Sustainability at KPU: Where Are We Now?

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INTRODUCTION

This report was prepared in support of the work of the **E**nvironmental **S**ustainability **C**ommittee (**ESC**) (see Appendix 9 for Terms of Reference). Under the leadership of president Dr. Alan Davis the ESC, chaired by Karen Hearn and Elizabeth Worobec (see Appendix 9-B for Membership List) was mandated to provide leadership in the development and planning of sustainable initiatives at KPU.

The purpose of this report is to serve as a living document that will be periodically updated to display KPU's current and planned sustainable practices. The information in this report is provided using the following categories:

- Sustainability in Academic Offerings
- Energy and Buildings
- Operations

Additional information such as environmental students groups and associations, course projects and assignments, research groups, ongoing events, current and potential partners as well as future projects are found in the Appendices section of the report.

A variety of different data gathering methods were used to complete the research including: web searches, meetings, event attendance and interviews conducted with a total of more than 37 students, staff, administration and faculty members.

The research found that KPU offers sixteen degrees and six certificate/diploma programs with a sustainability learning component. Many of these programs provide hands-on experience through projects and partnerships. In terms of construction, KPU buildings were the first LEED (Leadership in Energy and Design) Gold certified buildings in the City of Surrey. KPU continues to strive as environmental leaders and as a whole the university uses 50% less energy than the average for post-secondary institutions throughout North America.

Overall, KPU has a strong commitment to environmental sustainability however some areas for improvement were also recognized in marketing efforts, waste management and operations. Given these findings, future projects will be geared to fill these gaps and further the University's sustainability efforts (see Appendix 10 - Recommendations).

ACKNOWLEDGEMENTS

I would like to express my appreciation to everyone who helped make this report possible. Thank you all for the time that you took out to share your knowledge about KPU's sustainability initiatives and in helping me learn about sustainability in the process. Without the contributions that each of you made this report would not have been created.

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SUSTAINABILITY IN ACADEMIC OFFERINGS

A review of KPU's 2013 calendar identifies that KPU offers 16 degrees and 6 diploma/certificate programs that have an aspect of environmental sustainability as a required learning component. Some examples of projects students have completed in these courses can be viewed in Appendix 1 – Course Projects.

FACULTY OF SCIENCE AND HORTICULTURE

Students are taught by professionals in the field who belong to many external associations and committees that influence environmental and sustainability policies. Hands-on-training is a major component of the programs offered with students required to complete a variety of projects on campus and offsite.

URBAN ECOSYSTEMS: BACHELOR OF HORTICULTURE SCIENCE MAJOR

Graduates will be able to monitor and analyze the impact of horticulture activities on the local environment, remediate inefficient or ineffective gardens and landscapes, and install landscape features that make a positive contribution to the goal of a sustainable community.

Courses:
HORT 1104 – Soils and Growing Media
HORT 1110 – Introduction to Sustainable Horticulture
HORT 1217 – Foundations of Plant Health
HORT 2300 – Horticultural Work Experience
PHIL 3033 – Business Ethics
HORT 3210 – Applied Urban Ecosystems
HORT 3230 – Urban Watershed Planning
HORT 3251 – Landscape and Environment 1
HORT 3270 – Urban Agriculture

Some courses for this program are still under development

PLANT HEALTH: BACHELOR OF HORTICULTURE SCIENCE MAJOR

Students will learn to address the impact of weeds, pests, plant diseases and pest management practices on the environment.

Courses:
HORT 1104 – Soils and Growing Media
ENVI 1106 – Environmental Chemistry I
HORT 1110 – Introduction to Sustainable Horticulture
HORT 1217 – Foundations of Plant Health
HORT 2300 – Horticultural Work Experience
PHIL 3033 – Business Ethics

Some courses for this program are still under development

SUSTAINABLE AGRICULTURE: BACHELOR OF APPLIED SCIENCE

Students will learn the science and management of sustainable agriculture as well as the complex issues surrounding food systems. Through the program students will gain a fundamental understanding about sustainable agriculture and learn applied skills by working on farms and engaging in research work.

Courses:
GEOG 1101 – Human Geography
ENVI 1106 – Environmental Chemistry I
AGRI 1150 – Sustainable Agriculture for the 21st Century
PHYS 1400 – Energy, Environment, Physics
ENVI 1206 – Environmental Chemistry II
AGRI 1299 – Food System Field Analysis
AGRI 2230 – Sustainable Human Economy
AGRI 2240 – Ecologically Based Pest Management
BIOL 2322 – Ecology

Some courses for this program are still under development, proposed courses are available here.

RICHMOND FARM SCHOOL

The Farm School is offered by the Institute for Sustainable Food Systems. It is a 10 month practical program focused on training students in the science, management and business of sustainable human scale, ecologically sound agricultural enterprises.

Additional information on the Farm School program can be found here

ENVIRONMENTAL PROTECTION: DIPLOMA OF TECHNOLOGY

Students develop the skills and knowledge to assess the environment and work with different internal and community groups to apply their knowledge. The program also includes over 480 hours of hands-on-training and a co-operative education program that requires a minimum of 740 hours of work-place experience.

Courses:
ENVI 1106 – Environmental Chemistry I
ENVI 1121 – Environmental Issues
ENVI 1206 – Environmental Chemistry II
ENVI 1216 – Introduction to Earth Sciences
PHYS 1400 – Energy, Environment, Physics
ENVI 2305 – Environmental Toxicology
ENVI 2310 – Solid Waste management
ENVI 2315 – Water and Soil Sampling
BIOL 2322 – Ecology
ENVI 2405 – Environmental Legislation
ENVI 2410 – Water Resources Protection
ENVI 2415 – Air Quality Monitoring
ENVI 2420 – Contaminated Sites Management
ENVI 2900 – Research Project

GREENHOUSE AND NURSERY PRODUCTION DIPLOMA

Students learn sustainable methods of managing production environments and facilities. Students also gain knowledge about sustainable production methods for producing vegetables, flowers and nursery crops.

Courses:
HORT 1101 – Pesticide Applicator/Dispenser Certification
HORT 1104 – Soils and Growing Media
HORT 1217 – Foundations of Plant Health
HORT 1261 – Plant Propagation
HORT 2300 – Horticultural Work Experience
HORT 2371 – Fall Floriculture
HORT 2463 – Nursery Production

LANDSCAPE DESIGN AND INSTALLATION DIPLOMA

Students learn about sustainable landscaping and gardening techniques through a variety of in class and hands on sessions.

Courses:
HORT 1101 – Pesticide Applicator/Dispenser Certification
HORT 1104 – Soils and Growing Media
HORT 1217 – Foundations of Plant Health
HORT 1230 – Sustainable Turf Management
HORT 2300 – Horticultural Work Experience
HORT 2320 – Landscape Design I
HORT 2334 – Irrigation, Drainage and Lightning
HORT 2420 – Landscape Design II
HORT 2426 – Landscape Construction
HORT 2442 – Arboriculture II

TURF MANAGEMENT DIPLOMA

Students learn the skills and knowledge to advance community sustainability through in class sessions and educational field trips.

Courses:
HORT 1101 – Pesticide Applicator/Dispenser Certification
HORT 1104 – Soils and Growing Media
HORT 1217 – Foundations of Plant Health
HORT 1230 – Sustainable Turf Management
HORT 2300 – Horticultural Work Experience
HORT 2330 – Turfgrass and Environmental Stress
HORT 2334 – Irrigation, Drainage and Lightning
HORT 2426 – Landscape Construction
HORT 2442 – Arboriculture II

GEOGRAPHY: ASSOCIATE OF SCIENCE DEGREE

Students learn to examine the atmospheric changes in the environment and discover the relationships between human activities and environmental degradation.

Courses:
GEOG 1110 – Atmospheric Science
GEOG 2320 – Geomorphology

FACULTY OF ARTS

GEOGRAPHY: BACHELOR OF ARTS MINOR

Students learn about natural and human environments, with particular attention to urban spaces and issues. As potential future geographers students will develop fuller understandings of the natural environment, patterns of human activity and interaction, and the links between human and non-human realms.

Courses:
GEOG 2250 – The City
GEOG 4380 – Applications in GIS

GEOGRAPHY: ASSOCIATE OF ARTS DEGREE

Students will examine and discuss evidence and theories concerning long term climate change.

Course:
GEOG 1110 – Atmospheric Science

POLICY STUDIES: BACHELOR OF ARTS MAJOR

Students learn about policy by drawing from a variety of subjects in philosophy, political science, and economics that are approached from a perspective of sustainability. Students also collaborate with community partners such as local governments and develop sustainability policy recommendations under the supervision of policy practitioners.

Courses:
POST 1100 – Sustainability: Analysis and Ethics
ENVI 1121 – Environmental Issues
PHIL 1112 – Environmental Ethics
POST 2100 – Sustainability and Government
ECON 2260 –Environmental Economics
POST 3100 – Economics of Sustainability Policy
POST 3110 – Applied Policy Seminar I
POST 4110 – Advanced Applied Policy Seminar
POST 4150 – Psychology and Sustainability: Attitudes and Behavior

CHIP AND SHANNON WILSON SCHOOL OF DESIGN

INTERIOR DESIGN: BACHELOR OF INTERIOR DESIGN

Students are mostly taught by LEED certified professionals. To broaden the learning experience a number of external experts including Master Series

speakers and guest lecturers are brought in to educate students on sustainable interior design.

