GROWING GREENER CAMPUSES AT ONTARIO UNIVERSITIES

MANAGEMENT 2 0 1 3 R E P O R T

"SUSTAINABILITY IS

PART OF THE NARRATIVE FOR THE STUDENTS WE
TEACH, FOR THE SOCIETY WE LIVE IN. YOU CANNOT
CONTEMPLATE ANY OF THE 'BIG ISSUES' IN THE
WORLD TODAY THAT DON'T INCLUDE A
CONVERSATION ON SUSTAINABILITY."

~ Janice Deakin, Western University's Provost and Co-Chair of her institution's sustainability committee



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EXECUTIVE SUMMARY

Solar-powered cars, walls that are alive with plant life, and homes that generate more energy than they use – when it comes to sustainability research, Ontario universities are true leaders.

In order to ensure university campuses are also leading the way in sustainability, from infrastructure to day-to-day operations, the executive heads of each of Ontario's universities signed a *pledge* to ensure their campuses are fully sustainable. Ontario universities' fifth annual sustainability report highlights progress made by entire campus communities toward environmental sustainability.



Based on a survey of all 20 Ontario universities (22 campuses), this report features initiatives from 2013 and progress made since 2009. Report highlights include:

- 14 campuses are now generating their own renewable energy, up from seven in 2009. In addition, 18 campuses, up from eight in 2009, have conducted greenhouse gas inventories. All campuses have begun reporting their emission totals under new Green Energy Act regulations.
- 18 campuses have green building standards, up from nine in 2009.
- Sustainable transportation options have surged in popularity, with 14 universities offering bike-share programs, nine having installed bike lanes, and 20 having protected bike racks. Five campuses reported new or expanded car-share programs.
- All campuses now conduct waste audits to measure how much and what kind of waste is produced, and also recycle and compost an array of waste materials.
- "Green cleaning" programs have become almost universal, having been adopted by 21 out of 22 campuses—more than double the number in 2009.
- Two universities introduced green revolving funds that invest in sustainability projects and produce cost savings through energy conservation, which are then reinvested into the fund.
- Universities are creating living laboratory programs to give students the opportunity to learn and explore by studying the buildings, people, and natural environment of their own campuses.
- In 2013, the Ontario College and University Sustainability Professionals was formally established to facilitate the sharing of best practices between Ontario's postsecondary institutions.

INTRODUCTION AND BACKGROUND

This report reflects the enthusiasm and commitment of students, staff and faculty in realizing the vision of environmental sustainability on Ontario's university campuses.

The report is based on an annual survey of 20 Ontario universities conducted by the Council of Ontario Universities (COU).

LEADERSHIP, POLICY AND INVESTMENT

Groups focused on sustainability, composed of students, facilities staff, administration and faculty, are now widespread, with 19 of 22 campuses reporting that they have one. These groups work to support sustainability plans and policies.

- In 2013, **Nipissing University's** sustainability team conducted an exercise that measured the campus' carbon and water footprint.
- The Board of Trustees of Brock University adopted a new <u>Sustainability Policy</u> (PDF) that is aligned with the university's location within a UNESCO-designated Biosphere Reserve.
- Through its new <u>Land Use Framework Plan</u> (PDF), **Trent University** has renewed its commitment to protect nature and increased the size of the Trent Nature Areas on Symons Campus.
- Western University released its sustainability strategy, <u>Creating a Sustainable Western</u> <u>Experience</u>, that sets out five and 10-year goals requiring sustainability to be embedded in all aspects of campus culture.

GREEN REVOLVING FUNDS

Green revolving funds are an emerging trend at Ontario universities. The funds invest in sustainability projects that produce cost savings through conservation. Savings are then re-invested in the fund to support future projects.

- As part of Carleton University's new Sustainability Strategic Plan, a \$1-million Green Revolving Fund was created to fund top sustainability projects proposed by the university community. One project being funded involves the application of smart building technology, which will complement Carleton's ongoing energy management program. A pilot is planned for five buildings in 2014.
- The University of Toronto launched a \$4-million green revolving fund, which supported a pilot project to install a remote-controlled ventilation and alert system in a chemistry lab. The system yielded an estimated annual savings of 169,435 kWh of electricity, the equivalent of running a streetlight for almost 10 years, without compromising air quality

in the labs.

