Creative Arts meets energy smarts.

LANGARA'S INNOVATIVE LIGHTING SOLUTIONS

CHALLENGE

Each year, the creative talent of students in Design Formation, Fine Arts, Professional Photography, and Publishing is showcased in a final Grad Gallery Show. In 2013, organizers hosted the event as the first-ever pop-up show in the main foyer of A Building. The new format presented challenges for how new state-of-the-art, energy-efficient lighting design could be used to facilitate aesthetic lighting requirements for the exhibit, address colour rating needs, and accommodate the varying sizes and angles of each student work.

SOLUTIONS

Langara conducted a full assessment of the existing lighting system. The results helped to inform the new lighting design, which featured new LED track lighting and several retrofits. These installations dramatically improved the lighting in the main foyer and for the pop-up gallery.

RESULTS

The new lighting retrofit resulted in an overall energy savings of 85%, and boasts a 2 to 3-year payback on the installation. The lighting quality for the pop-up gallery was such a success that the Buffalo Lounge and other studios, where student artwork is created and displayed throughout the year, were also retrofitted with new energy-efficient lighting.

SUSTAINABILITY

Langara is committed to sustainability and optimizing energy use on campus as a way to limit greenhouse gas emissions.

Other energy-efficient lighting projects on campus include:

- Retrofitting the main Langara sign with energy-efficient bulbs
- Installing LED lighting to illuminate pathways and improve safety
- Utilizing advanced lighting controls to make the most of daylight

These lighting projects are just one of the ways that we are achieving our energy reduction goal.

In 2009, Langara set the goal of reducing campus energy use of existing buildings by 15% (from 2009/10 levels). Over the last five years, we have implemented numerous energy saving projects and in 2014, we met and exceeded our target.

Learn more.
www.langara.bc.ca/sustainability

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Lifelong learning, for buildings too.

LANGARA'S ONGOING COMMITMENT TO SAVING ENERGY

From innovative energy upgrades in existing buildings to industry-leading construction projects, Langara College is building a sustainable campus.

Optimizing the existing heating, ventilation, air conditioning, and lighting systems was no small task, given the variety of equipment and controls at Langara. To tackle the challenge, Langara joined BC Hydro's Continuous Optimization program (COp) in 2009, which has helped to identify issues and implement projects that improve building energy efficiency. The program consists of two integrated components - building recommissioning, and the development of an Energy Management Information System (EMIS).

Now almost five years into the program, COp has been implemented in 86% of building area on campus, including the installation of real-time metering to track energy use, and conducting multiple controls optimization studies. This has led to substantial energy savings -- over $110,000 in avoided costs from three buildings (L, A, and B) after the first year of implementing energy reduction measures. Energy-saving measures combined for each site had a less than two-year simple payback, and funding to investigate measures was provided by BC Hydro. Considering Langara's utility bill has been nearly a million dollars per year, these are significant savings.

"Once we took a detailed look at the operation of the heating, cooling, and lighting systems at Langara, even in new buildings like the Library, it was possible to find measures to achieve further energy savings," says Patricia Baker, Langara's Energy Manager. "From correcting the scheduling of heating and cooling systems, to the identification and replacement of faulty sensors, we have come a long way towards getting our house in good energy-efficient order."

With the support of BC Hydro, an initial review by Enersolv Consulting, and implementation by Prism Engineering, COp has proven to be an energy-saving success story for Langara College – and it is far from over. COp is now being implemented in the Student Union Building and Building C for Fiscal 2013/2014. Langara has also taken energy savings measures beyond COp to capital improvement projects, realizing further savings.

"COp implementation has provided us with the tools we need for continuous monitoring and control strategy adjustment," says Baker. "Together with our energy management team, our building operators now have what they need to maintain a proactive approach to continuous energy savings and improvement."

