a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

UBC REPORT

November 2011
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"This is a place for big ideas with global impacts."

John Robinson
UBC Sustainability Initiative

Martin Dee Photograph

Daniel Pauly, a professor at UBC's Fisheries Centre is among many university researchers working in the field of sustainability.

Martin Dee Photograph

In the news

Highlights of UBC's work on sustainability—environmental, social, financial—in the media

Heather Amos

Scientists call for end to deep-sea fishing

A September ***Washington Post*** article reported on a study that says industrial fishing in the deep sea should be banned because it has depleted fish stocks that take longer to recover than other species.

Daniel Pauly, who serves as principal investigator of the Sea Around Us Project at UBC Fisheries Centre, said the costs of deep-sea fishing far outweigh the benefits. "It's a waste of resources, it's a waste of biodiversity, it's a waste of everything."

Rashid Sumaila, one of the authors of the study and the director UBC Fisheries Centre, says fishing subsidies help sustain deep-sea fishing. He said high-seas trawlers around the world receive roughly $162 million each year in government handouts, which amounts to a quarter of the value of the fleets' catch.

The science is in: Insite saves lives

After a lengthy court battle, Canada's Supreme Court ruled that Insite, the supervised-injection facility in Vancouver's Downtown Eastside, should stay open. Throughout the court battle, UBC researchers provided expert opinion and wrote op/eds for the ***Washington Post***, the ***National Post***, the ***Canadian Press***, the ***Toronto Star*** and others.

Dr. Thomas Kerr, of the Faculty of Medicine, said there have been about 1,500 overdoses at Insite but that nobody has died. "This is without a doubt a facility that saves lives."

Dr. Julio Montaner, the director of the BC Centre for Excellence in HIV/AIDS and a professor of medicine at UBC, said that the Supreme Court decision on Insite shows that it is time to "allow evidence-based interventions to be the foundation of our response to health and social harms stemming from drug addiction."

Decline of big fish upsets ocean balance

A UBC study found that populations of predator fish have suffered huge declines over the past century, but that the total stock of "forage fish" has more than doubled, reported a February article in ***The Guardian***.

"By removing the large, predatory species from the ocean, small forage fish have been left to thrive," said **Villy Christensen**, lead author of he study and a professor in UBC Fisheries Centre.

Olympics go carbon neutral

The Vancouver Organizing Committee asked Sauder School of Business professor **James Tansey** to develop a plan to offset the 2010 Winter Games' carbon emissions.

He and his team of MBA students achieved success— a 15 per cent reduction of greenhouse gas emissions, reported the ***Globe and Mail***.

Population explosion scrutinized as scientists urge politicians to act

The population of the planet could reach 9.2 billion by 2050, and ***The Independent*** wrote a July 2010 article about a group of researchers who are trying to identify the future problems we could face.

The "ecological footprint" is one measure of the environmental impact of human populations. It was developed more than 15 years ago by **Mathis Wackernagel** and **William Rees**, a professor in the School of Community and Regional Planning at UBC, and is a measure of the demand placed on the biosphere by human activity.

Clean fuels wasted on Delhi's rickshaws

UBC researchers say a New Delhi program to switch its 5,000 auto-rickshaws with two-stroke engines to clean fuel has not significantly improved emission levels and the switch resulted in an increase in other emissions that negatively impact climate change, reported ***United Press International*** in March.

"Our study demonstrates the importance of engine type when adopting clean fuels," said **Conor Reynolds**, lead author of the study and post-doctoral fellow at the Liu Institute for Global Issues.

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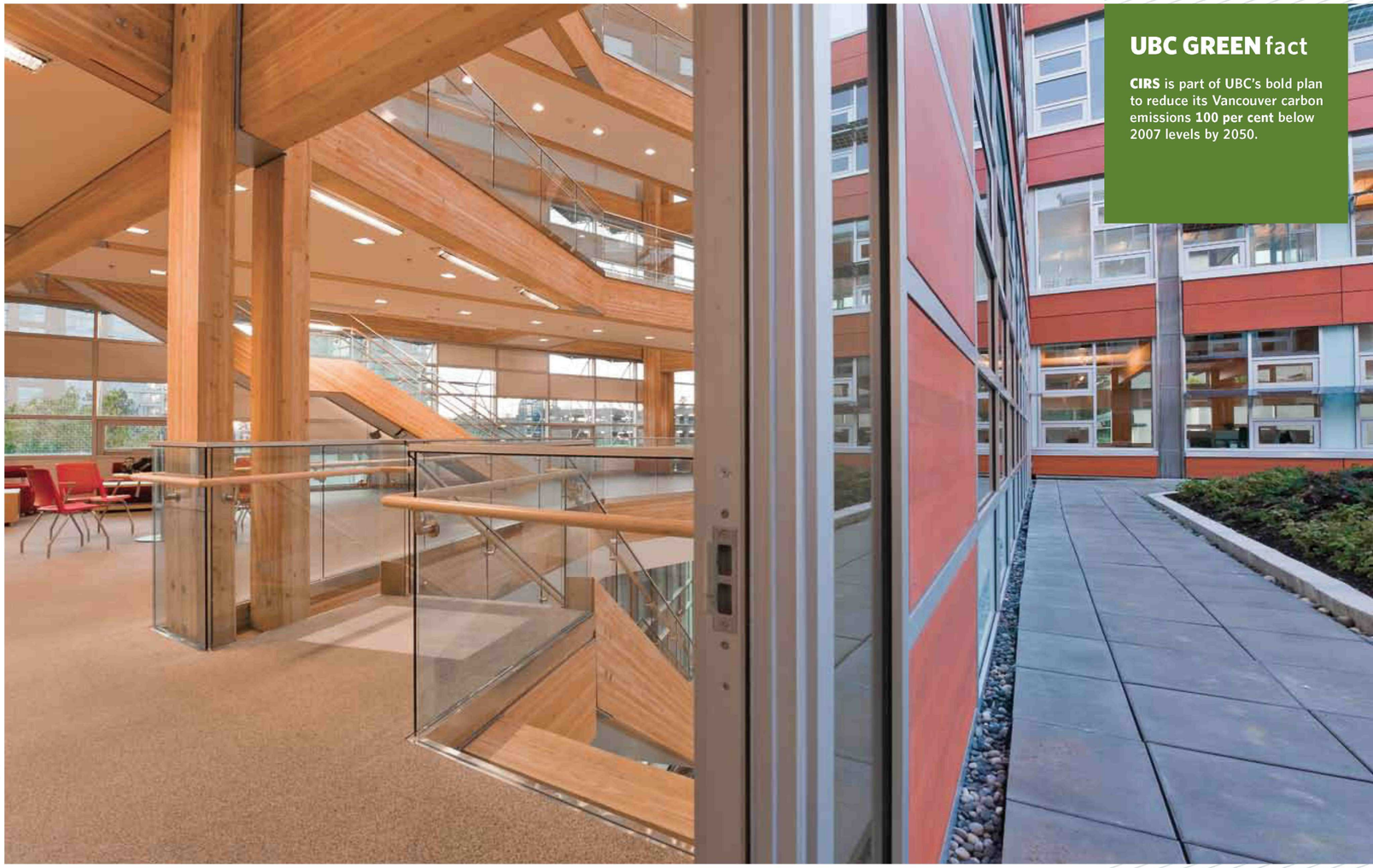
Public Affairs

UBC opens North America's most sustainable building

Living laboratory will advance sustainability research and innovation

Basil Waugh



Don Erhardt Photograph

Researchers will study how users interact with **CIRS** to improve building performance, inhabitants' health and global building practices.