Courses:
IDSN 1121 – Materials
IDSN 2325 – Building Systems 1
IDSN 2331 – Design Theories 1
IDSN 2375 – Environmental Human Factors
IDSN 2425 – Building Systems 2
IDSN 2431 – Design Theories 2
IDSN 3600 – Studio 6

GRAPHIC DESIGN FOR MARKETING: BACHELOR OF DESIGN

Students develop awareness about environmental issues surrounding graphic design practices and learn to create environmental graphics and package designs.

Courses:
GDMA 2140 – Communications Design, Consumerism and Popular Culture
GDMA 3210 – Packaging Design
GDMA 4240 – Contemporary Issues in Graphic Design

OTHER

Students in the following programs are required to take FIND 1150 – Designing for Humanity where they examine the relationship between design decisions and current and historical environmental issues:

Product Design: Bachelor of Design
Foundations in Design: Certificate

SCHOOL OF BUSINESS

All business programs have a required PHIL 3033 – Business Ethics course where students analyze environmental issues pertaining to a company and devisee solutions that take into account the company stakeholders and ethical principles.

Information Technology: Bachelor of Technology
Accounting: Bachelor of Business Administration
Entrepreneurial Leadership: Bachelor of Business Administration

Human Resources Management: Bachelor of Business Administration
Marketing Management: Bachelor of Business Administration

FACULTY OF COMMUNITY AND HEALTH STUDIES

Students in the following program are required to take PSYN 3200 – Global Problems and Health where they learn about the health challenges related to environmental factors:

Psychiatric Nursing: Bachelor of Psychiatric Nursing

OPERATIONS

KPU has daily activities that focus on environmental sustainability. For the purpose of this report operational duties, waste management, transportation, food, and ongoing events are included in this section.

OPERATIONAL DUTIES

KPU's Facilities Services employees are regularly encouraged to identify environmentally friendly opportunities for technology or innovation. To ensure our campuses run with a minimum impact on the environment Facilities Services staff members are tasked with the following related duties:

- Testing building systems on a regular basis to ensure energy saving controls are operating normally (i.e. occupancy sensors).
- Adjusting building management systems according to optimum daily conditions.
- Completing night time audits to identify equipment and lighting running unnecessarily and switching them off.
- Cleaning campuses during hours of operations to reduce the need for after-hours lighting and other building systems.
- Maintaining the Sodexo cafeteria's kitchen equipment on a quarterly basis to ensure optimal running conditions which reduce energy loss.

LANDSCAPING

KPU has the following sustainable landscape features and utilizes the following sustainable landscape practices:

- Langley campus has an integrated pest management Bug Garden showcasing a living lab for biological controls of plant growth and plant disease.
- Cloverdale campus perimeter has plantings of deciduous trees to provide summer time natural cooling as well as the opportunity to maximize natural light in the winter (as the leaves of the trees fall).
- Cloverdale visitor parking area and the Coast Capital Library expansion project used pervious concrete making it porous for absorbing rainwater and recharging the water table. Rainwater percolates through and into the soil, where it's naturally filtered and helps replenish the groundwater supply.
- Low flow drainage (storm systems) in parking lots prevents a surge of water and sediment to backflow preventers municipal systems and or local streams during heavy rain.
- Greenways have been planted with grasses and shrubs (bioswales) that slow down the flow of rainwater, trap sediment and release oxygen. Lined with a geotextile material, greenways prevent rainwater from seeping into and contaminating groundwater. They also clean the water and channel it into the stormwater management pond, which allows sediment within the water to be filtered.
- Viable plant or tree species requiring removal as part of building expansion or exterior improvements are relocated to a different location when possible.
- No pesticides, herbicides or phosphates are used for landscape maintenance.
- Irrigation is not used for regular maintenance of landscape features with the exception of targeted drip irrigation or hand watering to ensure survivability of significant specifies (e.g young trees, new plantings, and courtyard species with unusual heat load/concrete environments).
- Langley Pond (north and south campuses) is maintained to ensure the storm water from the buildings and parking areas travel through effective bio-filters before reaching the fish habitat.
- New plantings meet the LEED standard criteria for minimal maintenance and watering after establishment.

WASTE MANAGEMENT

The recycling processes divert approximately 25 consumer materials away from landfills with the opportunity for more diversion being explored. For the purpose of simplicity this section only contains physical waste. A summary of the waste diversion activities are provided in the table below with detailed waste management categorized using the 3 "R's": Reduce, Reuse, and Recycle.

WASTE DIVERSION SUMMARY

WASTE/ RECYCLEABLE PRODUCT	RECYCLING CONTRACTOR	DEPARTMENT RESPONSIBLE
Office paper	SuperSave	Facilities
Corrugated cardboard	SuperSave	Facilities
*fluorescent lamps, ballasts	Nulife	Facilities
*batteries/ballasts	Nulife	Facilities
printer and toner cartridges	IKON	Material Management
metals	local & R&P Metals	IET and Facilities
computer/ electronic scrap	ABC Metals	IET
masonry debris	SuperSave	Facilities
*used oil	M&R Mobile PlasticGrind	Facilities
*used oil filters	M&R Mobile PlasticGrind	Facilities
*tires	local companies	Automotive
*used antifreeze	M&R Mobile PlasticGrind	Facilities
*kitchen oil/ grease	West Coast Reduction	Facilities
*Science lab chemicals	Newalta	Sciences
compost/ green waste	SuperSave	Horticulture
bottles/cans/domestic plastics	SuperSave	Facilities
Confidential papers	Shred-It	Material Management
general waste	SuperSave	Facilities
hard cover books	Urban Impact	Facilities
*Hazardous fluids	Newalata	Facilities
Pallets	Various	Facilities
farrier shop organic waste	SuperSave	Facilities
drywall	contractors / inhouse	Facilities
paint	contractors / inhouse	Facilities
8 mm film		Library

Sodexo cafeteria recycles its own cardboard, plastic, glass and metal

REDUCE

- **Coffee cups**
  - Reusing a coffee mug will provide a $0.25 discount at the Grassroots Cafe, $0.15 discount at the Sodexo cafeteria and a $0.12 discount at Tim Hortons.
  - Proceeds from the purchase of reusable mugs sold at the cafeteria for $2 (with coffee), go towards the National Fish and Wildlife

Foundation.

- **Take-out containers**
  - Using a reusable lunch box/tiffin or purchasing a $8 tiffin at the Sodexo cafeteria will provide a $0.50 discount towards the purchase of food.
  - All cafeterias use biodegradable take out containers (soup bowls, cups, and plates) for food and beverages with the option to use metal utensils for in cafeteria meals.

- **Plastic bottles**
  - Bottles can be filled for free at any one of the water stations set up on all four campuses.
    - Currently there are 3 water stations in Surrey,1 in Langley, 1 in Coverdale, and 2 in Richmond. Additionally all cafeterias have free water refill stations.

- **Xpress nap holders**
  - All cafeterias have express nap holders with 100% recycled napkins from 70% post-consumer content.

- **Paper**
  - All paper purchased by KPU is 30% post-consumer recycled paper.
  - All paper used by the KSA is FSC certified.
  - Employee printers are automatically set for double sided printing.
  - Paychecks, many invoices, T4 and tax forms are all provided in electronic form.
  - KPU senate and board are provided with iPads to eliminate the need to distribute paper copies of meeting documents.
  - Hand dryers instead of traditional paper towel dispensers are installed in some washroom areas.

- **Hazardous waste**
  - Use of hazardous material has been kept to a minimum.
  - Paint supplies are low Volatile Organic Compound (VOC) content.
  - All hazardous materials that are used are removed by professionals and go through the proper procedures before being recycled or reaching the landfill.

- **Green cleaners**

- Janitorial staff only uses Certified Green Cleaning products formulated for cold water mixing.
- All Sodexo dishwashers use apex super concentrated detergent that comes in minimal packaging.

- **Waste disposal**
  - Waste and recycling container frequencies are adjusted seasonally to match volumes generated at each campus which ensures bins are near capacity before being picked up.

RE-USE

- **Furniture**
  - Furniture is reused when possible or auctioned through government surplus to avoid landfill destinations.
    - From 2009 to August 2013 it is estimated that over $1.7 million worth of furniture has been re-used at KPU.

- **E-waste**
  - IET is involved with recycling computers by having them shipped to African schools where the children there can use them for their studies.

- **Cardboard**
  - Cardboard is recycled.
  - School of Horticulture reuses cardboard by using it to cover soil which acts as a weed barrier.

- **Wood**
  - Students from the horticulture program maintain the KPU campuses by pruning small trees. The pruned material is chipped on site and used as mulch on the campuses.
  - Sawdust and wood waste from classes at the Cloverdale campus are recycled.
  - Wood shipping pallets are re-used if possible or recycled.

RECYCLE

- **Reboot Recycling Program**
  - The KSA Reboot center in Surrey will recycle any recyclable materials that are dropped off. Including but not limited to

batteries, cartridges, light bulbs, and computers.

- **Recycle stations**
  - All campuses have recycling bins to capture the most frequent consumer products (containers, papers, and bottles).
  - In addition to recycle bins all campuses have a central recycling area (includes batteries) with easy access to the building's loading dock.

- **Composting**
  - KPU Langley campus has onsite composting that composts food and plant waste which is then used in KPU landscaping and gardening.
    - Currently only the School of Horticulture Field Labs and greenhouses compost their waste. Sodexo cafeteria waste is also used on an as needed basis.

- **Construction/demolition waste**
  - All renovation and construction waste materials are sorted and recycled when possible.
  - For the LEED certified buildings and construction projects in general the aim is to divert at least 75% of all waste materials away from the landfills.