STUDENT ENGAGEMENT

Students play a leadership role in driving progress on campus sustainability, with 14 universities (up from 10 in 2009) reporting that students are now a key partner in developing sustainability strategies and goals.

- Queen's University hosted <u>Greenfest</u>, its first sustainability week, with themed days focusing on energy/climate, waste diversion, food/water, transportation, and sustainability education. Highlights from the week included a documentary night, an e-waste recycling games competition, sustainable meals and recipes in campus eating establishments, a trivia night, and an information fair with more than 20 exhibitors from campus and the community.
- Wilfrid Laurier University's Residence Energy Competition saved the university more than \$1,500 in just one week by encouraging students to turn off lights and electronics.

- OCAD University's Sustainability Task Force and Student Union collaborated to create their first sustainability month, <u>sMarch</u>, to engage the campus community on what it means to think, live, design, and create sustainably. Almost 30 activities and events took place including gallery exhibits, student contests, film nights, and an alumni discussion panel.
- Nearly 50 environmentally focused student groups thrive at the University of Toronto-St. George. The University of Toronto's Environmental Resource Network provides funding to student groups, a volunteer bank, and a dish-lending service. The Trinity Environment Club created a green roof and installed solar panels on residence buildings. The Green Chemistry Initiative provided public and campus-based education on environmentally friendly chemistry practices.

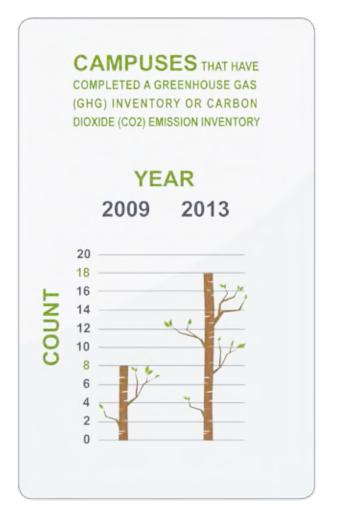
STUDENT ENGAGEMENT IN THE DIGITAL AGE

To engage students, many universities are using digital stratgies: social media, green technologies and mobile applications. Ryerson University's sustainability program uses Nudge Rewards, a mobile application that enables large organizations, including universities, corporations and governments, to communicate and track sustainability initiatives. Incubated in Ryerson's Digital Media Zone by Lindsey Goodchild, alumna of Ryerson, and Dessy Daskalov, alumna of Queen's University, Nudge Rewards is being used to engage employees and citizens in large-scale healthy living, green and community initiatives. The software takes a high-level goal, such as reducing waste on campus, and breaks it down into small actions that individuals can take to support the goal. Users of Nudge Rewards log their progress and are recognized immediately for their positive behaviours through a reward system.

OPERATIONS AND FACILITIES

ENERGY AND EMISSIONS

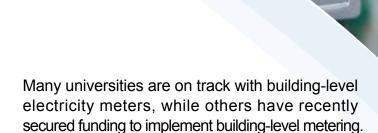
In response to provincial government reporting requirements, all Ontario universities are developing five-year energy demand management plans. Most universities have already conducted greenhouse gas inventories that identify sources and levels of greenhouse gas emissions.











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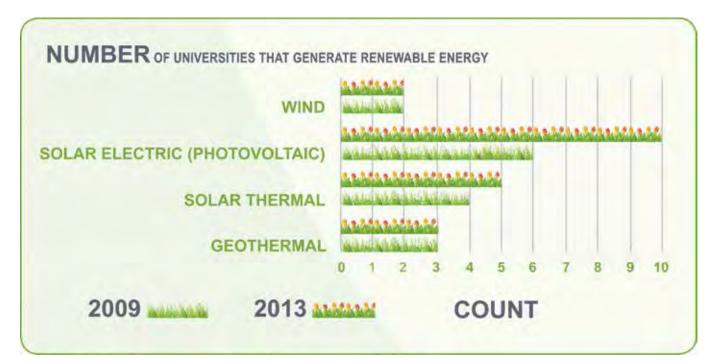


The University of Waterloo's Computer Room Server Project reduced electrical consumption by replacing existing servers with new, more efficient ones. The university received more than \$150,000 as an incentive for the project from the local utility through the 'saveONenergy' retrofit program (funded by the Ontario Power Authority) and will experience significant energy savings as a result.

