



UBC Vancouver Campus

Zero Waste Action Plan

October 3, 2014

campus + **community** planning



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

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Executive Summary

In the fall of 2010, UBC initiated a process to engage the Vancouver (Point Grey) campus community in the development of a Zero Waste Action Plan. The Plan sets out goals, targets, and actions that will move campus toward a vision of UBC as a zero-waste community. In the context of this plan, Zero Waste is as much a guiding principle or philosophy as an aspirational target, where all unwanted products and materials will be treated as resources that can be used again, resulting in virtually zero garbage.

UBC has implemented many successful recycling and composting programs and policies to date. During the three year 2011/12/13 period, the operational waste diversion (away from landfill and incineration disposal) was approximately 45%, slowly and steadily increasing, and construction and demolition waste diversion was fluctuating around 84%. This led to approximately 61% of UBC's overall waste being diverted during this period.

On the path to zero waste, UBC's Vancouver campus is targeting an increase in its overall diversion rate to 70% by 2016 and 80% by 2020, despite inevitable campus growth. With decreased disposal comes decreased cost for many materials, bringing the potential for a cost-neutral plan to be implemented over the longer term.

The initial focus of this Zero Waste Action Plan will be on operational waste and food scraps in particular due to a number of factors: the impending ban by Metro Vancouver in 2015 of organics from disposal, the large proportion of organics in UBC's waste, and the opportunity to increase current food scraps diversion practices on campus.

The following overall strategy will be utilized to achieve the goals and targets of this Plan:

1. Increase the extent and convenience of recycling and food scraps **collection infrastructure**, addressing gaps in collection systems and making existing systems more convenient for users.
 - a. Implement multi-stream waste-sorting and collection infrastructure and communications across campus by the end of 2015, with food scraps collection at all significant generation points by mid-2015.
 - b. To accommodate ongoing changes in recycling services and materials, maximize **flexibility** in the design of infrastructure and programs.
2. Implement cross-campus, effective, and consistent **communications and outreach**, in concert with the improved infrastructure.
3. Test major changes, whether infrastructure, communications, or other, through **pilot projects** prior to broader rollout, to maximize successful implementation. 2013/14 pilots included public realm waste-sorting stations (indoor and outdoor), office waste-sorting stations with enhanced food scraps collection program, enhanced student housing food scraps and recycling programs, and paper towel recycling. 2014/15 pilots include evaluating new indoor and outdoor recycling station designs and additional student housing strategies.

4. Improve **performance monitoring**, including addressing waste data collection gaps and uncertainties, and enabling better tracking of progress toward objectives and targets.
5. Continue designing and implementing strategies to **reduce the generation of waste**, primarily through procurement changes and reuse systems.
6. Explore opportunities for **research leadership**, academic collaboration, and Campus as a Living Lab partnerships, and utilize outcomes to support waste reduction at UBC wherever possible.
7. Utilize the unit-level **operational sustainability planning process** to integrate key zero-waste actions and metrics into the strategic plans of UBC's operational units.
8. **Collaborate with the University Neighbourhoods Association (UNA)**, Metro Vancouver and other external stakeholders on program development, communications, and research.

The campus-wide communications and engagement strategy for the Plan incorporating the Sort It Out and UBC Sustainability brands is being launched September 2014.

Resources required to implement the majority of institutional actions outlined in the Plan will be prioritized through existing budgets and staff. There are a few key actions – primarily those that will greatly assist UBC in meeting its targets – that will require additional resources for implementation for both hard (e.g. new recycling stations) and soft (e.g. communications and engagement) costs.

Shifting materials from disposal to recycling will lead to significant operational cost savings, which have the potential to offset most or all necessary investment costs over the longer term. Note however that the long-term net costs are also sensitive to factors outside of UBC's control such as landfill tipping fees and recycling commodity prices. Organic waste processing costs are also a major factor.

As the Plan is implemented, UBC's organic waste is expected to increase significantly over the next three to five years, which will exceed the capacity of UBC's existing in-vessel composting facility. The facility's operational limitations, such as difficulty accommodating plastic bags of any kind or larger amounts of food-soiled paper and cardboard, will become more pronounced as collection expands. Consequently, a range of alternative options are being explored, including plant upgrades and sending all or a portion of food scraps off-campus for processing.

Other waste management operational changes already initiated that complement Plan implementation include new garbage and cardboard compactors, ongoing adjustment of collection schedules, and new collection vehicles.

UBC's Zero Waste Action Plan is one step on the path to becoming a truly zero waste, sustainable campus community. Through our efforts, UBC will continue to be a leader in waste reduction and support the development of a sustainable region that is based on a green economy and healthy ecosystem.

Part I: Context

1. Scope

This Plan addresses waste management at UBC’s Point Grey campus, and also addresses collaboration with the UNA and other on-campus partners. Its recommendations can also inform waste management planning and activities elsewhere such as UBC Okanagan and UBC Robson Square. Within this Plan, in general “UBC” will be used to mean the Point Grey campus.

UBC is made up of many players and stakeholders. In general, UBC buildings and facilities can be divided into three categories with respect to waste services: core (academic) users, ancillary (academic) users, and tenants (non-academic).

Core (Academic)	Ancillary (Academic)	Tenant (Non-Academic)
<ul style="list-style-type: none"> • UBC owned and operated buildings that are not individually billed for waste services by UBC Waste Management 	<ul style="list-style-type: none"> • UBC owned and operated buildings that are billed for waste services by UBC Waste Management (e.g. Student Housing & Hospitality Services, Athletics and Recreation) 	<ul style="list-style-type: none"> • Buildings that are not owned or operated by UBC but occupy UBC land (e.g. market and rental housing, hospital) • Contract most waste services to a third party

This plan focuses on key stakeholders including institutional users of UBC’s waste services as well as major tenants and residents (e.g. housing residents represented by the UNA).

2. Background

2.1. Zero Waste: A Guiding Principle

In the context of this plan, Zero Waste is as much a guiding principle or philosophy as an aspirational target; a zero-waste campus means all unwanted products and materials will be treated as resources that can be used again, resulting in virtually zero garbage.

2.1.1. Waste Management Hierarchy



The three Rs, Reduce, Reuse, Recycle, are still very much applicable. However the pollution prevention hierarchy now includes 5 Rs: Reduce, Reuse, Recycle, Recover Resources, and Residual Management (i.e. disposal). A sixth R, representing Rethink or Redesign, is also occasionally placed at the top of the pollution prevention hierarchy.

The general principle of this hierarchy is that it is preferable to reduce (or avoid) the consumption of new materials, as it reduces or

eliminates the costs and impacts of managing it as a waste material. However, when materials are required, we should extract maximum value from those resources.

Different jurisdictions have different levels of control and influence on each one of these layers. Institutions such as UBC have the most control over recycling and to some degree reuse, some influence (but not control) over reduction and recovery, and less influence over recovery and residuals, with the exception of on-campus composting.

2.2. Regional and Provincial Context

Metro Vancouver released its Integrated Solid Waste and Resource Management Plan in 2010. The plan includes the following goals for the region:

- Reduce the quantity of waste generated per capita within the region, calculated on a rolling five-year average, to 90% or less of 2010 volumes by 2020.
- Increase the regional diversion rate from an average of 55% to a minimum of 70% by 2015.
- An aspirational target of achieving 80% diversion by 2020 assuming there will be sustained markets for all diverted material.

Metro Vancouver also announced that it will ban organic materials (including food scraps) from all sources from its waste management facilities by 2015. This change is a key driver of the Plan, as it will require virtually all organic waste to be source-separated from garbage. Based on information currently available, the ban will be phased in, starting with organizations whose waste is dominated by organics.

Most of the region's garbage is ultimately sent to one of three disposal facilities: the Vancouver Landfill (in Delta), Cache Creek Landfill, or the Waste-to-Energy facility in Burnaby.

Changes to provincial product stewardship programs may also affect UBC's waste management. For example, new products and materials are being added to the Product Stewardship Program over time. Waste management companies and municipalities will also be adapting to the Packaging and Printed Paper Product Stewardship Plan, which launches in 2014 and will affect the recycling services available in the region.

2.2.1. The Economics of Waste Reduction

One of Metro Vancouver's strategies to drive increased diversion rates is to provide financial disincentives to dispose of garbage. The regional tipping fee, or garbage disposal rate, increased by 50% between 2009 and 2012 and another 50% increase is anticipated by 2020. The 2014 tipping fee is \$108/tonne. Meanwhile, many materials can be recycled at a lower per-tonne cost, and in some cases such as corrugated cardboard, generate a net revenue. For example, in 2013 the average value for cardboard and office paper was between \$70 and \$90 per tonne. Overall, it pays to recycle. Changing regional waste policies and market context have also resulted in a much wider range of available services and providers.

