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CORPORATE REPORT

NO: R154 COUNCIL DATE: July 12, 2010

REGULAR COUNCIL

TO:	**Mayor & Council**	DATE:	**July 8, 2010**
FROM:	**General Manager, Engineering**	FILE:	**0450-20 (swmp)**
SUBJECT:	**Draft Regional Integrated Solid Waste and Resource Management Plan**		

RECOMMENDATION

The Engineering Department recommends that Council:

1. Support in principle the goals contained in the draft Regional Integrated Solid Waste and Resource Management Plan (ISWRMP) as discussed in this report;

2. Request Metro Vancouver to undertake an open market request for proposals for disposal of residual waste materials after diversion of recyclable materials that contemplates the viability of the technology(ies) proposed, the number of facilities required as well as in-region versus out-of-region options; and

3. Direct staff to forward a copy of this report and the related Council resolution to Metro Vancouver as our input into the draft Regional Integrated Solid Waste and Resource Management Plan.

INTENT

The purpose of this report is to document comments on the draft Metro Vancouver Regional Integrated Solid Waste and Resource Management Plan (ISWRMP) and its potential financial implications on member municipalities, including Surrey.

BACKGROUND

Municipal and Regional solid waste management is regulated by the B.C. Ministry of Environment through *Solid Waste Management Plans* that are developed in accordance with the *Environmental Management Act (EMA)*. The draft ISWRMP that is the subject of this report (attached as Appendix I) is an update to the current regional Solid Waste Management Plan (SWMP) that was adopted in 1995 and sets an aggressive goal to increase the diversion rate (i.e., the portion of waste materials that are diverted away from disposal) from the current regional rate of 55% to a minimum of 70% by 2015.

Chart 1: Metro Vancouver Current Percentage of Waste Diverted and Recovered:

2010 Population:
2.23 million

Waste Generation:
3.4 million tonnes/year

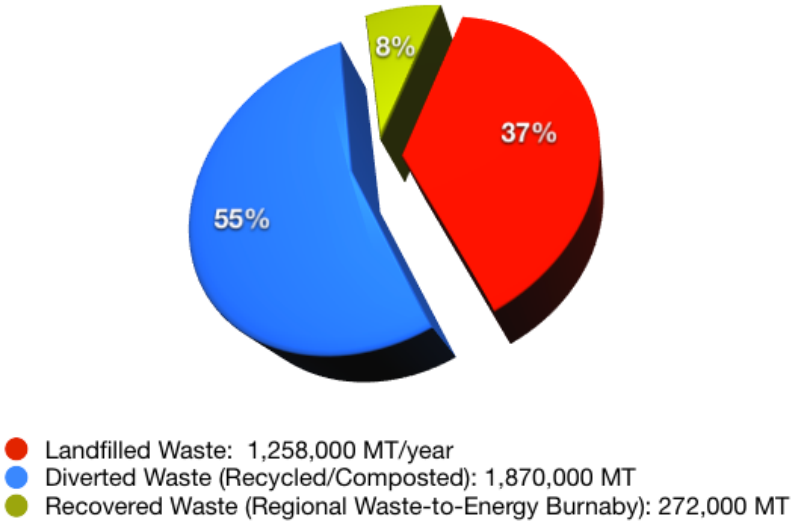
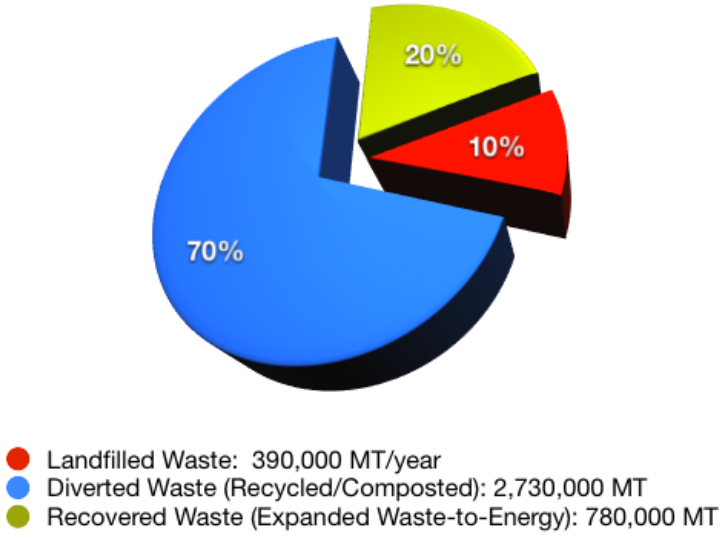


Chart 2: Metro Vancouver Proposed Increase to Diverted and Recovered Waste:

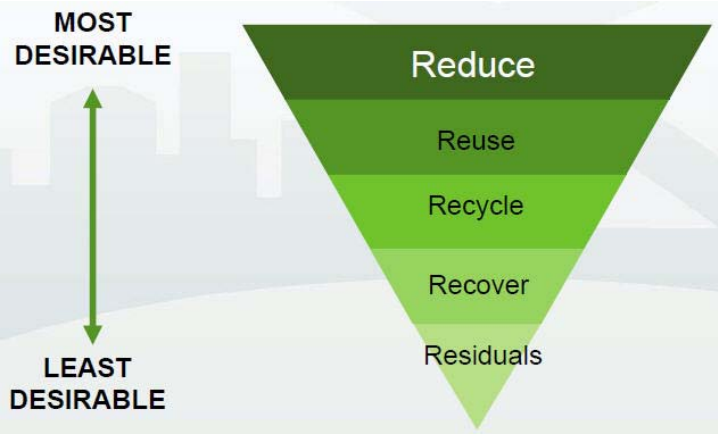
2015 Population:
2.55 million

Waste Generation:
3.9 million tonnes/year



DISCUSSION

The ISWRMP is based on the Provincial waste management hierarchical five-step approach commonly referred to as the Five R's with ***reduction*** of waste at the top of preferred approaches followed by ***reuse*** and ***recycling*** which are waste diversion strategies. The last two steps in the hierarchy are ***recovery*** and ***residual management***. The recovery step considers waste as a resource (i.e., waste-to-energy), while the final step addresses the waste remaining after all practical efforts to avoid, reduce, reuse, recycle and recover materials in the waste stream have been exhausted.



ISWRMP 70% Diversion Goal by 2015

Waste diversion is essentially achieved by way of the first three R', Reduce, Reuse and Recycle. By leveraging these approaches, MV reached its current level of waste diversion (55%). Initiatives leveraged in the 1990's to reach the current diversion rate included:

- Expansion of municipal curbside collection programs including expanded recyclables collections and yard waste diversion;
- Facilitating the Provincial Extended Producer Responsibility (EPR) Programs (i.e., Product Care, Used Oil Return, Used Paint Depots, Electronics Recycling, etc.);
- Implementing material bans at transfer stations and landfills; and
- Developing various programs geared towards educating and encouraging private sector adoption of waste diversion practices.

MV's current waste diversion rate of 55% is significantly higher than the Canada-wide average of 22%.

From a global perspective, several European countries report higher diversion rates than Canada and the United States with the Netherlands at 60%, Germany at 65% and Austria in the lead at 70%.

The draft ISWRMP's proposed 70% diversion target mirrors Austria's diversion rate, which, at present, is the best result achieved worldwide. This target was endorsed by the MV Board in May 2009 following extensive public consultation and re-affirmed by the Board in April 2010 following lengthy debate surrounding whether a higher waste diversion target (greater than 70%) should be established within the ISWMRP.

Establishing a waste diversion target beyond 70% is not recommended at this time. There are limitations on what can practically be recycled. These include composite materials (products constructed with different materials); difficult to recycle materials such as textiles, leather, or personal hygiene products; and materials with limited recycling value such as glass and some plastics. In addition, the recycling industry itself generates waste from contaminated materials that cannot be recycled (e.g., plastics recycling produces a residue of 20% of the incoming volume).

To achieve diversion rates beyond 70% will require significant changes to the global economy. This will include increased emphasis internationally on implementing product designs for the

environment and continuing to progress toward a zero waste economy – changes over which MV has little direct control.

Getting from 55% to 70% Waste Diversion

Building on the principles of the 5R's – reduce, reuse, recycle, recover and residuals management, the proposed regional draft ISWRMP has four main goals and associated strategies that were developed in consultation with member municipalities. These are listed in the following table.

Table 1: Metro Vancouver's 5R Goals and Strategies

Five R Category	Draft SWMP Goals	Associated Draft SWMP Strategies
Reduce	1. Minimize waste generation	1. Foster a Zero Waste Ethic through Metro Vancouver information, education, communication and community-based social marketing programs. 2. Advocate that senior governments transfer additional waste management responsibilities to producers and consumers.
Reuse **Recycle**	2. Maximize Reuse, Recycling and Material/Energy Recovery	3. Reduce wood waste being disposed. 4. Reduce paper and paperboard being disposed. 5. Target organics for recovery. 6. Target plastics for increased recycling. 7. Target multi-family and ICI sectors to improve diversion rates.
Recover	3. Extract maximum benefit from the disposed waste stream	8. Expand the waste-to-energy infrastructure. 9. Develop a system for recycling bottom ash.
Residual	4. Disposal of all remaining waste in landfill after material and energy recovery	10. Dispose of any remaining residuals to landfill and minimize the environmental impact.

The strategies and actions related to Goals 1 and 2 are aimed at diverting an additional 600,000 tonnes of waste per year within the Region, which is the amount required to achieve the minimum 70% target by 2015. This is expected to be achieved through:

1. Establishing municipal curbside organics collection programs and additional organic composting and bio-fuel facilities;
2. Mandatory recycling on job sites with increased facilities to manage wood reuse as well as reviewing building codes with a view to reducing barriers to wood reuse;
3. Increased emphasis on plastics, including reduced use, increased recycling, expansion of collection programs, development of local commodity markets and tougher regulations related to the use of plastic;
4. Advocating for the expansion of Provincial Extended Producer Responsibility (EPR) programs;

5. Mandatory recycling and compost diversion instituted across the Region for the Institutional, Commercial & Industrial (ICI) sectors which includes multi-family complexes and commercial buildings;
6. Additional material bans at all MV transfer stations and the Vancouver landfill;
7. Increased waste disposal fees to offset operational impact of lower waste volumes and to encourage greater participation in waste diversion;
8. Establishing Regional Eco-centres; and
9. Increasing awareness of methods of waste reduction and recycling through outreach programs.

The strategies and actions related to Goals 3 and 4 are targeted at recovering energy from the waste stream and managing the disposal of residuals in an environmentally responsible manner.

Growth in the Regional Waste Stream

Even with improved waste diversion over the next five years, the projected population growth within the Region will generate over half a million tonnes of additional garbage per year in 2015.

To manage the Region's waste in a sustainable manner, Metro Vancouver retained a consultant to undertake a technical evaluation of options for addressing the remaining waste stream after reducing, reusing and recycling of the waste stream. The consultant analyzed landfilling, waste-to-energy facilities or waste treatment (i.e., a process called mechanical biological treatment or MBT) prior to either landfilling or incineration. Based on the consultant's analysis, including air emissions, air quality impacts, greenhouse gas emissions, energy generation and costs, the proposed draft plan proposes that new waste-to-energy capacity be constructed within the Region by way of one or more facilities. These proposed facility(ies) would need to be built to a capacity of 500,000 tonnes/year and would need to be designed to maximize energy recovery for use in district heating systems, industrial applications and/or electricity generation. If an in-region facility is not possible, the draft ISWRMP recommends that an out-of region waste-to-energy facility by pursued.

The Vancouver Landfill would continue to handle any wastes that are not diverted to waste-to-energy facilities.

Engineering Comments on the Draft ISWRMP

From both an environmental and social perspective, the draft ISWRMP goal of a 70% waste diversion rate by 2015 is supportable. However, from a financial perspective, the goals and strategies outlined within the draft Plan will have significant impacts across the Region, including:

- Increased costs associated with regulating waste diversion from the *Institutional, Commercial & Industrial* and the *Demolition and Land Clearing* sectors;
- Increased costs associated with Waste diversion compliance;
- Increased waste disposal costs;
- Costs associated with constructing and operating new MV infrastructure required to handle diverted waste and waste-to-energy facilities; and
- Increased waste collection costs.

a) Draft ISWRMP Goals 1 & 2:

Multi-family Residential and Commercial Recycling:
Since 1998, Surrey has been encouraging multi-family recycling through mandatory weekly collection services. This is one of the draft ISWRMP strategies proposed to increase the waste diversion rate within the Region. Despite these efforts, additional emphasis will be required in areas of outreach and enforcement, particularly in relation to commercial recycling, which will be a new area for which recycling will become mandatory.

Demolition and Construction Waste Management:
Increased reuse and recycling of materials generated by the demolition and construction sectors are proposed to be targeted by the draft ISWRMP and will require that the City amend its by-laws such that prior to receiving a demolition or land clearing permit, applicants will be required to submit a waste management plan.

Organic Waste Collection:
Currently, the City of Surrey is in the planning stages in relation to initiating a pilot curbside organic waste collection program. The pilot is expected to get underway this fall and a City-wide program is expected to be rolled out before the end of 2012. Accordingly, Engineering staff has initiated public surveys and public consultation sessions to both apprise residents of the City's intentions and solicit their input on collection options (i.e., cart system, weekly/biweekly collection system, etc.). Depending on the type of collection program that is ultimately chosen, costs will vary.

Waste Diversion Facilities:
New waste diversion facilities are proposed for Surrey including an organics waste Bio-fuel facility and at least one regional waste drop-off facility (i.e., an eco-centre).

Staff Resources:
While new waste management facilities will likely be operated by contractors through MV, additional City staff will be required to effectively manage new waste diversion-related programs within Surrey. For example, even though MV is ultimately responsible for waste diversion for the *Institutional, Commercial Industrial* and the *Demolition and Land Clearing* sectors, enforcement efforts to ensure that waste from these sectors is being properly diverted will likely fall to member municipalities for reasons of practicality.

Waste Disposal Rates:
With regard to waste disposal, in 2010 MV increased the regional garbage disposal rate from $71/tonne to $82/tonne and announced that the disposal rate would increase annually to a peak of $130 per tonne by January 1st, 2014. These increases reflect the costs of the proposed strategies as well as the costs to educate the Region's population about the ISWRMP and to promote the move towards 70% waste diversion by 2015.

Staff will review the matter of cost impacts relating to achieving the 70% diversion goal in greater detail once more details are available and provide a further report to Council in due course.

b) Draft ISWRMP Goals 3 & 4:

Metro Vancouver is proposing waste-to-energy as the primary method of handling residual waste after diversion of recyclable materials. This decision was based on an analysis of options by an independent expert consultant.

The independent consultant's assessment considered impacts of waste-to-energy over landfilling or mechanical biological treatment (MBT) with respect to air emissions, air quality impacts, greenhouse gases, and heat and electricity generation potential and total costs. These three options were ranked accordingly with the following outcome (1st being most desirable, 3rd being least desirable):

	Net Air Emissions	Greenhouse Gases	Heat & Electricity Generation	*Disposal Costs
MBT	2nd	1st	3rd	3rd
Landfill	3rd	3rd	2nd	2nd
WTE	1st	2nd	1st	1st

* Disposal Cost assessments considered impacts over a 35-year period at a capacity of 500,000 tonnes of waste per year, the results of which are as follows:

MBT treatment facility 35-year net cost:	$3.1 billion
Landfill facility 35-year net cost:	$1.5 billion
Waste-to-Energy facility 35-year net revenue:	$20 million

Despite the consultant's assessment, the overall cost of the waste-to-energy option in comparison to the landfilling option, MBT option, or other options, have not been fully explored by MV through a competitive market call for proposals and through a comparison of a regionally owned and operated facility(ies) and a privately owned and operated facility(ies). Given that the cost of a 500,000 tonne/year waste-to-energy facility is expected to range from $400 to $600 million, this is an important consideration from an affordability and financial perspective. MV should explore the ingenuity of the private sector in relation to the above-stated options. In this regard, staff recommend that Council request Metro Vancouver to undertake an open market request for proposals for site specific options for disposal of residual waste materials after diversion of recyclable materials.

While staff holds the view that waste-to-energy is a viable in-region solution to managing solid waste, it is acknowledged that this technology is generating a level of public scrutiny. The concerns that have been raised by the public in relation to this option along with the responses by MV are documented in Appendix II.