The University of British Columbia has opened the "greenest" building in North America, a $37-million laboratory that will help to regenerate the environment and advance research and innovation on global sustainability challenges.

The Centre for Interactive Research on Sustainability (CIRS) is one of only a handful of buildings worldwide designed to provide "net positive" benefits to the environment. It will remove carbon from the atmosphere, power itself and other Vancouver campus buildings with renewable and waste energy, and supply water for inhabitants with rainwater treated onsite.

As a research centre, CIRS will investigate green building design and operation, community engagement and sustainable policies. Researchers will study users' interactions with the facility to improve building performance, maximize inhabitants' happiness, health and productivity and advance best green building practices at UBC and abroad.

"CIRS is a place for big ideas that have global impacts," says UBC Prof. John Robinson, Executive Director of the UBC Sustainability Initiative and a co-author of the Intergovernmental Panel on Climate Change report that shared the Nobel Prize with Al Gore in 2007. "It will serve as a living laboratory to test, learn, teach, apply and share the outcomes of sustainability focused inquiries."

Built to meet or exceed LEED Platinum and Living Building Challenge standards, CIRS is constructed primarily of certified wood and beetle-killed B.C. lumber. By nature of its wood construction, the four-storey, 60,000 square-foot facility effectively removes 500 tonnes of carbon from the environment—locking it into the building's structure—and eliminates GHG emissions that would have resulted from concrete, steel or other non-renewable materials.

Building features include: the BC Hydro Theatre, which has advanced visualization and interaction technologies to engage audiences in sustainability and climate change scenarios, the 450-seat Modern Green Development Auditorium, indoor environmental quality and building simulation software labs, a building management system that shares building performance in real-time with inhabitants and visitors, and the Loop café, which uses no disposable packaging.

The facility is a major part of UBC's transformation into a living laboratory for sustainability, where researchers, operations staff and industry partners collaborate. A key goal is to achieve the most aggressive carbon-reduction targets at a major research university: a 100 percent reduction in UBC's Vancouver campus GHG emissions by 2050.

According to Robinson, CIRS will help to bring sustainability innovations developed at UBC to the global marketplace through partnerships with industry. Partners include: Honeywell (energy systems), Hayworth (adaptable workspaces), BC Hydro (electricity systems) and Modern Green Development, China's largest green real estate developer.

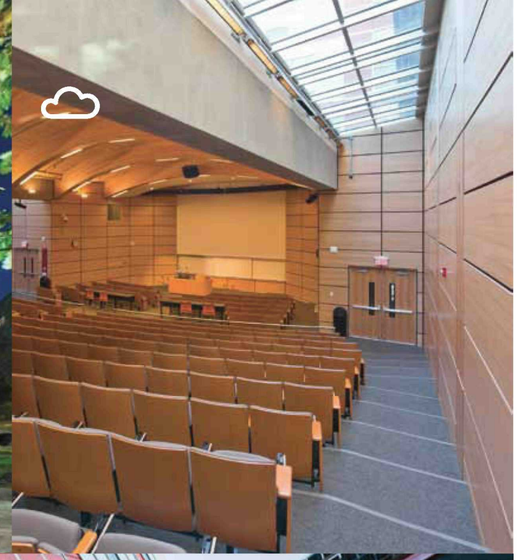
While the facility cost 26 per cent more to construct than an equivalent UBC building, Robinson says the university expects to recoup these up-front costs in 20 years through reduced maintenance, operation and energy costs—and provide significant cost savings, beyond the environmental benefits, over its lifetime. ●

For more information visit: www.cirs.ubc.ca

Turn the page for more CIRS images, features and projects.

