



Comox Strathcona Waste Management

Association of Vancouver Island and Coastal Communities: The State of Waste Management

SEPTEMBER 2015



TETRA TECH EBA

CONTACT INFO:
Wilbert Yang • 604.608.8648
Wilbert.Yang@tetrattech.com

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EXECUTIVE SUMMARY

Tetra Tech EBA Inc. (Tetra Tech EBA) was retained by Comox Valley Regional District (CVRD) to conduct a Solid Waste Management (SWM) Research Project, to support the goals of the Association of Vancouver Island and Coastal Communities (AVICC) special SWM committee.

The aim of the special SWM committee is to understand how member regional districts manage their solid waste, identify mutual goals, objectives and challenges, and to see where collaborative opportunities could benefit the AVICC. Regional districts share similar issues with respect to waste management systems; the need to reduce waste generation and increase diversion to protect limited resources, dwindling landfill capacity, and escalating management costs. For the AVICC to meet its objectives, the committee requires comprehensive and comparable information from all member regional districts.

All regional districts that are part of the AVICC special SWM committee were contacted as part of this research project to develop comparable data and information regarding the current state of waste management in each regional district. The data has been summarized, and aggregate totals and averages have been calculated to establish statistics about AVICC solid waste management programs.

Data on disposal and diversion per capita was collected. The average annual disposal rate across all eight regional districts is 399 kg/capita. The Province is proposing target disposal rates of 350 kg/capita by 2020. This was announced by British Columbia MOE on May 21, 2015. Most of the regional districts in the AVICC have met or are close to meeting the Province's target. It is worth noting, however, that to date no regional district is fully capturing or tracking the management of construction and demolition (C&D) waste, much of which is being exported and it is not consistently tracked or measured. AVICC members generally have higher recycling rates, ranging from 86 kg/capita up to 595 kg/capita. The average across all regional districts is 453 kg/capita. These rates are a reflection of long term and successful diversion programs that enjoy high participation rates among residents, particularly from single family households. All regional districts are collecting yard waste in some capacity with a range from 11 kg/capita to 175 kg/capita, with an overall average of 80 kg/capita captured through source separated composting programs. Those regional districts with Food Scraps collection see the highest kg/capita quantities of organics diversion.

There is no consistent pattern to the total amount of recycling, organics and garbage generated per capita. Powell River generates the least total quantity of total materials that are managed at 473 kg/capita, and the highest is the Comox Strathcona and Cowichan Valley Regional Districts that produce upward of 1,250 kg/capita of material that is managed.

Tipping fees range from \$95 per tonne to \$215 per tonne. High local tipping fees are driving some waste across regional district borders and/or off the Island and Coastal Communities altogether. Overall 320,000 tonnes of garbage were disposed, and of this 30,000 tonnes were exported by, AVICC regional districts in 2014. Based on each region's garbage generation rate and respective tipping fees, the overall cost of disposal (i.e. tipping fee multiplied by garbage tonnage totalled for each regional district) was calculated to be \$37.9 million across all AVICC members. Limited disposal capacity and increased costs in managing and operating existing landfill, have led to an overall increase in tipping fees across Vancouver Island and Coastal Communities, in an effort to maintain revenues and fund solid waste management systems.

All regional districts in the AVICC have signed up to the MMBC stewardship program for Packaging and Printed Paper (PPP) in some capacity (curbside or depot financial incentives). Almost all municipalities within the regional districts are signed up, with the exception of the Town of Comox and the City of Powell River. In total about 97% of all AVICC member residents' are covered by MMBC subsidies whether they receive curbside collection or self-haul to the local drop-off depot.

An increasing number of communities across British Columbia (and North America) are diverting organic material. CRD, CoVRD, and RDN all have residential food scraps collection programs in place, and CSWM and the District of Sechelt are currently conducting food scraps collection pilots. Organic material typically composes roughly 40% of the garbage, so removing it from the disposal stream is critical to improving diversion rates and reducing landfill gas generation. CoVRD, RDN, and Sunshine Coast Regional District (SCRD) all have organic processing facilities that accept food scraps. The combined capacity of existing organics processing facilities is roughly 65,000 tonnes per year, although this doesn't include the multiple small private facilities on Vancouver Island and Coastal Communities that accept yard waste. CSWM and CRD are also looking at options for constructing an organics processing facility in their jurisdiction.

Financial models for regional districts are based primarily on tipping fees. 63% of AVICC regional district operating budget revenues come from tipping fees. Finding a sustainable funding model is challenging especially since diversion programs impact revenue. As diversion rates increase, using tipping fees to finance the solid waste system becomes less practical. Raising tipping fees to cover budget shortfalls also presents its own challenges. Tipping fees can be increased however if set too high it could increase illegal dumping or cross border disposal.

Without a flow control mechanism in place, waste can flow out of the system to out of region facilities that have lower tipping fees. Finding the right balance is particularly challenging for Regional Districts that have no more disposal capacity and are paying extremely high tipping fee rates to dispose their garbage to the U.S. Other revenue sources for solid waste management operating budgets are outlined in Table 3 including taxation (12%), MMBC and EPR revenue (9%), utility fees (6%), and the remainder coming from permits, fines, operations, grants, loans or past surpluses.

Based on outcomes from a workshop held with the AVICC special SWM committee on June 19th, 2015 a series of 20 recommendations were developed and are included in Table 14 as considerations for collaboration opportunities within AVICC partnership. This includes opportunities to work on the following areas:

- AVICC partnerships;
- Long-term disposal capacity;
- Organics waste reduction strategies;
- Recycling collection and drop-off programs;
- Financially sustainable model;
- ICI sector strategy;
- C&D sector strategy;
- Regulations and enforcement; and
- Advocacy.

There are a wide range of solid waste management issues that AVICC members could collaborate on. From a political perspective, the most challenging areas for collaboration (e.g., shared disposal capacity, a unified tipping fee, and waste control) also offer the greatest potential for mutual gains in the long-term. Although some regional districts have landfill capacity in the short to mid-term while others – namely Cowichan Valley and Powell River – do not, the reality is that all regional districts have a disposal challenge in the long-term (20 to 40 years from now). Opportunities to site a new landfill are limited, and planning to export waste to the U.S. as a long-term strategy is not without risk. Taking a long-term perspective, all AVICC regional districts need to consider how much waste can be reduced through zero waste policies and approaches, and what options there are for disposing the residual.

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ACRONYMS & ABBREVIATIONS

Acronym	Definition
ACRD	Alberni-Clayoquot Regional District
AVICC	Association of Vancouver Island and Coastal Communities
BC	British Columbia
C&D	Construction and Demolition
CCME	Canadian Council of Ministers of the Environment
CRD	Capital Regional District
CSWM	Comox Strathcona Waste Management
CVRD	Comox Valley Regional District
CoVRD	Cowichan Valley Regional District
EOW	Every Other Week
EPR	Extended Producer Responsibility
GHG	Greenhouse Gas
ICI	Industrial, Commercial and Institutional
kg	Kilogram
MARR	Major Appliances and Recycling Roundtable
MMBC	Multi Material British Columbia
MOE	British Columbia Ministry of Environment
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
MWRD	Mount Waddington Regional District
RDN	Regional District of Nanaimo
PPP	Packaging and Printed Paper
PRRD	Powell River Regional District
SRD	Strathcona Regional District
SSO	Source Separated Organics
SWM	Solid Waste Management
SWMP	Solid Waste Management Plan
SCRD	Sunshine Coast Regional District
SWOT	Strengths, Weaknesses, Opportunities and Threats
WM	Waste Management
WTE	Waste to Energy

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Comox Valley Regional District and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Comox Valley Regional District, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix A of this report.

1.0 INTRODUCTION

Tetra Tech EBA Inc. (Tetra Tech EBA) was retained by Comox Valley Regional District (CVRD) to conduct a Solid Waste Management (SWM) Research Project, to support the goals of the Association of Vancouver Island and Coastal Communities (AVICC) special SWM committee.

The aim of the special committee is to understand how member regional districts manage their solid waste, identify mutual goals, objectives and challenges, and to see where collaborative opportunities could most benefit the AVICC. Regional districts share similar issues with respect to waste management systems; the need to reduce waste generation and increase diversion to protect limited resources, dwindling landfill capacity, and escalating management costs. The intention of this committee is to identify possible solutions to waste management issues, either as a whole group, or through strategic partnerships between jurisdictions.

1.1 Project Objectives

For the AVICC to meet its objectives, the committee requires comprehensive and comparable information from all member regional districts. Establishing this baseline will enable the committee to identify collaborative opportunities and work towards developing mutually beneficial long-term solid waste management strategies. The objectives of this project are as follows:

- Summarize the state of SWM in each AVICC regional district;
- Review relevant legislation; and
- Identify synergies and collaborative SWM strategies for AVICC members.

For this project, information was collected through a series of interviews with staff from each participating regional district. A workshop was held in the Regional District of Nanaimo (RDN) on Friday June 19, to present findings to committee members, corroborate information compiled to date, and to further understand each regional districts priorities and challenges. The discussions from this workshop have been integrated into the report findings and the meeting minutes can be found in Appendix B, and a copy of the presentation is included in Appendix C.

2.0 SOLID WASTE MANAGEMENT TRENDS

Over the past thirty years, the waste management industry has changed from strictly focussing on landfill disposal, to one that includes recycling, organics processing, extended producer responsibility and energy from waste. These changes are due to a range of drivers including the need to minimize environmental impacts, conserve natural resources, develop financially sustainable waste management systems, and depleting landfill disposal capacity.

The following section outlines important and emerging trends in waste management that have an impact on the planning and decision-making processes of the AVICC. Understanding the implications of these trends will support AVICC members to develop solid waste management plans and infrastructure that are resilient to the changing landscape and support the needs of their communities 50 years from now.

2.1 Recycling

Change in Materials

With the continual change and development in technology and product design, the quantities and types of recyclable materials produced are in constant flux. In particular, the success of plastics has resulted in the ongoing replacement of non-plastic materials with plastic products and packaging, leading to an increase in their prevalence

and disposal. In contrast to bottle and non-bottle rigid plastics, some plastic packaging is challenging to recycle due to use of complex multi-material laminates. Continuing demand for complex plastics due to their versatility and properties, means that recycling technologies will need to evolve. Other end-of-life recovery options, e.g., waste-to-energy, are also increasingly being adopted.

Growth in the plastics industry has resulted in a mirrored decline in glass packaging, which by contrast is heavy and therefore costly to transport. However, consumer preferences for glass bottles for beer and wine still drives demand. In 2011, glass bottles accounted for over 60% of the beer packaging market in the US¹.

Simultaneously, the recycling industry has seen a dramatic decline in fibre, particularly newsprint, which has reduced by more than 50% since its peak in 2000². Advances in high speed internet access and the proliferation of smartphones, has made digital the preferred platform for media content and information sharing. This unanticipated decrease has left some material recovery facilities (MRFs) with significant excess equipment capacity.

Extended Producer Responsibility Programs

In British Columbia, Extended Producer Responsibility (EPR) (formerly referred to as Industry Product Stewardship) is an environmental policy approach in which the producer's responsibility for reducing environmental impact and managing the product is extended across the whole life cycle of the product, from selection of materials and design to its end-of-life (MOE). EPR, as legislated through the Provincial Recycling Regulation, continues to evolve and there is no guarantee that municipalities will be involved or that they will be compensated for what collection options they choose to offer through municipal programs. That said, there are tax reduction benefits inherent in EPR program development since the responsibility, and financial burden, of end-of life management is shifted from local governments (and tax payers) to manufacturers.

The Canadian Council of Ministers of the Environment (CCME) published a Canada-wide Action Plan for EPR in 2009. It is a strategic plan rather than a specific regulation, so there is some concern on how follow up will be reinforced by each jurisdiction and if EPR will remain a priority for CCME. While a Canada-wide implementation of EPR programs will have more impact, it should be noted that the British Columbia Recycling Regulation is on schedule for implementation. The 2015 and 2017 goals are summarized in Table 1. All materials slated for 2015 are now covered by EPR programs in British Columbia.

Table 1: CCME Canada-Wide Action Goals for Extended Producer Responsibility

2015	2017
Packaging and printed paper (PPP) materials	Construction materials
Household hazardous waste	Demolition materials
Electronics and electrical equipment	Furniture
Mercury-containing lamps	Textiles and carpet
Automotive products	Appliances including ozone-depleting substances

The most recent program to be legislated in British Columbia is PPP, which includes products currently collected in municipal curbside and depot based recycling programs and expands beyond it to include packaging from a broader array of products. MMBC's PPP program launched in May 2014 for the residential sector, which includes single family and multi-family dwellings, and is managed by the industry-funded non-profit Multi Material British Columbia

¹ www.researchandmarkets.com/reports/3086502/glass-packaging-market-for-food-and-beverages.

² Making Sense of the Mix: Analysis and Implications of the Changing Curbside Recycling Stream (Green Spectrum Consulting LLC, and Resource Recycling Inc., 2015).

(MMBC). Public streetscapes will also be covered by the MMBC program in the future. While most local governments have found that the incentive does not cover all operational costs for curbside collection programs if they continue to deliver services themselves (municipalities have generally reported cost recovery of between 40 and 60%), the incentive still represents a significant saving. Depot based recycling programs are offered a price per tonne for recyclable materials collected, and the cost of transport of the materials from the depot are covered by MMBC.

In addition to the existing EPR programs, two other programs are currently being developed in British Columbia:

- Major Appliances and Recycling Roundtable (MARR) for large appliances and white goods; and
- Mattress and Box Spring Recycling Program.

Changing Collection Approaches

Recent years has also seen a trend towards single-stream recycling, whereby residents are provided with large capacity carts or bins in which they co-mingle or mix all their recyclables into one bin as a single stream. Single stream recycling is becoming more common in some municipalities as additional processing facilities have been built that can efficiently sort the materials into clean materials streams for recycling. The benefits include lower overall collection costs, increased participation due to ease of use, and ability to combine with an automated collection program. Drawbacks include increased contamination and residuals. Specifically, the fibre stream is less clean at the end of processing compared with a source separated fibre stream, and therefore receives a lower price in the recycling market.

As well as expanding the types of packaging that can be collected, MMBC has also imposed some restrictions. Specifically, they will not accept glass in curbside programs and consider it to be contamination. Municipalities and regional districts that have signed on to MMBC need to either provide a separate recycling box for glass, or alternatively tell residents to take glass to collection depots. StewardChoice, a second PPP industry steward that has submitted a plan to the British Columbia Ministry of Environment (MOE), may become a competing industry steward for PPP collection starting in 2016 if their plan is approved by the MOE.

2.2 Organics Management

Food Scraps Collection Programs

Food scraps also known as food waste, or organics includes anything that is compostable from fruit and vegetable peelings to yard waste, bones and meat, to food soiled paper and napkins. These organic materials are the largest portion of residential garbage, representing up to 40% by weight. Due to the large amount of organics in the garbage, many regional districts and municipalities have started to implement source separated organics (SSO) curbside programs to divert organics from disposal. Currently over 64% of residents in the province are part of regional districts or municipalities that have started collecting SSO and have banned organic waste from disposal.

On Vancouver Island, CoVRD, RDN, and Capital Regional District (CRD) have residential food scraps collection programs within their regional districts from some residents. As a result of these initiatives, the overall quantity of food scraps in the garbage has been decreasing over time. It is estimated, from 2014 curbside collection data, that residential food scraps diversion programs in BC are collecting approximately 75 kg/capita/yr. Collection approaches include collecting food and yard waste together in one green bin (most Metro Vancouver municipalities) or source separated food scraps only (CoVRD, RDN, and Toronto).

With the introduction of yard waste and food scraps collection programs, it is less necessary to collect all material streams (garbage, recycling, and organics) on a weekly basis. As a result, every other week (EOW) garbage and

recycling collection services have become more common. Over the past five years a number of British Columbia municipalities have switched to EOW garbage collection, including the City of Victoria, the Regional District of Nanaimo and the majority Metro Vancouver communities. Municipalities that have implemented EOW garbage collection and weekly organics collection have seen the following:

- 20% to 40% reduction in collection and disposal costs;
- 25% to 40% reduction in the disposal rate; and
- Diversion rates of just over 70%.

Organics Processing Facilities

The primary methods for processing organic matter are aerobic composting (with oxygen), and anaerobic digestion (without oxygen). Within these two processing methods, there are many different technology options available.

Aerobic Composting is the microbial degradation of organic materials in the presence of oxygen. An **aerobic in-vessel** system is an engineered system in which favourable composting conditions are induced in order to accelerate the degradation process and contain it within a manageable area. Although the technology is relatively new, it is expanding rapidly and many options are already in use, including several facilities on Vancouver Island and Coastal Communities and within Metro Vancouver. Aerobic in-vessel composting systems come in a variety of sizes and technologies, and produces usable soil amendment, potentially requiring additional curing. Figure 1 illustrates the various steps required to produce a soil product.

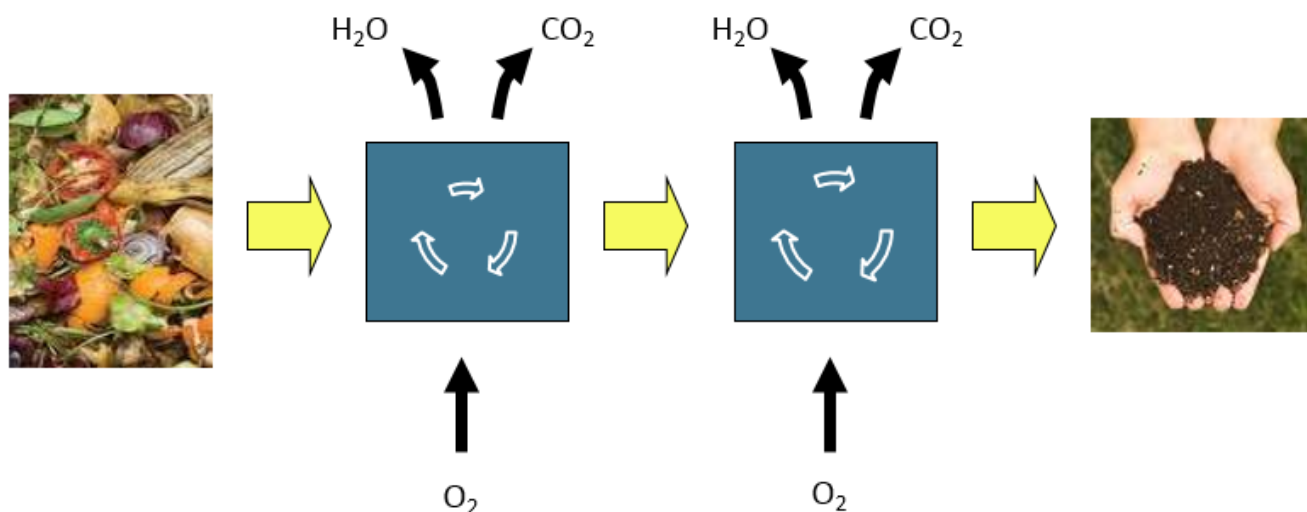


Figure 1: Process Flow Diagram for Aerobic Composting

One notable requirement of aerobic in-vessels systems is the addition of a bulking agent. To achieve an output that can be considered as compost, a certain ratio of Carbon to Nitrogen is required. Organics (i.e., food waste) are typically rich in nitrogen, so a source of carbon generally needs to be added to the system to achieve the proper balance. Generally, wood waste, wood chips, sawdust, or wood pellets are used, however, in some cases paper or cardboard can also be used as a bulking agent. Bulking agents also serve to control moisture content. The ratio and recommended bulking agent depends on the specific technology used.

Anaerobic Digestion is a process in which organic material is degraded in the absence of oxygen. The by-products of anaerobic digestion are biogas, which can be used as an energy source. In some instances, a liquid extract is used as a fertilizer and a solid components which, depending on process parameters, can be used as

soil-amendment or processed further to create a finished compost. Anaerobic systems are becoming increasingly popular for food scraps processing due to their ability to generate power. Their major drawback is that operation and maintenance costs are high compared with aerobic systems. Figure 2 illustrates the difference between anaerobic and aerobic processing options.

Odour management is a major challenge for organics processing facilities. When facilities are built in or near populated areas, odour issues are the most significant cause of adverse publicity and facility closures due to regulatory pressures. Factors that influence generation of odours include: feedstock composition, decomposition rates, availability of the nutrients in the feedstock to the microbes, how well mixed the feedstocks are, and several physical factors, such as moisture content, particle size, oxygen content, and temperature. As well as managing the above factors, biofilters, and vaporizing technologies can be used to reduce or treat odours.

