



2014 CARBON NEUTRAL ACTION REPORT

Prepared by Facilities Services



May 2015

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EXECUTIVE SUMMARY

Kwantlen Polytechnic University (KPU) has a long tradition as an active and creative leader in contributing to a more sustainable world by focusing on sustainable approaches to energy conservation, business practices, educational offerings and research. The recent establishment of the Environmental Sustainability Committee brings champions within KPU from all areas to collectively facilitate, advise, advocate and enable the implementation of integrated environmental sustainability activities at KPU. KPU's commitment to creating a more sustainable world includes reducing Greenhouse Gas Emissions for the University.

In support of the Provincial Government's Bill 44 targets to reduce Green House Gas Emissions, KPU has achieved a 17% reduction in GHG emissions for buildings by decreasing electricity and natural gas consumption from 2007 to 2014. KPU has been a Carbon Neutral organization since 2010 and purchased 2,382 tons of carbon offsets for 2014 GHG emissions. Cumulative reductions in GHG emissions from electricity and natural gas from 2007 to 2014 resulted in a total of 1,539 tCO₂e GHG emissions prevented equivalent to 64.6% of the 2014 emissions.

From a global perspective, KPU recognizes that organizations need to greatly reduce their impact on the natural environment. KPU's strategic plan, Vision 2018¹, outlines "opportunities to achieve success in a diverse range of programs that blend theory, practice, critical understanding, and social and ethical awareness necessary for good citizenship and rewarding careers." Vision 2018 further outlines the values of "responsible stewardship of resources" with specific goals of "integrating sustainability into core curriculum" and "continuing to enhance sustainability efforts on campus". To that end, along with the numerous curricular offerings, KPU strives for efficient and sustainable outcomes in all its service delivery. Examples include green procurement practices and product selections such as enhanced recycled paper content; technological solutions for meeting rooms and office PCs to reduce the need for travel between campuses; and promoting alternative transportation such as an intercampus shuttle, bike lockers, bike repair stations, and showers.

KPU strives to reduce consumption of electricity and natural gas so that KPU is a leader to others in our sector and the community. The Association of Physical Plant Administrators (APPA) Facilities Performance Indicators identifies KPU as using 40% less energy than the average for post-secondary institutions in North America. KPU Energy Conservation is a core consideration when completing new expansions, renovating buildings, and conducting daily operations.

Energy Consumption Records² indicate that from 1994 to 2014 KPU has increased in space by 36% while at the same time decreasing natural gas use by 3% and electricity by 9%.

¹ Vision 2018, Strategic Plan 2013 – 2018, Kwantlen Polytechnic University, June 2013.

² Energy Consumption Records <http://www.kpu.ca/sustainability/energy-consumption-records>.

KPU's energy conservation success has been created with our many partners including design professionals, service technicians, building operators, BC Hydro, Natural Resources Canada (NRCan), the Province of British Columbia and more. Much of the energy efficiency work performed has been funded by either future avoided energy costs, or from financial assistance from NRCan, BCHydro, and the Province of British Columbia. In 2014, a contribution of \$160,000 from the Ministry of Advanced Education matched by the University enabled KPU to complete a boiler retrofit and the conversion of Domestic Hot Water tanks to instantaneous water heaters at our Langley campus.

OVERVIEW

This report constitutes Kwantlen Polytechnic University's (KPU's) Carbon Neutral Action Report (CNAR) for 2014. Legislatively mandated, this is intended to meet the reporting requirements for the [Carbon Neutral Government Regulation](#). It outlines our actual annual and cumulative greenhouse gas (GHG) emissions and offsets. It outlines the actions that were taken in 2014 to reduce KPU's GHG as well as the planned future actions for 2015. Finally, this report offers background information showcasing areas of the university's commitment to sustainability and energy conservation. Visit KPU's webpage on [Sustainability and Energy](#) for further details including archived records of KPU's previous Carbon Neutral Action Reports (CNAR) and other valuable resources.

