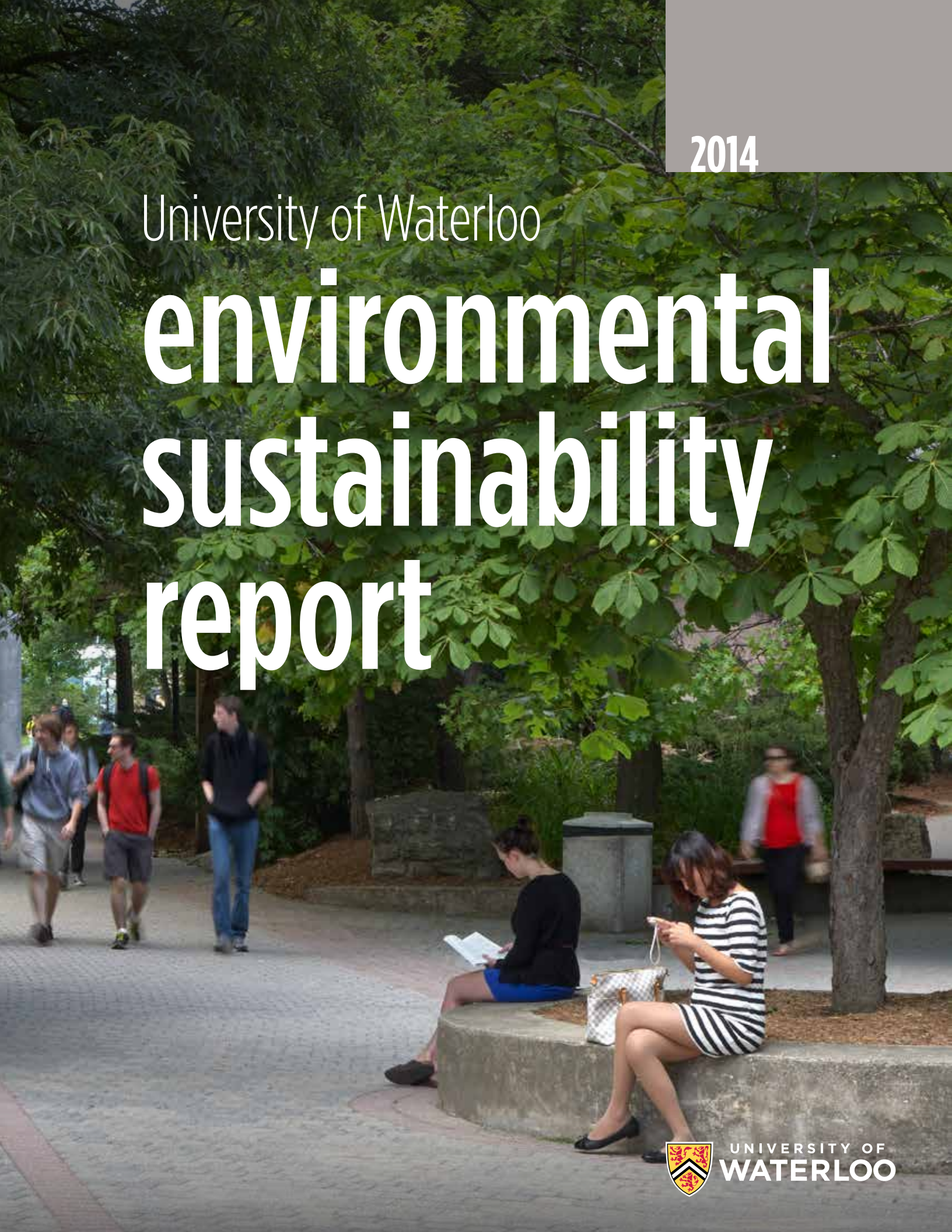
2014

University of Waterloo

environmental sustainability report



UNIVERSITY OF WATERLOO

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Published: October 2015

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messages from ...

THE PRESIDENT

I am proud to present the University of Waterloo 2014 Environmental Sustainability Report, which reflects and builds on Waterloo's goal of embedding sustainability deep within the University community.

Our University has a long history of leadership on environmental issues. From establishing Canada's first Faculty of Environment, to building Ontario's first LEED-Platinum structure on a university campus, to maintaining a thriving curriculum on water, energy, and climate change, sustainability has always been part of who we are.

As you will read about in this report, we are building on those strengths to achieve new successes, like a 10% decrease in waste-to-landfill in 2014, and a 7.5% decrease in greenhouse gas intensity from 2010-2014.

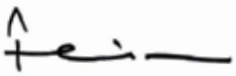
We still have lots of work to do — we need to make our facilities greener, our carbon footprint lighter, and sustainability has to become essential to how we think and operate at every level of the organization.

To ensure we sustain our momentum and continue achieving tangible results, I am pleased to have the support of our new President's Advisory Committee on Sustainability. This group, mandated to bring forward ambitious, achievable goals and an action plan to achieve them, first convened in May 2015 and comprises faculty, student, and staff representatives. I look forward to continuing our work together.

As you review this report, and consider how you can contribute to our sustainability work in your own way, remember that these efforts are essential to Waterloo's success over the long term. It brings us into better alignment with our values, fosters the long-term welfare of our natural environment, and builds public trust.

Thank you for joining with me and the President's Advisory Committee on this important effort.

Sincerely,



FERIDUN HAMDULLAHPUR
President and Vice-Chancellor

SUSTAINABILITY ADVISORY COMMITTEE CO-CHAIRS

In 2009, the University of Waterloo signed the Council of Ontario Universities' sustainability pledge, *Ontario Universities: Committed to a Greener World*. By signing this pledge, the University accepted responsibility for developing and implementing strategies that address a number of environmental issues, from the resources we use to the waste that we produce.

In 2010, the first University of Waterloo Sustainable Development Report was produced. Since that time, much has changed on campus — environmental curricula have evolved, green technologies have been adopted, and new practices have been implemented.

As the University of Waterloo continues to improve our campus sustainability, two notable milestones were achieved in the winter of 2015: appointment of a full-time Sustainability Coordinator and creation of the President's Advisory Committee on Sustainability. This report, entitled, *University of Waterloo 2014 Environmental Sustainability Report*, represents the third major achievement of the year. The report covers the three high-level impact areas of Academics, Operations, and Engagement, with specific indicators in each section. And so as to be comparable with other universities, the reports uses the recommended calculations from the Association for the Advancement of Sustainability in Higher Education's assessment framework, the Sustainability Tracking, Assessment and Rating System.

We are proud of our achievements to date, and committed to moving forward on the sustainability agenda over the coming months and years.

Sincerely,

JEAN ANDREY
Dean of Environment

DENNIS HUBER
Vice President Administration and Finance

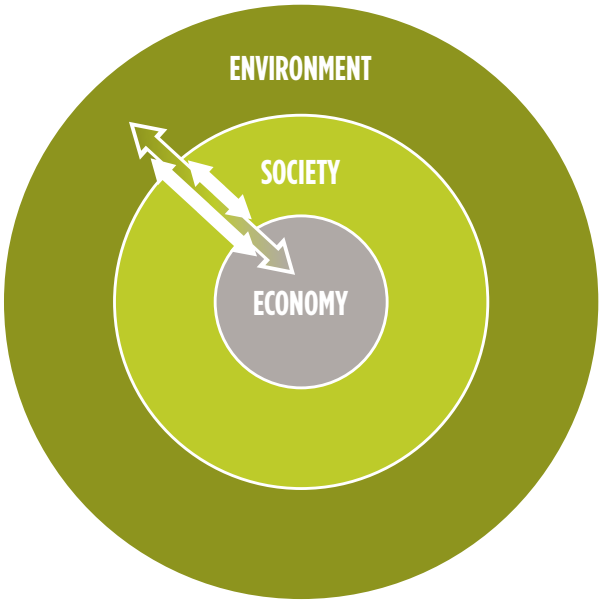
about the report

Sustainability means more than just a commitment to the environment. It is about maintaining the integrated health of the environment, society, and economy for today and into the future.

The University of Waterloo is committed and active in pursuing all three dimensions of sustainability. While other offices are tackling the social and economic spheres, the President's Advisory Committee on Sustainability is tasked specifically with our environmental performance.

As such, the 2014 Environmental Sustainability Report highlights the University's progress on a number of environmental indicators, while recognizing there are mutually reinforcing connections with economic and social sustainability. In this report, the term 'sustainability' refers specifically to environmental sustainability.

The Spheres of Sustainability



The report covers the three high-level impact areas of academics, operations, and engagement, with specific data and indicators in each section. It concludes with sections on Governance and "Looking Forward." For each data set or indicator, there is supplementary methodology available in the appendices at the end of the report.

General principles followed in the completion of this report include:

Transparency: Presenting all relevant and available information in order to celebrate successes and acknowledge areas for improvement.

Clarity: Displaying technical indicators in a fashion that is simple to understand, with details for those who are interested.

Currency: Reflecting calendar years from 2010-2014, unless otherwise noted.

Geography: Covering all University of Waterloo campuses, unless otherwise noted. The report also includes information on Federated University and Affiliated Colleges where noted.

Methodology: Utilizing a common framework and explaining calculations. For comparability with other universities and to enable a future full sustainability assessment, the report uses the recommended calculations from the STARS 2.0 technical manual whenever possible. Created by the Association for the Advancement of Sustainability in Higher Education, STARS stands for the Sustainability Tracking, Assessment, and Rating System. It is a comprehensive tool for evaluating college and university sustainability efforts.

institutional overview

In just half a century, the University of Waterloo, located at the heart of Canada's technology hub, has become a leading comprehensive university with nearly 36,000 full- and part-time students in undergraduate and graduate programs.

Consistently ranked Canada's most innovative university, Waterloo is home to advanced research and teaching in science and engineering, health, environment, arts and social sciences. From quantum computing and nanotechnology to clinical psychology and health sciences research, Waterloo brings ideas and brilliant minds together, inspiring innovations with real impact today and in the future.