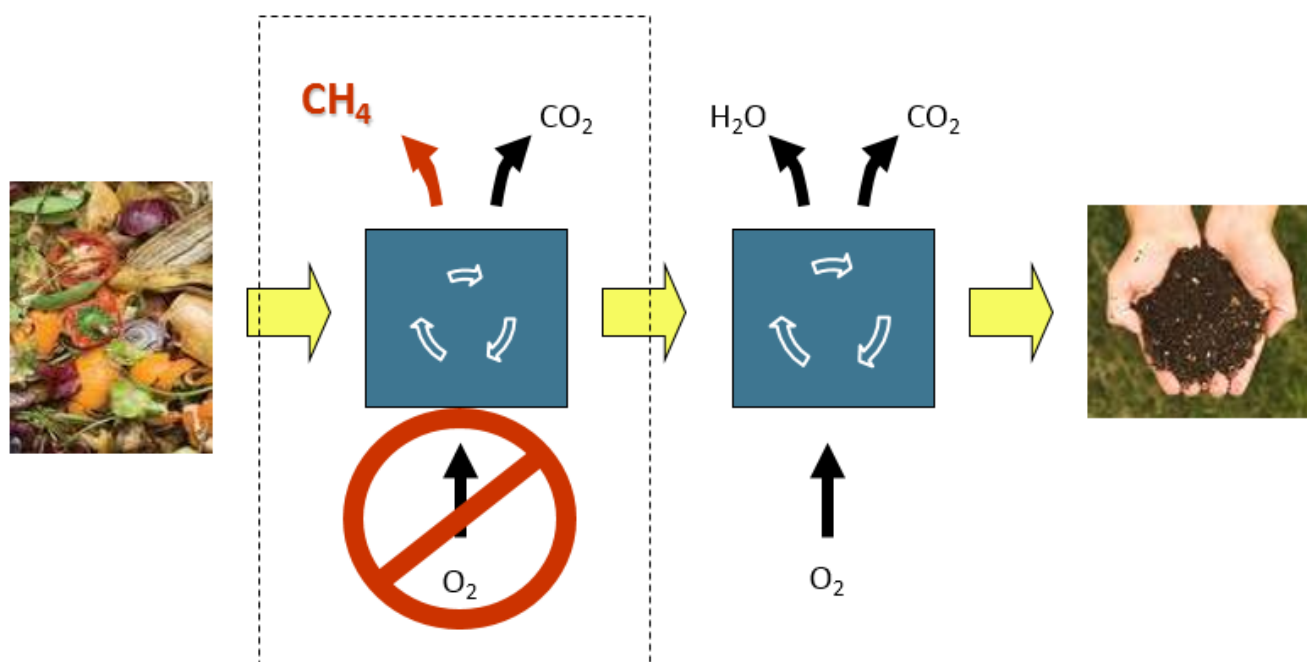


Figure 2: Process Flow Diagram for Anaerobic Digestion with Composting as a Finishing Step

2.3 Mixed Waste Material Recovery Facility

Mixed waste material recovery facilities, also known as dirty MRFs accept mixed MSW and then separate out recyclable and compostable materials through a combination of manual and mechanical sorting. The residual waste is then disposed of. Although utilized by a number of U.S. cities, mixed waste MRFs remain a controversial approach to recycling. The quality of recyclables tends to be low after processing and materials are often downgraded (for example, fibre is composted rather than processed to be used as fibre again). Many facilities have not reached their diversion targets – although promising up to 80%, most facilities actually achieve around 50%.

The Fraser Valley Regional District is undergoing an assessment of mixed waste MRF and overall system diversion options. This includes the development of regional approaches to improve overall efficiency and cost of building and running an advanced MRF to sort garbage and remove recyclable commodities to conserving the long-term disposal capacity at landfills in the region.



2.4 Waste to Energy

Despite diversion programs, there is still residual waste that needs to be dealt with. Given the declining amount of landfill capacity and the significant challenges associated with siting new landfills, long-term disposal options are a high priority for regional governments. Waste to Energy (WTE) technologies are often considered a more viable option than landfilling since it converts waste materials to energy which can then be used in place of burning virgin fossil fuel. WTE facilities generate high pressure steam that can be used for industrial processes or to make electricity such as the WTE facility in Burnaby pictured below.



WTE facilities generally reduce the quantity of the residual waste materials. Depending on the technology used, expected reductions include the following:

- **Mass reduction:** 80% by weight; and
- **Volume reduction:** > 90%.

Environmental concerns associated with these systems include air emissions that could impact air quality, and residuals from the process (fly ash and bottom ash) that still require landfill disposal.

WTE technologies need to be operated at their designed processing capacity to be economical. If they are designed and sized appropriately to meet anticipated long term disposal capacities then the cost can be as projected. Two examples are summarized below.

2.4.1 Durham Region WTE Facility

Durham Region in Ontario is in the process of commissioning their mass burn WTE facility. It employs a similar thermal processing technology to Metro Vancouver's WTE facility in Burnaby. This facility is estimated to cost \$260 million and process 140,000 tonnes per year.

Although this facility cost \$260 million, much of the foundation and infrastructure was designed for a 400,000 t/yr facility. This facility has elevated capital costs which affects its unit processing cost. The calculated unit processing cost for the Durham WTEF is estimated to be \$250 per tonne. This includes a 20 year amortization at a interest rate of 6%. If the facility was built for its design capacity, the unit processing cost is estimated to be \$150 per tonne. This includes the cost for disposal of the residuals.



2.4.2 City of Edmonton WTE Facility



The City of Edmonton in Alberta is also commissioning a WTE facility that uses gasification technology from Enerkem. This facility is one of the first commercial scale gasification facilities in North America and cost over \$210 million. It is designed to process 100,000 tonnes of MSW annually.

The unit processing cost was calculated for the Enerkem facility. Additional pre-processing activities supports higher operating costs (estimated to be 20% higher than the Durham WTEF). The unit processing cost is estimated to be \$195 per tonne.

2.4.3 Tri-Regional District WTE Feasibility Study

In 2010, the Tri-Regional District Solid Waste Study was commissioned that assessed the feasibility of thermal treatment (or WTE) technologies for MSW for the three southern Vancouver Island regional districts. The study assessed different technologies, considering the combined solid waste available from the three regional districts. The figure below illustrates the expected unit processing cost for thermal treatment technologies based on their design processing capacity. For the three regional districts, the design capacity was 200,000 tonnes per year. This indicates a unit processing capacity that is just over \$100 per tonne. For more information see Section 3.5.

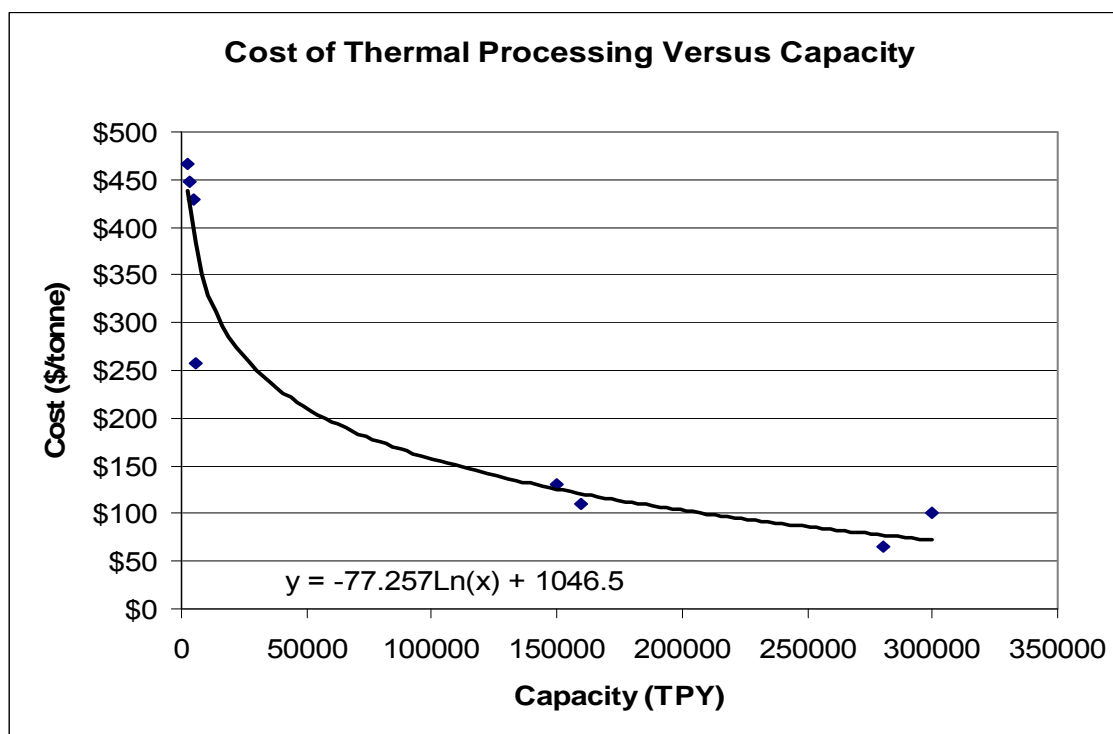


Figure 3: Cost of Thermal Processing Versus Capacity

2.5 Institutional, Commercial, and Industrial Sector and Multi-Family Residential Waste Management

Most municipalities and regional districts in British Columbia have implemented successful single family residential recycling programs, with diversion rates reaching over 70%. However, overall diversion rates are pulled down because of much lower rates in the Institutional, Commercial, and light-Industrial (ICI) sector and multi-family housing. Challenges can include space limitation for additional containers for recycling and organics diversion, training and education of staff and residents for using the program, and the use of shared bins by multiple users, and the cost of adding additional recycling and organics collection. Private sector waste haulers typically collect and process waste and recyclable materials from these sectors.

Metro Vancouver, for example, has been working closely with the ICI sector to launch the organics disposal ban which started in January 1, 2015 and to start enforcing the ban in July 1, 2015. Metro Vancouver has consulted with the ICI sector and provided educational materials as well as tools and direct support for businesses. They have also developed bylaw templates for recycling and organics diversion bans for municipalities. The City of Calgary has also developed an ICI waste diversion strategy with disposal bans at the centre of the action plan to reduce waste. Paper, cardboard and organics bans are all in development as well as a recycling bylaw that requires source separation. The City also intends to support the ICI sector with direct assistance programs, promotion and certification programs, monitoring and reporting, and consulting with industry ICI Working Group. Successful ICI and Multi-Family organics strategies have used landfill bans along with enforcement mechanisms such as fines to enforce the material bans.

2.6 Construction and Demolition Sector Waste Management

Likewise, C&D waste needs to be tracked and recycled in order to reach zero waste goals. C&D waste can make up a significant portion of the waste stream, and many of the materials can be reused and recycled and help meet

waste reduction and diversion goals. The proper disposal and recycling of C&D debris has been recognized as a challenge for regional districts and municipalities in British Columbia. The materials can be easily shipped to regions with less controls or bylaws, or illegally dumped on vacant or municipally owned land creating possible soil and groundwater contamination. Regional districts need to ensure that C&D waste is recycled, and what is not recyclable is brought to authorized and licensed facilities for transfer and proper disposal. C&D waste programs are being established in a number of jurisdictions that building permit, and demolition permits must include the development of a recycling plan, and a requirement that all waste is disposed at a licensed facility.

2.7 Waste Management Financing

In 1990 the provincial government required all regional districts to develop solid waste management plans that would contribute towards the overall goal of 50% reduction in waste disposal per person by the end of the year 2000. Since then most regional districts in the province have adopted the long-term goal of working towards Zero Waste and have set more ambitious diversion targets of 70 or 80% by 2020.

To meet targets, regional governments across British Columbia have invested in diversion programs, commonly financed (or subsidized) by tipping fee revenue from their landfill. As residual waste tonnages decrease and diversion rates increase, this form of financing has been stretched to the limits. Even with tipping fees of up to \$200 per tonne, most regional districts face a funding gap and challenges of waste export across regional, provincial and federal borders is beginning to emerge.

This issue has resulted in a renewed interest in waste flow control regulations, to eliminate export of materials and create a sustainable financing mechanism for a regional district's waste management system. In early 2015 Metro Vancouver's Bylaw 280, which required that all residential and ICI garbage be delivered to Metro Vancouver facilities, was rejected by British Columbia MOE. Hauler franchises in the ICI sector have also garnered some interest in British Columbia. A hauler franchise is a system in which a jurisdiction allows solid waste collection services to be provided by selected private waste haulers but requires haulers to bid on through a request for proposal and enter into a commercial franchise agreement with the jurisdiction to provide exclusive waste hauling services to a specific geographic area within the jurisdiction. Under this franchise system, all customers within the specified area would have service provided by the same hauling company, and the terms for service would be defined in the RFP.

Another way to fill the financing gap is by relying less on variable revenue streams (tipping fees) and more on fixed revenue sources such as taxation or utility fees.

3.0 ASSOCIATION OF VANCOUVER ISLAND AND COASTAL COMMUNITIES SOLID WASTE OVERVIEW

This study takes a benchmarking approach, identifying key metrics and system components, to enable a comparison between different regional districts. Metrics that were collected for the overview are provided in the table below. Some of this information is also presented visually in the subsequent figures and charts.

3.1 Disposal and Composting Facilities

Figure 4 is a schematic map of AVICC member regional districts that depicts landfills and organics processing facilities, including both public and privately owned and operated sites. The aim of this map, along with the supporting data provided in Table 2, is to show the processing capacity of the AVICC and potential opportunities for collaboration. Transfer stations and recycling facilities, including MRFs, have not been included since recycling processing infrastructure is less of a challenge and provides fewer opportunities for collaboration. More detailed

maps of each regional district – including the names of the facilities – can be found in the individual regional district summaries at the end of the report.

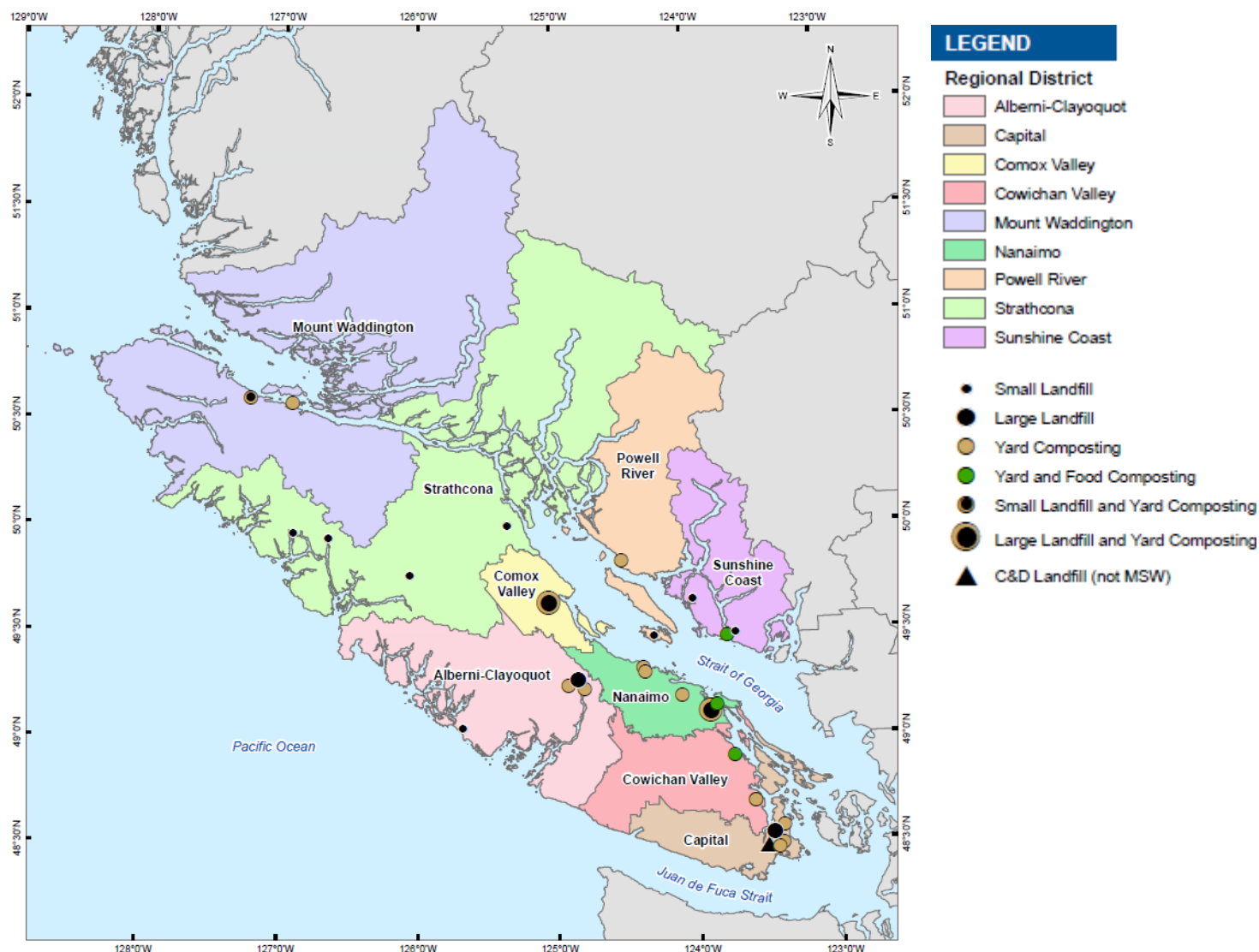


Figure 4: Map of Association of Vancouver Island and Coastal Communities Regional Districts, Depicting Landfill and Composting Facilities

Table 2: Association of Vancouver Island and Coastal Communities Member Solid Waste Overview

Metric	Alberni Clayoquot	Capital	Comox/Strathcona	Cowichan Valley	Mount Waddington	Nanaimo	Powell River	Sunshine Coast	Total
General Information									
Population	31,061	372,463	104,950	81,704	11,523	150,404	19,480	29,584	801,169
Area (km ²)	6,588	2,340	19,977	3,475	20,244	2,038	5,075	3,777	63,514
Density (population/km ²)	4.7	153.8	5.25	23.1	0.57	71.9	3.9	7.6	12.6
SWMP* Approved (Year)	2008	1995	2013	1995	1996	2004	1996	2011	
SWMP Current Status		Stage 3		Amended 2007	Stage 1	Stage 2	Stage 3		
Disposal/Capita (kg)	699	369	610	286	542	335	236 ⁴	352	399
Diversion Rate	22%	52%	51%	74%	32%	68%	50%	50%	57%
Residual Management									
Generated/yr (MT)	21,597	137,306	64,292	23,333	6,243	52,237	4,604	10,229	319,653
Exported/yr (MT)	0	0	0	23,333	0	1,915	4,604	0	29,852
Landfill Capacity ¹ (m ³)	1,340,880	10,872,000	286,770	0	779,542	2,400,000	0	251,771	15,930,963
Landfill Capacity ¹ (yrs)	80	35	25	0	80	25	0	15	
Tipping Fee	\$95	\$110	\$120	\$140	\$115	\$125	\$215	\$150	
Disposal Cost ²	\$2,051,715	\$15,082,980	\$7,715,040	\$3,266,620	\$717,911	\$6,529,611	\$2,283,945	\$1,534,350	\$37,888,087
Organics Management									
Generated/yr (MT)	409	15,219	4,690	11,356	2,011	26,250	902	3,318	64,087
Exported/yr (MT)	0	15,219	0	0	0	0	0	0	15,219
Capacity ³ (MT)				37,200		22,500	902		60,602
Recycling									
Generated/yr (MT)	4,700	132,057	62,436	66,918	986	86,603	3,713	5,563	362,976
Population served by MMBC	100%	100%	87%	100%	100%	100%	34%	100%	97%
¹ Including planned expansion. ² Disposal cost = tipping fee x garbage generated. ³ Excludes small, private yard/wood waste facilities. ⁴ Does not include C&D waste *Solid Waste Management Plan (SWMP)									

3.2 Solid Waste Management Plans

Each regional district is at a different stage with its SWM Plan as outlined in Figure 5. The Comox Strathcona Waste Management (CSWM) Plan was the most recent SWM Plan to be approved by the British Columbia MOE in 2013, while Powell River Regional District's (PRRD) new SWMP has been completed and is just awaiting final approval.

Cowichan Valley Regional District (CoVRD) and the Capital Regional District has taken a slightly different approach; rather than developing an entirely new SWM Plan they have passed amendments to the original Plan, which were approved in 1995. For the CoVRD there have been a total of three amendments approved, in 1997, 2002 and most recently in 2006, expiring in 2016. For the CRD there has been a total of 12 amendments with the last one occurring in 2012.

The MOE recently announced its intention to update guidelines for preparing regional solid waste management plans. The aim of the updated guideline is to reduce the burden on local governments, and to make the planning and approval process more efficient.

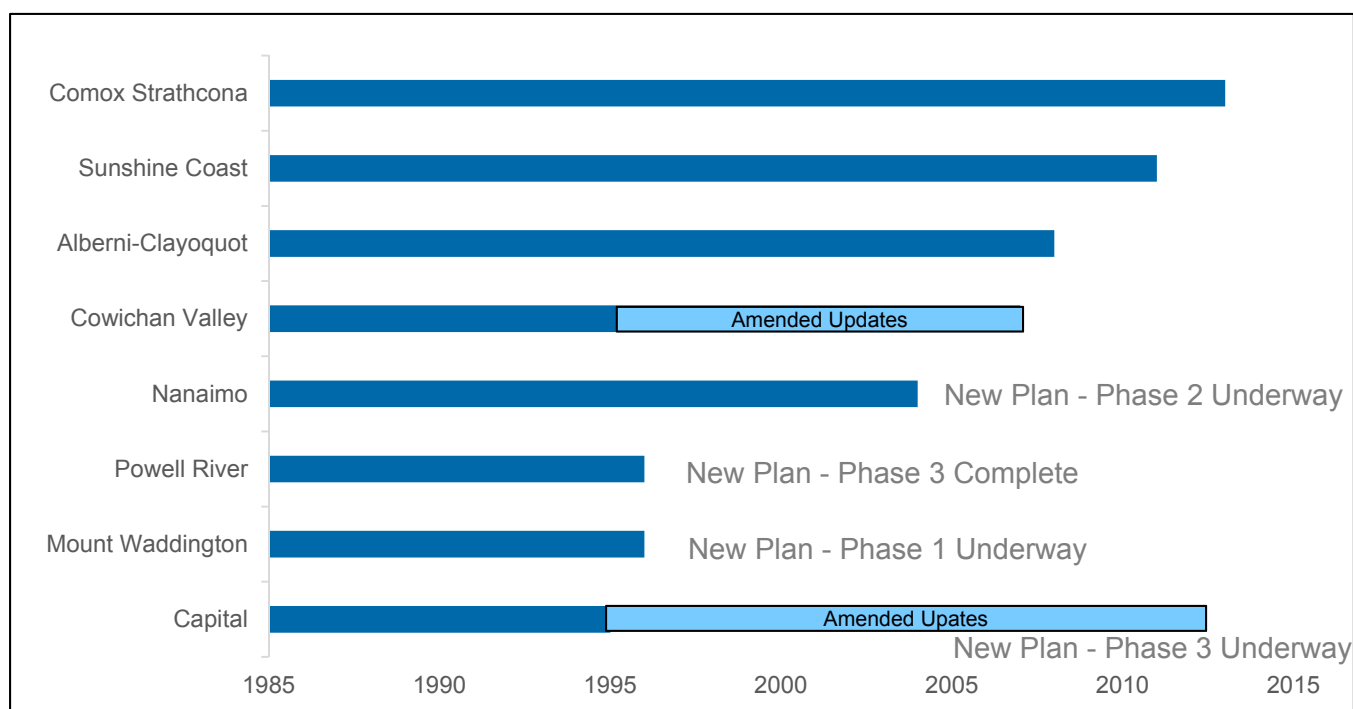


Figure 5: Solid Waste Management Plan Year of Approval and Current Status

3.3 Per Capita Disposal and Diversion

Data on disposal and diversion per capita was collected. The average disposal across all eight regional districts is 399 kg/capita. The Province has a ministry service plan target that lowers the municipal solid waste disposal rate to less than 350 kg/capita by 2020. This was announced by British Columbia MOE on May 21, 2015.