2014 CNAR Approval

Executive Director, Facilities Services

Karen Hearn



President and Vice Chancellor

Dr. Alan Davis



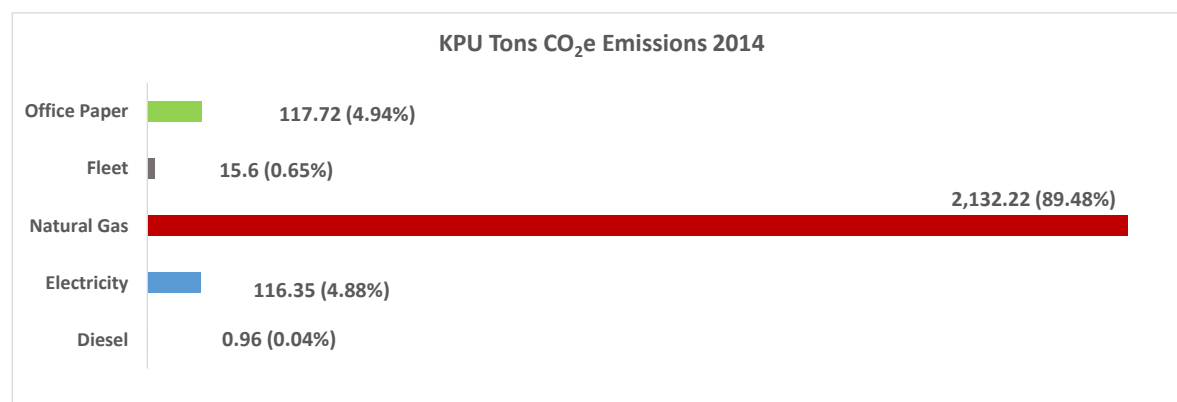
I. EMISSIONS AND OFFSETS, 2014

Green House Gases consist of a variety of gaseous compounds that trap heat within the earth's atmosphere and create global warming. Historically these gases have existed in consistently stable quantities that were environmentally balanced to meet planetary life sustainability needs. It's been estimated that since the beginning of the industrial age carbon dioxide levels alone have increased by about 42%. This has led to increased heat retention and continually rising global temperatures.

The Provincial Government's Bill 44 targets carbon dioxide producing activities to compel pursuit of reductions and requires the purchase of offset credits at \$25 per ton of CO₂equivalent (tCO₂e) to generate funding for support of carbon reduction projects that reduce atmospheric GHG levels. Provincially legislated targets have been set to reduce GHG emissions from 2007 levels, 6% by 2012, 18% by 2016, 33% by 2020, and 80% by 2050.

2014 Greenhouse Gas Emissions

KPU's 2014 total emissions from all sources for offsets were **2,382** tCO₂e, representing a reduction of 163 tCO₂e, or a 6.4% decrease from 2013 emission levels.



Emission Source	2011 (tCO ₂ e)	2012 (tCO ₂ e)	2013 (tCO ₂ e)	2014 (tCO ₂ e)	2014 vs 2013
Buildings					
Diesel*	4.39	1.91	4.08	0.96	-76%
Electricity	284.85	280.99	163.19	116.35	-29%
Natural Gas	2,424.83	2,229.85	2,246.60	2,132.22	-5%
Fleet	25.74	20.65	17.26	15.60	-10%
Office Paper	151.34	132.31	114.33	117.72	3%
Total Emissions	2,891.15	2,665.71	2,545.46	2,382.85	-6%
Offset Exempt	1	1	1	1	
Total for Offsets	2,890	2,665	2,545	2,382	-6%

- Diesel is used only in KPU's emergency generators.

Annual Fugitive Emissions generated by equipment using Hydrochloroflourocarbon (HCFC) refrigerants remain well below 1% of our total emissions and were not reported in 2014, as permitted under regulatory guidelines.

Offsets Applied to be Carbon Neutral in 2014

KPU has been a Carbon Neutral organization since 2010 with an annual purchase of carbon offsets. For 2014 offsets purchased totaled 2,382 tons of carbon emissions as identified in SMARTTool, at a cost of \$62,527.50 including GST.

