are the diversion of organics from the solid waste stream. A corporate solid waste plan is currently being developed, which will seek to understand current solid waste streams and identify opportunities to reduce corporate waste. Through education related to the development of recycling programs, waste diversion has been become a common form of conservation practiced in communities. Ensuring waste diversion is available at corporate facilities results in less waste and allows staff and the community to maintain their behaviours practiced at home that contribute to conservation, and deepen the District's leadership in solid waste and material management across the community.

**Table 17: Solid Waste and Material Management – Recommended Action Summary**

| Action | |
|---|---|
| **SW1** | Complete and implement the corporate solid waste plan currently underway. |

## WATER CONSERVATION

Water conservation is an important component of corporate sustainability, and one in which the District has direct control and receives the benefit of reduced operating costs through water conservation.

To effectively reduce water use, a clear understanding of where water is being consumed and where opportunities lie is necessary. As District sites all have water meters, a detailed water inventory and opportunity assessment should be undertaken. Some of the areas of potential water savings include:

- low-flow toilets, faucets and showerheads
- automatic urinal tanks
- irrigation systems
- vehicle washing
- water leaks
- rainwater collection.

**Table 18: Water Conservation – Recommended Action Summary**

| Action | |
|---|---|
| **WC1** | Undertake a detailed water use inventory and opportunity assessment, and implement appropriate measures. |

## CORPORATE POLICIES

Effective corporate policies are important to the short and long term success of the Plan. Decisive policies make Council's intentions clear to staff and provide a rationale for taking action or requesting and soliciting funds to implement projects. They also provide continuity as staff and Councils change.

Many such policies manifest themselves in ways that clearly communicate the District's commitment to climate action, notably green buildings and green cars. These assets are highly visible indicators of corporate values and very effective ways to *inspire excellence and lead by example.*

While some policies are in already place to support climate action, there are several areas where additional policies should be considered:

**Green Buildings Policy**. While recent buildings constructed by the District have been built to high levels of efficiency, there is no policy requirement in place. A new *green buildings policy* would provide clear guidance to staff. While most new building policies reference a recognized standard (e.g. LEED or a specified energy intensity), the policy could also include such things as absolute energy consumption targets (e.g. per cent less than the building being replaced), preferred fuels, renewable supply, or funding commitment for cost effective measures, end of trip bike facilities, and visitor bike parking, preferred parking for EVs and carpools. This is key to ensuring costs and emissions related to utilities are limited for the life of the building.

**Streetlight Policy**. A streetlight policy would require all new streetlights to be LED and could also include a requirement for automatic controls. As most *new* streetlights are put in by developers, this would need to be a bylaw as well as a corporate policy. It may be combined with other relevant policies such as a *dark sky policy*.

**Green Fleet Policy**. Although staff currently considers fuel efficiency when purchasing new vehicles, it is not a specific criterion rather, it is at the fleet superintendent's discretion and budget availability. A vehicle replacement policy would set guidelines for new vehicles, including fuel efficiency, and could be part of a broader purchasing criteria based on full life cycle costing. A green fleet policy may address broader approach to staff mobility that incorporates vehicle right-sizing, a District car-share account, a District bike fleet, and/or electric scooters/bikes.

**Sustainable Purchasing Policy**. Adopting a green purchasing policy was an action in the 2005 Environmental Strategy but has not yet been fully implemented. The District is now updating its overall purchasing policy and guidelines, which will be a good time to incorporate green purchasing components. These might include references to Energy Star or other efficiency standards, recycled content, and life cycle costing.

**Climate Action Strategic Planning Lens:** Taking comprehensive, coherent action on novel agendas like climate change is challenging. Forging a low carbon pathway requires a course correction to traditional public policies at all levels of government. Fortunately, at the local level in the community, the co-benefits can be immense, and corporately, there are typically big life cycle

savings. A climate action strategic planning lens can support decision making that manages costs and carbon and may eventually introduce risk management for climate change impacts. The lens could require carbon and life cycle costs to be calculated in major policy agendas and planning processes, and consideration of management options and alternative approaches to meeting policy objectives. The lens could shape important procurement and tendering processes, e.g. solid waste and material management pick up. Analysis could be phased in, starting with coarse qualitative analysis and becoming more quantitative.