Most of the regional districts in the AVICC have met or are close to meeting the Province's target. It is worth noting, however, that to date no regional district is fully capturing or tracking the management of C&D waste, much of which is being exported.

Figure 6 depicts disposal per capita, recycling per capita and diversion of organics per capita for each regional district. All regional districts are collecting yard waste in some capacity, and those with Food Scraps collection see the highest kg/capita quantities of organics diversion. There is no consistent pattern to the amount of recycling and garbage produced per capita.

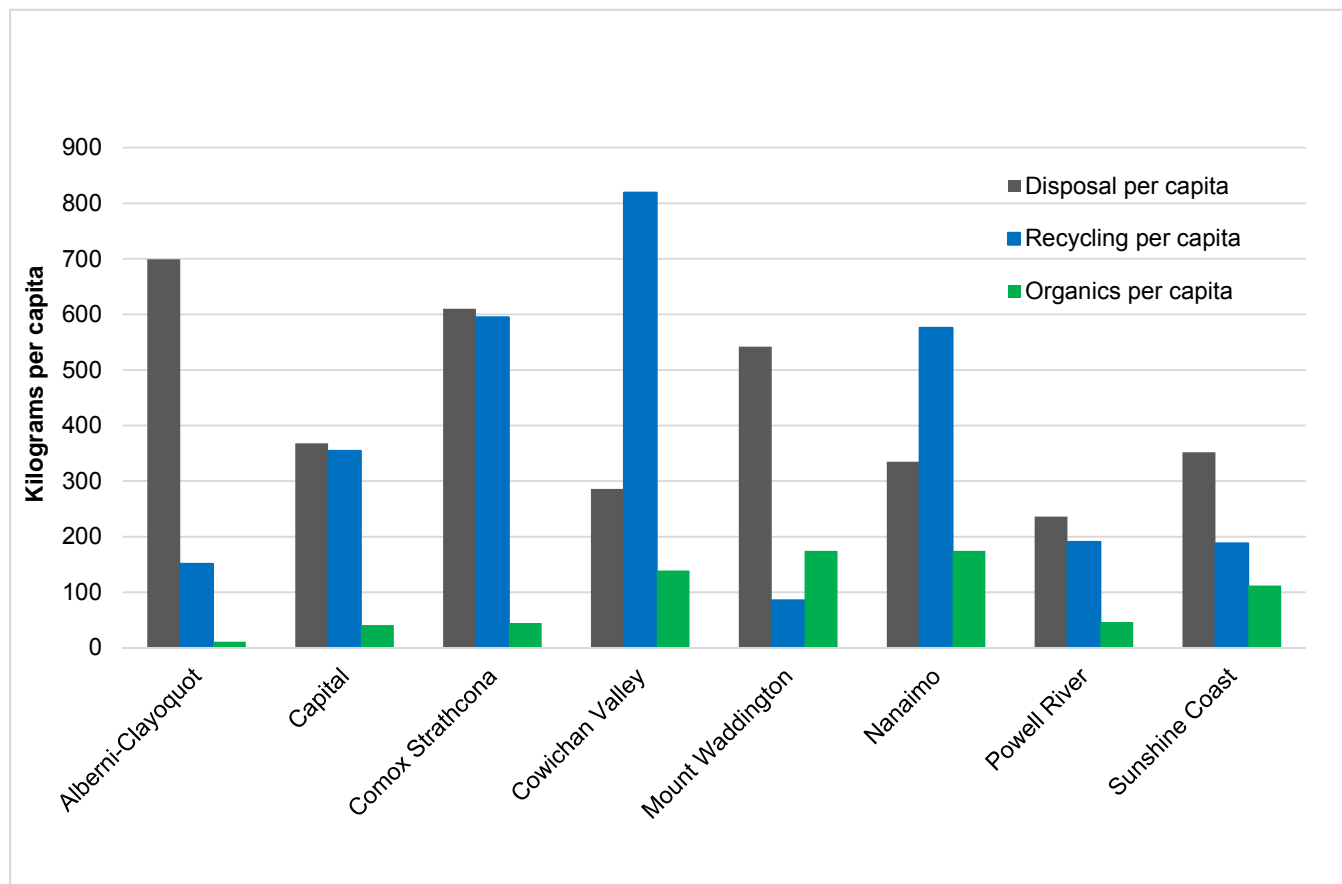


Figure 6: Per Capita Disposal, Recycling, and Organics Diversion

3.4 Residual Management

Of the eight AVICC member regional districts, two have no local landfill capacity remaining – CoVRD and PRRD. Both regional districts are currently exporting residual waste to a U.S. landfill in Washington State. Figure 7 shows the remaining disposal capacity, in years, for each regional district.

Limited disposal capacity in these, and other, regional districts has led to an overall increase in tipping fees across Vancouver Island and Coastal Communities, in an effort to maintain revenues and fund solid waste management systems. Tipping fees, depicted in Figure 8, currently range from \$95 per tonne in Alberni-Clayoquot Regional District (ACRD), to \$215 per tonne in PRRD. High local tipping fees are driving waste across regional district borders and/or off the Island and Coastal Communities altogether. Overall 320,000 tonnes of garbage were disposed of, and of this 30,000 tonnes were exported by, AVICC regional districts in 2014. Based on each region's garbage generation rate and respective tipping fees, the overall cost of disposal (i.e. tipping fee multiplied by garbage tonnage totalled for each regional district) was calculated to be \$37.9 million across all AVICC members.

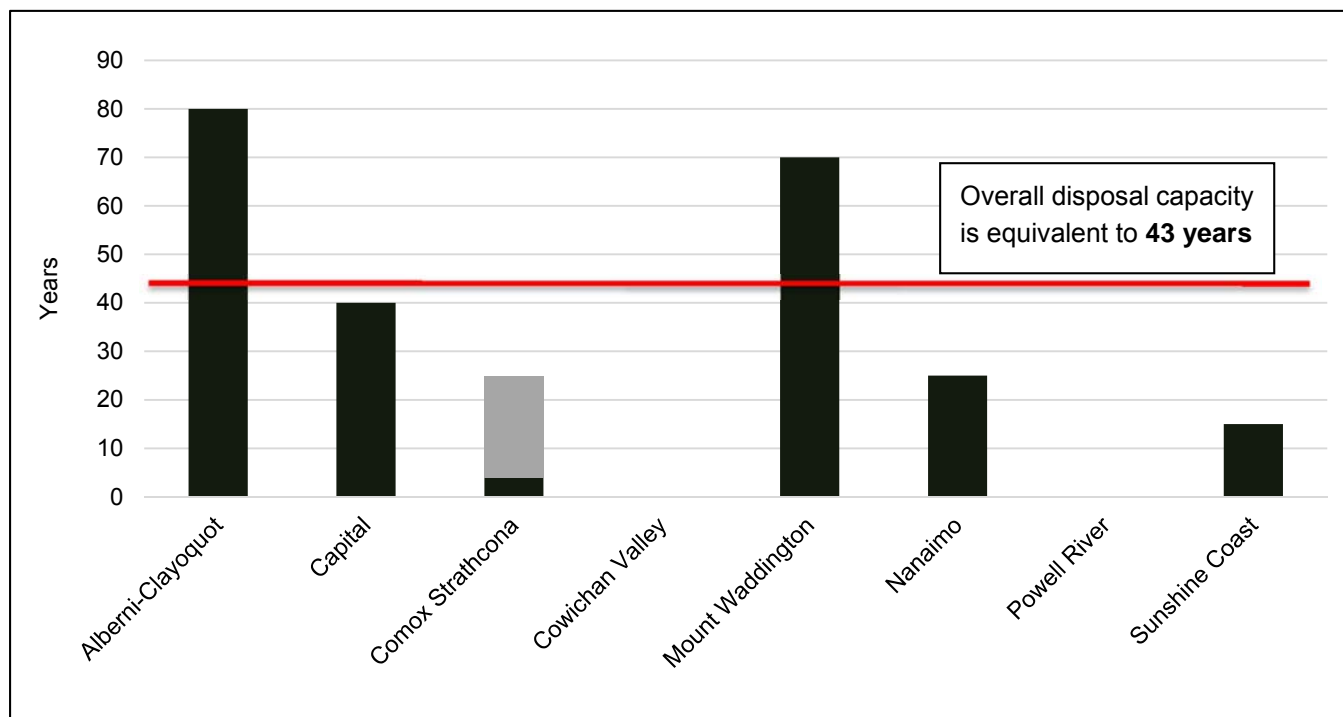


Figure 7: Remaining Planned or Available Disposal Capacity in Years

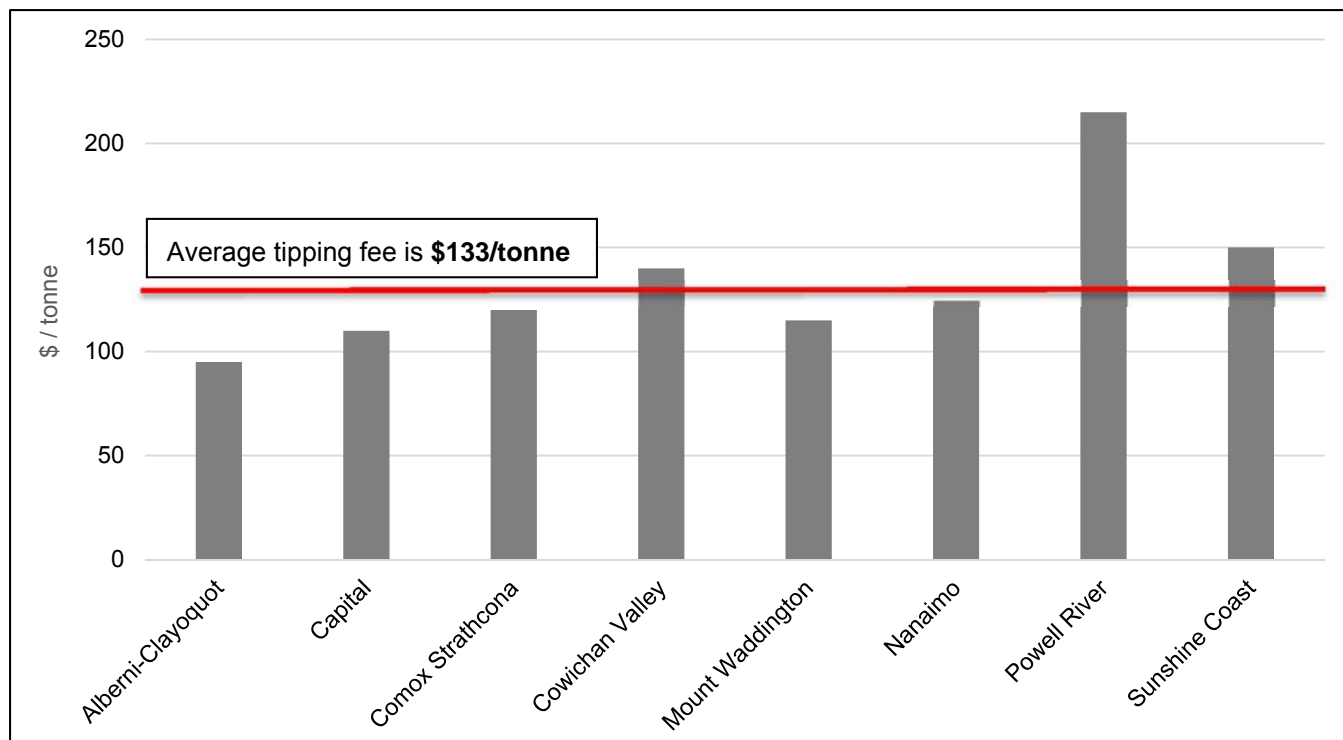


Figure 8: Municipal Solid Waste Tipping Fees

3.5 Recycling

As shown in Figure 6, AVICC members generally have high recycling rates, ranging from 86 kg/capita up to 595 kg/capita in CoVRD. The average across all regional districts is 453 kg/capita. These rates are a reflection of long term and successful diversion programs that enjoy high participation rates among residents, particularly from single family households.

AVICC members have a range of recycling services and infrastructure across their regional districts. Many communities receive curbside recycling services (roughly 70% of the population across all regional districts) although more rural populations are serviced by drop-off depots. Landfill sites also have their own depot areas where they accept a range of recyclable materials. As well as the regional district-owned drop-off depots, there are a wide range of private recycling facilities operating across the AVICC. These private facilities recycle various materials and primarily cater to the private sector. There are seven MRFs in CRD, CSWM, and RDN.

All regional districts in AVICC have signed up to the MMBC stewardship program for PPP in some capacity (curbside or depot financial incentives). Almost all municipalities within the regional districts are signed up, with the exception of the Town of Comox and the City of Powell River. In total about 97% of all AVICC member residents' are covered by MMBC subsidies whether they receive curbside collection or self-haul to the local drop-off depot. No SCRD municipalities are a part of MMBC, however they have access to self-haul depots that have signed up with MMBC.

3.6 Organics Management

An increasing number of communities across British Columbia (and North America) are diverting organic material. Collection approaches include collecting food and yard waste together (e.g., Metro Vancouver municipalities) and separate collection streams for food waste and yard waste (e.g., CoVRD and RDN). As noted above, CRD, CoVRD, and RDN all have residential food scraps collection programs in place, and CSWM and the District of Sechelt are currently conducting food scraps collection pilots. Organic material typically composes roughly 40% of the garbage, so removing it from the disposal stream is critical to improving diversion and reducing landfill gas generation.

CoVRD, RDN, and Sunshine Coast Regional District (SCRD) all have organic processing facilities that accept food scraps. The CoVRD has two private composting facilities who accept food scraps, and a third one that accepts yard and garden debris. The organic processing facilities that accept food scraps have faced various challenges with odour issues, despite using in-vessel technologies. One staff member who was interviewed for the study noted that to combat odour issues a technological resolution was required, which may require a much larger facility (to reach economies of scale) that could be shared by multiple regional districts. The combined capacity of existing organics processing facilities is roughly 65,000 tonnes per year, although this doesn't include the multiple small private facilities on the Island and Coastal Communities that accept yard waste. CSWM and CRD are also looking at options for constructing an organics processing facility in their jurisdiction.

3.7 Financial Models

Financial models for regional districts are typically based on tipping fees. Finding a sustainable funding model is challenging especially since diversion programs would affect revenue. As diversion rates increase, using tipping fees to finance the solid waste system, becomes less practical. Tipping fees can be increased however if set too high it could increase illegal dumping or cross border disposal practices. Without a flow control mechanism in place, waste will flow out of the system to out of region facilities that have lower tipping fees. Finding the right balance is particularly challenging for Regional Districts that have no more disposal capacity and are paying extremely high rates to dispose their garbage to the U.S.

Regional Districts have a range of income sources available to them to pay for solid waste management, and each one employs a slightly different model. Primary revenue sources for solid waste management operating budgets are outlined in Table 3.

Table 3: Primary Revenue Sources for Solid Waste Management Operating Budgets

Primary Revenue Sources	% Contribution to SWM Operating Budget
Tipping Fee Revenues	32% to 79%
MMBC Subsidies/EPR Revenues	2% to 17%
Taxation	0% to 54%
Utility Fes	0% to 24%

Financial information about each regional district's revenue sources was requested. The overall revenue for AVICC's eight regional districts were combined and is depicted in Figure 9. The breakdown for each regional district is in the Table 4. These numbers are for operating expenses only and do not take into account financing of capital projects and/or municipally-run programs. A regional district's operating expenses depends on the infrastructure and services they manage (e.g., curbside collection programs, operating a landfill etc.). For example, curbside recycling services tend to be financed primarily through MMBC incentives and taxation and/or utility fees, whereas infrastructure and landfill operations tends to be more heavily resourced through tipping fees.

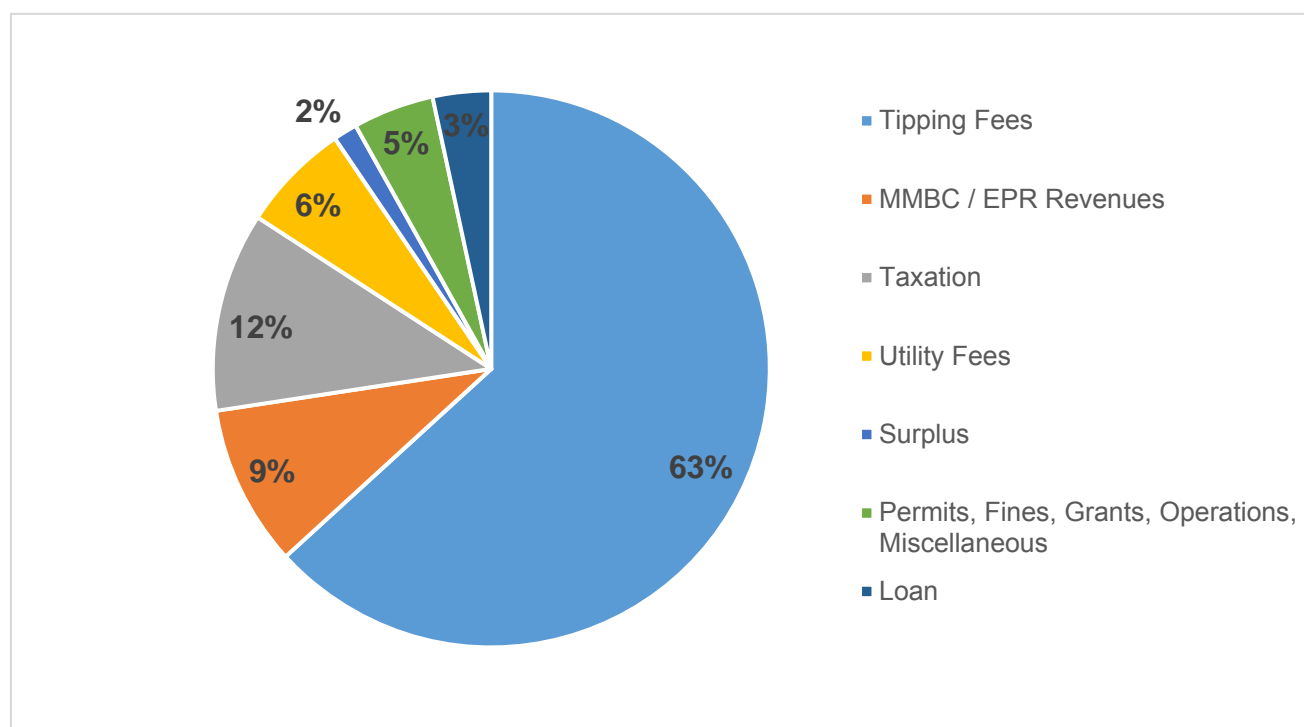


Figure 9: Breakdown of Contributing Revenue Sources for Regional District Solid Waste Management Operating Budgets

Table 4: Breakdown of Revenue Sources for Operating Budgets

Description	ACRD	CRD	CSWM	CoVRD	MWRD	RDN	PRRD	SCRD
Operating Budget¹	\$3,289,500	\$19,810,879	\$11,754,067	\$7,300,000	\$973,417	\$11,888,000	\$1,780,407	\$3,778,965
Population	31,061	372,463	104,950	81,704	11,523	150,404	19,480	29,584
Area (km²)	6,588	2,340	19,977	3,475	20,244	2,038	5,075	3,777
Density (population/km²)	4.7	153.8	5.25	23.1	0.57	71.9	3.9	7.6
Revenue	\$3,289,500	\$19,424,186	\$11,754,067	\$7,310,000	\$1,150,237	\$13,167,375	\$1,780,407	\$4,082,605
<i>Tipping Fees</i>	\$2,126,543	\$15,384,915	\$8,502,565	\$2,450,000	\$370,886	\$7,267,000	\$861,735	\$2,133,840
<i>MMBC/EPR Revenue</i>	\$355,000	\$3,331,124	\$192,200	\$600,000	\$123,365	\$1,024,375	\$30,369	\$135,000
<i>Taxation</i>	\$183,264	\$0	\$707,135	\$3,960,000	\$536,976	\$462,000	\$236,906	\$1,066,920
<i>Utility Fees</i>	\$0	\$0	\$0	\$0	\$0	\$3,183,000	\$0	\$746,845
<i>Surplus</i>	\$603,693	\$0	\$257,422	\$0	\$0	\$0	\$0	\$0
<i>Permits, Fines, Grants, Operations, Misc.</i>	\$21,000	\$708,147	\$0	\$300,000	\$0	\$1,231,000	\$651,397	\$0
<i>Loan</i>	\$0	\$0	\$2,094,745	\$0	\$0	\$0	\$0	\$0
<i>First Nation Requisition</i>	\$0	\$0	\$0	\$0	\$119,010	\$0	\$0	\$0
Shortfall/Profit	\$0	(\$386,693)³	\$0	\$10,000	\$176,820	\$1,279,375⁴	\$0	\$303,640
Cost/Capita²	\$106	\$53	\$112	\$89	\$84	\$79	\$91	\$128

¹ Budget year: 2015 (ACRD, CSWM, CoVRD, RDN), 2014 (CRD, MWRD, PRRD, and SCRD).

² Based on operating budget only for the regional district (No municipal costs included). Some regional districts provide collection services to electoral areas, and other operate depots so financial numbers are not directly comparable as different services are offered.

³ Funded with surplus

⁴ Surplus includes money that is dedicated for transfer to reserve for landfill closure.

3.8 Collaboration Efforts

3.8.1 Comox Strathcona Waste Management

The CVRD is responsible for solid waste management planning in both the CVRD and the Strathcona Regional District (SRD) geographic areas. The service is governed by a board of directors that includes elected officials from member municipalities and electoral areas of both regional districts and is branded.