- **Plant pots**
  - School of Horticulture Field Labs sends all plastic pots and poly to West Coast Plastic Recycling.

TRANSPORTATION

To aid with carbon reduction the following transportation services are provided:

- **UPass**
  - Students can use their Upass to ride on any TransLink bus and SkyTrain. The Upass also provides discounted fitness memberships and access to car sharing services.
    - http://kpu.ca/upass.html

- **Intercampus shuttle**
  - KPU has the largest University provided shuttle service in North America which is available to all students and staff.

- Currently the shuttle makes an average of 1,100 trips a week (this is expected to increase with the increase in services starting in the fall of 2013).
    - http://kpu.ca/upass/shuttle-schedule.html

- **Carpool option**
    - To reduce the impact of vehicle emissions all four campuses are registered with car sharing programs.
        - http://www.kpu.ca/supply/park_transit/carpool.html

- **Car rental program**
    - To facilitate the need for a vehicle KPU has registered with Car-2-Go, a low emission, electric drive vehicle option. These vehicles have 2 free parking stalls on all campuses.
        - http://www.ksamultipass.ca/car2goCarSharing.html

- **Bike storage**
    - All 4 campuses are equipped with enclosed bike storage.

- **Showers**
    - 3 of 4 campuses (Cloverdale, Langley and Surrey) have showers to facilitate those choosing to walk or bike to campus.
        - All campuses will have showers once the Richmond Chip and Shannon Wilson School of Design building is complete.

- **Anti-idling awareness**
    - KPU vehicles have posted reminders to reduce fuel emissions. Drivers are briefed yearly on idle free driving.

- **E-vehicle stations**
    - The Cloverdale campus has designated parking spots with outlets for electric vehicles to charge.

- **Hybrid vehicle stalls**
    - Dedicated parking stalls for hybrid vehicles are available at the Surrey and Cloverdale campuses.

- **Telework and compressed work weeks**
    - Some staff members have the option to reduce travel emissions by working from home or working more hours in fewer days.

- **Teleconferencing**
  - IET has implemented teleconferencing infrastructure and equipment which allows staff in multiple locations to attend meetings without traveling from one campus to another.
    - Conference calls can be initiated from staff and faculty office phones as well as teleconferencing units that can be signed out at the campus libraries.

- **Hotel offices**
  - IET staff members have drop-in offices setup at all campuses to allow them to work closer to home and cut down on carbon emissions.

- **Online classes and compressed courses**
  - Students have access to a variety of online and compressed courses which help reduce carbon emissions. Since 2007/08 KPU has increased the number of on-line course registrations by 80%.
    - http://www.kpu.ca/online-learning/onlinecourses.html

- **Other**
  - All staff in the office of sustainable agriculture transit or bike to work.
  - 2/3 of design students transit, walk or carpool to school.
  - Horticulture students are encouraged to carpool to different field trips.
  - Mail delivery between campuses has been changed from day to night when there's less traffic, resulting in a total reduction of 2 hours of road time per day.

FOOD

The following sustainable food options are provided to the community:

- **Campus cafeterias**
  - KPU has partnered with Sodexo to provide sustainable dining services. Menus are designed to take advantage of local fruits and vegetables, including the Langley garden.
  - From May to September food is prepared using some produce from the Langley School of Horticulture Field Labs.
  - All coffee sold at the Surrey campus cafeteria is Rainforest Alliance Certified, all coffee sold in the Langley cafeteria is Fair-trade certified.
  - Seafood follows Ocean Wise standards when possible.

        - http://www.kwantlenkuisine.com/sustainability/local.html

- **Grassroots Cafe**
    - Student run cafe providing 100% fair trade and organic coffee, tea, and chocolate products. The products are always organic and local when possible.
        - https://sites.google.com/a/kusa.ca/cafe/home

- **Farmers Market**
    - The KPU Langley campus is home to the Langley community farmers market running from late May to early October. The market has fresh local produce and home baked goodies, along with many other goods and activities.
        - http://www.langleycommunityfarmersmarket.com/the-market/

- **Langley Produce Sale**
    - Organic and non-organic produce is grown for teaching and learning purposes. Every Thursday from 11AM-2PM the School of Horticulture Field Labs puts its freshly picked produce on sale. All unsold produce is donated to the local food bank.

- **Harvest boxes**
    - KSA runs a Harvest box program to provide students, staff and the community with affordable local produce. Anyone can order fresh local produce and pick them up at any one of KPU's four campuses.
        - http://kwantlen.weebly.com/harvest-boxes.html

- **Student Food Bank**
    - Students facing financial difficulties can receive 2 free food hampers per month. All requests for food hampers are processed anonymously and provided through an anonymous locker program.
        - http://kwantlen.weebly.com/student-food-bank.html

COMMUNITY OUTREACH

As advocates of sustainability KPU hosts various events for the KPU community and the community at large. These events spark discussions about the

importance of sustainability and methods of decreasing our environmental impact.

- **Branching Out**
  - Started in 2010 and occurring every year since.
  - Brings together students from landscape, production and turf, arboriculture, and horticulture science programs to learn from one another through round-table discussions and networking. An expert speaker is brought in to stimulate discussions.
  - The 2013 event occurred in January with keynote speaker Brian Minter.

- **Farmers Market**
  - The KPU Langley campus hosts the Langley community farmers market running from late May to early October. The event features local food, artisans, home baked goodies, and creative artisan crafts.
    - http://www.langleycommunityfarmersmarket.com/the-market/

- **Green Wednesdays**
  - Started in 2007 and occurring every year since.
  - KPU Langley holds a sustainability related public event that features movies and speakers. The event sparks community dialogue and is responsible for planting the ideas for many initiatives such as the Langley Farmers Market and the use of bees in the greenhouses at School of Horticulture Field Labs.
    - http://www.horticulturebc.info/greenWednesdays.htm

- **Institute for Horticulture (ISH) Workshops**
  - ISH hosts various workshop events throughout the year to help educate students, staff and the community.
    - http://www.kpu.ca/ish/workshops.html

- **Open House at ISH Research Greenhouse**
  - On the 3rd Wednesday of every second month, the Institute for Sustainable Horticulture hosts an open house featuring projects that would appeal to greenhouse producers.
    - http://www.kpu.ca/ish/openhouse.html

- **Community Garden**

- From mid-September till the first week of July local students from Douglas Park Elementary school are taught how to grow and maintain crops at a garden at the School of Horticulture Field Labs. The items grown are provided to the students to take back for their lunch.

- **Bees Workshop**
  - 3 bee honey comes every 2nd Wednesday to complete hive maintenance at the School of Horticulture Field Labs. They also educate the community about honey bees.

- **Langley Plant & Produce Sale**
  - The School of Horticulture Field Labs holds an organic and non-organic produce and flowers sale every Thursday from 11AM-2PM. A plant only sale is held on the last Saturday of April from 9am-3pm. At these events the community can purchase plants and produce and ask any related questions such as information about gardening or plant diseases.

BUILDINGS & ENERGY

KPU buildings are designed to minimize our environmental impact and energy consumption. We use 50% less energy than the typical post-secondary in North America and have the first two LEED certified buildings in the City of Surrey (Cloverdale campus and the Surrey Coast Capital Library).

AWARENESS & TRAINING

The following resources and programs have been developed for students, staff, and faculty members to help us reach our climate and energy goals. Numerous resources are also available to the public to help reduce the impact on the environment.

ENERGY CONSUMPTION DASHBOARDS

KPU has installed the following dashboards that provide real-time information as well as past information about our energy consumption:

- Campuses Dashboard

    - Online dashboard displaying the energy consumption of KPU campuses (Cloverdale, Richmond, Langley & Surrey).
- ISH Research Lab Dashboard
    - Online dashboard displaying the energy consumption of the Institute for Sustainable Horticulture (ISH) Research Lab at the Langley Campus.
- Info Screen
    - At the Horticulture Center there is a touch screen which is available to the public. It displays the energy consumption of the Horticulture building and greenhouses.
- Building Management Dashboard
    - Available to trained KPU personnel. This dashboard allows individuals to access and control heating, ventilation, air-condition and lighting. It is also used in identifying dysfunctional equipment and optimizing energy use.

BUILDING OPERATOR TRAINING

The following is a brief summary of the training activities that occurred in 2013. Training ensures that employees are up to date on the latest sustainable practices. Currently three KPU facilities personnel are LEED (Leadership in Energy and Design) certified. For a look at the training activities occurring prior to 2013 please refer to the Strategic Energy Management Plan.

Action	Start Year	Status
AHU (Air Handler Unit) log sheet developed to raise FSG (Facilities Support Generalist) awareness of AHU energy use	2013	Every month
Horticulture Green Team training – learn to look at energy bills and metering to determine causes and prevention methods to reduce energy use (Green Teams will expand to different departments)	2013	Every month
Attend BCHydro Energy Manager session	2013	Complete

GREEN TIPS

To help everyone understand how they can help conserve energy, tips and resources are provided on the Facilities Service website.

- Green Tips
- Helpful Resources

PRESENTATIONS

Presentations about KPU's sustainability initiatives have been occurring yearly. These presentations help to spread knowledge and awareness about environmental sustainability. For the year ending August 2013, the following has occurred:

Event	Description	Date
Student Awareness Orientation	Energy booths in Richmond, Langley, and Surrey campuses during student orientations were set up to inform new students about KPU's sustainability initiatives	Aug 28-30 2013
Human Factors & Architecture	A class highlighting the sustainable features of the Surrey campus design	Mar 28 2013

Past presentations can be viewed in the Strategic Energy Management Plan.