Should MV decide to proceed with an in-region waste-to-energy solution, it is recommended that the remaining waste (residual) be treated in-region at a residual waste management facility (either publicly or privately owned/operated).

Public Consultation

During the months of May and June, MV staff engaged in a process of public consultation with a view to informing the public about the draft ISWRMP and to understanding and addressing concerns with the Plan, including those related to the waste to energy option,. This consultation took the form of a series of public meetings across the Region. Comments and feedback from the public and interested stakeholders may be submitted to MV until July 14th, 2010.

Metro Vancouver staff will then present the results of the public consultation process and a final version of the ISWRMP to the Metro Vancouver Waste Management Committee and to the Board for endorsement. This is expected to be completed by late July 2010. The approved ISWRMP will then be submitted to the Minister of Environment for approval. Each municipality will also be given an opportunity to consider the final plan for approval relative to the municipal commitments contained within the Plan. Metro Vancouver has details of the next steps in the attached letter in Appendix III provided Board members.

CONCLUSION

Based on the above discussion, it is recommended that Council:

- Support in principle the goals contained in the draft ISWRMP as discussed in this report;
- Request Metro Vancouver to undertake an open market request for proposals for disposal of residual waste materials after diversion of recyclable materials that contemplates the viability of the technology(ies) proposed, the number of facilities required as well as in-region versus out-of-region options; and
- Direct staff to forward a copy of this report and the related Council resolution to Metro Vancouver.

Vincent Lalonde, P.Eng.
General Manager, Engineering

VL/RAC/brb

Appendix I - Metro Vancouver Draft Integrated Solid Waste and Resource Management Plan (April 2010)
Appendix II - Metro Vancouver Responses Concerns related to the Waste-to-Energy Option
Appendix III - Letter to Metro Vancouver Board Members

SUSTAINABLE REGION INITIATIVE . . . TURNING IDEAS INTO ACTION

Integrated Solid Waste and Resource Management

A Draft Solid Waste Management Plan
for the Greater Vancouver Regional District and Member Municipalities

DRAFT

April 28, 2010

metro vancouver

www.metrovancouver.org

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Vision Statement

Metro Vancouver has a vision to achieve what humanity aspires to on a global basis – the highest quality of life embracing cultural vitality, economic prosperity, social justice and compassion, all nurtured by a beautiful and healthy natural environment.

We will achieve this vision by embracing the principles of sustainability, not least of which is an unshakeable commitment to the well-being of current and future generations and the health of our planet, in everything we do.

As we share our efforts in achieving this vision, we are confident that the inspiration and mutual learning we gain will become vital ingredients in our hopes for a sustainable common future.

Building a Sustainable Livable Region

Building a sustainable, livable region is the overarching regional vision. Social, environmental and economic sustainability is, therefore, a fundamental objective in all Metro Vancouver activities: from the services we deliver through the management and strategic plans we develop and administer, to the various outreach activities we engage in pursuit of collaborative governance.

As we build and facilitate collaborative processes, including those that engage citizens, and enhance understanding of other levels of government, we are confident that the inspiration and mutual learning we gain will become vital ingredients in our hopes for a sustainable common future.

Goals and Targets

Goals

The overriding principle of Integrated Solid Waste and Resource Management Plan is the avoidance of waste through an aggressive waste reduction campaign and through the recovery of materials and energy from the waste that remains. In line with this principle, the Integrated Solid Waste and Resource Management Plan (IS-WRMP) has four goals:

Goal 1: Minimize waste generation

Goal 2: Maximize reuse, recycling and material recovery

Goal 3: Recover energy from the waste stream after material recycling

Goal 4: Dispose of all remaining waste in landfill, after material recycling and energy recovery

The key strategies and actions to achieve the goals of the ISWRMP are set out in Part B, Goals, Strategies, Actions and Measures.

Targets

The target of the ISWRMP is to increase the regional diversion rate from an average of 55% to 70% by 2015.

Conventionally it has been assumed that the 5Rs hierarchy approximates the sequence of processes in waste management and the goal of reducing, reusing or recycling waste to the maximum extent possible has been measured as the rate of 'diversion' of waste from reaching the fifth step in the hierarchy – the disposal of residuals. Modern reality is more complex. As a result, using the conventionally defined 'diversion rate' includes some source separated material that is used as fuel still being considered 'recycled' while some material that is recycled after incineration is still considered 'disposed.'

This plan is driven by the underlying principles but, for the sake of historic comparability, continues to use the conventional definition of 'diversion rate'.

If the waste reduction and recycling initiatives in the plan are successfully implemented, only 30% of the generated waste stream will require treatment before disposal. Additional waste-to-energy capacity would be made available to recover energy from this stream.

A. Integrated Solid Waste and Resource Management Plan

Guiding Principles

The plan follows the sustainability principles set out in Metro Vancouver's Sustainability Framework, the principles of Integrated Resource Recovery and the 5R hierarchy of resource management.

Sustainability

Sustainability encompasses a long-term commitment to economic prosperity, community well-being and environmental integrity. It is at the core of Metro Vancouver's vision for the future, and provides the foundation for the development of the region's management plans.

The Metro Vancouver Sustainability Framework identifies three overarching principles which state that decision making must:

- Have regard for both local and global consequences, and long-term impacts
- Recognize and reflect the interconnectedness and interdependence of systems
- Be collaborative

These provide the foundation for the three operating principles that guide Metro Vancouver:

- Protect and enhance the natural environment (Conserve and develop natural capital)
- Provide for ongoing prosperity (Conserve and develop economic capital)
- Build community capacity and social cohesion (Conserve and develop social capital)

A solid waste management plan which follows these principles will seek to ensure our individual and collective behaviour does not generate avoidable or unnecessary material waste and will seek systems and technologies which recover and recycle materials and recover energy.

Where investment or reinvestment in infrastructure is required, that infrastructure will be resilient, be adaptable to climate change, lessen the region's dependence on non-renewable energy sources, and protect the environment.

Integrated Resource Recovery

Integrated Resource Recovery is an approach to designing and managing urban systems, particularly utilities, to generate synergies which enable the 'waste' from one system to become 'resources' for another.

These traditional wastes are untapped resources. If accessed and used appropriately, they can help preserve non-renewable resources, stretch the capacity of existing infrastructure, save energy, generate revenue, protect the environment and reduce greenhouse gas (GHG) emissions.

Resource Management Principles: The 5Rs

The principles of the 5R hierarchy also emphasize the value of waste as a resource. The hierarchy sets out the relative value of different methods of waste management:

- **R**educe waste at source
- **R**euse where possible
- **R**ecycle products at the end of their useful life
- **R**ecover energy or materials from the waste stream
- Manage **R**esiduals in an environmentally sound manner

Process and Consultation

All actions included in this plan will be undertaken in consultation and cooperation with municipalities, senior government, First Nations, the business community, and the public.

As the population grows and circumstances change, the ISWRMP will be reviewed and revised. An ISWRMP progress report will be made every two years and a comprehensive review of the plan every ten years.

Aligning With Provincial Initiatives

This is a provincially mandated plan. The objectives set out in the 1995 Greater Vancouver Regional Solid Waste Management Plan were set by the Provincial Government. These objectives were:

- To reduce per capita garbage disposal in the year 1995 by at least 30% from 1990 levels
- To similarly reduce per capita garbage disposal in the year 2000 by at least 50% from 1990 levels
- To responsibly manage residuals

These objectives have been met.

The updated ISWRMP is guided by principles that are aligned with current provincial policies and positions, ensuring that Metro Vancouver's and senior governments' environmental and fiscal objectives and actions are mutually supportive and successful.

Key provincial plans and policies supported by the ISWRMP include the:

- **BC Climate Action Plan.** This plan sets a provincial target of 33% less greenhouse gas emissions by 2020, and 80% fewer by 2050.

  The ISWRMP will contribute to meeting these targets by facilitating waste reduction and by treating waste as a resource to be reused or recycled.

- **BC Energy Plan - A Vision for Clean Energy Leadership.** The Energy Plan sets goals for clean, self-sufficient electricity production including "clean energy leadership" and energy self-sufficiency by 2016. The ISWRMP seeks to expand the generation of electricity and biofuels from municipal solid waste as well as the recovery of heat for use in industrial or district heating systems.

- **A Guide to Green Choices - Ideas and Practical Advice for Land Use Decisions in BC Communities.** This guide expressed the need for "sustainable infrastructure". The long-term sustainable management of existing and future infrastructure investments requires integrated, innovative solutions.

  The ISWRMP contains actions that support sustainable infrastructure, such as clean energy from district energy systems.

- **LiveSmart BC.** This program aims to support low-carbon communities through incentives for energy savings and GHG reduction in homes and businesses, on the road, and in the community.

  The ISWRMP facilitates opportunities for the residential and commercial sectors to reduce their contribution to GHG emissions through waste reduction, reuse, recycle and regional organic waste management.

- **BC Bioenergy Strategy.** The Strategy encourages the production of fuel from biomass.

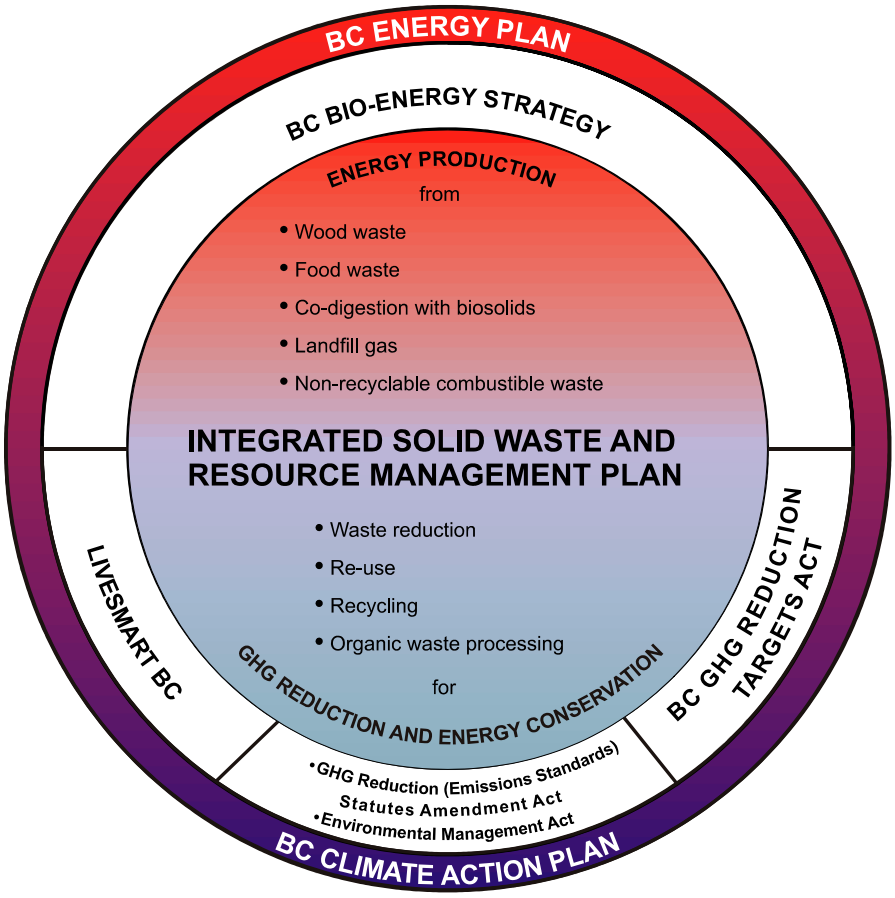
  The ISWRMP builds upon existing efforts involving the recovery of methane from landfills. It also promotes additional diversion of biomass, such as food residues and treated wood, for use as renewable sources of energy. Opportunities to integrate liquid and solid waste management also support the BC Bioenergy Strategy.

- **Landfill Gas Management Regulation.** This regulation requires landfills to consider designs that optimize methane capture, reducing greenhouse gas emissions.

  Existing and any future Metro Vancouver landfills under the ISWRMP will follow this regulation, contributing to the climate change solution.

In partnership with municipalities and the private sector, Metro Vancouver's initiatives in all of these areas will reduce greenhouse gas emissions, diversify the region's sources of energy, increase renewable energy sources, and increase the region's energy independence, as shown in Figure 1.

FIGURE 1: KEY CONNECTIONS BETWEEN PROVINCIAL PLANS AND METRO VANCOUVER'S INTEGRATED SOLID WASTE AND RESOURCE MANAGEMENT PLAN



Coordinating With Other Metro Vancouver Plans

The Sustainable Region Initiative provides a framework for linking the ISWRMP with the region's other plans, as shown in Figure 2. It also establishes links across regionally mandated plans and with initiatives that are executed by other partners.

The ISWRMP identifies synergies with Metro Vancouver's other utilities and plans, to make the best use of society's resources, and to minimize the region's impact on the environment.

The ISWRMP includes coordinated actions with the Integrated Liquid Waste and Resource Management Plan, chosen to identify opportunities to make best use of the resources generated from the two waste streams. For example, organic municipal solid waste, like waste food, can potentially be co-digested with sewage sludge.

The principles guiding the ISWRMP and the connected goals and actions will also help achieve objectives in the Air Quality Management Plan and Metro Vancouver 2040, the region's Regional Growth Strategy. The ISWRMP will minimize Metro Vancouver's contribution to climate change by reducing the disposal of untreated waste in landfills, by recovering energy in the form of heat for district heating, and by reducing the use of fossil fuels for space heating. These steps will assist in building compact, complete communities using clean energy for district heating.

Figure 3 shows the connections between the ISWRMP and other regional plans.

FIGURE 2: METRO VANCOUVER SUSTAINABILITY FRAMEWORK

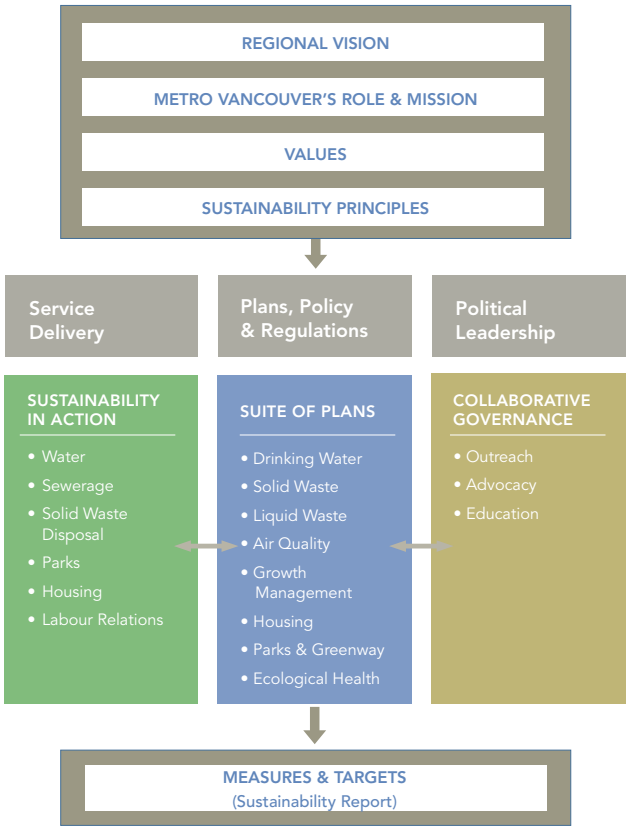
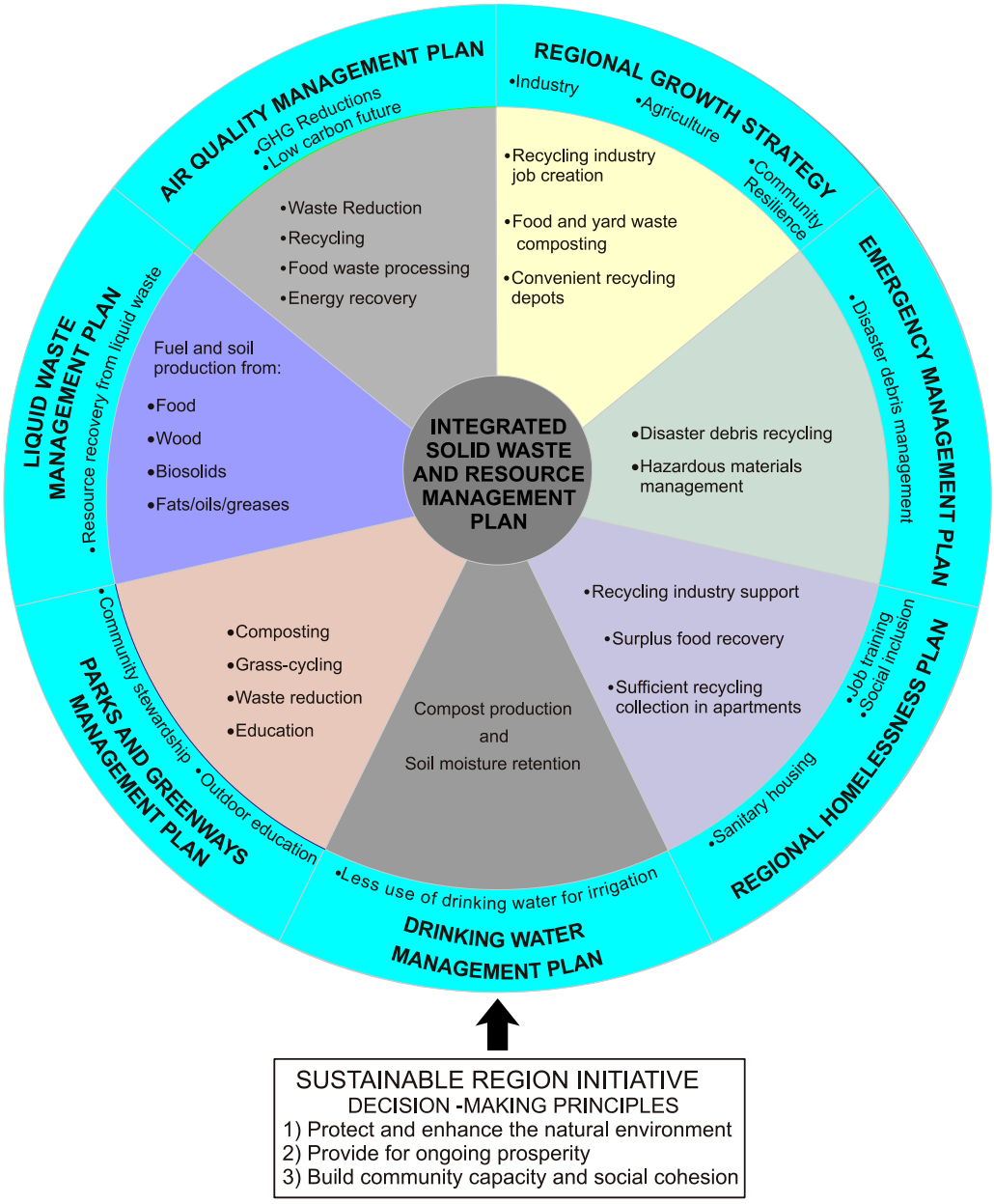