CSWM manages all of the solid waste infrastructure and services for both regions. This includes responsibility for two regional waste management centres that serve the Comox Valley and Campbell River, as well as a range of transfer stations and smaller waste-handling and recycling facilities for the electoral areas of the CVRD and the SRD. The CSWM service manages over 100,000 tonnes of waste and recycled material and oversees a number of diversion and education programs.

CSWM has demonstrated that two regional districts can work together on solid waste management planning and operation. This sub-regional partnership allows to build some economies of scale and sharing of resources.

3.8.2 Tri-Regional District Solid Waste Study

A few AVICC members have previously collaborated on solid waste management initiatives. In 2011, the RDN, CVRD and CRD jointly commissioned a Tri-Regional District Solid Waste Study that assessed thermal treatment technologies for MSW. The study assessed different technologies, considering the combined waste available from the three regional districts. It was estimated that the facility should have capacity to process about 225,000 tonnes per year of waste (after organics management and recycling programs have been maximized). The three technologies considered were:



- Mass burn;
- Gasification; and
- Plasma gasification.

Finding of this study include the following:

- Mass burn was the most proven, reliable, and lowest cost technology;
- Capital cost in the order of \$210 million;
- Unit processing cost estimated at \$115 to \$120 per tonne (for mass burn technology); and
- Gasification and Plasma Gasification technology cost approximately 40% and 55% more, respectively.

3.9 Policies and Bylaws

The BC Environmental Management Act grants the authority and responsibility to manage all municipal solid waste and recyclables to regional districts. Section 24 of the Act outlines how regional districts are responsible for developing and implementing SWMP's that provide long term plans for the management of municipal solid waste, including waste diversion and disposal activities. The most common policies and bylaws that exist in AVICC regional districts include:

- Material bans from disposal as garbage (once stable alternative use is identified)
- Waste stream management licencing and/or facility authorization systems
- Bylaws – tipping fees, requirements for minimum levels of service, organics diversion, codes of practice for facilities etc.

Regional districts can enact landfill bans on materials. The Regional District of Nanaimo has had the practice of banning materials from disposal once a viable recycling alternative is in place since 1991. Currently there are over material bans including drywall (1991), cardboard (1992) paper, metal and tires (1998), commercial food waste (2005), yard and garden waste (2007) wood waste (2007) EPR materials (2007), household plastic containers (2009) and metal food and beverage containers (2009)³. In addition there are a number of other materials and wastes that are prohibited at solid waste disposal facilities.

The authority to license and regulate solid waste facilities is given to regional districts through BC's Environmental Management Act and the licensing bylaw can be enacted through inclusion in the solid waste management plan. Section 25 of the Act contains provisions for the licensing of solid waste management facilities and haulers by regional districts. All facilities that handle municipal solid waste (MSW) in whole or part are can be included in the licensing system with the exception of those facilities covered under other provincial regulations such as landfills and incinerators, soil facilities, stewardship program depots, concrete and asphalt recycling and auto wreckers. Transfer stations, recycling depots, composting facilities, material recovery facilities and brokers can be subject to the licensing system. The Regional District of Nanaimo (RDN) and the Cowichan Valley Regional District (CoVRD), working in partnership, adopted Waste Stream Management Licensing Bylaws No. 1386 (RDN) and 2570 (CoVRD) in 2004. Under these bylaws, the RDN and the CoVRD are authorized to license all private or non-government operated municipal solid waste diversion and recycling facilities within their respective regions. The bylaws were established under the authority of both the RDN and CoVRD SWMP.

Enforcement mechanisms to ensure compliance with policies and bylaws can be difficult. All of the options including material bans and facility licensing systems work best when regional districts and neighbouring regional districts collaborate to follow or develop similar programs. This can help prevent the movement of waste to avoid landfill bans or bylaws in one jurisdiction. For example regional districts also have the ability to licence haulers, however if a hauler is not based in the regional district it becomes difficult to have any enforcement mechanisms to implement the licensing requirement.

From time to time, the MOE has also developed considerations that Ministry staff will use during the review of SWMP's and approval. In 2010 a Waste to Energy information sheet outline a series of critical criteria that would be expected of local governments before considering the inclusion of WTE facilities within their SWMP's. This included a minimum target of 70% reduce, reuse and recycle of waste before utilizing a WTE facility as a waste management option.

³ Maura Walker and Associates (2013) Solid Waste Management Plan Update: Stage One Report

4.0 ASSOCIATION OF VANCOUVER ISLAND AND COASTAL COMMUNITIES MEMBER SOLID WASTE PROFILES

Each regional district manages their SWM system differently. For example some regional districts own and operate their own disposal systems, while others contract the service to the private sector. Collection approaches also differ; some are provided by the public sector and others by the private sector, some are administered by the regional district and others by the municipality, and some provide drop off depots instead of curbside collection services. These differences also extend to how services are funded.

The following sub-sections provide high level summaries of each regional districts' solid waste management system. Section 4.0 takes a benchmarking approach, comparing key metrics across regional districts.

4.1 Alberni-Clayoquot Regional District

ACRD is a federation of member Municipalities; Port Alberni, Tofino, Ucluelet, Treaty First Nations; Huu-ay-aht, Yuułu?ił?ath and Uchucklesaht Tribe Government and six electoral areas; "A" (Bamfield), "B" (Beaufort), "C" (Long Beach), "D" (Sproat Lake), "E" (Beaver Creek), and "F" (Cherry Creek). Alberni-Clayoquot Regional District is within the traditional territory of ten First Nations. Roughly 60% of the population lives in Port Alberni. Established in 1967, the Alberni-Clayoquot Regional District provides services to their member jurisdictions. As service providers, the Regional District provides three distinct roles:

- Serves as local government to the six (unincorporated) electoral areas, providing basic local services such as community planning, water supply and fire protection;
- Serves as an inter-jurisdictional service body providing sub-regional services to different combinations of municipalities; electoral areas and First Nations; and
- Responsible for providing regional services and undertaking key activities on behalf of the entire region.



Photo 1: Alberni Valley Landfill

Table 5: Alberni-Clayoquot Regional District Key Metrics

Description	Metric
Population	31,061
Per Capita Disposal	699 kg/year
Diversion Rate	22%
Tipping Fee	\$95/tonne
Disposal Capacity	70 years

Programs and Infrastructure

Roughly 30% of the population has curbside garbage and recycling collection, and the remainder use recycling depots or self-haul garbage directly to the landfill or transfer station. ACRD has five recycling depots, three of which are owned by the regional district and funded by MMBC. There are two private composting facilities that handle yard waste, saw dust and fish waste. ACRD has two landfills (Alberni Valley and West Coast Landfill) and a transfer station.



Photo 2: Ucluelet Recycling Depot

Priorities

- Implementing an old corrugated cardboard disposal ban;
- Achieving 50% diversion; and
- Possible construction and wood waste ban.

4.2 Capital Regional District

CRD's jurisdiction is the Southern tip of Vancouver Island and the surrounding 70 Gulf Islands. CRD has 13 municipalities; Central Saanich, Colwood, Esquimalt, Highlands, Langford, Metchosin, North Saanich, Oak Bay, Saanich, Sidney, Sooke, Victoria, View Royal, and three electoral areas; Juan de Fuca, Southern Gulf Islands, Salt Spring Island.

The CRD is directly accountable to municipal partners and electoral areas for regional and sub-regional services and is the local government for the electoral areas, where it provides many sub-regional and local services. The CRD has a direct relationship with individuals, households, businesses, organizations and institutions that access regional utilities and services, and with communities that collaborate for regional services on behalf of their residents. It also works collaboratively with First Nations and senior levels of governments. Their mission is "diverse communities working together to better serve public interest and build a livable, sustainable region".



Photo 3: Hartland Landfill

Table 6: Capital Regional District Key Metrics

Description	Metric
Population	372,463
Per Capita Disposal	368 kg/year
Diversion Rate	52%
Tipping Fee	\$110/tonne
Disposal Capacity	35 years

Programs and Infrastructure

Roughly 60% of the population has curbside garbage, recycling and food scraps collection. CRD has three private composting facilities that accept yard waste and wood waste. Food scraps are taken to Fisher Road in Cowichan Valley or Harvest Power in Metro Vancouver. CRD has seven recycling depots and two MRFs (mixed waste recycling facilities). The whole population is covered by MMBC subsidies. There are two landfills: Hartland and Tervita Highwest. Tervita accepts C&D (construction and demolition) waste. Additionally, there is a transfer station at Port Renfrew.

Priorities

- Finalize new Solid Waste Management Plan;
- Develop an integrated food waste processing facility in the region; and
- Develop a financially sustainable model for the solid waste management system.



Photo 4: Mayne Island Recycling Depot

4.3 Comox Strathcona Waste Management

The CSWM, provides regional solid waste services to CVRD and SRD. This system is managed by the CVRD.

CVRD is a federation of three municipalities; the Town of Comox, the City of Courtenay, and the Village of Cumberland, and three electoral areas; Baynes Sound – Denman/Hornby Islands, Lazo Nort, and Puntledge-Black Creek.

SRD is a federation of five member municipalities; City of Campbell River, the Village of Gold River, the Village of Sayward, the Village of Tahsis, the Village of Zeballos, and four electoral areas; Sayward – Kyuquot/Nootka, Cortes Island, Discovery Islands – Mainland Inlets, and Oyster Bay – Buttle Lake. In addition, there are 14 First Nations with reserve lands located in the CSWM area.



Photo 5: Campbell River WM Centre

Table 7: Comox Strathcona Waste Management Key Metrics

Description	Metric
Population	104,950
Per Capita Disposal	610 kg/year
Diversion Rate	51%
Tipping Fee	\$120/tonne
Disposal Capacity	4 + 21 years

Programs and Infrastructure

More than 95% of the population has curbside garbage collection, and around 75% have curbside recycling and yard waste collection. The CSWM is responsible for servicing two regional waste management centres that serve the Comox Valley and Campbell River, as well as a range of transfer stations and recycling facilities for the electoral areas of the CVRD and the Strathcona Regional District. A planned expansion at Comox Valley will give the regional district an additional 21 years of landfill capacity. There are also two private facilities that process yard waste, and a food scraps composting pilot underway at Comox Valley. The CSWM service manages over 100,000 tonnes of waste and recyclable materials, and oversees a number of diversion and education programs.



Photo 6: Comox Valley WM Centre

Priorities

- Construct the new landfill by 2017;
- Build a regional composting facility; and
- Construct a transfer station to support the new landfill.

4.4 Cowichan Valley Regional District

The Cowichan Valley is nestled between Victoria to the South and Nanaimo in the north. CoVRD has four municipalities including the City of Duncan, the District of North Cowichan, the Town of Ladysmith, the Town of Lake Cowichan, and nine electoral areas including: Mill Bay/Malahat, Shawnigan Lake, Cobble Hill, Cowichan Bay, Cowichan Station/Sahtlam/Glenora, Cowichan Lake South/Skutz Falls, Saltair/Gulf Islands, North Oyster/Diamond and Youbou/Meade Creek.

The CoVRD is responsible for regional solid waste planning, policy and bylaw development and enforcement and operation of solid waste facilities. CoVRD administers contracts for curbside garbage and recycling in electoral areas and the long-haul trucking and disposal of residual MSW.

The CoVRD provides garbage collection for selected electoral areas while provide recycling pick up service for all electoral areas. Private collector picks up garbage and food waste from Areas A, B and C.



Photo 7: Bings Creek WM Centre

Table 8: Cowichan Valley Regional District Key Metrics

Description	Metric
Population	81,704
Per Capita Disposal	286 kg/year
Diversion Rate	74%
Tipping Fee	\$140/tonne
Disposal Capacity	0 years

Programs and Infrastructure

Roughly 80% of the population has access to curbside garbage and recycling services. In addition, all four municipalities have food scraps collection. CoVRD and its' municipalities have all signed on to MMBC and the regional district manages several recycling depots, including the transfer stations. CoVRD has three transfer stations (Bings Creek, Peerless Creek, and Meade Creek) where residual MSW is collected before being consolidated on B-Train trailers for long-haul transportation to a U.S. landfill for disposal. There are also three private composting facilities, two of which process residential food waste.



Photo 8: Bings Creek WM Centre

Priorities

- Find a local solution to garbage disposal; and
- Resolve odour issues at composting facilities.
- Plan for future needs, i.e. yard and garden and food scraps composting

4.5 Mount Waddington Regional District

The MWRD is the governing body that provides local services, planning, solid waste, parks, and economic and tourism development services for the residents of Northern Vancouver Island and part of British Columbia's mainland coast.

MWRD stretches from Keta Lake to Brooks Peninsula to Cape Scott on Northern Vancouver Island, and reaches from Cape Caution up to the birthplace of the Klinaklini River and back down to Johnstone Strait on the coast. The regional district encompasses a number of settlements, including five municipalities; Alert Bay, Port Alice, Port Hardy and Port McNeill, and four electoral areas. MWRD services some very small and isolated communities although roughly 60% of the population lives along the east coast in Port Hardy and Port McNeill.



Photo 9: 7 Mile Compost Windrows

Table 9: Mount Waddington Regional District Key Metrics

Description	Metric
Population	11,523
Per Capita Disposal	542 kg/year
Diversion Rate	32%
Tipping Fee	\$115/tonne
Disposal Capacity	70 years

Programs and Infrastructure

Approximately 95% of the population has curbside garbage collection. Residents either have curbside recycling collection in addition, or are served by regional district-owned recycling depots. The regional district and its member municipalities are all signed up to MMBC. MWRD owns the 7 Mile Landfill which has recently undergone an upgrade including a biocover to reduce methane. There are several transfer stations which collected garbage and transport it to 7 Mile.



Photo 10: 7 Mile Recycling Depot

Priorities

- Services for isolated communities; and
- Cost benefit analysis of introducing organics curbside collection.

4.6 Regional District of Nanaimo

The RDN is British Columbia's fifth most populous Regional District. Roughly 75% of the population lives along the coast. Communities within the regional district include the municipalities of Nanaimo, Lantzville, Parksville, and Qualicum Beach.

The RDN is responsible for administration, local governance and services in the seven electoral areas that are within the region.



Photo 11: Church Road Transfer Station in Parksville, BC

Programs and Infrastructure

Essentially the entire regional district is provided curbside collection services for garbage, recycling and food scraps. RDN and its' municipalities are signed up to MMBC and receive subsidies for their curbside programs and depots. There are three private MRFs in RDN. The landfill has been operational since 1991 and has a gas collection system linked to British Columbia Hydro. The transfer station in Parksville collects around 50% of the districts garbage, servicing the northern part of the district. There are two private composting facilities, one of which accepts residential food waste.

Table 10: Regional District of Nanaimo Key Metrics

Description	Metric
Population	150,040
Per Capita Disposal	335 kg / year
Diversion Rate	68%
Tipping Fee	\$125 / tonne
Disposal Capacity	25 years



Photo 12: RDN Regional Landfill

Priorities

- Solid waste management plan review;
- To address the implication of waste export that is taking place;
- Develop a financially sustainable model for the solid waste management system;
- Advance diversion beyond 70%"; and
- Assess long term disposal options.

4.7 Powell River Regional District

PRRD is located on the west coast of British Columbia about 175 km north of Vancouver, within the traditional territory of the Sliammon (Tla'amin) First Nation. It is bound by the Sunshine Coast Regional District to the south, the Squamish Lillooet Regional District to the northeast, the Comox-Strathcona Regional District to the northwest, and the Georgia Strait to the west.

PRRD includes one municipality, the City of Powell River, and five electoral areas. Texada, Savary and Lasqueti Islands, are all located within the boundaries of PRRD. Roughly 70% of the population live in the City. Lasqueti Island operates under a Sub Plan to the Solid Waste Management Plan as it has its own landfill and recyclables go to Vancouver Island. Lasqueti Island Population, waste volumes and PRRD owned recycling depot will not be included in the following data as there are currently no numbers for volume or weight disposed of at the landfill.



Photo 13: Augusta Recyclers Transfer Station

Table 11: Powell River Regional District Key Metrics

Description	Metric
Population	19,480
Per Capita Disposal	236 kg/year
Diversion Rate	50%
Tipping Fee	\$215/tonne
Disposal Capacity	0 years



Photo 14: Augusta Recyclers Transfer

Programs and Infrastructure

Roughly 68% of the population has curbside collection for garbage and recycling, with organics curbside collection planned for 2016. PRRD is signed up to MMBC but the City of Powell River is not. In addition to the six PRRD-owned recycling depots (including at the transfer station), there is a privately owned depot that accepts commercial recyclables, C&D recyclables, and has an MMBC depot within the operation. Augusta Recyclers owns a private transfer station, which collects all of the region's MSW before it is exported to the U.S. PRRD does not have any landfill capacity remaining. PRRD recently issued a request for expressions of interests for organics diversion and will be moving to the request for proposals in fall 2015.

Priorities

- Finalize the new solid waste management plan;
- Implement an organics diversion program;
- Expand EPR beyond existing programs; and
- Develop a potential resource recovery centre (grant applied for).

4.8 Sunshine Coast Regional District

The SCRD is located within the traditional territories of the Sechelt and Squamish First Nations. SCRD's municipalities and electoral areas include: District of Sechelt, Town of Gibsons, Sechelt Indian Government District, Egmont/Pender Harbour, Halfmoon Bay, Roberts Creek, Elphinstone, and West Howe Sound. Roughly 50% of the population lives in Gibsons and Sechelt.



Photo 15: Salish Soils – Gore Cover Composting System

SCRD's vision is "A community for all generations connected by our unique coastal culture, diverse economy and treasured natural environment".

Table 12: Sunshine Coast Regional District Key Metrics

Description	Metric
Population	29,584
Per Capita Disposal	352 kg/year
Diversion Rate	50%
Tipping Fee	\$150/tonne
Disposal Capacity	15 to 20 years

Programs and Infrastructure

Approximately 95% of the population has curbside collection services for garbage. Some residents have curbside recycling but the majority use recycling depots. There are three private depots, one in Gibsons, one in Sechelt, and the other at Pender Harbour. SCRD has two landfills; Sechelt and Pender Harbour although Pender Harbour is being closed in 2015. There is a private composting facility with a GORE-cover system that accepts yard waste, food scraps and fish waste. Only the District of Sechelt residents have curbside recycling. The SCRD funds PP drop-off at each of the three recycling depots.



Photo 16: Gibson's Recycling Depot

Priorities

- Closure of Pender Harbour Landfill and conversion to a transfer station;
- Review the 24 initiatives outlines in the SWMP to prioritize for post-2015; and
- Develop a financially sustainable model for the solid waste management system.

5.0 AVICC SWOT ANALYSIS

Based on the benchmarking across regional districts that Tetra Tech conducted, the current Strengths, Weaknesses, Opportunities and Threats (SWOT) was developed. A SWOT analysis helps provide a good all-around view of the AVICC's current and forward-looking opportunities and threats. The SWOT analysis was presented at the AVICC workshop in Nanaimo on June 19, 2015, and augmented by regional district representatives. The SWOT analysis, was used as a brainstorming session, and a tool to gain a collection of ideas regarding the current state of solid waste management, and potential future collaboration opportunities. The table below integrates all the ideas and issues identified, both before and during the workshop.

Table 13: Strengths, Weaknesses, Opportunities, and Threats Analysis

<p>Strengths</p> <ul style="list-style-type: none"> ▪ Good public knowledge and participation in existing programs ▪ High capture of residential recycling ▪ Good range of items accepted for recycling at depots ▪ AVICC committee's commitment to collaboration ▪ Overall landfill capacity (43 years) allows time for long term planning ▪ Some of the lowest Per Capita Waste Disposal rates in British Columbia ▪ Private sector involvement in waste diversion 	<p>Weaknesses</p> <ul style="list-style-type: none"> ▪ Multi-family waste management has poor diversion and involvement overall. ▪ Rural/urban divided and consistent level of service not provided to everyone in the region ▪ C&D waste tracking and disposal ▪ ICI waste diversion and recycling level is weak ▪ Tipping fees driving waste across borders ▪ Tipping fees are a key source of revenue for waste programs (lower disposal rates decrease revenue needed to operate the system) ▪ Service delivery for rural and remote residents
<p>Opportunities</p> <ul style="list-style-type: none"> ▪ Unified SWM plans and systems ▪ Decreased reliance on landfills ▪ EPR program collaboration to achieve scale ▪ Increased organics collection to improve waste diversion ▪ Collaboration for processing/disposal of materials (shared landfill capacity, waste to energy, organics processing facilities) ▪ Management of greenhouse gas from landfills ▪ Consistent messaging ▪ Unified approach to regulations (e.g., Disposal bans, building design) ▪ Coordinated advocacy efforts (National Zero Waste Council, British Columbia MOE, EPR Stewards) ▪ Federal and provincial legislation changes 	<p>Threats</p> <ul style="list-style-type: none"> ▪ Challenges around emerging technologies – take a long time to plan, very expensive, and high risk ▪ Waste export may not be reliable in the long term due to border concerns, exchange rates ▪ Federal and provincial legislation changes ▪ Lack of localized landfill capacity ▪ Stability of EPR programs over time ▪ Solid waste system resilience ▪ Likelihood of siting a new landfill for more disposal capacity

6.0 COLLABORATION OPPORTUNITIES FOR AVICC

There are a wide range of solid waste management issues that AVICC members could work together on. From a political perspective, the most challenging areas for collaboration (e.g., shared disposal capacity, a unified tipping fee, and waste control) also offer the greatest potential for mutual gains in the long-term.

Although some regional districts have landfill capacity in the short to mid-term while others – namely Cowichan Valley and Powell River – do not, the reality is that all regional districts have a disposal challenge in the long-term (20 to 40 years from now). Opportunities to site a new landfill are limited, and planning to export waste to the U.S. as a long-term strategy is not without risk. Taking a long-term perspective, all AVICC regional districts need to

consider how much waste can be reduced through zero waste policies and approaches, and what options there are for disposing the residual.

The average disposal rate across all eight regional districts is currently 399 kg/capita. Based on the RDN's experience (and other organics case studies), implementing organics diversion strategies could reduce this amount by about 70 kg/capita⁴. Introducing enhanced C&D diversion programs (e.g., wood waste ban) could lead to an additional reduction of 100 kg/capita for those regional districts who have not yet implemented bans. Overall, with high performing organics and C&D diversion strategies, the average disposal for AVICC regional districts could be reduced to as low as 285 kg/capita.