STUDIES & PROJECTS

The following is a brief overview of some of the relevant studies and projects KPU staff and faculty have completed:

- Green Roof Plants Final Report

  Funded by Agriculture and Agri-Food Canada through the Canadian Agriculture Adaptation Program, a green roof plant study was reported to the Investment Agriculture Foundation of British Columbia. KPU faculty and staff conducted this study in collaboration with BCIT's Center for Architectural Ecology.

- Frost & Sullivan 2008 Bright Green Building Case Study

  KPU contributed a review of the Cloverdale campus and the impact of intelligent building management systems used within the building.

- Green Buildings – Pilot Project

  KPU assisted the Government of BC to develop its Green Buildings BC – Retrofit Program by being the first "Pilot Project" to test the various policies and instruments. The project started in 2001 and was completed by late 2002. Energy cost savings from the project are over a million dollars every three years – unadjusted for inflation.

- Weather station

  KPU's Surrey campus weather station has been linked to the Building Management System. The data gathered will be utilized to assist in planning future energy conservation projects.

- Earth hour- Energy Audit

  Facilities participated in the world wide event turning off exterior building, parking, and non- emergency lighting at all campuses. During this time audits were conducted, providing information for additional energy saving opportunities.

SUSTAINABLE BUILDING DESIGN

All new construction and renovations follow the Design Guiding Principles and are built to reduce our carbon footprint. KPU's construction projects are designed to meet or exceed LEED Gold requirements and all major renovations aim to meet LEED Silver certification or better.

LEED CERTIFICATIONS

KPU received the first LEED Gold certification in the City of Surrey. Also, of the eight LEED Gold certified buildings in the City of Surrey, two are KPU buildings.

LEED Gold: Surrey Arbutus (Coast Capital Savings Library) building (74% more efficient than the traditional model building) and Cloverdale Campus (33% more efficient than a traditional campus).
LEED Silver: Surrey Main building
LEED Pending: Langley ISH Labs, Langley West wing and Richmond library

LEED RENOVATIONS/CONSTRUCTIONS

KPU renovations and constructions are planned to limit our negative impact on the environment. The LEED certified buildings in particular use an integrated design process and incorporate the following sustainable design practices where possible:

- **Minimize finishes:** Concrete floors are used where viable to avoid future flooring replacement, as well as reduce the cleaning processes including the cleaning chemicals to maintain them. Coloured concrete walls were used at the Cloverdale campus.

- **Maximize natural light:** Large windows, oculus, and/or skylights maximize natural light while building orientation and/or window glazing helps minimize solar heat and glare.
    - The Cloverdale campus site specifically was tested for several months in order to orient the building to maximize natural light and solar gain. 90% of the building has views to the outdoors.
- **Select local/high recycle content material:** Local artisans and suppliers are considered for building materials with consideration given to materials with high recycle content.
- **Recycle or re-use products:** Materials from the original buildings are incorporated into renovations. New constructions include the use of recycled products e.g. Pine beetle wood (typically considered waste) was used to create an acoustic ceiling at the Cloverdale campus.
- **Minimize water waste:** Utilize low-flow toilets, waterless urinals, sensor-controlled faucets, low-flow roof drains, drought tolerant plants and/or bioswales to reduce water waste.
- **Use natural ventilation:** Trickle vents and/or operable windows provide 100% outdoor fresh air to the buildings. Skylight vents and mechanical louvers exhaust air from the buildings in support of the stack effect.
    - Utilize a carbon dioxide sensor to monitor the rooms activity and start mechanical ventilation as required.
- **Use low-emitting products:** Finishes use low-emitting products, and zero CFC and HCFC products to minimize air pollutants.
- **Use geothermal:** Geo-exchange is utilized when viable. Currently, 25% of the Surrey campus is served by a geothermal field. A greenhouse at the School of Horticulture Field Labs also uses geothermal.
- **Incorporate photovoltaic:** Cloverdale campus south elevation has photovoltaic panels generating a small portion of power for the campus.
- **Provide open faculty offices:** Open offices reduce the construction materials required. These also provide a reduction in mechanical and electrical lighting and control systems, along with improved air circulation.
- **Install multipurpose sensors:** Multipurpose sensors control the building systems which automatically shut down lighting and ventilation when there is no activity in a room.
- **Utilize commissioning experts:** After the construction process, commissioning experts are brought in to optimize the building controls and systems balancing, in response to changes in space functions (renovations) and as regular audits.

For details about the LEED buildings refer to the Publications section of the Facilities Services website.

NEW LEED CONSTRUCTIONS

KPU is currently designing the building. The construction aims to receive a minimum of LEED gold certification. It follows KPU's environmental commitment of reducing our carbon foot print by using locally produced materials and energy efficient features.

ENERGY MANAGEMENT ACTION PLAN

KPU became a partner of BC Hydro Power Smart in 2002. Since then we have made energy improvements that saved over a million dollars in energy costs every three years, and reduced our greenhouse gas emissions by 30%. Most recently we received the 2012 BC Hydro Power Smart Excellence Award, this is the fifth time KPU has received this highest of B.C. Hydro's designations.

Efforts that have reduced KPU's energy efficiency costs can be viewed in the following resources:

- Strategic Energy Management Plan
  - KPU has been identified for having one of the most comprehensive energy reporting systems in the educational sector. Developed to annually capture what has been achieved and further projects and actions for the future.
  - For 2013/14 $300,000 is budgeted for energy management projects for a target reduction of 2% in kWh/ m^2.

- Success Stories
  - Since completing major retrofits in 2002 KPU has found continuous ways to conserve energy and achieve operating efficiency. Some of the energy conservation success stories have been documented to guide future projects and help others complete similar projects.

- Efficiency Improvements Using Technology
  - Technology has been used in many of KPU campuses to help increase energy conservation and reduce the overall carbon footprint. Some of the technologies involved are condensing boilers, natural ventilation, demand ventilation, lighting, electric motors and radiant flooring. Geo-exchange systems are also used for partial or full heating and cooling needs at Surrey Main and the Arbutus building, as well as the greenhouse at the School of Horticulture Field Labs.

- Sustainable Technology Initiatives
    - IET has made various changes that demonstrate our commitment to the overall vision of Green information technology at KPU. These include remote shut-down of computers, thin clients, virtualization of servers, and the increased provisioning of laptops for faculty and staff.
    - IET is currently in the process of installing 1,600 Dell Wyse zero clients to replace its outdated PCs and thin client devices. The expected power savings are $23,000/year. More info about this system can be found here.

ENERGY PROJECTS UNDERWAY

For the 2013 year the following energy saving projects have begun:

- Project to replace parking lot lights at the Surrey campus is underway. 150w metal halides will be replaced by 68w LED retro kits or new fixtures. The yearly electrical savings are expected to be over $3,500. Future LED replacement opportunities are being explored.

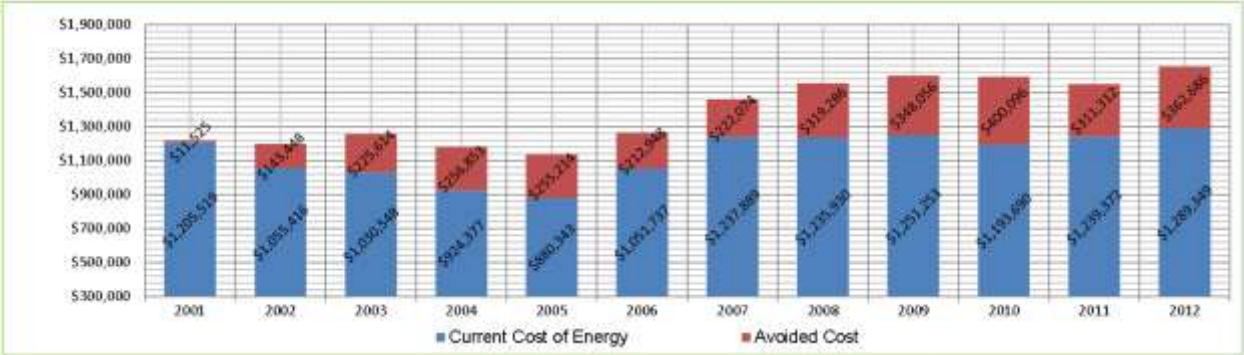
- The Surrey campus main server room for the University is having an air conditioning upgrade. The upgrade will allow for cooling of the server components rather than the cooling of the whole room. It will also redistribute the excess heat from the server room back to the geothermal field to improve its performance.

ENERGY CONSUMPTION RECORDS

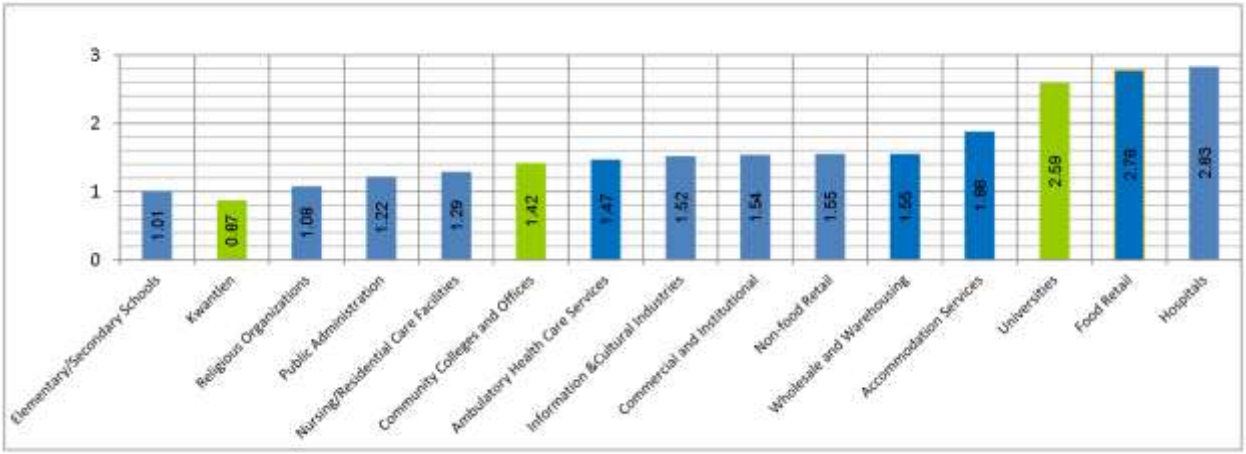
KPU has been compiling detailed energy consumption and greenhouse emissions data since the 1990s. These records help measure and compare consumption and help identify trends and opportunities. With a commitment to energy conservation KPU's total amount of energy avoidance from 2000-2010 has been enough to power 4,150 homes for a year.