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ENERGY SAVING

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CONTINUOUS OPTIMIZATION MEASURES

TOTAL SAVINGS FOLLOWING THE FIRST YEAR OF COP IMPLEMENTATION

L BUILDING | SAMPLE MEASURE: EXHAUST FAN COMMISSIONING

Built in 2007, the LEED Gold Certified Library building has captured both national and international attention for its environmentally-progressive features and unique energy-efficient design. Exhaust fans in the parking lot underneath the building are controlled by CO_2 sensors. The retrocomissioning report revealed that the fans were continuously operating at 100% speed due to improper commissioning and faulty wiring of CO_2 sensors. To fix the issue, the CO_2 sensors were re-wired and the exhaust fans now run only when needed.

L BUILDING
45% ELECTRICITY SAVINGS
$60,000 AVOIDED COSTS

A BUILDING | SAMPLE MEASURE: START-UP MODE

The retrocommissioning report for A Building identified that the start-up modes for the HVAC (heating and cooling) systems were not commissioned correctly. Every morning, cold outdoor air was being introduced into the building as heating equipment worked to bring the building up to a comfortable temperature. A simple re-programming fix now ensures that the outdoor air dampers remain closed for 30 minutes after heating begins, to ensure that the building reaches the desired temperature without the extra work of heating cold outdoor air.

A BUILDING
6% ELECTRICITY SAVINGS
$30,000 AVOIDED COSTS

B BUILDING | SAMPLE MEASURE: AHU-5 VALVE REPLACEMENT

A closer look at the energy data revealed that an Air Handling Unit (AHU) in B Building was wasting energy due to a faulty cooling coil control valve. Essentially, too much chilled water was being introduced into the system, which was working extra hard to bring air up to the required temperature. Once the valve was replaced, this extra energy use was eliminated.

B BUILDING
22% ELECTRICITY SAVINGS
$27,500 AVOIDED COSTS

KEY COP MEASURES

- Optimized DDC (Direct Digital Control) system equipment schedules
- Upgraded DDC graphic interface for increased usability for operators and facility managers
- Calibrated and replaced faulty CO_2 & temperature sensors for optimization of equipment control
- Optimized equipment ventilation rates to ensure airflow rate slows down when not required
- Recommissioned VAV (Variable Air Volume) flow rate and optimized controls for more individual programming and schedules
- Installed new VAV controls hardware
- Replaced faulty heating valves on equipment
- Commissioned controls system to improve point functionality and communication

A measurable difference.

LANGARA'S 5-YEAR STRATEGY FOR SAVING ENERGY EXCEEDS TARGETS

SUPPORT FOR SAVING ENERGY

Langara College is committed to saving energy and has been working in partnership with BC Hydro to achieve its goals. In 2009, with sponsorship through BC Hydro, an Energy Manager was brought on board to help Langara develop and implement an energy management plan, engage the campus community in energy conservation, and track success in energy reduction goals. In addition, Langara participated in an Energy Management Assessment (EMA) workshop to assess current energy-related practices and identify opportunities for improvement. That same year, Langara joined the BC Hydro Continuous Optimization (COp) program, which helps identify and implement building system controls that improve energy efficiency.

THE STRATEGIC ENERGY MANAGEMENT PLAN

In 2009, Langara created a Strategic Energy Management Plan (SEMP) to take our commitment to saving energy above and beyond benchmark standards and BC government regulations. The SEMP, prepared by the Energy Manager in association with the Facilities Department, supports Langara's commitment to reducing its energy use and environmental impact.

As part of this plan, Langara set the goal of reducing campus energy use of existing buildings by 15% (from 2009/10 levels), as well as greenhouse gas emissions (GHGs), over a 5-year period. The SEMP is updated on an annual basis by Langara's Energy Manager as a way to track progress toward this goal.

SAVING ENERGY TAKES COMMUNICATION

Langara engages with the entire college community to influence attitudes and change behaviour. Over the past five years, Langara has organized a variety of campus engagement activities to encourage students, staff, faculty, and the community to participate in energy conservation actions.

