UBC Annual Operational Sustainability Report

Vancouver Campus

2011/2012

campus + community planning
campus sustainability

a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

The UBC Annual Operational Sustainability Report provides an overview of sustainability initiatives and highlight achievements at UBC's Vancouver Campus from the 2011/12 fiscal year and outlines strategic operational priorities for the next fiscal year.

Executive Summary

In 2011, UBC's sustainability achievements and leadership were recognized as UBC became Canada's first university to receive a Gold rating from the **Sustainability Tracking, Assessment & Rating System (STARS)**, a new comprehensive university sustainability ranking system administered by the Association for the Advancement of Sustainability in Higher Education (AASHE) in which over 300 institutions are participating. Over 70 staff across campus contributed to the report, which showcased UBC's sustainability efforts in operations, education, research, planning, administration, and engagement.

In the first two years of implementing our **Climate Action Plan**, we have also made significant progress on achieving our bold greenhouse gas (GHG) reduction targets of 33 per cent below 2007 levels by 2015, investing $117 million in innovative energy efficiency and infrastructure projects that will pay back in utility savings. We completed Phase 1 and began Phase 2 of one of the largest **steam to hot water conversions** in North America, which will reduce GHG emissions by 22 per cent and save up to $4 million a year in operational and energy costs. We also opened the **Bioenergy Research and Demonstration Facility**, which will reduce emissions by 9 per cent. And we continue to improve building performance through the **Building Tune Up** program, which is retro-commissioning 72 buildings across campus to reduce emissions in core buildings by 10 per cent.

In November 2011, UBC opened the **Centre for Interactive Research on Sustainability (CIRS)**, designed to be the one of the most sustainable buildings in North America. Built to exceed LEED Platinum and Living Building Challenge standards, this $37 million "living laboratory" will help to regenerate the environment and advance research and innovation on global sustainable challenges.

We also began developing a **Campus Sustainability Engagement and Social Marketing Strategy** to foster a culture of sustainability and resource conservation. The strategy will identify key ways students, staff, faculty and residents on campus can take to reduce energy use, greenhouse gas emissions, water consumption and waste. The strategy will also recommend strategic engagement priorities, programs and evaluation frameworks for measuring the outcomes of our sustainability engagement programs.

We are pleased to share some of our highlights from 2011/12 with you.

Orion Henderson
Director, Operational Sustainability

Highlight Achievements

The UBC Annual Operational Sustainability Report 2011/2012 provides an overview of operational sustainability initiatives at UBC's Vancouver campus and highlights achievements and provides a snapshot of future priorities that are critical to maintaining and growing UBC's leadership position in operational sustainability and engagement. The appendix includes a presentation of progress against some key sustainability metrics.

1.1. ENGAGEMENT

UBC SEEDS Project Participants. Credit: Javier Landaeta

UBC's numerous award-winning engagement programs aim to inspire students, staff, faculty and residents to get involved and contribute to a culture of sustainability on campus.

1.1.1. Engagement Programs

- **UBC SEEDS Program** engaged over 500 students, staff, and faculty to work collaboratively on the development and implementation of projects that apply the "Campus as a Living Lab" concept and address real-life campus sustainability challenges. Innovative outcomes included a worm composting pilot in the current SUB and approval for integration into the new SUB, a campus food garden guide, a paper towel composting pilot, a new weed-control protocol, and a UBC Fair Trade Marketing Plan leading to the first UBC Fair Trade Week.

- The pilot **Shut the Sash competition** engaged over 100 researchers in three energy-intensive lab buildings to save energy by shutting their fume hood sashes when not in use. The competition reduced the average fume hood sash height by 85 per cent. If the improved practices continue through the year the savings will be equivalent to eliminating energy use in 46 typical homes.

- The expanded **Do It in the Dark energy conservation competition** in Totem Park and Place Vanier reached over 3,100 first-year students with energy conservation messaging and tips. UBC won 'campus champion' in the provincial competition, Totem Park won the grand prize for greatest energy reduction, and Place Vanier took 3rd place for participation.