As home to the world's largest post-secondary co-operative education program, Waterloo embraces its connections to the world and encourages enterprising partnerships in learning, research, and commercialization. With campuses and education centres on four continents, and academic partnerships spanning the globe, Waterloo is shaping the future of the planet.

overview of sustainability at Waterloo, 2010-2014

500+ *sustainability courses or courses that include sustainability*

239 *researchers from all six faculties;*
11 SUSTAINABILITY-RELATED *research institutes*

CLIMATE CHANGE: CO_2

4.7% ***decrease** in emissions per capita;* 7.5% ***decrease** in emissions per square meter (2010 to 2014)*

WASTE:
10% ***reduction** in total waste to landfill in 2014;*

13 ***student groups** on campus*

*Student group launches on-site **compost program and recycles** 2,000 pounds of waste*

*Creation of **Sustainability Advisory Committee***

*Joining **TravelWise** to provide staff and students access to:* carpool matching, emergency ride home, discounted GRT passes

*Environment 3 became the **first LEED-Platinum Certified** building on an Ontario university campus*

WATER:
20% ***reduction** in water use per capita;* 22% ***reduction** in water use per square meter (2010-2014)*

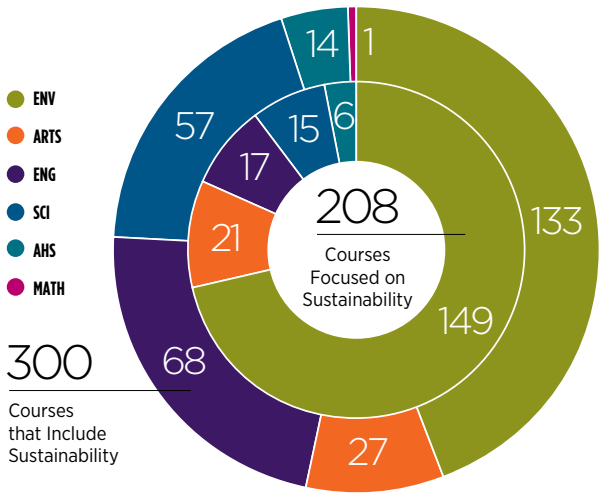
ACADEMICS

As an institution of higher education, it is natural to start with an analysis of how sustainability is embedded in our academic areas. Courses, programs, and research are Waterloo's largest impact areas as an organization, and sustainability is integrated into all areas.

sustainability courses

The skills and theoretical and applied knowledge developed in the classroom empower students to solve pressing environmental challenges around the world. This education encourages a shift to more sustainable lifestyles. The University of Waterloo has over 500 courses focusing on at least one sustainability theme, or including content related to sustainability. While there is natural leadership within the Faculty of Environment, there is robust curriculum across the faculties in areas such as governance, technological innovation, and understanding of the natural environment.

Sustainability-Related Courses



NOTES: For methodology, see Appendix A1 – Sustainability Courses

Masters in Climate Change

In 2013, the University of Waterloo launched the Masters of Climate Change program, the first of its kind in Canada. Based in the Department of Geography and Environmental Management, the program provides students with an interdisciplinary understanding of the complex scientific, socio-economic, technological, and institutional issues involved in a transition to a low-carbon economy and climate-resilient adaptation.

Collaborative Water Program

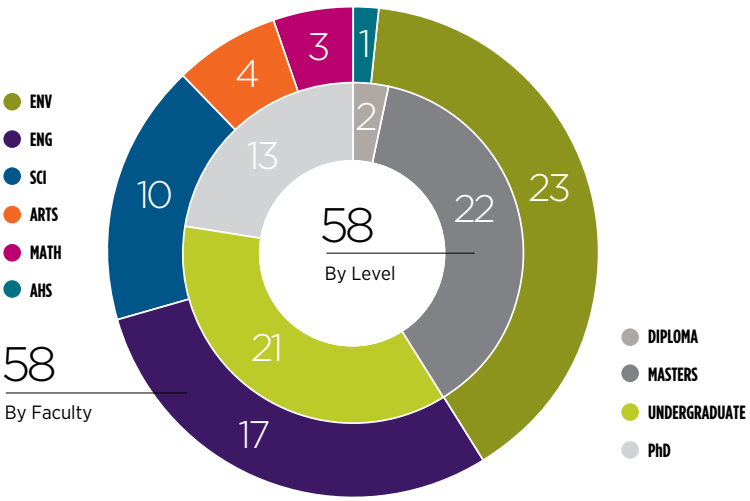
Funding from the RBC Foundation supported the launch of the interdisciplinary Collaborative Water Program from ten participating departments on campus. Co-ordinated by the Water Institute, the program exposes students to the complex scientific, economic, and governance challenges influencing global and local water issues, and connects them to visiting scholars and experts.

sustainability programs

Sustainability courses do not exist as electives alone. Many programs across campus have a strong focus on sustainability, or have streams or applications related to sustainability. The University of Waterloo offers 58 programs across all levels and all faculties where students have the option to study sustainability or a sustainability-related problem. The breadth of program offerings among all six faculties indicates the importance of embedding sustainability into many areas of a modern education. From water flow modelling in applied mathematics to architecture to chemistry, there are many theoretical and applied sustainability program options for students.

Graduates from these programs bring social, technological, and economic innovation to global challenges.

Sustainability-Related Programs

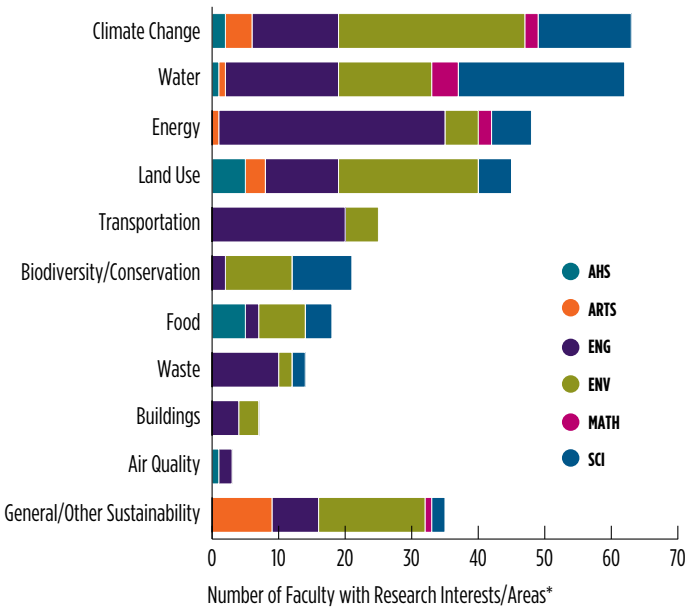


NOTES: For methodology, see Appendix A2 – Sustainability Programs

sustainability research

Coupled with student learning, research is a cornerstone of university activity. At the University of Waterloo, 239 researchers across all six faculties address pressing sustainability issues, often in an interdisciplinary manner. Formal research institutes reflect strengths and activity in the areas of climate change, water, and energy. Research exploring terrestrial systems, geographic mapping and modelling, and sustainable community planning reflects strong activity in the land use theme, and sustainable transportation research is underway in the areas of infrastructure development, planning, and green vehicles. Many faculty members also conduct research on more general concepts of environmental sustainability which go beyond any specific thematic area.

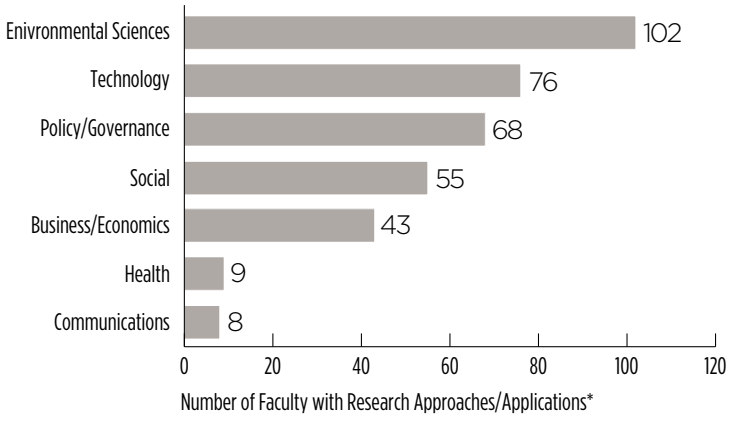
Sustainability-Themed Research from Faculty



**Note that themes are not mutually exclusive. Researchers may be included under two or more categories.*

Researchers often approach these thematic areas through the lens of environmental science to deepen understanding of the natural environment and of human impact upon the natural world. There are also many faculty exploring the development or application of new technologies to address sustainability challenges, from battery technology to smart grids, and from remote sensing to wastewater filtration. Research on policy innovation, societal changes related to environment, and economic relationships with the environment are also prominent. The interaction between environment and health is an emerging lens of research, as is the study of sustainability discourse and framing.

Faculty Approaches/Applications for Sustainability Research



**Note that approaches are not mutually exclusive. Researchers may be included under two or more categories.*

research case studies

Bryan Grimwood, Recreation and Leisure Studies

Professor Grimwood's research on arctic tourism and environmental responsibility takes him to the Thelon River in Canada's north, where he explores the relationships between Aboriginal communities and a sacred landscape undergoing social and ecological changes.

Steven Bednarski, History

Professor Bednarski leads a team of historians, archeologists, and paleontologists studying the impacts of climate change on a medieval village in southern England. Understanding how past communities have responded to increased rainfall, coastal flooding, and changing temperatures offers alternative perspectives on the current climate crisis.

Francis Poulin, Applied Mathematics

Professor Poulin's calculations of ocean currents around Cape Cod help understand the conditions experienced by the endangered right whale during their spring travels. The models could one day help predict plankton blooms on which the whales depend, and will deepen insights into ocean currents in coastal waters.

Susan Tighe, Civil and Environmental Engineering

Professor Tighe is the Norman W. McLeod Professor in Sustainable Pavement Engineering and Director of the Centre for Pavement and Transportation Technology. She explores ways to make roads and surface infrastructure more sustainable by extending pavement lifespan under a changing climate and using recycled materials in pavement construction.

Ian Rowlands, Environment and Resource Studies

Professor Rowlands looks to transform the way we use and conserve energy, making it convenient for homeowners to save money and reduce energy consumption. This includes participation in projects that deploy smart grid technologies, evaluate energy policy, and deepen understanding of individual interactions with advanced building systems.

Linda Nazar, Chemistry

Recently named a Web of Science 2014 Highly Cited Researcher and Officer of the Order of Canada, Professor Nazar's research team is developing new materials for energy storage that could double the range of electric vehicles and increase electricity grid storage capacity, while being lower cost and more sustainable than current lithium-ion technology.