Additional resources include:

- Interactive monitoring of Langara's energy use with the Pulse Dashboard
- Belkin Energy Monitor devices available at the Library for individuals to track personal energy use

ENERGY SAVING CHALLENGES

Langara is growing.
Since 1999, the campus building area has increased by 17%, equivalent to over 72,000 ft^2.

Langara is a diverse hub of activity.
While the majority of the academic activities on campus take place in a classroom environment, there are also various science and computer labs and theatre spaces. In addition to being used by students, staff and faculty, the College facilities also host numerous community events.

It takes money to save energy.
The total College budget is approximately 39 million dollars annually; utilities cost the College just less than 1 million dollars per year. The challenge is to identify energy saving opportunities that make financial sense.

Over the last five years, we have implemented numerous energy saving projects. All of these actions have helped us become more resilient to rising energy costs, reduce our environmental impact, and contribute to fostering a sustainable campus community. In 2014, we met and exceeded our energy savings target.

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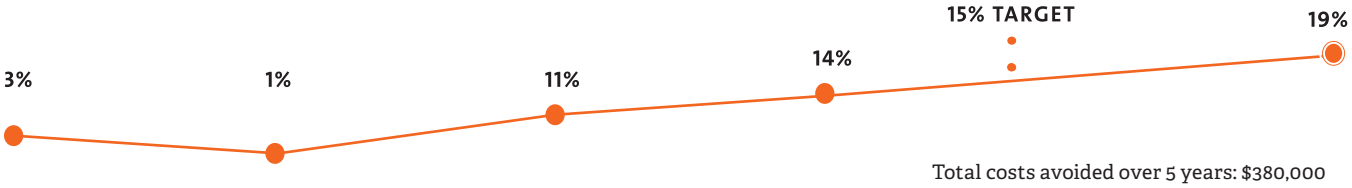
2009 - 2014 SAVINGS OF 1100 TONS OF CO2

Equivalent to taking 240 cars off the road for one year.

*Average of 4.75 metric tons of CO_2 emissions per passenger vehicle per year.

% ENERGY SAVINGS OVER ESTIMATED BASELINE



Total costs avoided over 5 years: $380,000

YEAR 1

2009/2010:

- Energy Manager hired
- SEMP created

YEAR 2

2010/2011:

- Campus electrical and gas submeters installed for improved energy monitoring
- COp investigation phase begins in Building L

YEAR 3

2011/2012:

- Building L COp implementation
- Green IT study
- Boiler condition testing & review
- Building A & B COp investigation phase
- Operations manual for energy efficiency

YEAR 4

2012/2013:

- COp implementation in the gym, daycare and Building A
- Building B COp implementation, including new VAV controls
- LED lighting upgrades
- Electric vehicle charging stations

YEAR 5

2013/2014:

- Creative Arts LED installations
- Building B & C DDC control and piping upgrades
- Green IT infrastructure upgrades

OUR COMMITMENT TO SUSTAINABILITY

We know that our choices, both big and small, impact our world and future generations. As an educational institution, we have a responsibility to lead initiatives that positively contribute to our community. Our goal is to foster and provide leadership to create more environmentally sound, socially just, and economically vibrant communities. More specifically, our energy goals are:

- To optimize the campus energy usage with the existing technology and controls;
- To reduce Langara's greenhouse gas (GHG) emissions;
- To reduce and control energy costs and minimize exposure to energy price volatility;
- To upgrade building systems with the most efficient alternative through capital improvements and maintenance where feasible, considering the life cycle cost of the equipment;
- To raise awareness of the need to use energy efficiently among the college community;
- To minimize the load on BC's electrical infrastructure and as a result, minimize the environmental impact of new generation capacity.

ANNUAL SAVINGS ACHIEVED

- 27% of fuel usage
- 11% of electricity usage
- 26% of GHG emissions
- $165,000 in avoided costs

Over the past five years, all energy saving measures combined had a payback period of less than two years. Energy savings will also pay for almost 1.3 million dollars in building renewal capital over the next 7 years, and this equipment will last much longer than that. The overall net savings for the College should reach close to one million dollars.

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