- The award-winning **Sustainability Coordinator Program** engaged 110 staff on the Vancouver campus with opportunities and resources to promote and implement sustainable practices in their unit. New resources and initiatives developed for the program in 2011/12 included a **New Employee Sustainability Guide** for UBC staff and faculty, the **UBC Recyclopedia** and a monthly sustainability networking series.

- The **Sustainability in Residence program** continued to mobilize students to reduce water, waste, and energy consumption in residences and to build a culture of sustainability by training and supporting 32 Residence Sustainability Coordinators in 2011/12. Key achievements include developing tailored **Sustainability in Residence toolkits** and creating three new formal Sustainability Committees in student residences.

- UBC led over 145 tours of CIRS and other green buildings on campus through the **Green Building Tours program.** Since 2001, over 6,500 guests have toured our green buildings, from high school students to professionals from around the world.

1.1.2. Student Involvement in Sustainability

With over **20 sustainability-related student groups, clubs, associations** on campus, student involvement at UBC continues to be significant.

- In August 2011, the UBC Sustainability Initiative opened the **Sustainability Education Resource Centre** and hired a Student Sustainability Advisor to council students campus wide on curricular and co-curricular sustainability learning opportunities.

- The **AMS Sustainability Projects Fund**, established September 2011, has distributed over $90,000 thus far to support over 35 student projects that reduce the ecological footprint of UBC and its students while increasing education and outreach opportunities. Projects listed at http://www.amssustainability.ca.

- Campus Sustainability continued to support **goBeyond** and **Common Energy UBC** by offering an internship position for UBC campus outreach activities on climate action and sustainability. In 2011, Common Energy held 23 events at UBC with a total attendance of 995 participants, had 50 active student volunteers and coordinated initiatives such as a composting flash mob and a Fair Trade flash mob.

1.2. CLIMATE AND ENERGY

Bioenergy Research and Demonstration Facility Interior. Credit: Don Erhardt

In the first two years of implementing its Climate Action Plan, UBC made significant progress on achieving its aggressive 2015 GHG reduction targets to reduce emissions by 33 per cent, investing $117 million in three signature projects.

1.2.1. Climate Action Plan Progress

- Completed Phase 1 of one of the largest **steam to hot water conversions** in North America that will replace 14 km of aging steam system piping infrastructure, reduce emissions by 22 per cent and save up to $4 million a year in operational and energy costs.

- In February 2011, UBC broke ground on the $27 million **Bioenergy Research and Demonstration Facility**, which will eliminate 9 per cent of campus GHG emissions per year by reducing natural gas consumption used for generating steam. The first demonstration of its kind in the world of a community-scale heat and power system fuelled by biomass, this innovative research and teaching platform will yield valuable new knowledge in the clean energy sector and will inform new global standards for the performance of bioenergy systems.

- The **Building Tune-up (Continuous Optimization)** program is retro-commissioning 72 buildings to reduce emissions in core buildings by 10 per cent. A pilot in two buildings is complete, the next phase of implementation is underway in 17 buildings, and investigation of 21 more buildings is in progress.

To read the full Climate Action Plan Annual Report, **click here**.

1.2.2. GHG Inventory

In 2011, **GHG emissions** for UBC's Vancouver campus buildings, fleet and paper amounted to 63,803 tonnes CO2e. While emissions increased 4.5 per cent from 2007 levels, emissions decreased 5.6 per cent per FTE student (Table 1). The absolute increase in emissions from 2007 to 2011 can be attributed to several factors, including a 6.6 per cent increase in floor space. Emissions will reduce as UBC's major investments in

