

# **CASE STUDY /** **ENERGY + CLIMATE** **MANAGEMENT**

UBC Campus Sustainability Office



**a place of mind**  
THE UNIVERSITY OF BRITISH COLUMBIA

2008 / 2009

# CASE STUDY/ ENERGY + CLIMATE MANAGEMENT


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# Abstract/

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ENGAGING WITH THE ENTIRE UNIVERSITY COMMUNITY IS NECESSARY TO GAINING BROAD ACCEPTANCE AND SUPPORT FOR ENERGY, WATER AND GHG CONSERVING MEASURES.

AN EFFECTIVE COST RECOVERY MODEL HELPS OVERCOME RESISTANCE FROM DECISION MAKERS ON IMPLEMENTING SUSTAINABILITY INITIATIVES.

ONGOING MONITORING OF UTILITY SAVINGS AND ACCOUNTABILITY ARE KEY TO ENSURING SAVINGS ARE MAINTAINED.

# Introduction/

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## UBC HAS HAD GREAT SUCCESS IN MAKING LARGE REDUCTIONS IN ENERGY CONSUMPTION, WATER USE AND GHG EMISSIONS

Addressing campus energy and water usage, along with mitigating greenhouse gas (GHG) emissions associated with university operations, is essential to achieving UBC's commitment to sustainability.

Through a number of self-funded initiatives over the past decade, UBC has had great success in making large reductions in energy consumption, water use and GHG emissions while improving the campus working environment and renewing aging infrastructure. This case study describes the development of UBC's energy and climate change management programs.

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## A KEY CHALLENGE TO ENSURING THE SUCCESS OF CAMPUS SUSTAINABILITY PROGRAMS IS PROVIDING THE FINANCIAL RESOURCES TO IMPLEMENT AND SUSTAIN THESE PROGRAMS.

context/

**ecotrek**

This building is part of Canada's largest university energy and water retrofit.

**ECOTREK gives more:**

- comfort for building occupants
- support for teaching and research by saving \$2.5 million a year

**ECOTREK reduces:**

- energy – up to 20%
- water use – up to 40%
- CO<sub>2</sub> emissions – 15,000 tonnes a year

info: [www.ecotrek.ubc.ca](http://www.ecotrek.ubc.ca) 604.822.8248

THE UNIVERSITY OF BRITISH COLUMBIA | VANCOUVER

Managed by the UBC Campus Sustainability Office  
and McW Custom Energy Solutions Ltd.  
With the support of BC Hydro Power Smart.

As an institution committed to the principles of sustainability, UBC has pursued a number of initiatives designed to reduce energy consumption, water use and GHG emissions. These individual initiatives have been carried out as part of larger energy and climate management strategies.

A key challenge to ensuring the success of campus sustainability programs is providing the financial resources to implement and sustain these programs. Initiatives that are reliant on outside funding sources are inherently more vulnerable and, in the long run, are not sustainable. Ensuring that the success of these programs continues into the future also requires that policies be put in place to ensure that the savings, once achieved, are maintained.

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**THE FOLLOWING FIVE STEPS  
OUTLINE THE PROCESS USED  
TO IMPLEMENT PROGRAMS  
THAT HELPED UBC ACHIEVE  
ENERGY AND CLIMATE  
CHANGE SUSTAINABILITY  
GOALS:**

**Story/**  
**S**

## DEVELOPING THE MODEL

The first priority for establishing the UBC Sustainability Office (SO) was cost recovery. The intention was to be able to fund sustainability initiatives through reductions in energy costs. This was achieved first by targeting easily achievable energy savings from lighting, the “low hanging fruit”.

Within eight months, enough energy savings were generated to not only cover the cost of the pilot project, but also to fund a Director of Sustainability in 1998. In addition to the significant energy savings, additional benefits were realized in the form of improved lighting quality. This successful model was to serve as the basis for ECOTrek, a much larger and more comprehensive energy and water conservation program.