Renewable energy generation continues to increase on university campuses. Three universities have developed geothermal energy sources. The recently built Instructional Centre at the **University of Toronto - Mississauga** is powered by a geothermal heating and cooling system. The *geothermal well field*, composed of 117 boreholes drilled to a depth of 168 metres, eliminates the need for a separate boiler and chiller to heat or cool the building resulting in significant energy and cost savings.



The most popular form of renewable energy used by universities in 2013 was solar electric power. Compared to 2009 when only six universities had solar panels, by 2013, 10 universities had installed them. The majority of universities, 14, reported generating their own renewable energy, while four purchased energy or renewable energy credits from off-campus sources.





SUSTAINABLE AND ENERGY-EFFICIENT BUILDINGS

The majority of Ontario universities have adopted green standards, such as Green Globes or Leadership in Energy and Environmental Design (LEED), so that new buildings or retrofits are built using leading eco-friendly standards. In 2013, **Brock University's** International Centre building received LEED Silver Certification from the Canada Green Building Council. **Trent University** received LEED Gold Certification for part of its Life & Health Sciences building as well as LEED Silver Certification for its Athletics addition. **Laurentian University's** Ben Avery Active Living Centre received LEED Certification for its addition, which houses new fitness and recreation space.

The University of Windsor's Ed Lumley Centre for Engineering Innovation opened early in the 2012-13 year, designed for LEED Gold certification. It features a 500-square-metre green roof, building materials that store thermal energy in the building's concrete, a green wall to filter recirculated air, and smart building technologies.





Universities continue to make upgrades to existing campus buildings, such as retrofitting lighting, heating-ventilation-air-conditioning systems and controls. Last year, **Algoma University** invested in roof replacements for two buildings to achieve an improved R-Value, which measures heat loss.

Beyond building efficiency, universities have worked to improve indoor air quality and, more broadly speaking, indoor environments such as acoustics and temperature comfort. In 2010, five universities measured indoor air quality. In 2013, 12 universities did this routinely.

One delicate balance in achieving high indoor environmental quality requires maximizing efficiency without compromising on ventilation in laboratories. In 2013, the **University of Ontario Institute of Technology** (UOIT) installed a ventilation control system in its labs that improved energy efficiency, resulting in a reduction of 55 tons of greenhouse gas emissions.

SMART BUILDING TECHNOLOGIES

Many universities are investing in smart building technologies such as smart meters and dashboards to monitor and control electricity, water, and heating/cooling systems in real time. These technologies allow universities to reduce their energy use during low-demand hours without sacrificing comfort or health and safety. They also raise awareness among the campus community.

- Trent University has applied a system of 'daylight harvesting' to its lighting system, which uses photo sensors to measure daylight levels. Electric lights are automatically dimmed or switched off when there is adequate daylight. In Trent's Bata Library, this system has resulted in more than 560,000 kilowatt hours of energy saved and \$50,000 in cost savings annually.
- The University of Toronto St. George installed smart building technologies as part of a major heating-ventilation-air-conditioning <u>retrofit</u> for its Medical Science Building. These technologies included improved building automation, real-time system diagnostics, variable speed drive fan technology, and wireless thermostatic controls. Building engineers can monitor and control systems down to the room level. Implemented with \$600,000 in funding from Toronto Hydro and Enbridge Gas, these changes will drastically reduce energy consumption and save more than \$800,000 each year, paying for themselves in only 13 months.

TRANSPORTATION

Universities continue to make progress in reducing transportation emissions. Projects include car-share programs, bike-share programs and bike-friendly campuses, do-it-yourself bike repair stations, subsidized transit passes, expanded transit, flexible work arrangements and smart car-use initiatives.



A rapidly growing number of universities report that they have provided space for car-sharing companies or co-operatives to locate cars on their campuses. These car-share services are now ubiquitous in large urban centres and often manage to reduce the need for private car ownership, particularly in combination with public transit and cycling infrastructure. Universities that launched or expanded car share services in 2013 include Carleton University, University of Guelph, Queen's University, University of Toronto - Mississauga, University of Windsor, and York University.