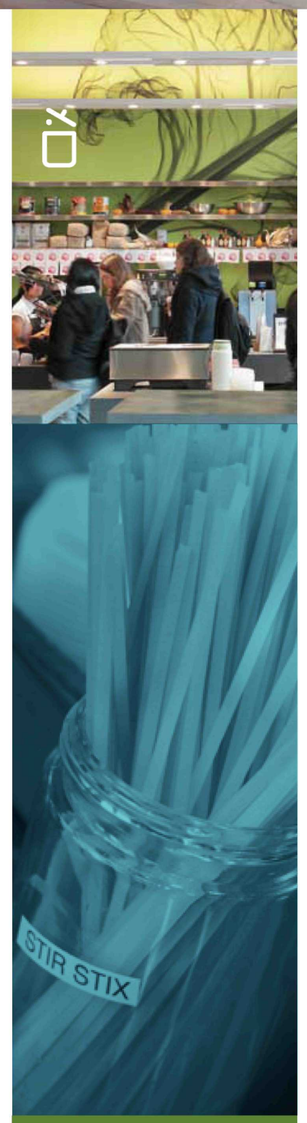
UBC GREEN fact

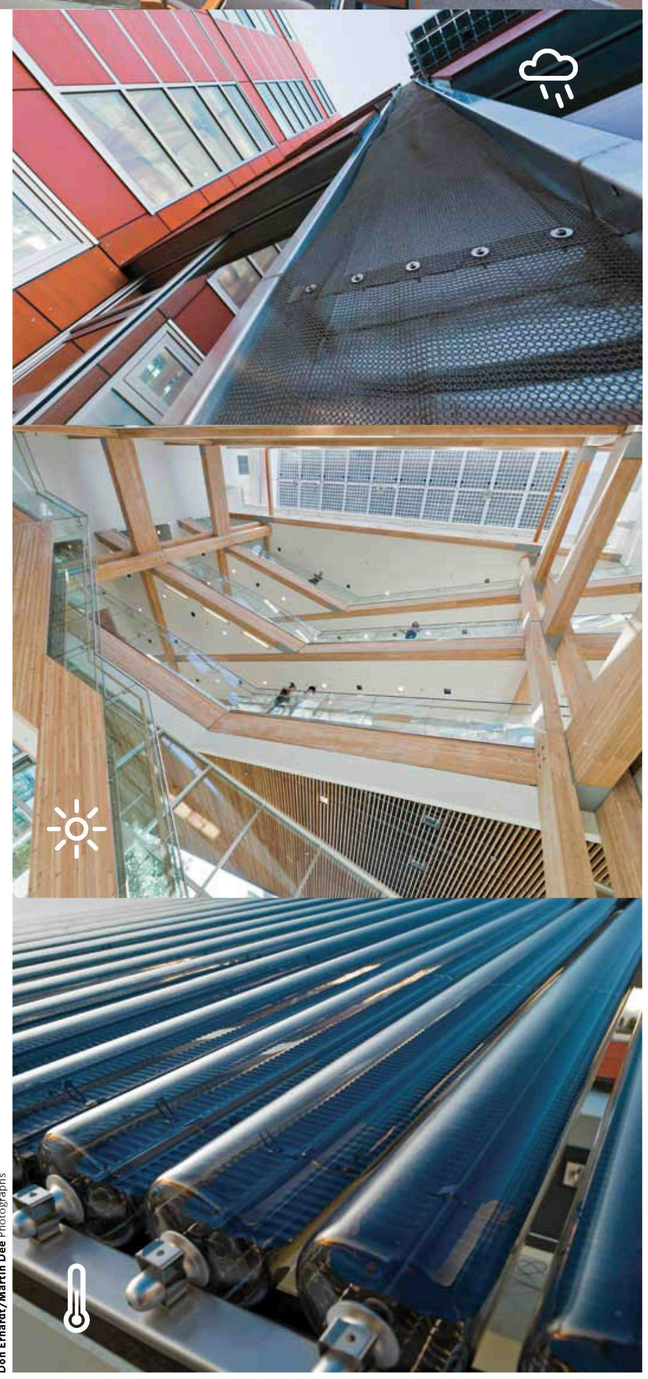
CIRS is part of UBC's bold plan to reduce its Vancouver carbon emissions **100 per cent** below 2007 levels by 2050.



Take a peak inside CIRS

Regenerative features make the Centre for Interactive Research on Sustainability 'net positive' on energy, carbon and water.





Don Erhardt/Martin Dee Photographs

Energy Efficiency+
By capturing waste heat from the Earth, the sun and the nearby Earth and Ocean Sciences (EOS) building, CIRS heats itself and returns 600 megawatt hours of surplus energy back to campus.

0%

Sans Fossil Fuels
While CIRS is carbon neutral (building systems require no fossil fuels), the surplus energy CIRS returns to EOS removes an additional 150 tonnes of GHG emissions annually through reduced natural gas use.

>GHG

Beetle-killed wood structure
One of the few commercial buildings with a primarily wood structure, CIRS locks in more than 500 tonnes of carbon, eliminating GHG emissions that would have resulted from non-renewable construction materials or unused beetle-killed lumber, which is currently B.C.'s largest source of carbon emissions.

Rain Water Harvesting
CIRS will satisfy the water needs of 200 inhabitants, plus hundreds of auditorium and café users by capturing rain and treating it onsite. Excess water will recharge the local aquifer.

Superior Work Environment
CIRS' U-shape design maximizes the amount of natural daylight and fresh air for inhabitants, who control their environment through their computers. And thanks to flexible design—there are no light switches or wiring through walls—workspaces can be completely reconfigured overnight.

Green IT
CIRS has no servers and desktop computers guzzling energy. Instead, everything is stored "in the cloud"—drives, desktops and servers are part of a green information technology pilot project with UBC IT.

Mind Matters
Researchers, including members of the Dept. of Psychology, will use CIRS to study how best to encourage people to adopt sustainability in their lives.

Earth-friendly Eats
CIRS' Loop Café has no disposable packaging onsite, and serves local, organic choices.

UBC GREEN fact

At the new **CIRS**, you stir your coffee and tea with dry linguine, which composts faster than wooden stir sticks.

Martin Dee Photograph

Stephen Sheppard works with communities to plan for a future with climate change and lower-carbon footprints.

Window to the future

A theatre in the new CIRS allows users to experience future scenarios

Heather Amos

For some, seeing is believing and the BC Hydro Theatre in UBC's new Centre for Interactive Research on Sustainability is like a crystal ball, giving communities a look into their future.

"We're giving people an opportunity to walk into an alternate future," says Stephen Sheppard, the researcher leading the design phase of the theatre and a professor in the Faculties of Forestry and Applied Science. "They will be immersed in an environment that looks and feels like an actual place in 2050."

Sheppard's research group, the Collaborative for Advanced Landscape Planning (CALP), will use the BC Hydro Theatre to model and visualize future sustainability, including how climate change will transform the way cities and rural communities look. Working with scientists and local experts, CALP helps community planners and politicians plan for a future with climate change and lower-carbon footprints.

"They can see possible consequences of their community's decisions and lifestyles," says Sheppard.

The theatre, also known as the Decision Theatre, is a large space equipped with the newest imaging technologies that allow people to project five-metre images on two walls, immerse themselves in visualizations on a wrap-around screen, use touch-screen tables and videoconference. Users are also able to work off iPads or computers to change the content displayed on the walls and collaborate in real-time.

The new Decision Theatre is a bigger version of the experimental Landscape Immersion Lab that Sheppard and his students developed at UBC for research on 3D visualization, environmental perception, and decision-making.

Previously, Sheppard has presented different adaptation options for sea level rise in Delta, where modeling has shown that rising sea levels are likely to cause flooding unless major and expensive measures are undertaken

The research group has also worked with communities in the Kootenays, and is collaborating on land-use planning research with Canadian cities, like Toronto and Calgary.

Recently CALP has been working with Clyde River in Nunavut, a remote Canadian community on Baffin Island in the Arctic.

"With remote communities like Clyde River, CALP will use the Decision Theatre to give stakeholders and local experts the chance to virtually engage with UBC expertise, databases, resources and experiences, saving travel costs and carbon."

With nothing fixed to the floors or ceiling, the space can easily be transformed for different purposes and is intended to be a communal space. The theatre will be used for interactive presentations, perception research, conference workshops, art installations and collaborative planning sessions.

"We want the space to be used equally by UBC researchers, practitioners, and community groups," says Jon Salter, a PhD student in Sheppard's lab who has been managing the design and installation of the Theatre.

The BC Hydro Theatre will be open to researchers across campus, partners like BC Hydro, and the public. For local communities, the theatre will serve as a hub for sustainability research, training practitioners on visioning methods, and engaging the public in dialogue on issues such as district energy and behaviour change. ●

To learn more, visit:
www.calp.forestry.ubc.ca/projects

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External Review The Faculty of Graduate Studies

At the direction of Dr. David Farrar, UBC Provost and Vice President Academic, a review of the UBC Faculty of Graduate Studies will be carried out by Dr. Karen P. DePauw, Vice President and Dean for Graduate Education, Virginia Tech; Dr. Fred L. Hall, former Vice-Provost (Graduate Education) and Dean of Graduate Studies, University of Calgary; and Dr. Carolyn Watters, Vice President Academic and Provost, Dalhousie University.