RESEARCH CENTRES AND INSTITUTES

- Centre for Control of Emerging Contaminants
- Centre for Ecosystem Resilience and Adaptation
- Centre for Groundwater Research
- Centre for Pavement and Transportation Technology
- Heritage Resources Centre
- Interdisciplinary Centre on Climate Change
- Water Institute
- Waterloo Centre for Automotive Research
- Waterloo Institute for Complexity Innovation
- Waterloo Institute for Sustainable Energy
- Waterloo Institute for Social Innovation and Resilience

NOTES: For methodology, see Appendix A3 – Sustainability Research

OPERATIONS

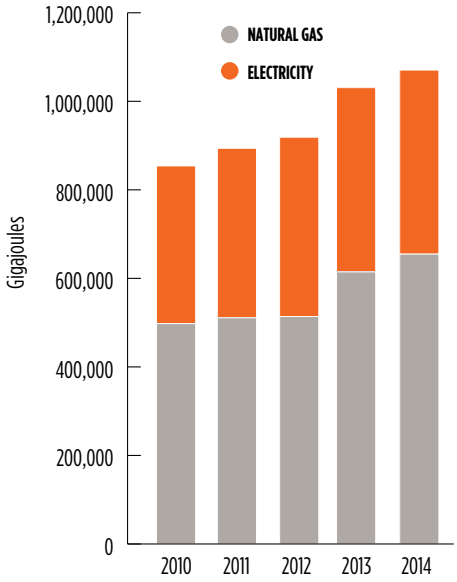
The University of Waterloo is a leader in academic activity and innovation on environmental sustainability. At a more concrete level, the operations of the physical campus offer a wide range of areas impacting Waterloo's sustainability performance. As a large organization, these are significant. Leading by example in our campus operation and individual behaviours has the potential to improve the local environment, enhance the University's reputation, and improve financial efficiency.

energy

Energy is one of the most widely referenced sustainability indicators, and is important from both an environmental and financial perspective. As the University of Waterloo continues to grow, the total energy consumed by the campus has also grown. Most years had a small increase of 3-5 per cent, while 2013 saw a 12 per cent increase in total energy use.

Energy consumption is best understood in the context of campus size. Comparing the energy consumed per square meter accounts for increased space as new buildings begin to consume energy, otherwise known as "intensity". Waterloo's energy intensity has remained consistently below the average for other research-intensive universities in Ontario.

Total Energy Consumption



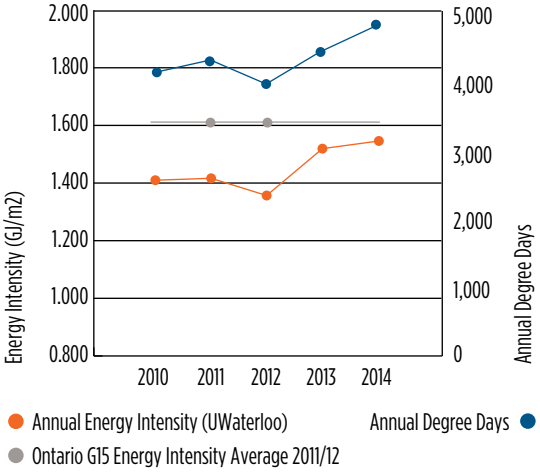
Case Study: Building Design

Energy efficiency begins with building design. Ensuring the campus grows sustainably, all new buildings are designed to LEED Silver standards, at minimum. LEED stands for Leadership in Energy and Environmental Design, and is a certification system that requires buildings to meet sustainability performance thresholds. The Environment 3 building is certified LEED Platinum, the first of its kind on an Ontario university campus, and includes a solar panel array capable of generating 67,000 kWh of electricity each year.

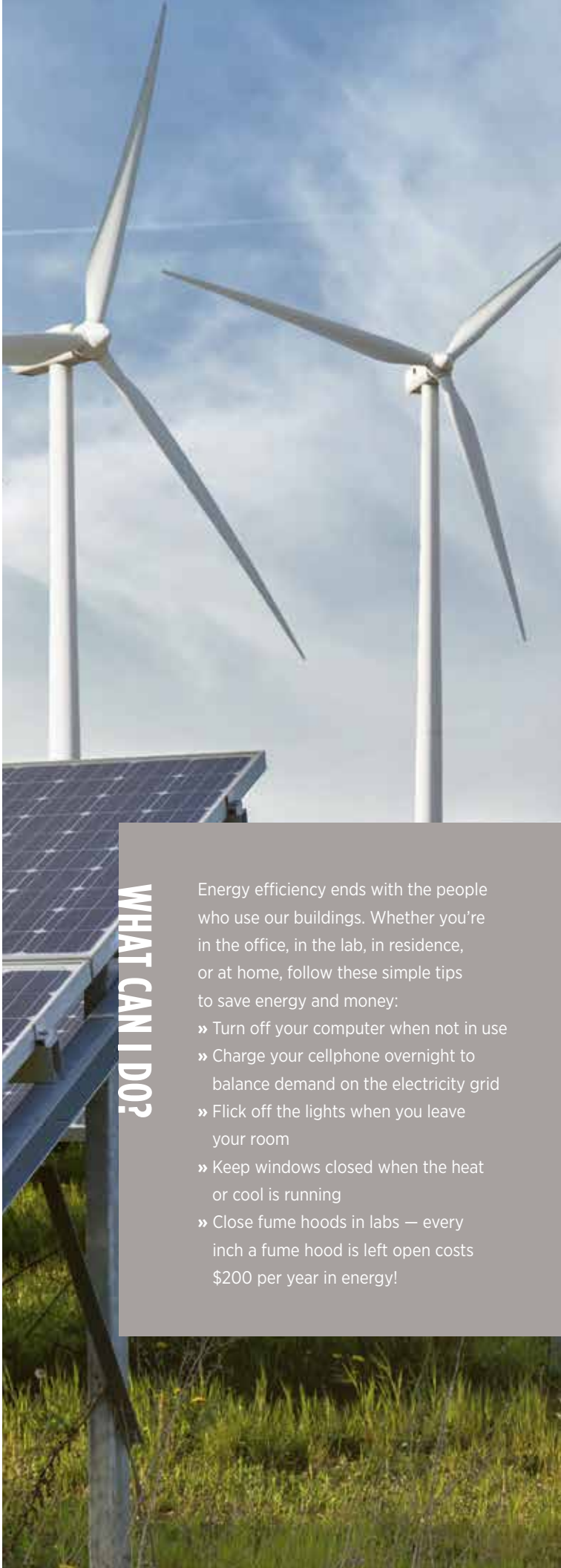
Weather and use of space are two significant factors influencing our energy use. Buildings need more energy to maintain a comfortable working and learning environment during cold winters and hot summers. Adding up degree days — a measure of how much the outside temperature is warmer or cooler than the desired inside temperature — over a year is a useful way to understand how hard the mechanical systems worked. The graph shows a strong correlation between local weather conditions and annual energy use, particularly during the cold winters of 2013 and 2014.

The type of new spaces added to campus also shape energy use. For example, Waterloo added 8,400 square meters of new laboratory space between 2012 and 2013. These facilities are vital to enable the University's innovative research, but they require advanced equipment and building systems that are more energy-intensive than classroom or office space.

Energy Intensity versus Degree Days



NOTES: For methodology, see Appendix B1 – Energy



WHAT CAN I DO?

Energy efficiency ends with the people who use our buildings. Whether you're in the office, in the lab, in residence, or at home, follow these simple tips to save energy and money:

- Turn off your computer when not in use
- Charge your cellphone overnight to balance demand on the electricity grid
- Flick off the lights when you leave your room
- Keep windows closed when the heat or cool is running
- Close fume hoods in labs — every inch a fume hood is left open costs $200 per year in energy!

Regional Carbon Initiative

Waterloo joined the Regional Carbon Initiative (RCI) in 2012 with an intent to set an emissions reduction target for campuses within Waterloo Region. The RCI offers tools and resources to a network of local organizations working to reduce their climate change emissions, and provides public recognition for successful efforts. In 2014, the University also supported the David Johnston Research and Technology Park in joining the RCI, building momentum to be the first research park in Canada to establish an emissions target.

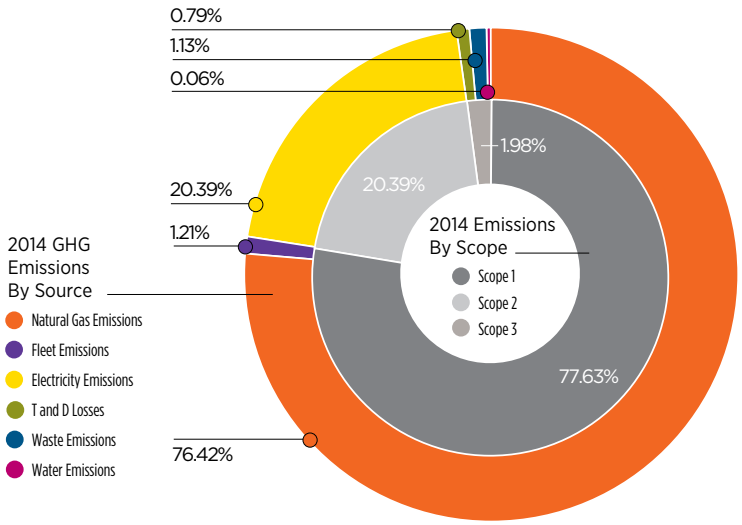
climate change

Climate change presents one of the most pressing global sustainability issues, with effects that are already impacting close to home. The University of Waterloo contributes to climate change from a number of activities. The heat blowing from a vent, campus plows and lawnmowers, cafeteria waste, computers, and even the water coming out of the tap all contribute emissions. Many of these are necessary to function as an organization, but when magnified by the tens of thousands of people on campus every day, they add up to over 1 per cent of all emissions in Waterloo Region and over 3.3 per cent of all local workplace-related emissions in 2010.

All emissions fall into three scopes under the Greenhouse Gas Protocol:

- Scope 1 — Emissions created on-site, such as through UW's fleet and boilers
- Scope 2 — Emissions from electricity production
- Scope 3 — Other emissions, including waste, water, and transmission and distribution (T and D) losses

More than three-quarters of all emissions at the University of Waterloo came from Scope 1 sources in 2014, the vast majority of which was fuel used to heat campus buildings. One-fifth of emissions came from electricity use, and a very small percent came from waste and water. It is expected that emissions from business-related travel would also form a large percentage of Waterloo's emissions profile. This data, however, is not currently available. Business travel includes employee and student trips to offsite locations and emissions from air travel, such as travel to conferences. The introduction of new expense reporting software could help quantify emissions from employee travel in future years under the Scope 3 category.



NOTES: For methodology, see Appendix B2 – Climate Change

Three large trends affected the University of Waterloo's greenhouse gas (GHG) emissions from 2010 to 2014. First, emissions from electricity use decreased by over 30 per cent from 2010 through 2014 despite a 16 per cent increase in electricity consumption. In 2010, electricity represented 31 per cent of Waterloo's emissions. This shrunk to 20 per cent by 2014. Ongoing changes to the provincial electricity grid, including phasing out coal-fired power plants and introducing more renewable energy, have enabled this downward trend.