Western University, Carleton University, and University of Toronto (all three campuses) launched or expanded bike-share programs in 2013. Trent University is developing a bike-share program on campus for 2013-14, and recently opened a new bike shop supported by a student levy. The University of Ottawa has added four new bike repair stations and created a contra-flow bike lane that provides convenience and safety for cyclists travelling in both directions on streets that are one-way for cars.



WASTE DIVERSION AND REDUCTION

Programs to support the three Rs—reduce, reuse, and recycle—continue to grow on campuses, along with a number of new Rs including repair and repurposing. In 2013, **Brock University** installed new water bottle filling stations at two buildings and turned its e-waste recycling pilot project during residence move-out into an annual program. Students at Nipissing University launched a successful water bottle reduction campaign, resulting in the installation of water-bottle filling stations at various campus locations and a reduction in the purchase of plastic bottles. Ryerson University implemented paperless systems across administrative and academic departments and introduced a zero-waste floor in an administrative building, providing only recycling facilities and no waste bins.

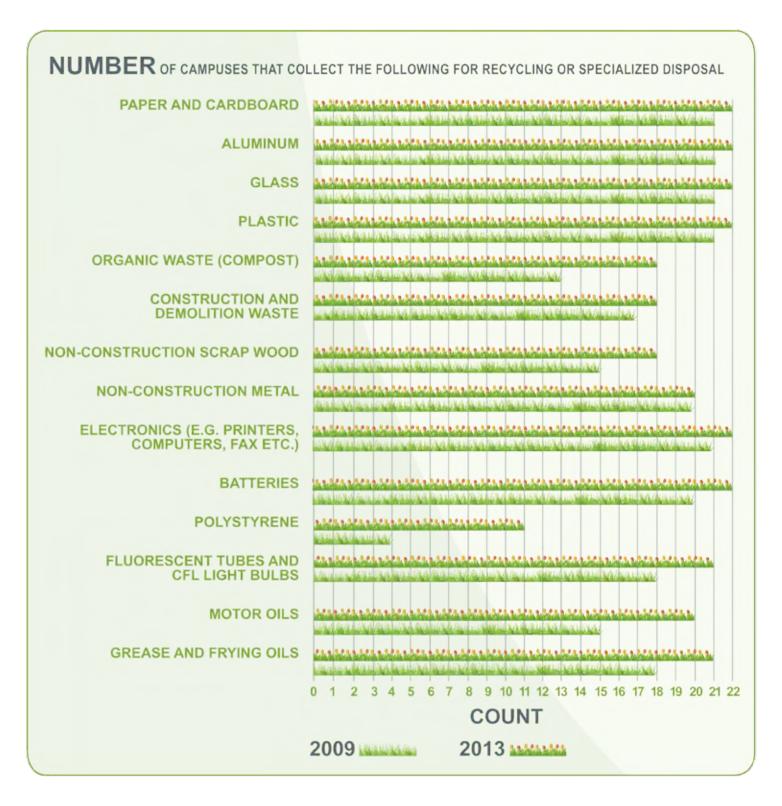
In 2013, York University and the University of Ottawa both won recycling competitions: Ottawa was the RecycleMania 2013 Canadian Champion for the fifth year in a row, while York received an Award of Excellence for the Res Race to Zero Competition.





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For the first time in 2013, all 22 campuses reported having conducted waste audits and having at least six streams of recycling. Building on their enthusiastic adoption of recycling, Ontario universities have also introduced organic composting en masse, now available at 18 campuses. Lakehead University expanded its composting facilities by installing an organic waste conversion system in its main cafeteria. The University of Toronto - St. George reported that their dining halls had achieved a 99 per cent diversion rate on both front (eating) and back of house (kitchen) waste.



With an emphasis on reduce and reuse, universities have shown a pronounced increase in the number of materials exchange programs operating on campus—from 11 campuses in 2009 to 18 campuses in 2013. Almost half of Ontario university campuses (9) reported expanding their e-waste recycling programs, with a focus on collecting electronic equipment during residence move-out.



WATER CONSERVATION

The **University of Guelph** has undertaken a series of major landscape initiatives to reduce the environmental footprint of the campus and increase the conservation of natural resources, with an emphasis on water conservation, the use of local materials, and reuse of existing materials for construction projects.