The review will assess the academic and administrative strengths of the Faculty, the balance among its various functions, and the Faculty's stature. The reviewers will also consider the Faculty's leadership and management, its effectiveness in the use of resources and facilities, and its future development.

The reviewers will be on the Vancouver campus on November 16, 17, and 18. All members of the UBC community are invited to send the reviewers their comments in writing, to either Dr. Herbert Rosengarten, Review Coordinator (hjr@exchange.ubc.ca) or Ms. Stephanie Milliken (Stephanie@millikenhr.com). **The deadline for sending comments is November 10, 2011.** All submissions should be clearly signed; those sent to Ms. Milliken will be forwarded to the panel in a synthesized form with no names attached.

For a fuller description of the review's Terms of Reference, please go to the Provost's web-site: **www.vpacademic.ubc.ca**

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UBC Remembers

The University of British Columbia held its first Remembrance Day Ceremony in the War Memorial Gym in 1951. 60 years later UBC is honoured to help commemorate those men and women who have given their lives for the freedom of others.
For more information please visit
www.ceremonies.ubc.ca

Remembrance Day Ceremony
November 11th 2011 | 10:45 a.m.
UBC War Memorial Gym

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Engineering a greener future

UBC Master of Clean Energy Engineering students learn in UBC neighborhoods

ErinRose Handy

Martin Dee Photograph

Student **Mike Hoy** is helping homeowners reduce their energy consumption.

Graduate engineering students on UBC's Vancouver campus are contributing to a greener future through energy assessments in UBC University Neighbourhoods Association (UNA) developments. Their projects are demonstrating clean energy solutions that could potentially be used by other communities on campus and beyond.

Student Mike Hoy is helping homeowners in the Hawthorn Neighborhood (located south of Thunderbird Blvd. on Main Mall) interested in implementing alternative energy systems and energy efficiency upgrades to reduce consumption and greenhouse gases (GHGs).

For the project, Hoy is monitoring energy data, performing an audit and researching efficiency improvements and sustainable solutions, including solar and geothermal for 20 units in the complex. He will also survey 10 homeowners and align their preferences with results from his technical analysis.

"Buildings are responsible for 30 per cent of GHG emissions in North America, so it is important to make them more energy efficient," says Hoy, 31. "UBC provides a unique environment that enables us to learn from real data and positively influence a real community."

Senthil Rushya, another student in the program, is studying residential buildings in the Sitka development that is going up on the corner of Agronomy Rd. and Wesbrook Mall, slated to be completed by fall 2012. He is assessing the environmental and economic aspects of installing a heat recovery system of grey water from dishwashers, laundry and household sinks. Since any hot water that goes down the drain carries energy away with it, capturing this energy and recycling it to preheat cold water will reduce energy consumption.

"We strive to help students work on real-world energy problems for their master's projects," says Eric Mazzi, Power Smart® Instructor with UBC's Master of Clean Energy Engineering program. "UBC's living laboratory provides our students with valuable learning that they carry forward to their future jobs."

Launched at UBC in 2009, the Masters of Engineering in Clean Energy Engineering is intended for those with an undergraduate degree in engineering with interest in advanced training in energy efficient technologies and policies. It graduated its first class of 24 students in May 2011 and as many as 90 per cent are now employed in energy-related positions, Mazzi says.

"It is our goal to inspire innovation in our students so they can take that knowledge forward and effect positive change," Mazzi adds.

"The UNA is fortunate to have access to the talent of the Clean Energy Engineering students," says Ralph Wells, UNA Sustainability Manager. "This is a win for the community and the students, and we hope these are the first of many projects to come." ●

For more information visit:
www.cerc.ubc.ca/prospective_students/cleanenergy.php

UBC GREEN fact

Through UBC's **SEEDS** program, more than 4,000 students, staff and faculty have advanced campus sustainability since 2000, from improving campus eatery operations to increasing the energy-efficiency of buildings.

Build it and they will stay

Kera McArthur and Basil Waugh

The signs of a growing residential community on UBC's Vancouver campus are everywhere, but numbers speak even louder to the sustainability aspirations of UTown@UBC.

Inspired by iconic college towns such as Cambridge and Harvard, UBC is transforming from a commuter campus to a complete sustainable community, where shops, services, parks and public transportation are all within walking distance.

A wildly successful universal transit pass, new housing for students, faculty and staff, and increased financial support are all part of a plan to make UTown@UBC a vibrant community to learn, work and live.

Housing

9,000
With more than 9,000 students living on the Vancouver campus, UBC has more student housing on one campus than any university in Canada.

29%
Currently 29 per cent of undergraduates and 22 per cent of graduate students live on campus.

3,100
More than 50 per cent of campus households include someone who works or studies at UBC. Of the nearly 3,100 units built since 1991, 20 per cent are rentals and 10 per cent are offered at non-market rates.

Transportation

15%
Automobile traffic coming to and from campus has decreased by 15 per cent since 1997 despite a 42 per cent growth in daytime population.

63,000
Thanks largely to the U-Pass, transit trips have more than tripled during this period, from 19,000 to 63,000 trips per day.

Financial Support

$300 million
Family homes on campus have contributed over $300 million to UBC's Endowment Fund—approximately a third of its total value—which finances scholarships, bursaries, professorships and research.

$
UBC's Student Housing Financing Endowment will direct a large portion of land lease proceeds from creating residential communities on the Vancouver campus toward student housing projects.

For more information, visit:
www.planning.ubc.ca

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THE FACULTY OF ARTS

UBC Killam Teaching Prizes

Once again the University is recognizing excellence in teaching through the awarding of prizes to faculty members. Up to six (6) prize winners will be selected in the Faculty of Arts for 2012.

ELIGIBILITY
Eligibility is open to faculty who have three or more years of teaching at UBC. The three years include 2011 - 2012.

CRITERIA
The awards will recognize distinguished teaching at all levels; introductory, advanced, graduate courses, graduate supervision, and any combination of levels.

NOMINATION PROCESS
Members of faculty, students, or alumni may suggest candidates to the Head of the Department, the Director of the School, or Chair of the Program in which the nominee teaches. These suggestions should be in writing and signed by one or more students, alumni or faculty, and they should include a very brief statement of the basis for the nomination. You may write a letter of nomination or pick up a form from the Office of the Dean, Faculty of Arts in Buchanan A240.

DEADLINE
4:00 p.m. on January 13, 2012. Submit nominations to the Department, School or Program Office in which the nominee teaches.

Winners will be announced mid-April, and they will be identified during Spring convocation in May.