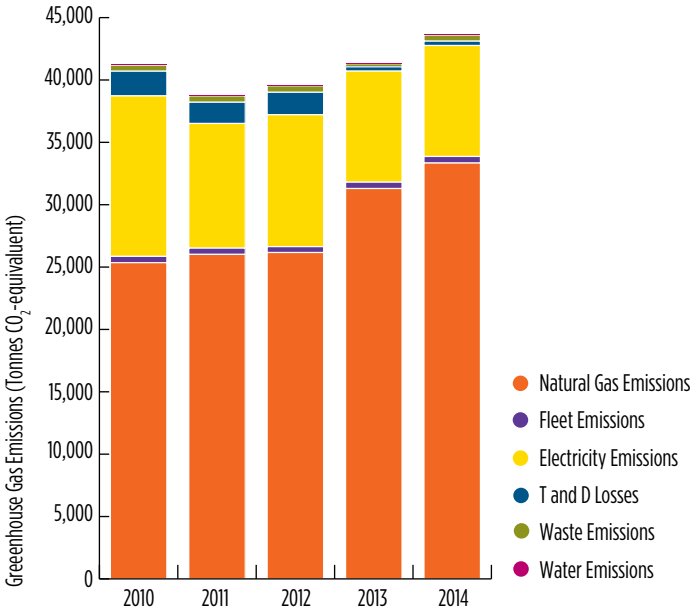
Second, weather conditions increased the use of natural gas to heat campus buildings. The proportion of natural gas emissions has increased from 61 per cent in 2010 to 76 per cent in 2014. This is due to a declining proportion of electricity emissions, but also two colder than normal winters. Future emissions will depend upon local winter conditions.

Lastly, it is necessary to place these climate change emissions in the context of campus growth. When accounting for growing floor space and the increased number of staff, students, and faculty from 2010 to 2014, there has been:

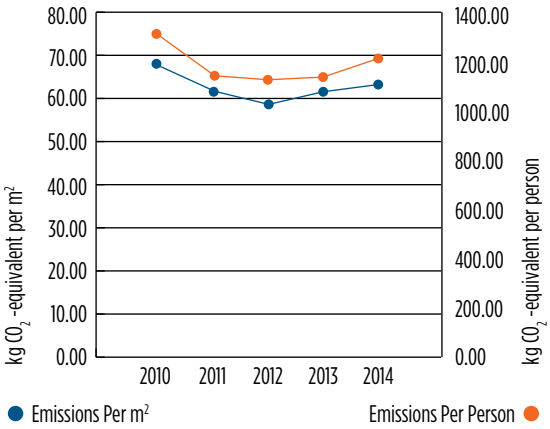
- A 4.7 per cent reduction in emissions per capita
- A 7.5 per cent reduction in emissions per square meter

This result should be celebrated and form a foundation for further action.

Total GHG Emissions, 2010-2014



Carbon Intensity



WHAT CAN I DO?

Following energy savings tips will also reduce climate change emissions at the University. Many of our everyday activities, however, also contribute to climate change. In fact, workplaces like UWaterloo represent only 32 per cent of all climate change emissions in Waterloo Region, according to our local Climate Action Plan. The other 68 per cent comes from transportation, our homes, agriculture, and waste. Almost everything you do on campus to lower your impact can also be applied at home.

water use

Southwestern Ontario is blessed with abundant water supplies, but there is still a growing need for conservation to minimize expensive new infrastructure.

The University of Waterloo uses water for grounds maintenance, heating and cooling, and in washrooms and residences. Many research facilities also require substantial water to operate, such as the fish lab.

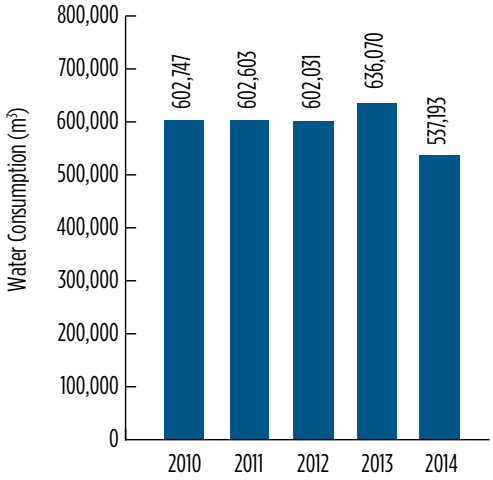
2014 saw a 15 per cent year-over-year decrease in water use, and a 10 per cent decrease since 2010. This is a positive trend, and occurred despite the physical and population growth of the campus. When analyzing the intensity of water use across campus between 2010 and 2014, there was:

» A 22 per cent reduction in water use per square meter
» A 20 per cent reduction in water use per capita

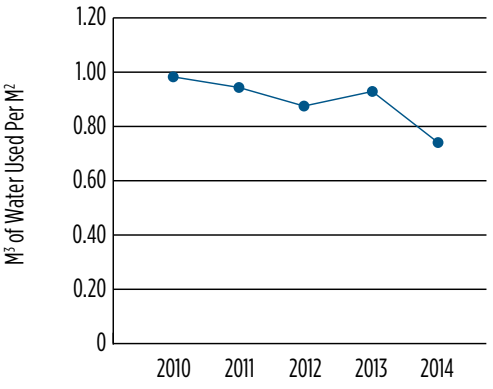
This points to the success of several programs, such as low-flow showers and plumbing fixtures, and a closed-loop circulation system that diverts a substantial amount of cooling water from going down the drain.

NOTES: For methodology, see Appendix B3 — Water

Total Water Used



Water Intensity



Rainwater Harvesting

Environment 3 harvests excess rainwater that falls on the roof, and transports it to an underground cistern next to the building. The water then passes through a vertical flow system that feeds the constructed wetlands above and also cleanses the water. The filtered water then gets pumped back into the building for use in low-flush toilets and on the two-story living wall.

WHAT CAN I DO?

Sometimes things break. If you notice a leaky faucet or toilet that keeps flushing, let Plant Operations know so water is not wasted! If you live in residence, challenge your peers to keep showers to no more than 5 minutes.

waste

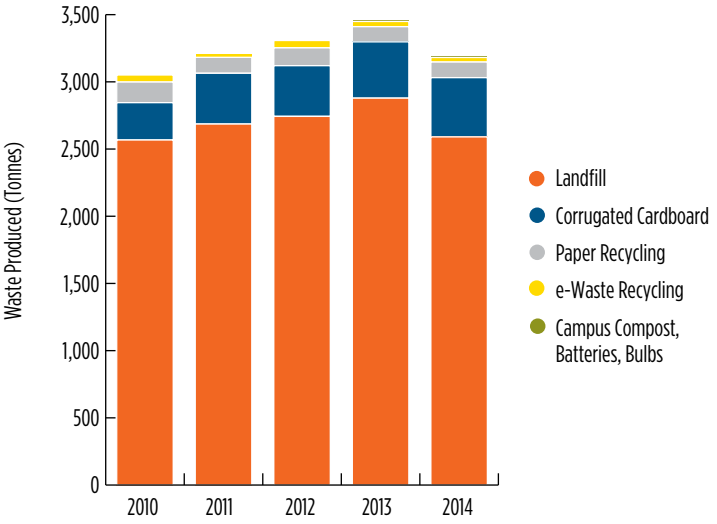
Encouraging students, staff, and faculty to minimize the campus' waste footprint helps preserve our local landfill sites and prolongs the lifecycle of materials. The University of Waterloo's waste footprint grew in conjunction with the growth of the campus population between 2010 and 2013, although per-capita waste increased only slightly. There was a 10% drop in waste sent to landfill in 2014 that should be celebrated.

A 2013 waste audit of sample buildings found that 38 per cent to 83 per cent of waste was diverted through recycling, depending on the location. However, 67 per cent to 80 per cent of waste going to landfill could have been diverted through an organics collection program or through proper use of existing recycling programs. This demonstrates that improved facilities, programming, and education is needed to meet the province of Ontario's 60 per cent diversion rate target.

Future effort should also be made to quantify blue bin and green bin data to determine an accurate diversion rate for the whole University.

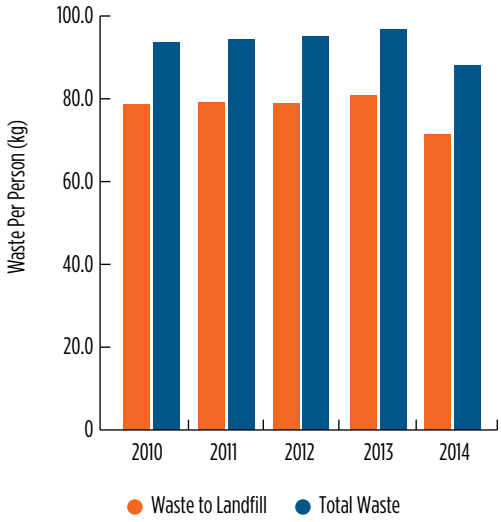
NOTES: For methodology, see Appendix B4 – Waste

Campus Waste, Including Federated University and Affiliated Colleges



Note: Blue bin data is not available, but is a large portion of Waterloo's waste diversion

Waste Per Capita (kg/pp)



E-Waste

In 2010, Central Stores launched an e-Waste collection program for used electronics. They worked with a local responsible recycler to properly dispose over 38 tonnes of used electronic waste in 2014. This did not include computers and electronics that were resold as part of the Surplus Sale.

Hazardous Materials

The Safety Office also implemented programs to stop hazardous materials in batteries and lightbulbs from going to landfill. They have recycled more than a tonne of batteries from 2013-2014. Over 14,000 burnt-out lamps and light bulbs were also recycled — equivalent to 0.5kg of mercury, 65kg of phosphor, four tonnes of glass, and 51kg of metal.

Campus Compost

Campus Compost is a student-led initiative launched in 2014 to collect organic food materials from Environment and Arts buildings. With funding from the Waterloo Environment Students Endowment Fund, the group purchased the Compost Cow to break down collected materials. In 2014, Campus Compost collected over 2,000 pounds of food waste and began conversations to have continuous collection across more of campus.

WHAT CAN I DO?

Reducing is better than recycling. Try taking a pledge to go waste-free for a week. It might sound tricky, but it is doable! When you need to throw something out, see if it can be recycled first, and always read the labels on the bins around campus. For some inspiration, take the #wastebucketchallenge.

transportation

Transportation is one of the fastest-growing sources of GHGs, and in Waterloo Region it accounts for nearly 40 percent of all emissions.

The University of Waterloo has the opportunity to position itself as a local leader in sustainable transportation. Surveys among employees have shown that many members of the University community already choose sustainable commuting options.