2.3. UBC's Waste Management Context

2.3.1. Operational Waste

Operational waste includes materials generated during the normal operation of UBC's buildings and facilities such as food scraps, paper and cardboard, containers, electronic waste, garbage, and others.

Many departments are involved in managing UBC's waste including Procurement and Payment Services, Student Housing & Hospitality Services (SHHS), Risk Management Services (RMS) and Building Operations. These departments may be involved at different phases within a material's life cycle from purchasing through to disposal.

UBC Waste Management (UBCWCM), which is a part of Building Operations, collects most of UBC's operational waste. The recycling streams are sent to different recycling companies for transformation, while food scraps are composted in UBC's in-vessel system. Garbage is sent to transfer stations for disposal.

UBCWCM does not collect garbage or recycling from residents of the UNA – these services are provided through their individual strata corporation or property management company. However, UBCWCM does collect food scraps from UNA buildings that opt into UBC's compost program.

In 2011, UBC achieved a Gold rating in STARS, a framework for universities to measure their sustainability performance. In comparison to its peers, UBC has been shown to score higher on average in the waste category. UBC has also been shown to generate less waste per capita on average than its peers.

Past Successes

UBC has a long track record of past accomplishments and successes in the area of operational waste management.

Well-established recycling programs at UBC turn waste into resources. Blue and grey carts collect mixed paper, cans, bottles, and plastics (hard plastics #1-5 & 7) for recycling. Corrugated cardboard is also recycled and there are programs for other items including electronic waste, light bulbs, batteries, wood and metal, with pilot programs for soft plastics and styrofoam packaging. UBC's desk-side recycling program, *My Waste, My Responsibility*, equips workstations across campus with a personal blue recycling bin with a small black garbage attachment empowering people to acknowledge, sort, and dispose of their own waste. Mattress recycling from student housing is another recent addition.

Regionally, UBC has been an early adopter of organics management. In 2004, an in-vessel composter was commissioned on South Campus to convert food waste into a useful, nutrient-rich compost used for landscaping at UBC, negating the need to purchase compost off-campus. All major food outlets on campus receive collection services and other buildings participate on a voluntary basis.

To address access to surplus assets on campus for reuse, the [Reuse-it UBC](#) web site was launched in 2011 to facilitate the reuse of surplus items on campus by generating awareness and creating

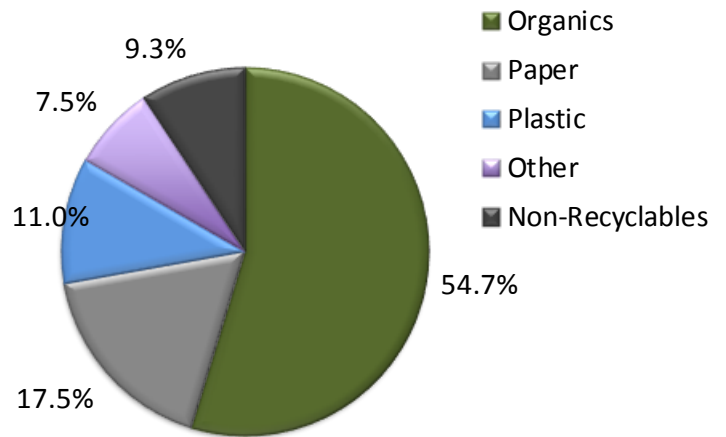
opportunities to connect departments with a wide variety of items that might otherwise go to the landfill.

Current Situation

In 2010/11, UBC conducted a waste audit to assess current waste disposal practices and waste composition at the Vancouver campus. The figure (right) illustrates the composition of UBC’s operational solid waste. Based on the audit results, organics comprise more than half of UBC’s garbage and less than 10% of UBC’s garbage is not recyclable.

During the 2013-14 fiscal year¹, UBC sent approximately 3,000 tonnes of material to disposal while recycling or composting 2,900 tonnes of material, resulting in an operational waste diversion rate of 49%.²

**Composition of Disposed Materials
(Based on Waste Audit, 2010)**



2.3.2. Construction and Demolition (C&D) Waste

This category includes those materials generated during the construction, demolition, or renovation of UBC’s buildings and other infrastructure.

UBC retains control over all institutional construction and demolition projects, and through land lease conditions and permitting processes also retains control over residential projects. However, most waste management for these projects is privately contracted. Major construction and demolition projects are managed by UBC Properties Trust (UBCPT) or other land development companies. Smaller projects are managed by Project Services or the Construction Office.

Recycled C&D waste includes wood, gypsum (drywall), metal and others, depending on the project.

Past Successes

All new UBC Neighbourhood residential buildings must achieve a minimum Gold certification through UBC’s green building program, the Residential Environmental Assessment Program (REAP). REAP guidelines require mandatory diversion of 75% of construction waste. In addition, all new institutional buildings on campus must achieve a minimum Leadership in Energy and Environmental Design (LEED)

¹ The UBC fiscal year is from April 1 to March 31.

² Using an updated calculation method that better separates some construction waste materials from operational waste, the operational waste diversion rate was approximately 45%, with a slowly increasing trend over the last several years. This updated calculation method will be used going forward.

Gold or equivalent rating, which includes potential credits for material reuse and waste diversion. UBC has made 75% construction waste diversion mandatory for all academic buildings.

Current Situation

During the 2013/14 fiscal year, UBC achieved an overall C&D diversion rate of 80%. This is down from approximately 90% in the previous year, primarily due to variability of recycling rates in large construction projects.³

2.3.3. Overall Solid Waste Diversion

UBC's overall institutional diversion rate including both operational and C&D waste during the 2013/14 fiscal year was approximately 61%, down from around 67% in 2012/13 (due to the decrease in C&D waste diversion), and was about 61% for the three year period 2011/12/13. This overall rate was slightly higher than the regional average of 60%. Section 5 includes a chart that shows recent diversion rates.

2.4. Other Relevant UBC Plans

Place and Promise: The UBC Plan

UBC's strategic plan, Place and Promise, contains nine commitments with goals and actions designed to realize our vision for the future. Sustainability is one of the key commitments embedded into the university's strategic direction.

Climate Action Plan

The UBC Climate Action Plan identifies the University's aggressive greenhouse gas emissions reduction targets and strategies, to guide the Vancouver campus in its ongoing transition toward a low-carbon future. This plan includes a number of waste-reduction objectives and actions that support the Zero Waste Action Plan.

Campus Sustainability Engagement Strategy

The Campus Sustainability Engagement Strategy was developed in 2013. It outlines an approach for engaging the Vancouver campus' community members (student, staff, faculty, and residents) to help achieve UBC's sustainability targets for energy, greenhouse gases, water, and waste. The Strategy provides key recommendations for delivering engagement programs aimed at increasing waste diversion in student residences as well as in office areas on campus. Elements of the Engagement Strategy related to waste have been developed for consistency with the draft Zero Waste Action Plan and many of the recommendations directly support actions in this plan.

³ C&D diversion rates tend to fluctuate significantly more than those for operational waste, due to the relatively small number of large projects. During 2011/12/13 fiscal years, the average diversion rate was about 84%.

2.5. Zero Waste Planning Process

In the fall of 2010, UBC initiated a process to engage the campus community in the development of the Zero Waste Action Plan. The process was launched in February 2011 with a public workshop and open house to help establish a long-range vision and to solicit ideas on how to achieve this vision. Working groups were subsequently established to fully develop these ideas and prioritize actions.

During the workshop and open house, members of the public were led through exercises to solicit their ideas regarding a vision and related actions. This input was considered by UBC staff to develop a draft vision statement, which was then reviewed by this plan’s steering committee and subsequently posted online for public input. The final vision statement is presented at the beginning of this plan.

The four working groups are described in the table below. Each working group met at least twice in the summer of 2011 for the purposes outlined below. Subsequent meetings were held with smaller groups or individual members of the working groups to help inform the development of the draft plan.