## ECOTREK

ECOTrek, begun in 2001, was conceived as the largest energy and water infrastructure project ever to have taken place on a Canadian campus. In the four years prior to the start of this project, UBC’s utility costs doubled, primarily as the result of climbing energy prices. The goal was to reduce energy and water consumption in core academic buildings along with associated GHG emissions. In addition to achieving reduced energy and water consumption, ECOTrek provided a mechanism to fund facility renewal, which had been increasingly deferred, and utility management infrastructure (meters), which has a very long ROI, through utility savings. In order to minimize the financial risk to the university, UBC entered into an energy performance contract with an energy services company (ESCO).

The ESCO undertook energy audits of 288 buildings on campus. Reductions in water and energy use were targeted at 30 percent and 20 percent respectively, along with associated GHG emissions. The cost for implementing the identified energy conservation measures was budgeted at \$39 million, a little more than double UBC’s annual \$17 million energy bill. Incentives totalling nearly \$4 million were provided by BC Hydro, contingent on the projected electricity savings being realized. The

remainder of the project was funded by a loan from the university, to be repaid over the 24-year loan period out of expected annual utility savings of \$2.6 million. Construction on these measures has recently been completed and the project is now entering the monitoring and verification phase to ensure that the promised energy savings materialize.

**“THE INTENTION WAS TO BE ABLE TO FUND SUSTAINABILITY INITIATIVES THROUGH REDUCTIONS IN ENERGY COSTS WITHIN EIGHT MONTHS, ENOUGH ENERGY SAVINGS WERE GENERATED TO NOT ONLY COVER THE COST OF THE PILOT PROJECT, BUT ALSO TO FUND A DIRECTOR OF SUSTAINABILITY”**

One unique element, which made a significant contribution to the success of ECOTrek, was the use of community-based social marketing techniques to communicate with the campus community and obtain buy-in for the project work and goals.

ECOTrek also pursued savings through a series of soft measures, including general maintenance related issues and staff and student awareness programs. These measures complemented UBC’s goals of institutionalizing sustainability within the university community.

## OTHER ENERGY AND GHG-SAVING INITIATIVES

Outside of the ECOTrek process, UBC has also pursued reductions in energy use and GHG emissions through a number of other initiatives.



UBC Renew, a partnership between UBC and the provincial government, seeks to rehabilitate rather than replace aging campus buildings. This results in a greatly reduced environmental impact with the added benefit of significant capital cost savings.

UBC Okanagan's geo-exchange program uses energy extracted from groundwater to heat and cool academic buildings. By 2010, the system will supply 120,000 m<sup>2</sup> of building area and is expected to avoid costs of \$23 million and GHG emissions of 68,000 tonnes of CO<sub>2</sub>e over the next 25 years.

Sustainable transportation initiatives, including the U-Pass program, to provide subsidised transit passes for all UBC students.

New construction guidelines for residential and academic building construction to ensure that new campus construction meets or exceeds the most rigorous building code standards

## “UBC RENEW SEEKS TO REHABILITATE RATHER THAN REPLACE AGING CAMPUS BUILDINGS.”

### ENERGY MANAGEMENT PROGRAM

To continue to meet UBC's goals of minimizing consumption of energy and water in the operation of its facilities, it was essential to develop an Energy Management Plan. This plan is based largely on BC Hydro's Energy Management Program.

#### **The key components of an energy management program include:**

- Monitoring gas, steam, electricity and water usage of major consumers
- Data analysis and benchmarking
- Identifying areas of overconsumption and establishing conservation targets

- Reporting results to the appropriate parties and periodically reviewing the management process

The main goal of this policy is to ensure there is accountability in maintaining energy savings and a procedure in place to deal with unwarranted increases in energy consumption.