**Table 19: Corporate Policies – Recommended Actions**

| Action | |
|---|---|
| **CP1** | Establish a Corporate Green Buildings Policy for new buildings and major renovations. Includes investigation of operational savings from energy efficiency and renewable energy options. |
| **CP2** | Establish a Streetlight Policy to ensure new streetlights are energy efficient. |
| **CP3** | Establish a Green Fleet Policy that incorporates fuel efficiency and life cycle costing to manage vehicle replacements. |
| **CP4** | Include green purchasing policies within the new District purchasing policy. |
| **CP5** | Establish a Climate Action Strategic Planning Lens to manage carbon and costs. |

## STAFF ENGAGEMENT

The Energy Manager worked closely with the consultant to provide data and coordinate meetings with key staff. Input was compiled and ultimately reviewed by relevant departmental managers. The consultation period occurred between April 2015 and July 2016.

Engaging staff in changes and having positive behaviour modeled by senior managers around technical improvements or policy rollouts will strengthen the impact of new efforts. Demonstrating the organization's commitment to a sustainable workplace can attract and retain employees as sustainability grows in importance. Consideration should be given to integrating sustainable values and practices into HR policy.

A variety of communication channels should be used to promote corporate sustainability and information on successes should be shared with the community.

**Table 20: Staff Engagement – Recommended Action**

| Action | |
|---|---|
| **SE1** | Develop a staff engagement strategy to support conservation and climate action. |

## CARBON NEUTRAL LOCAL GOVERNMENT

The District's voluntary Climate Action Charter carbon neutral commitment requires "offsetting" remaining corporate emissions by an equivalent reduction in emissions from other activities. The District has joined a small group of local government climate leaders fully meeting this carbon neutral pledge.

### Offsets, Carbon Neutral Government, and Climate Action Reserves

Carbon offsets can be purchased to compensate for the quantity of reported corporate emissions and if desired can be used to of achieve carbon neutrality. They typically come from external projects that have resulted in significant reductions of greenhouse gases and are sold on the *carbon market*. Carbon offsets allow an organization to easily reduce their yearly emissions but are an ongoing cost which may increase if higher levels of carbon pricing are introduced. Total elimination of operational GHGs in unlikely in the near future so investing in carbon offsets allows for compensation against "unavoidable" remaining emissions such as those from heavy trucks.

When the BC Government established its climate change reduction targets in 2007, it pledged to have "carbon neutral" government operations, i.e. emissions from all activities in the public service would be 100% offset by emission reduction projects in BC. Part of the impetus for this commitment was that investing in projects across BC would stimulate emission reduction activity across the province. The cost of these projects to organizations is additionally an incentive to reduce its own corporate emission activity. All *Provincial* public sector activity – government departments, schools, hospitals, crown corporations – must annually offset 100% of their emissions.

Local governments were not *legislatively* required to be carbon neutral. However, most local governments voluntarily accepted a carbon neutral commitment by signing the Climate Action Charter. As of 2015, 40 local governments achieved 100% carbon neutral status. The District of West Vancouver is amongst these leaders. Many local governments are annually contributing to a fund used to offset their corporate emission activity and put them on track to become carbon neutral. These Climate Action Reserve Funds are typically seeded with the Climate Action Revenue Incentive Program grant received by Climate Action Charter municipalities. The amount of this grant is equivalent to the carbon tax paid on fossil fuel purchases by local governments for its corporate activity.

To comply with the carbon neutral commitment, there are three approaches:

1. investing in Climate Action Secretariat approved reduction projects that conform to specific methodologies for the following activities:
    - energy efficient building retrofits / fuel switching and solar hot water
    - household organic waste composting
    - low emission vehicles
    - reforestation and avoided deforestation
2. investing in other high integrity reduction projects beyond the Climate Action Secretariat approved project methodologies
3. purchasing high integrity offsets.