FIGURE 3: KEY CONNECTIONS BETWEEN METRO VANCOUVER'S INTEGRATED SOLID WASTE AND RESOURCE MANAGEMENT PLAN AND OTHER METRO VANCOUVER PLANS



Governance, Roles and Responsibilities

Solid waste management plans are authorized and regulated through the BC Environmental Management Act. Once each updated plan is approved, it becomes a regulatory document for solid waste management.

Metro Vancouver and member municipalities work collaboratively to provide waste management services to the region. Metro Vancouver coordinates the long-range planning process for recycling and disposing of solid waste in the region. Metro Vancouver also funds and manages the operating contracts for the transfer stations, waste-to-energy facility and landfill (with the exception of the Vancouver South Transfer Station and the Vancouver Landfill which are owned and operated by the City of Vancouver) that make up the region's integrated solid waste management system.

Municipal solid waste (MSW) is defined as refuse that originates from residential, commercial, institutional, demolition, land clearing or construction sources.

For management purposes, waste is generated from three sectors: residential (from both single-family units and multi-family units); industrial, commercial and institutional (ICI); and demolition, land clearing and construction (DLC). Member municipalities operate or co-ordinate the collection of recyclables and garbage and in some cases yard and garden waste from the single-family residential sector and some ICI and multi-family residential sources. Recycling from multi-family residences is also collected by municipalities, but much of the ICI and multi-family residential garbage collection services are provided by the private sector. ICI recycling is collected almost exclusively by private haulers. The third sector, DLC, is primarily self-managed with businesses and non-profit societies providing recycling, transferring and/or disposal services.

The management of household hazardous wastes is carried out by the Province primarily through Extended Producer Responsibility (EPR) programs. Provided financial and liability issues are satisfied, Metro Vancouver and member municipalities will cooperate with the Province and industry groups to provide a comprehensive household hazardous waste management program.

All the recycling processing facilities in the region are privately run businesses, as are the brokers who facilitate the movement of recyclables to end markets inside and outside of the region.

The extent and complexity of the solid waste systems, with roles and responsibilities spread across several levels of governance, require close co-ordination among the following groups:

Federal Government

- The Federal Government regulates waste management facilities on federal lands and on First Nation Reserves.

Provincial Government

- Ministry of Environment
- Ministry of Community and Rural Development
- Ministry of Health
- Environmental Assessment Office

Local Government

- Member municipalities implement municipal actions in the ISWRMP and are mandated to manage solid waste
- Metro Vancouver implements regional actions in the ISWRMP, takes a collaborative role for some actions, and is required to report on ISWRMP progress

First Nations

- First Nations have constitutional rights which must be taken into account in the planning process

Private Sector

- Private sector businesses generate waste which requires management under the ISWRMP
- Private sector haulers, material brokers, recyclers and others provide services which make the implementation of an integrated waste management system possible

Non-profit Sector

- Provides voluntary services to segments of the waste generating public

Residents

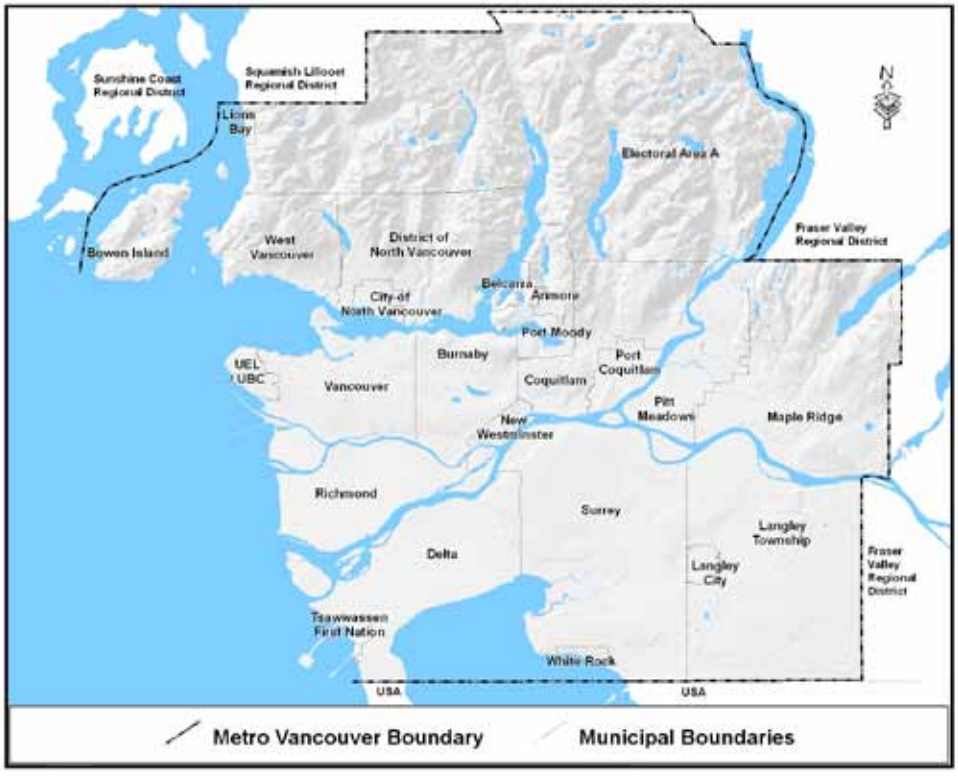
- Generate waste either as private individuals or as contributers to institutional, commercial, industrial, demolition, land clearing or construction activities
- Responsible for carrying out proper waste reduction, recycling and disposal activities

Geographic Scope

The ISWRMP applies to the geographic area of Metro Vancouver (see Figure 4). All strategies and actions in the ISWRMP apply to the members of the Greater Vancouver Regional District.

City of Abbotsford
Village of Anmore
Village of Belcarra
Bowen Island Municipality
City of Burnaby
City of Coquitlam
Corporation of Delta
City of Langley
Township of Langley
Village of Lions Bay
District of Maple Ridge
City of New Westminster
City of North Vancouver
District of North Vancouver
City of Pitt Meadows
City of Port Coquitlam
City of Port Moody
City of Richmond
City of Surrey
City of Vancouver
District of West Vancouver
City of White Rock
Tsawwassen First Nation
Electoral Area A – *which includes the west side of Pitt Lake, the northern portion of Indian Arm, a portion of land between the District of West Vancouver and Squamish Lillooet Regional District (excluding the Village of Lions Bay), the islands of Bowyer, Passage and Barnston, the University Endowment Lands (including Pacific Spirit Regional Park), and the University of British Columbia*

FIGURE 4: MAP OF PLAN AREA



Approved Facilities

Municipal solid waste in the region can be directed for disposal to any approved disposal facility identified in the ISWRMP.

Approved disposal facilities include the:

- Waste-to-Energy facility in Burnaby
- Vancouver Landfill
- Cache Creek Landfill
- Any disposal facility licensed by Metro Vancouver under the Greater Vancouver Sewerage and Drainage District Municipal Solid Waste and Recyclable Material Regulatory Bylaw No. 181, 1996 as amended by Bylaw No. 183, 1996
- Any new waste-to-energy facility established through a competitive process and subject to an environmental assessment as required by provincial and federal regulation

Since the 1995 SWMP was approved the following disposal facility has been closed:

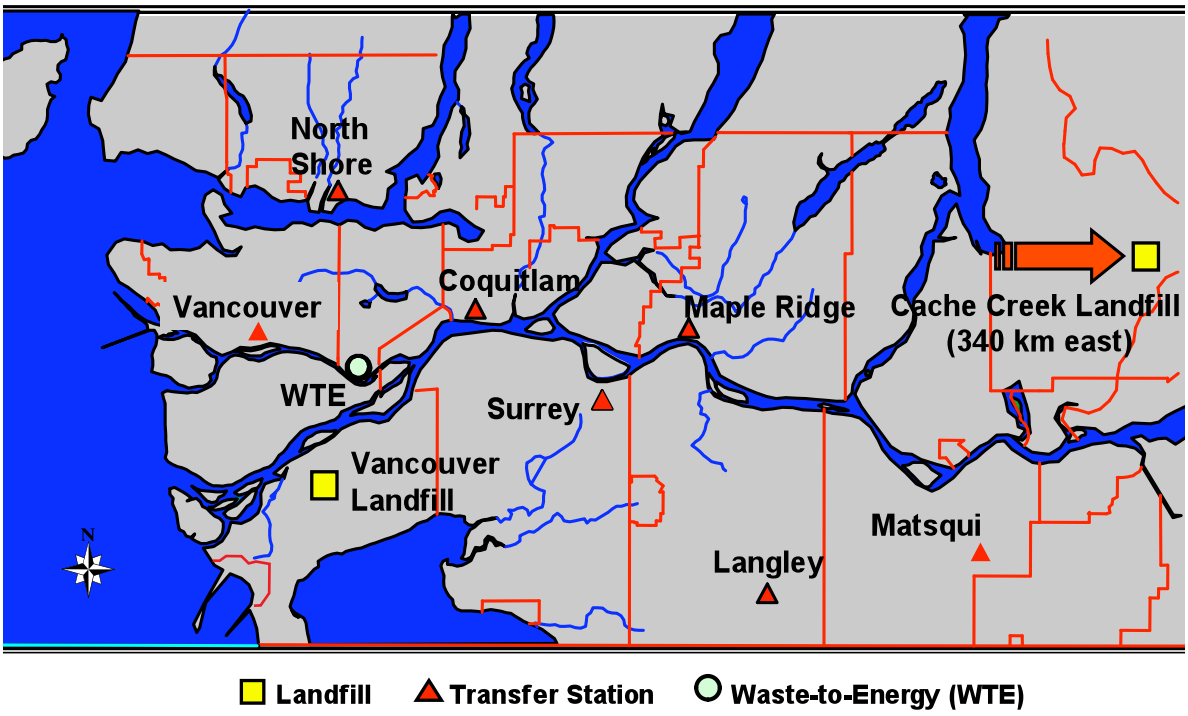
- Port Mann Landfill

In addition to the approved disposal facilities, the following transfer stations are an integral part of the Metro Vancouver integrated waste management system:

- North Shore Transfer Station
- Vancouver South Transfer Station
- Coquitlam Transfer Station
- Surrey Transfer Station
- Langley Residential Transfer Station
- Maple Ridge Residential Transfer Station
- Matsqui Transfer Station

The locations of the Metro Vancouver and City of Vancouver facilities are shown in Figure 5.

FIGURE 5: MAP OF APPROVED FACILITIES



New Facilities

The Ministry of Environment will be informed and consulted regarding the addition of new waste-to-energy facilities. Metro Vancouver will develop a public consultation plan as required by the environmental assessment process.

The addition of new facilities not contemplated in this plan will require an amendment to the plan. The addition of new facilities which are not disposal facilities will not necessitate an amendment to this plan.

First Nations Lands

Unknown quantities of waste from Metro Vancouver, primarily from the DLC sector, are disposed in landfills located on First Nations lands both outside and inside the Metro Vancouver geographical area. Metro Vancouver has no jurisdiction for these landfills.

B. Goals, Strategies, Actions and Measures

Goal 1: Minimize Waste Generation

The following strategies and actions are proposed to achieve this goal:

STRATEGY 1.1

Advocate that senior governments transfer additional waste management responsibilities to producers and consumers

The costs and responsibilities of waste management have historically been borne by local governments and taxpayers. The responsibility for the costs and risks to manage end-of-life products should progressively transfer to the manufacturers of goods and the consumers that use them to provide the appropriate market mechanism to encourage more sustainable manufacturing and consumer choices.

METRO VANCOUVER WILL:

1.1.1 Be a strong advocate for Extended Producer Responsibility (EPR). *Ongoing*

1.1.2 Participate on Federal EPR initiatives such as the Canadian Council of Ministers of Environment (CCME) Extended Producer Responsibility Task Force, to develop national guidelines for sustainable packaging. *Ongoing*

1.1.3 Participate on industry stewardship advisory committees. *Ongoing*

1.1.4 Participate on the BC Product Stewardship Council to assist in evaluating existing and developing new EPR programs. *Ongoing*

MUNICIPALITIES WILL:

1.1.5 Partner with Metro Vancouver in support of actions 1.1.1 through 1.1.4 *Ongoing*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

1.1.6 Ministry of Environment to create a formal partnership with Metro Vancouver representation, to accelerate EPR program development and implementation. *2010*

STRATEGY 1.2

Reduce or eliminate materials entering the solid waste system which hinder or limit the opportunities to achieve reuse, recycling, or energy recovery, or that may exacerbate environmental impacts of disposed residuals

Some inputs to the solid waste stream may hinder or limit the opportunities to achieve reuse, recycling, or energy recovery, or may exacerbate environmental impacts of disposed residuals. These inputs will be identified and programs developed to reduce or eliminate them. This strategy also applies to Goal 2.

METRO VANCOUVER WILL:

1.2.1 Work with disposal facility operators, local municipalities and the recycling industry. *Ongoing*

(a) to introduce material bans after suitable public information programs. *Ongoing*

STRATEGY 1.3

Provide information and education on options to reduce waste

The amount of waste we produce is directly linked to the amount and type of goods and services we consume. Providing the public and businesses with an awareness of the consequences of unsustainable behaviour and tools and incentives to change will assist in reducing the generation of waste.

METRO VANCOUVER WILL:

1.3.1 Develop and deliver a community social marketing based program to inform and educate citizens on waste reduction opportunities including schools. *Ongoing*

(a) Promote a minimum of 70% diversion goal over all sectors – feature in communication materials. *Ongoing*

1.3.2 Develop and deliver a community social marketing based business education plan, including business guides and other outreach programs to inform and educate businesses on waste reduction opportunities. *2011*

MUNICIPALITIES WILL:

1.3.3 Partner with and assist Metro Vancouver in the development and delivery of public and business information and education programs. *Ongoing*

Goal 2: Maximize Reuse, Recycling and Material Recovery

Strategies to achieve this goal focus on proactive approaches to reuse, increased recycling effort and implementation of a region-wide food waste composting program.