For further information about these awards contact your Department, School or Program office, or **Judy Barry** in the Dean of Arts Office, **(604) 822-9062.**

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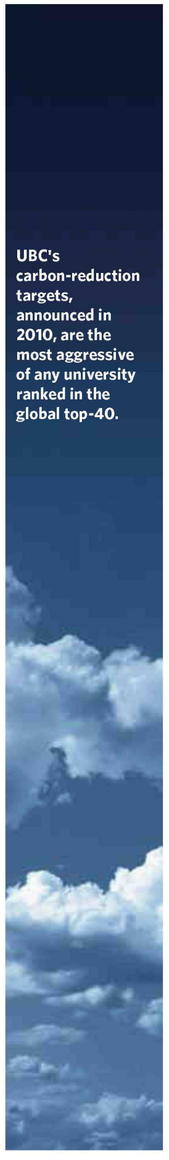
UBC's roadmap to zero emissions

UBC—essentially, a city of 70,000 people—is taking steps to completely eliminate institutional greenhouse gases in Vancouver by 2050.
While dramatic emission reductions are not new at UBC—the university was Canada's first to meet the Kyoto Protocol targets in its academic buildings—achieving carbon neutrality has inspired the university to re-envision itself as a living laboratory for sustainability.



UBC's carbon-reduction targets, announced in 2010, are the most aggressive of any university ranked in the global top-40.

2015

UBC is on track to meet or exceed its targeted 2015 reduction of 33 per cent as a result of three flagship projects valued at more than $116-million-dollars.

Hot Water District Energy System
An new $85-million, 14-km hot water district energy system, to be completed by 2015, will slash carbon emissions by 22 per cent (11,000 tonnes), akin to removing 2,000 cars from the road.

Bioenergy Research and Demonstration Project
When completed in 2012, this pioneering $27-million bioenergy project—it runs on wood chips—will eliminate up to nine per cent (4,500 tonnes) of campus emissions, akin to removing 1,100 cars off the road, while generating enough electricity to power 1,500 homes.

Continuous Optimization
By improving operations, maintenance and energy monitoring in 72 core academic buildings, this $4-million program is expected to reduce carbon emissions by 10 per cent by 2015.

33%
GHG REDUCTION

2020

While still in the planning stage, these projects are expected to help UBC meet or exceed its 2020 target of a 67 per cent GHG reduction.

Heat Recovery
UBC is exploring opportunities to recover waste heat from TRIUMF, the national laboratory for particle and nuclear physics at UBC. If it proves viable, it would provide a major new source of energy and as much as 23 per cent in emission reductions. Projected cost and completion: $16 million, 2016-2018.

Smart Energy System
UBC plans to develop one of the first community integrated energy management systems. Improving energy monitoring and management across the university's more than 400 academic and residential buildings while integrating new clean energy sources will help UBC achieve carbon and energy goals and identify new opportunities. Projected completion: 2015.

BC Hydro Self-Sufficiency
BC Hydro's goal to provide carbon-neutral electricity by 2016 will result in a 6.5 per cent GHG reduction for UBC.

67%
GHG REDUCTION

2050

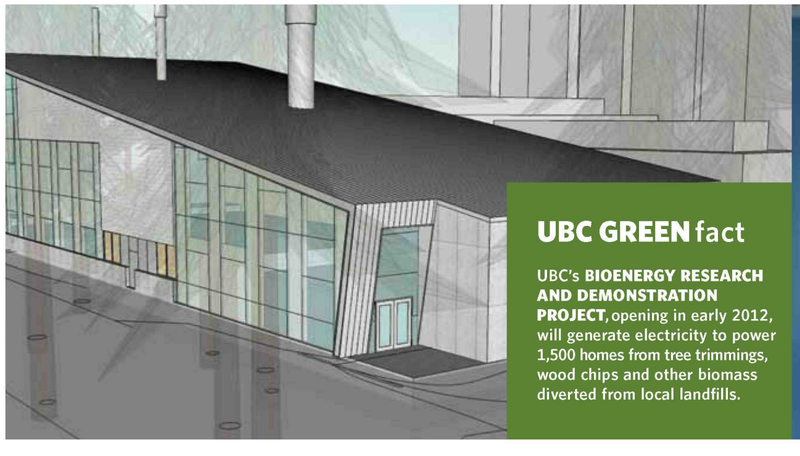
With 70 per cent of GHG reductions planned by 2020, the remaining steps to become carbon neutral will include:

Alternative Energy Projects
UBC is exploring new sources of energy for campus, including ocean thermal energy, sewer waste heat recovery, plus advances in geothermal, bioenergy, solar thermal and photovoltaic, wind, and energy storage. Successful projects will reduce carbon emissions and the reliance on natural gas and electricity.

Greener Buildings
Currently all new UBC buildings must meet or exceed LEED Gold and use 42 per cent less energy than national standards. Future buildings will aim to be carbon neutral or "net positive," like UBC's Centre for Interactive Research on Sustainability, which removes 150 tonnes of carbon from the environment annually.

Clean Transportation
By expanding the U-Pass transit system to staff and faculty and switching its 300-vehicle fleet to electricity or other types of clean energy, UBC hopes to achieve further reductions in greenhouse gases.

100%
GHG REDUCTION



Rendering courtesy of **Nexterra** Photograph **Javier Landaeta**

UBC GREEN fact

UBC's **BIOENERGY RESEARCH AND DEMONSTRATION PROJECT**, opening in early 2012, will generate electricity to power 1,500 homes from tree trimmings, wood chips and other biomass diverted from local landfills.

"As far as we know, no one is integrating research and operations on sustainability as deeply as we are at UBC.
As owner-operator of the campus, we have the ability to develop, test and demonstrate advances right here, and serve as a sustainable model for other communities."

John Metras, Director of UBC Building Operations

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Turning global problems into solutions

Harnessing sunlight to convert carbon dioxide into cleaner fuels

Lorraine Chan and ErinRose Handy

Nature makes it look so easy. Using sunlight, flowers and trees convert carbon dioxide and water into useful sugars and oxygen.

At UBC's Clean Energy Research Centre (CERC) in Vancouver, Director David Wilkinson is exploring how to convert carbon dioxide (CO_2) into fuels.

CERC is an interdisciplinary facility dedicated to improving existing energy technologies and developing new sustainable sources of energy. The centre supports more than 60 faculty and 200 graduate students whose research includes clean burning engines, fuel cells systems, process emission reductions and new energy sources such as hydrogen and biofuels.

"It's one of the holy grails," says Wilkinson, professor and Canada Research Chair in the Dept. of Chemical and Biological Engineering. "Being able to convert the greenhouse gas CO_2 into cleaner energy fuels on an industrial scale would not only help to offset the future shortage of fossil fuels but would help to offset CO_2 emissions to reduce the risk of global warming."

The process requires capturing CO_2, combining it with water, and then using the sun's energy to trigger a photochemical reaction. With enough light, the photocatalyst transforms carbon dioxide into simple low-carbon fuels such as methane, methanol and others that can be used for combustion or in fuel cells for many different applications.

Since CO_2 can last up to 100 years in the atmosphere, the challenge is developing photocatalysts that can use solar radiation to break down CO_2 efficiently and at practical conversion rates without using another energy source.