There are pros and cons to each option. Purchasing offsets, Option 3, is the simplest and usually most cost effective option if broader community co-benefits are not considered. However, many local governments prefer that their money is invested in their own community on projects that reduce the community's emissions and could benefit local residents and businesses in a variety of ways (e.g. reduced energy spending in buildings and transportation or forest protection).

Options 1 and 2 are similar, but option 1 is a simplified process that makes it easier to calculate and validate the reductions.

The District has achieved carbon neutrality through individual and collective participation in a number of innovative emission reduction projects.

As part of an agreement between Metro-Vancouver, the City of Vancouver, and the Corporation of Delta, the District receives an allotment of reductions from the Vancouver Landfill Gas Capture Optimization Project. This amounted to 2,300 tonnes CO2eq in 2013 and similar amounts are expected for 2014 and 2015. In 2016 landfill gas collection becomes mandatory for the Vancouver Landfill and no more credits will be available.

Also through an agreement with Metro Vancouver, the District is allotted offsets for residential compost collection. This amounted to 361 tonnes CO2eq in 2013. A similar amount is expected for 2014. Beginning in 2015 the amount of offset is expected to be reduced as Metro Vancouver will be phasing in an organics ban.

In 2014 the District submitted an Option 1 project to the Climate Action Secretariat that was approved for carbon credits from avoided deforestation in Whyte Lake Park. The resultant 18,898 tonnes CO2eq of carbon credits will provide for five years of carbon neutrality based on 3,000 tonnes CO2eq of annual corporate emissions.

The District will need to develop a carbon neutral strategy as offsets from these projects expire. A Climate Action Reserve Fund seeded by the CARIP grant is being used by many local governments to invest in community wide emission projects, facilitating implementation of the Community Energy and Emissions Plan and is a strategy the District should investigate to see if it is viable to implement.

**Table 21: Carbon Neutral Local Government – Recommended Action**

| Action | |
|---|---|
| **CN1** | Explore a Carbon Neutral Strategy that continues the District's carbon neutral leadership, starting with establishment of a Carbon Neutral Reserve Fund, possibly seeded by the District's annual CARIP grant (carbon tax rebate). The strategy will examine innovative emission reduction projects. |

# 4 SUMMARY OF ACTIONS

Each recommended action is summarized below, with estimates of GHG reductions and budget required for implementation. GHG reduction and budget estimates presented are approximate, as major retrofit projects will need more detailed estimates prior to implementation. Costs do not include time for existing staff.

If all actions were to be implemented, annual GHG avoidance in the range of 1050 – 1100 tonnes CO2eq could be achieved, or 29 - 31% relative to 2007. This is close to the 33% reduction target for 2020. The budget required for implementation of all actions is estimated at $2.5 - 3.5 million.

The District will need to prioritize actions and identify timelines for implementation in order to achieve targets set by council.

### Table 22 Overall Implementation Budget and Expected Reductions (If All Actions Implemented)

| Annual GHG Avoidance* | Annual Cost Avoidance** (in 2015$) | Estimated Implementation Budget |
|---|---|---|
| 750 - 850 tonnes CO2eq relative to 2013<br>1000 - 1100 tonnes CO2eq relative to 2007<br>(28 - 31% reduction) | $300,000 - 350,000 | $2,000,000 - $3,000,000 |

* GHG avoidance does not match sum of individual actions due to interactions and external impacts.
** Cost avoidance is a result of energy savings, minus any ongoing cost of actions. See Appendix 3.