Table 14: Recommendations and Options for AVICC Solid Waste Collaboration

Area of Work	Item #	Recommendation and/or Option Description	Key Driver
AVICC partnership	1.	Develop a vision and goals for the AVICC including: <ul style="list-style-type: none"> A communication strategy A unified education program 	<ul style="list-style-type: none"> Establish a platform for effective collaboration Develop clarity of all recycling efforts across the AVICC
	2.	Continue to meet regularly – identify one solid waste challenge or opportunity to investigate at each meeting. <ul style="list-style-type: none"> Establish a 3 to 5 year process to maintain and update the 2015 baseline report information 	<ul style="list-style-type: none"> Establish a platform for effective collaboration Build understanding of priorities
Long-term disposal	3.	Conduct an assessment to forecast future solid waste disposal demand of AVICC member populations in 20, 40, and 60 years' time.	<ul style="list-style-type: none"> Ensure accurate data and assumptions for making long-term investment decisions
	4.	Review the mid and long-term business case for a WTE energy facility with all AVICC members giving waste as a feedstock.	<ul style="list-style-type: none"> Need to effectively manage residual waste
Organics waste reduction strategies	5.	Develop a comprehensive AVICC organics strategy that engages the residential and ICI sectors. Build on existing organics systems in place in RDN and CoVRD.	<ul style="list-style-type: none"> Reduce per capita garbage generation Increase diversion rate Ensure regional processing capacity aligns with organics diversion strategies (e.g., curbside programs and disposal bans)
	6.	Conduct an assessment of organic feed stock and analysis of capacity needs along with a review of combined existing and planned organics infrastructure to ensure sufficient processing capacity is in place, either in the private and/or the public sector.	
	7.	Standardize organics curbside collection to provide consistency for materials collected, including food scraps and food-soiled paper.	
Recycling collection and drop-off programs	8.	Establish consistency in materials collected in curbside recycling programs and accepted at depots.	<ul style="list-style-type: none"> Increase diversion Optimize services and program efficiency Maximize participation
	9.	Implement common promotion and education programs throughout the AVICC. Focus on standardizing messaging, colours and system types.	

⁴ MWA Environmental Consultants, CWMA Conference 2014.

Area of Work	Item #	Recommendation and/or Option Description	Key Driver
Financially sustainable model	10.	Explore implications of establishing unified tipping fee: <ul style="list-style-type: none"> Impact on revenue; Impact on tonnages disposed; Impact on leakage; and Impact on illegal dumping. 	<ul style="list-style-type: none"> Establish a sustainable financial model
	11.	Assess leakage and export of waste by private haulers and private landfills. Explore opportunities for government control of waste collection systems (flow control/franchising).	
ICI sector strategy	12.	Engage the ICI sector in constructive dialogue to identify opportunities for collaboration to address waste diversion issues. Establish an initial network of ICI contacts and use to educate and promote goals (e.g., organics and other disposal bans).	<ul style="list-style-type: none"> Increase diversion
C&D sector strategy	13.	Track all C&D waste generated including what is disposed in the region and what is exported.	<ul style="list-style-type: none"> Increase diversion Increase longevity of existing landfill capacity
	14.	Expand or add areas to existing landfills to sort and separate recyclable C&D materials while other materials are stockpiled to be used for cover at the landfill or shipped out of region for recycling or beneficial reuse or energy recovery.	
	15.	Develop permit process that requires contractors to assess waste materials generated and develop a diversion strategy, and provide contractors with tools to support them.	
	16.	Ensure all regional districts have requirements that all C&D waste must be disposed of at a licensed facility, and have similar rules regarding the requirement of disposal and diversion.	
Regulations and enforcement	17.	Ensure that disposal bans and bylaws are consistent across regions to reduce leakage across borders.	<ul style="list-style-type: none"> Track material generation and movement Increase diversion Ensure program costs are efficient
	18.	Ensure that accurate and consistent metrics and statistics are taken for all materials (MSW, C&D, Recycling, Organics, Etc.) and receiving facilities (including private) are documented in terms of meeting standards and providing accurate data.	
	19.	Develop a consistent enforcement strategy to support regulations.	
	20.	Develop standards for odour levels for organic processing	
Advocacy	21.	Advocate British Columbia MOE and industry groups to review and expand waste reduction and diversion policies.	<ul style="list-style-type: none"> Adopt and implement new EPR programs Refine and improve existing EPR programs

7.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.



Prepared by:
Jessica Frank, M.Sc.
Project Manager – Waste Management
Environment Practice
Direct Line: 778.945.5776
Jessica.Frank@tetrattech.com



Prepared/Reviewed by:
Avery Gottfried, ME, P.Eng.
Solid Waste Planning Engineer
Environment Practice
Direct Line: 778.945.5749
Avery.Gottfried@tetrattech.com



Reviewed by:
Wilbert Yang, P.Eng.
Waste Planning Team Lead
Environment Practice
Direct Line: 604.608.8648
Wilbert.Yang@tetrattech.com

/bj:jmt

APPENDIX A

TETRA TECH'S GENERAL CONDITIONS

GENERAL CONDITIONS

GEOENVIRONMENTAL REPORT

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of Tetra Tech EBA's client. Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Tetra Tech EBA's Client unless otherwise authorized in writing by Tetra Tech EBA. Any unauthorized use of the report is at the sole risk of the user.

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2.0 ALTERNATE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed Tetra Tech EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of Tetra Tech EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Tetra Tech EBA. The Client warrants that Tetra Tech EBA's instruments of professional service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems. Tetra Tech EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by Tetra Tech EBA in its reasonably exercised discretion.

4.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of the report, Tetra Tech EBA may rely on information provided by persons other than the Client. While Tetra Tech EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

APPENDIX B

WORKSHOP MINUTES



MEETING MINUTES

MEETING TIME:	11:15 am – 4:00 pm	DATE:	June 19, 2015
LOCATION:	Board Chambers, Nanaimo Regional District Office 6300 Hammond Bay Road, Nanaimo	FILE:	704-ENVSWM03638-01
ATTENDEES:	Avery Gottfried, Wilbert Yang – Tetra Tech (Presenters) 22 total from AVICC and 8 of the 9 regional districts (Capital, Cowichan Valley, Nanaimo, Alberni-Clayoquot, Comox Valley, Strathcona, Powell River, Sunshine Coast)		
ABSENT:	Mount Waddington		

1.0 INTRODUCTIONS & EXPECTATIONS

- Ian Morrison – Cowichan Valley RD – Great opportunity. Currently ship garbage to the US. We have a high diversion rate and a high cost. Issues include rural services and illegal dumping. Looking at new technologies and ideas to make them happen. Collaboration to get new opportunities. Deal with our own waste closer to home.
- Ian Winn – Sunshine Coast RD – Get new board up to speed on plan as there are a lot of new faces, how to implement all 24 ideas in the plan, and how to prioritize them. Want high diversion rates but how to get there. Prioritization and how to collaborate, and what can be achieved.
- John McNabb – Alberni Clayoquot RD – Mixed system, diverse due to spread out location. Available life of landfill can change quickly if land claims and other issues come up. Want to improve their diversion, and future diversion solutions. Don't want a new landfill site in the future. Look at options beside landfills. What has been unsuccessful elsewhere and learn from it so we don't make the same mistakes.
- Stan Gisborne – Powell River RD – Ship waste to US. Just went to RFP for new compost site. Best way to deal with their waste as it is expensive. Have looked at shipping to the Island before and that is costly. Spent 5+ years trying to find a new landfill site and were not able to identify any.
- Edwin Grieve – AVICC – Moving target with the Ministry. New guidelines, want for 70% organics diversion for 2020. Who knows if they are rigid or flexible in meeting the new guidelines?
- Jude Schooner – Strathcona RD – Really wants more diversion, best way to help financial situation as landfilling is only getting more expensive. Looked into extending the landfill life in Tahsis or transferring waste to Comox, all options are expensive and ultimately went with transferring waste to Comox as running small landfills holds a lot of liability and long term risk. Regulatory – BCMOE – find a way to get infrastructure funding for ideas from the AVICC and overall collaboration between regional districts.
- Judy Brownoff – Capital RD – Solid Waste Management Plan update and local organics management have been the issue, along with liquid waste management. All caught up in long issues for the past year. Biggest issue is landfill life and solid waste finances (more diversion results in less revenue for balancing budget). Proud that tipping fees pay for everything – but now the financial sustainability is at risk as not enough revenue from tipping fees, may need taxation to level out the cost.

- Alec McPherson – Nanaimo RD – How to cover the cost for solid waste management is the main issues. You pound down in one area and the problem pops up elsewhere. Best idea for you may not be best for all, and let's be aware of that. Is there consensus in the community for what way to go – can diversion go to 80%. Biggest issues with landfill fixed costs. Need province to allow them to delegate the responsibility, such as flow control, the way they want to manage their waste. More diversion is key, but it gets more expensive. Saw a presentation recently for Multi-Family dirty material recovery facility (MRF) – but could cost \$10 million dollars. Hard job to see what current reality is. What are the best solutions for the island, given the current systems, and how to change our current systems so that we can get there? Wilbert has a tough job to make this happen.
- Rod Nichol – Comox Valley RD– Likes what he heard about the waste to energy (WTE) facility in Edmonton, other facilities use and recycle ash to make building products. Also there is a new wood waste, drywall and slaughterhouse waste processing facility in Malaysia that is a great WTE facility. If we have the tonnage we can help make these technologies happen.

Expectations Summary from Flip Chart:

- Island Solution;
- Understand what other are facing;
- Learn from others;
- Other options outside of landfills;
- Ways to achieve more diversion;
- Learn about funding opportunities;
- Financial sustainability;
- How can a AVICC catchment are solid waste management system work; and
- Manage solid waste in a manner that island residents are proud of.

2.0 SOLID WASTE SYSTEM OVERVIEWS AND TRENDS

- Slide 9 – Map of all landfills and composting operations.
 - Comment: Idea – Each region becomes an expert and managing a product and finds a way to deal with it.
 - Discussion – Given the projected closures in the short term (Comox Valley and Sunshine Coast) there will eventually only be 4 larger landfills, 1 Demolition and land clearing waste landfill and 7 small landfills remaining for the entire AVICC region. Show this on the map.
- Slide 10 – Disposal per capita. Slide has been updated. (Axes labels were shifted.)
- Slide 11 – Disposal capacity. Slide Updated.
 - Question: did we compare landfills to show which ones are actually meeting the Ministry standards?
 - Answer: no we are not going to that level of detail for this study.

- Slide 15 – AVICC Overview – Organics. Slide updated with clarification to food waste or yard waste composting facilities.
 - Comments: We currently collect only food scraps without yard waste, which makes a low carbon compost with high nitrogen. It's hard to make a marketable product this way. If we focus on the product we want to make, we would take yard waste as well to help solve this problem. Private landscaping compost operations take the yard waste as it makes good quality compost and we not are stuck with the difficulty of dealing with food scraps.
 - Feedback: Include in the report: info that shows current collaboration that has happened. For example, the WTE tri-regional study.
- Slide 16 – Alberni Clayoquot – currently have 2 SWMP related documents under development. Updated. Plan implementation and review is underway.
- Slide 21 – Comox Strathcona – building a regional composting facility in Campbell River or Comox
- Slide 34 – Trends – Recycling
 - Comment – glass in BC is doing well due to California legislation that requires a specific amount of recycled glass content in new wine bottles. This legislation helped create the market for the recycled product.
- Slide 35 – Trends – Organics
 - Comment – Comox Valley RD finished a pilot for organics collection with two different collection systems:
 - Every other week garbage, weekly organics in Cumberland – very high organics uptake and 70% participation
 - Weekly garbage and organics in Comox – less uptake 40% participation
- Slide 40 – Trends – WTE
 - Comment: Capital costs for these big systems such as gasification. In the range of \$95-\$130/tonne. How will this align for different costs at different disposal locations? Comox has undergone a large amount of work to determine what a universal tipping fee rate should be which takes into account many different parts of the system.

3.0 SWOT ANALYSIS

Additions to ideas presented in the PowerPoint slides:

Strengths:

- Good public knowledge and involvement in existing programs. The public is keen to do more diversion.
- # Items accepted for recycling at some depots.

Opportunities:

- Unified solid waste management plans.
- Decrease reliance on landfills.

Weakness:

- Multi-family waste management. Poor diversion and involvement overall.
- Rural/urban divide and providing service to everyone in a region, or across the AVICC.

Threats:

- Challenges around emerging technologies. They take a long time to plan, cost a lot, and come with a lot of risk.

Identification of Ideas for Break-Out Group Discussion and Prioritization:

A long list of opportunities, issues and challenges was created by the group and can be found in the table below. In total 9 collaborative opportunities, 4 challenges, and 5 issues were identified. For the opportunities, 3 key themes emerged and so the 9 ideas were consolidated and grouped into 3. (The original list of 9 is provided below and the 3 that were included in the short list for discussion are in the table). Each member was given 5 dots to prioritize options list in the Table below.

Collaborative Opportunities: regrouped the long list of 9 into the 3 in the table below.

- Plan for Waste to Energy;
- Coordination of landfill capacity to use by other regional districts;
- Unified solid waste system and the management of risk and liability between all parties;
- Consistent Messaging for practice of solid waste;
- Collaboration on specific waste streams (e.g. Organics and garbage);
- Involvement of the private sector in this conversation;
- Unified approach to laws and requirements (e.g. Disposal bans, building design [deconstruction]); and
- Combined lobbying efforts (including the zero waste council).

Table: Items for Breakout Group Discussion

Theme	Discussion Topic	Score
Opportunity	Long term disposal capacity options; coordination of sharing existing disposal capacity.	8
Opportunity	Unified approaches: <ul style="list-style-type: none"> ▪ Disposal bans ▪ Accepted materials ▪ Building design (deconstruction) ▪ Combined lobbying efforts 	13
Opportunity	Consistent education and messaging. Leading by example.	14
Challenge	Financial stability and alternative financial models for solid waste budgets. Including private funding and involvement.	12

Theme	Discussion Topic	Score
Challenge	Management of hazardous waste materials by the private sector.	1
Challenge	Enforcement of illegal dumping laws (Construction demolition waste and contaminated soil ending up in Cowichan Valley RD – hard to control but now have a large number of contaminated sites they must clean up).	7
Challenge	Time frame to develop emerging technology.	0
Issue	Reduction of materials not cover by EPR.	0
Issue	Non-recyclable packaging (laws to ban this).	6
Issue	Getting MMBC to accept recyclable materials that are not packaging in the blue box program or depots.	4
Issue	Time frame required to amend solid waste management plans.	0
Issue	Having multiple regional districts develop coordinated waste management plans.	11

4.0 IDENTIFIED PRIORITIES DISCUSSION

From the above ideas and general discussion during the workshop, we grouped a number of issues and participants decided to focus on the following 3 key priorities:

1. Financial Models and financial stability. Including alternative funding opportunities.

- Can we have a high level summary of the unified rate cost study that was done in Comox Valley RD.
- Opportunity for external GMF funding if projects are done in partnership across regions.
- Note that sharing budgets is difficult, need each municipally involved as well – example is a curbside program where the budgets are all ok, but other aspects of the waste program are struggling. It's not possible to shift money from one to the other without each municipality voting to agree to this.
- What fiscal frameworks exist that go beyond using Tipping fees for revenue?
- Reminder – We first need to determine what we fundamentally want to do with solid waste, determine the core values such as organics bans. Then we will know what kind of financial models we may need. We are not just going for the cheapest system here, we want the best system.
- Be wary of the moving target – costs can double in a short period of time for infrastructure.

2. Unified approaches and having multiple regional districts develop joint solid waste management plans.

- Unified approach to laws and material bans (or also ensuring they all accept specific materials for recycling);
- Consistent education and messaging across regions;
- Sharing landfill capacity;
- Consistent laws and enforcement;

- Best opportunities will come from a unified approach;
- Reach out to the Province, we will need resources to get this process started, and how to get more resources;
- We can use AVICC to lobby EPR on a joint, unified approach, same with MMBC and the Province;
- Can start to pilot some ideas come next year as the first step; and
- This can help make sure that materials don't keep jumping from region to region, depending on who has a ban in place or who has weaker enforcement or control.

3. Long – Term Capacity and sharing of existing disposal capacity

- Need to get to 70% diversion before ideas like WTE can even be presented to the Province; and
- Seen as an end goal, not the first issue to tackle.

APPENDIX C

WORKSHOP PRESENTATION



TETRA TECH



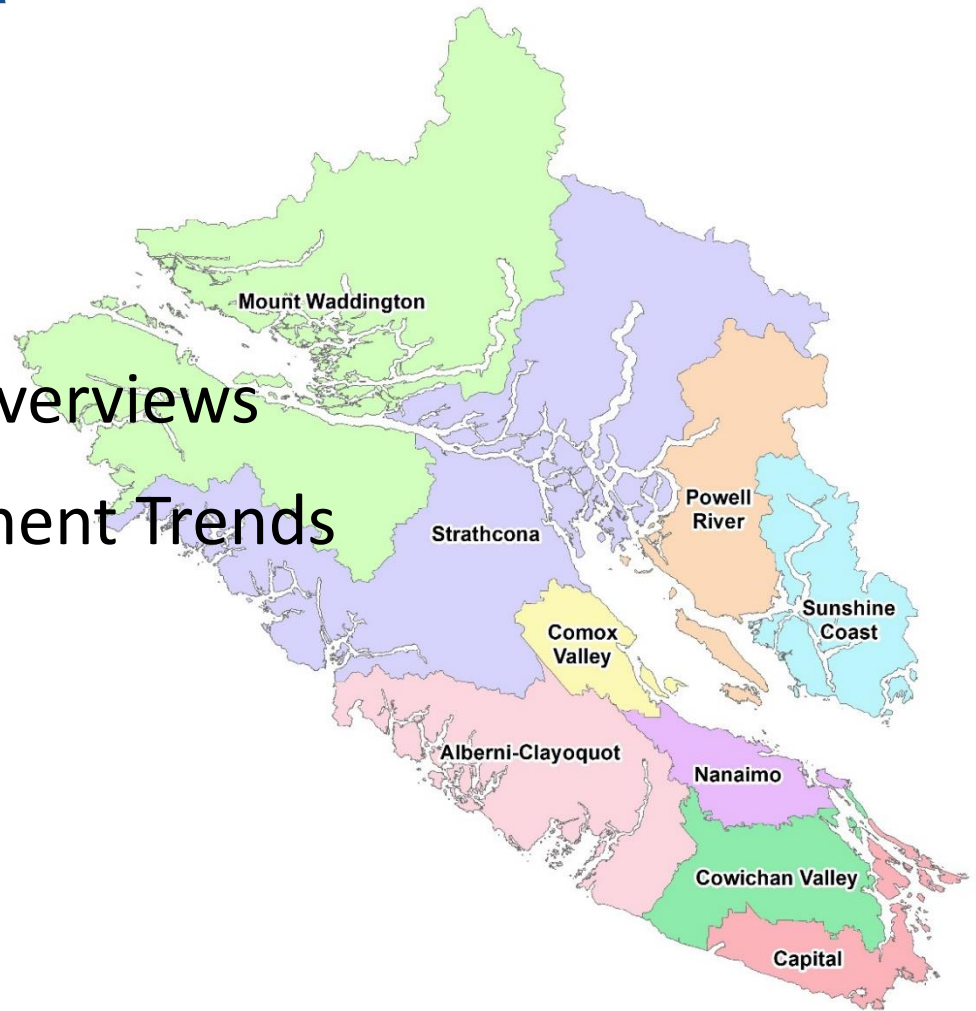
AVICC: Solid Waste Workshop



June 19, 2015

Workshop Agenda

- Introductions
- Project Objectives
- Solid Waste System Overviews
- Solid Waste Management Trends
- SWOT Analysis
- Break Out Sessions
- Presentations
- Next Steps



Introductions

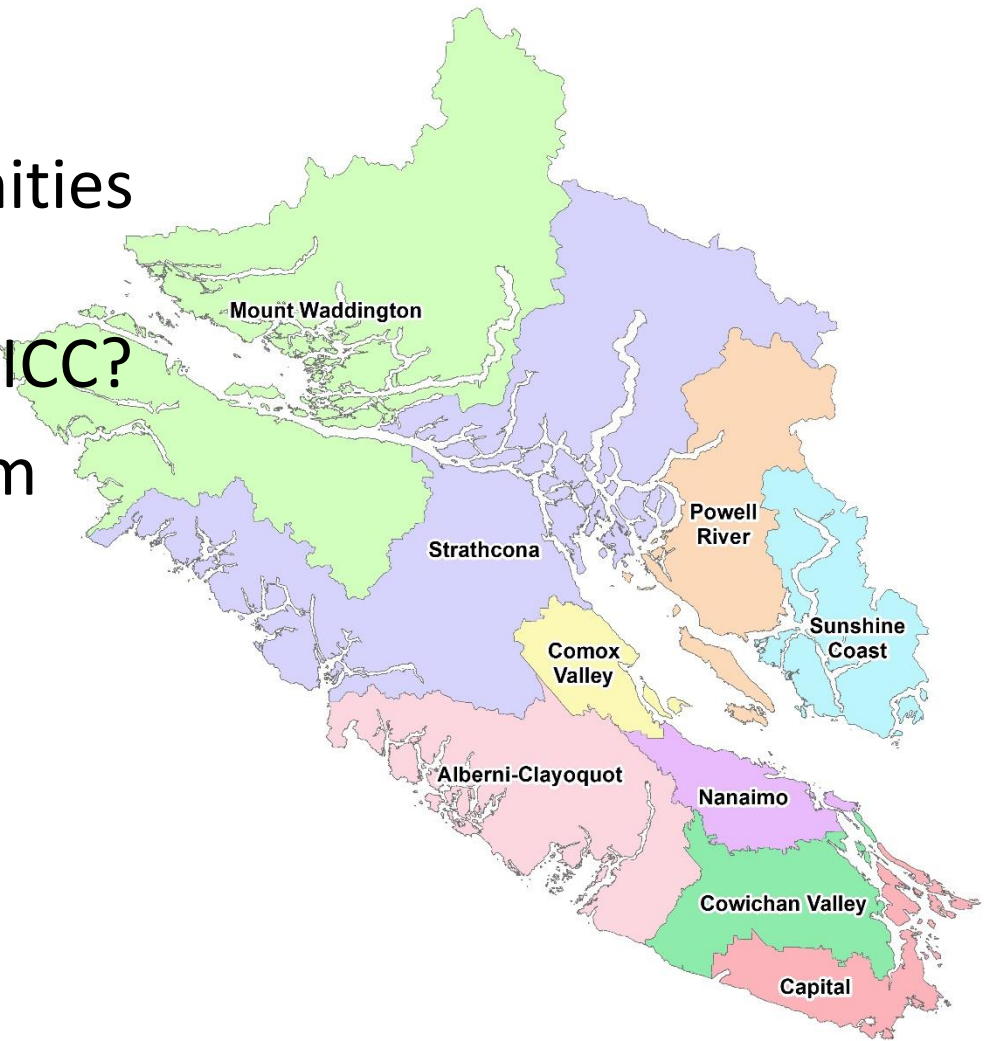
- Workshop Leader(s)
 - Wilbert Yang, P. Eng., Senior Waste Management Engineer
 - Avery Gottfried, ME, P. Eng., Solid Waste Planning Engineer
 - Jessica Frank, Project Management Coordinator
- AVICC Representatives
 - Your name
 - Who you represent
 - Expectations for the workshop

Workshop Objectives

- Baseline for solid waste management practices for Vancouver Island and Coastal Communities
- Understanding of issues and challenges
- Identify opportunities for collaboration

Guiding Questions

- What are the opportunities to advance solid waste management in the AVICC?
- What can we learn from each other?
- What could we do cooperatively?
- Who should lead?