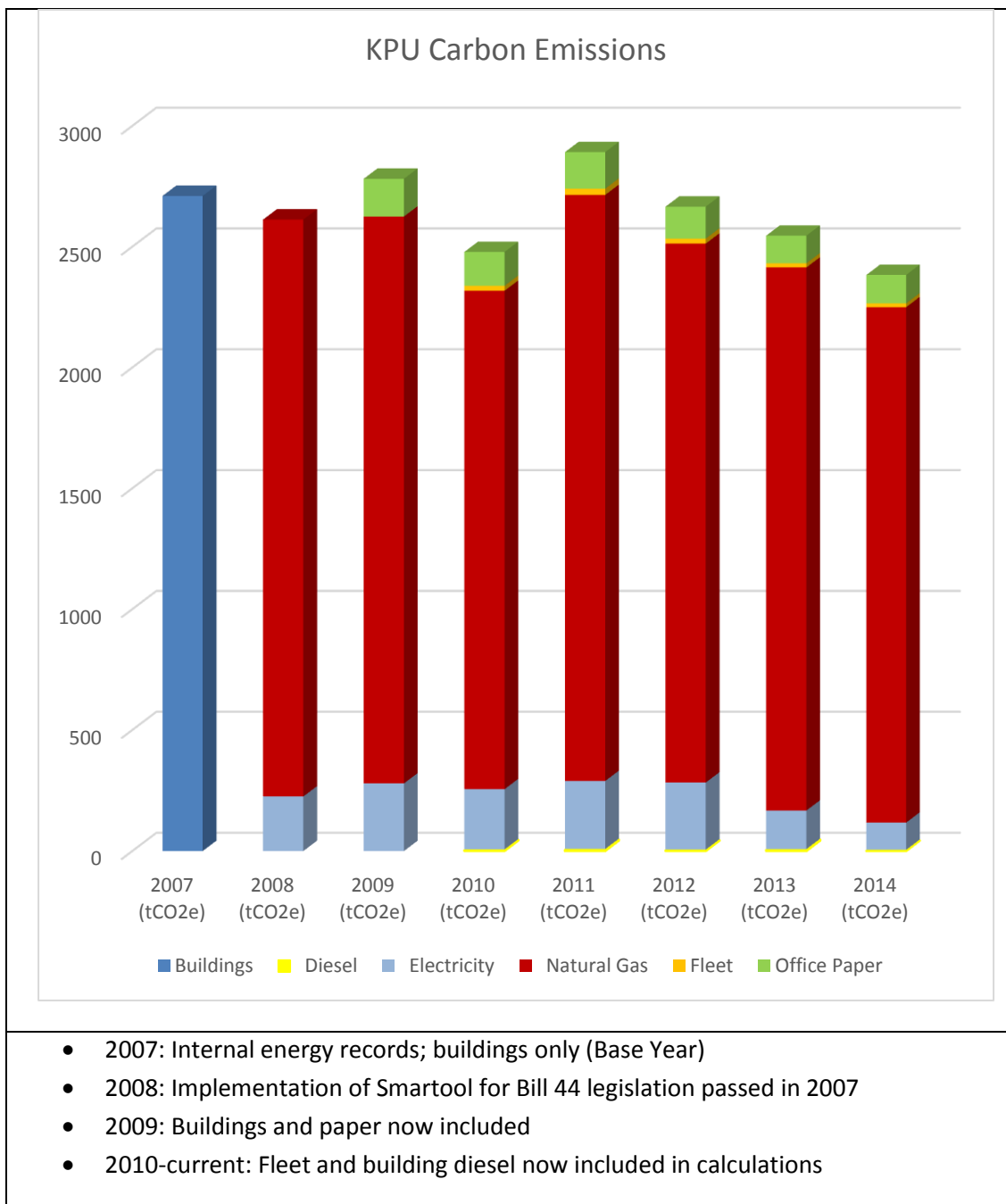
KPU spent \$340,173 including GST to purchase carbon offsets for 12,959 tons of carbon emissions during the period 2010 to 2014.

II. ACTIONS TAKEN TO ACHIEVE 2014 GHG REDUCTIONS

KPU 2014 carbon emissions for buildings (excluding diesel, fleet and office paper) as calculated by the Provincial Government SMARTTool were 2,249 tCO₂e. This is a 17% reduction in emissions from the comparative 2007 buildings emission level. Cumulative reductions in GHG emissions from electricity and natural gas from 2007 to 2014 resulted in a total of 1,539 tCO₂e GHG emissions prevented.