In co-operation with the Toronto Region Conservation Authority, **York University** has implemented a wide range of storm water management techniques such as green roofs, rainwater harvesting, permeable pavement, and bio-swales, which slow down water runoff during a rainstorm and spread it across a landscape causing it to seep into the earth instead of the sewer system.



SUSTAINABLE FOOD, DINING SERVICES, AND PROCUREMENT

Universities continue to report expansions of local food and fair trade initiatives. The University of Ottawa was recently named a Fair Trade Campus by FairTrade Canada. Contributing to this designation was the selection of a campus food service provider which met a stringent set of sustainability standards including annual sustainability reports, higher quotas for local and fair trade foods, and more vegan-friendly meals.

Wilfrid Laurier University created a <u>medicinal</u> garden and ceremonial area for the Office of Aboriginal Initiatives. The vegetables and herbs will be used in the Aboriginal Student Centre's weekly soup lunches, and the ceremonial area will be used for traditional ceremonies. Sustainable features were incorporated into the garden's design.

Beyond food initiatives, seven universities reported that they had made changes to their procurement practices to support sustainability. Laurentian University, McMaster University, University of Ottawa, Ryerson University, University of Toronto - St. George, Western University, and York University have all recently increased the sustainability requirements in their requests-for-proposals and/or implemented updated procurement systems that drastically reduced the volume of paper used in the process of purchasing goods and services.

An important but often overlooked element of institutional sustainability has to do with reducing the use of virgin paper products and toxic chemicals in campus caretaking. "Green cleaning" programs became almost universal at Ontario universities by 2013, having been adopted by 21 out of 22 campuses, up from 9 in 2009.















EXPERIENTIAL LEARNING

Increasingly, university campuses are developing experiential learning opportunities focusing on community gardens, sustainable agriculture, and food processing. In 2012-13, Emily Taylor and Julianne Bagg, two students in McMaster University's Integrated Science Program, planned and created the McMaster Teaching & Community Garden.

Taylor and Bagg consulted with campus stakeholders before applying for grant funding, and conducted outreach activities to establish strong stakeholder connections. Having developed relationships with Mac Farmstand and Mac Bread Bin, the garden is now operating under the auspices of the McMaster Students Union. The garden provides ongoing experiential learning opportunities for students.

TEACHING AND LEARNING

PROGRAMS AND COURSES

In 2013, 17 university campuses offered sustainability-related undergraduate degree (major) programs, 19 offered minors and 15 offered multidisciplinary degrees. At the master's-level 11 campuses offered majors in sustainability-related fields and 13 offered minors, while at the doctoral level eight university campuses offered standalone programs and another six offered multi-disciplinary programs.

Sustainability-related courses continue to be available across a wide range of disciplines, from the natural, physical, and health sciences to the humanities, social sciences, engineering, and business faculties. Six universities also offer courses in architecture/design and teacher education, both at the undergraduate and graduate levels.

New courses introduced in 2012-13 address a variety of issues including climate change, food sustainability, the built environment, energy technology, and sustainable design innovation.

- Queen's University has introduced a new program, Sustainable Engineering in Remote Areas, designed to train graduate students for work in remote and Aboriginal communities. Funded through the Natural Sciences and Engineering Research Council as well as the private sector, the program focuses on renewable energy systems, sustainable energy, and energy-efficient housing design, and aims to start a dialogue around engineering and Aboriginal cultural values.
- McMaster University has developed the Sustainable Future Program for students interested in learning about sustainability while engaging in experiential learning through a real-world sustainability initiative. Open to students in any faculty, the program is intended to create more knowledgeable and effective change agents focused on sustainability.