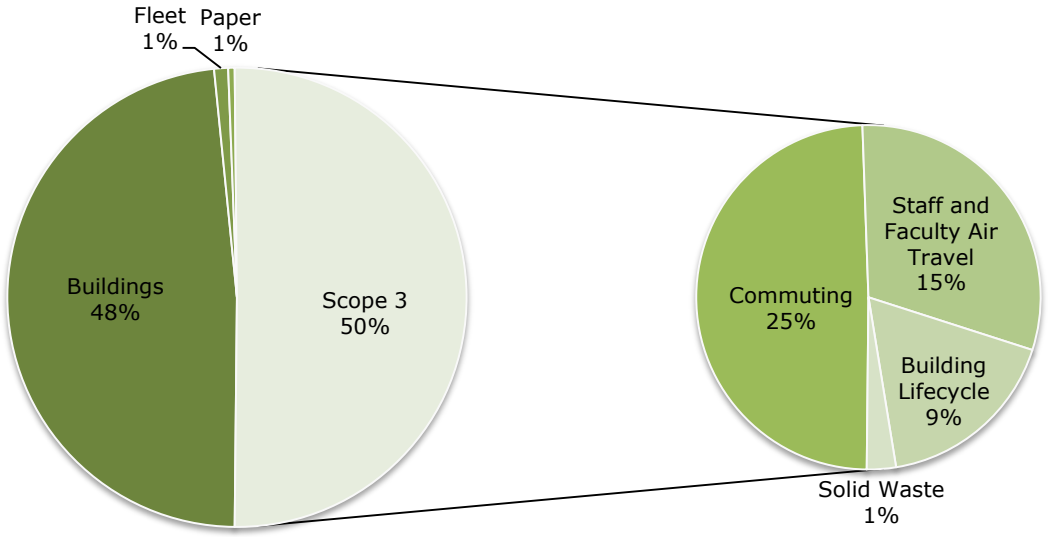
steam to hot water conversion, Bioenergy Research and Demonstration Facility and Continuous Optimization reach completion by 2015.

As required by provincial regulation, UBC offset its emissions by purchasing high quality offsets from the Pacific Carbon Trust for the UBC Vancouver Campus and off-campus properties to become carbon neutral for 2011.

Table 1: UBC Vancouver Campus Offsettable Emissions Compared to 2007 Baseline

Key Performance Indicator	2007	2011	Change from 2007 to 2011
GHG Emissions (tonnes CO_2e)	61,082	63,803	+4.5%
Floor Space (square meters)	1,284,592	1,368,873	+6.6%
Student Enrolment (FTE)	37,589	41,598	+10.7%
GHG Emissions per Student (tonnes CO_2e/FTE)	1.62	1.53	-5.6%
Staff and Faculty Employees (FTE)	12,045	13,020	+8.1%

Figure 1: UBC Vancouver Campus Emissions by Scope (Offsettable + Scope 3 Emissions), 2011



1.3. GREEN BUILDINGS

The Centre for Interactive Research on Sustainability. Credit: Martin Dee

With over 400 institutional and residential buildings on campus, building operations is the largest component of UBC's environmental footprint—and we've been transforming our buildings to become visible and enduring elements of our commitment to sustainability.

1.3.1. Building Innovations

- In November 2011, the **Centre for Interactive Research on Sustainability (CIRS)** opened on the Vancouver campus. Built to exceed LEED Platinum and Living Building Challenge standards, this $37 million "living laboratory" will help to regenerate the environment and advance research and innovation on global sustainable challenges. A **video** prepared for the opening of CIRS has garnered over 9,000 views on YouTube. This state-of-the-art regenerative building includes waste heat recovery from a neighbouring building, solar PV, ground-source heating and on-site wastewater treatment.

1.3.2. Institutional Green Buildings

- **LEED Gold** certification is mandatory for all new construction and major renovations for institutional buildings at UBC. In 2011, construction was completed on four projects awaiting LEED certification: the Centre for Interactive Research on Sustainability (CIRS), Allard Hall (new Faculty of Law Building), Biological Sciences Renew and the new Tennis Centre. New projects registered in LEED in 2011/12 include the Engineering Student Centre, Ponderosa Commons, and the Djavad Mowafaghian Centre for Brain Health.

1.3.3. Policy and Planning

- In addition to the provincial requirement that new buildings be LEED Gold certified, UBC developed a **LEED Implementation Guide** to optimize the LEED process for the UBC campus context and help UBC achieve its sustainability targets. The guide outlines which credits are considered mandatory requirements at UBC, including a minimum of 11 points from Energy & Atmosphere Credit 1, which requires energy performance of 42 per cent better than MNECB for new construction and major renovations.