KPU has been performing energy efficiency retro-fits for over 10 years. From 2001-2012 the university had a total cost avoidance savings of $3,069,110 ($1,797,498 electrical, $1,199,671 natural gas, $71,941 carbon tax).

The following graph shows the annual energy cost avoidance since the year 2001:



As a leader in energy efficiency, KPU used 39% less energy than a typical college and 66% less energy than the average university in Canada in 2012. The following graph displays KPU's energy intensity use compared to other industries (benchmarked to Natural Resources Canada Data – eGJ/M²):



Detailed information about our energy consumption and resulting cost avoidance can be viewed in our Energy Consumption Records.

ENERGY SAVING OPPORTUNITIES

As of 2013, three evaluation station areas are set up to test potential lighting products prior to installation:

- **Surrey loading dock:** Light display in the Surrey campus Birch building loading dock remains following testing and evaluation of different locally supplied light fixtures. The test stations are a 40w induction, 10w LED, 30w LED, 20w LED, 75w and a rebuilt 125w metal halide. This display is open to the public with all-weather signage displaying the test results.

- **Surrey Main stairs:** Trial testing a 5w LED and a 13w LED light, both of which replaced 2-60w incandescent lights. Successful test results will result in the implementation of these LEDs in low-traffic/ "back of house" stairwells

throughout all the campuses. The new lights will last approximately 13 years and result in significant energy and maintenance cost savings.

- **Langley Horticulture:** A new style of 56w LED called Central Light is being tested as a replacement for a 250w Metal Halide lamp.

GOVERNMENT REPORTING

KPU has taken many steps to reduce greenhouse gas emissions and energy consumption in order to achieve carbon neutrality. In 1995, KPU joined the federal government's Energy Innovators Initiative and Canada's Climate Change Voluntary Challenge and Registry (VCR). KPU is also involved with the following government initiatives:

CARBON NEUTRAL ACTION REPORT

KPU links energy conservation with its Carbon Neutral Action Report to ensure that energy remains a key organizational priority.

The Carbon Neutral Action Report is part of the required mandate of Bill 44 which makes greenhouse gas reduction a legal requirement. The report documents KPU's greenhouse gas emissions as well as the actions that are taken and will be taken to further reduce emissions.

The bill outlines specific targets that KPU is to achieve in 2012, 2016, 2020, and 2050

- By 2012 – 6% below 2007 levels
- By 2016 – 18% below 2007 levels
- By 2020 – 33% below 2007 levels
- By 2050 – 80% below 2007 levels

PUBLIC SECTOR ENERGY CONSERVATION AGREEMENT (PSECA)

KPU is also a part of the Public Sector Energy Conservation Agreement (PSECA) which outlines specific targets that are to be achieved in 2011, 2016 and 2020. As KPU continues to grow (3% student full time enrollment growth and 2% increase in building area from 2011-2012) it has the challenge of meeting the following energy reduction goals:

- 2011 – 5% reduction
- 2016 – 14% reduction
- 2020 – 20% reduction

APPENDICES

APPENDIX 1 – COURSE PROJECTS/ASSIGNMENTS

Following is a brief look at some of the projects and assignments offered in the sustainability related courses.

APPENDIX 1-A: ENVIRONMENTAL TECHNOLOGY COURSES

ENVI 1121: Students scan the news for anything that has happened in the local environment (e.g. fires, storms, etc.). This information is then posted to a blog.
ENVI 2307: Students complete energy audits in an area of their choice to understand which uses less energy.
ENVI 2310: Groups of 5-6 students complete a waste audit of KPU campuses. The first waste audit resulted in a reduction of toilet paper waste (as cleaners were previously throwing out toilet paper rolls that were not completely used).
ENVI 2315: Students pick an area they're interested in e.g. they may look at a creek's quality to determine if it is good for salmon habitat. In the past students have examined the water quality in Logan Creek, the impacts of putting damns on rivers, and have worked with the City of Surrey to take samples of creeks that go into boundary bay.
ENVI 2405: This is a project based course. Students work within the community to have municipality change/amend bylaw. Currently students are partnered with Burns Bog to help create bylaw for peat removal in Delta. In the past, one group successfully lobbied the City of Surrey to expand bylaw for Diwali festival's to include a recycling requirement in order to get a license. Other efforts which didn't go through but started a discussion have been with the City of Vancouver to levy taxes on plastic bags and make the presence of recycle bins a requirement for wherever there are newspaper booths (2000 signatures obtained). The City of Surrey was also lobbied to put in an anti-idling bylaw.
ENVI 2900: This is a research project course. Students find their own project which is generally a technical project with a focus on community needs. In the past some students have worked with the Institute for Sustainable Horticulture to determine effectiveness of different composts. Some have worked with Agriculture Canada. Some have gone overseas (Ghana, Cuba) to work on projects such as biochar, composting methods, and pest biocontrol. One student calculated the amount of pollution produced from generators in food carts.

APPENDIX 1-B: FARM SCHOOL

Students design their own projects to explore their interest in agricultural management and business. In the past, the projects have included sustainable management of blueberries, composting tea to be used for soil nutrition and biological diversity, composting farm waste through permaculture design, and using honey and beeswax to make value-added products.

APPENDIX 1-C: HORTICULTURE COURSES

HORT 1122: Students maintain the Langley Bug Garden and use it for plant identification, pest management, and landscape practices. In 2009 students partnered with the Salvation Army Gateway of Hope Building to restore Logan Creek with native plants and install a 2800 sq.m. green roof.
HORT 1119: In a partnership with Metro Vancouver students installed palisades (wooden tree trunks as defensive structures) and wattle fencing (woven wood fencing) on sections of Brae Island slough. Students also retrofitted two green roofs on Brae Island with engineered crumb rubber media and adapted green roof plants for a performance trial. This is an ongoing project that is monitored and maintained by the students. At the Langley ISH labs students work with mulch trials to identify the most effective method for suppressing weeds.
HORT 1240: Students prune the low branches on trees at the Langley campus. Prunings chipped on site and used as mulch on the campuses. In the past students have worked with LEPS (Langley Environmental Partners Society) to demonstrate tree maintenance so LEPS can replicate the techniques. Students also maintain the Langley Bug Garden and use it for educational purposes.
HORT 2426: Students critically look at how "green" a green product is by looking at where the product came from, how it was manufactured, how it got here and how long it lasts in the landfill.

APPENDIX 1-D: POLICY STUDIES COURSES

Post 1100: For the 2013 summer semester students will be sending a letter to someone (likely KPU faculty) arguing for or against a policy. This type of project may continue into future semesters.

APPENDIX 2 – ENVIRONMENTAL STUDENT GROUPS & ASSOCIATIONS

- **CIR:CLE** (**C**enter for **I**nterdisciplinary **R**esearch and **C**ommunity **L**earning **E**ngagement)
    - Goal is to establish strong, equally beneficial relationships with community partners, and maintain a positive impact for members of a community through long-term engagement.
    - Current Director: Larissa Petrillo; Former Director: Steve Dooley.
        - http://kpu.ca/circle.html

- **EGB** (**E**merging **G**reen **B**uilders)
    - Run by the Interior Design Department.
    - Created the first Seeds library in the Fraser Valley.
    - Promote resource efficient and environmentally friendly building designs.
        - https://www.facebook.com/pages/Kwantlen-Emerging-Green-Builders/153263214702922

- **ENACTUS** (**E**ntrepreneurship, **A**ction and **US**)
    - Student-led organization open to all KPU students.
    - Aims to create opportunities for students, families, and communities.
        - https://www.facebook.com/EnactusKPU
        - http://sifekwantlen.com/

- **KPIRG** (**K**wantlen **P**ublic **I**nterest **R**esearch **G**roup)
    - Student-led society open to all KPU students and faculty members.
    - Aims to promote social and environmental projects.
    - First of its kind in the south of the Fraser.
    - Aiming for collection in September.