Strategy 2.1
Increase the opportunities for reuse

Increasing the opportunities for individuals to reuse more materials involves increasing convenience and reducing impediments.

METRO VANCOUVER WILL:

2.1.1 Investigate financial and regulatory barriers which prevent or discourage the reuse of materials. *2011*

2.1.2 Investigate the effectiveness and adequacy of existing material exchange networks. *2011*

2.1.3 Bring forward appropriate measures which respond to the findings of 2.1.1 and 2.1.2. *2011*

2.1.4 Enhance partnerships with the Province, industry and academia to research and develop solutions to overcome barriers to recycling and new opportunities to re-engineer recycled material. *2011*

MUNICIPALITIES WILL:

2.1.5 Work with Metro Vancouver to give effect to 2.1.1, 2.1.2, 2.1.3 and 2.1.4. *Ongoing*

Strategy 2.2
Increase the effectiveness of existing recycling programs

Use the existing infrastructure effectively to achieve higher recycling rates.

METRO VANCOUVER WILL:

2.2.1 Implement disposal bans on materials that limit opportunities to achieve reuse, recycling, or energy recovery. *Ongoing*

(a) Work with disposal facility operators, local municipalities and the recycling industry to determine the impact and source of components of the waste stream, the consequence and feasibility of banning materials with the most negative impacts and the most suitable recycling options for those materials. *Ongoing*

(b) Continue the monitoring and enforcement of the disposal bans. *Ongoing*

(c) Introduce material bans as determined by 1.2.1 (a) after suitable public information programs. *Ongoing*

(d) Analyse the effectiveness of disposal bans and possible alternative enforcement models including enforcement at source. *2010*

(e) After suitable public information programs, expand disposal bans to include materials encompassed by new EPR programs and material for which new recycling markets are developed. *Ongoing*

2.2.2 Inform businesses and residents of recycling opportunities. *Ongoing*

(a) Continue and upgrade a regional web-based source of information on recycling opportunities for businesses and residents. *Ongoing*

(b) Keep municipalities fully informed as to recycling collection and drop off facilities and changes to policies and facilities. *Ongoing*

(c) Provide outreach services. *Ongoing*

2.2.3 Increase the efficiency and consistency of recycling collection services across the region. *2012*

(a) Work with municipalities to review materials accepted for recycling from residential and ICI sources. *2012*

(b) In collaboration with municipalities, undertake a business case review of the residential and ICI waste and recycling collection services over the region to determine and implement the appropriate level of consistency between municipalities. *2012*

2.2.4 Establish Eco-Centres. *Ongoing*

(a) Establish a work group to determine the terms and conditions for participating municipalities and industries and the means of integrating Eco-Centres into Metro Vancouver's transfer station system and municipal depot systems. *Ongoing*

(b) Develop the model of Eco-Centres, new one-stop-drop centres for recycling. *Ongoing*

(c) With municipalities, determine the terms and conditions for participating municipalities and industries and develop appropriate business cases. *Ongoing*

(d) After determining terms and conditions, establish the first Eco-Centre in Surrey. *Ongoing*

(e) Progressively expand the Eco-Centre system across the region as municipal business cases determine. *Ongoing*

2.2.5 Promote recycling at festivals and events. *Ongoing*

(a) Complete pilot studies on Zero Waste initiatives at festivals and events. *Ongoing*

(b) Develop a Zero Waste toolkit for festivals and events. *Ongoing*

(c) Continue to work with municipalities, EPR groups and local community groups to implement waste minimization and recycling at community festivals and events, including conferences and tradeshows. *Ongoing*

(d) Provide outreach services. *Ongoing*

2.2.6 Work with schools to conduct pilot programs to promote waste reduction and recycling. *Ongoing*

(a): Develop instructional programs that encourage waste reduction and recycling both within the schools and at home. *Ongoing*

MUNICIPALITIES WILL:

2.2.7 Work with Metro Vancouver on actions designed to: *Ongoing*

(a) implement disposal bans; *Ongoing*

(b) inform businesses and residents of recycling opportunities; *Ongoing*

(c) increase the efficiency and consistency of recycling collection services across the region; *Ongoing*

(d) establish Eco Centres; *Ongoing*

(e) promote recycling at community events and festivals; *Ongoing*

(f) work with schools to conduct pilot programs to promote waste reduction and recycling. *Ongoing*

Strategy 2.3: Facilitate increased private sector recycling

There is a shortage of recycling processing capacity for many materials within the region. Metro Vancouver and member municipalities can assist in addressing this shortage by using tools at its disposal to change the business environment so that the private sector can increase capacity.

METRO VANCOUVER WILL:

2.3.1 Facilitate the siting of private sector recycling activities. *2012*

(a) Review the GVS&DD Solid Waste Regulatory Bylaw to facilitate the siting of municipal solid waste facilities that meet municipal bylaws. *2012*

2.3.2 Foster research and market development for recycled materials. *Ongoing*

(a) Evaluate a business case for a regional scale recyclable service delivery model. *2010*

(b) Review desirability, feasibility and opportunity for establishing a non-profit organization to facilitate the development of recycling businesses and markets, along the lines of the 'London Remade' model in the U.K. *2012*

(c) Subject to the results of 2.3.2 (a) and (b), establish a regional role in processing and marketing of recycled materials, a land acquisition strategy for required recycling facilities, and enhanced policy-based initiatives to promote local recycled content in consumer goods. *Ongoing*

MUNICIPALITIES WILL:

2.3.3 Facilitate the siting of private sector recycling activities. *2012*

(a) Review zoning bylaws to remove unnecessary impediments to and encourage recycling and material recovery activities in appropriately zoned areas. *2012*

2.3.4 Work with Metro Vancouver on the evaluation of regional scale recycling facilities and development of recycling markets. *Ongoing*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

2.3.5 Provincial and Federal Governments to identify and establish minimum post-consumer recycled content requirements for consumer goods. *2012*

Strategy 2.4: Target demolition, land clearing and construction (DLC) sector for increased reuse and recycling

Although the DLC sector has very high recycling rates due to high levels of concrete and asphalt recycling, there are significant opportunities to improve with respect to a variety of other materials such as wood and roofing.

METRO VANCOUVER WILL:

2.4.1 Encourage reuse of wood. *2010*

(a) Examine and, where feasible, implement incentives for reuse and remove barriers to re-use of wood waste. *2010*

(b) Develop and implement information and education programs on the reuse and effective recycling of DLC waste. *2010*

2.4.2 Implement waste reduction strategies directed toward diverting DLC waste from disposal while supporting opportunities for beneficial use. *Ongoing*

(a) Encourage the role of building supply retailers and producers in the collection of DLC material for recycling. *Ongoing*

(b) Provide areas for separated recyclable DLC materials at Eco-Centres and at transfer stations as they are upgraded. *Ongoing*

2.4.3 In collaboration with municipalities and industry groups, develop a policy and amendment to this plan to regionally mandate DLC recycling at the job site by December 2011. A schedule for implementation will be part of the policy. *2011*

2.4.4 Review existing DLC recycling and processing capacity, project future needs and develop a strategy to address any identified gaps. *2012*

MUNICIPALITIES WILL:

2.4.5 Work with Metro Vancouver to develop a policy and amendment to this plan to regionally mandate DLC recycling at the job site by December 2011. *Ongoing*

(a) Review municipal DLC permitting processes with a view to requiring waste management plans as a condition of such permits. *Ongoing*

(b) Review the desirability and feasibility of deposit systems or other financial incentives to increase enforcement of DLC waste management plans. *Ongoing*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

2.4.6 Provincial Government to expand the inclusion of the reuse of wood in building codes. *Ongoing*

Strategy 2.5: Reduce paper and paperboard being disposed

19% of the disposed waste stream is made up of paper and paperboard, much of which should be included in the existing recycling programs. Food contaminated paper which cannot be recycled can be composted along with other organics to produce a reusable and beneficial product.

METRO VANCOUVER WILL:

2.5.1 In collaboration with municipalities, conduct pilot programs to determine the most effective method of reducing unwanted junk mail and other publications and act accordingly on the results. *Ongoing*

2.5.2 Promote reduced paper use and increase paper recycling opportunities in the community and businesses. *Ongoing*

(a) Carry out a community social marketing campaign to determine and overcome barriers to reducing the use of and increasing the recycling of paper in schools and community facilities. *Ongoing*

(b) Carry out a targeted outreach campaign to business to determine and overcome barriers to reducing the use of and increasing the recycling of paper. *Ongoing*

MUNICIPALITIES WILL:

2.5.3 Collaborate with Metro Vancouver in junk mail reduction pilot programs and community social marketing programs in community facilities. *Ongoing*

Strategy 2.6: Target organics for recovery

Food waste comprises 21% of the waste disposed. This, along with yard and garden waste and some paper and paperboard can be composted together in a source separated stream to produce a beneficial and marketable product which includes compost and bio-fuel.

METRO VANCOUVER WILL:

2.6.1 Evaluate options for processing of organics with biosolids and other utility residuals. *2010*

(a) Complete trials on commingling food waste with wastewater solids to produce bio-fuels. *2010*

(b) Determine costs and benefits of commingling biosolids with other residuals. *2010*

(c) Bring forward appropriate actions based on results of 2.6.1 (a) and 2.6.1 (b). *2010*

2.6.2 Divert organics from the waste stream *Ongoing*

(a) Establish one or more organics processing facilities. *Ongoing*

(b) Determine which paper and paperboard products are suitable for processing at an organics management facility. *Ongoing*

(c) In collaboration with municipalities, develop and implement a work plan for the diversion of organic waste, including food waste, from: *Ongoing*

i) single family residences. *Ongoing*

ii) multi-family residences. *Ongoing*

iii) the ICI sector. *Ongoing*

(d) Develop and implement supporting communication programs for 2.6.2 (c). *Ongoing*

MUNICIPALITIES WILL:

2.6.3 In collaboration with Metro Vancouver, develop and implement a work plan for the diversion of organic waste from single family residences, multi-family residences, and the ICI sector, including appropriate supporting communication programs. *Ongoing*

(a) Municipalities will divert organics from the waste stream to a Metro Vancouver or alternative licensed organics processing facility. *Ongoing*

(b) Municipalities will report the tonnage of diverted organic waste to Metro Vancouver in the event that organics are delivered to licensed non-regional processing facilities. *Ongoing*

Strategy 2.7: Target plastics for increased recycling

Many plastics can be used to create new products. Recycling plastics reduces the amount of waste that must be transported, treated, and landfilled and conserves a non-renewable resource.

METRO VANCOUVER WILL:

2.7.1 Expand the recycling of plastics in the residential and commercial sectors. *2011*

(a) Establish a standard for municipal programs for collection of plastics based on market strength. *2011*

(b) In cooperation with retail partners and municipalities, undertake social marketing pilot programs to reduce the use of disposable take-out food and beverage packaging including plastic and other disposable bags. *2011*

MUNICIPALITIES WILL:

2.7.2 Work with Metro Vancouver on programs to reduce the use of disposable take-out food and beverage packaging including plastic and other disposable bags. *2011*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

2.7.3 The Provincial Government to develop EPR programs for all plastics that provide incentives for alternatives to non-recyclable plastics. *Ongoing*

2.7.4 The Provincial and Federal Governments to require all plastic material sold in BC to have a material code identifying its composition. *Ongoing*

Strategy 2.8: Target multi-family and industrial, commercial and institutional (ICI) sectors to improve diversion rates

Multi-family residences and the commercial sector have relatively low diversion rates, in part because many premises do not have adequate facilities to accommodate recycling.

METRO VANCOUVER WILL:

2.8.1 Develop bylaws to require recycling in all multi-family and commercial buildings and complexes. *2011*

(a) Develop a model bylaw and enforcement model to require recycling in multi-family and commercial buildings. *2011*

(b) Create an advisory service for recycling programs for multi-family and commercial buildings. *2011*

MUNICIPALITIES WILL:

2.8.2 Work with Metro Vancouver to implement recycling in multi-family and commercial buildings. *2011*

Goal 3: Recover Energy from the Waste Stream After Material Recycling

The following strategies will increase processing of the waste remaining after recycling in order to provide the highest beneficial use to society.

Strategy 3.1: Use Waste-to-Energy to provide electricity and district heating

Waste-to-Energy facilities most effectively and efficiently extract energy from the waste stream remaining after recycling and when combined with district heating can reduce the environmental impacts of energy use within the region. The planned capacity of such facilities should be compatible with waste diversion targets and initiatives and projected waste flows which remain after such diversion.

METRO VANCOUVER WILL:

3.1.1 Continue use of existing waste-to-energy facility in Burnaby.

(a) Use the facility at its optimal capacity to recover available energy in the waste remaining after recycling for district energy and electricity generation. *Ongoing*

(b) Continue to improve environmental performance of the facility with improved technologies and monitor performance to ensure compliance with environmental regulations and objectives. *Ongoing*

3.1.2 Expand the use of waste-to-energy within the region. *2015*

For the purpose of assessment, waste-to-energy may include, but not necessarily be limited to:

- targeted incineration
- industrial use of refuse derived fuel
- gasification/pyrolysis
- anaerobic digestion

or a combination of technologies

(a) Establish a limit of 500,000 tonnes per year of new waste-to-energy capacity within the region in one or more facilities.

(b) Ensure implementation of new waste-to-energy capacity maximizes energy recovery for use in district heating, industrial applications and electricity generation.

(c) Monitor trends in waste reduction, recycling and waste flows and implement additional waste-to-energy capacity if, and only if, justified on the basis of these trends.

(d) Scale any additional waste-to-energy capacity so that total waste-to-energy capacity in the region does not exceed the most probable minimum waste flow projected over the economic life of those facilities.

(e) Monitor the waste-to-energy facility (ies) to ensure compliance.

3.1.3 Locate new waste-to-energy capacity within the Region on the basis of: *2015*

site availability; suitability of site for providing district heating from recovered energy; potential for site to optimize network of transfer stations; results of local screening level impact assessment and triple bottom line analysis; and results of community consultation process for each potential site.

3.1.4 If expanded use of waste-to-energy within the region is not possible then establish waste-to-energy capacity outside the region.

(a) Establish a limit of 500,000 tonnes per year of new waste-to-energy capacity outside the region.

(b) Ensure implementation of new waste-to-energy capacity maximizes energy recovery

for use in district heating, industrial applications and electricity generation.

(c) Monitor trends in waste reduction, recycling and waste flows and implement additional waste-to-energy capacity if, and only if, justified on the basis of these trends.

(d) Scale any additional waste-to-energy capacity so that total waste-to-energy capacity does not exceed the most probable minimum waste flow projected over the economic life of those facilities.

(e) Monitor the waste-to-energy facility(ies) to ensure compliance.

3.1.5 Locate new waste-to-energy capacity outside the Region on the basis of: site availability; suitability of site for maximum energy recovery; results of local screening level impact assessment and triple bottom line analysis; and the results of community consultation for each potential site.

3.1.6 Ensure that new waste-to-energy facilities are designed to maximize the environmental, financial and social benefits of facilities. *2015*

(a) Evaluate cost/benefits of proposed new facilities over their lifetime, including construction, commissioning, operation and maintenance, future retrofits and decommissioning impacts.

(b) Conduct an environmental impact assessment of the waste-to-energy facility(ies), based on applicable provincial and federal government requirements.

(c) Evaluation criteria will include: use of best available commercial technology; emissions outperform applicable environmental standards; alignment with sustainability principles; electricity and district heating production; beneficial use of ash; metals recovery; potential local job creation; and opportunities for research and education.

3.1.7 Recover metals and ash from new and existing waste-to-energy facilities for beneficial use. *Ongoing*

(a) Work with regulatory agencies to identify and remove barriers to beneficial use of ash.

(b) Maximize metal recovery from the waste stream after recycling.

(c) Process bottom and fly ash to generate products for beneficial use.

(d) Use processed bottom and fly ash beneficially for highest value applications available.

(e) Establish supply agreements to provide bottom and fly ash for beneficial use.

3.1.8 Recover energy from regional utility materials that cannot be recycled, including liquid waste and water utilities *Ongoing*

(a) Recover energy from drinking water treatment processes, such organic filter media that cannot be recycled.