- In addition to the relative performance requirements under LEED, a study was completed in 2011 to recommend absolute energy performance targets for UBC buildings including student residences, offices, classrooms and laboratory spaces. UBC now sets an **Energy Performance Target** for each new building project, expressed in kWheq/m2/yr, that the design team must meet or exceed. The methodology for assigning an energy target to a building was piloted on one multi-use building in 2011 and further refined for use in future building projects.

1.4. WATER & WASTE

UBC is currently developing Waste and Water Action Plans to outline steps to enhance waste reduction and diversion efforts and increase water conservation on campus.

1.4.1. Waste Action Plan

- In 2011/12, UBC achieved a 44 per cent diversion rate for operational waste. UBC is currently developing a comprehensive **Waste Action Plan** based on a campus waste audit and consultations with students, staff, faculty, and working groups. The Plan will outline UBC's targets to reach new milestones in waste reduction and management, and the actions required to achieve our goals.

- In the first year of operation, **reuse-it! UBC**, a pilot project to facilitate the reuse of furniture, office supplies and electronic equipment between departments on campus, transferred a total of 1,100 items instead of going to the landfill. A task force is being formed to embed the program on campus and update Policy 108.

1.4.2. Water Action Plan

- In 2011/12, UBC achieved a 50 per cent reduction in water consumption in institutional buildings compared to 2000 levels (adjusted for growth).

- A Water Audit of seven UBC buildings was conducted in 2011 to help develop an informed water conservation strategy. UBC's **Water Action Plan** will outline opportunities to increase water conservation and will outline actions, strategies and targets to realize our vision of establishing a campus-wide closed loop water system at UBC.

1.5. TRANSPORTATION

Pierre Ouillet, Vice President Finance, Resources and Operations, stores a bike at the new Buchanan bike cage. Credit: Spencer Kovats

UBC's Transportation Planning department coordinates and promotes sustainable transportation options. In 2011, 70 per cent of campus users used more sustainable modes of transportation (walking, cycling, transit or carpool).

1.5.1. Transit

- In Fall 2011, UBC transitioned successfully to the province-wide **U-Pass BC** program and upgraded the pass distribution system. Ridership of public transportation increased again this year – transit trips have almost quadrupled from 19,000 trips per weekday in Fall 1997 to 74,800 in Fall 2011. More trips are made to and from UBC by transit than by all other modes combined. UBC is participating in the UBC Line Rapid Transit Study, exploring options for creating a rapid transit line on the Broadway Corridor to UBC.

1.5.2. Cycling Infrastructure

- Completed the construction of two additional **secure bike parking facilities** (Fraser River Parkade and North Parkade) removing vehicle parking and creating an additional 170 free, secure bike parking spaces for staff, faculty and students. An additional 27 bicycle lockers were installed across campus providing an additional 54 secure bike parking spaces for rent, available for $10/month.

1.5.3. End-of-Trip Facilities

- Examined campus development projects for compliance with Vancouver Campus Plan (VCP) Design Guidelines, which specify quantity of lockers and showers required in new developments. Provided in-kind support to departments or units interested in developing end-of-trip facilities in their buildings and provided gear lockers in the North Parkade secure bike parking project.

1.5.4. Electric Vehicles

- Bicycle cages in two parkades now have power outlets for recharging electric bicycles and all new bicycle facilities will have outlets. Two plug-in stations were also installed in Health Sciences Parkade for campus fleet vehicles.

1.5.5. Pedestrianized Campus

- Campus pedestrianization plan implementation began; Main Mall upgraded to facilitate more walking and cycling as part of the **Public Realm Plan**.

1.5.6. Parking Reduction

- In 2011, four surface parking lots were closed or reduced in size, removing 200 spaces. In addition, fourteen parking spaces in two of UBC's parkades were converted to 170 secure and covered bicycle parking spots.

1.6. UTOWN@UBC

Utown@UBC

UTown@UBC is UBC's vibrant residential community on campus where over 18,000 students, faculty, staff and other residents live, work and learn together. Innovative, sustainable community development and green building design is making UTown@UBC an emerging ecocity where shops, services, parks and public transportation are all within walking distance of home and work.