Working Group	Purpose
Operational Waste & Supply Chain	<ul style="list-style-type: none"> • To reduce operational waste by eliminating unnecessary goods and materials that arrive on campus and enhancing reuse programs • To increase operational waste diversion by improving infrastructure for recycling and composting
Construction and Demolition Waste	<ul style="list-style-type: none"> • To develop a methodology and process for tracking construction and demolition waste diversion at UBC • To determine how to increase diversion of construction and demolition waste at UBC
Behaviour Change	<ul style="list-style-type: none"> • To develop communications and engagement strategies to support solid waste reduction and diversion
University Neighbourhoods Association	<ul style="list-style-type: none"> • To develop cross-cutting recommendations for waste and water, relevant to UBC and UNA residents

Due to staff changes, Plan development was paused and resumed in late 2012. Since that time, additional consultation was undertaken with staff and key stakeholders, including through UBC’s Waste-Free Committee, in order to update Plan strategies and actions given recent changes in regional policy and UBC operations. Plan development was also coordinated with the unit-level sustainability planning process that was undertaken by C&CP in conjunction with other business units, to maximize alignment of Plan goals and actions with strategic planning in those units.

Part II: Vision

3. A Zero Waste UBC Community

This vision statement was developed in collaboration with the public and broader UBC community, as described in the Zero Waste Planning Process section. It reflects a long-term perspective that goes beyond UBC's campus and implementation of the Zero Waste Action Plan – for a truly Zero Waste future, a shift is needed in the behaviour of the broader community and in the way materials and products are developed and manufactured.

UBC's Vancouver campus will be transformed into a **zero-waste** community by advancing innovative solutions to conserve, reuse, recycle, and redesign materials and resources.

In pursuit of our vision, we will:

- Engage with the supply chain to eliminate unnecessary goods and materials that arrive on campus;
- Empower individual and collective action through education, engagement, and the development of integrated systems and enhanced infrastructure;
- Pioneer a viable financial model to enable zero waste;
- Leverage our unique position as a research and educational institution to develop, demonstrate and implement innovative waste management solutions.

4. Objectives

Given the regional and UBC contexts and UBC's sustainability priorities, overall objectives of the Plan are:

1. Reduce waste disposal, moving UBC toward the zero-waste campus vision. This includes two sub-objectives:
 - a. Minimize waste generation and use of virgin materials
 - b. Increase waste-diversion rate
2. Reduce GHG emissions and other environmental impacts⁴ associated with waste disposal such as land impacts, groundwater pollution from landfills, or air emissions from incineration.

⁴ While this Plan does not specifically include it, minimizing toxic products used on campus is a complementary objective, which is addressed in the unit-level sustainability planning process. (Refer to Section 10 - Implementation for more information).

3. Maintain financial viability and seek out opportunities to improve the business case with a long-term target of cost-neutrality.
4. Contribute to the Campus as a Living Lab initiative stimulating research, teaching, and collaboration opportunities.
5. Meet or exceed requirements of current and anticipated regional waste management regulations, policies, and programs.

5. Targets and Milestones

Through implementation of this Plan, UBC intends to meet the following major milestones and targets:

- 1. Implement multi-stream waste sorting and collection infrastructure and communications across campus by end of 2015, targeting food scraps collection at all significant generation points by mid-2015.**
- 2. Increase diversion rates toward meeting the Metro Vancouver regional diversion targets:**
 - a. 70% diversion by 2016***
 - b. 80% diversion by 2020**
- 3. Decrease operational waste disposal to landfill/incineration steadily, despite campus growth, toward the long-term aspiration of a zero-waste campus.**

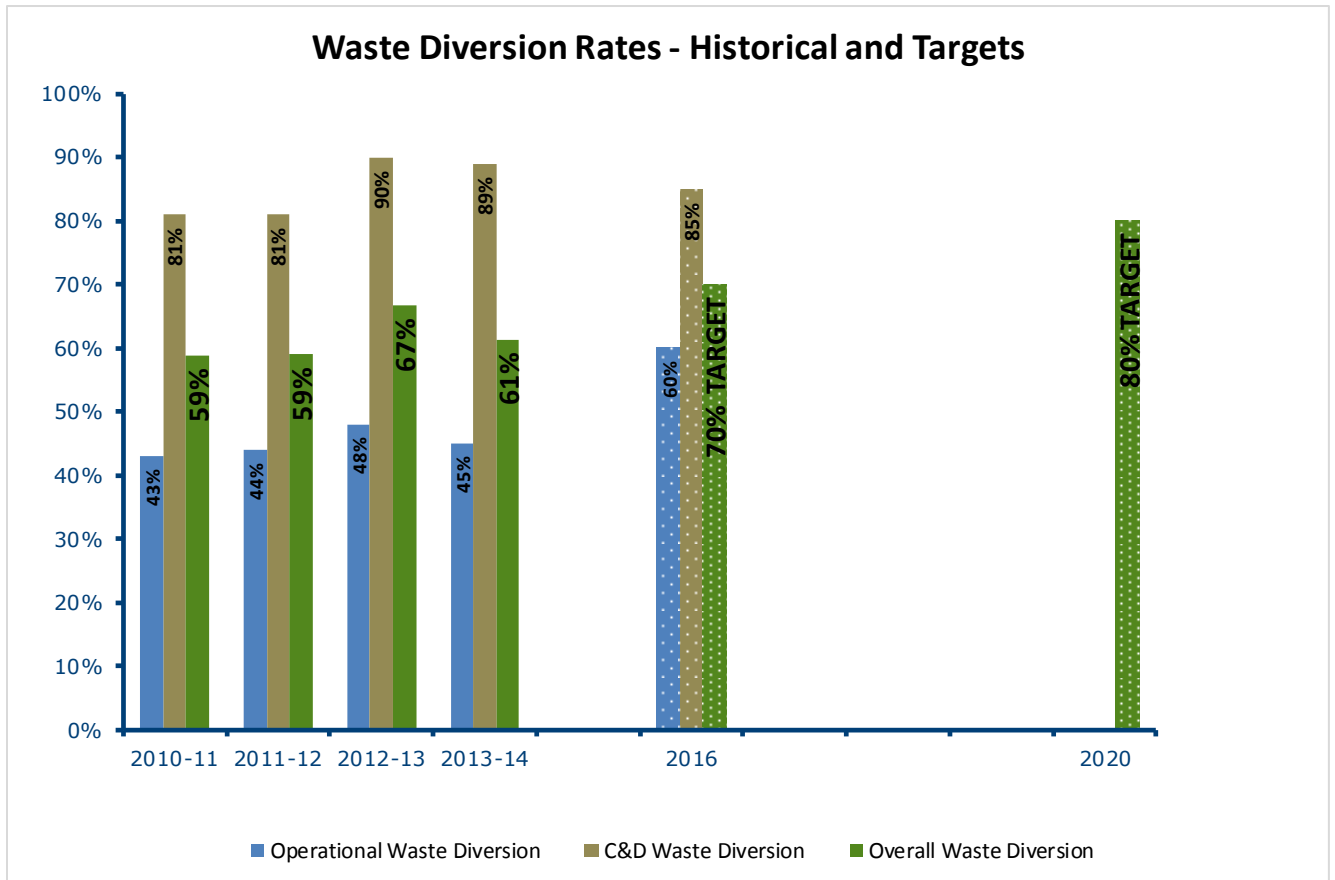
*The timelines for meeting the regional diversion targets have been tempered by two main factors: first, the time required to pilot and roll out new waste diversion infrastructure and communications programs and second, the inherent challenges in increasing diversion rates in multi-residential student and family housing, which generate a major segment of UBC's waste.

The UBC diversion targets correspond to a reduction in disposed waste of about 10% by 2016 and 39% by 2020 compared to a 2012/13 baseline, or about 14% and 45% respectively when corrected for University growth.

Based on current waste generation and diversion rates and projected university growth, the following diversion rates for specific materials streams would allow us to meet the 70% diversion target by 2016:

- 60% operational waste diversion
- 85% diversion of construction waste

These rates indicate one realistic scenario that would lead to achieving the 70% overall diversion target. The following figure illustrates the waste diversion targets alongside recent waste diversion rates⁵.