### Table 23 Summary of Actions

| Action | | Responsibility | Annual GHG Reductions | Budget Estimate* |
|---|---|---|---|---|
| **GO1** | Update the Corporate Energy and Emissions Plan prior to 2020 to confirm progress and establish actions beyond 2020.Include a medium term target of reducing corporate GHGs by at least 50% below 2007 levels by 2030. | Energy Manager | Supportive | Minimal |
| **IN1** | Continue to track and report regularly on indicators and progress for all sectors, including sectors paper, corporate waste, and water. | Energy Manager | Supportive | Minimal |
| **BI1** | Implement list of identified energy efficiency projects to reduce utility costs and energy use. | Energy Manager | 300 - 500 tonnes | High |
| **BI2** | Conduct combined energy study for the Main Community/Aquatic Centres. | Energy Manager | Supportive | Minimal |
| **BI3** | Work with BC Hydro and other Metro-Vancouver municipalities to accelerate adoption of LED streetlights and advanced controls. | Energy Manager, Transportation Engineer | Supportive | Minimal |
| **BI4** | Review equipment inventory and energy use in water and wastewater pumping stations to identify energy efficiency opportunities for planned equipment upgrades. | Utilities Engineer | Supportive | Minimal |

| | | | | |
|---|---|---|---|---|
| **BI5** | Identify and implement additional energy efficiency projects in buildings and infrastructure. | Energy Manager | 50 - 100 tonnes | High |
| **FM1** | Increase the percentage of bio-diesel used for fleet vehicles. | Superintendent Fleet & Equipment | 20 - 40 tonnes | Minimal |
| **FM2** | Expand driver training programs focused on fuel efficient driving. | Superintendent Fleet & Equipment | 0 -20 tonnes | Minimal |
| **FM3** | Analyze vehicle use and route and trip planning for efficiencies in fleet operation. | Superintendent Fleet & Equipment | 0 - 40 tonnes | Minimal |
| **FM4** | Make emissions reductions part of the criteria for selecting a contracted services company. Require annual reporting on fuel consumption and actions taken to reduce emissions. | Purchasing Manager | 0 - 20 tonnes | Minimal |
| **RE1** | Investigate and implement renewable energy projects such as district energy, solar water heating, or geo-exchange and maximize public profile. | Facilities Maintenance Manager, Energy Manager | 50 - 100 tonnes | Modest/ High |
| **PU1** | Increase recycled content of printer paper to 100% where possible and partial recycled content elsewhere. | Purchasing Manager | 0 – 20 tonnes | Minimal |
| **PU2** | Identify ways to further reduce paper consumption. | Energy Manager, ITS Department | Supportive | Minimal |
| **SW1** | Complete and implement the corporate solid waste plan that is currently underway. | Energy Manager | Supportive | Minimal |
| **WC1** | Undertake a detailed water use inventory and opportunity assessment, and implement appropriate measures. | Energy Manager, Facilities Maintenance Manager | Supportive | Minimal |
| **CP1** | Establish a Corporate Green Buildings Policy for new buildings and major renovations. Includes investigation of operational savings from energy efficiency and renewable energy options. | Facilities Capital Project Coordinator, Energy Manager | Supportive | Minimal |

| | | | | |
|---|---|---|---|---|
| **CP2** | Establish a Streetlight Policy to ensure new streetlights are energy efficient. | Transportation Engineer | Supportive | Minimal |
| **CP3** | Establish a Green Fleet Policy that incorporates fuel efficiency and life cycle costing to manage vehicle replacements. | Purchasing Manager (Lead)<br>Superintendent Fleet & Equipment | Supportive | Minimal |
| **CP4** | Include green purchasing policies within the new District purchasing policy. | Purchasing Manager | Supportive | Minimal |
| **CP5** | Establish a Climate Action Strategic Planning Lens to manage carbon and costs. | Purchasing Manager, Manager of Env. and Sustainability | Supportive | Minimal |
| **SE1** | Develop a staff engagement strategy to support conservation and climate action. | Manager of Env. and Sustainability, Energy Manager, departments | Supportive | Minimal |
| **CN1** | Evaluate continuation of the District's corporate carbon neutrality by developing carbon credits from investment in innovative emission reduction projects. | Manager of Env. and Sustainability, Energy Manager | Supportive | Minimal |

| *Budget Cost Ranges | |
|---|---|
| Minimal | $0-25,000 |
| Modest | $25,000 - 150,000 |
| High | >$150,000 |

# 5 EVALUATING PROGRESS – MONITORING AND REPORTING

Ongoing monitoring and reporting is essential to track and support progress towards targets and inform Council and the community of these achievements. The District currently tracks emissions and reports to the Province as required under the Carbon Neutral Local Government legislation. There is some additional monitoring and reporting that would be beneficial to include, as well as some methodological changes in monitoring.