(b) Use waste-to-energy to process grit and screenings from wastewater treatment for beneficial uses, where appropriate.

(c) Use reclaimed water from wastewater treatment plants in waste-to-energy steam generation or district heating, if viable.

Strategy 3.2: Recover energy from other solid waste management facilities

Valuable methane in landfill gas will be captured and used to generate clean electricity or heat.

MUNICIPALITIES (CITY OF VANCOUVER) WILL:

3.2.1 Recover landfill gas from Vancouver Landfill and strive to maximize the beneficial use of the recovered gas. *Ongoing*

Strategy 3.3: Utilize non-recyclable material as fuel

Some materials cannot be recycled. However, such materials can provide a valuable source of fuel, replacing virgin fossil fuels.

METRO VANCOUVER WILL:

3.3.1 Direct recoverable loads of combustible material received at transfer stations to public or private energy recovery facilities *2012*

3.3.2 Ban wood from landfill disposal.*2012*

MUNICIPALITIES (CITY OF VANCOUVER) WILL:

3.3.3 Collaborate with Metro Vancouver in ensuring actions 3.3.1 and 3.3.2 are carried out at solid waste management facilities operated by the City of Vancouver. *2012*

ACTIONS REQUESTED OF OTHER GOVERNMENTS AND AGENCIES:

3.3.4 Provincial Government to develop material and energy requirements for existing and future stewardship programs to use the non-recyclable portion of returned material as fuel rather than landfilling. *2012*

Goal 4: Dispose of All Remaining Waste in Landfill, after Material Recycling and Energy Recovery

Strategy 4.1: Utilize the Vancouver Landfill as a disposal site

Waste will remain after recycling and energy recovery. Additionally, as a result of ensuring that waste-to-energy facilities are sized to be compatible with waste reduction and diversion objectives, there will be residual (post recycling) waste flows which exceed the aggregate capacity of the region's waste-to-energy facilities. Such waste must be disposed of in an environmentally sound and economically efficient manner. The Vancouver Landfill provides a local solution for remaining waste.

METRO VANCOUVER WILL:

4.1.1 Use the Vancouver Landfill to dispose of any remaining waste not directed to waste-to-energy facilities, subject to any fixed limits identified in the Operational Certificate of the landfill, related contracts, agreements between Vancouver, Delta, and Metro Vancouver and regulations. *Ongoing*

(a) Monitor the Vancouver Landfill to ensure compliance.

4.1.2 Report annually on the remaining capacity of the waste management system and prior to the closure of Vancouver Landfill, reassess the region's waste-to-energy and disposal options. *Ongoing*

MUNICIPALITIES (CITY OF VANCOUVER AND THE CORPORATION OF DELTA) WILL:

4.1.3 Work with Metro Vancouver to accommodate residual waste flows at the Vancouver Landfill subject to any fixed limits identified in the Operational Certificate of the landfill, related contracts, agreements and regulations. *Ongoing*

4.1.4 Where limits in the Operational Certificate, contracts, agreements and regulations appear to work contrary to the overall interests of the regional community, review the particular provisions in good faith with the Province, Metro Vancouver and any other involved party to determine if there is a solution acceptable to all affected parties. *Ongoing*

Strategy 4.2: Ensure a disposal site is available for DLC waste

Notwithstanding efforts to increase recycling, local public and private disposal sites for DLC waste are expected to reach their capacity in the near future. Collaboration with local and out-of-region stakeholders is necessary to anticipate DLC waste flows and identify future disposal sites.

METRO VANCOUVER WILL:

4.2.1 Assess long-term disposal of demolition, landclearing, and construction (DLC) waste remaining after recycling in collaboration with the private sector, neighbouring regional districts and First Nations communities. *Ongoing*

4.2.2 Identify disposal sites for DLC waste remaining after recycling that will be available when existing disposal facilities reach their capacity. *Ongoing*

Strategy 4.3: Establish contingency disposal sites

During the implementation of, or, following the implementation of Goal 3, if waste-to-energy capacity and/or local landfill capacity do not provide adequate disposal capacity, Metro Vancouver will need to use out-of-region landfill(s) for disposing of non-recyclable waste.

METRO VANCOUVER WILL:

4.3.1 Ensure adequate landfill capacity for:

- non-combustible and non-recyclable material; and
- municipal solid waste in excess of waste-to-energy and in-region landfill capacity (including allowances for variability in waste flows and short term operational disruption), and non-recyclable ash.

Ongoing as required

4.3.2 If sufficient waste-to-energy or landfill capacity is not available in the Region, this plan explicitly permits Metro Vancouver to seek and utilize the best available out-of-region landfill(s) for the disposal of remaining waste, subject to that facility having appropriate permits, from the local permitting jurisdiction in which it is located, to accept such waste.

Ongoing as required

(a) Monitor contingency disposal site(s) for performance and compliance. *Ongoing*

Strategy 4.4: Use adaptive management to address evolving needs

A key feature of the plan is adaptive management—monitoring progress, identifying challenges, and finding solutions to overcome challenges. Through monitoring, assessment, and collaboration, Metro Vancouver and its members will continue to adapt and evolve their solid waste management operations and infrastructure and create more resilient and adaptable systems.

METRO VANCOUVER WILL:

4.4.1 In the event of circumstances such as an operational disruption or closure at a facility identified in the Plan, the region will be prepared to send surplus waste to an out-of–region landfill until sufficient processing or disposal capacity becomes available in the region. Permitted landfill(s) will be selected based on:

(a) ability to provide service on a short term or interim basis

(b) sustainability principles. *Ongoing*

4.4.2 Continue to assess the success of initiatives outlined in the Plan against the overall trends in waste generation and the performance of waste-to-energy facilities to determine the need for an emphasis of future resource allocations to the various strategies and actions. *Ongoing*

4.4.3 Continue to receive advice from the Waste Management Committee. *Ongoing*

4.4.4 In collaboration with municipalities, biennially produce a progress report on plan implementation for distribution to the Ministry of Environment that:

(a) summarizes progress from the previous two years on regional and municipal plan implementation, the status of performance measures, and relevant education and outreach programs.

(b) includes summaries and budget estimates for proposed Metro Vancouver and municipal ISWRMP implementation programs for the subsequent two calendar years.

Ongoing every two years

4.4.5 Will obtain public feedback on the report by making the report available through Metro Vancouver's website and by holding a special meeting of the Metro Vancouver Waste Management Committee to receive public comments and input on the report.

Ongoing every two years

4.4.6 In collaboration with members and the Ministry of Environment, undertake a comprehensive review and update of the plan on a five-year cycle.

Ongoing every five years

MUNICIPALITIES WILL:

4.4.7 Work with Metro Vancouver to give effect to 4.4.4, 4.4.5, and 4.4.6. *Ongoing*

Performance Measures

Metro Vancouver will develop a waste accounting system for the entire solid waste management system, identifying the quantities generated, recycled, composted, used for energy recovery, and disposed in landfill. Comparison of per capita disposal values will provide the most accurate assessment of progress of the plan.

The following performance measures will monitor progress in achieving the specific goals. Performance should be considered in the context of 2008 waste management data. Performance Measures for each goal are:

Goal 1: Minimize Waste Generation

- Waste generation per capita tracked year-over-year
- Waste generation per capita for residential and commercial waste tracked year-over-year
- Increase of product stewardship initiatives by senior governments to more than two initiatives every three years

Goal 2: Maximize Reuse, Recycling and Material Recovery

- Overall diversion rate tracked year-over-year
- Diversion rate per capita tracked year-over-year
- Tracking of material recycling tonnage

Goal 3: Recover Energy from the Waste Stream After Material Recycling

- Energy outputs from solid waste and its beneficial use tracked year-over-year
- Energy outputs recovered from materials that cannot be recycled through recycling efforts and stewardship programs
- Greenhouse gas production tracked year-over-year

Goal 4: Dispose of all Remaining Waste in Landfill, after Material Recycling and Energy Recovery

- Quantity of treated and untreated waste per capita going to landfill is tracked year-over-year

Financial Implications

Roles and Responsibilities

Solid waste management services are provided for the region collaboratively by Metro Vancouver, member municipalities, and the private sector. While the roles of each party may overlap, primary roles for recycling include: Metro Vancouver establishes policy for waste diversion initiatives, member municipalities implement recycling programs including collection within their municipalities, and the private sector provides collection services, manages material brokerage and physical recycling of materials including provision of infrastructure for recycling facilities.

Responsibilities for disposal of the remaining solid waste includes: Metro Vancouver establishes policy for waste disposal, and manages infrastructure and operations of transfer and disposal facilities; member municipalities manage solid waste collection services; and the private sector may provide services for collection, and operation of transfer and disposal facilities. The main exception to these roles is the ownership and operation of the Vancouver Transfer Station and Landfill by the City of Vancouver.

Cost of Solid Waste Management

Funding for material recycling is provided by residents and businesses through one of two mechanisms. Materials with no associated industry stewardship program, such as paper, are funded from businesses and residents to recycling collectors (municipalities, or private sector contractors) either through municipal taxes or through direct contracts with collectors. Materials covered by Extended Producer Responsibility programs, such as beverage containers, are typically funded through deposits paid by consumers to the industry association which then carries responsibility for collection and recycling of the materials.

As outlined in Table 1, within Metro Vancouver, net expenditures associated with recycling activities is currently estimated to be $190 million annually. This reflects the cost paid to contractors for collection, transportation, and processing of recyclable materials. Following implementation of actions within this Plan, regional recycling net expenditures are projected to increase by 42% to $270 million annually – an increase of $80 million each year. The increase in economic activity will result in a corresponding increase in the diversion rate from 55% to 70% - a 27% increase. The cost increase of 42% producing a 27% increase in recycling reflects diminishing returns with respect to recycling materials with lower value, or more expensive processes and infrastructure. This trend of diminishing returns is anticipated to continue as the 70% diversion target is approached since the remaining materials become more challenging and costly to recycle.

TABLE 1 REGIONAL WASTE MANAGEMENT – NET EXPENDITURES

	35 Year Net Cost ($ billion)	Annual Net Cost ($ million)	Per Capita Cost ($)
Total Current SWMP	$20	$550	$247
Total Proposed ISWRMP	$18	$490	$220
Difference	**($2)**	**($60)**	**($27)**
Current Recycling (55%)	$7	$190	$85
Proposed Recycling (70%)	$10	$270	$121
Difference	**$3**	**$80**	**$36**
Current Disposal	$13	$360	$162
Proposed Diposal	$8	$220	$99
Difference	**($5)**	**($140)**	**($63)**

Funding for management of the materials remaining after recycling is provided by residents and businesses to solid waste collectors (municipalities or private sector contractors) either through municipal taxes or through direct contracts with the private sector collectors.

Within Metro Vancouver, net expenditures associated with solid waste disposal are currently estimated to be $360 million annually. This reflects the cost for collection, transportation, and disposal of solid waste remaining after recycling. Following implementation of actions within this Plan, regional solid waste disposal net expenditures are projected to decrease by 39% to $220 million annually – a decrease of $140 million each year. This decrease is due to the reduction in waste quantities, and increased revenues from energy recovery through actions outlined in Goal 3 of the Plan.

The system costs for both recycling and disposal are also expressed in Table 1 on a per-capita basis. The per-capita cost for recycling will be higher than disposal, reflecting the greater quantities of recyclable materials. However, pricing will be established to ensure a financial incentive to encourage recycling and waste diversion.

The costs identified in Table 1 reflect expenditures based upon the actions identified in the Plan which includes additional waste-to-energy capacity provided within the region. Alternately, if waste-to-energy capacity is provided out-of-region, net costs are anticipated to increase by $1.5 billion dollars over 35 years, or, $43 million annually. Similarly, if out-of-region landfill capacity is pursued, net costs are anticipated to increase by $1.5 billion over the same time frame, or $43 million annually compared to the proposed plan. It is expected that the cost to export waste to the U.S. would be similar to those presented for out-of-region landfill.

While Table 1 identifies the net regional expenditures on waste management, it does not account for the regional economy associated with recycling and disposal. There is considerable economic activity that takes place in the process of recycling the collected materials into new goods as an alternative to virgin feedstocks. Although difficult to estimate, the economy associated with remanufacturing recycled materials into new products exceeds the costs for collection, transportation and processing. Net expenditures associated with disposal more closely reflect the entire disposal economy since there is little economic activity that occurs following disposal. While this Plan places much greater emphasis on

waste reduction and recycling, and shifts regional net expenditures in alignment with this emphasis, there is an even greater shift in the overall regional economy from disposal to waste reduction and recycling. As a result, the regional economy for waste reduction and recycling far exceeds that for waste disposal and therefore is reflective of the priority placed upon waste reduction, reuse and recycling as outlined in this plan.

Pricing Strategies

The costs of operating the integrated solid waste and resource recovery system, including initiatives to encourage waste reduction, reuse and recycling, will be funded from revenues from users of the system (principally the tipping fee) and from revenues from recovered resources (recycled materials and recovered energy).

Residents and businesses will have an economic incentive to invest in waste diversion initiatives, arising primarily from the difference between the cost of recycling and the tipping fee for waste disposal at public facilities. The regional tipping fee will continue to be set at a rate to recover Metro Vancouver's cost to manage the solid waste system. The tipping fee for many recyclable materials will be reduced or waived at regional facilities to encourage participation. By utilizing this economic incentive of reducing or waiving the tipping fee for recyclable materials, positive behaviour will be encouraged thereby driving an increase in the material diverted from the disposal stream and helping to achieve the 70 percent diversion target. Pricing will be established so that the most expensive choice for residents and businesses will be to place materials in garbage cans and dumpsters for disposal.

Ownership and Financing

There are options to be considered for facility ownership and the related business model for all new facilities contemplated in this Plan. Currently, the existing waste-to-energy facility in Burnaby is owned by Metro Vancouver and operated by a contractor under a long-term operating agreement. The benefits of facility ownership include the accrual to Metro Vancouver of debt reduction once debt has been fully serviced, full control of all upgrades associated with the facility, no need for put-or-pay contracts, the ability to fully maximize revenues to offset costs, the control of all indirect costs including royalty payments, the control and negotiation of all operating certificates and the ability to further minimize cost by not requiring a profit margin. The consideration of the benefits of ownership was paramount when the decision was made in 2000 by the Board to purchase the Ashcroft Ranch and pursue the development of a Metro Vancouver owned landfill. In selecting the ownership and business model for new facilities Metro Vancouver will choose the option that results in the best available financial position for the residents and businesses of the region.

Where capital needs to be raised and debt financed, the least expensive alternative is Metro Vancouver ownership with financing provided through the Municipal Finance Authority. In addition to this financing structure, Metro Vancouver will explore other structures including Public Private Partnerships (3P) on a facility specific basis, where capital financing may be provided by the private sector partner.

As the outcomes of this plan contribute to the achievement of provincial and federal environmental and energy goals, and as regional and municipal financial resources are limited, and as public investment in the actions set out in this plan will assist in achieving the goals of this plan and are in the public interest, financial support from provincial and federal sources will be sought to implement waste diversion programs and develop facilities identified in the Plan.

Financial Details

Direct expenditures by Metro Vancouver and member municipalities for Goals 1 and 2 of the draft Plan are estimated to cost $170 million in one-time capital costs, and $40 million in annual operating costs. Significant initiatives provided through these expenditures (action number provided for reference) include: establish and progressively expand a network of eco-centres (2.2.4); divert organics from the waste stream through separated collection from residential and industrial, commercial and institutional sectors, and establishing one or more organics processing facilities (2.6.2, 2.6.3); provide information and education including social marketing programs (1.2.1, 1.3.1, 1.3.2, 1.3.3, 2.2.2, 2.2.5, 2.2.6, 2.2.7, 2.4.1, 2.5.2, 2.5.3, 2.6.2, 2.6.3, 2.7.1); regionally mandate DLC recycling at jobsites (2.4.5); and regionally mandate recycling in all multi-family and commercial buildings (2.8.1, 2.8.2).

Expenditures for actions identified in Goals 1 and 2 will be funded through tipping fees received for waste disposal and from revenues associated with actions. For example, expenditures for eco-centres will be partially offset by compensation from industry stewards for EPR material collection at the eco-centres and from private sector partners operating at eco-centres. Revenue from compost or energy sales at organics processing facilities will offset the costs associated with operating these proposed facilities.