Over the past months, Wilkinson and his team have been working with photocatalysts that employ nanoscopic structures of titanium oxide mixed with copper and other materials for improved performance. "We're looking at ways to improve how efficiently the photocatalyst works, its stability and sensitivity to light, and how best to incorporate it into a reactor," explains Wilkinson.

"It's conceivable that we could have a small pilot prototype within five years," says Wilkinson, adding that CERC is one of only a few centres in the world tackling solar-carbon conversion, an emerging research area.

He notes that, "UBC is uniquely positioned given the scope of our sustainable clean energy research and our progress in such related fields as catalysis, fuel cell and electrosynthesis technology, and advanced electrolysis including solar splitting of water."

The new technology would initially target industries where large quantities of CO_2 are produced, such as power plants that use natural gas or coal. "Until recently there have been very few options to use this waste CO_2 as a useful input to other processes, instead of releasing it into the atmosphere or burying it underground." ●

For more information about UBC's Clean Energy Research Centre, visit www.cerc.ubc.ca

Clean energy researcher **David Wilkinson** is investigating solar fuels.

Martin Dee Photographs

Ming Bai (left) and **Jingmei Li** interned with China's Modern Green Development.

Going green abroad

Students learn through partnership with China's top green building developer

Heather Amos

A unique internship experience gave three UBC engineering students the chance to get out of their labs and off the continent this summer.

The graduate students went to China to learn from the country's top green building developers, Modern Green Development, a partner with UBC's Centre for Interactive Research on Sustainability (CIRS). The students were asked to use their engineering knowledge to improve or develop new technologies to make buildings more sustainable.

"It's good to use your knowledge and apply it to real-life scenarios," says Jingmei Li, a PhD candidate in mechanical engineering, who spent her summer working at Modern Green's Beijing office.

Modern Green has developed more than 10-million square-feet of green buildings in China and Australia, using geothermal heating, energy-saving technologies and other sustainable building practices. It is currently building its first development in Canada, Yu, on UBC's South Campus.

Earlier this year, Modern Green donated $3.5 million to UBC to establish a research partnership with the university. As a result, UBC students can intern at Modern Green to learn how the company takes research from the lab and puts it to use in designing new green buildings.

Li, who is originally from China and who had studied heating, ventilation and air conditioning systems for her master's degree there, used this work to help design and consider different options for radiant cooling, a system that cools down living spaces by absorbing heat from a room.

"Now that I have some experience working in the industry, I have more confidence in my research and how I can apply it," says Li, who wants to work in the field once she has completed her PhD studies next year.

Modern Green is among a growing number of industry partners collaborating with UBC on sustainability solutions. UBC has partnered with Honeywell, Haworth and BC Hydro for the CIRS project, and Nexterra Power Systems Corp. and General Electric Co. for UBC's Bioenergy Research and Demonstration Project, which is the first biomass-gas-fueled, combined heat-and-power generation system of its kind.

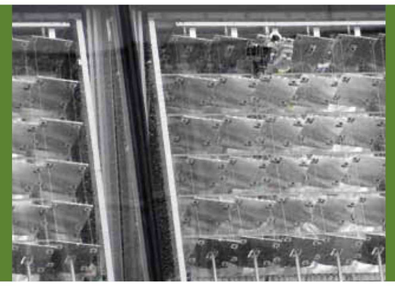
These collaborations help UBC achieve its sustainability goals while giving partners the opportunity to collaborate with researchers and students and test innovations at a community scale.

Ming Bai, a master's student in electrical engineering, had never studied or worked in the field of sustainability, but spent his summer with Modern Green researching how to reduce energy use in houses and implement metering systems that increase consumers' awareness of their energy consumption.

Bai, who had visited Beijing before, noticed that the city had changed and that it was working hard to make things more sustainable. He is now interested in pursuing engineering work opportunities including sustainable building design. ●

UBC GREEN fact

UBC's **CORE SUNLIGHTING SYSTEM**, invented by Physics Prof. Lorne Whitehead, uses automated mirrors to collect and channel sunlight deep into UBC's Biological Sciences building.



UBC GREEN fact

The UBC **SUPERMILEAGE CAR**, developed by engineering students, travelled 5,060 km—the distance from Vancouver to Halifax—on one gallon of gasoline.

UBC GREEN fact

The **AMS SUSTAINABILITY FUND** will provide up to $120,000 in funding for student-led sustainability projects this year.

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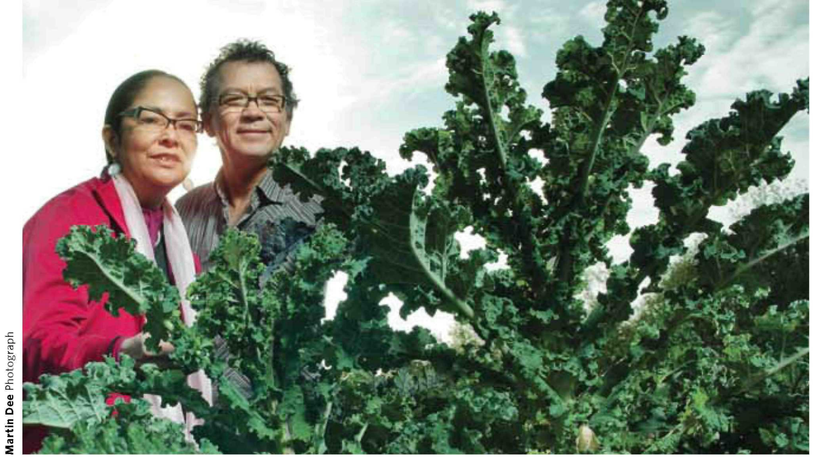

Martin Dee Photograph

A thicket of kale surrounds researcher **Eduardo Jovel** and PhD student **Alannah Young Leon** at UBC Farm.

Growing social sustainability at UBC Farm

Lorraine Chan

The Centre for Sustainable Food Systems at UBC Farm hosts a number of indigenous food security initiatives that are seeding social sustainability through the elements of water, earth and community.

Consider the Urban Aboriginal Community Kitchen Garden Project, which is organized by the Vancouver Native Health Society. Hundreds of participants – many from Vancouver's Downtown Eastside – regularly make the trek to UBC Farm which involves carpooling or taking the bus to UBC's south campus. They plant, weed and harvest crops, preparing communal meals and sharing extra produce with those in need.

Many participants undergo a sense of renewal by connecting to others and to the land, says Assoc. Prof. Eduardo Jovel, Director of Indigenous Research Partnerships at the Faculty of Land and Food Systems.

Jacqui Adams says her time at the Urban Aboriginal Community Kitchen Garden Project is nothing less than restorative. "When we came back from residential school in the summertime, my mom always had a garden. There is a lot of stuff that I forgot about, that I am remembering. It restores my soul."