The first complete reporting year for buildings and paper in the SMARTTool reporting system was 2009. In that year, KPU's total carbon emissions for offsets were **2,781** tCO₂e. KPU total carbon emissions for offsets for 2014 were **2,382** tCO₂e. This resulted in a **14.35% reduction** in emissions from 2009.

Emission Source	2007 (tCO ₂ e)	2008 (tCO ₂ e)	2009 (tCO ₂ e)	2010 (tCO ₂ e)	2011 (tCO ₂ e)	2012 (tCO ₂ e)	2013 (tCO ₂ e)	2014 (tCO ₂ e)	2014 vs 2013	2014 vs 2009	2014 vs 2007
Buildings	2710										-17%
Diesel				2.78	4.39	1.91	4.08	0.96	-76%		
Electricity		225.3	279.22	252.65	284.85	280.99	163.19	116.35	-29%	-58%	
Natural Gas		2386.84	2345.69	2062.07	2424.83	2229.85	2246.6	2132.22	-5%	-9%	
Fleet				20.31	25.74	20.65	17.26	15.6	-10%		
Office Paper			156.09	140.21	151.34	132.31	114.33	117.72	3%	-25%	
Total Emissions	2710	2612.14	2781.00	2478.02	2891.15	2665.71	2545.46	2382.85	-6%	-14%	
Offset Exempt				1	1	1	1	1			
Total for Offsets		2612	2781	2477	2890	2665	2545	2382	-6%	-14%	-17%



With the success KPU has achieved in previous conservation efforts, a focused effort has continued in 2014 to improve the efficiency of building systems and monitoring as well as expand awareness to front line teams and individual departments. Strategically targeting the highest energy consumers first, Facilities building operators and front line department personnel work together to understand and fine tune operational efficiencies in their areas. The following efforts were completed to reduce KPU's Carbon Foot Print in 2014.

2014 Projects and Partnerships

Partnership with the CleanTech Sector; British Columbia's first technology accelerator.	KPU contributed \$80,000 to fuel clean tech innovation in Surrey partnering with industry leading Foresight Cleantech Accelerator Center in Newton. This opportunity links innovation, research, experiential learning, and industry in support of healthy, sustainable communities. Clean Technology can be described as products and processes that harness renewable materials and energy sources reduce the use of natural resources, and reducing or eliminating emissions and wastes.
Green Collaboration to Advance Agricultural Innovation	A multi-level partnership was established with several other post-secondary institutions, local organizations, and the City of Surrey, bringing the skills and resources of all to support technology incubation and research projects with a focus on applied research in the vital area of feeding increasingly urban populations.
Multi-Function Device (MFD) Replacement Project	KPU's IET department completed a replacement of its aging MFD (printer/copier/scanner) fleet. Approximately 120 of these older units were replaced with models that were 67% less overall cost and 75% more energy efficient.
Boiler Replacement Project, Langley Horticulture 	Replaced the large single Horticulture boiler with 5 smaller condensing boilers providing improved energy savings, greater demand control and reduced future maintenance costs by 50%. Projected GHG reduction of 126.85 tCO ₂ / year, natural gas reductions of 2,252 GJ, and electrical savings of 7,780 kWh amount to a total projected annual utility and offsets savings of \$18,537. Project funding was a 50/50 partnership between KPU & the Ministry of AVED CNCP funding.
Water Consumption Metering, Surrey campus	Monitoring of water consumption using newly installed metering to develop verifiable patterns, identified an anomaly in one of the Surrey campus geothermal system make up water lines.
Conversion of Pneumatic controls to DDC (direct digital control), Surrey Campus.	Converted the last portion of Birch and Surrey Main buildings from pneumatic controls to DDC (direct digital control), improving overall building operational efficiencies and removing obsolete air compressors in each building.
Building System Monitoring (BMS) Software Improvements	New Monitoring and Presentation tools with Coppertree Kaizen Software which mines our utilities usage of BMS and hosts the information externally.