- **KPU Builds**
    - Student driven initiative in partnership with Habitat for Humanity and Global Village.
    - Operates as a sustainable non-profit organization that aims to provide opportunities for students to contribute to the community in a meaningful way.
        - http://kpubuilds.com/
        - https://www.facebook.com/HabitatForHumanityKpuBuildTeam

- **KSS** (**K**wantlen **S**tudents for **S**ustainability)
    - Developed to focus on increasing student involvement and mobilization towards sustainable policy issues. KSS aims to encourage, stimulate, and maintain excellence in scholarship of individual members in all fields, particularly in Policy Studies, and to advance interdisciplinary studies in public policy.
    - Merger of Sustainable Greenhouse Group and Policy Students Group.
    - Facility Representative: Paul Richard.
        - https://www.facebook.com/KwantlenSustainability

APPENDIX 3 - RESEARCH GROUPS

APPENDIX 3-A: INSTITUTE FOR SUSTAINABLE HORTICULTURE BIO-CONTROL RESEARCH GROUP

The Institute for Sustainable Horticulture (ISH) is developing microbial biocontrol products to replace pesticide use in agriculture and urban landscapes to control plant diseases and pests. ISH works not only to discover and research these new environmentally protective products, but has pilot scale production facilities which help move them into the market. In addition to developing new biocontrol products, ISH works with local industries who are developing other environmentally protective new products such as bio-fertilizers and plant extracts that control plant diseases and pests, and natural plant active compounds. All of these products will help agriculture and landscape

horticulture become more sustainable. Some of the current projects involve the following:

- Developing new biological fungicides from native beneficial fungi with a local nursery partner, and the province of BC. The goal is a commercial product for ornamental plant production that controls soil-borne diseases.
- Developing BC native beneficial fungi as new biocontrols for insect pests of a range of crops. Being developed with the support of a number of BC growers associations.
- Working with a number of industry partners to conduct studies on the use of biochar as a soil amendment for agriculture and horticultural use.

Some of the past projects can be viewed here

APPENDIX 3-B: INSTITUTE FOR SUSTAINABLE FOOD SYSTEMS RESEARCH GROUP

The Institute for Sustainable Food System research group's focus is to help develop regional-scale, human intensive food systems. The past and current work falls under two categories: Municipally Enabled Sustainable Agriculture (MESA) projects and Bio Regional Food Systems projects. Some of the projects involve the following:

- Research in south-west BC and Yukon to evaluate the potential of food systems organized at the eco-regional scale.
- Completed a study on Surrey's underutilized ALR (agriculture land reserve) lands.
- Worked with the City of Langley to develop a detailed implementation plan and associated cost structure of a MESA demonstration project utilizing BC Hydro Right-of-Way.

Further information on projects can be viewed here

APPENDIX 4 – SUSTAINABILITY RELATED EVENTS

KPU students and staff participate in a variety of activities that promote sustainability. The following provides an overview of the 2013 environmentally sustainable events. For prior events please review KPU News, Highlights & Stories.

- Cuba Food Security
    - KPU students have been involved in food security and sustainable agriculture development project in Sancti Spiritus, Cuba for 3 years, with funding provided by the Students for Development program (CIDA and AUCC).

- KPU Build's Bula
    - Students from the KPU Builds team visited Fiji to help create safe, affordable and sustainable housing for a local community.

- Amazon Field School
    - Students and staff spent two weeks exploring Bogota and the Amazon jungle.
    - As a part of their trip, students and staff toured a monkey rescue center and learned about the Calanoa Project which champions sustainability and conservation in the Amazon regions.

- Beautifying Cloverdale Station
    - KPU School of Horticulture partnered with Fraser Valley Heritage Railway Society to have students create hanging baskets for the station.
    - Students are also developing a landscaping plan for the heritage station that will utilize sustainable practices. The plan is set to be complete in December 2013.

- WCTA Conference
    - KPU Turfgrass diploma students travelled to Penticton B.C for the 50th annual Western Canada Turfgrass Association (WCTA) conference.
    - Students learned how to manage the largest green spaces in our community and had the opportunity to connect with industry experts.

- Idle No More Teach-In
    - KPU faculty and students hosted a public education symposium to explore the issues surrounding resource exploitation and the bypass of environmental regulations in Indigenous lands.

- Margaret Atwood
    - KPU's Miss Representation Action Group welcomed Margaret Atwood at the Melville Center for Dialogue at the Richmond Campus for her feature documentary, Payback.
    - KPU Horticulture students decorated the stage with plants they grew. These were then given away to all of the event goers.

APPENDIX 5 – AWARDS & RECOGNITIONS

KPU's sustainability efforts have been recognized with various awards. The following is a list of the 2012-2013 environmental awards won by the University, its students and staff. For previous successes please view KPU News, Highlights & Stories and Sustainability Awards.

- **BC Hydro's Power Smart Excellence Award – 2012**
    - 5th time KPU has received this designation

- **HEITBC's Award of Excellence for Innovation – 2012**
    - Awarded to the IET thin client team

- **ISA's Excellence in Arboricultural Education Alex L. Shigo Award – 2013**

- Awarded to Susan Murray (nominated by students)

- **Provincial Skills Canada competition gold – 2013**
  - Awarded to KPU Turf students – Kevin O'Conner (Landscape Apprenticeship Program) and Jason Thompson (Turf Management Diploma Program)

- **Vancouver Giants Medal of Valor – 2013**
  - Awarded to the KPU Builds team in recognition of their humanitarian efforts of building homes in Fiji
- **Vancity enviroFund Grant for $75,000 – 2013**
  - Awarded to KPU's Institute for Sustainable Food Systems in support of their BC bio-regional food system design and plan project and its goals

APPENDIX 6 - CURRENT PARTNERS

- **Acting Together - Community-University Research Alliance (AT-CURA)**
  - A partnership with AT-CURA whose goal is to identify protective factors that may prevent youth from violence and gang involvement. AT-CURA's partner, the City of Surrey has donated a plot where high school youth are employed for the summer and part of fall to learn how to grow organic vegetables. A large portion of the food is donated to the food bank.
    - http://www.actingtogether.ca/

- **Burns Bog**
  - A current partner (Summer 2013) with the Environmental Protection Program (ENVI 2405) working to create bylaw for peat removal in Delta.
    - http://www.burnsbog.ca/

- **City of Langley**
  - Partnered with the Institute for Sustainable Food Systems to assess viability of Municipally Enabled Sustainable Agriculture (MESA) demonstration project using BC Hydro Right Of Way.
    - http://www.city.langley.bc.ca/

- **City of Richmond**
  - Provides educational space for the Richmond Farm School at Terra Nova Rural Park. Also provides incubator farm land to program graduates.
    - http://www.richmond.ca/home.htm

- **City of Surrey**
  - Partnered with the Institute for Sustainable Food Systems to fund and participate in the research of Surrey's underutilized agricultural land reserves. Students from the Environmental Protection Program (ENVI 2315)

have worked with the City of Surrey to take samples of creeks that go into boundary bay.
    - http://www.kwantlen.ca/__shared/assets/Surrey-Report-201325975.pdf
    - http://www.surrey.ca/

- **Collaborative Applied Landscaping Planning Team (CALP-UBC)**
    - Partnered with the Institute for Sustainable Food Systems to produce a plan for the City of Langley for the Municipally Enabled Sustainable Agriculture (MESA) demonstration site.
        - http://calp.forestry.ubc.ca/

- **Cuba**
    - Institute for Sustainable Horticulture has partnered with Cuba to connect undergraduate classes in Agronomy in Cuba with a class of Environmental Protection Technology students to study vermicomposting by sharing data and comparing how vermicomposting differs between a tropical and temperate climate.
    - KPU students also complete internships on food security in Cuba with groups generally going every year since 2010.

- **Douglas Park Elementary School**
    - Partnership started in 2008. Classes from kindergarten to grade 5 come once a week for 2 hours to the School of Horticulture Field Labs. Children there are taught how to grow vegetables and maintain gardens.
    - At times a summer booster camp is setup for the kids.
        - http://www.actionschoolsbc.ca/schools-in-action/success-stories/success-story-sd-35-douglas-park-community-elementary

- **Feeding Our Future**
    - Sodexo initiative lasting 2.5 months (1 week/account).
    - KPU Sodexo volunteered for a week over the summer to make lunch bags for the Boys and Girls Club of Vancouver.
        - http://secondharvest.ca/feeding-our-future
        - http://www.feedingourfutures.com/

- **Global Village**
    - Partnered with KPU builds to help deliver humanitarian initiatives.

- **Habitat for Humanity**
    - Partnered with KPU Builds to help deliver humanitarian initiatives.

- **KEYS Housings and Health Solution - Barrister Island Organic Community Farm**

- The School of Horticulture has partnered with KEYS to provide technical help with setting up and maintaining their community garden on Barnston Island.
- Partnership facilitated by Steve Dooley.
  - http://keyssolutions.org/barnston-island-community-garden/

- **LEPS (Langley Environmental Partners Society)**
  - KPU students in HORT 1240 worked with LEPS to show them how KPU maintains trees so they can replicate it later on. This partnership will continue.
    - http://www.leps.bc.ca/
    - https://www.facebook.com/pages/LEPS/45135392279

- **Metro Vancouver Regional Parks**
  - Students from the Faculty of Science and Horticulture help maintain the regional parks. Students are also involved in the concept development of the garden and nearby pond.

- **Research Impact**
  - KPU has partnered with Research Impact which connects research and researchers with people and organizations seeking to develop sustainable solutions to social, environmental, economic and cultural challenges.
    - http://www.researchimpact.ca/home/

- **Richmond Food Security Society**
  - Richmond Food Security Society is partnered with the Sharing Farm Society. The society maintains the Community Gardens throughout Richmond. Through this partnership students of the Farm School program work with the Sharing Farm Society and become involved in community food security projects.
    - http://www.richmondfoodsecurity.org/

- **Salvation Army**
  - Sodexo Langley donates its raw produce to the local Salvation Army.
    - http://www.salvationarmy.ca/

- **Second Harvest**
  - A partner of Sodexo, all large amounts of Sodexo produce is donated to Second Harvest.
    - http://secondharvest.ca/

- **Sharing Farm Society**
  - Provides educational farm site for the Richmond Farm School. The Farm grows year round organic produce for the Richmond Food Bank and other community meal projects.