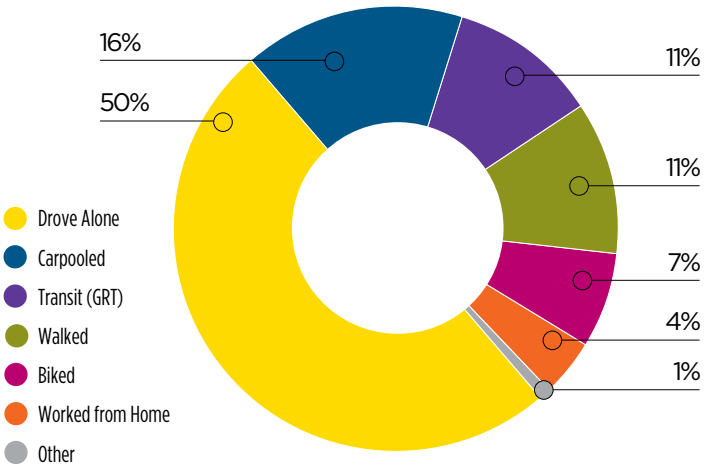
All campuses in Waterloo Region are situated along the emerging rapid transit corridor, which will further enable commuting choices. Furthermore, nearly 75 per cent of employee survey respondents lived within 10 kilometers of their worksite, making sustainable travel a distinct possibility.

NOTES: For methodology, see Appendix B5 – Transportation

Employee commuting information is available through the University's participation in TravelWise surveys. Student commuting data is currently unavailable, but the introduction of the student U-Pass enabled a major shift in student transportation patterns.

The University of Waterloo owns 10 golf carts to help minimize transportation emissions and costs for its fleet. Plant Operations, Housing and Residences, and Parking Services use these carts for a quick and easy way to get around campus without a full-sized car or truck. With over 150 fleet vehicles in academic and operations roles, the University could demonstrate leadership by sourcing more fuel-efficient or electric vehicles where it fits the needs and usage profile.

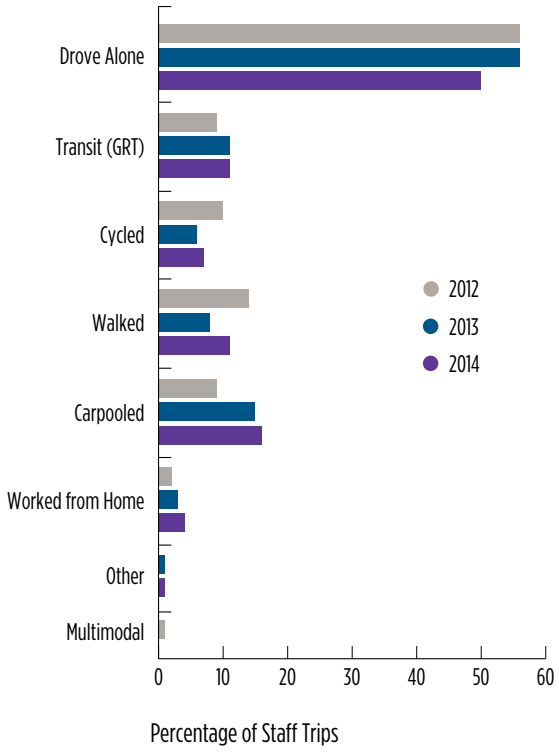
Employee Commuting Over One Week, Fall 2014



TravelWise

Parking Services helped the University of Waterloo join TravelWise in 2012. Through the program, employees can access discounted transit passes, an emergency ride home program for sustainable commuters, and carpool matching and trip tracking software. The University is also able to share best practices on employee commuting with other community organizations, and collaborate with regional government and local non-profits.

Employee Commuting Changes



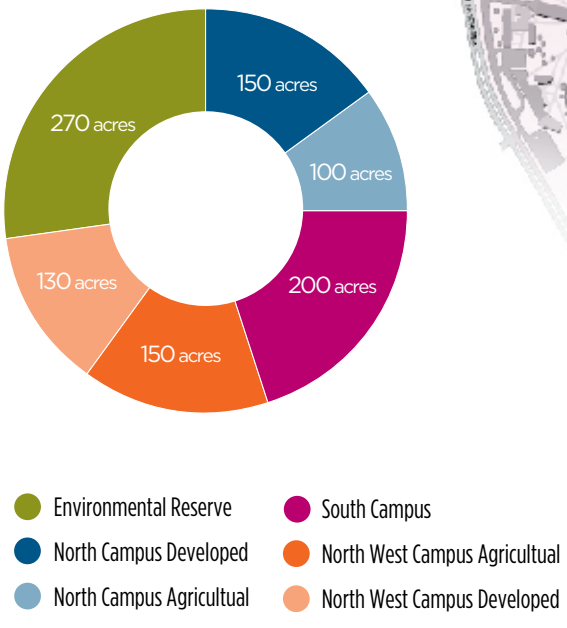
WHAT CAN I DO?

Getting to campus without a car doesn't have to be a big deal. Try it once a week, and you'll be surprised at how easy it is to carpool, bus, bike, or walk. If everyone drove one less day a week, it would be a 20 per cent reduction in traffic!

grounds

The University of Waterloo owns approximately 1,000 acres of land, so ecological grounds maintenance impacts biodiversity, stormwater management, and natural areas for the entire community. The physical appearance of the campus is also incredibly important to staff, faculty, and current and future students. Green, connected, and attractive campuses are fundamental to a successful university.

Approximately half of all University lands are under agricultural development or are part of the Environmental Reserve. South Campus complies with an integrated pest management plan, which minimizes use of chemical pesticides on campus and applies targeted chemicals only when necessary. In addition, the Ecology Lab gardens and Arts-Environment Gardens meet sustainable landscape management criteria for their plant and soil stewardship and for utilizing environmentally preferable materials. Plant Operations staff completed Smart About Salt certification developed by Landscape Ontario, which encourages appropriate use of salt technologies in winter.



NOTES: For methodology, see Appendix B6 – Land Management

Green Roof

Environment 3, Engineering 5, and the Quantum-Nano Centre all host large green roofs. These support stormwater retention and turn an otherwise drab roofline into an attractive return to nature for the nearby indoor and outdoor common areas. Smaller green roofs are also in place on Hagey Hall and the Centre for Environmental and Information Technology.

Permeable Pavement

In 2014, the Sustainable Campus Initiative student group led the installation of permeable pavement between the Davis Centre and the Math and Computers buildings. The project replaced an old gravel walkway, making the space far more attractive. It also allows water to penetrate between the paving stones to better filter into the surrounding areas and prevent runoff.

food

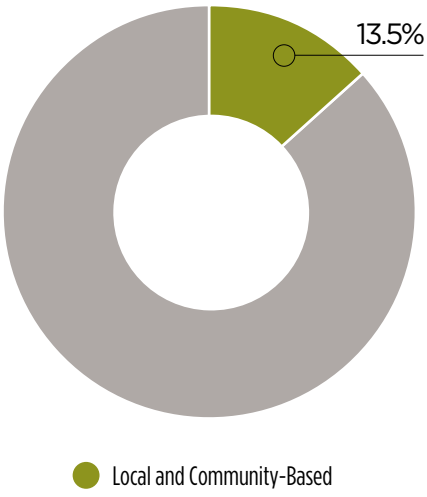
Everyone loves and needs a good meal, but food contributes to climate change emissions, waste generation, and land, water, and energy use. Agriculture is one of the largest causes of deforestation and species loss on a global scale, and there are options to reduce its impacts. Sourcing local food dramatically reduces transportation costs and emissions, and shifting diet to include less meat and dairy products can also reduce emissions and land use pressures.

Food Services has built partnerships with local suppliers for 13.5 per cent of all food purchases, and launched the Farm Market in 2006 to make local produce available to the UWaterloo community. To reduce packaging waste, all Styrofoam containers have been eliminated from campus-run eateries. Food Services also partnered with the Region of Waterloo to have green bins located in kitchen preparation areas. This has helped divert a significant amount of food waste from landfill.

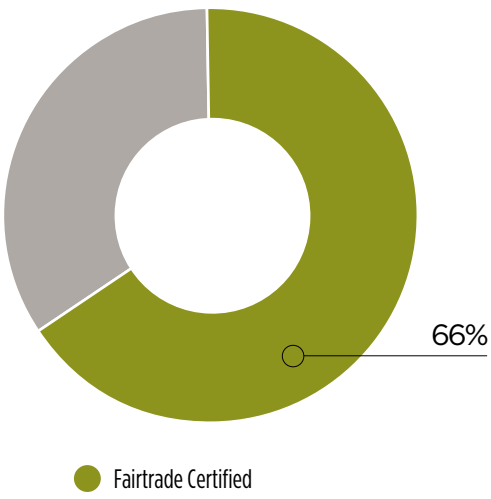
Many groups across campus have collaborated to increase the availability of Fairtrade products, which improve the economic livelihood of farmers while supporting sustainable farming practices. Approximately 66 per cent of hot beverages purchased by Food Services, excluding franchises, are Fairtrade certified.

NOTES: For methodology, see Appendix B7 - Food

Total Food Purchases



Food Services Hot Beverage Purchases



Farm Market

University of Waterloo Food Services launched the Farm Market in 2006 to provide fresh and local food for the campus. Staff and students responded enthusiastically, with many attendees visiting the Student Life Centre Lower Atrium during the Spring and Fall terms to pick up delicious produce, breads, and preserves. Visit the Food Services website to see upcoming dates!

St. Paul's Community Gardens

The St. Paul's Community Garden, founded by a University of Waterloo student, has established sites both on and off campus to grow and harvest fresh, local, and sustainable food. Through the employment of University students and mentorship from a local farmer at Steckle Heritage Farm, this project sells affordable produce to the cafeteria at St. Paul's College, as well as to students and faculty members.

WHAT CAN I DO?

We get to choose what we eat. Visit the Farm Market and other community markets to find local options, and next time you're at a campus eatery, look for a vegetarian option or ask to see Fairtrade choices when purchasing coffee.

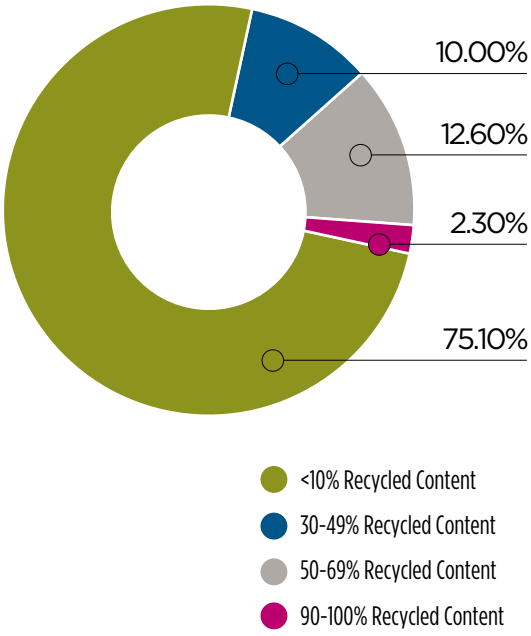
procurement

Making sustainable purchases is an important strategy for the University of Waterloo to leverage its buying power to better the environment. Organizations choosing more sustainable cleaning and electronic products, office supplies, and consumables decrease their environmental footprint and also encourage suppliers to improve their green offerings.