Energy Conservation Policy	KPU's first Energy Conservation Policy and Procedure have been prepared and vetted within KPU and await only Executive approval prior to implementation. The Policy identifies energy conservation as a significant priority for the university while the procedures include items such as <i>Individual Actions</i> , <i>Technical Strategies</i> , and <i>Energy Awareness Training</i> . The procedures also define the temperature range KPU is committing to for classrooms and offices.
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Training and Awareness

Training Events/ Team Awareness Development	<ul style="list-style-type: none"> As KPU refines its Energy Conservation efforts there has been a focus on front line building operators and individual departments to partner together looking for new savings opportunities. The formation of energy Green Teams and training opportunities provided to front line personnel have occurred in house and with external partners such as BC Hydro and consultant engineers. In 2014 three new Green Teams were established.
Presentations and Participation at Events.	<ul style="list-style-type: none"> To help reduce GHG emissions, efforts to broaden awareness were completed in 2014. A variety of events and presentations have occurred across the university including presentations by KPU's President and Vice Chancellor, Dr. Alan Davis at an all employee event (KPU Days). Additional audiences include such examples as individual classes, the Administrative Forum, and the Sustainability Committee. Participation at events was an additional way to raise awareness. The Kwantlen Student Association's Eco-Days and the global Earth Hour are just a few examples of how KPU was able to raise awareness through increased participation.

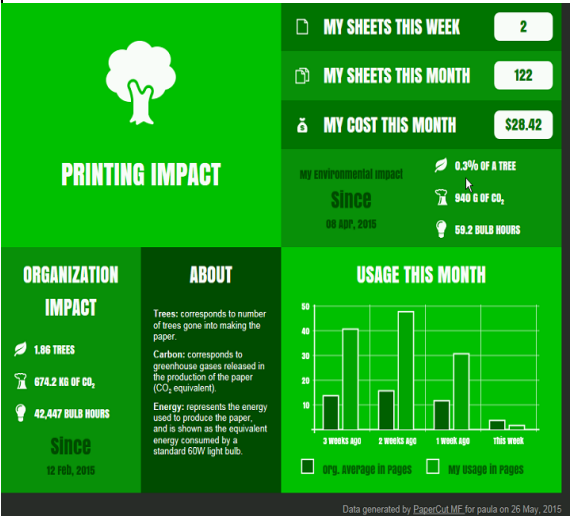
Awards and Recognitions

<p>LEED Silver achieved for the Langley West Wing Renovation, Canada Green Building Council (CGBC).</p> 	<p>Extensive use of glass partitions enables deep daylight penetration and access to outside views to more than 90% of regularly occupied and seated floor spaces. A 29% reduction in lighting power density below ASHRAE requirements was achieved with high efficiency lighting and zoned controls.</p>
<p>BC Hydro Power Smart Excellence Award - Leadership Excellence</p> 	<p>As leaders in energy conservation for over a decade, KPU's efforts towards energy conservation have resulted in eight BC Hydro awards including Power Smart Leader and Power Smart Excellence.</p>
<p>Institute for Sustainable Horticulture (ISH) lab, LEED Gold, Langley campus.</p> 	<p>This state-of-the-art research lab, intended to advance sustainable horticulture through collaborative research, was awarded LEED Gold certification by the Canada Green Building Council (CaGBC). 75% of the construction waste was diverted from landfills.</p>
<p>Horticulture Greenhouse LED lighting</p>	<p>The Horticulture Green Team is currently conducting an evaluation of the LED lighting fixtures that were installed in a section of a greenhouse to determine if they are suitable for use as replacements for the High Pressure Sodium lights that use much more energy.</p>
<p>All Campuses</p>	<p>Solid waste Audit – completed</p>
<p>Green Walls Langley Campus</p>	<p>Installation completed in West Wing.</p>

III. FUTURE ACTIONS PLANNED FOR 2015

KPU entered 2014 with a broader range of Facilities personnel focused on energy conservation and reduction of GHG emissions. This team and the university enter 2015 with continued established partnerships including design professionals, service technicians, building operators, BC Hydro, NRCan, the Province of British Columbia and more.

Of the 2,382 tCO₂e KPU produced in 2014, **2,133 tCO₂e** was produced by burning natural gas. Improving efficiencies in heating systems and exploring alternative energy heating sources is key to further reducing GHG emissions.