LIVING LABORATORIES

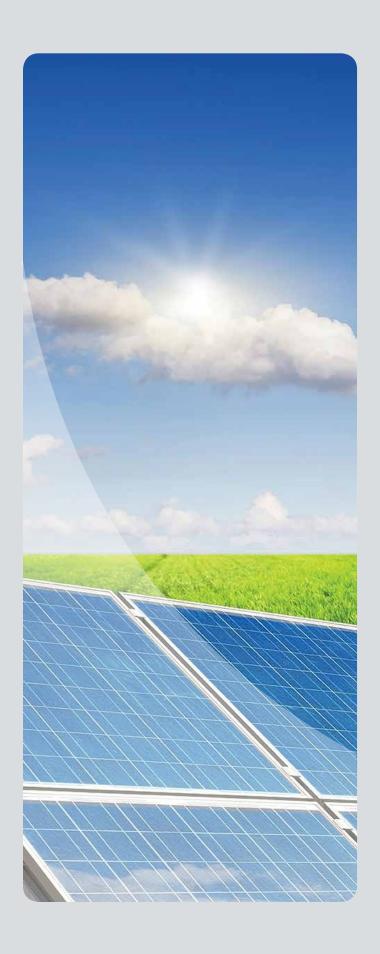
Several universities have developed 'living laboratory programs' in which research and learning takes place using the buildings, people and natural environment of the campus as the object of exploration. Incorporating course-based learning as well as service-learning through programs such as Alternative Spring Break, living laboratory programs give students the opportunity to conduct academic work while making a positive impact on the sustainability of their own campus communities.

Co-ordinated by the Office of Campus Sustainability and the Community Service Learning Program, University of Ottawa's Living Laboratory program has helped create dozens of sustainability projects on campus with the engagement of 573 students. For example, students in a natural

resources course created sustainability plans for a variety of natural resource management issues on campus. In several social science courses, students designed and implemented a variety of campus environmentalism and sustainability surveys. In an Alternative Spring Break program, students created interactive recycling displays on campus.

Some universities that employ a living laboratory approach have begun to engage students in sustainability measurement and reporting. At the University of Windsor, a group of fourth-year Environmental Engineering students completed the university's STARS (the Sustainability Tracking, Assessment & Rating System™) assessment. STARS is a reporting system used to measure sustainability performance.





ONTARIO STUDENTS BUILD SOLAR HOME, TAKE FIRST PLACE FOR ENGINEERING IN COMPETITION

A winning home design by Ontario students uses solar power to keep electricity use and costs down. Team Ontario is composed of students from Queen's University, **Carleton University and Algonquin College.** The team placed first in the engineering category for the U.S. Department of Energy's 2013 Solar Decathlon Competition, which challenges students to design, build and operate solar-powered houses. The home, called *Echo*, is net-zero positive, meaning it produces as much if not more energy as it uses to run for an entire year. The home had such an impressive design and build that the students are currently in conversation with developers interested in replicating their solar house.

The cost of the 940 square-foot home is \$257,000 and the use of solar power translates to huge savings in electricity and heating costs. Echo uses energy from the electricity grid at night and, during the day, solar energy is produced and fed back into the grid.

Apart from a first-place ranking in the engineering contest, the home also tied for first in energy balance, placed second in affordability and fourth in market appeal.

The cross-institution collaboration brought together students from engineering, geology, business and computer science. As a result of the project, the students are now able to look beyond their fields of study and interpret opportunities and challenges from many different perspectives.

RESEARCH

Sustainability is an important focus of research at universities across Ontario, and several universities have launched innovative programs:

- University of Ontario Institute of Technology (UOIT) researchers have begun a program of research on hydrogen production at the <u>Clean</u> <u>Energy Research Laboratory</u>.
- The **McMaster** Automotive Resource Centre is a new 80,000-square-foot university lab where researchers, students and industry professionals work to design the future of transportation. Projects include the development of hybrid and electric powertrains, lighter materials, and smart controls to improve safe driving.
- Ryerson University launched the <u>Innovation</u>
 <u>Centre for Urban Energy</u>. Housed at the <u>Centre</u>
 <u>for Urban Energy</u>, it is a sustainability incubator
 that cultivates applied research, entrepreneurship,
 student innovation and experiential learning. The
 goal is to create smart, adaptive technologies
 and innovative ways of integrating electricity into
 the grid to support the renewable energy needs
 of dense urban environments moving toward a
 carbon-neutral future.
- Led by Dr. David Greenwood, Canada Research Chair in Environmental Education, Lakehead University's Centre for Place and Sustainability Studies was launched with funding from the Canada Foundation for Innovation Leaders Opportunity Fund and the Ontario Ministry of Education's Ontario Research Fund.
- Wilfrid Laurier University launched the Laurier Research Centre for Sustainable Food Systems, providing opportunities for cross-disciplinary research into sustainable community food initiatives related to urban and rural food security around the world.