1.6.1. Sustainable Community Development

- UBC and the **University Neighbourhoods Association (UNA)** are collaborating, in partnership with BC Hydro, on the development of a **Community Energy and Emissions Plan (CEEP)** which will result in a living document that sets ambitious, yet obtainable, targets for reductions in GHG emission and energy use in the UTown@UBC community.

- UBC is also collaborating with the UNA on **Waste and Water Action Plans** to outline ambitious new targets for waste diversion and water conservation for UBC's institutional and residential communities.

- Many campus residents who live in our neighborhoods work or study at UBC and choose **sustainable transportation** options, such as walking, cycling and transit. The average number of vehicle trips per household in UBC's residential neighbourhoods are 58 per cent to 67 per cent of "typical" vehicle trip generation rates for comparable residential developments elsewhere.

1.6.2. Housing

- As part of the creation of a **Housing Action Plan** for the Vancouver campus, a comprehensive discussion paper was developed to explore potential housing program options to help improve housing choice and affordability for faculty, staff and students.

- In September 2011, Totem Park opened 566 new beds, furthering the student housing objectives outlined in the Vancouver Campus Plan.

- Currently, 25 per cent of all housing in residential neighbourhoods is rental; 56 per cent of that rental housing is restricted rental for faculty, staff and students.

1.6.3. Residential Green Buildings

- The **Residential Environmental Assessment Program (REAP)** is a comprehensive, UBC-specific green building rating system for mandatory application to all residential construction on campus. All new residential buildings at UBC must achieve REAP Gold certification.

- In 2011, three neighbourhood residential buildings earned REAP Gold certification and UBC piloted the use of REAP on new Totem Park student residence buildings to deliver equivalence to LEED Gold. REAP is currently under review and REAP 3.0 is expected to be released in Fall 2012.

- 45 per cent of neighbourhood residential buildings are REAP certified or Pending Certification *(Table 2)*. Preliminary research indicates that REAP certified buildings use approximately 16 per cent less energy and generate 27 per cent less operational GHG emissions than the average Lower Mainland multi-unit residential building and consume 8 per cent less water than the average Canadian multi-unit residential building.

Table 2: REAP Certified Residential Buildings at UBC Vancouver

REAP Certifications	#of Buildings	% of Total Residential Buildings
Gold	8	12%
Silver	8	12%
Bronze	4	6%
Pending REAP Certification	10	15%
Total REAP Certified or Pending Certification	30	45%
Built Prior to REAP Adoption	29	45%
Not Certified	6	9%
Total Residential Buildings	65	100%

Future Priorities 2012/2013

4.1. Policy and Governance

- Starting in 2012, UBC will be developing a **sustainability planning process for campus operational units**. These planning efforts will define each unit's commitment and responsibility for achieving our ambitious climate, water, and waste targets. In 2012/13, we will be piloting the planning process with operational units. The outcomes of this process will be integrated into each unit's annual business planning, operations and reporting and inform the upcoming Operational Sustainability Strategy.

4.2. Engagement

- Starting in 2012, the **Campus Sustainability Engagement and Social Marketing Strategy** will be designed to foster a culture of sustainability and resource conservation. The strategy will identify key ways individuals on campus can take action in reducing energy use, greenhouse gas emissions, water consumption and waste. The strategy will be targeting UBC Vancouver students, staff, faculty and residents. It will recommend strategic engagement priorities for Campus Sustainability programs, develop and pilot several behaviour-related conservation programs for UBC Vancouver community members and define an evaluation framework for measuring the outcomes of Campus Sustainability engagement programs.

- The new UBC Sustainability Initiative **revamped website** will feature an updated and improved information architecture. The new sustain.ubc.ca site will act as a comprehensive portal to more effectively represent and showcase sustainability initiatives across campus and integrate operations, teaching and learning, and research and partnerships.