Annual reporting should be comprehensive and easy to understand. The report should clearly show progress to date towards reduction targets. It should include both energy and emissions units, with breakdowns by sector, and out of scope sectors such as paper and solid waste should also be identified separately. Secondary indicators should also be included.

Although not necessary for Council reports, sources and methodological details should be carefully recorded. This is important so that future inventory updates can be conducted in a consistent fashion. The scope and methodology of local government inventories has changed several times over the years, leading to some difficulties in making comparisons with the 2007 base year. The 2007 inventory has now been aligned with the current methodology and scope, but any future changes will need to be incorporated.

Recommendations for Monitoring and Reporting:

- report annually on the District's energy consumption and emissions
- include energy and non-energy (e.g. mass of paper and solid waste) consumption in addition to CO2eq emissions
- provide comparisons to the 2007 base year and previous years, as well as progress towards targets
- break down consumption and emissions by sector (e.g. buildings, fleet, department, etc) as well as by fuel type
- identify key factors why consumption and emissions has changed from previous years
- include secondary indicators in reporting
- identify all data sources
- include a section on the methodology followed, with details on any changes to methodology and key assumptions made.

Once established, such a monitoring and reporting regime can be reasonably efficient to report on.

# 6 MOVING AHEAD

The District of West Vancouver's Corporate Energy & Emissions Plan provides a summary that highlights the progress made since 2007 in emission reductions. With the existing corporate momentum around sustainability the District can use the Corporate EEP to enhance organizational change and develop implementation plans for technical actions that will ensure it continues to move ahead towards its greenhouse gas emission and energy reduction goals.

## APPENDIX 1 - EXISTING DWV OBJECTIVES AND POLICIES

**West Vancouver's 2015 - 2018 Council Priority # 4:** Natural Environment and Climate Action

**West Vancouver's Mission Statement (environmental portion) :** Protect, restore, and defend our natural environment; legislate efforts to effect positive change.

**West Vancouver's Official Community Plan, 2004:**

| Plan Reference | OCP Section | |
|---|---|---|
| Targets | | |
| O1 | Climate Action | Commits to becoming carbon neutral with respect to municipal operations by 2012. |
| O2 | Climate Action | Commits to reducing our greenhouse gas emissions by at least 33% below 2007 levels by 2020 and at least 80% below 2007 levels by 2050. |
| Objectives | | |
| O3 | Natural Environment | Demonstrate leadership in environmental management, practices and use of resources. |
| O4 | Transportation | Promote alternatives to private vehicles, including the enhancement of public transportation and walking and cycling networks. |
| O5 | Municipal Utilities | Support environmentally, socially and economically sustainable development. |
| Policies | | |
| O6 | Built Form - A1 | Promote superior environmental design in new development. |
| O7 | Built Form - A2 | Demonstrate municipal leadership by providing a commitment to the environment and sustainability practices. |
| O8 | Municipal Utilities - 1 | Promote energy consciousness. |
| O9 | Municipal Utilities - 4 | Upgrade water supply, treatment and distribution, and promote conservation. |
| O10 | Municipal Utilities - 8 | Minimize the amount of refuse generated and promote the reuse and recycling of waste. |
| O11 | Transportation - 5 | Enhance and expand transportation options to reduce auto dependency and associated environmental impacts. |
| O12 | Natural Environment -12 | Establish comprehensive environmental policies, bylaws, regulations, and practices. |