Direct expenditures by Metro Vancouver and member municipalities for Goals 3 and 4 of the draft Plan are dependent upon the financing and ownership structure for new facilities. If new disposal facilities are provided by and owned by Metro Vancouver, costs for Goals 3 and 4 are estimated to be $440 million in one-time capital costs. Annual operating costs are projected to be approximately $15 million lower than current costs. Under this financing and ownership structure, tipping fees for waste disposal will increase initially during the 15 year amortization period. Following debt retirement, tipping fees will decrease considerably reflecting the net revenue from new waste-to-energy capacity and no debt repayment costs. Over a 30 year operating period, total revenues for new waste-to-energy facilities are projected to exceed the total expenditures resulting in a net revenue. Profit will continue to increase each subsequent year as revenues are accrued in the absence of any capital repayment costs. This is favourable over a 30 year operating period when compared to a $3.1 billion expenditure for an option emphasizing mechanical-biological-treatment processing or a $1.5 billion expenditure for an option emphasizing landfilling.

Provision of waste-to-energy capacity is estimated on the basis of a single new facility providing 500,000 tonnes capacity annually. Distributed systems of waste-to-energy using several smaller facilities will provide social and environmental benefits in the form of additional facilities and the corresponding increased convenience to customers, and reduced emissions and congestion from transportation of waste from regional transfer stations. Financially, a distributed system would reduce the need for transfer stations and associated costs, but would also reduce economies of scale provided by a larger capacity facility and result in higher costs.

If new waste-to-energy facilities are owned and financed by the private sector, costs for Goals 3 and 4 may be recovered over a longer time frame and the regional tipping fees could increase gradually over time due to inflated contract costs. Over a 30 year operating period, privately owned facilities could cost hundreds of millions of dollars more than public ownership if increasing energy revenues accrue to the operator. Accordingly, Metro Vancouver will pursue the ownership and financing model that is in the best interest of member municipalities, residents, and businesses within the region.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APPENDIX II

Metro Vancouver Responses to Concerns Related to the Waste-to-Energy Option

1. Wouldn't building a waste-to-energy facility compete with Metro Vancouver's Zero Waste Challenge goals? Wouldn't we be committed to supplying the facility with a large amount of waste to make it economical?

Our commitment is to diverting waste from disposal in the first place, and experiences in Metro Vancouver (recycling in the region has increased since the Metro Vancouver waste-to-energy facility located in Burnaby began operating in 1988) and elsewhere point to better than average recycling rates in communities with waste-to-energy facilities. After achieving world-class rates of diversion, a growing population means that more than one million tonnes of waste will still need to be managed. Nevertheless, proposed new waste-to-energy capacity in the Draft Integrated Solid Waste & Resource Management Plan is limited to 500,000 tonnes per year.

First and foremost Metro Vancouver is committed to establishing and promoting waste reduction, reuse and recycling programs. Since initiating the Zero Waste Challenge, Metro Vancouver has prioritized minimizing waste generation and maximizing reuse, recycling and material recovery as the top two goals in the Draft Integrated Solid Waste & Resource Management Plan (ISWMRP, 2010). Metro Vancouver and member municipalities are strong supporters of waste diversion and regard all Zero Waste Challenge initiatives as paramount. Work has already begun to provide food waste composting and increase waste diversion from commercial sources. Metro Vancouver currently has a waste diversion rate of 55%, which is far better than the 22% Canada-wide average.

Recycling is very much a part of an integrated waste management system regardless of which new disposal facility is chosen. As illustrated in Figure 1 below, the current waste diversion trend in Europe (where there are more than 400 waste-to-energy facilities) indicates that countries with a higher percentage of waste going to waste-to-energy facilities also have higher recycling rates (AECOM, 2010). Germany, a European leader in waste diversion, emphasizes "Waste prevention has priority over recovery and disposal. Nevertheless, the use of waste for energy recovery is an indispensable element of sustainable waste management" (German Federal Environment Agency, 2008).

According to the US EPA, the national recycling rate in the U.S. is 32%. A 2008 study titled "A Compatibility Study: Recycling and Waste-to-Energy Work in Concert" by Dr. Berenyi of Government Advisory Associates, Inc. reviewed recycling rates in U.S. communities that also use waste-to-energy. The data from this research indicates that "recycling and waste-to-energy are compatible waste management strategies, which are part of an integrated waste management approach in many communities across the United States" (Berenyi, 2008).

Metro Vancouver currently has a waste diversion rate of 55%, which is far better than the 22% Canada-wide average. To ensure that new waste-to-energy capacity will not undermine efforts to increase the diversion rate to 70% by 2015 and then go beyond that level to the extent practical, any new waste-to-energy capacity would be sized such that it would not exceed the amount of waste requiring disposal after recycling. The Draft Integrated Solid Waste & Resource Management Plan states that Metro Vancouver would "monitor trends in waste reduction, recycling and waste flows and implement additional waste-to-energy capacity if, and only if,

justified on the basis of these trends." The region would also "scale any additional waste-to-energy capacity so that total waste-to-energy capacity in the region does not exceed the most probable minimum waste flow projected over the economic life of those facilities".

In addition, current Metro Vancouver data does not support the contention that waste-to-energy and waste reduction are incompatible. Metro Vancouver already has a waste-to-energy facility located in Burnaby, and waste diversion has continued to increase since the waste-to-energy facility began operation in 1988.

Data since 1994 shows a marked increase in waste generation due in large part to the increase in population (Figure 2). This has been accompanied by an increase in the quantity of materials recycled while the quantity of waste requiring disposal has remained virtually constant. Increasing the regional waste diversion rate to 70% or higher will still leave significant quantities of waste requiring management.

According to the German Federal Environment Agency, the use of disposal technology to manage waste does not influence the public's consumption habits. The same quantity of waste disposed in a waste-to-energy facility or landfill would have arisen without expanding disposal capacity. Efficient recycling of and energy recovery from waste not avoided in manufacturing and consumption is important for environmental protection (German Federal Environment Agency, 2008).

2. **Isn't waste-to-energy harmful to the environment and to human health?**

Modern, well-managed waste-to-energy facilities are acknowledged by scientific authorities around the world as safe for the environment and for human health. Metro Vancouver has operated the waste-to-energy facility located in Burnaby for more than 20 years without negative impacts.

Independent studies and scientific evidence from health and environment authorities have concluded that emissions from modern well-managed waste-to-energy facilities are not a health concern. This is because stringent environmental regulations have resulted in increasingly lower emissions through:

- Controlled, high temperature destruction of toxins;
- Advanced emissions control systems to capture contaminants; and
- Continuous monitoring of emissions.

The U.K. Health Protection Agency recently stated "Studies published in the scientific literature showing health effects in populations living around incinerators have, in general, been conducted around older incinerators with less stringent emission standards and cannot be directly extrapolated with any reliability to modern incinerators" (U.K. Health Protection Agency, 2010). Upon having examined the suggested links between emissions from waste-to-energy facilities and health, the U.K. Health Protection Agency concluded that "any potential risk of cancer due to residency near to municipal waste incinerators is exceedingly low and probably not measurable by the most modern techniques. Since any possible health effects are likely to be very small, if detectable, studies of public health around modern, well managed municipal solid waste incinerators are not recommended." This follows the comprehensive review by the Department for Environment, Food, and Rural Affairs (DEFRA) of various municipal solid waste management activities in the United Kingdom. DEFRA found that emissions from WTE were lower than those

from domestic heating or cooking and that there was no epidemiologic link between waste-to-energy and cancer or respiratory disease (Department for Environment, Food, and Rural Affairs, 2004).

A 2000 study into the health aspects of incineration by the American National Research Council concluded that emissions from well-operated modern facilities were expected to contribute little to environmental concentrations of toxic pollutants or to human health risks. The report noted that the substantial reductions occurred as a result of the US EPA introducing stricter environmental regulatory standards (National Research Council, 2000)) and waste-to-energy facilities implementing more advanced air pollution control technology to comply with these standards.

In Canada, a growing body of research on the health effects of the new generation of waste-to-energy facilities has come to the same conclusion. The Durham Region in Ontario retained Jacques Whitford Ltd. to conduct a study titled: “Review of International Best Practices of Environmental Surveillance for Energy-From-Waste Facilities” in conjunction with the Durham/York Residual Waste Study. The report concluded that a modern waste-to-energy facility that employs the Maximum Achievable Pollution Control Technology (MACT), a US EPA standard, would not significantly increase contaminant levels in the environment. This technology, coupled with a recommended surveillance methodology of continuous and periodic stack testing of chemical emissions, is the most prevalent method of ensuring public and environmental health protection for waste-to-energy projects. The report further concluded that no correlation exists between chemical concentrations in ambient air and stack emissions from facilities that employ modern pollution control technology and that there would be no impacts to soil and vegetation quality (Jacques Whitford, 2009). Health Canada states that “If incinerators are equipped with proper pollution control systems (activated charcoal beds, spray dry scrubbing, etc.), the health risks of incineration are very low” (Health Canada, 2004).

The Federal Office of the Environment of Switzerland (FOES) has determined that a municipal solid waste waste-to-energy facility is not an important source of pollution in Switzerland. The FOES also reports that using waste-to-energy facilities for power generation has reduced total air pollution by avoiding the emissions from other power producing facilities in the country (Federal Office of the Environment of Switzerland, 2010).

According to an article in BC Local News published April 30, 2010, B.C. provincial health officer Dr. Perry Kendall said he has no concerns about Metro's waste-to-energy strategy. "There are technologies that can remove any of the health risks," Kendall said. "If you're doing it right, you shouldn't be getting anything harmful. You're getting water vapour and carbon dioxide. Anything else can be scrubbed out, gasified and buried" (BC Local News, 2010).

The Metro Vancouver waste-to-energy facility located in Burnaby (page 17) was developed on the basis that the Best Available Control Technology (BACT) to minimize any environmental impacts. The same policy would apply to a new waste-to-energy facility in the region. Environmental performance is continually monitored and improvements are implemented to ensure the existing facility stays at the forefront of environmental performance. Since beginning operation in 1988, the Metro Vancouver waste-to-energy facility located in Burnaby has:

1. Implemented a carbon injection system to remove mercury from emissions;
2. Implemented an ammonia injection system for NOx abatement;
3. Installed the WES-PHix patented stabilization system to treat fly ash;

4. Implemented zero liquid discharge;
5. Obtained ISO 14001 certification, an independently audited International Standard that requires ongoing continuous environmental improvement of the facility; and
6. Implemented a continuous emissions monitoring system to increase the ability to control the operation and emissions from the facility.

The emissions monitoring programs implemented for the Metro Vancouver Waste-to-Energy Facility in Burnaby were originally recommended by technical committees which included representatives from the Ministry of Environment, Environment Canada, Metropolitan Board of Health, and the GVRD (Metro Vancouver). The Minister of Environment then appointed a Technical Review Committee to assess and evaluate the environmental monitoring program that had been implemented. The Technical Review Committee also included representatives from the Ministry of Environment, Environment Canada, Metropolitan Board of Health, and the GVRD. This Committee appointed a Soil and Vegetation Sub-Committee to oversee the assessment of the soil and vegetation monitoring program.

GVRD staff in association with the Soil and Vegetation Sub-Committee wrote the 1992 report "Burnaby Incinerator: Summary of Soil and Vegetation Monitoring Data" expressly for the Technical Review Committee's consideration. The report presents a comparison of the pre-construction and post-operation soil characteristics at the waste-to-energy facility in Burnaby. The report analyzed the data for individual trace elements in soils and vegetation, and PAH in soil and vegetation around the waste-to-energy facility. It noted that the concentrations of the majority of parameters had decreased over the study period. Those parameters that did not consistently decrease did not exhibit any trends (some sampling sites and depths increased, some decreased). Generally, those parameters that did not consistently decrease over the study period did decrease in the final year of study. There was also no correlation between the levels of metals observed in the soils and vegetation study and the ambient air monitoring program. The conclusion reached after further analysis of the data was that "there is no visible trend that correlates levels of trace element concentrations with emissions from the GVRD incinerator in Burnaby" (GVRD, 1992).

The Technical Review Committee approved the 1992 report which was then forwarded to the (GVRD) Solid Waste Committee for information. The multi-agency committee appointed by the Minister of Environment approved the report that concluded: "To date there is no evidence to indicate that incinerator emissions have had any measurable adverse impact on soil and vegetation trace elements or PAH levels at the representative monitoring sites used in this sampling program", with no further recommendation for ongoing soil and vegetation monitoring.

The measured emissions of contaminants including, particulate matter, nitrogen oxides, sulphur oxides, hydrogen fluoride, hydrogen chloride, metals including mercury, cadmium, and lead, dioxin/furans, and carbon monoxide at the Metro Vancouver Waste-to-Energy Facility located in Burnaby are well below the allowable standard and in most cases negligible. Figure 2 below presents the historical emission monitoring results for these parameters and the associated regulatory levels.

3. **Won't the additional emissions from waste-to-energy make a poor situation even worse in the unique Lower Fraser Valley Airshed? Didn't Metro Vancouver oppose Sumas 2 for these reasons?**

All management of garbage, regardless of the process, results in some air quality impacts. That said, waste management practices contribute less than one percent to the air contaminants in the Lower Fraser Valley, a level that will decline under the Draft Integrated Solid Waste & Resource Management Plan. Modeling indicates that there is no discernible difference in air quality between the various options (landfilling, waste-to-energy, etc.) under consideration. Metro opposed the Sumas 2 project as it would have resulted in an incremental increase in emissions with no benefit to Canada and Canadians.

The Sumas Energy 2 (SE2) project was originally proposed in 1999 as a 660 MW combined cycle power plant to be located in Sumas, Washington - less than one kilometre from the Canada-U.S. border. The project was approved by the Washington State Governor in 2004, but faced opposition from a number of Canadian agencies, including the GVRD Board. Ultimately, the permit to construct the proposed transmission line from the Canada-U.S. border to an Abbotsford, B.C. substation was denied by the National Energy Board in 2004 (National Energy Board, 2004), and the denial was upheld by the Federal Court of Appeal in 2005 (Federal Court of Appeal, 2005). There is no comparison between the SE2 plant and new waste-to-energy facilities. Analysis showed that SE2 would result in a net increase in emissions as well as health impacts to the region. As such, SE2 was viewed as contrary to Metro Vancouver's goals to improve the air quality in the airshed – goals which would be achieved by continuing to reduce harmful air emissions from all possible sources and avoiding the introduction of unnecessary emission sources to the Lower Fraser Valley Airshed. SE2 was an unnecessary, incremental source of air contaminants that would offer no benefits to Canadians – only negative impacts.

In contrast, if we accept that a growing population of over 2 million residents in the region will continue to generate waste that needs to be disposed for the foreseeable future, even as we increase waste diversion to 70% and beyond, then waste management emissions are necessary and unavoidable to replace existing waste disposal facilities. Moreover, if waste-to-energy is selected as the method of waste disposal, the analysis from AECOM Canada Ltd.'s report on the "Management of Municipal Solid Waste in Metro Vancouver" shows that net waste management emissions in the future can be lower when energy is generated to displace fossil fuel use, e.g. district heating replaces natural gas use in the region (AECOM, 2009).

Current waste management emissions in the region are associated with the Vancouver Landfill in Delta, closed landfills throughout the region, the waste-to-energy facility in Burnaby, transfer stations and truck emissions from hauling waste. Refer to Figure 1 below for a summary of 2005 emissions in the airshed, which shows that waste management contributes from 0.1% to 1.2% of the total emissions in the airshed.

Future waste management emissions are comparable to present day and are very low relative to total emissions in the airshed.

The total waste management emissions are equivalent to:

1. The NOx and SOx emissions of about one cruise ship travelling the Vancouver to Alaska run;

2. 1% of the overall total of ammonia emissions in the FVRD in 2020 (most of which are from agricultural activities);
3. Only 0.7% of fine particulate matter (PM2.5) emissions from woodstoves and fireplaces in the region.

Given these low levels, air quality modeling shows no discernible ambient air quality difference between waste-to-energy and landfilling (or where they are located(RWDI Air Inc, 2009).

In 2009, AECOM reviewed eight combinations of waste management options for Metro Vancouver for the management of waste after recycling. The comparative analysis included options such as in-region and out-of-region landfilling, in-region waste-to-energy (existing and new), and use of mechanical biological treatment with the product going to either a cement kiln, refuse derived fuel or to a local landfill.