        - http://www.sharingfarm.ca/

- **Terramera**
    - One of the partners for the Institute for Sustainable Horticulture. Working with them to help them obtain the first Neem (natural insecticide) product registration in Canada.
        - http://terramera.com/

- **Van Belle Nursery**
    - One of the partners of the Institute for Sustainable Horticulture. Working with them to develop a natural biological fungicide for use in ornamental crops.
        - http://vanbelle.com/

- **VanCity**
    - Sponsorship helps support the Farm School to train new farmers and enhance local sustainable agriculture.
        - https://www.vancity.com/

- **National Fish and Wildlife Foundation**
    - Proceeds from mug purchase sold at the Sodexo run cafeterias go to the National Fish and Wildlife Foundation.
        - http://www.nfwf.org/Pages/default.aspx#.Ue2NMW34KVp

APPENDIX 7 - POTENTIAL PARTNERS

- **Bee Friendly**
    - Promotes the conservation and rehabilitation of native bee populations and their habitat.
        - http://www.beefriendly.ca/index.php/whats-new

- **Ecotrust Canada**
    - Will potentially support student volunteers to work on projects with them.
        - http://www.ecotrust.ca

- **Envirohub**
    - Non-profit organization whose mission is to generate environmental awareness in academic, local, and business communities around the world.
        - http://theenvirohub.org/
        - https://www.facebook.com/theEnviroHub

- **Environmental Youth Alliance**
    - Helps youth and children discover the benefits of nature.

        - http://www.eya.ca/

- **Farm Folk City Folk**
    - Not for profit society working to cultivate a local, sustainable food system.
    - Work on projects that provide farmland protection and accessibility.
        - http://www.ffcf.bc.ca/

- **Get on Board BC**
    - A coalition of residents, students, workers, businesses, academics, and other groups who are interested in improving public transit.
        - http://www.letstalktransit.ca/

- **Green Ideas Network**
    - Non-profit organization that works with individuals, governments, educators and community groups to create healthy communities for everyone.
    - Dedicated to provide education about sustainability via solutions-based approaches.
        - http://greenideasnetwork.org/

- **The Edible Garden Project (EGP)**
    - A project of the North Shore Neighborhood House. Work with a range of groups on the North Shore.
        - http://www.ediblegardenproject.com/about/who-we-are/

- **Village Surrey**
    - Engages individuals, neighborhoods and organizations to take actions that build sustainable communities in a fun atmosphere.
        - http://www.villagevancouver.ca/group/village-surrey

APPENDIX 8 - FUTURE PROJECTS

Potential projects to work on in the future. Underlined projects mean the project is underway or is certain to be accomplished. The name of the person who recommended the project comes before the project list.

Betty Cunnin

- **Revamp HORT class schedule**
    - For 2014 the schedule for HORT classes will be set up to reduce commute times for students.

- **Urban forestry management plan**
    - Want to have an urban forest on campus. This will most likely be taken on by Betty, Iain and students.

- **Trees in parking lot**
    - Trees have a 60 year life span but most in the city die before their 20th birthday. Want to have trees in the campus parking lot which can be used for a long term study about helping trees live in the city.

David Davidson

- **Rainwater capturing**
    - Would like rain water to be captured and recycled at the greenhouses.

- **Better access to Langley south**
    - Make the south end of Langley more accessible which will then give access to the creek.

- **Sustainability idea more explicit in HORT**
    - The diploma program for horticulture is under review to make the idea of sustainability more explicit. The changes should be completed by December 2013.

Deborah Henderson

- **Test energy conservation system**
    - The Institute for Sustainable Horticulture is hosting a research project on energy conservation for greenhouses. This will be commissioned early fall of 2013 in collaboration with a UBC PHD engineering student. The study will be hosted for a year.

Don Smith

- **Biodegradable garbage bags**
    - Exploring options for biodegradable garbage bags.

Farhad Dastur

- **Composting-to-community gardens project**
    - Convert KPU generated green waste into compost which could then be used in Community Gardens. Some of the compost could also be sold for revenue generation.

- **Sustainability conference**
    - Hold a campus-wide day-long conference in which members of the KPU community come together to share ideas, talk about projects, and network on issues related to sustainability.

Heather Harrison

- **Sustainability audit**

- Have Policy Studies (POST) students complete a sustainability audit such that students can learn about the different measures that are in place and the different types of audits.

Jeremy McElroy

- **Bike co-op**
  - Implement a bike co-op (more likely will be a bike kitchen) with workshops on repairing and maintaining bicycles. Most likely for the Richmond and Surrey campuses.

- **Vermicomposting**
  - Launch vermicomposting at the current Surrey compost site.
    - Can look to ISH and Paul Richard for help. Sodexo has agreed to support this initiative.

- **Expand recycling**
  - Offer more recycling options.

- **Green walls & green roof**
  - Humans are biophilic (attracted to nature) and are psychologically happier and less stressed when exposed to green space. This project will increase social wellbeing and also reduce the heat island effect. It can also be used as part of program teachings.
  - Currently have one biowall at the Surrey Coast Capital Library.
    - Green walls also suggested by Shelly Murley, Michelle Nakano, and David Davidson.

- **Reflective roof**
  - Paint the roof with a reflective paint to reflect heat. Could also plant bushes on the roof for the same effect.
  - This will reduce heating/cooling costs and improve the air quality.

- **Permaculture**
  - University of Massachusetts has allocated nearly 100% of existing land used for low impact farming (plants take care of each other e.g. potato takes nitrogen out of soil beside it spinach that puts nitrogen in and where pesticides are taken care of by bringing in predators to take care of pests). Would like commitment from KPU to have students implement a similar system.
    - http://www.umassdining.com/sustainability/permaculture

- **Partnership with School of Horticulture Field Labs**

- Want to partner with the School of Horticulture Field Labs to incorporate their produce into the food at the Grassroots Café.

- **End-of-trip facilities**
  - Currently there are limited showers and changing rooms on most campuses, would like to see this expand.

- **Digitizing records**
  - Transitioning paper forms to an online version.
  - Also getting anew Toshiba photocopier with recyclable cartridges.

Kent Mullinix

- **Developing two farms**
  - Currently in the process of developing a teaching and research farm in Metro Vancouver at Colony Farm Regional Park (initiating Fall 2013), and the City of Richmond Garden City Lands (possibly initiating Spring 2014).

Lisa Wegener

- **Autoclaving**
  - Looking for ways to compost substrates. Would like to autoclave (steam sterilize) fungus to allow for substrate composting.
    - Also mentioned by Deborah Henderson.

Maurice Bedard

- **Live Smart Leaders**
  - KPU students/groups can become members of the "LiveSmart BC Climate Leaders Community" where they can gain access to resources about sustainability and collaborate with others to learn about sustainable initiatives.
    - http://www.livesmartbccommunity.ca/

- **Program development**
  - Can create a program where students learn to build and maintain sustainable energy (wind mill, solar panels, etc.) The construction of the structures can utilize students from various trades programs. Energy produced can be used by KPU campuses, excess energy can be sold to the BC government.
  - As electric vehicles become more common KPU trades programs can be developed to incorporate the maintenance of electric vehicles. KPU may also partner with companies to come in and train students on maintaining these vehicles.

Michelle Nakano

- **Sustainable land practices**
    - KPU campus land practices could be aligned with those found on the Sustainable Sites Initiative. Problems could become case studies for resolution by Urban Ecosystem students.
        - http://www.sustainablesites.org/ (see guidelines in pull down menu)

- **Phytoremediation, bioswale, and rain gardens**
    - Currently these structures do not exist at the Langley campus. Could have a site on Langley campus where students can view and learn about these structures.
        - One non-functional structure exists on the West side of the Institute for Sustainable Horticulture Labs. The structure was built with the lab's construction.

- **Urban Ecosystem Degree curriculum**
    - The study of plant competition in novel plantings for suppression of weeds and urban ecosystem function is a new area of research that has not yet been started. This should be a part of the Urban Ecosystem degree curriculum.

- **Install hardscape elements**
    - Elements such as permeable paving (porous concrete, asphalt), living walls, green roof infrastructures and storm water planters could be included at the campuses. Ongoing infrastructure development could be designed and implemented in Horticulture degree and diploma programs.

Paul Richard

- **Hire student to maintain environmental news blog**
    - Currently have students in ENVI 1121 report about local environmental issues (e.g. fires) which are posted to a blog. Want to hire a student who can do this year round. Would like to have KPU become known as a source for this type of info.
        - http://envinewsbc.blogspot.ca

- **Boardwalk over Logan Creek**
    - The Langley Logan Creek area is becoming more suburban – would like to measure changes to creek as more development happens. Logan creek is used for water sand sediment sampling. An extended board walk over the creek will help facilitate measurements.

- **Partner Environmental Physics students with KPU staff**
    - Students in ENVI 2307 complete energy audits. Could enhance the students learning experience by pairing them with a KPU staff member.

- **Expand waste dumping**
    - Would like students in the Solid Waste Management – ENVI 2310 course to have access to the waste in the faculty offices.

Richard Hosein

- **Seattle Urban Food Forest**
    - Implement an urban food forest similar to the one set up in Seattle.
        - http://www.fastcoexist.com/1682269/seattles-urban-food-forest-is-open-for-foraging

- **Langara Sustainability and Equality Event**
    - Hold a similar event with dialogues about sustainability and social implications.