Procurement and Contract Services provides options for recycled paper products, has negotiated deals with VIA Rail for personal and business travel for the University of Waterloo, and ensures more fuel-efficient vehicles are available for business travel when renting. They have also worked with the Green IT Advisory Group to provide information and encourage the purchase of more sustainable computers and printers.

Most paper purchases over the past year were still on virgin paper, leaving significant room for improvement. Several other product categories could also be incorporated into future reporting, such as the percent of the University's electronics registered with the Electronic Product Environmental Assessment Tool or the amount of environmentally-certified cleaning products.

Recycled Paper Content in Total Paper Purchases



NOTES: For methodology, see Appendix B8 – Procurement

All paper towels and bathroom tissues on campus are made from 100 per cent post-consumer recycled paper. Compared to purchasing virgin fibre, this saves annually:

2,056 trees
(5 American football fields)

7.9 million
litres of water
(3 Olympic swimming pools)

113 *(9 garbage trucks)*
tonnes of waste

263
tonnes of CO_2
(88 cars per year)

3,322
GJ of electricity
(30 households per year)

WHAT CAN I DO?

If you are purchasing supplies for your department, be sure to look for sustainable options. 30 per cent recycled paper is actually cheaper than purchasing virgin paper!

ENGAGEMENT

Sustainability requires effort from all areas of campus. Whether it is student groups launching initiatives, staff champions leading projects in their department, or new connections with local community organizations, engaging broad areas of the University is necessary. Campus sustainability can only be realized through long-term behaviour changes that complement building and infrastructure improvements.

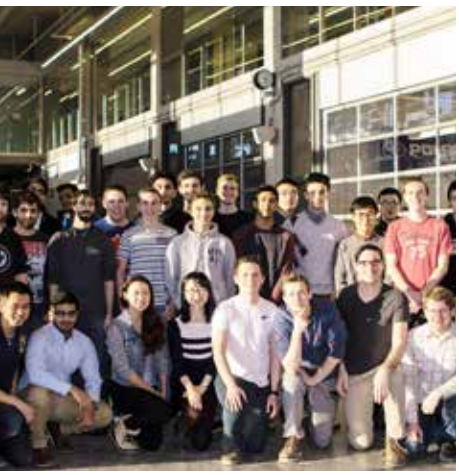
student engagement

At the University of Waterloo, learning extends beyond the classroom. A world-renowned co-op program gives students practical experience to complement their coursework, and extra-curricular activities equip students with new skills and applied knowledge. Sustainability-related groups are also a powerful demonstration of student interest and support for campus sustainability.

There are at least 13 student sustainability groups or organizations at Waterloo, with focuses ranging from global conversations on climate change to tangible campus projects. The Federation of Students and Graduate Students Association have also integrated sustainability into their own operations. Further effort could be made to formally support student sustainability engagement through leadership networks, collaborative projects, and relevant opportunities for applied research on campus.

Sustainable Campus Initiative

Sustainable Campus Initiative (SCI) is a service run by the Federation of Students. They comprise a passionate mix of students who are focused on campus sustainability projects and outreach. SCI's recent projects include the launch of an e-waste recycling bin in the Student Life Centre and the installation of permeable pavement between the Davis Centre and Math and Computers buildings. They are also working with Engineers Without Borders and Food Services on a Fair Trade Campus designation, and host regular "SCI talks."



UW Alternative Fuels Team

The University of Waterloo Alternative Fuels Team (UWAFT) provides a platform for students to engage in engineering, business, and communication efforts to gain industry-level knowledge and hands-on experience engineering sustainable vehicle systems. UWAFT pushes the boundaries in the automotive industry, finding ways to integrate advanced technologies and innovation into a 2016 Chevrolet Camaro while educating the public on hybrid-electric vehicles.

WHAT CAN I DO?

Join a club! Many groups on campus are looking for volunteers to support their active projects. Joining one of these or other student groups is a great way to put your ideas to work, meet and collaborate with your peers, and learn a lot along the way.

STUDENT GROUPS

- Campus Compost
- Climate Students
- Enactus Waterloo
- Engineers Without Borders
- Geographers Without Borders
- Midnight Sun Solar Team
- Ontario Campus Food Systems Project
- Students of the Water Institute, Graduate Section
- Sustainable Campus Initiative
- UW Alternative Fuels Team
- UW Parks Canada Club
- UW Plants Society
- Waterloo Public Interest Research Group

employee engagement

Training and empowering employees to take action on sustainability initiatives magnifies operational efforts and ultimately develops stronger employee-employer relationships. Many employees have already taken leadership roles by commuting sustainably, participating in community initiatives, minimizing their own impact, and even educating their colleagues.

Establishing stronger networks of these champions at the departmental level will support their effectiveness across campus and enable knowledge-sharing and mutual support. Promoting sustainability services relevant for employees also strengthens the relationship between the University and its employees.

WHAT CAN I DO?

Be creative! Each department faces slightly different challenges. If you have ideas on how to improve sustainability performance in your area, give it a try. Reach out to see if others are interested, and let the sustainability office know where you might need support.

Library Recycling Group

In 2014, library staff noted that waste facilities were not being used properly. They collaborated with Plant Operations to conduct a waste audit of library facilities, and launched a survey with library patrons to uncover recycling attitudes and barriers. Using these results, the group is now working to rearrange the waste bins and clarify signage to improve recycling and reduce waste to landfill.

Green Offices, Great Results

In 2011, the Graduate Studies Office received an Innovation Award from the Ontario University Registrar's Association for automating their application management and admissions process. Over 4,700 student files have since been made paperless through the automated system, and over 94,000 admissions documents were imported in 2014 alone.

Local Climate Change

Waterloo staff and faculty have participated eagerly in local and global initiatives to mitigate climate change. At the local level, Environment and Business students conducted a feasibility study in partnership with Sustainable Waterloo Region and REEP Green Solutions that planted seeds for Waterloo Region's first ever Climate Action Plan. In 2013, all four local governments unanimously endorsed the 6 per cent reduction target within the plan.

community engagement

Innovative research reaches beyond the classroom, the lab, and the campus. Students, staff, and faculty make some of their largest contributions towards environmental sustainability by applying their knowledge and skills in the surrounding community. Community engagement on sustainability also embeds the University as a valuable institutional participant in the local and global society.

Many faculty and staff sit on food, energy, water, and transportation advisory committees locally, provincially, and even internationally. Their knowledge and expertise affects policy and decision-making. In 2012, the University of Waterloo joined Sustainable Waterloo Region's local Regional Carbon Initiative to commit to reducing greenhouse gas emissions and participate in a community-driven program. In 2012, Waterloo also joined TravelWise, a collaboration between the Region of Waterloo and other local organizations to empower sustainable transportation among employees.

Local Watershed Management

Protecting water resources is of vital importance for communities, especially in Waterloo Region. In 2014, Earth and Environmental Science professor in the Faculty of Science and Water Institute member Dave Rudolph led a team to implement a smart watershed data integration platform for the Grand River Watershed. The project, in collaboration with IBM Canada, is part of the Southern Ontario Water Consortium and integrates real-time data about hydrologic conditions and water quality from remote sensing stations across an 80 square kilometer catchment area. The data can lead to more informed decision-making and improved management for local authorities.

governance

Academics, operations, and engagement ultimately depend on support from University administration. Sustainability efforts across these impact areas are often collaborative and usually challenging, as they involve changing "the way things are done" at the operational and behavioural level. Effective sustainability governance therefore becomes necessary to empower momentum on campus, manage conflict that inevitably arises under change, and ensure that initiatives support the mission and direction of the University. In essence, a governance structure sustains sustainability efforts.

Momentum is growing across campus. Waterloo approved the creation of a new full-time sustainability coordinator position in 2014, and the University endorsed the President's Advisory Committee on Sustainability in 2015. The committee includes staff, students, faculty, and senior administration, and has a mandate to develop a sustainability policy, plan, and ongoing monitoring efforts for the University.

GOVERNANCE INITIATIVES

The following initiatives strengthen the high-level support for campus sustainability.

Pledges:

» Council of Ontario Universities Pledge, Ontario Universities: Committed to a Greener World

Practices/Procedures:

» All new buildings designed to LEED Silver

» High efficiency lighting retrofits mandated during all major renovations and new construction projects

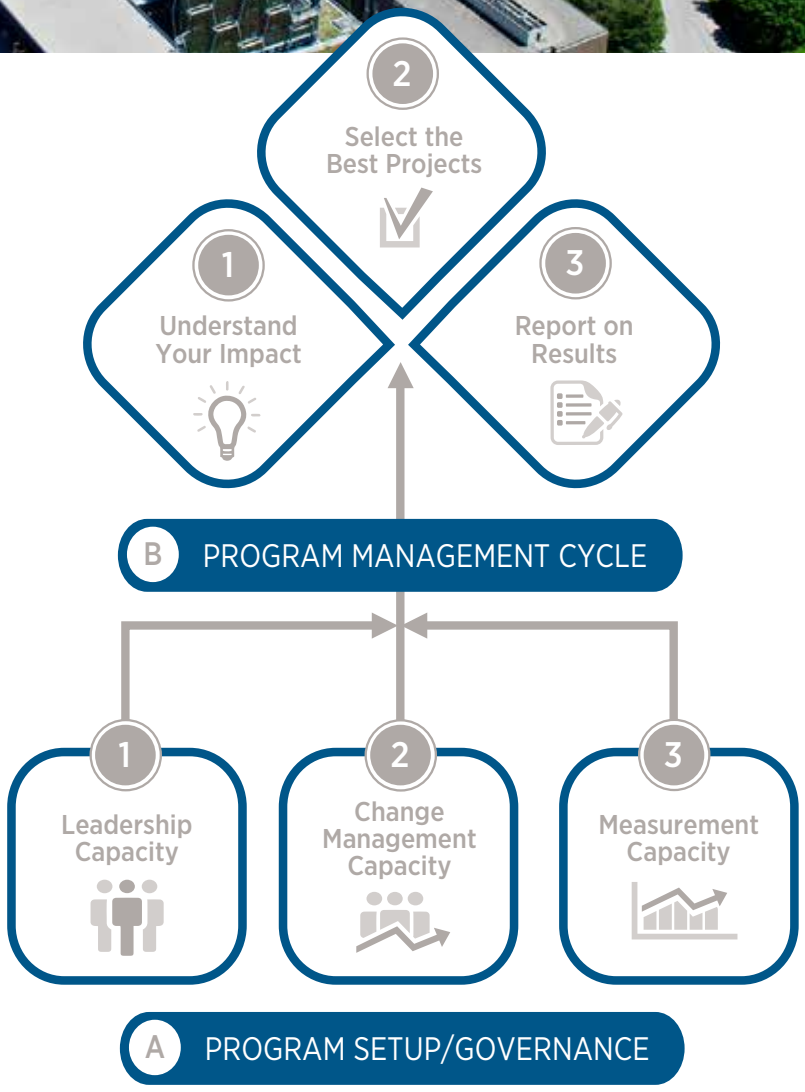
» Grounds minimize or eliminate use of chemical pesticides as part of an integrated pest management plan

» Office printers are centralized and default to double-sided printing whenever possible

Directions:

» Campus Master Plan highlights a pedestrian-oriented campus and environmental stewardship/sustainability as defining features of development

In Spring 2015, the President's Advisory Committee on Sustainability supported the implementation of a management framework to communicate and coordinate efforts. The framework was developed by REFOCUS, a division of the non-profit Harbourfront Centre in Toronto, with the aim of creating effective, lasting, and value-added sustainability change on campus. The approach will guide the committee's efforts moving forward.



looking forward

The path to sustainability is constantly evolving. This sustainability report outlines the University of Waterloo's progress over the past five years. There have been many successes, including continual improvement of a robust curriculum and positive indications that energy, water, waste, and transportation patterns are shifting.