Also at UBC Farm are the Maya in Exile Garden, the Institute for Aboriginal Health Teaching and Learning Research Garden and the Musqueam Indian Band Garden. Overall, more than 300 community members and students got involved in these four gardens.

"As a 24-hectare teaching and learning farm, UBC Farm offers a physical and cultural space where people can explore sustainability issues, including Aboriginal health and traditional ecological knowledge," says Jovel, whose research areas include ethnobotany, aboriginal health, natural product chemistry and food security.

Jovel says UBC Aboriginal faculty and academic units, along with community partners, are developing an interdisciplinary community service learning (CSL) field school at the Center for Sustainable Food Systems at UBC Farm where students can engage further with Aboriginal communities. Curricula will address issues such as intellectual property, culture, research ethics and traditional protocols.

UBC is a recognized leader in community service learning (CSL), which encourages students to apply discipline-specific knowledge in resolving real-life challenges, he says. Last year, close to 2,600 UBC students engaged with non-profit organizations, public schools and businesses in CSL projects as diverse as analyzing living wage policies and supporting children's literacy.

"When working with indigenous partners, we advocate a common protocol that follows the four 'R's' – respect, responsibility, reciprocity and relevance," says Jovel, a Pipil from El Salvador who is interested in how indigenous worldviews intersect with western science.

One step toward this vision is an online video library that Jovel's team will launch this year to connect students with Aboriginal initiatives at UBC Farm. The videos document the often profound journey of participants, he says.

UBC's Institute of Aboriginal Health (IAR) also hosts popular monthly "Feast Bowl" events at the First Nations House of Learning, which feature guest speakers and lunch with UBC Farm-fresh ingredients, attracting upwards of 100 guests. As well, the IAR facilitates a summer workshop series, which recently looked at traditional medicines and how to prepare tobacco – harvested from UBC Farm – for ceremonial use.

"We want to demonstrate that Aboriginal learning involves multi-generational education, a holistic, experiential, spiritual and communal process," says Jovel.

He says these values support UBC's academic plan for south campus, which envisions UBC Farm as an immersive environment for globally significant research on key sustainability issues that include green technology innovations, organic agriculture and clean energy. "Our work also advances the objectives of the Aboriginal Strategic Plan in outreach to local indigenous communities, curricula development, and public programming." ●

"There is a lot of stuff that I am remembering. It restores my soul."

UBC GREEN fact

In 2011, UBC was named Canada's first **"FAIR TRADE CAMPUS."** UBC now has its very own blend of ethically sourced coffee, courtesy of Vancouver's Milano Coffee.

Courtesy of Erica Frank

Prof. **Erica Frank**, says NextGenU will be tuition-free, carbon-free and open to all.

Public health professor pursues tuition-free online university

Brian Kladko

As UBC and other universities strive to reduce their greenhouse emissions over the coming decades, one faculty member is determined to hit a far more ambitious goal – creating a completely carbon-free university, now.

Prof. Erica Frank, UBC School of Population and Public Health, is preparing to launch NextGenU.org – an online university that will initially emphasize health sciences education.

NextGenU's primary target is the millions of current and potential students in the developing world, where specialized higher education is a scarce resource. Frank believes computer-aided education can help address the huge imbalance between the need for health professionals and the number of seats to train them all.

Frank, a physician and Canada Research Chair in Preventive and Population Health, thinks NextGenU can make post-secondary education a more environmentally, financially, and socially sustainable enterprise by allowing people to learn where they live and work, instead of forcing students and instructors to relocate great distances, regularly commute, or, in the case of continuing professional education, travel to distant meetings. Online materials are provided through wind-powered servers, while skills-based learning will come from volunteer local mentors, and local and international peer-to-peer training.

And tuition? There is none. NextGenU will not only be carbon-free, but free, period.

"Traditional education, what I call 'University 1.0,' is enormously resource-intensive," Frank says. "Buildings must be built, maintained, powered, and heated or cooled. People must travel to them. And that also costs a lot of money, with much of the cost passed on to the students themselves. NextGenU enables people to advance their knowledge, their skills, their careers, without any additional burden on the planet – or students' finances."

NextGenU.org can operate with a small budget, as nearly all instructors donate their time, either in creating courses or acting as local mentors. Educational materials are drawn from web resources like Health Sciences Online, NextGenU's first library, an online portal that Frank began in 2001 that contains links to 50,000 learning resources.

Frank's commitment to environmental sustainability extends beyond NextGenU. She recently won a two-year $20,000 University Sustainability Initiative Teaching & Learning Fellowship from UBC to create on online course on climate change and health – one of NextGenU's first offerings. Prior to moving to UBC, she co-designed and lived in the only energy-independent home in Georgia (all of its power was self-generated), and also served as president of Physicians for Social Responsibility.

Altogether, NextGenU plans to have about 20 courses ready for its launch, expected in the next couple of months. NextGenU is not offering any degrees for now, but will immediately offer an equivalent of a master's degree in public health, called a Certificate in Public Health, endorsed by the American Association of Public Health Physicians, the Public Health Foundation of India and the Presbyterian University of East Africa in Kenya.

NextGenU will also launch with residency and other training programs for physicians in the developing world, in the areas of emergency medicine, pediatrics, and preventive medicine.

While the venture is aimed at the developing world, Frank believes many courses will be useful for students in Canada and other wealthy nations.

"NextGenU is for a new generation of learners, who do not want or may not have the luxury to pay for their education, or leave their homes to receive it, or degrade the environment through the act of learning," Frank says. "The standard model of university education simply doesn't work for vast numbers of students, so we're launching, testing, refining and expanding a new model." ●

For more information visit: nextgenu.org

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MARCH 1, 2012
Exploratory Workshop Grant

Exploratory Workshops provide funding for bringing together researchers from different disciplines at UBC with distinguished external experts to, for example, work jointly toward assessing the research possibilities in a new area. Typically, Exploratory Workshops will take place over a period of several days and have a mix of open and closed sessions. The amount of the award is up to $25,000.

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Harnessing nature's energy to heat an entire campus

Geothermal technology expands to academic buildings on the Okanagan Campus

Darren Handschuh

The University of British Columbia's Okanagan campus is digging deep—literally—to reduce the impact it has on the planet.

UBC has gone underground to employ geo-exchange technology for the heating and cooling needs of most campus buildings. Using the natural energy of the earth reduces the environmental footprint while meeting the climate-control needs of the large campus buildings.

The geo-exchange system is estimated to avoid putting approximately 38,000 tonnes of greenhouse gas emissions into the atmosphere over the next 25 years. On average, a typical passenger car emits 5.5 tonnes of CO_2 annually.

All new academic buildings are now heated and cooled using geothermal technology—including the Fipke Centre for Innovative Research, University Centre, Arts and Sciences II, Engineering, Management and Education (EME) and the Health Sciences Centre. In addition, the new 212-bed Purcell Residence has its own horizontal geo-exchange loop system.