Saima Zaidi

- **Eco-Takeouts**
    - Implement an Eco-Takeout system at the Grassroots Cafe. Users can buy a container exchange card and use it to checkout a reusable container, consume their food outside of the cafeteria and then return the container to the cafeteria where it's washed and reused.
        - http://ecotakeouts.com/

- **Red Dot Campaign**
    - Potential resource to be added on the KPU website to help prevent waste.
        - http://www.reddotcampaign.ca/

Scott Gowen

- **Electronic mail**
    - Implement a system similar to Canada Post where secure messages can be e-mailed instead of mailed.
        - http://www.canadapost.ca/cpo/mc/business/productsservices/mailing/postecs.jsf

- **100% post-consumer recycled paper**
    - Currently testing 100% post-consumer recycled paper with photocopy/printer/faxing machines. Expected to be ready to use by 2014.

- **Fleet replacement**
    - KPU currently has 4 fleets that are replaced every 15 years. Would like faster replacement to increase vehicle efficiency.

- **Employee bus pass**
  - Work with Translink to have reduced transit passes for KPU employees.

- **Purchasing policies**
  - Create a sustainable purchasing and social responsibility policies mandate.

- **Campus shuttle**
  - Expand the intercampus shuttle to include Bike racks by 2014.

- **Implement Managed Print Service (MPS)**
  - A process to monitor current usage and equipment (e.g. # of prints and by whom, broken/damaged equipment, cartridge refills, etc). This will help monitor, control, and reduce print volumes. May occur in 2014 contract.

WooW Student group

- **Child care facilities**
  - Talks about implementing it underway.

Facilities Services Personnel

- **Energy efficient lighting**
  - Implement projects to retrofit a minimum of six areas with new energy efficiency lighting in 2013.

- **Building Management System (BMS)**
  - Have installed interval metering as part of existing BMS. The internal hyperlinks can be shared with users to access BMS graphic information for monitoring and discovering areas of improvements.

- **Interval metering**
  - Utilize interval metering to identify new energy saving opportunities.

- **Internal monitoring**
  - Implement internal monitoring responsibilities and follow up protocols to correct anomalies.

APPENDIX 9 – KPU ESC TERMS OF REFERENCE

APPENDIX 9-A: MANDATE

To facilitate, advise, advocate and enable the implementation of integrated environmental sustainability activities at KPU.

The Committee will provide an advisory role to the Executive while recognizing that the accountability for planning and delivery of environmental sustainability initiatives rests within the Academic and Service areas. The approval of environmental sustainability strategies and initiatives for the University rests with the University Executive.

The Committee is to provide two way sharing, engaging and problem solving while being advocates to champion the advancement of integrated environmental sustainability strategies for KPU.

APPENDIX 9-B: MEMBERSHIP AND OPERATIONS

Betty Worobec (co-chair)	Dean Faculty of Science
Karen Hearn (co-chair)	Executive Director Facilities Services
Steve Dooley	Director Community Engagement
Maggie Fung	Chief Information Officer
Scott Gowen	Director Supply & Business Services
Marlyn Graziano	Director External & Government Affairs
Heather Harrison	Philosophy Faculty
Richard Hosein	KSA
Jeremy McElroy	KSA
Paul Richard	Environmental Protection Technology (EPT) Faculty

APPENDIX 9-C: DUTIES AND RESPONSIBILITES

Define environmental sustainability, vision, values, outcomes and opportunities at KPU and provide recommendations to the Executive on sustainability policy, best practices and priorities.

Monitor, synthesize and seek synergies related to University wide sustainability activities and achievements and promote and celebrate successes and lessons learned.

Engage in environmental scanning, provide information on future trends and options as well as forums for discussion on environmental sustainability across the University.

Assist and support others to move their environmental sustainability priorities forward.

Discover and promote synergies between the University and community-based environmental sustainability initiatives.

Act as a strong communication group within the University community to encourage grassroots involvement and commitment to sustainability as per KPU's Vision and Commitments.

Assist with the communication of KPU's sustainability initiatives and excellence to external audiences.

Within two years of the establishment of KPU's Environmental Sustainability Committee aim to provide input to KPU's annual planning process related to sustainability resource allocations, accountability and performance targets by:

a) Being available to provide expertise and assist Academic and Service areas at their request with the preparation of their environmental sustainability initiatives for inclusion in their operating plans.
b) Providing support and assistance where required for the coordination of larger cross-jurisdictional initiatives.

Consolidate Academic and Service area environmental sustainability plans into a KPU wide summary report to create awareness of all that KPU is doing to advance environmental sustainability and, to be used for sustainability reporting for example, the annual provincial government Carbon Neutral Action Report and BC Hydro's Strategic Energy Management Plan.

APPENDIX 9-D: ACCOUNTABILITY

The Committee will provide minutes of its discussions and decisions to the President, committee members and will post them to a KPU Environmental Sustainability website to make available to students, employees and the general public.

APPENDIX 9-E: MEETINGS

Frequency of Meetings:	The Committee will hold a minimum of three meetings a year.
Time and Duration:	1 – 2 hours
Agenda/Minutes:	The Co-chairs will be responsible to draft the agenda, ensure minutes are prepared and distribute any relevant documents.
Communication:	All communication related to or required beyond regular meetings is to be copied to all committee members. Timely responses to requires for information received by e-mail and other means are required.

APPENDIX 10 – RECOMMENDATIONS

To assist with the mandate of the Environmental Sustainability Committee and to further KPU's environmental sustainability efforts the following are recommended:

KPU has made excellent progress towards becoming a leader in sustainability however this progress remains to be effectively communicated to the KPU community. A lack of awareness within the university's students and staff will result in minimal assistance for further sustainability projects as well as continual obliviousness of KPU's sustainability efforts not only among students and staff but also among the general community.

By marketing KPU's sustainability efforts in a method that's appealing to the students and staff, KPU will not only increase their involvement in sustainable initiatives but also provide them the knowledge to market KPU's sustainability efforts to the community at large.

In order for sustainability to appeal to students and staff in non-environmental as well as environmental fields a non-technical and engaging approach must be taken. This approach will assist with comprehension and invoke interest. Potential methods of creating this interest could be through the following:

- Have "Did You Know" signs near a sustainable feature stating how the feature adds to sustainability e.g. a sign on the outdoor wall near the oculus explaining its function. These signs will allow students and staff to see the information while performing their daily activities and will allow them to make a direct connection without the effort of going online to specifically look for the info. The signs can also display a URL for more info.
- Have displays in the library showcasing the sustainable features of the library and/or other buildings or areas of that campus.
- Have a digital walkthrough of the campuses with a focus on the sustainable features of the particular campus. This may be done through a video or through a walkthrough using images. Having this feature will be especially appealing to new students who would use it to learn how to navigate the campus but at the same time would be learning about KPU's sustainability efforts.
- Have a sustainability week where students can be provided a questionnaire about KPU's sustainability efforts, correct answers can be entered into a draw for a prize. During this week the "Did You Know" signs and library displays can be setup.

These methods will help market KPU's current sustainability efforts however it is important not to neglect the ways in which KPU can improve its sustainability initiatives.

The area most often recognized as needing improvement is KPU's waste management. KPU has done an excellent job of ensuring waste material is recyclable or/and compostable. However, methods of recycling and composting are insufficient or lacking. KPU currently has an inadequate number of recycling stations and composting of the campus's waste is unavailable. Without proper waste disposal options, the

recyclable and compostable materials KPU offers will end up in the landfills. It is strongly recommended that composting and recycling options be increased to take advantage of KPU's recyclable and compostable materials. As recycling is easily recognized as a method of preserving the environment, providing better waste management options will also increase KPU's image as a sustainable university.

The second most talked about initiative KPU should implement, as recognized through the interviews were green walls. It is understood that there is concern that such a feature would cause damage to the walls therefore it is suggested that KPU implement a small scale green wall on a wall structure separate from the walls of the campuses. Such a feature meets the goal of expanding the learning environment for the students and can be cost effective as it can be maintained by the students as part of their program curriculum. If this trial wall proves to be successful there is the possibility of implementing it on a larger wall in the future.

Another improvement KPU can make is to better utilize the teleconferencing options IET have provided. Often times KPU employees, especially at the higher management level need to travel from one campus to another. It is recommended that when the physical presence of an individual is not required on site that the option of teleconferencing be considered. Although this change in behavior is potentially difficult it should be kept in mind that many corporations are already utilizing teleconferencing options as they provide a reduction in travel time as well as eliminate the cost and carbon emissions from commuting. Teleconferencing option may also be provided to job applicants for interviews to further reduce the overall impact to the environment.

Lastly, the adaption from paper to electronic documents needs to be more fully embraced. KPU has done an excellent job of ensuring students are encouraged to utilize online documents through cost benefits for printing fewer documents and sharing files through Moodle. KPU employees also have a file sharing system to encourage electronic sharing. However to further encourage employees to view and share files online rather than through printing documents it is recommended that a MPS (Managed Print Service) be implemented. This system will be able to monitor the number of prints and by whom which in turn can be used to determine methods of reducing print volumes and encourage employees to print fewer documents.

In conclusion, it can be said that KPU has developed many methods of ensuring environmental sustainability. These methods can be improved through the methods presented in this section such as effective marketing, waste disposal options, green walls, teleconferencing, and electronic file viewing/sharing. The overall impact on the environment was not considered in these recommendations nor was the overall costs associated with the recommendations. Therefore these recommendations are to serve solely as potential methods KPU can consider to improve its sustainability efforts.