Project Deliverable

- Report that summarizes workshop objectives
- Presentation in a “Consumer Report” style to help regional districts:
 - Understand solid waste system performance;
 - Identify areas for improvement;
 - Learn from others; and
 - Opportunities for collaboration.

SOLID WASTE MANAGEMENT - FLOW DIAGRAM

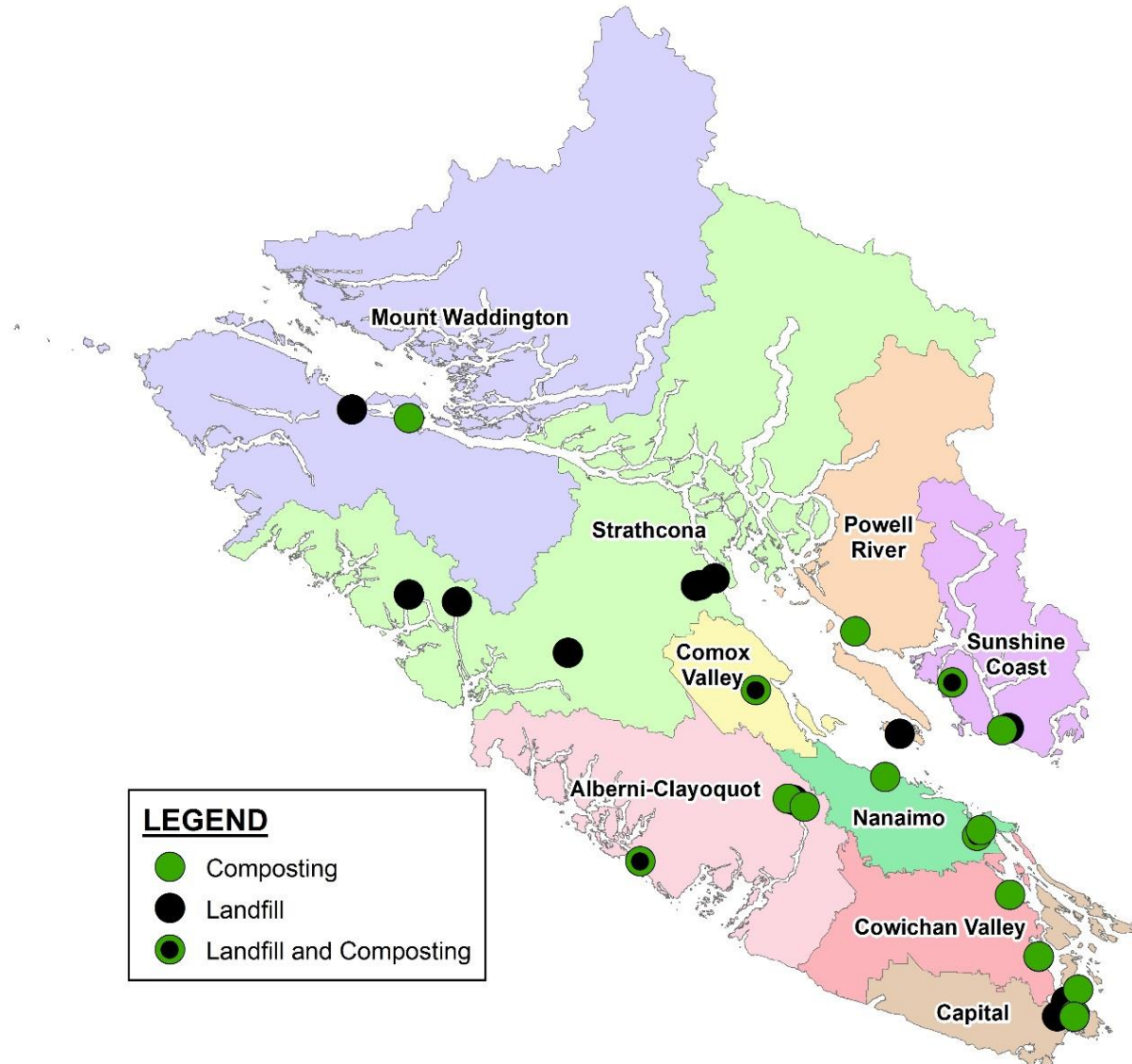


AVICC Overview - Disposal

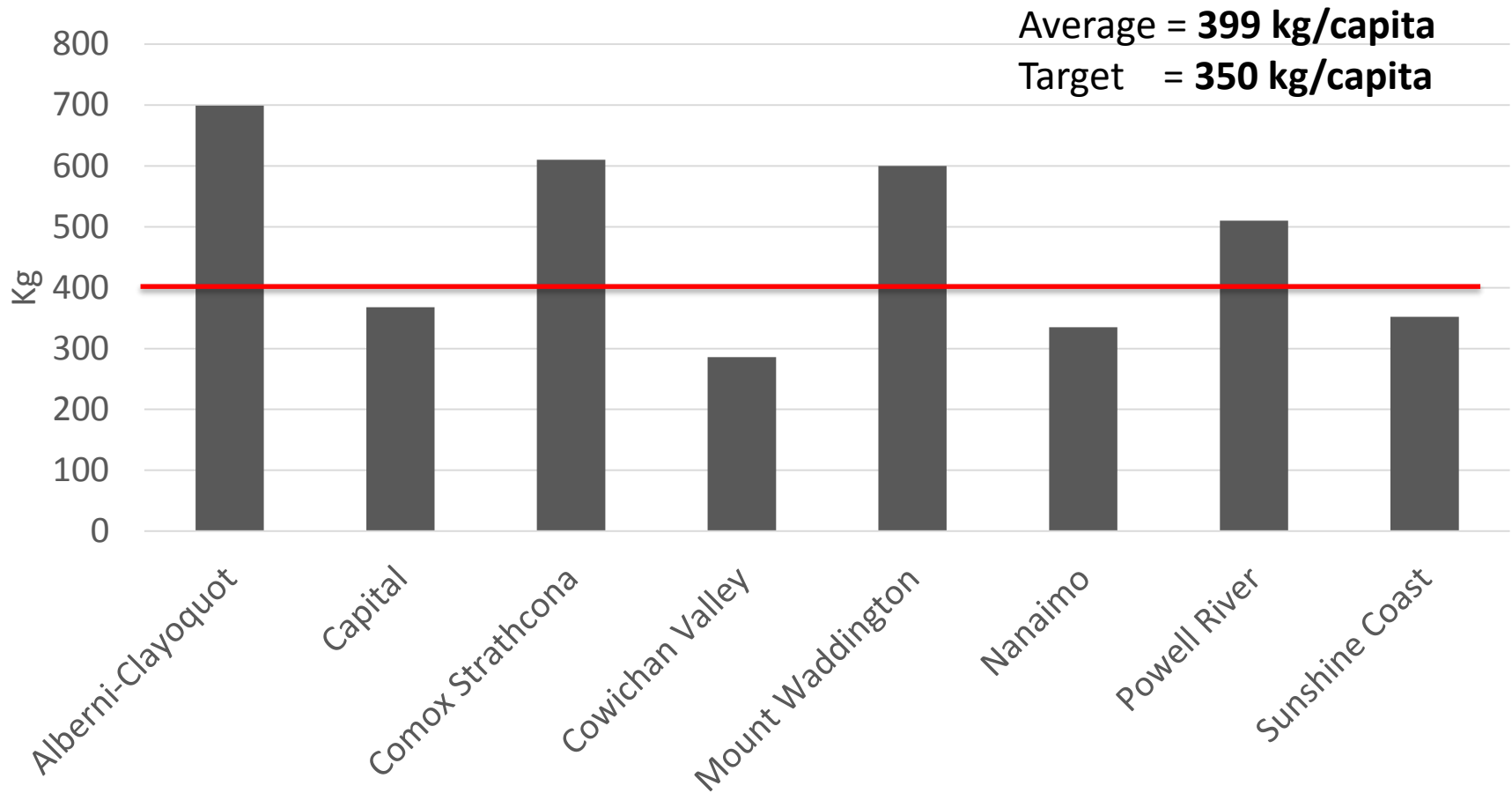
- Population: 800,000
- Population Distribution: 88% in 4 Regional Districts
- Disposal (2013): 320,000 tonnes
- Disposal per capita*: 399 kg/capita
 - Range: 236 to 699 kg/capita
 - BC Average (2012): 570 kg/capita
- Tipping fees (average): \$133/tonne
 - Range: \$95 to \$215 /tonne

* Construction & Demolition disposal figures not complete

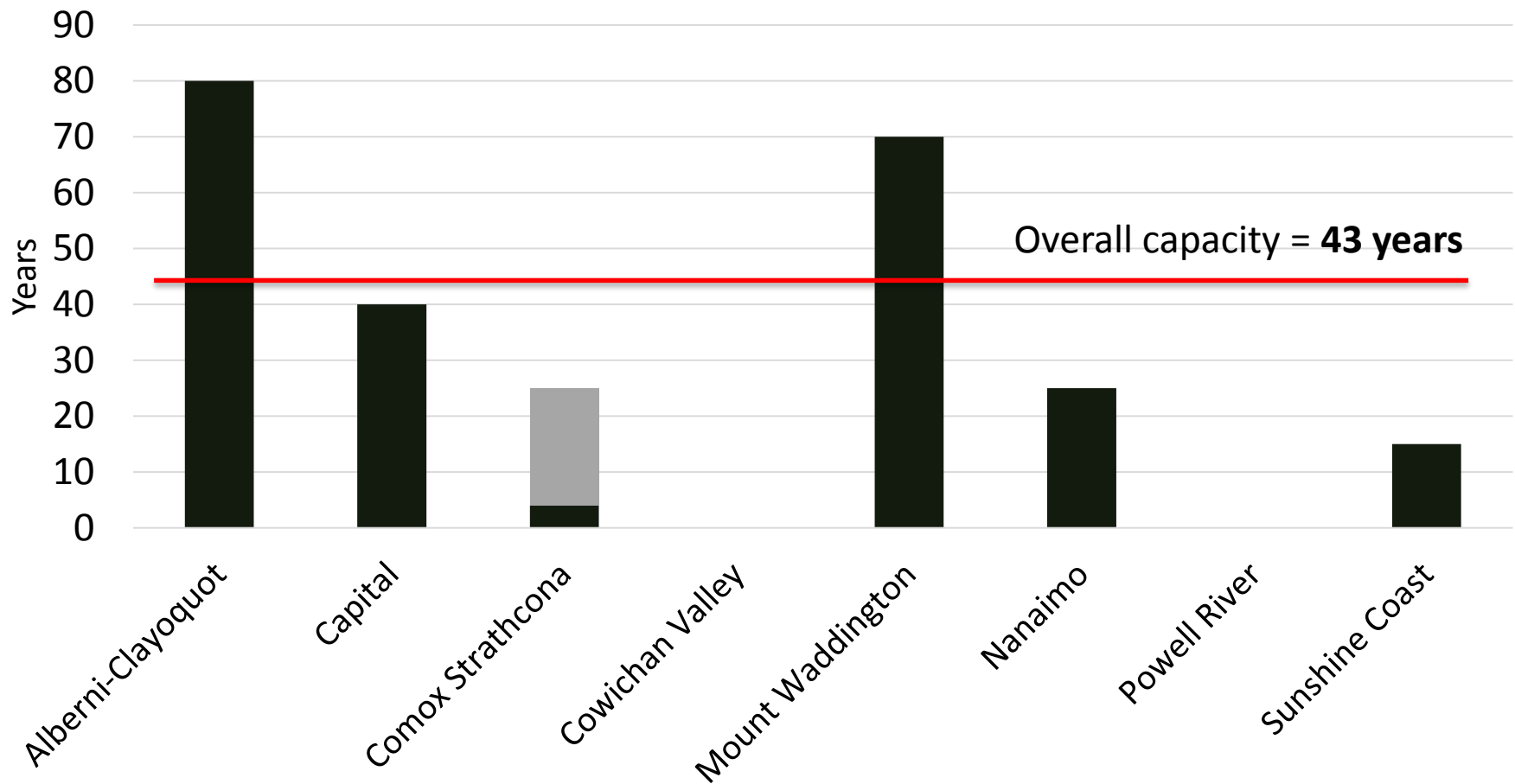
Landfill and Composting Operations



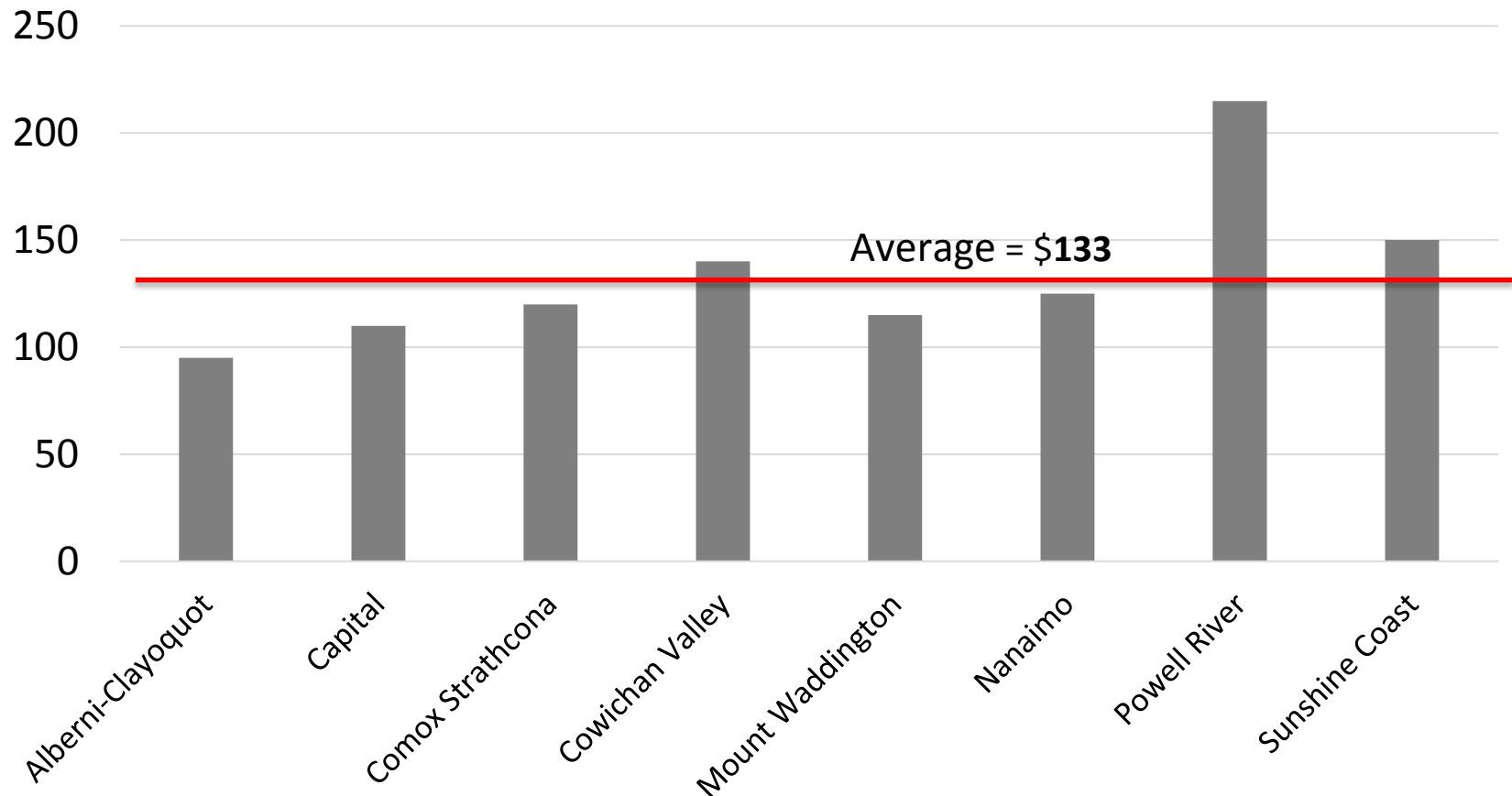
AVICC Overview – Disposal per Capita



AVICC Overview – Available Landfill Disposal Capacity



AVICC Overview – Garbage Tipping Fees

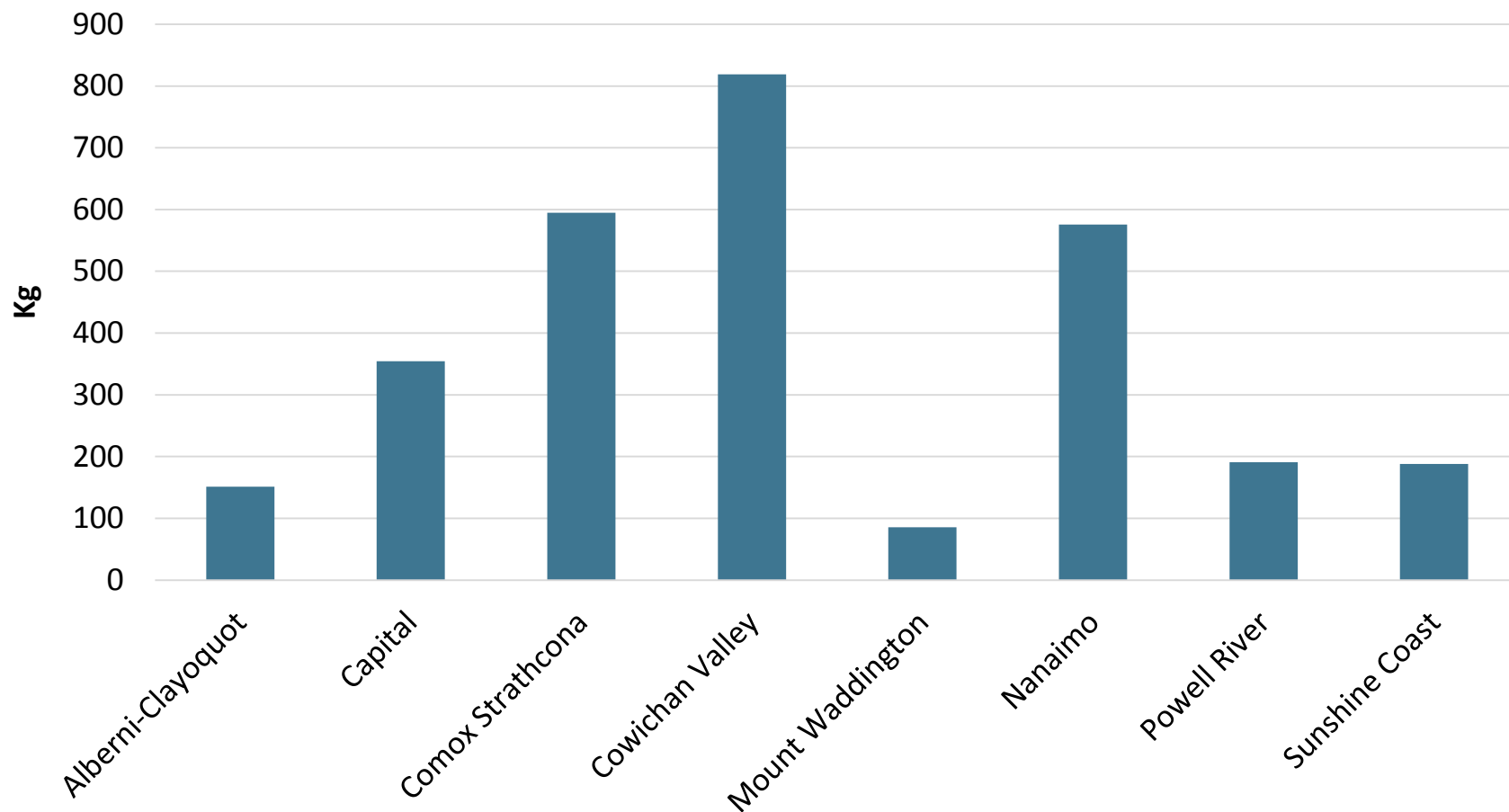


Total disposal cost (tipping fee x garbage tonnage) = **\$37.9 million**

AVICC Overview - Recycling

- Recycling:
 - More recycled than disposed (362,976 tonnes)
 - Almost all communities receives incentives from MMBC
- Recycled per capita (Average): 453 kg/capita
 - Range 86 to 595 kg/capita
- 7 Material Recycling Facilities in the AVICC area
 - CRD
 - CSWM
 - NRD