These eight scenarios were then compared using an accepted air quality model, CMAQ (Community Multi-Scale Air Quality model) that has been applied in the Pacific Northwest on many occasions to compare air quality impacts of different policy options. The following figures compare projected regional ozone and PM2.5 levels for the eight different scenarios and also compare them to the present day situation. The modeling indicates that there is no discernible difference in ambient levels of ozone or fine particulate matter between the eight waste management scenarios outlined by AECOM. This is to be expected given the small contribution of waste management to overall emissions in the airshed, and the even smaller differences between the different waste management options.

The situation in the Lower Fraser Valley airshed is not poor. Through two Air Quality Management Plans (AQMPs) adopted in 1994 and 2005, supported by comprehensive monitoring and assessment of emissions sources, we have seen significant improvements. Metro Vancouver is committed to continuing to be cautious in the management of this shared airshed and the AQMP commits to a principle of continuous improvement. Continuous improvement does not mean never allowing new sources of emissions. It must be acknowledged that some new sources of emissions are necessary and unavoidable, and can be acceptable if they are appropriately managed and provide a benefit to the region and its airshed. Emissions from new waste-to-energy plants are not an incremental increase; but rather, with system-wide improvements and the implementation of district energy opportunities, the net effect is a decrease in emissions compared to present day waste management. This supports the principle of continuous improvement.

Europe has a number of airsheds similar to the Lower Fraser Valley. In particular, the Federal Department of the Environment in Switzerland has identified 30 state-of-the-art municipal solid waste waste-to-energy facilities located mainly in densely populated valleys of the country. Their experience has shown that state-of-the-art waste-to-energy facilities are “not a really important source of pollution.” All waste-to-energy facilities in Switzerland recover energy and in most cases reduce the total emissions to the region. In the case of the Thun Municipal Solid Waste Incinerator (MSWI), which processes 100,000 tonnes of waste per year, there was no influence found on particulate matter (PM10), dust deposition, heavy metals in dust or deposition of heavy metals from the facility on the airshed. Emissions in the region from traffic, small industries, and households factored more heavily than those from the waste-to-energy facility. In fact, the main source of dioxins in Switzerland is “uncontrolled burning of waste in households (open fires or in stoves)”.

4. **At a time when we are trying to decrease greenhouse gases that cause global warming, why are we adding a new source?**

Metro Vancouver's top priority is to reduce waste – increasing waste diversion from 55% to 70% will result in significant reduction of greenhouse gas emissions.

With the remaining waste, Metro Vancouver proposes to replace the Cache Creek Landfill (scheduled for closure) with a new waste-to-energy facility, resulting in lower greenhouse gas emissions. A waste-to-energy facility can achieve lower greenhouse gas emissions than a landfill because it recovers metals for recycling and generates energy to replace fossil fuels as a source of heat and electricity. In contrast, a landfill recovers much less energy and produces methane which is 21 times more efficient than carbon dioxide at warming the planet.

Municipal solid waste contains both fossil carbon and biogenic carbon. When handling these types of carbon, both a waste-to-energy facility and a landfill will produce emissions as carbon dioxide or methane. Carbon dioxide and methane in particular contribute to the greenhouse effect, resulting in global climate change. Fossil carbon refers to carbon that originates from ancient stores from the earth, e.g. coal, petroleum, and natural gas. Examples in the waste stream include plastics, synthetic fibers, and composite materials. Biogenic carbon is carbon created by plants or animals during 'recent' growth. Typically this refers to material such as wood, paper, plants, food waste, etc. In terms of greenhouse gas emission inventories or carbon accounting, the release of biogenic carbon as carbon dioxide into the atmosphere is not considered a net greenhouse gas emission. This is because this carbon is simply returning to the atmosphere from where it was recently removed. Biogenic materials release carbon dioxide whether they are combusted in a waste-to-energy facility or decay in a landfill. Placing these materials in a waste-to-energy facility doesn't increase the amount of carbon dioxide released. However, biogenic carbon can create a net greenhouse gas emission if it is transformed into a more potent form such as methane in a landfill. Carbon that is being returned to the atmosphere in a more potent form than it was removed must be included in the accounting.

Waste-to-energy facilities with efficient energy generation including district heating displace fossil fuels used in the region for electricity and heating buildings. Avoiding the release of greenhouse gas emissions that would be emitted from generating electricity and heat from fossil fuels reduces global greenhouse gas emissions. Although waste-to-energy does emit greenhouse gases, the avoided emissions from energy generation can be greater than the facility emissions. In addition, waste-to-energy facilities also avoid greenhouse gas emissions through metal recovery by separating ferrous and non-ferrous metals for recycling. The recovery of metals avoids the mining of virgin materials and the manufacturing of steel, thereby leading to significant upstream energy savings and additional avoidance of greenhouse gas emissions.

In contrast, the decomposition of waste in landfills generates methane gas, which is 21 times more potent than the carbon dioxide emitted from a waste-to-energy facility. Some of the methane can be captured, but not all is collected due to delays in the installation of the gas collection system from initial waste placement and leaks in collection pipes, gas wells, and through the landfill cover. According to the US EPA, "It is difficult to quantify emissions with a high degree of certainty since emissions result from biological processes that can be difficult to predict, occur over multiple decades, and are distributed over a relatively large area covered by the landfill" (US EPA, 2009).

Some critics of waste-to-energy have produced misleading estimates of the greenhouse gas emissions from waste-to-energy by including CO_2 emissions from the biogenic portion of waste. This practice is not consistent with the guidelines from the United Nations Intergovernmental Panel on Climate Change which state that "The CO_2 emissions from combustion of biomass materials (e.g., paper, food, and wood waste) contained in the waste are biogenic emissions and should not be included in national total emission estimates. However, if incineration of waste is used for energy purposes, both fossil and biogenic CO_2 emissions should be estimated. Only fossil CO_2 should be included in national emissions under Energy Sector while biogenic CO_2 should be reported as an information item also in the Energy Sector" (UN Intergovernmental Panel on Climate Change, 2006).

In 2009, the US EPA Office of Research and Development issued a study comparing landfilling and waste-to-energy for electricity production. The analysis excluded the effect of avoided emissions when examining the range of conditions for waste-to-energy and landfill-gas-to-energy (LFGTE). The findings indicated that waste-to-energy is on average six to eleven times more efficient at recovering energy from waste than landfills and for even the most optimistic assumptions about landfill-gas-to-energy, net life-cycle environmental trade-offs is 2 to 6 times the amount of greenhouse gases compared to waste-to-energy (US EPA, 2009).

Based on her review of numerous life-cycle studies on solid waste management, Executive Director Dr. Rita Schenck of the Institute for Environmental Research & Education at the American Center for Life Cycle Assessment writes in her letter to Metro Vancouver: "Waste-to-energy solutions usually have quite good outcomes, because the emissions they cause offset the emissions that would have been caused if the energy had been made using conventional fossil fuels (natural gas and coal). Modern waste to energy plants are highly regulated and typically have very few emissions, often less than a conventional gas turbine, for example. Landfill solutions usually have the worst outcomes, because the emissions from the landfill are substantially uncontrolled. This is the case even when methane capture systems are installed. These capture systems rarely achieve even 50% capture of gases. The studies I have seen where the landfill option seems attractive tend to have over-estimated methane capture and have set the system boundaries in non-conventional ways" (Institute for Environmental Research & Education, 2010).

The Solid Waste Division of the American Society of Mechanical Engineers (ASME) states that: "WTE [waste-to-energy] is a proven, environmentally sound process that provides reliable electricity generation and sustainable disposal of post-recycling MSW." "In fact, nation-wide use of the WTE technology can become one of the big contributors to America's planned reduction in greenhouse gas emissions" (Solid Waste Division of the American Society of Mechanical Engineers, 2008). Furthermore, the US EPA reports that producing electricity using waste-to-energy has less environmental impact than almost every other source of electricity (US EPA, 2003) as shown in Figure 3 (US EPA, 2009). The Chief of EPA's Energy Recovery Branch has stated that "If you want to have an impact on greenhouse gas mitigation, focus on MSW" because there's nationally significant energy available from MSW combustion and "Even if you have >50% recycling, you still have a significant amount of energy to recover" (US EPA, 2009). The Center for the Study of Sustainable Use of Resources (SUR) at North Carolina State University has reported that in a comparison of alternative solid waste management practices, "…WTE is the most effective way in which to reduce greenhouse gas emissions from solid waste management". (Center for the Study of Sustainable Use of Resources, 2009).

Given the small contribution of waste management to overall emissions in the airshed, air quality management efforts would be better focused on major regional sources (vehicles and space heating), as strategized in Metro Vancouver's Air Quality Management Plan. AECOM Canada Ltd. reports that "GHG emissions from waste management activities are 3% of the GHG emissions produced in Canada and 5% of those produced in BC. 95% of the GHG associated with waste management in BC originates from landfills.

5. **Shouldn't we be concerned about nanoparticles and toxic emissions from waste-to-energy facilities?**

Modern, well-managed waste-to-energy facilities (such as the Metro Vancouver waste-to-energy facility located in Burnaby) are not significant sources of air emissions – nanoparticles or other contaminants – according to both local experience and international authorities.

Modern and well-managed municipal solid waste waste-to-energy facilities are not significant sources of air emissions. The British Department for Environment, Food and Rural Affairs (DEFRA), the German Ministry of the Environment (MOE), US EPA, and the United Kingdom Health Protection Agency (U.K. HPA) agree that modern waste-to-energy facilities emit low levels of contaminants, and have even achieved up to 99% reductions for compounds such as dioxins and mercury. For example, emissions from the Metro Vancouver Waste-to-Energy Facility located in Burnaby fall well below Canada Wide Standards, which are the most stringent in the world for substances like dioxins and mercury (Canadian Council of Ministers of the Environment, 2010).

Regarding emissions from waste-to-energy facilities, Health Canada reports that "Metals such as cadmium and chromium pose a low risk, as do mercury and lead. Metals are released by incinerators that are not equipped with proper scrubbers. Such cases, which were still common in Canada in the 1990s, are now the exception. Several underperforming incinerators have been closed, while others have undergone major modifications." Furthermore, "If incinerators are equipped with proper pollution control systems (activated charcoal beds, spray dry scrubbing, etc.), the health risks of incineration are very low (Health Canada, 2004). Other countries report similarly low contaminant emissions from modern municipal solid waste waste-to-energy facilities. For example, in the UK 0.5% of dioxin emissions come from incineration of municipal solid waste and another 0.5% come from burning landfill gas (Department of Environment, Food, and Rural Affairs, 2004). The German Ministry of the Environment reports that dioxins from waste-to-energy is less than 1% of total dioxin emissions and is considered insignificant. For context, the German Ministry of Environment also reports that tiled stoves in private households in Germany emit 20 times more dioxins in the environment than waste-to-energy facilities (German Ministry of the Environment, 2005). Additionally, the use of MSW WTE facilities in Denmark "reduced the country's energy costs and reliance on oil and gas, but also benefited the environment, diminishing the use of landfills and cutting carbon dioxide emissions. The plants run so cleanly that many times more dioxin is now released from home fireplaces and backyard barbecues than from incineration" (New York Times, 2010). The US EPA has reported that the largest source of dioxins in the US is backyard burning, which releases almost 50 times as much dioxins as compared with all waste-to-energy facilities in the US (US EPA, 2009). The Federal Office of the Environment of Switzerland (FOES) reports that the largest source of dioxins in Switzerland is "uncontrolled burning of waste in households (open fires or in stoves or chimneys)" (Federal Office of the Environment of Switzerland, 2010). In the Metro Vancouver context, AECOM Canada Ltd. reports that for all the waste management scenarios analyzed the "contribution to overall emission levels in the LFV [Lower Fraser Valley] airshed is very small

(1.2% or less)" (AECOM, 2009). Other sources of emissions in the Lower Mainland, such as those related to transportation are significant contributors of contaminants to the LFV airshed.

A recent scientific article in the Atmospheric Pollution Research Journal states that, "The incineration sector has undergone rapid technological development over the last 10 - 15 years, due to specific legislation applied to industry that has obliged several European countries to reduce toxic emissions from municipal waste incinerators (MWIs) (European Commission, 2006). However, the fine and ultrafine particle stack emission has not yet been fully characterized. Because of this, MWIs represent a rather interesting subject of investigation. In Western countries there is a strong debate on the emission of ultrafine particles at the stack of waste-to-energy plants, although MWIs surely represent only a minor source of anthropogenic aerosol emission compared to fossil fuel power plants and vehicle emissions (Airborne Particles Expert Group, 1999; EPA, 2000; Cass et al., 2000)." The article also goes on to say that according to their study, the fabric filters in a modern waste-to-energy facility are 99.995% efficient in terms of particle capture (Buonanno et al, 2010).

A study by the Institute for Applied Environmental Technologies at the University of Rapperswil (UMTEC) in Switzerland examined the effectiveness of different air pollution control systems to control fine and ultra fine particulates at waste-to-energy facilities in Switzerland. The study demonstrated on the basis of actual measurements at operating waste-to-energy facilities that electro filters followed by wet scrubbers could remove ultrafine particulates to levels at or below ambient conditions. Figure 4, shows the measured values of ambient air and cleaned flue gas from the KEZO Waste-to-Energy Facility. The red line represents ambient air particulate concentration in an urban setting, the yellow line is for a rural setting, and the blue line shows the measured values from the waste-to-energy stack.

In the review of the risk assessment for the proposed Durham waste-to-energy facility, an independent study for the region of Halton in Ontario prepared for the Medical Officer of Health stated that "it should be noted that these ultrafine and nanoparticles are emissions of concern from hazardous waste incineration, as opposed to municipal EFW facilities" (Smith, Dr. L.F., 2007). Similarly, the Chair of the European Union Scientific Committee on Emerging and Newly Identified Health Risks and Europe's top scientists who advise the European Commission on issues including nanotechnologies have determined that nanoparticulate matter from municipal waste-to-energy facilities is not a significant health concern (Bridges, 2009).

6. Aren't landfills the cheapest disposal option for residents?

While local landfills, such as the Vancouver Landfill located in Delta, can be relatively cost effective, remote, out-of-region landfills can be over twice the cost of local landfills due to transportation and other costs. In contrast to landfills, waste-to-energy facilities generate significant revenues through the sale of heat, electricity and recovered metals and can generate a net profit.

Independent financial analysis indicates that over 35 years, out-of-region landfilling would cost the region some $1.5 billion (or about $100,000 per day) while waste-to-energy would result in a net profit in the order of $20 million.

The net cost for out-of-region landfills is driven by fuel consumption, heavy equipment operation and labour, for both the long distance transportation and landfill operations. These three cost

centres are projected to increase with inflation over time, resulting in continued escalation in the costs for landfilling. This results in an increasing long term cost trend for landfills.

The major costs for waste-to-energy are the capital construction and financing costs, which are offset by revenues from the sale of heat, electricity and recovered metals. While the construction costs will be fixed, one-time costs, the revenues are projected to increase over time with increasing energy rates. After debt retirement, waste-to-energy will return annual profits. The financial break-even point for waste-to-energy facilities is approximately 30 years, beyond which net profits will continue to increase. This analysis includes expenditures for facility refurbishment. It is important to note that facilities typically operate for 40 years or more. For example, the Metro Vancouver Waste-to-Energy Facility has an existing operations contract until 2025, at which time the facility will be 37 years old. Following an initial period of capital repayment, the long term cost trend for waste-to-energy is for increasing revenues and associated net profit.

Waste-to-energy or landfilling options can be financed either by Metro Vancouver or by the private sector. Public sector financing will result in higher initial capital costs which are offset by higher long term revenues. While there is greater variability associated with public sector financing, the long term costs under this financing structure are significantly lower. In contrast, private sector financing will result in lower initial costs, but higher long term costs. Private sector financing serves to smooth the cost curve out providing cost stability, but results in higher long term costs.

This financial analysis was conducted in 2009 by Dr. Marvin Shaffer, Professor of Economics at Simon Fraser University as part of AECOM Canada Ltd's study "Management of Municipal Solid Waste in Metro Vancouver". Dr. Shaffer's model results indicate that waste-to-energy has the potential to generate a net profit for the region and landfilling will cost in excess of one billion dollars.

7. Doesn't waste-to-energy create a large volume of ash containing toxins that still need to be landfilled anyway?

Bottom ash and fly ash are produced by the waste-to-energy process. Bottom ash is non-hazardous and is often recycled as a road construction material, or as landfill cover. Fly ash treated at the waste-to-energy facility is also non-hazardous and disposed in a landfill.