There are also opportunities and challenges that require tangible next steps. These include:

- Launching a formal campus organics program
- Designing clearer signage and better positioning for recycling and waste bins
- Strengthening sustainable purchasing options for paper, electronics, and cleaning products
- Developing a business case to sub-meter campus buildings for utility consumption
- Piloting energy reduction challenges in residences
- Increasing the availability of secure bike parking on all campuses
- Integrating sustainability into student and employee orientation and training
- Creating a voluntary departmental champion network for staff and faculty
- Encouraging a student leaders network for residences and off-campus housing

High-level or structural action should empower these next steps to ensure project effectiveness, connect with funding, and support the University's desired goals and strategies. This systemic support includes:

- Launching a campus-wide sustainability plan
- Creating a sustainability policy for the University
- Facilitating collaboration between departments
- Completing a formal sustainability assessment, such as STARS
- Committing to formal targets in relevant impact areas
- Improving the collection of key data sets to monitor progress
- Embedding sustainability into University processes and accountability

These governance changes will help to identify, prioritize, and assign projects and initiatives to maximize the impact and efficiency across the University. Just as importantly, they are key to harnessing the passion, excitement, and commitment from many campus stakeholders to create lasting change.

acknowledgements

This report would not have been possible without the contributions of many groups and individuals across campus.

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Joanne Voisin – Office of the Registrar

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APPENDIX A

academic

A1 – SUSTAINABILITY COURSES

FACULTY	FOCUS ON SUSTAINABILITY	INCLUDE SUSTAINABILITY	TOTAL
Applied Health Science	6	14	20
Arts	21	27	48
Engineering	17	68	85
Environment	149	133	282
Mathematics	–	1	1
Science	15	57	72
TOTAL	208	300	508

Scope: Current academic calendar; undergraduate and graduate courses

Methodology: The count of sustainability courses arose from a scan of publically available course descriptions on the current academic calendar. Since this report focuses mainly on environmental sustainability, the STARS criteria were modified according to the definitions below. Courses were analyzed on whether they focused specifically on environmental sustainability (or one of the major themes within sustainability), or whether their primary focus was on a topic other than environmental sustainability, but they included content or an application related to sustainability.

Cross-listed courses were treated as one total course and were weighted equally across the departments (ie, 0.5 allocated to Geography & Environmental Management and 0.5 allocated to Earth Sciences for a shared course).

Limitations and Exclusions:

» Course descriptions are not exhaustive, and it is possible that there are many more courses that have units, modules, or case studies related to sustainability that were not included in the description. Further analysis could be conducted by looking at course syllabi.

» Special Topics courses were normally excluded from the count, unless the description provided a list of specific topics that could be related to sustainability.

» The academic calendar lists all courses that are available at the University of Waterloo, but does not indicate whether they were actually scheduled. Further analysis could be done through the Quest system to analyze the number of courses and sections offered.

Definitions:

STARS criteria define a sustainability-focused course as one in which the "primary and explicit focus is on sustainability and/or understanding or solving one or more major sustainability challenge." However, they define sustainability along the more commonly-accepted and holistic integration of economic, social, and environmental wellbeing. Since this report focuses on environmental sustainability, it modified the definitions accordingly:

» **Sustainability-Focused Courses** are courses in which the primary or explicit focus is on environmental sustainability or a thematic area related to sustainability, including: climate change, energy, water, air pollution, waste, land use, conservation/biodiversity, transportation, food, and buildings. For example, this might include courses on Sustainable Agriculture, Climate Change Mitigation, or Conservation Biology.

» **Sustainability-Related Courses** are courses where the primary focus is on a topic other than sustainability, but where there are sustainability units, modules, case studies, or assignments related to sustainability. For example, this might include a planning course where the primary focus was on infrastructure development, but also covered environmental criteria; it may have also included a course where the focus was on aquatic chemistry, but which had applications for groundwater protection and pollution control.

A2 – SUSTAINABILITY PROGRAMS

FACULTY	UNDERGRAD	GRADUATE	PHD	DIPLOMA	TOTAL
Applied Health Sciences	–	1	–	–	1
Arts	1	2	1		4
Engineering	7	5	4	1	17
Environment	8	10	4	1	23
Mathematics	1	1	1	–	3
Science	4	3	3	–	10
TOTAL	21	22	13	2	58

Scope: Current (2015) program offerings

Methodology: The list of undergraduate programs available at **universityofwaterloo.ca/find-out-more** and the list of graduate programs available at **gradcalendar.uwaterloo.ca/page/GSO-Grad-Programs** were used to identify all University of Waterloo programs. Sustainability-related programs were then identified based on program descriptions on individual department websites depending on whether they referenced sustainability, environmental protection, or understanding or solving of a sustainability-related challenge.

Limitations and Exclusions:

» Many programs could be tailored or specialized to focus on a topic related to sustainability, but these were not included unless it was identified explicitly as a theme, option, stream, or application. As such, it is likely that there is an underreporting of student learning within other programs that are not counted here.

Definitions:

Since this report focuses mainly on environmental sustainability, it was more difficult to apply STARS criteria, which looks at Sustainability-Focused Programs as "interdisciplinary academic programs that concentrate on sustainability as an integrated concept, including its social, economic, and environmental dimensions." Furthermore, the STARS definition does not adequately capture the full breadth of activity that happens from a scientific and technological perspective at the University of Waterloo, with applications towards sustainability themes. As such, the definition adopted here is broader and more inclusive than would be reported through STARS:

Sustainability Program: is any program focused on environmental sustainability or a sustainability theme (climate change, energy, water, air pollution, waste, land use, conservation/biodiversity, transportation, food, or green buildings), or which has themes, options, streams, or applications related to sustainability.

A3 – SUSTAINABILITY RESEARCH

THEMATIC AREA	AHS	ARTS	ENG	ENV	MATH	SCI	TOTAL
Climate Change	2	4	13	28	2	14	63
Water	1	1	17	14	4	25	62
Energy	–	1	34	5	2	6	48
Land Use	5	3	11	21	–	5	45
Transportation	–	–	20	5	–	–	25
Biodiversity/ Conservation	–	–	2	10	–	9	21
Food	5	–	2	7	–	4	18
Waste	–	–	10	2	–	2	14
Buildings	–	–	4	3	–	–	7
Air Quality	1	–	2	–	–	–	3
Other Sustainability	–	9	7	16	1	2	35
TOTAL	14	18	122	111	9	67	n/a

APPROACH/LENS	COUNT
Environmental Sciences	102
Technology	76
Policy/Governance	68
Social	55
Business/Economics	43
Health	9
Communications	8

Scope: All faculty, current information only

Methodology: The data was collected through a scan of publically available research profiles on each department's website. It was attempted to search for keywords or concepts focused on environmental sustainability or research that addressed a particular environmental sustainability problem. Faculty were identified based

APPENDIX A

on both thematic areas (ie conservation, climate change, energy) and approach (ie. science, technology, governance) where possible. Some faculty may have research spanning a number of thematic areas and using multiple approaches, so the categories are not mutually exclusive.

Limitations and Exclusions:

- The scan only included permanent faculty, and did not include Adjunct faculty or Lecturers.
- The scan did not include Masters or PhD research.
- In some cases, faculty members did not have a link to their research areas, making it impossible to identify whether research was related to environmental sustainability.
- In several cases, there was difficulty distinguishing research that had multiple applications. In such cases, the faculty member was included if their profile specifically referenced applications to environmental sustainability or sustainability thematic areas. It is possible that some research was excluded because this reference was not made explicit, and there was insufficient disciplinary knowledge to make an implicit connection.
- Terminology varied considerably across disciplines. It is possible that research topics were included or excluded from misinterpretation of language.

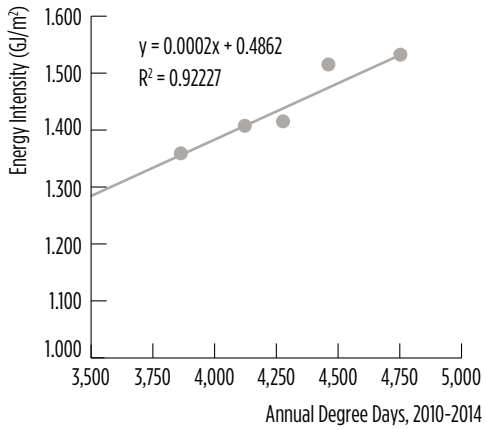
Definitions of Impact Areas:

- Environmental Sciences – Research that deepens the understanding of a particular sustainability issue area, such as water flows, climate change modelling, or ecological processes
- Technology – Research that develops or deploys innovative technologies to address sustainability issue areas, such as hybrid/electric vehicles, GIS systems, or smart grids
- Policy/Governance – Research that explores political, management, or regulatory aspects of sustainability issue areas
- Social – Research that explores societal responses or interactions with the natural environment, such as community development, culture, philosophy, or impacts on certain social groups
- Business/Economics – Research that explores the relationship of environmental sustainability within corporations, on economies, or on natural resource extraction and management
- Health – Research that explores the links between environment and public health, such as the impact of climate change on disease transfer, or drinking water sanitation
- Communications – Research that explores the language, marketing, or discourse around environmental sustainability or specific sustainability issues

APPENDIX B

operations indicators

Regression Analysis of Degree Days and Energy Intensity



B1 – ENERGY

Energy Source	2010	2011	2012	2013	2014
Electricity (kWh)	98,960,234	106,342,165	112,486,202	115,625,012	115,530,674
Electricity (GJ)	356,257	382,832	404,950	416,250	415,910
Natural Gas (m3)	13,347,453	13,698,510	13,777,376	16,478,861	17,553,152
Natural Gas (GJ)	497,860	510,954	513,896	614,662	654,733
Total Energy Use (GJ)	854,117	893,786	918,846	1,030,912	1,070,643
Floor Area (m2)	605,953	631,823	676,439	679,513	693,399
Degree Days	4,120	4,276	3,870	4,464	4,756

Scope: University of Waterloo only;

Methodology: Energy data is based on billed information for electricity and natural gas, and converted into a gigajoule (GJ) equivalent. The report used recommended conversion factors from the National Energy Board. Intensity metrics for the University of Waterloo are calculated based on total building floor space.