AVICC Overview – Recycling per capita



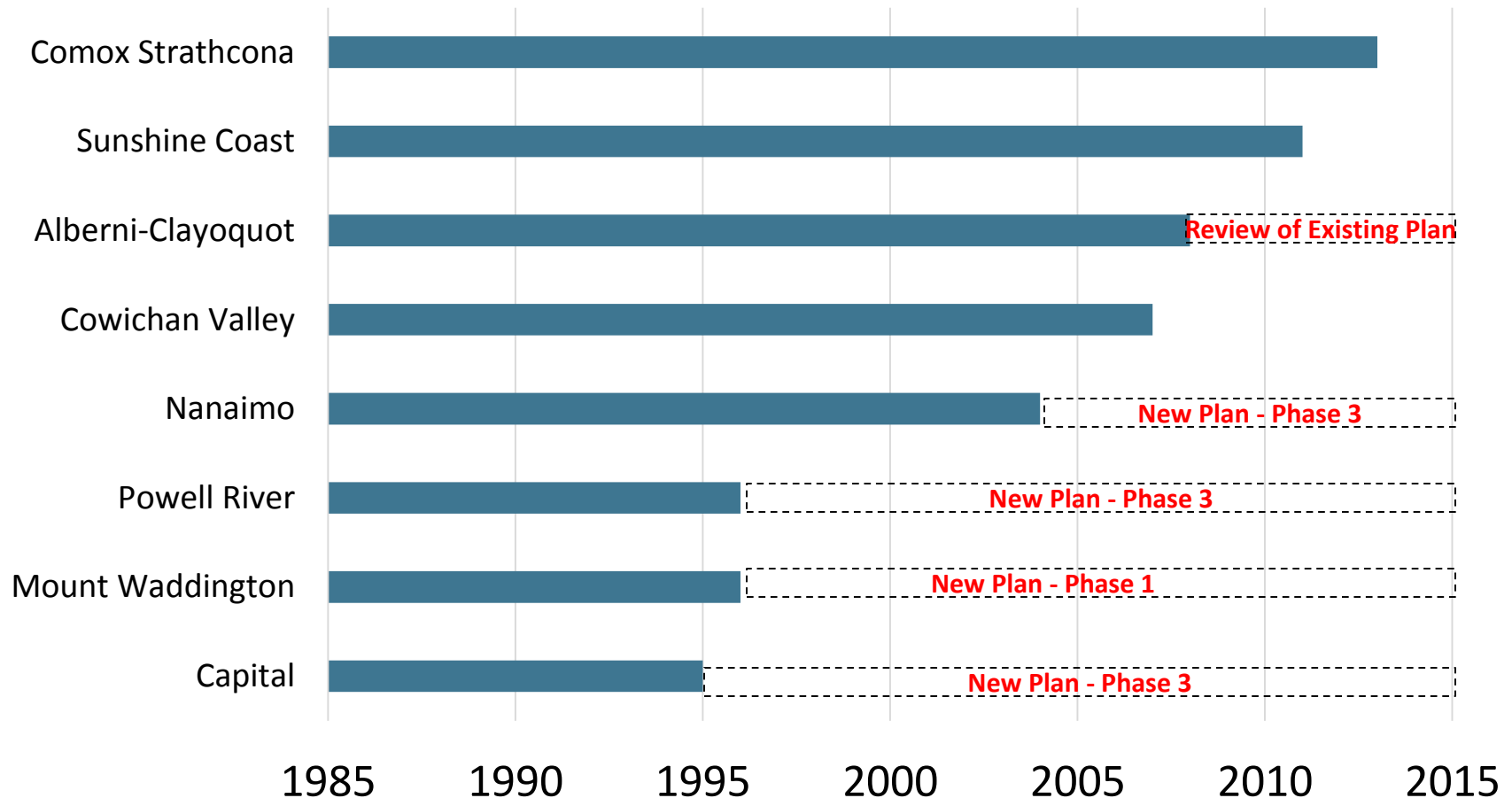
AVICC Overview - Organics

- **Ladysmith, BC** – one of the first to start collecting food waste from residents
- CowichanVRD, RDN and CRD are collecting residential food waste
- Food waste composting facilities in RDN, CowichanVRD, and Sunshine Coast
- Private yard waste composting facilities in all regional districts
- Communities across Canada are considering food waste diversion

Organics diversion total: 65,000 tonnes per year

Solid Waste Management Plan

Year of Approval



Summary - Alberni Clayoquot

- SWMP Approved 2008
- Population 30,876
- Per Capita Disposal 699 kg/yr
- Diversion Rate 22%
- Tipping Fee \$95 /t
- Disposal Capacity 70 yrs

- Garbage 21,597 t
- Recycling 4,700 t
- Organics (yard) 409 t



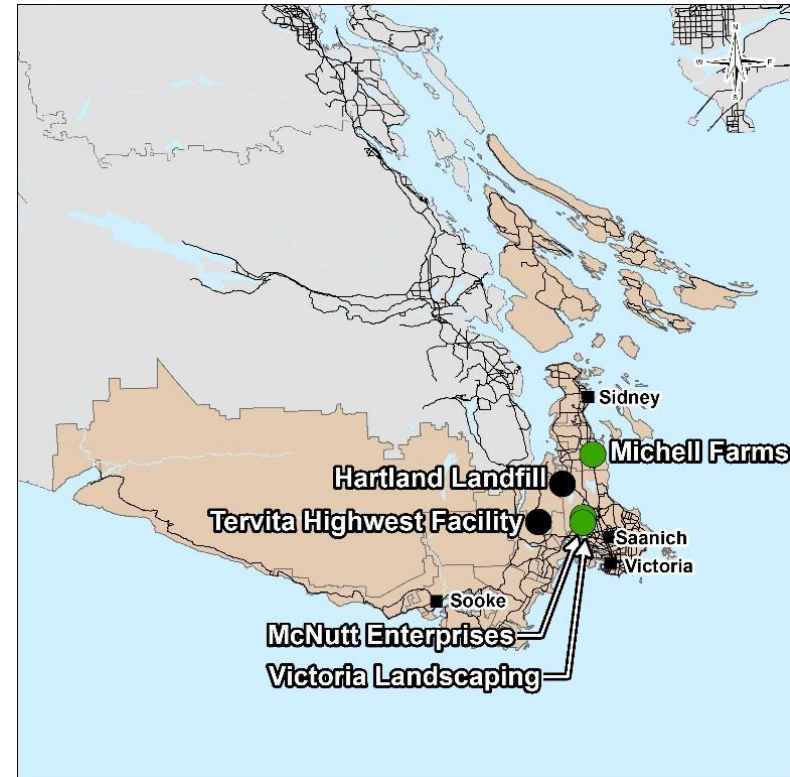
Summary - Alberni Clayoquot

- Priorities
 - Implementing the OCC disposal ban
 - Can achieve 50% diversion
 - Possible construction and wood waste ban
- Opportunities for collaboration
 - Finding facilities for materials that ACRD plans to ban from disposal e.g. organics and wood waste

Summary - Capital

- SWMP Approved 1995*
- Population 372,463
- Per Capita Disposal 368 kg/yr
- Diversion Rate 52%
- Tipping Fee \$110 /t
- Disposal Capacity 30 yrs

- Garbage 137,118 t
- Recycling 132,057 t
- Organics 15,219 t



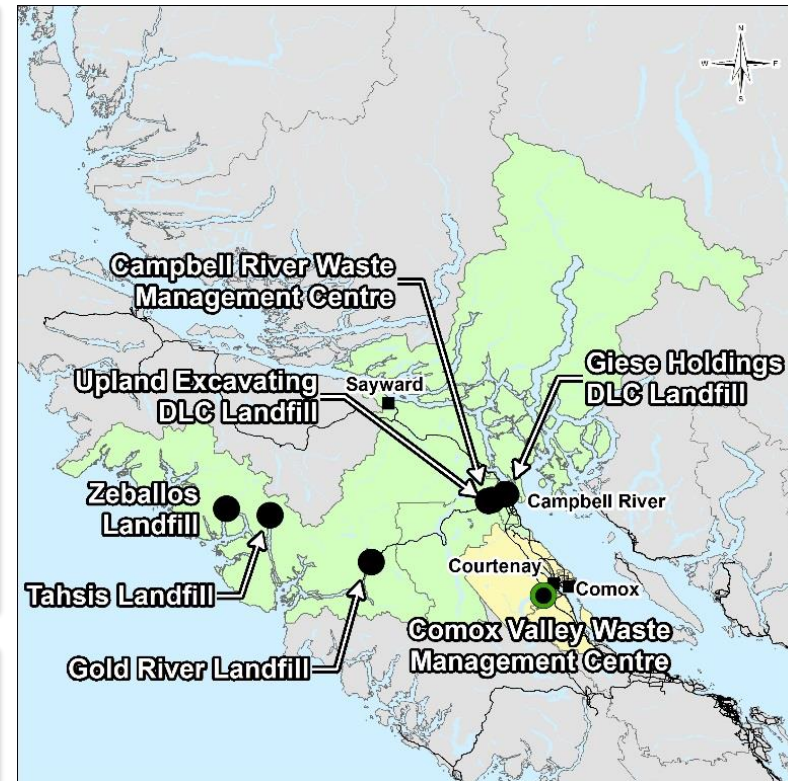
Summary - Capital

- Priorities
 - Revision of SWM Plan. Currently in Phase 3
 - Develop integrated food waste processing capacity in the region (currently exporting to Cowichan Valley and/or Harvest Power in Richmond)
 - Develop a sustainable financial model for SWM
- Opportunities for collaboration
 - Financial sustainability models
 - Shared landfill space - be part of the solution
 - Consolidation of tonnages for shared facility (WTE)

Summary – Comox Strathcona WM

- SWMP Approved 2013
- Population 104,950
- Per Capita Disposal 610 kg/yr
- Diversion Rate 51%
- Tipping Fee \$120 /t
- Disposal Capacity 4 yrs*

- Garbage 64,292 t
- Recycling 62,436 t
- Organics (yard) 4,690 t



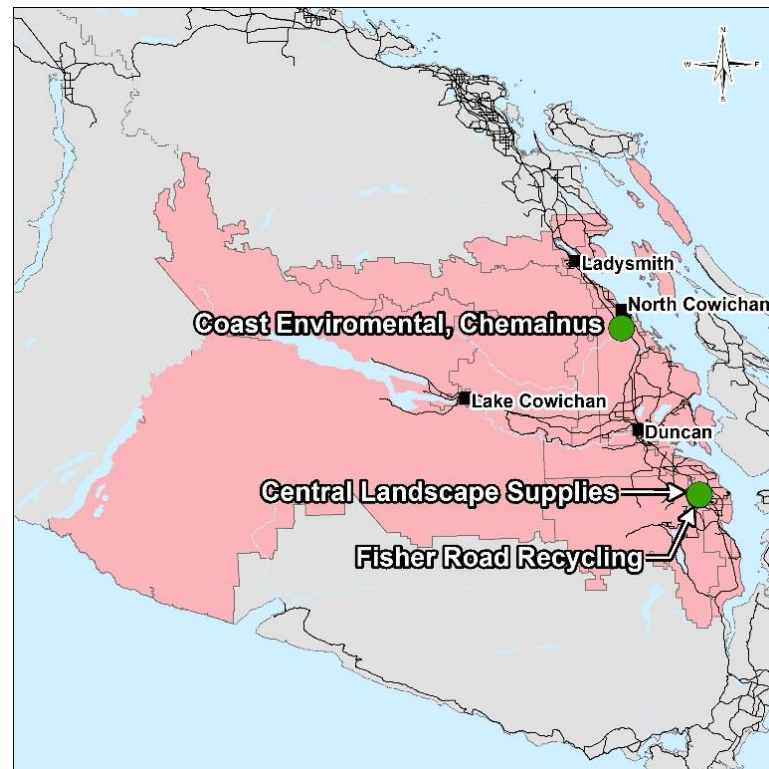
Summary – Comox Strathcona WM

- Priorities
 - Construct a new landfill by 2017
 - Build a regional composting facility in the next few years
 - Closure of Campbell River Landfill
 - Construct new Transfer Station to support the new landfill
 - Finding the funds to do all the work
- Opportunities for collaboration
 - Benefits of economies of scale from working together
 - Opportunity for a shared mega landfill (consolidated service and fee to include transportation)

Summary – Cowichan Valley

- SWMP Approved 1995*
- Population 81,704
- Per Capita Disposal 286 kg/yr
- Diversion Rate 74%
- Tipping Fee \$140 /t
- Disposal Capacity 0 yrs*

- Garbage 23,333 t
- Recycling 66,918 t
- Organics 11,356 t



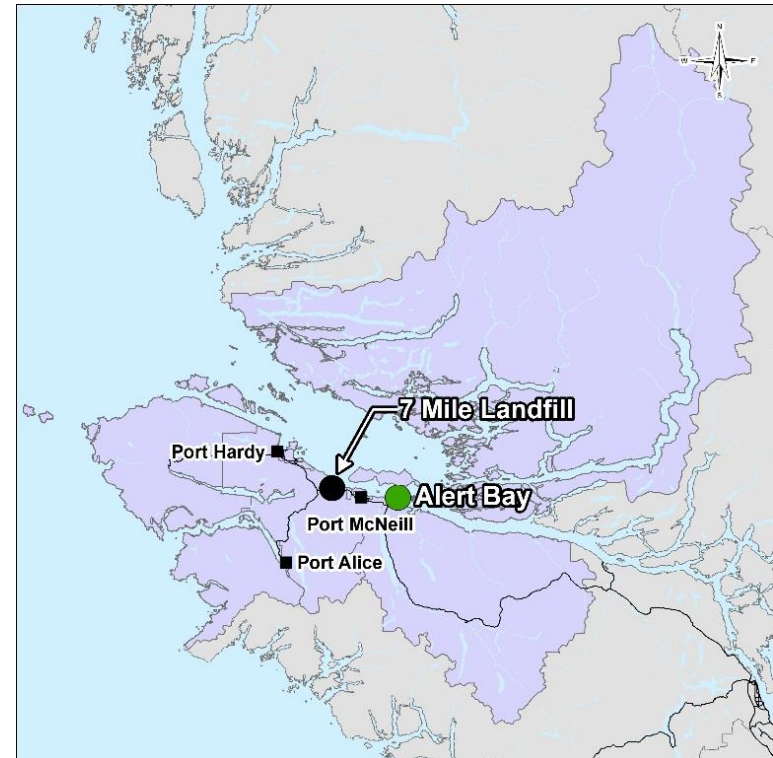
Summary – Cowichan Valley

- Priorities
 - Finding a local solution to garbage disposal
 - Composting – facilities have odour issues that require a technological resolution
- Opportunities for collaboration
 - Local solutions to garbage disposal e.g. collaboration for landfill or WTE facility
 - High tech organics processing solutions
 - Leakage – loss of solid waste to other jurisdictions

Summary – Mount Waddington

- SWMP Approved 1996*
- Population 11,523
- Per Capita Disposal 542 kg/yr
- Diversion Rate 32%
- Tipping Fee \$115 /t
- Disposal Capacity 70 yrs

- Garbage 6,243 t
- Recycling 986 t
- Organics (yard) 2,011 t



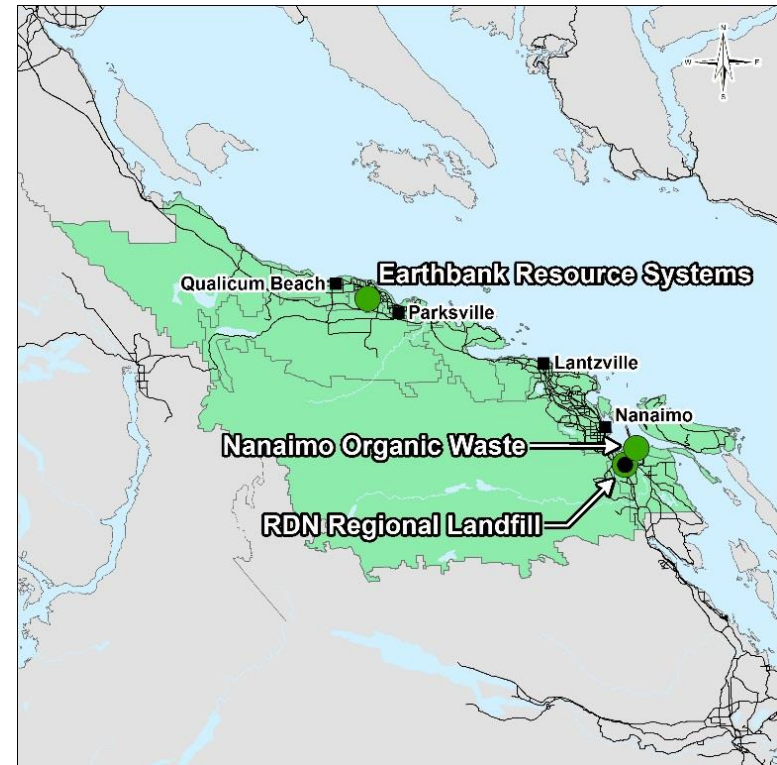
Summary – Mount Waddington

- Priorities
 - Need to provide services for small isolated communities – poor transport links, long distances
 - Cost benefit analysis of introducing organics collection
- Opportunities for collaboration
 - Primarily there to observe
 - Have invested in the landfill and are happy with program
 - Concern over impact of StewardsChoice – if undercuts MMBC, rural communities will suffer

Summary – Nanaimo

- SWMP Approved 2004*
- Population 150,040
- Per Capita Disposal 335 kg/yr
- Diversion Rate 68%
- Tipping Fee \$125 /t
- Disposal Capacity 25 yrs

- Garbage 52,237 t
- Recycling 86,603 t
- Organics 26,250 t



Summary – Nanaimo

- Priorities
 - SWM Plan review – underway
 - Managing waste export – could look at changing by-laws
 - Sustainable financing for the system – because of export tipping fees are not providing sufficient revenue
 - Advance diversion beyond 70%”, maybe using a MRF
 - Long term disposal options
- Opportunities for collaboration
 - Cooperative approach to marketing recyclables
 - Potential for a joint emerging technology

Summary – Powell River

- SWMP Approved 1996*
- Population 19,480
- Per Capita Disposal 236 kg/yr
- Diversion Rate 50%
- Tipping Fee \$215 /t
- Disposal Capacity 0 yrs

- Garbage 4,604 t
- Recycling 3,713 t
- Organics (yard) 902 t



Summary – Powell River

- Priorities
 - Finalize SWM Plan
 - Implement organics diversion program
 - Expand EPR beyond existing programs – local opportunities
 - Potential resource recovery centre – applied for grant
- Opportunities for collaboration
 - Possibility of using another regions' landfill for disposal
 - Exploring all options for residuals (after max. diversion)

Summary – Sunshine Coast

- SWMP Approved 2011
- Population 29,584
- Per Capita Disposal 352 kg/yr
- Diversion Rate 50%
- Tipping Fee \$150 /t
- Disposal Capacity 15-20 yrs

- Garbage 10,229 t
- Recycling 5,563 t
- Organics 3,318 t



Summary – Sunshine Coast

- Priorities
 - 24 Initiatives in SWMP
 - Including curbside organics and EOW garbage collection
 - Closure of Pender Harbour Landfill and conversion to a TS
 - Reviewing priorities for post 2015
- Opportunities for collaboration
 - Developing financially sustainable SWM models
 - Information sharing
 - Service delivery for rural residents

Solid Waste Management Trends

Trends – Recycling

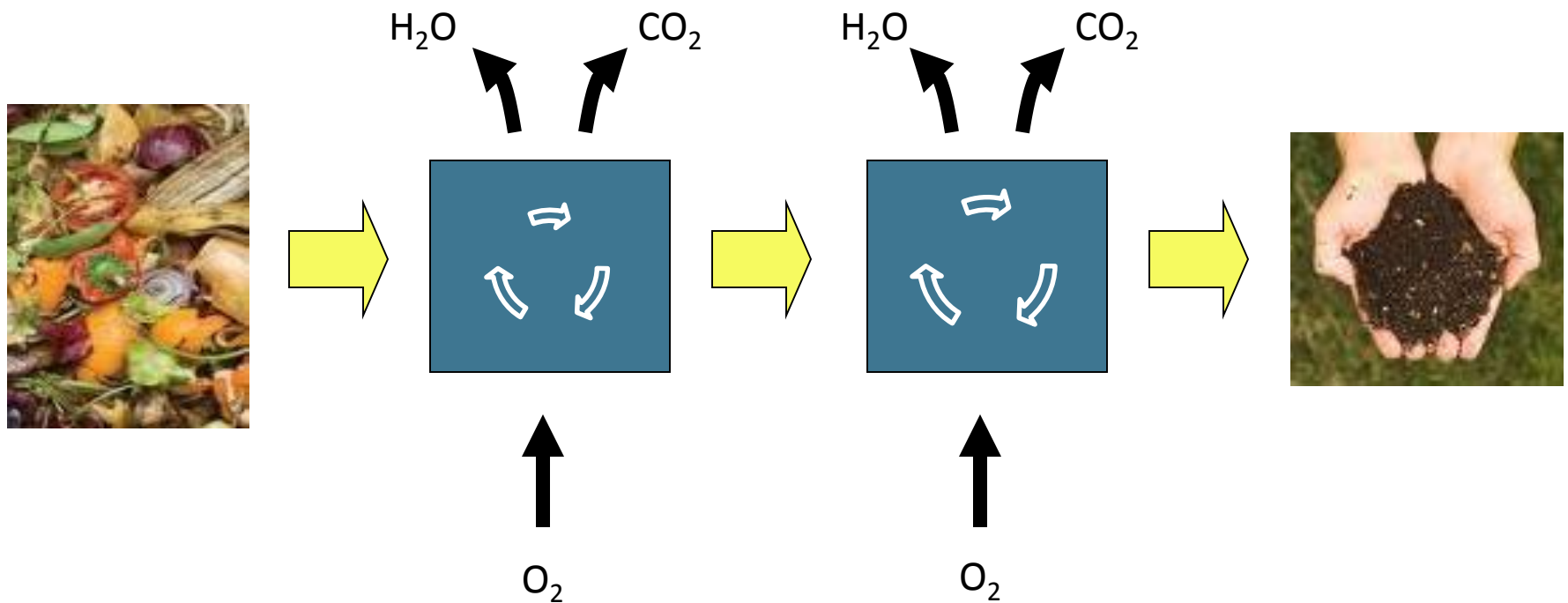
- Materials changing:
 - Less paper (mainly ONP)
 - Less glass
 - More plastic
- EPR support (MMBC)
 - Money good
 - Restrictions on what is collected
- Collection approach changing:
 - Glass being excluded
 - Single stream vs source separated