4.3. Ecological

- UBC is collaborating with the University Neighbourhoods Association (UNA) in developing a **Community Energy and Emissions Plan**. The plan will help determine a path to UTown@UBC energy conservation and greenhouse gas emissions reductions while complementing UBC's Climate Action Plan.

- **Water and Waste Action Plans** will outline key steps for achieving targets and new milestones in water conservation and waste reduction.

- The **Continuous Optimization** program will continue to be deployed from 2012-2015, optimizing building performance in 72 buildings totaling 7.7 million square feet, reducing energy consumption and GHG emissions in core buildings by 10 per cent. Phase 1 will be complete by March 2013 and Phase 2 investigation will continue in 21 academic and administrative buildings.

- Phases 2, 3 and 4 of the **steam to hot water conversion** will continue in conjunction with upgrades to the Public Realm. When completed in 2015, the conversion will connect 130 buildings on campus and will reduce emissions by 22 per cent, the equivalent of reducing 11,000 tonnes of GHG emissions, or taking 2,000 cars off the road.

- The completed **Bioenergy Research and Demonstration Facility**, a combined heat and power system fuelled by biomass, is anticipated to provide 12 per cent of UBC's average district heating load and up to 6 per cent of the campus's average electrical demand when operating in the

demonstration or cogeneration mode. In cogeneration mode, the system will generate 4 megawatts of carbon-neutral thermal energy, equivalent to the amount of natural gas to heat 1,200 homes. At the same time it will generate 2 megawatts of cost-effective clean electricity, equivalent to the amount of electricity to power 1,500 homes.

Measures of Sustainability (2011/12)

5.1. Selected Measurements for Model Campus and Campus Engagement Based on Data Collected for 2011/12

Reduce Pollution	Result (trend data where available)
Reduce GHG emissions 33 per cent by 2015, 67 per cent by 2020, and 100 per cent by 2050, compared to 2007 levels.	2007: 61,082 $tCO2_e$ 2008: 62,470 $tCO2_e$ 2009: 60,580 $tCO2_e$ 2010: 58,353 $tCO2_e$ 2011: 63,803 $tCO2_e$
Maintain daily automobile traffic at or below 1997 levels (absolute reductions)	2006-2007 – 22% reduction 2007-2008 – 20% reduction 2008-2009 – 18% reduction 2009-2010 – 19% reduction 2010-2011 – 15% reduction 2011-2012 – 21% reduction
Conserve Resources	**Result (trend data where available)**
Reduce water consumption in institutional and ancillary buildings by 40% (adjusted for growth) from 2000 levels	2006-2007 – 42% reduction 2007-2008 – 40% reduction 2008-2009 – 29% reduction 2009-2010 – 37% reduction 2010-2011 – 48% reduction 2011-2012 – 50% reduction
Divert 55% of annual operational waste from the landfill (by 2010)	2006-2007 – 46% diversion 2007-2008 – 44% diversion 2008-2009 – 39% diversion 2009-2010 – 44% diversion 2010-2011 – 43% diversion 2011-2012 – 44% diversion
Campus Engagement	**Result (trend data where available)**
Support and engage staff, faculty and students in sustainability learning, practice and leadership development	2006-2007 – 398 SEEDS participants, 64 papers 2007-2008 – 500 SEEDS participants, 69 papers 2008-2009 – 600 SEEDS participants, 91 papers 2009-2010 – 627 SEEDS participants, 151 papers 2010-2011 – 610 SEEDS participants, 149 papers 2011-2012 – 503 SEEDS participants, 119 papers 2000-2012 – over 4,500 participants, over 800 SEEDS projects
Demonstrate and recognize sustainable practices in the workplace and in student living	2006-07: 141 Sustainability Coordinators 2007-08: 146 Sustainability Coordinators 2008-09: 150 Sustainability Coordinators 2009-10: 150 Sustainability Coordinators 2010-11: 150 Sustainability Coordinators 2011-12: 110 Sustainability Coordinators 2011-12: 32 Residence Sustainability Coordinators; created 3 new formal Sustainability Committees in student residences.
Common Energy UBC	2011-12: In 2011, Common Energy held 23 events at UBC with a total attendance of 995 participants and had 50 active student volunteers.