5.1.1. Moving Toward Zero Waste

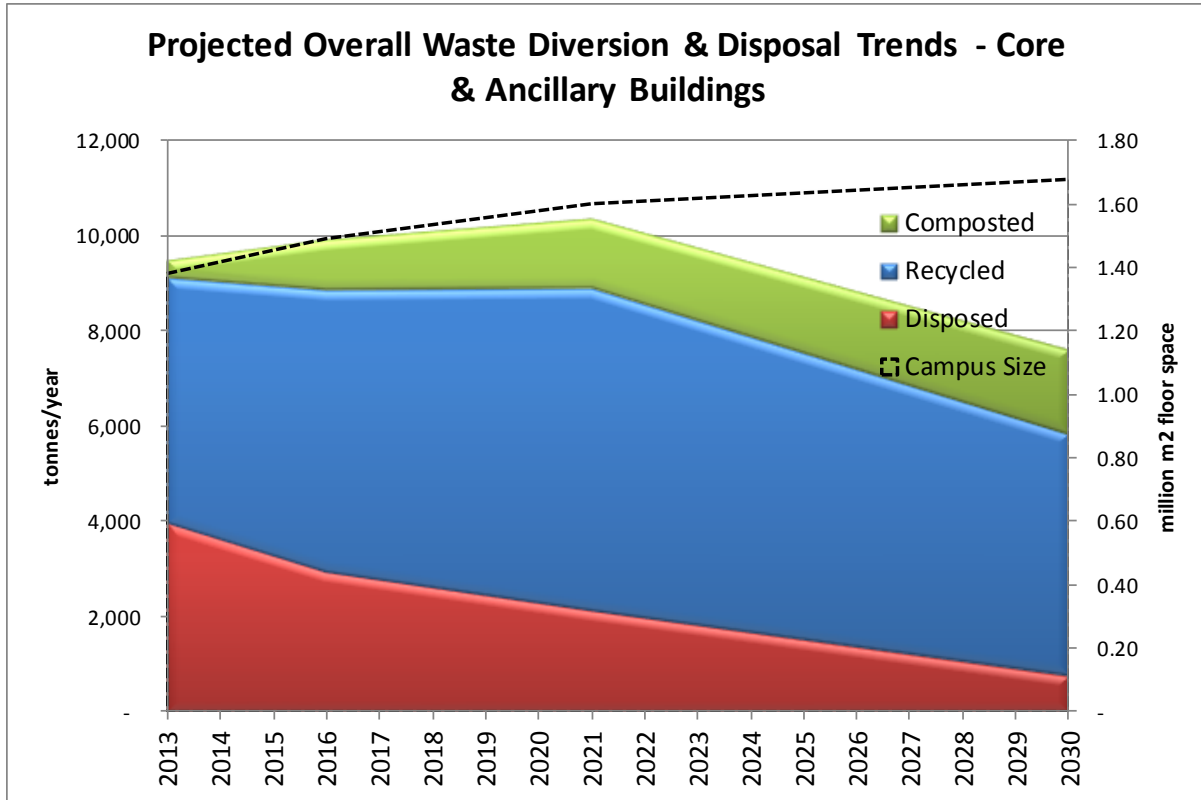
The following chart illustrates the projected trends in UBC’s waste streams based on meeting the targets listed previously and assuming growth projections.

As UBC grows (dotted line in chart below), assuming its current growth trends, so would waste generation and disposal. Under the Plan, a reduction in generated waste is assumed to begin in 2016, once waste reduction strategies are implemented (e.g. within procurement), reaching a 10% reduction by 2020 and aligning with Metro Vancouver’s reduction target.

As the Plan is implemented and diversion rates begin to increase in 2014, the amount of waste disposed of should begin to decrease. Since the Plan targets extend to 2020, the 2020-2030 projections are based on extrapolation of trends to 2020. In this scenario, there is a 30% reduction in waste generation assumed by 2030; combined with increased waste diversion rates this would result in an 80% reduction in waste disposal below current levels.

⁵ The apparent decrease in the operational waste diversion rate is due to an updated calculation method. Using the previous method, the operational waste diversion rate was 49%, as noted in Section 2.3.

However, it is important to note that the achievement of these long term reductions in waste generation and disposal will probably require changes in product design and packaging and are affected by many variables, some of which are outside of UBC's control.



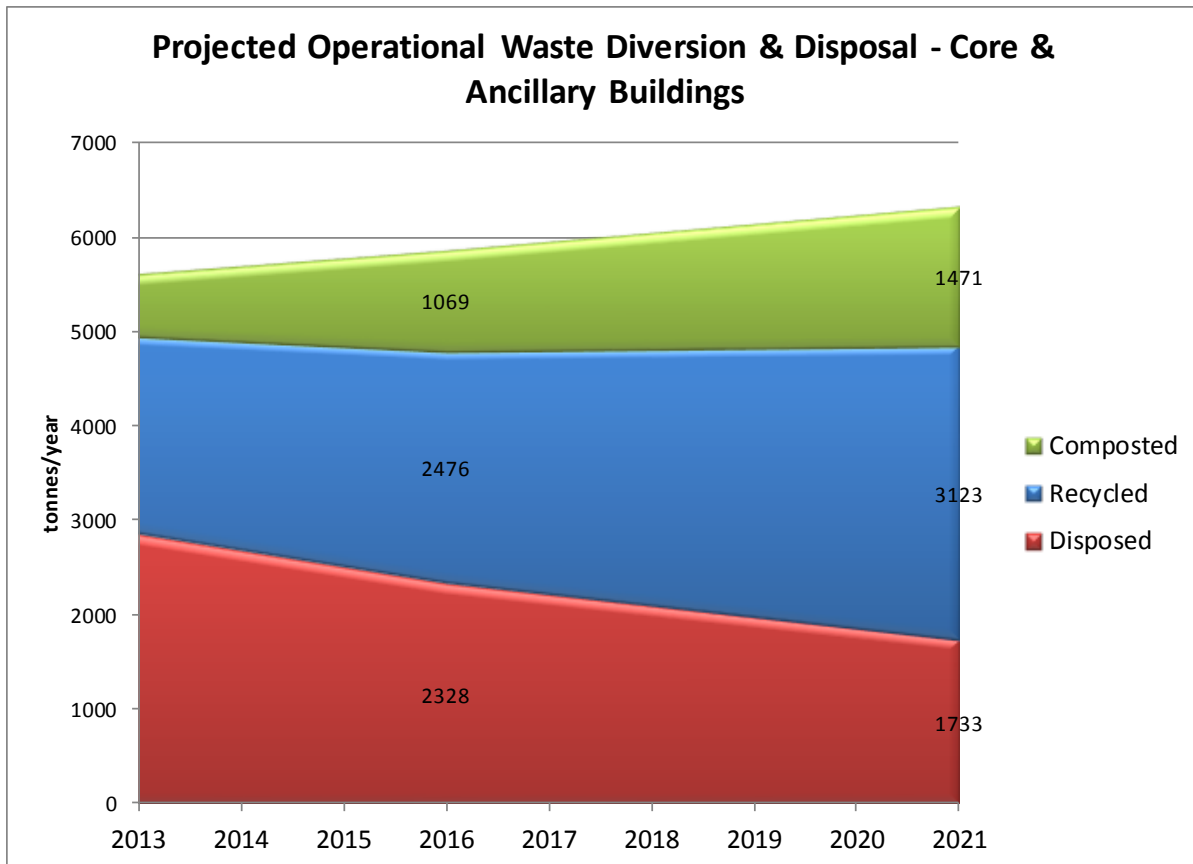
5.2. Operational Waste Targets

UBC is aiming to achieve the following complementary operational targets in 2015:

1. Provide food scraps collection (including soiled and compostable paper and packaging) to all buildings on campus by mid-2015.
2. Phase out solo garbage bins and replace with strategically located waste-sorting stations that cover most common waste materials (i.e. mixed paper and recyclable containers).
3. Make available a full suite of recycling options at strategic locations on campus including cardboard, soft plastics, styrofoam, and paper towels.

The figure below illustrates the projected composting, recycling, and disposal tonnages to 2021 for operational waste, based on anticipated growth and the reduction and diversion targets outlined earlier.

UBC will also continue to update its waste management infrastructure, equipment, and processes to accommodate campus growth, changes in available waste services, and changes in waste streams as diversion increases, and to maintain or improve operational efficiency.



5.2.1. Focusing on Food Scraps

UBC will focus significantly on the organics (food scraps) stream for several reasons: the 2015 organics ban, it is the single largest component of UBC's waste, landfilling of organics has a high GHG intensity, and organics currently have a relatively low diversion rate, offering real opportunity for improvement.

UBC will strive to maximize organics diversion from the many different types of generators on campus. It is also important to recognize challenges in organics diversion:

- Many users have identified barriers to collecting food scraps such as concerns about odours and fruit flies and solutions to overcome these barriers are still being researched and tested.
- The wide variety of facilities on campus including classrooms, recreation facilities, housing, food services, commercial tenants, and others means that the necessary opportunities, barriers, diversion strategies, and tools will vary.
- Metro Vancouver municipalities have found recycling and organics diversion in multi-family housing challenging, with relatively low diversion rates being achieved. An overall diversion target of only 30% for this sector was identified in the regional solid waste plan. Student and family housing at UBC contribute significantly to organic waste generation and are expected to share many of the same challenges, however, UBC plays a much more direct role in management of student housing relative to market housing. Note also that a Zero Waste Challenge project with 12 families in UNA multi-family buildings completed in 2013 resulted in an 83% waste diversion rate.