Trends – Organics Management

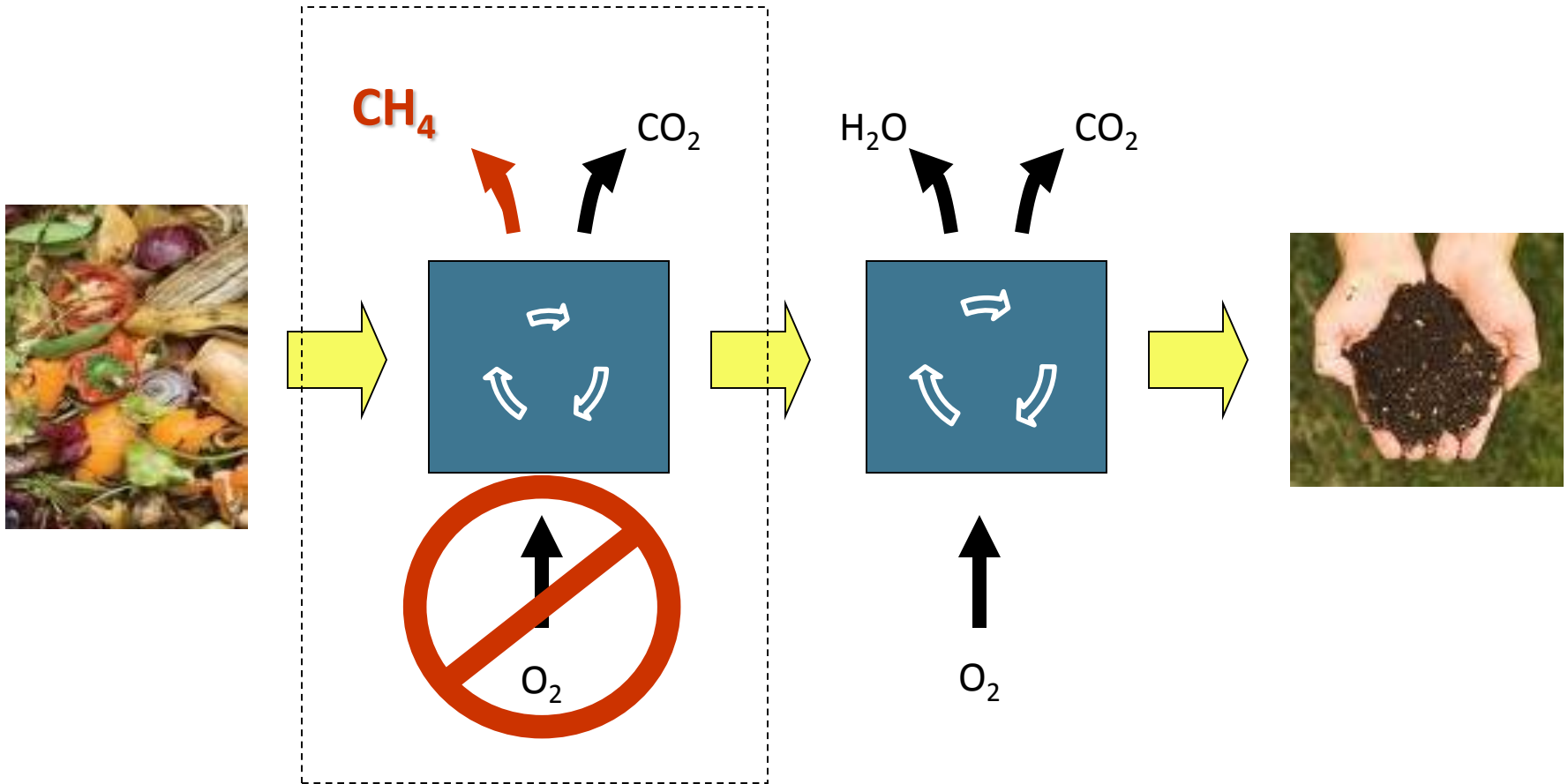
- Organics typically 40% of the disposal stream
- More and more communities diverting organics (food waste and soiled paper)
- Collection approaches include:
 - Food and yard waste (Metro Van municipalities)
 - Source separated food waste (CVRD, RDN and Toronto)



Composting Process



Anaerobic Process



Trends – Organics Management

- Odour management primary concern for facilities
- Bi-weekly garbage collection and weekly organic collection is resulting in 80% diversion of organics in the waste stream



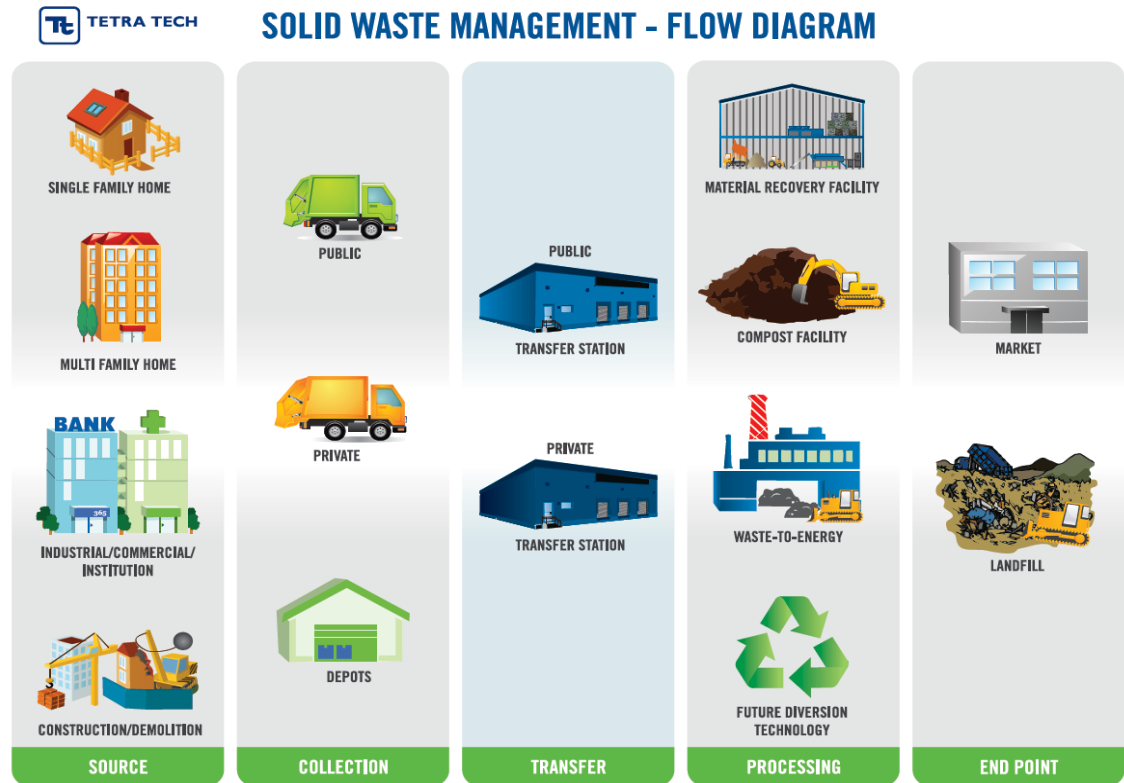
Trends – Organics Management

- Many technologies available
- Anaerobic digestion becoming more popular
 - Composting still required to transform organic material into a quality soil amendment



Trends – Waste To Energy

- Not a disposal option
- Converts waste materials to energy
- Usually another process required after WTE process



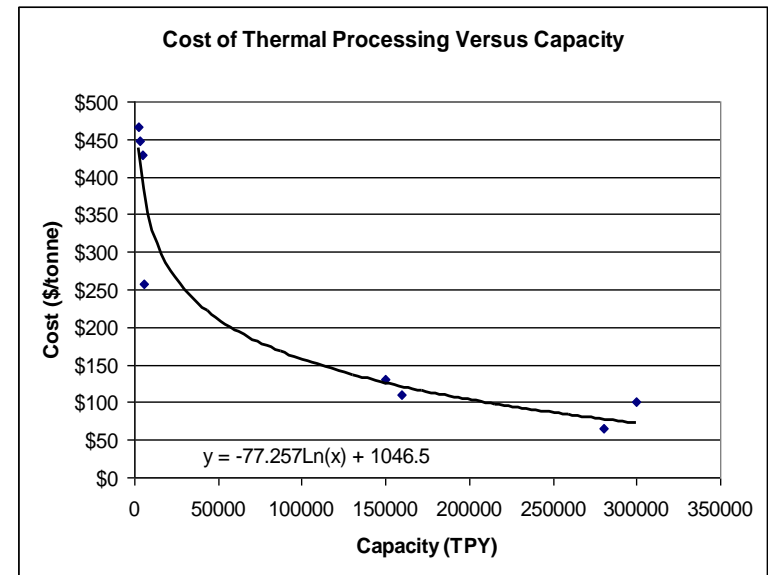
Trends – Waste To Energy (Thermal)

- Mass Burn – Metro Vancouver
- 280,000 tonnes/yr
- Generates high pressure steam that can be used for industrial processes or make electricity (25 MW)
- Mass reduction: 80%
- Volume reduction: >90%



Trends – Waste To Energy

- Issues:
 - Air emissions
 - Cost
 - Residuals (Fly ash & Bottom ash)
- Cost from Tri-Regional District Study:
 - Capital Cost = \$235M
 - Capacity = 200,000 t/yr



Trends – Waste To Energy

- Gasification – Edmonton
- Supplier: Enerkem
- Start Date: 2015
- Converts MSW into methanol, ethanol and chemical intermediates
- First full scale commercial facility



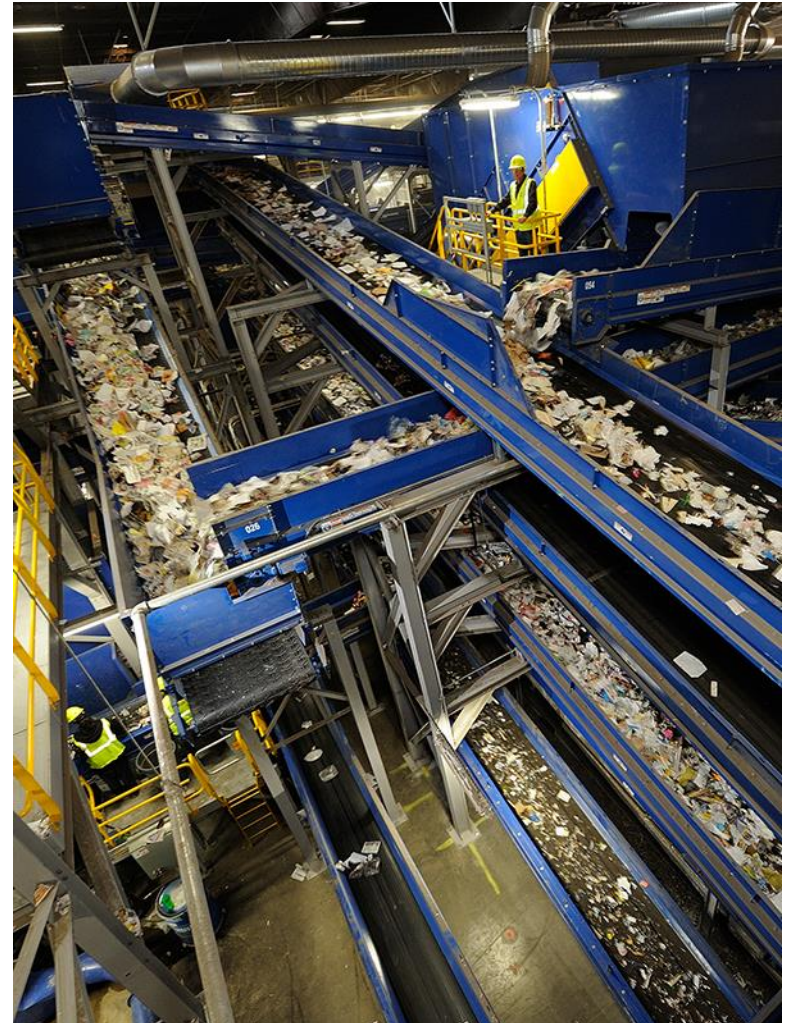
Trends – Waste To Energy

- Less air emissions (w.r.t. Mass Burn)
- Higher cost (Double)
- Cutting edge issues/delays
- Spent to Date:
 - Capital Cost > \$200M
 - Capacity = 100,000 t/yr



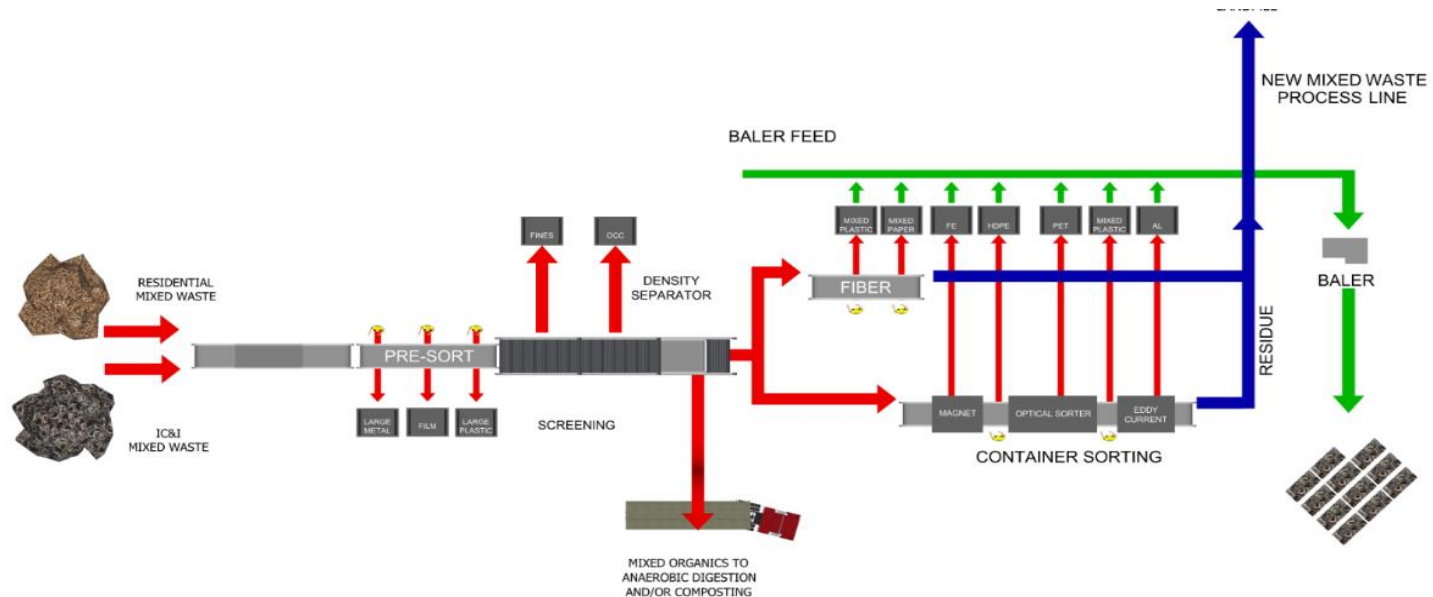
Trends – Mixed Waste/Dirty MRFs

- Controversial approach to recycling
- Parts of US cities use it as a primary form of recycling
 - Quality of recyclables tend to be low
 - Can achieve 50% diversion



Trends – Mixed Waste/Dirty MRFs

- Dirty MRF's can enhance recycling
 - Food waste diversion makes waste drier and easier to sort
 - Potentially more diversion can occur?



Trends – Refuse Derived Fuel

- RDF – product produced from dirty MRFs
- Typically used as a replacement for fossil fuels such as coal
- Likely users of RDF:
 - Cement Kilns
 - Coal Power Plants
 - Industrial processes



What does SWM look like in the AVICC in 50 or 100 years?



SWOT Analysis



- Exercise to find priorities (top 4-5 points for each area)

Strengths, Weaknesses, Opportunities & Threats (SWOT)

- Help share and compare ideas
- Bring a clearer common purpose and understand of factors for success
- Organize important factors linked to success and failure
- Provide linearity to decision making process

Strengths

- AVICC committee and collaboration
- Overall landfill capacity (40 years) allows time for long term planning
- Per capita waste generation rate is below the BC average
- High capture of residential recycling
- Private sector involvement in waste diversion

Opportunities

- EPR program collaborating and achieving economies of scale
- Increased organics collection to improve waste diversion
- Collaboration to achieve scale to solutions (processing organics, garbage, recyclables)
- Management of GHG from landfills

Weaknesses

- Construction and Demolition Debris (C&D) tracking and disposal
- Industrial, Commercial and Institutional (ICI) waste diversion and recycling
- Tipping fees that drive waste to lower cost options and leakage
- Tipping fees a key source of revenue for funding waste programs (lower disposal rates decrease revenue needed to operate the system)
- Service delivery for rural and remote residents

Threats

- Waste export may not be reliable due to boarder concerns, exchange rates
- Federal and provincial legislation changes (also an opportunity)
- Landfill capacity
- Stability and responsibility in EPR programs over time
- Solid waste system resiliency

Issues for Further Discussion in Break-Out Groups

- Items for discussion:
 - Issues
 - Challenges
 - Collaboration Opportunities

Break-Out Topics

- Five Groups
- Vote on following items for discussion:
 - Issues
 - Challenges
 - Collaboration Opportunities
- One or several topics to discuss
- Select a secretary and presenter in each group

Break-Out Guiding Questions

- What Will it Take to Achieve <x> Priority?
- What can we learn from each other?
- What could we do cooperatively?
- Who should lead / be involved?

Sample Identified Needs:

- Policies and Procedures
- Information and Communication
- Performance Standards and Guidelines
- Infrastructure

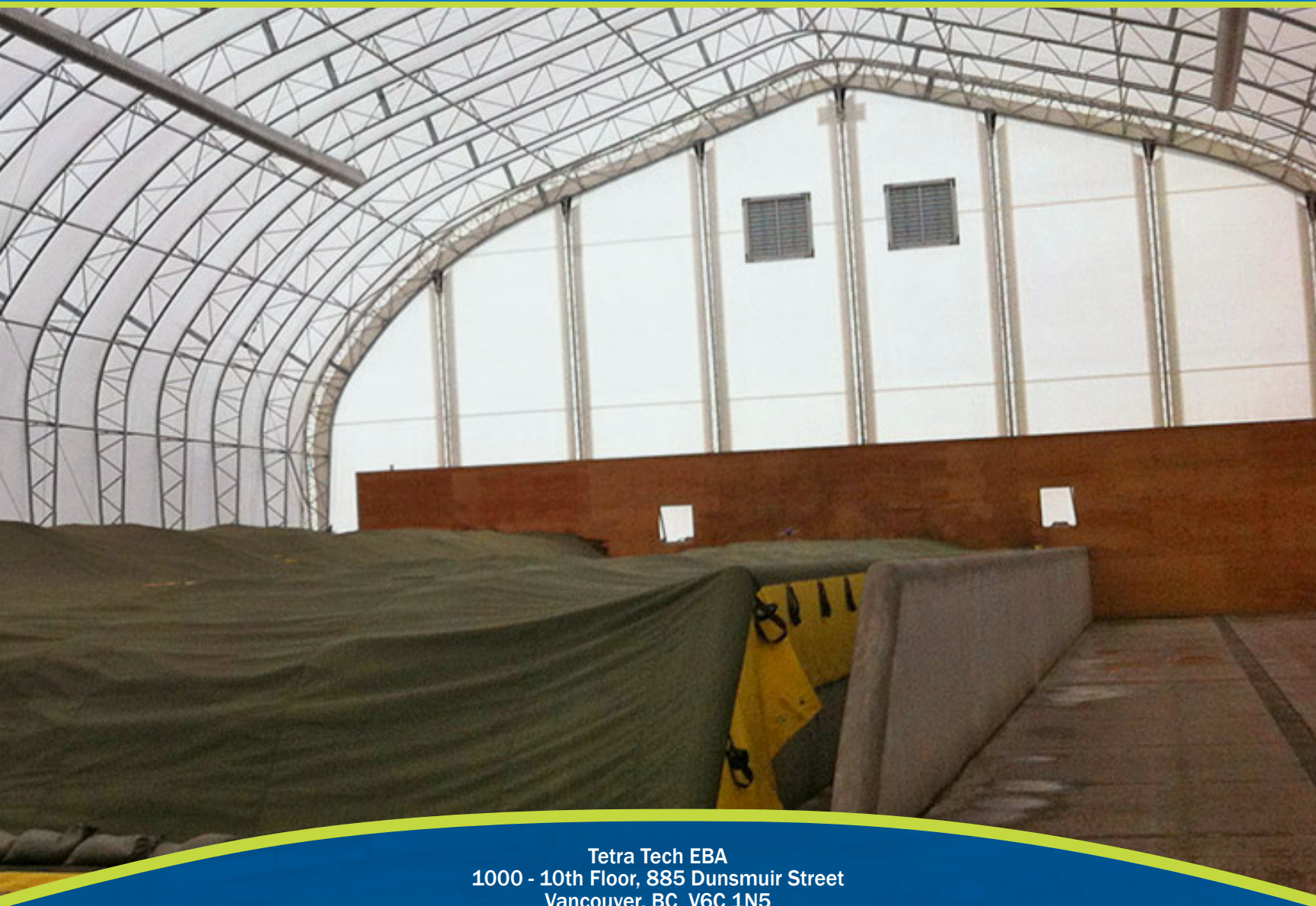
Next Steps

- Summary report of various programs
- Workshop results to be included



Comox Strathcona Waste Management

ASSOCIATION OF VANCOUVER ISLAND AND COASTAL COMMUNITIES: THE STATE OF WASTE MANAGEMENT



Tetra Tech EBA
1000 - 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5



TETRA TECH EBA