<p>Awareness and Training; Green Teams</p>	<p>KPU's early successes in conservation focused on major building systems. As the program becomes more refined, partnership with the faculty, students, and front line teams becomes ever more important. Continued participation at events, discussions, and the expansion of energy Green Teams increase awareness and improve both the understandings and opportunities for new operational efficiencies.</p>
<p>Desk Top Printer Replacement Program</p>	<p>As part of the IET department's centralized copier replacement program, this year's project will dramatically reduce the number of individual printer/copiers in individual offices by replacing them with centralized print/copy stations.</p>
<p>Print Management Software Program</p>  <p>The screenshot displays the PaperCut ME dashboard with the following data:</p> <ul style="list-style-type: none"> PRINTING IMPACT: 1.86 TREES, 674.2 KG OF CO₂, 42,447 BULD HOURS. MY SHEETS THIS WEEK: 2 MY SHEETS THIS MONTH: 122 MY COST THIS MONTH: \$28.42 MY ENVIRONMENTAL IMPACT: 0.3% OF A TREE, 040 G OF CO₂, 69.2 BULD HOURS. USAGE THIS MONTH: Bar chart showing usage over 4 weeks. <p>Legend: <input checked="" type="checkbox"/> 1 pg. average in Pages <input type="checkbox"/> 1 pg. usage in Pages</p> <p><small>Data generated by PaperCut ME for pauls on 26 May, 2015</small></p>	<p>Along with the Printer/Copier replacement program, IET is planning the implementation of a secure print service (employee card required). The software uses a dashboard to allow users to track their impact on the environment by totaling all ongoing print and energy usage. Success in other similar environments have achieved up to 30% reduction in paper usage.</p>

<i>Heating System Efficiency Improvements</i>	The feasibility of replacing aging inefficient boilers with higher efficiency condensing boilers and heat distribution piping will be explored to increase system efficiencies. Geo-exchange systems will be fine-tuned to maximize system operational effectiveness. New opportunities to add more geo-exchange fields will be explored.
<i>Lighting Retrofits</i>	Significant success in the past with lighting retrofits along with emerging new technologies in the sector have KPU exploring additional lighting retrofit projects
<i>Monitoring and Metering Projects</i>	To find new opportunities, a further understanding of current load demands is needed. KPU is targeting 4 areas in the university this year for additional metering.
<i>KSA Intercampus Shuttle Bus Shelters</i>	The installation of bus shelters at the intercampus shuttle bays will increase ridership by enhancing the profile of this service as well as providing a more comfortable environment in seasonal conditions.
<i>Langley Main - Green roof</i>	Installation including rainwater collection system.
<i>Update Strategic Energy Management Plan (SEMP)</i>	Document prepared May 2015

IV. KPU's COMMITMENT TO SUPPORT CARBON REDUCTION, SUSTAINABILITY, AND ENERGY CONSERVATION

Energy conservation is a strength with KPU's energy consumption 40% less than the average for post-secondary institutions within the Pacific Coast Region, (from the 2014 Association of Physical Plant Administrators' Facilities Performance Index , APPA FPI) KPU extends our conservation focus to embed it within business practices, academic offerings, and buildings.

The following are highlights from KPU's comprehensive report, Sustainability at KPU. Where Are We Now?

Sustainability in Academic Programs

KPU's Academic calendar offers over 16 degrees and 6 diploma/certificate programs that have an aspect of environmental sustainability. Program areas include, but are not limited to, Horticulture, Environmental Protection, Greenhouse and Nursery Production, Institute for Sustainable Food Systems, Turf Management, Geography, Policy Studies, Interior Design, Graphic Design, School of Business, and the Faculty of Community & Health Studies.

Sustainable Principles in Facilities Operations

Facilities Services initiatives include:

- Custodial Services during operating hours rather than after hours saves energy;
- Green Cleaning program; and
- Optimized Building Management System controls with ongoing monitoring and verifications; and night audits and comprehensive maintenance contracts to ensure equipment is running at its most efficient.

Sustainable Landscape Maintenance Practices

Core principles in the delivery and design of landscape services include:

- plantings that require low maintenance and no irrigation after establishment;
- deciduous trees around building perimeters that provide summer shading/cooling and improved winter natural lighting during after leaf drop;
- rain water capture systems;
- green walls and a green roof under construction; and
- the ban of herbicides, pesticides, and phosphates in the core contract.

Comprehensive Waste Management and Diversion Program

Diverting over 25 consumer materials from the general landfill stream, KPU's waste management program utilizes the 3 Rs principle of action: Reduce, Reuse, Recycle. The university is poised to launch its initial composting program in 2015.