The increase in organic waste diversion will trigger the necessity for additional composting (or other organics processing technology) capacity on or off campus as early as 2015. However, the key constraint on organic waste diversion currently is not processing capacity but achieving source separation from the garbage stream (i.e. minimising contamination).

5.2.2. GHG Emissions Reductions

Through implementation of this Plan, UBC aims to decrease GHG emissions associated with waste.

With the help of a SEEDS project, the Waste Planning Tool was used to explore potential changes in GHG emissions associated with management of UBC's waste. While further analysis is necessary to confirm the quantitative results, this led to some preliminary estimates and conclusions as follows:

- GHG emissions from downstream waste management, primarily from landfill disposal, will decrease steadily as the amount of organic material sent to landfill decreases. While not part of UBC's carbon neutral commitment, waste GHG emissions are reported separately under Scope 3 emissions on the corporate emissions inventory.
- When expanding the scope to include life cycle GHG emissions of waste products, which include emissions associated with manufacturing of those products, the expected GHG emissions reductions (most of which are outside UBC) are much greater.

5.2.3. A Cost-Neutral Zero Waste Target

UBC is targeting a cost-neutral waste Plan implementation when considered over a longer-term timeframe.

In the Lower Mainland tipping fees have been steadily increasing and are expected to increase further in the future. Per-tonne waste disposal fees are now higher than the per-tonne costs for recycling for most materials, and in some cases UBC generates revenue through recycling. One exception is the current UBC composting facility, where the net cost of composting still exceeds the cost of waste disposal (and off-campus composting) on a per-tonne basis.

The Plan will require investment into infrastructure and program soft costs in order to achieve decreased waste disposal and meet targets. However, by shifting materials from disposal to recycling, there will be significant operational cost savings and this will enable recovery of most or all of the needed investment costs over the longer term. Refer to Appendix E for more information.

5.2.4. Uncertainties in Projections

As part of Plan development, the UBC Zero Waste Planning Tool was developed for operational waste. This spreadsheet tool was used to estimate the relationships between diversion rates of individual materials and the overall operational diversion rate, and to begin to provide a better understanding of how targets might be achieved while taking into account anticipated growth. However, there is significant uncertainty in the baseline waste generation and diversion data due to current data collection methods. There is greater uncertainty in accurately predicting achievable diversion rates for a given waste stream (e.g. food scraps) as there are few directly relevant precedents and regional and provincial programs and services continue to evolve.

Though the Plan includes actions to improve waste data collection, other uncertainties will continue as regulatory and other conditions continue to evolve. It is therefore important for UBC and stakeholders to recognize that the timeline to achieve zero-waste targets is to some extent subject to factors beyond UBC's control. It also points to the need for flexibility in waste reduction and diversion programs to help UBC adapt to changing conditions.

5.3. C&D Waste Targets

As highlighted earlier, UBC currently has a C&D waste diversion rate, primarily for large LEED construction projects, of approximately 80% to 90%. Looking ahead, UBC has established targets of:

- **90% diversion for all major construction projects by 2015.**
- **Implementation of a waste-tracking system for smaller projects by 2015.**

It is important to note that due to some gaps in construction waste collection, primarily the challenges involved in tracking C&D waste for mid-size renovation projects handled by contractors, addressing this data gap could potentially have a positive or negative effect on the overall C&D waste diversion rate.

5.4. University Neighbourhoods Association

The University Neighbourhoods Association (UNA) is a key partner in UBC's sustainability efforts. The UNA has identified the following waste reduction goals:

- 1. Reduce waste generation and increase waste diversion through composting and recycling within residential buildings.**
- 2. Develop UNA waste reduction and diversion targets.**
- 3. 100% participation of UNA residential buildings in UNA composting program, and 100% availability of recycling service in UNA residential buildings to a defined level of service (to be determined), with concurrent sustainability outreach and education programs.**

More detail on UNA's waste reduction actions can be found in Part III of this Plan.

Part III: Making It Happen

This section summarizes UBC's strategies and priority actions to achieve the goals and targets presented in Part II.

6. Overall Strategy

The following overall strategy will be utilized to achieve goals and targets of the Plan.

1. Increase the extent and convenience of recycling and food scraps **collection infrastructure** – addressing gaps in collection systems and making existing systems more convenient for users.
 - a. Implement multi-stream waste-sorting and collection infrastructure and communications across campus by the end of fall 2015, with food scraps collection at all significant generation points by mid-2015.
 - b. To accommodate ongoing changes in recycling services and materials, maximize **flexibility** in the design of infrastructure and programs.
2. Implement cross-campus, effective, and consistent **communications and outreach** in concert with the improved infrastructure.
3. Test major changes, whether infrastructure, communications or other changes, through **pilot projects** prior to broader rollout to maximize successful implementation. 2013/14 pilots included public realm waste-sorting stations (indoor and outdoor), office waste-sorting stations with enhanced food-scrap collection program, enhanced student-housing food-scrap and recycling programs, and paper-towel recycling. 2014/15 pilots include evaluating new indoor and outdoor recycling station designs and additional student housing strategies.
4. Improve **performance monitoring** including addressing waste data collection gaps and uncertainties and enabling better tracking of progress toward objectives and targets.
5. Continue designing and implementing strategies to **reduce the generation of waste**, primarily through procurement changes and reuse systems.
6. Explore opportunities for **research leadership**, academic collaboration, and Campus as a Living Lab partnerships, and utilize the outcomes to support waste reduction at UBC wherever possible.
7. Utilize the unit-level **operational sustainability planning process** to integrate key zero-waste actions and metrics into the strategic plans of UBC's operational units.
8. **Collaborate with UNA, Metro Vancouver**, and other external stakeholders on program development, communications and research.

7. Priority Actions

The priority actions for meeting UBC's targets are outlined in the following sections, organized by focus area. All actions (priority and non-priority) are provided with implementation information such as timeline and responsibility in Appendix A, Implementation Matrix.

Priority actions are all intended for implementation over the first two years.

7.1. Waste Reduction and Reuse

Waste reduction and reuse strategies are needed to reduce waste generated. Since UBC procures and manages many of the goods and materials on campus, it has significant influence through procurement policies and other strategies.

7.1.1. Action: Review and update the Sustainable Purchasing Guide and promote within procurement.

Vendor waste reduction best practices to be considered in the guide include voluntary and Extended Producer Responsibility (EPR) take-back programs, and purchasing products that are readily recyclable, have recycled content, have less packaging, and/or are recyclable at UBC. Include a one to two-page quick reference sheet for waste reduction.

Using the updated Guide, promote incorporation of sustainable purchasing considerations in procurement:

- Promote the updated Guide, for example through the Zero Waste Communications and Engagement program, to reach diverse audiences including Building Operations, Alma Mater Society (AMS), Student Housing and Hospitality Services (SHHS), Project Services, Properties Trust, and Information Technology (IT). Include these groups in consultation when updating the Guide.
- Explore using the existing online purchasing infrastructure, such as the online purchase requisition forms, as a mechanism to further the inclusion of sustainability in procurement.
- Integrate sustainable purchasing education and materials reduction into training for small UBC purchases (currently UBC VISA). Include: Sustainable Purchasing Guide promotion, Buysmart promotion, awareness of EPR and vendor waste reduction best practices. A one-page guide may be appropriate.
- Also investigate linking sustainable purchasing information into credit card statements (paper and/or electronic).

7.1.2. Develop and track updated Sustainability Scorecard content that takes vendor waste reduction best practices into account.

Implementation considerations:

- Including waste provisions in the scorecard will help to promote vendors with waste reduction best practices.
- Avoid addition of overly-onerous volume to the scorecard and increase the number of vendors who are sent the Scorecard.

- Review procurement RFP language and evaluation criteria and update if necessary.
- Update vendor information as appropriate in the UBCBuySmart program⁶.
- Track and report on vendors who offer waste reduction best practices and highlight this information in communications to different purchasing audiences.
- Consider the creation of a database to track vendor practices and offerings, including incorporation of information from RFP processes.