The bottom ash residue remaining after combustion has been shown to be a non-hazardous solid waste that can be safely landfilled or recycled as construction aggregate (Abbott et al., 2003). A study undertaken for Metro Vancouver in 2001 concluded that bottom ash can be used successfully as a structural fill material in the construction of roads (AMEC, 2001). Approximately 17% (by weight) of the waste processed at the Metro Vancouver waste-to-energy facility located in Burnaby becomes bottom ash. This bottom ash, which is regularly tested and consistently meets the Ministry of Environment's classification for municipal solid waste, is used at the Vancouver Landfill in Delta as landfill cover and road construction aggregate.

Fly ash produced at the Metro Vancouver waste-to-energy facility located in Burnaby, approximately four percent (by weight) of the received waste, is chemically treated onsite to stabilize leachable lead. The treatment renders the ash safe for disposal in landfill. After

treatment, each load is tested before hauling to disposal to ensure it complies with provincial municipal solid waste standards (BC Ministry of Environment, 1997).

Given the 90% reduction in waste volume achieved through waste-to-energy, the life of a landfill can be significantly increased. In addition, landfill emissions are significantly reduced as waste-to-energy renders the ash inert by combusting the organic fraction that would otherwise generate methane, a potent greenhouse gas with a global warming potential 21 times that of carbon dioxide.

8. Does Canada have stringent enough regulations on toxic chemicals to stop them from getting into the waste stream and burned at waste-to-energy facilities?

Canada is a leader in the control of toxic substances at their source and continues to enact regulations intended to remove toxic chemicals from the waste stream. In addition, the high temperatures in waste-to-energy processes effectively destroy or capture toxics that may remain. This is proved out by monitoring data from the Metro Vancouver Waste-to-Energy Facility located in Burnaby.

Regarding source control of toxic substances, Canada is further along than the European Union (a recognized leader) in the assessment and implementation of instruments to manage risks for chemical substances. Canada, like the United States and European countries, has been evaluating and managing chemical substances for decades. However, Canada is the first country in the world to categorize the thousands of chemical substances in use before comprehensive environmental protection laws were created. The results mean that we are able to focus our efforts on those substances suspected to have the most dangerous properties, and set priorities for further research on the ones we need to know more about (Environment Canada, 2010). The federal government is consistently enacting legislation to remove toxic chemicals from the waste stream (CEPA Environmental Registry Website, 2010). Canada is a signatory to the Stockholm Convention on persistent organic pollutants which is an international environmental treaty that aims to eliminate or restrict the production and use of these toxic materials.

Removing toxic material from municipal solid waste is a priority for Metro Vancouver. Metro Vancouver has been working with the Province of British Columbia on Product Stewardship programs to ensure products at the end of their use are managed in an environmentally responsible way. Programs currently exist to remove beverage containers, household hazardous waste, paint, lead-acid batteries, tires, used oil, electronics, pharmaceuticals, and dental amalgam. The Ministry of Environment has committed to adding two new product categories every three years. Aside from beverage containers, Product Stewardship efforts to date have applied to materials with hazardous components and properties.

Unlike landfills, waste-to-energy facilities are capable of capturing toxic chemicals and under very high temperatures, destroying them. Twenty-two years of monitoring data from Metro Vancouver's Waste-to-Energy Facility in Burnaby support the fact that the high temperature operation of a waste-to-energy facility and the advanced pollution control systems that are employed are effective in destroying or capturing toxic constituents present in the waste stream. According to the Canadian Council of Ministers of the Environment, Canada has the most stringent emissions criteria in the world for contaminants such as dioxins (Canadian Council of Ministers of the Environment, 2007) and the waste-to-energy facility in Burnaby surpasses this criteria. The SYSAV facility in Malmo, Sweden illustrates how efficient modern WTE facilities are at capturing and destroying toxic constituents. The facility accepts waste from a heavy industrial

area, yet emissions from this facility are very low and fall below stringent air quality guidelines (AECOM, 2009).

A 2000 study of "Waste Incineration & Public Health" by the American National Research Council (NRC) concluded that emissions from newer, well-operated facilities were expected to contribute little to environmental concentrations of toxic pollutants or to human health risks. The NRC also made a clear distinction between higher levels of emissions in facilities operating prior to the US EPA Maximum Achievable Control Technology (MACT) standard and facilities with lower emissions that were developed following introduction of the standard (National Research Council, 2000). A 2003 letter from US EPA to the Integrated Waste Services Association states that "Upgrading of the emissions control system of large combustors to exceed the requirements of the Clean Air Act Section 129 standards is an impressive accomplishment" and that waste-to-energy facilities produce electricity with "less environmental impact than almost any other source of electricity" (US EPA, 2003).

Modern and well-managed municipal solid waste waste-to-energy facilities are not significant sources of air emissions. Since the 1990's, compared with other known sources of emissions, modern waste-to-energy facilities emit low levels of contaminants and have achieved up to 99% reductions for compounds such as dioxins and mercury (British Department for Environment, Food and Rural Affairs, German Ministry of the Environment ,US EPA, United Kingdom Health Protection Agency.

9. **The financial case assumes revenue from electrical and district heating sales – what if you don't generate that revenue?**

The Metro Vancouver Waste-to-Energy Facility located in Burnaby generates approximately $10 million each year in revenue from the sale of heat and electricity. Demands for expanded energy production locally provide a growing market that Metro Vancouver is confident can be served by additional waste-to-energy capacity in the region.

Waste-to-energy would not be an attractive disposal option for the region if there were no revenues from the sale of electricity and heat. Any new waste-to-energy facility will only be built in a location where it will be possible to sell the heat and electricity generated by the facility. Electricity generated by the Metro Vancouver waste-to-energy facility located in Burnaby is sold to BC Hydro which has a growing need for energy and is expanding energy generation across British Columbia through purchase agreements.

As was the case with the Metro Vancouver Waste-to-Energy Facility located in Burnaby, energy sales agreements would be established prior to plant construction to provide economic certainty.

District heating systems convey hot water or steam in insulated pipes from the waste-to-energy facility to nearby users. The hot water or steam is circulated in buildings or industrial applications for heat, thereby reducing or eliminating the need to produce heat through the combustion of fossil fuels. In addition to heat, district energy systems can also be configured to provide cooling. District energy systems are common in many urban centres including Metro Vancouver. The district heating system in New York City was established in 1882 and includes 160 kilometres of pipe, providing 3,000 megawatts of capacity to 1,800 customers (70% commercial buildings) (Waste-to-Energy Research and Technology Council,2008). The district energy network in Linköping, Sweden provides both heating and cooling spanning 500 kilometres in length. This

network also supplies energy to an adjacent town, 28 kilometres away (Usitall, 2008). Several municipalities in Metro Vancouver are currently investigating their district energy options.

The Metro Vancouver Waste-to-Energy Facility located in Burnaby generates steam and electricity. The steam is sold to a paper recycling facility (equivalent to the heating requirements of 8,000 single family homes), while the electricity is sold to BC Hydro (enough to meet the electricity requirements of 13,000 single family homes). The combined revenue from these sales works out to over $10 million in annual revenue.

The long term financial models of waste management systems indicate that waste-to-energy will generate a net profit over a 35-year period for the region whereas landfilling will cost billions of dollars over the same period. Waste-to-energy or landfilling options can be financed by Metro Vancouver or by the private sector resulting in either higher initial capital costs, or higher long-term operating fees (AECOM, 2009).

10. **Why do you keep presenting the case supporting waste-to-energy? Why are we not hearing the other side?**

An independent analysis of options for managing the waste that remains after recycling, carried out on behalf of Metro Vancouver, considered a very broad range of processes – waste to energy, landfilling, the pre-treatment of waste, and combinations of all three technologies. That analysis has been discussed publicly at great length, and consultations with the public continue to provide opportunities for all information to be reviewed. This analysis and others by independent authorities clearly demonstrate that on the balance of issues, waste-to-energy is the best solution.

In July 2008, the Metro Vancouver Board requested staff to hire an independent consultant to study the characteristics and merits of landfilling, waste-to-energy and Mechanical Biological Treatment from the perspective of economics, environment and social impacts. AECOM Canada Ltd. performed this work and concluded that waste-to-energy was the most financially viable option with the lowest environmental impacts. The AECOM report cites the findings of independent health and environment authorities from around the world, as described in the following paragraphs.

In a US Environmental Protection Agency (EPA) publication, it was determined that on a life-cycle basis, greenhouse gas emissions from waste-to-energy facilities are lower than those from the most aggressive attempts to capture energy from landfills (US EPA 2009). The Environment and Energy Study Institute states that "Converting MSW [municipal solid waste] to energy also has tremendous potential to reduce climate-changing greenhouse gases. According to a model developed by the EPA, each MWh of electricity generated through combustion of MSW results in a net negative CO_2 footprint of 3636 lbs. of carbon dioxide equivalent (CO_2-eq). This translates to approximately 1 ton of carbon equivalent for each ton of MSW combusted" (Environment and Energy Study Institute, 2009).

The American Society of Mechanical Engineers (ASME) advises that "WTE is a proven, environmentally sound process that provides reliable electricity generation and sustainable disposal of post-recycling MSW" (ASME, 2008). ASME continue to support waste-to-energy by stating that waste-to-energy technology can be one of the biggest contributors to America's planned reduction in greenhouse gas emissions. They go on to state that WTE provides clean, reliable energy while reducing dependence on fossil fuel, and complements recycling, reducing

truck traffic and associated emissions and recovers and recycles metals, thereby reducing mining operations (ASME, 2008).

In terms of health risks, Health Canada has stated that "If incinerators are equipped with proper pollution control systems (activated charcoal beds, spray dry scrubbing, etc.) the health risks of incineration are very low" (Health Canada, 2004). Any new waste-to-energy facility built would be equipped with state-of-the-art pollution control systems.

The cost analysis performed by AECOM Canada Ltd. shows that over 35 years, the construction and operation of a new waste-to-energy facility within the region is $1.5 billion less expensive than a new out-of-region landfill, and $1.8 billion less than an out-of-region refuse derived fuel plant. The energy production value from waste-to-energy facilities is well established with hundreds of facilities generating power around the world. According to Rick Brandes of the US EPA, municipal solid waste is the only secondary material stream that contains sufficient potential energy to be a significant contributor of energy. The US EPA states that, "Even with greater than 50% recycling, you still have a significant amount of potential energy to recover" (US EPA, 2009).

Waste-to-energy facilities reduce base load fossil fuel generation of electricity by producing reliable energy around the clock. Worldwide, waste-to-energy facilities supply 20 million people with electricity, and 32 million people with heat. The Metro Vancouver Waste-to-Energy Facility located in Burnaby produces enough electricity for 13,000 homes and replaces fossil fuel sources through district heating equivalent to heating 8,000 homes. That's with a regional diversion rate of 55% (AECOM, 2009).

Critics of waste-to-energy have brought forward alternative information that attempts to make the case that these facilities produce harmful emissions. However, the context and source of information used to rate the performance of waste-to-energy facilities must be examined. Typically, critics have used information from old, highly polluting incinerators that are no longer allowed in North America or Europe, and are not being considered as part of Metro Vancouver's new Integrated Solid Waste & Resource Management Plan. The UK Health Protection Agency has stated that "Studies published in the scientific literature showing health effects in populations living around incinerators have, in general, been conducted around older incinerators with less stringent emissions standards and cannot be directly extrapolated with any reliable modern incinerators" (UK Health Protection Agency, 2010). The UK HPA has also published reviews of literature on waste-to-energy and health including the British Society for Ecological Medicine (BSEM) report titled "Health Effects of Waste Incinerators". The UK HPA conducted a review of the information presented by the BSEM and concluded that "Having considered the BSEM report the HPA maintains its position that contemporary and effectively managed and regulated waste incineration processes contribute little to the concentrations of monitored pollutants in ambient air and that the emissions from such plants have little effect on health." (UK Health Protection Agency, 2006).

11. Isn't there sufficient uncertainty regarding waste-to-energy to invoke the precautionary principle?

The best available scientific advice states the risks to human health and the environment from waste-to-energy are understood with sufficient confidence that there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new waste-to-energy facilities.

The "precautionary principle" has at times been suggested as a decision-making tool. As defined by the UK Health Protection Agency (HPA) and the UK National Radiological Protection Board (NRPB), the precautionary principle is a "…political term. It defines the way to decide on prevention action if the scientific evidence is not clear enough for a reasonably accurate assessment of the risk. If the level of harm and likelihood of its occurrence are well enough known, then a precautionary principle is not needed because the harm can be calculated directly and the government or public can make evidence-based decisions" (NRPB, 2006). Health authorities have agreed that the health risks from modern well-run municipal solid waste waste-to-energy facilities are not a concern from a health perspective. Statements such as the one above from the UK Health Protection Agency and statements from the Health Protection Agency of Scotland below address the use of the precautionary principle in the waste-to-energy context:

"…it remains reasonable to conclude that any risk to human health associated with emissions from newer incinerators, operated within the current regulations, is very likely to be less than was the case previously. In view of this, the balance of evidence suggests that a more precautionary approach to either the location or the operation of incinerators is currently not recommended."

"The present regulatory regime governing waste incineration processes already incorporates a "precautionary" approach and sets emission standards explicitly designed to limit human exposure to potentially harmful contaminants. The present system is therefore designed to protect human health. The evidence to date does not suggest that there is currently any need to adopt a more precautionary approach." (Health Protection Scotland, 2009)

"The level of scientific uncertainty is not sufficient to justify adopting more extreme measures, nor is it sufficient to justify setting an arbitrary 'safe' distance between incinerators and human habitation or activity" (Health Protection Scotland, 2009).

The UK Health Protection Agency has stated: "As there is a body of scientific evidence strongly indicating that contemporary waste management practices including incineration, have at most, a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators" (UK Health Protection Agency, 2006).

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July 5, 2010 File: CP-16-00

Metro Vancouver Board of Directors

Sent via email

Dear Director:

Re: Draft Integrated Solid Waste and Resource Management Plan – Next Steps

The Waste Management Committee is in the final stage of a comprehensive, two and a half month public consultation on the Draft Integrated Solid Waste and Resource Management Plan. When the public consultation is complete, the draft plan will be revised based on the input that we have heard and presented to the Waste Management Committee and the Greater Vancouver Sewerage and Drainage District Board for discussion and decision by the end of July.

This schedule is demanding but necessary in order to have a timely completion to the process. As we approach the final stage of Committee and Board work, we write to inform Directors of the schedule for July, remind Directors of upcoming deadlines, and review the process we will undertake to reach a Greater Vancouver Sewerage and Drainage District Board decision on a new solid waste management plan for the region.

First, and most important, July 14, 2010, is the final date for input to the public consultation process. On that day a final public consultation will take place at Metro Vancouver head office and members of the public will have the opportunity for any final feedback on the plan or recommendations for amendments. The draft plan will be revised based on the input received, so no further feedback can be accepted after that date.

On July 21, 2010, a revised plan will be presented to the Waste Management Committee for discussion and recommendation to the Greater Vancouver Sewerage and Drainage District Board. July 28 is also being held as a potential Committee meeting date if additional discussion is needed.

On July 30, 2010, the Greater Vancouver Sewerage and Drainage District Board will consider the revised plan and respond to the recommendation from the Committee.

The public input deadline of July 14th also applies to municipalities. It is important that municipal comments be received by that date so that the Waste Management Committee can take all municipal input into consideration, along with the feedback we will have received from the general public, adjacent regional districts and First Nations.

We encourage Directors to attend the Waste Management Committee meeting on July 21st in order to gain a deeper appreciation for the many complex issues and points of view that the Committee will address. However, in order to maintain an orderly process to review the revised plan, debate will be limited to Committee members.

Finally, for the Greater Vancouver Sewerage and Drainage District Board meeting on July 30th, in order to be consistent with the commitment that public input cannot be received after July 14th, discussion will be limited to Greater Vancouver Sewerage and Drainage District Board members.

Committee members have worked extremely hard to undertake a comprehensive consultation process, and we look forward to a timely Board resolution on a new solid waste management plan for the region.

Respectfully,

Original Signed by

Lois E. Jackson, Chair
Metro Vancouver Board

Original Signed by

Greg Moore, Director, Chair
Waste Management Committee

LEJ/DL/cg