### CLIMATE PLANNING

In 2007, provincial legislation was introduced mandating UBC to be carbon neutral (specified emission sources) by 2010. To achieve this target, UBC is developing a climate management program. UBC's climate management program is being developed with the input of students, staff and faculty and consists of the following major elements:

- Identify and measure GHG emissions sources and recommend GHG emissions reductions strategies
- Identify strategies that enhance the institution's resiliency to climate change
- Provide 'living lab' teach, learn and study opportunities through linking academic programming with operational activity
- Engage and motivate the UBC community to reduce their personal emissions through behavioural change
- Communication and public outreach to inspire the public with climate change achievements
- Create an open and transparent reporting structure to evaluate annual GHG emissions
- University Presidents' Climate Change Statement of Action for Canada committing universities to a leadership role in combating climate change



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# Impact

## THE SUCCESS OF THESE INITIATIVES CAN BE MEASURED BY THE FOLLOWING ACHIEVEMENTS:

ECOTREK HAS RESULTED IN ANNUAL ENERGY AND WATER SAVINGS OF \$4.2 MILLION (CONSIDERABLY HIGHER THAN THE \$2.6 MILLION ORIGINALLY ESTIMATED DUE TO HIGHER THAN EXPECTED ENERGY PRICES) AND GHG SAVINGS OF 8,000 TONNES A YEAR.

PHASE 1 OF UBC RENEW WILL HAVE PREVENTED 6,000 TONNES OF GHGS AND REDUCED CONSTRUCTION COSTS BY \$89 MILLION BY COMPLETION IN 2010.

UBC OKANAGAN'S GEO-EXCHANGE SYSTEM WILL AVOID 38,000 TONNES OF GHGS OVER THE NEXT 25 YEARS, AND THIS CAMPUS IS WELL ON ITS WAY TO BECOMING CANADA'S FIRST CLIMATE NEUTRAL CAMPUS.

UBC'S TRANSPORTATION MANAGEMENT PROGRAM, INCLUDING THE U-PASS PROGRAM, HAS LED TO A 16,000 TONNE ANNUAL REDUCTION IN GHGS AND HAS INCREASED TRANSIT RIDERSHIP AT UBC VANCOUVER BY 185% AND AT UBC OKANAGAN BY 50%.

ASPECTS OF UBC'S CLIMATE MANAGEMENT PROGRAM ARE MORE DIFFICULT TO DIRECTLY ASSESS THE IMPACT OF. THESE INCLUDE COMMUNITY OUTREACH AND RESEARCH AND EDUCATION INITIATIVES. BY 2010, UBC WILL BE CARBON NEUTRAL BY PURCHASING OFFSETS, WITH A MANDATE TO CONTINUOUSLY REDUCE EMISSIONS.

# Replicability!

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## UBC'S APPROACH TO CLIMATE AND ENERGY MANAGEMENT IS ONE THAT CAN BE REPLICATED BY OTHER INSTITUTIONS AND ORGANIZATIONS

UBC's approach to climate and energy management is one that can be replicated by other institutions and organizations. One of the main reasons for the success of UBC's sustainability initiatives has been their self-funding nature. By proving the worth of this funding model with small-scale projects, and by not relying on outside financial support for these programs, it has been much easier to gain support for initiatives that might otherwise have been regarded as low-priority measures. Having high-level champions who believe in the value of these projects has also been instrumental to UBC's success. Establishing comprehensive management policies to address energy use and climate change throughout the organization will help to embed these principles in the culture of the university. Finally, ongoing success requires having the policies in place to make the appropriate personnel accountable for ensuring the reductions, once achieved, are maintained.

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## FUTURE

UBC has come a long way towards reducing energy consumption, water use and GHG emissions, and will continue to benefit significantly from these climate and resource management programs. However, there is still significant progress to be made towards achieving goals such as becoming climate neutral and eventually becoming the first net-positive energy and water campus in the world. Moving forward with the implementation of the newly developed energy management policy and integrated climate management strategies will be essential to achieving these goals. Towards these ends, UBC is also moving forward by building on past successes with the ECOTrek, UBC Renew and U-Pass programs and pioneering several new initiatives. These include world-class research projects involving net-zero buildings and a project to replace aging energy and water distribution infrastructure with an integrated clean energy and water micro-grid.

## CONCLUSION

Achieving significant reductions in energy consumption, water use and GHG emissions in a postsecondary institution is possible provided that a number of elements are in place. To make these programs a success, a robust and sustainable funding structure is mandatory and there needs to be broad commitment at all levels of the organization, from the top down.