7.1.3. Continue to explore potentially viable solutions and business models for goods and materials re-use on campus, including Re-useIT UBC, a reuse centre, and promote the program.

- Continue to explore how to increase the effectiveness of the ReuseIT UBC web site or implement this function in another way.
- Develop and implement an effective communications program for ReuseIT UBC or alternative system.
- Explore opportunities to connect reuse programs with building renovation projects.

7.2. Infrastructure – Organics

Expansion of food scraps collection infrastructure is needed to address gaps in collection such as public areas and many office areas including kitchenettes. Where infrastructure is already in place, as in most student housing and some offices, enhancements are needed to increase convenience and ease of use.

7.2.1. Enhance food scraps collection in student residences by updating or fine-tuning infrastructure and increasing participation rates.

- Conduct pilot projects to prove out infrastructure improvements, communications, and engagement strategies.
- Provide coordinator/support roles to help optimize the program in each building and build capacity.
- On a residence-by-residence basis, identify composting and recycling champions and engage with residence staff and administrators to launch the zero-waste program.
- For each residence, review composting and recycling infrastructure and waste management procedures; identify and implement steps to optimize and align with best practices as much as possible.
- Integrate zero-waste elements into ResLife, resident activities, and events on an ongoing basis to maximize diversion rates, with support from engagement coordinators and an engagement toolkit (to be finalized).

⁶ UBCBuySmart is designed to be a resource of preferred vendors that meet UBC’s supplier code of conduct, etc.

7.2.2. Provide food scraps collection for all core buildings including kitchens and lunch-rooms, with regular pick-up, and in public realm waste-sorting stations where possible.

Key considerations in the rollout of food scraps collection particularly in the public realm is the contamination level, the ability of the UBC composting facility to accommodate this contamination, and how to minimize it.

- Following completion of pilots in progress and establishment of satisfactory contamination levels, roll out food scraps collection in strategically located sorting stations where appropriate; some locations such as library book stacks may not be compatible with food scraps collection.
- Pilot test alternative methods of collecting food scraps from office and academic areas including monitoring and auditing and once proven roll these out to remaining areas.
- Consider a campus-wide policy to mandate collection infrastructure if deemed necessary once technical and program issues have been resolved as best as possible.
- Monitor and audit food scraps contamination over time from the different building types and update strategies for minimizing contamination as needed; this may include adjusting food scraps collection locations, updating communications and engagement, and/or changing waste station design.

7.2.3. Investigate and pilot strategies to reduce barriers to food scraps collection for users.

- Conduct research on strategies to address real and perceived nuisances such as odour and flies or other barriers identified.
- Test these strategies in pilots, e.g. labeling of food packaging, Bag to Earth bin liners, or communications and engagement enhancements.

7.3. Infrastructure – Recycling

Similar to food scraps, new infrastructure is needed to address gaps in recycling collection such as public areas and many office areas. In some cases existing collection infrastructure needs updating to increase effectiveness or create consistency across campus. New buildings need to be designed for recycling infrastructure as existing buildings often cannot easily accommodate the new sorting stations.

7.3.1. Eliminate solo garbage cans and install Waste-Sorting Stations across campus, which include food scraps collection wherever possible.

- Standard stations include food scraps, paper, containers, and garbage.
- Rollout of stations includes concurrent communications and engagement rollout; volunteers will provide user engagement and training in several key buildings.
- Pilot test new configurations of stations prior to rollout including both indoor and outdoor public realm.
- Monitor results including impact on littering, contamination, effectiveness in waste diversion, and user experience.

7.3.2. Standardize and update labeling on all recycling and food waste collection bins and carts across campus wherever possible to maximize consistency.

- Ensure alignment with current UBC waste management capabilities and practices to coincide with launching the zero-waste communications and engagement plan.
- Maximize consistency with regional messaging where possible.
- Balance specificity of signage with flexibility to accommodate future changes.

7.3.3. Operationalize and enhance the styrofoam and laboratory (hard plastics) recycling pilot and voluntary programs.

- Requires permanent funding and resourcing as funding has generally been provided by research grants.
- Ensure there is concurrent effort to minimize generation of styrofoam waste.
- Explore opportunities to make the system more efficient and expand it cost effectively.
- Promote the voluntary laboratory recycling program to expand the service to other labs as appropriate.

7.3.4. Review and update UBC Technical Guidelines and Campus-Wide Design Guidelines to reflect current waste management best practices in new construction and renovation (addressing both construction and operational waste).

- Update C&D waste diversion targets.
- Include space in new buildings for waste-sorting stations and recycling storage.
- For food facilities, include space for dishwashing equipment to enable more reusable plates, etc.
- Design washrooms to minimize paper towel use.

7.3.5. Provide campus-wide paper towel collection and recycling (or composting)

- Complete washroom pilot projects to prove out collection method.
- Expansion or rollout of a broader program where appropriate, pending pilot testing and financial viability.

7.4. Communications and Engagement

Effective communications and engagement is critical to the success of this Plan and is required to educate, motivate, and support campus users in reducing waste generation and maximizing waste diversion by using the recycling and food scraps infrastructure. Creating consistent messaging, including visuals, is also a critical part of communications as the present lack of consistency across campus creates confusion and uncertainty amongst users.

7.4.1. Develop and implement a campus-wide Zero Waste Communications and Engagement program including UBC Zero Waste Toolkits for facilities and events.

The aim of the program will be to engage campus users, in partnership with key campus stakeholders, to support achievement of the targets. Elements will include infrastructure signage, print materials,

digital messaging including web site updates, advertising, stakeholder engagement, and promotion at events.

A key element of communications and engagement will be to educate and support users in recycling behaviour, i.e. separating food scraps while minimizing contamination. Depending on pilot results and food scraps contamination levels, engagement may need to go beyond provision of information, e.g. more direct contact with building inhabitants.

As part of the program, a Zero Waste Toolkit will be developed for facility managers, building administrators, tenants, and other stakeholders. The toolkit will include these components:

- A zero-waste event-specific toolkit, including a zero-waste event guide and event-specific communications element.
- A zero-waste engagement and implementation toolkit for student housing.
- Resources for zero-waste signage and communications materials that can be utilized or adapted by different audiences.

UBC's sustainability branding will be included in all materials where appropriate.

7.4.2. Continue to encourage and pilot materials sorting initiatives for events and catering.

Events are a great opportunity to promote zero waste and can play a part in achieving waste reduction targets. They involve both procurement and waste management.

- Event organizers and stakeholders will be encouraged to integrate zero waste into UBC events and embed zero-waste practices into event organizing over time that it will become standard. This will be supported by the zero-waste event guide and toolkit components.
- Explore opportunities to increase waste diversion associated with catering and explore opportunities to increase reduce waste disposal from catered events.

7.5. Construction Waste Reduction and Diversion

While construction waste diversion for UBC's LEED and REAP projects at UBC is strong, there are opportunities to improve diversion further through working toward higher diversion targets and facilitating best practices particularly in the smaller to medium sized special projects, which are not under LEED or REAP green building systems.

7.5.1. Promote C&D waste best management practices.

- LEED and REAP projects have achieved relatively high performance to date, therefore, this will involve enhancing existing practices in consultation with stakeholders.
- Small- to mid-size renovation projects are typically not under LEED or REAP meaning strategies will be explored to encourage best practices and establish waste diversion data.
- Incorporate updated waste diversion targets into UBC policies and guidelines including Technical Guidelines listing requirements to track waste and achieve a minimum of 75% diversion, with an aspirational target of 85% diversion (note that the LEED Implementation Guide already requires 85% for LEED projects).

- Work with Metro Vancouver as they are currently investigating and developing new C&D waste reduction strategies and tracking systems.

7.6. Performance Monitoring

Measuring performance against objectives, including key performance indicators, is critical to assess how well programs are working and where changes are needed. While UBC has made significant progress in many areas of data collection and monitoring, better data collection and monitoring that is fully integrated into unit operations is a critical need for effective management of waste reduction strategies being implemented. Monitoring of pilot projects is also an important short-term priority.

7.6.1. Develop an operational waste data collection methodology and performance indicators including per-building indicators and waste auditing strategy.

- Conduct a review of record keeping related to waste collection and diversion and explore the feasibility of improving the data collection and analysis capability using current systems.
- Assess the need and feasibility of implementing automated tracking systems such as weight- and location-based systems, bar code readers, etc.
- Work with recycling service providers.
- Create one or more reporting indicators that reflect waste reduction and correct for growth (e.g. per capita).
- Explore opportunities to integrate performance monitoring into staff training, e.g. waste collection workers or dining hall kitchen staff.