Existing Okanagan campus academic buildings are being retrofitted for heat from geo-exchange.

"The geo-thermal system serves as the foundation of our emissions and energy reduction strategy on campus," says Jackie Podger, associate vice president, finance and administration. "All new academic buildings are expected to create substantial energy savings over a conventional building with the same design, and generate fewer greenhouse gas emissions."

Geo-exchange technology extracts low-grade heat from the earth—in the case of the Okanagan campus with water from a lake-size underground aquifer—and compresses it via a reverse refrigeration process that increases the temperature and can then be used to heat buildings in the winter.

In the summer, the relative cold temperature of the aquifer water cools the buildings.

Benefits of geo-exchange include reduced natural gas consumption, a reduction in harmful greenhouse gas emissions, and significant operational cost savings compared to using conventional, gas-fired heating equipment.

"Measures to improve operational sustainability on campus go beyond the geo-exchange system to incorporate green roofs, solar panels for domestic water pre-heat, water-saving fixtures and best practices in locally-sourced, high-recycled content materials," says Leanne Bilodeau, director, sustainability operations. "Together, these measures serve to reduce the campus' environmental footprint, reduce energy use and costs and help to support the local economy." ●

Key sustainability projects on UBC's Okanagan campus

Sustainability Institute

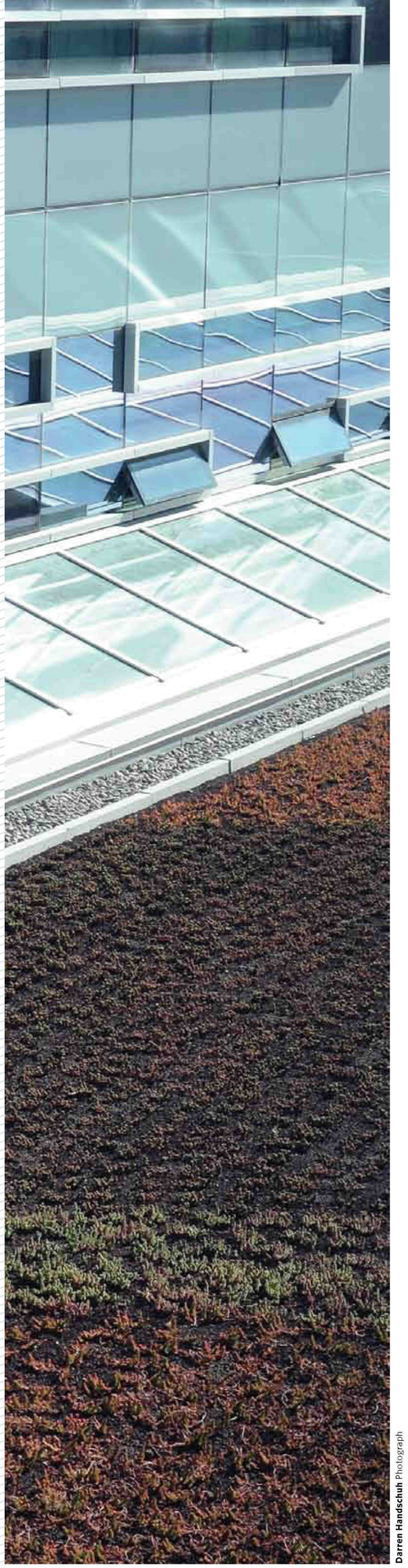
The Okanagan Sustainability Institute (OSI) is an interdisciplinary, inter-faculty institute dedicated to issues of long-term sustainability within the Okanagan region and beyond. Membership is made up of faculty and staff at UBC's Okanagan campus, complemented by a variety of partnerships in the region.

The objectives of OSI include the generation of information, knowledge, methods and processes that help regions in planning sustainable development while also advancing academic knowledge and practice.

Partnership with Kelowna

UBC's Okanagan campus has partnered with the City of Kelowna on several sustainability initiatives that advance climate action goals and benefit the environment. UBC has funded projects that will reduce water use, increase transit ridership and cultivate social and cultural sustainability through story and local food.

Sustainable transportation and ways to reduce waste going in to landfills are also joint projects between the city and university, as is an academic grant program to advance sustainability in Kelowna's Glenmore neighborhood.



Darren Handschuh Photograph

Okanagan Campus green roofs provide natural temperature control.

outtakes

Reflections on academic life

A UBC expert participates in Al Gore's 24-hour climate reality project

Prof. Simon Donner

UBC Geography Prof. **Simon Donner** (left) beside U.S. vice president **Al Gore** during the 24-hour broadcast.

This September, UBC climate change expert Simon Donner participated in former U.S. vice president Al Gore's latest project, "24 Hours of Reality," a worldwide online event that connected recent extreme weather events—floods, droughts and storms—with manmade pollution that is changing our climate. In this edition of *Outtakes*, Donner gives a behind-the-scenes account of his experience on the set in New York City.

Once the make-up was done and the microphones were attached, the segment producer led us out to the stage and assigned us seats on the couch. I was last. "Simon, take the end there, and Mr. Gore will sit beside you before we go live."

Wonderful, I thought. Thanks for the warning.

When I was first asked to be panellist on Al Gore's "24 Hours of Reality," I was skeptical. I've seen many well-intentioned efforts to raise awareness about climate change turn into political spectacles that alienate much of the audience. But in talking it over with family and colleagues, I was reminded of that old Roosevelt quote: it's not the critic that counts.

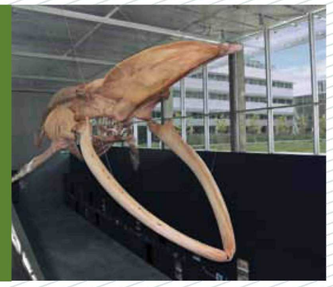
So I found myself sitting next to former U.S. Vice President—the maker of the Academy Award-winning documentary *The Inconvenient Truth*, thinking "remember to say the bit about methane" and "Forget Paul Simon, DO NOT CALL HIM AL."

Mr. Gore—I got that right—was gracious and put us nervous scientists at ease. I actually found his close-ups the only stressful part of the broadcast. In the video, you can probably tell the moment I noticed that my head was in all of his close-ups. I tried to quietly shift sideways, but the only way out of the shot would have been to sit on someone else's lap.

Though I do wonder whether Mr. Gore's mix of science and solutions is the most effective method of outreach, I gained a real admiration for the energy and passion his team brings to addressing climate change. ●

UBC GREEN fact

UBC **BEATY BIODIVERSITY CENTRE** is home to Canada's largest blue whale skeleton exhibit, a 25-metre skeleton of a whale that washed ashore off the coast of Prince Edward Island.



UBC GREEN fact

In **2011**, UBC received Canada's first "Gold" in the **AASHE STAR** (Sustainability Tracking, Assessment & Rating System™) program that assesses sustainability achievements in higher education.

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