Laurentian University is one of 11 universities in the <u>Canadian Network for Aquatic Ecosystem</u>
<u>Services</u>, a new \$4.4-million consortium of researchers from academia, government, and the private and not-for-profit sectors funded by the Natural Sciences and Engineering Research Council and dedicated to the health of Canada's wetlands, lakes and rivers.

Innovations in sustainability are often sparked when researchers come together to exchange ideas. OCAD University's <u>Urban Ecologies</u> <u>Conference</u> provided a multi-layered perspective on sustainability in the urban context. Plenaries examined research and practice in regenerating cities, building health, visualizing information, and fostering community.

The innovative work of individual researchers was also recognized in 2013. At the University of Waterloo, Environment and Resource <u>Professor Jennifer Clapp</u> was recently appointed the Canada Research Chair on Global Food Security and Sustainability, while the Director of the University of Toronto's Centre for Global Change Science, <u>physicist Richard Peltier</u>, won a Killam Prize for his pioneering work on global warming.





PARTNERSHIPS

At the **University of Windsor**, Environmental Engineering graduate student Taylor Purdy <u>received</u> <u>a grant</u> from the Ontario Hospital Association's Green Hospital Champion Fund to promote waste reduction and recycling at Hotel-Dieu Hospital.

The University of Toronto - Scarborough's Sustainability Office hosted the second annual Eastern GTA <u>Eco Summit</u>, bringing together students, faculty, environmental groups and the public to develop an environmental agenda for the region. Partners include Evergreen Canada, Toronto & Region Conservation Authority, Live Green Toronto, FoodShare Toronto, Metrolinx, and Smart Commute. The summit sparked dialogues on transportation, sustainable food, parks and conservation, and climate action.

In 2013, **Trent University** *partnered with Kawartha Land Trust* to provide new opportunities for students and faculty to conduct field research in areas facing stresses from urbanization and climate change.

The **University of Guelph's** <u>Better Planet Project</u> is a \$200-million fundraising campaign supporting four key teaching and research priorities at Guelph: food, environment, health, and communities. The campaign recently received a \$1-million donation from the Royal Bank for water sustainability.

Wilfrid Laurier University has developed a new partnership with <u>Young City Growers</u>, funded by the Ontario Trillium Foundation and TD Canada Trust. Young City Growers provides sustainable food options and education for the community, as well as experiential learning opportunities for youth focusing on organic farming, stewardship and entrepreneurship, including growing and selling local produce. The organization is now an urban farm operating on the community-supported agriculture model in which customers purchase a share at the beginning of the growing season for a flat fee in order to share risks and benefits with the farmer whether the harvest is plentiful or sparse.

The University of Toronto - Mississauga hosted the Sierra Youth Coalition's annual Sustainable Campuses Conference. Youth from across Canada as well as members of the local community attended talks on the campus' green features, as well as tours of the Instructional Centre's geothermal system and the nature trail and storm water retention pond.

AWARDS

In 2013, Ontario universities reported receiving 25 awards, not including certifications for green building design. Awards were received in air quality, commuting, sustainable food, and more. Highlights include:

- The University of Windsor received the Essex Regional Conservation Authority 2012 Conservation Award for research, teaching, and its new sustainable engineering faculty building.
- Western University won the Ontario Chamber of Commerce's Environmental Leadership Award and Ontario Business Achievement Award for corporate citizenship and environmental stewardship.
- Both <u>York University</u> and the <u>University of Ottawa</u> placed in the top 15 world wide, and first and second in Canada, respectively, by UI GreenMetric World University Rankings. York has also been named one of <u>Canada's Greenest Employers</u> by the editors of Canada's Top 100 Employers project.



PLANS FOR THE FUTURE

Universities are planning many environment-focused initiatives including more ambitious sustainability policies, new green buildings—including for the PanAm/ParaPan Games in 2015—and retrofits, sustainable food initiatives, awareness campaigns, sustainability benchmarking, and new specialized graduate programs.

A positive sector-wide development is the emergence of the Ontario College and University Sustainability Professionals, which facilitates the sharing of best practices in sustainability at Ontario's postsecondary institutions. COU is pleased to be working with the new group on sustainability benchmarking and in developing new survey questions for next year's report.





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