7.6.2. Develop an ongoing C&D tracking process for major construction projects and renovation projects.

- While waste data is currently tracked under LEED and REAP certifications for major projects, a more streamlined process is needed for development project managers to compile and send data for centralized collection.
- Small- to mid-size renovation projects are typically not under LEED or REAP, leaving other methods to be developed to track waste amount and diversion data.

7.6.3. Waste audits for food scraps contamination and other diversion opportunities

- Update and address information gaps in waste composition auditing data and develop a plan for future audits including the need for a more comprehensive campus-wide audit by 2015.
- Explore opportunities to incorporate waste audits into student curriculum.
- Conduct spot audits of specific operations to assess performance and identify opportunities for improvement, e.g. diversion of food waste from dining hall kitchens.
- Identify waste leaders for each major building and facility (or groups of buildings) to assist with performance monitoring activities and create a process for reporting on issues and improvement opportunities.

7.6.4. Implement a monitoring program for waste-sorting stations in the public realm, indoor and outdoor.

- Key monitoring aspects are source separation of materials, contamination, and litter.
- Monitoring may be primarily done by visual spot checks and periodic composition audits where appropriate.

7.7. Research Opportunities

As an academic institution, UBC is in a unique position to help advance and demonstrate innovative solutions through research as well as by treating the campus as a 'living laboratory'. One of UBC's goals is to integrate on-campus research and operations, and collaborate with other partners. Collaboration opportunities include the creation of a research consortium with Metro Vancouver and industry.

Priority waste-related research activities include:

- Behaviour change/Community-based social marketing pilot projects for student residences.
- Recycling and food scraps collection signage design including behavioural aspects, with participation of the Brain Attention Research (BAR) lab and Metro Vancouver.
- Pilot projects to assess waste diversion potential of updated collection infrastructure in student housing and offices, with BAR involvement.
- Pilot projects to assess multi-family waste diversion in multi-family residential housing with UNA and BAR lab.

8. Supporting and Longer Term Actions

The following actions are non-priority, meaning they are not critical to meeting the 2016 targets, and/or they require further investigation prior to implementation.

As UBC's recycling and food scraps infrastructure rollout is completed along with communications and engagement, responding to regional policy changes and actions to reduce waste generation will begin to play a more prominent role in overall waste reduction.

8.1. Waste Reduction and Reuse

- Reduce washroom paper towel use through installation of hand dryers and updated washroom design.
- Investigate opportunities and develop extended product responsibility/product stewardship strategies for procurement and waste management.
- Track development of sustainable packaging standards and as these standards become available investigate opportunities to integrate into procurement processes and policies.
- Explore enhancement and promotion of student housing move in/out process and enhanced infrastructure to increase goods and materials reuse.
- Update procurement and operational processes with the goal of purchasing all packaging that can be diverted from disposal.

- Work toward minimizing or phasing out of bottled water sales on campus.
- Enhance promotion of eco-to-go program and reusable mugs and bottles on campus.
- Engage academic, government (e.g. Metro Vancouver), and industry partners (e.g. recyclers) to explore longer-term opportunities to develop waste reduction strategies and issues such as food scraps contamination.
- Develop targets for reduction of waste generation.

8.2. Infrastructure - Organics

- Consider implementation of a campus-wide Zero Waste policy or directive to provide food scraps waste collection infrastructure and services to all appropriate locations.
- Develop a strategy for food scraps processing going forward given costs, service life, and capacity of UBC composting facility.
- Work with interested parties to promote vermi-composting or other organics recycling processes that complement the mainstream services.

8.3. Infrastructure – Recycling

- Continue periodic public e-waste collection events.
- Expand soft plastics collection points as appropriate.
- Develop a small appliance recycling program.
- Determine necessity for additional e-waste collection cages at strategic locations on campus.
- Identify and investigate reuse and recycling solutions for specific items with low diversion rates, e.g. air filters.
- Determine feasibility of initiating an electronics reuse program.

8.4. Communications and Engagement

- Formalize the Waste Free committee and utilize the committee to support implementation of the Plan.
- Implement a policy or process that requires events to implement zero-waste elements, including potential linkage to catering.
- Plan for periodic updates to communications materials and signage as the recycling industry continues to evolve and regional changes occur.
- Continue to work with vendors and commercial partners to align procurement and waste practices with UBC's practices and guidelines.

8.5. Construction Waste Reduction and Diversion

- Periodically update the minimum construction diversion targets in REAP and LEED to reflect the highest reasonable standard that contractors can achieve.
- To maximize C&D recycling, including for projects that are not required to certify under REAP or LEED, update project specifications to include waste-diversion targets and encourage waste-reduction best practices.
- Consider incorporating waste-diversion requirements into Development, Building and Occupancy permitting processes.

8.6. Performance Monitoring

- Build on the new (draft) Zero Waste Planning Tool to provide better decision-making information including cost performance, GHG emissions, and potentially other parameters such as environmental impact.
- Transition to a more accurate and automated operational waste data management system.
- Explore the feasibility of a GIS-based map with all solid waste related infrastructure along with operational and design information.

8.7. Research Opportunities

In addition to the priority research activities identified earlier, other opportunities to explore include:

- Innovations in product design to reduce waste and advance Design for Environment principles; these may be pursued in the context of the National Zero Waste Council.
- Integrating smart-grid technology to optimize collection services.
- Assessing the environmental, social, and economic costs of waste management.
- Analyzing different methods to deal with cross-contamination of waste streams.
- Comparing single-stream and multi-stream approaches to waste management.
- Alternative food waste processing options including technology comparisons (e.g. pyrolysis or anaerobic digestion).

Other research opportunities may also exist to help UBC transform into a zero-waste campus while being a model for other organization and jurisdictions. These opportunities will be largely explored through SEEDS projects and the UBC Strategic Partnerships office.

9. University Neighbourhoods Association

9.1. UBC – UNA Collaboration Strategy

The UNA is a key partner in UBC's sustainability efforts. Collaboration strategies include:

- Sharing elements of the UBC and UTown@UBC communications and engagement strategy and working toward concurrent implementation.
- Collaborating on waste reduction and recycling research and infrastructure such as behaviour change research and zero-waste stations designs (indoor and outdoor).
- Pursuing shared UBC/UNA waste metrics and targets wherever possible.

9.2. UNA Actions

The UNA has identified the following waste-reduction actions and rationales:

Action	Rationale
<p>Organics Work toward full participation of UNA residential buildings in UNA composting program</p>	<p>Organics are estimated to make up over half of the residential waste stream and are a source of methane (a potent greenhouse gas) in landfills. Consequently, organics are a high priority for diversion.</p>
<p>Recycling Work toward full availability of recycling service in UNA residential buildings</p>	<p>Access to standard recycling is a status quo service UNA residents should have reasonable access to, and is an important component of waste diversion.</p>
<p>Product Stewardship and Non-Standard Recycling Improve access to Product Stewardship Program (PSP) and non-standard recycling for residents</p>	<p>An increasing number of products that can't be recycled through standard building level recycling service (e.g. e-waste, small batteries, and small appliances) can be recycled through the PSP program. However, access to PSP service is confusing and fragmented, and generally not available in the Point Grey area.</p>
<p>Landscape Maintenance Waste Identify local options for composting landscape maintenance waste</p>	<p>Substantial amounts of landscaping waste are generated from UNA public lands and stratas. While this waste is composted regionally, a local UBC solution would reduce air pollution and greenhouse gas production from trucking waste off-campus and provide valuable soil and bark mulch for on campus landscaping.</p>
<p>Metrics and Targets Develop campus-wide waste reduction and diversion targets. Develop waste diversion and reduction metrics to track and communicate progress toward waste reduction targets.</p>	<p>Campus-wide targets will provide UBC and the UNA with shared goals that provide clarity in direction and a clear and simple engagement message. Without metrics there is no way to evaluate the effectiveness of UNA waste diversion and reduction programs or track progress toward waste diversion and reduction goals.</p>
<p>Community Engagement Develop sustainability outreach and education programs for residents, including programs oriented toward children. Increase waste diversion in composting and recycling within residential buildings.</p>	<p>Outreach and education programs are an effective way for the UNA and UBC to support sustainable behaviour in the community. In buildings with compost and recycling facilities, more than half of strata waste is estimated to be organics, and up to 80% of waste is estimated to be compostable or recyclable. With organics diversion estimated at less than 20% and overall diversion estimated at 45%, increasing resident participation is a priority.</p>
<p>Community as a Living Lab Develop Campus as a Living Lab research projects for UNA neighbourhoods and residents.</p>	<p>Engaging the UBC academic community to undertake sustainability research in UNA neighbourhoods represents a unique opportunity for the UNA residential community and for UBC academics.</p>

10. Implementation

This section outlines considerations for the implementation of this plan from an institutional perspective.