West Vancouver's Environmental Strategy, 2005:

| Plan Reference | Env. Strategy Section | |
|---|---|---|
| Objectives | | |
| E1 | Objective 1 | Lead by example in environmental stewardship. |
| Policies | | |
| E2 | Objective 1 Action 1.1 | Develop and implement high performance operation standards for major new and upgraded District facilities, utilities, and services. |
| E3 | Objective 1 Action 1.3 | Educate staff on methods to reduce environmental impact in the provision of facilities, utilities, and services. |
| E4 | Objective 1 Action 1.4 | Integrate sustainability into purchasing policy. |
| E5 | Objective 1 Action 1.5 | Develop and implement a District Environmental Awards Program. |

## APPENDIX 2 - INVENTORY OF EMISSIONS FACTORS AND DATA SOURCES

### Emissions Factors

| Fuel Type | Units | 2007 | 2013 |
|---|---|---|---|
| Electricity | t/kWh | 0.000025 | 0.000014 |
| Natural Gas | t/GJ | 0.04999 | 0.04999 |
| Gasoline | t/L | 0.002433 | .0002325 |
| Diesel | t/L | 0.002474 | 0.002634 |
| Solid Waste | t/tonne | - | 0.474 |
| Paper | t/package | - | 0.005 |

**Notes:**

1. Emissions factors for electricity, natural gas, gasoline, diesel, and paper from *BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions*, Ministry of Environment, Province of BC.
2. Emissions factor for solid waste from *2010 Community Energy and Emissions Inventory*, Province of BC.
3. 2007 inventory has been adjusted to align with 2013 traditional services methodology.
4. Reimbursed transportation and contracted solid waste collection for 2007 assumed to be the same as 2013.
5. Gasoline and diesel emissions factors are a fleet average based on vehicle type. Fleet mix in 2007 assumed to be the same as 2013.
6. 2013 gasoline emissions include 5% ethanol as per *BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions*.
7. 2007 and 2013 diesel emissions include 11% and 4% bio-diesel respectively, as per *BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions*.

### Data sources

*2013 BC Traditional Services Inventory*, District of West Vancouver, prepared by GHG Accounting Services

*District of West Vancouver Corporate Greenhouse Gas Inventory*, September 2008

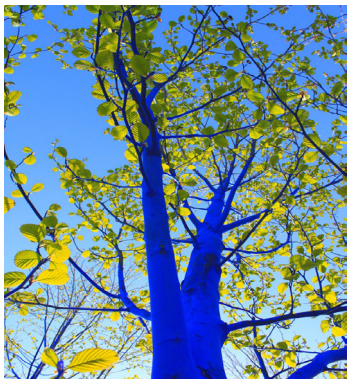
*2007 Terasen Gas Account Summary*

*Mills West Vancouver 2013 Paper Report*

*Super Save DWV 2013 Pickup Statistics*

## APPENDIX 3 - BREAKDOWN OF EMISSIONS AND CONSUMPTION REDUCTIONS

| Sector | Annual Avoidance | | |
|---|---|---|---|
| | Tonnes CO2eq | GJ | $ |
| **Buildings & Stationary Infrastructure** | **603** | **17,530** | **$235,100** |
| **Electricity** | 60 | 6,670 | $148,100 |
| **Natural Gas** | 543 | 10,860 | $87,000 |
| **Fleet & Mobile Activity** | **212** | **2,810** | **$92,600** |
| **Gasoline** | 120 | 1,810 | $59,600 |
| **Diesel** | 92 | 1,000 | $33,000 |
| **Other** | | | **-$2,000** |
| **Total** | **815** | **20,340** | **$326,000** |



*"Blue Trees" was an installation by Konstantin Dimopoulos in 14 locations around the world, including West Vancouver and Squamish First Nations Capilano Territory.*

*"The Blue Trees takes an urban landscape with which you are familiar and changes it for a brief period of time so that it becomes surreal, unfamiliar, even uncomfortable," Dimopoulos states. "We are creatures who like certainty and we become disconcerted when our environment changes. Yet we have altered and destroyed much of the global environment."*

*Dimopoulos is optimistic that his art generates discussion and inspires solutions.*