Alternative Transportation Efforts

In its approach to support alternative transportation options, KPU has the following in place:

- student U-Passes promoting transit use that also offer discounted fitness club memberships and access to car sharing;
- an intercampus shuttle that made over 1,100 trips/ week in the Fall & Spring semester;
- carpooling options;
- Car-2 Go registry and vehicles on each campus;
- bike storage at all campuses with access to showers at all except the Richmond campus (Showers at the Richmond campus are in the planning stage); and
- dedicated electrical and hybrid vehicles stalls at the Surrey & KPU Tech campuses.

Work Schedules

KPU encourages reduced commuting and travel between campuses with efforts such as:

- promotion of technologies to allow teleconferencing for meetings;
- hotel offices at each campus to provide less travel for faculty;
- on line classes; and
- adjusted work week schedules and opportunities to work from home where practical.

Food Services

- Food Services at KPU promote sustainable food options.
- The university has partnered to bring Farmer's Markets to the Langley campus throughout the spring and summer.
- The Langley Horticulture program provides locally grown produce for sale and a Student Food Bank initiative is in place.
- Richmond campus Farmer's Market will be opening June 2015.

Buildings and Energy

KPU's buildings are designed to minimize our environmental impact and energy consumption with outcomes that have led to an overall average less than 40% of the typical energy used by other North American post-secondary institutions.

- With optimized monitoring and controls in place, continuous focus is on front line teams for ongoing monitoring; building operator training; awareness training to service contractors such as Custodial and Security); and participation and partnerships with external agencies like BC Hydro.
- As leaders in energy conservation for over a decade, KPU's efforts towards energy conservation have resulted in 8 BC Hydro awards including Power Smart Leader and Power Smart Excellence.

Sustainable Building Design

KPU's construction projects are designed to meet or exceed LEED Gold requirements and all major renovations to exceed LEED Silver. The current LEED certified buildings include;

- **LEED Gold:**
 - Surrey Arbutus (Coast Capital Savings Library) building (74% more efficient than the traditional model building);
 - KPU Tech Campus (33% more efficient than a traditional campus); and
 - Langley Institute for Sustainable Horticulture (ISH) Labs.
- **LEED Silver:**
 - Surrey Main building; and
 - Langley West Wing.
- **LEED Pending:**
 - Richmond Library; and
 - Langley South.

Awareness and Partnerships

The promotion of sustainability is embedded in important awareness activities with the university including:

- KPU's Sustainability and Energy website provides a number of detailed reports, Success Stories, list of energy improvements and resources for the community; [Sustainability and Energy](#);
- internal and external partnerships and attendance at events;
- Internal champions are part of KPU's Sustainability committee; [KPU Environmental Sustainability Committee](#);
- Green Teams in energy conservation unite building operators with department level expertise to understand local area energy use and saving opportunities;
- attendance at conferences and student events, local area school districts and municipality partnerships; and
- promotion of global efforts such as Earth Day.

Strategic Energy Management Plan (SEMP)

As a leader in energy conservation, KPU's efforts have resulted in approximately a million dollars of avoided energy costs every 3 years.

- KPU's energy conservation efforts have been identified as the targeted benchmark for some other post-secondary institutions in BC.
- The [Strategic Energy Management Plan \(SEMP\)](#) guides electrical reduction efforts.

Information and Educational Technology (IET) Initiatives

KPU's IET department's growing list of Sustainable Technology Initiatives include:

- remote shut down of computers;
- increased use of Thin Clients and lap tops replacing the more energy consuming office PCs;
- server virtualization; and
- removal of desktop printers.

Government Reporting

KPU has taken many steps to reduce greenhouse gas emissions and energy consumption while being ever challenged by increasing building growth and increasing student enrollment.

- In 1995 the university joined the federal government's Energy Innovators Initiative and Canada's Climate Change Voluntary Challenge and Registry (VCR).
- Bill 44 and this Carbon Neutral Action Report outlines the specific greenhouse gas targets and accomplishments to date.
- Participation in the Public Sector Energy Conservation Agreement (PSECA) with specific targets to reduce energy consumption in 2011 (5%), 2016 (14%), and 2020 (20%).