10.1. Unit Level Implementation Planning

A unit-level strategic planning initiative led by Campus Sustainability is assisting major units such as Building Operations and SHHS in integrating sustainability (including waste reduction objectives) with their own operational plans and activities.

Consultation with these units is leading to inclusion of waste-related goals, actions, and reporting metrics in their strategic plans and is confirming waste-related commitments for upcoming unit work plans. This process is helping units integrate the actions included in this plan into their operations.

In terms of the actions outlined in this plan, the responsible portfolios are identified in Appendix A.

10.2. Resource Requirements and Business Model

Resources required to implement the majority of institutional actions outlined in this plan will be prioritized through existing budgets and staff. There are a few key actions – primarily those that will greatly assist UBC in meeting its targets – that will require additional resources for implementation for both hard (e.g. new recycling stations) and soft (e.g. communications and engagement) costs. These strategies and actions are shown in Appendix A, with key budget implications in Appendix E. Note that as the various initiatives are developed and rolled out, in part based on the results of the pilot projects, the implementation details will change and the resource requirements will also change and require refinement.

By shifting materials from disposal to recycling, there will be significant operational cost savings, which have the potential to offset most or all of the needed investment costs over the longer term. Note however that the long term net costs are also sensitive to factors outside UBC's control such as landfill tipping fees and recycling commodity prices. Food scraps processing costs are also a major factor.

There will also be shifts in custodial duties. A key change is the number of locations (i.e. garbage cans and bins) to collect from will be dramatically reduced but the collection frequency at the recycling stations will be higher. Pilot studies indicate that the net effort for custodial staff will not increase, even factoring in the collection of organic waste from the new stations.

10.3. Operational Changes

There are several operational changes planned for UBC Waste Management that support and enable actions in the Plan, including:

- Garbage and cardboard compactors will be installed to replace and consolidate about half of the existing metal collection bins behind buildings starting with pilots at two sites.
- This strategy will enable other changes to collection regimes including freeing up resources and enabling 'just in time' curbside pickup for other buildings.
- New collection vehicles will be purchased that will be compatible with changing conditions, including the above collection system changes, and increasing diversion rates

More detailed information on these changes can be found in Appendix D.

10.3.1. UBC Composting Facility

Since 2004, UBC's food scraps have been processed at the UBC In-Vessel Composting Facility with all compost produced used for landscaping on campus. This facility made UBC an early adopter of on-site food waste composting and a leader amongst North American universities.

As UBC continues to lead universities in the expansion of food scraps collection programs, this will create new challenges for processing. As the Plan is implemented, organic waste collected is expected to increase significantly over the next three to five years. This will require substantial changes to the current facility and will likely exceed the capacity of the composting system. The existing system also has some operational limitations such as difficulty in accommodating plastic bags of any kind or larger amounts of food-soiled paper and cardboard that will become more pronounced as collection expands.

Consequently, a range of alternative options are being explored including plant upgrades and sending all or a portion of food scraps for off-campus processing. Studies are being conducted and a process is in place to assess these options and develop a strategy that will meet UBC’s environmental sustainability, financial, and operational objectives.

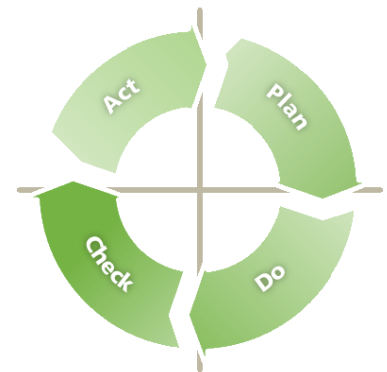
Refer to Appendix D for more detailed information.

10.4. Continuous Improvement

Moving forward, the actions and monitoring requirements developed in this plan will be regularly reassessed and refined.

Process: Plan, Do, Check, Act

An ongoing feedback loop, known as the Deming Cycle facilitates continuous improvement. The four components of the Deming Cycle are *plan, do, check* and *act*.



- Plan: Gain broad support for the vision and targets; engage stakeholders in developing actions.
- Do: Implement the actions starting with pilot projects where necessary.
- Check: Monitor implementation activities and performance metrics.
- Act: Integrate and incorporate learning into future actions and planning.

10.4.1. Monitoring

Monitoring includes two components:

1. Monitoring of plan activities – what is being done, who is doing it, funding, etc. This will be partially accomplished through annual check-in meetings with the various working groups and/or the Waste Free/Zero Waste Committee.
2. Data collection and analysis for performance monitoring. Refer to the Performance Monitoring actions sections earlier in this document. Metrics are typically compiled and analyzed in the spring following completion of the fiscal year for incorporating into various reports.

Key performance metrics that are to be monitored overall and for specific units where possible include:

1. Total waste generation rate: total tonnes of waste diverted plus disposed (including recycling, composting, and garbage) per student FTE per year (tonnes/FTE/yr).
2. Overall diversion rate: % of total waste generated that is diverted.
3. C&D waste: tonnes of waste diverted and disposed, by unit, individually for major construction projects, and overall.

4. Operational waste diverted and disposed by stream: tonnes paper, recyclable containers, food scraps, and other materials diverted; tonnes garbage disposed (annual: core + ancillary).

Over the longer term, once improvements are in place for waste data collection, ideally Building Operations (and potentially SHHS) will be able to measure the waste disposal and diversion rates on a building-by-building basis. This will help diversion programs and collection systems to be optimized and cost benefits to be realized by identifying strong and weak points in the system.

10.4.2. Reporting and Ongoing Plan Updates

On an annual basis a report on the progress of this plan will be prepared for the UBC Executive and Board of Governors. This could be a standalone report or part of annual sustainability reporting.

Furthermore, a comprehensive review will be completed to determine the success of this plan's activities within three to five years. As a result of this review, UBC will essentially produce an updated plan including a summary of progress made and, where necessary, produce revised goals, targets, and actions.

10.5. Risks and Mitigation Strategies

Implementation of the Plan is subject to several risks including the following⁷:

1. **Meeting the regional organics ban.** There are inherent challenges with achieving high food scraps and recycling diversion in multi-family/student housing. The projections assume that a 50% organics diversion rate can be achieved by 2016. It is not certain that this level can be achieved in that timeframe (as there are no known precedents in North American universities), and it is also not certain that this level would enable compliance with the organics ban. Details on phasing and compliance criteria of the organics ban were not available at the time of writing. Risk mitigation will include detailed pilot studies to maximize food scraps diversion, and continuing to be involved in discussions with Metro Vancouver on ban implementation.
2. **Food scraps contamination levels.** Pilots and information from municipalities suggest that it will be difficult to collect clean food scraps (i.e. 1% contamination or less) in the public realm and in student housing. This impacts the cost and feasibility of the UBC composting facility and potential off-campus processors to process the material. Risk mitigation will include detailed pilot studies and monitoring and assessing alternative technologies and partners that can handle contamination.
3. **Quality of data collection.** Monitoring the effectiveness of actions requires measurement of indicators. Improvements are needed to current data collection and tracking systems, which is largely dependent on staff resources in multiple units, and there is uncertainty in the feasibility and timelines for improved data collection. Risk mitigation will require multiple units to work together on developing monitoring methods that are as efficient as possible and waste audits.

⁷ Note that most of these risks are shared with municipal waste departments in the Metro Vancouver region.

4. **Importance of human behaviour to success.** Achieving the targets depends largely on behaviour change of the many different users on campus and this has dependencies on factors outside campus such as recycling literacy inside and outside the region. Risk mitigation will include studying the effectiveness of behaviour change strategies, and development, implementation, and continual improvement of user communications and engagement strategies.

10.6. Looking Ahead

UBC's Zero Waste Action Plan sets out a vision, goals and targets, strategies and actions for the Point Grey campus. However, this plan is one step on the path toward zero waste. In order to meet UBC's ambitious goals and targets, many departments have specific roles with respect to policy development, infrastructure improvements and communications and engagement.

Moving forward, it is also necessary to find points of further integration between UBC's many social and physical systems (e.g. water, materials, energy, transportation). This will ensure UBC's Vancouver campus continues to be at the forefront of sustainable practice, fulfilling its role as a leader and change agent.