Degree Days were sourced from Waterloo North Hydro's 2015 Rate Application, as they provided a complete and local historical data set. These were also cross-referenced with available data from Environment Canada, although the latter record is less complete.

A linear regression analysis was used to test the influence of degree days on energy consumption, which revealed a correlation, though the sample size was small. A similar linear regression analysis displayed a much weaker sensitivity to floor space increases, which could reflect the type of new floor spaces being introduced. New LEED Silver building standards, for example, may help lower energy intensity for office or common space, while lab spaces could offset those increases in other areas, and vice-versa.

APPENDIX B

Ontario's Broader Public Sector (BPS) emissions reporting system provides publically available data for the university sector. To compare the University of Waterloo with similar universities, an average was taken from other Group of 15 Research-Intensive Universities in Ontario, namely McMaster University, Queen's University, University of Ottawa, University of Toronto, and University of Western Ontario. BPS emissions data is only available for 2011 and 2012 calendar years.

Exclusions and Limitations:

- For those facilities where energy data was not available or was not of sufficient quality, the facility's square footage was excluded from the above to avoid biasing the intensity metric. Electricity data was available for all main campus areas — exclusions were mostly limited to offsite maintenance locations and leased properties.
- Fuel oil is used to heat some offsite buildings and to power emergency generators intermittently. Reliable information on consumption patterns was not available, although this is expected to have an extremely minor impact on the overall emissions profile.

Supplementary Data (Not included in main report):

Conrad Grebel

ENERGY SOURCE	2010	2011	2012	2013	2014
Electricity (kWh)	844,579	856,478	830,056	838,633	1,017,351
Electricity (GJ)	3,040	3,083	2,988	3,019	3,662
Natural Gas (m3)	164,358	169,328	154,195	199,966	204,126
Natural Gas (GJ)	6,131	6,316	5,751	7,459	7,614
Total Energy Use (GJ)	9,171	9,399	8,740	10,478	11,276

St. Paul's

ENERGY SOURCE	2010	2011	2012	2013	2014
Electricity (kWh)	988,074	1,044,080	1,042,905	1,028,593	994,622
Electricity (GJ)	3,557	3,759	3,754	3,703	3,581
Natural Gas (m3)	164,358	169,328	154,195	199,966	204,126
Natural Gas (GJ)	6,131	6,316	5,751	7,459	7,614
Total Energy Use (GJ)	9,688	10,075	9,506	11,162	11,195

Sources:

Environment Canada, Historical Climate Data, 2015. Available online at: **http://climate.weather.gc.ca/** using Advanced Search for weather stations within 25km of Kitchener.

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B1 – CLIMATE CHANGE

SOURCE (TONNES)	2010	2011	2012	2013	2014	Scope
Natural Gas Emissions	25,352	26,018	26,168	31,299	33,340	1
Fleet Emissions	506	499	470	506	528	1
Electricity Emissions	12,864	9,996	10,574	8,903	8,896	2
Transmission and Distribution (TandD)	1,979	1,701	1,800	347	347	3
Waste emissions	488	510	521	547	492	3
Water emissions	49	35	35	31	26	3
Total Emissions	41,239	38,760	39,568	41,632	43,628	–
Floor Area (m2)	605,953	631,823	676,439	679,513	693,399	–
Population (FTE)	32,622	33,928	34,803	35,669	36,240	–

Scope: University of Waterloo only. Reporting scope includes Scope 1 Emissions, Scope 2 Emissions, and several Scope 3 Emissions under the GHG protocol.

Methodology: Scope 1 and 2 emission sources were quantified using utility bills for electricity and natural gas, as well as invoices for fuel purchases for the University of Waterloo fleet. Scope 3 emission sources were quantified from waste invoices and allocating Transmission and Distribution Losses according to the GHG Protocol.

Each emissions source was then multiplied by an emissions factor to calculate total emissions according to the following table. All values are converted into carbon dioxide equivalent (CO2eq).

EMISSION SOURCE	UNIT CONVERSION	EMISSION FACTOR	REFERENCE
Natural Gas	KG CO2eq per m3	1.8994	NIR
Gasoline	KG CO2eq per L	2.29906	NIR
Diesel	KG CO2eq per L	2.71212	NIR
Electricity*	KG CO2eq per kWh	2010: 0.13; 2011/12: 0.094; 2013/14: 0.077	NIR
Transmission and Distribution**	KG CO2eq per kWh	2010: 0.02; 2011/12: 0.016; 2013/14: 0.003	NIR
Waste to Landfill***	KG CO2eq per tonne	0.19	SWR
Water****	KG CO2eq per m3	2010: 0.08125 2011/12: 0.05875 2013/14: 0.041825	SWR

*Reflects annual upgrades to the electricity grid, which have lowered the carbon content due to the phase-out of coal power. Ontario updates emissions factors annually for the period 3-years previous and provides an estimate for the period 2 years previous, meaning that annual adjustments to historical emission factors are necessary. For example, in 2015, Ontario released finalized emission factors for 2012, and estimated emission factors for 2013. It is important to note that emission factors are different from the generation mix that is published by the Independent Electricity System Operator. This report applied the same emissions factors for 2013 and 2014, and will update both annually.

**Reflects the loss in power between generation and consumption, and from sulfur hexafluoride and other emissions released at transformers and along distribution infrastructure.

***Reflects local emissions factors, as developed by the Region of Waterloo and Sustainable Waterloo Region based on actual waste amounts reported by the Region of Waterloo.

****Reflects energy related to upstream purifying and pumping of water in Waterloo Region. This calculation yields 0.625 kWh per m3, which is then linked to electricity generation emissions factors.

APPENDIX B

Limitations and Exclusions:

» Scope 1 and 2 Emissions from the Federated University and Affiliated Colleges were not included, as not all institutions were able to provide source data. Scope 3 emissions from waste are included as the University of Waterloo handles all waste for the Federated University and Affiliated Colleges and it could not be separated.

» Business travel, including mileage and flight data, is likely a very large Scope 3 source of emissions for the University of Waterloo. Unfortunately, there are no tracking systems in place that are capable of providing data to calculate historical emissions. With the ongoing roll-out of a new expense tracking system, future reports may be able to include business travel emissions.

» Fugitive emissions under Scope 1 are not included in this report. These might include Hydroflourocarbon (HFC) emissions generated by on-site cooling systems. Plant Operations has installed filter systems to remove HFCs from atmospheric release, and the quantities would be immaterial to the University's emissions profile.

Sources:

Environment Canada, National Inventory Report 2015: Greenhouse Gas Sources and Sinks in Canada, Part 2 Annex 6, Ottawa: 2015. Available online at: **http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8812.php**

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B3 – WATER

	2010	2011	2012	2013	2014
Total Water Use (Litres)	602,747	602,603	602,031	636,070	537,193
Floor Area (m2)	605,953	631,823	676,439	679,513	693,399
Population (FTE)	32,622	33,928	34,803	35,669	36,240

Scope: University of Waterloo Only

Methodology: Total water consumption was calculated using billed amounts for all campus locations.

Limitations and Exclusions:

» Not all Federated University and Affiliated Colleges were able to provide utility data, so their consumption was not included in the total.

B4 – WASTE

WASTE STREAM	2010	2011	2012	2013	2014
Waste to landfill (kg)	2,567,370	2,686,130	2,743,180	2,878,750	2,590,550
Corrugated Cardboard (kg)	277,760	377,610	377,120	418,780	440,680
Office Paper Recycled (kg)	153,370	118,750	132,680	113,040	116,040
E-Waste Diverted (kg)	52,580	17,398	54,760	38,834	34,099
Campus Compost (kg)					907
Blue Bin Recycling (kg)	unknown	unknown	unknown	unknown	unknown
Green Bin Recycling (kg)	unknown	unknown	unknown	unknown	unknown
Batteries (kg)				577	565
Light Bulbs (kg)*				1,692	1,692
TOTAL WEIGHT	3,051,080	3,199,888	3,307,740	3,451,674	3,184,533
Population (FTE)	32,622	33,928	34,803	35,669	36,240
Per Capita to Landfill (kg/pp)	78.7	79.2	78.8	80.7	71.5
Per Capita Total Waste (kg/pp)	93.5	94.3	95	96.8	87.9

* A total of 4,231kg of glass, metal, and phosphor was recycled from 2013 through May 2015 from lightbulbs; since more detailed summaries are not available, results have been averaged.

Scope: All campuses, 2010-2014. Federated University and Affiliated Colleges also dispose waste centrally through the University of Waterloo, so their streams cannot be separated.

Methodology: All data is from invoices received from the waste contractor for each stream. Campus Compost weighs all collected material on-site.

Limitations and Exclusions:

- Due to the nature of the University's contract with the Region of Waterloo, weight information or equivalent is not available for recycling or green bin programs, which are likely a large portion of the campus' waste stream. Data collected from 1-day waste audits is not of sufficient quality to extrapolate campus-wide.
- Construction and demolition waste is normally disposed separately as part of a project.
- Some materials are brought directly to the Region of Waterloo landfill, such as used tires, but these amounts are very small.
- Event waste, such as for the Canada Day celebration, is not included.
- Yard waste is not included, as Plant Operations normally composts and re-uses all waste on-site.
- A calculation of weighted per-capita use was not possible, using the criteria established by STARS, as not all Federated University and Affiliated Colleges were able to provide sufficient data and centralized waste collection makes it impossible to separate these streams.

APPENDIX B

B5 – TRANSPORTATION

Scope: Waterloo Region campuses only, University of Waterloo employees only, 2012-2014.

Methodology: Data was collected from an annual TravelWise survey released to staff and faculty during the fall term. Respondents answered several questions about their commuting patterns and preferences. To calculate a mode split for the university, respondents filled out their past five days of travel. These were summed across all respondents, and used to determine the number of trips taken throughout the week as a proxy for the usage of different modes of getting to campus.

Percent of Employee Trips

MODE	2012	2013	2014
Drove Alone	56	56	50
Transit (GRT)	9	11	11
Cycled	10	6	7
Walked	14	8	11
Carpooled	9	15	16
Worked From Home	2	3	4
Train (GO or VIA)			
Other		1	1
Multimodal	1		

The survey launched in the fall to avoid over-representation of active transportation during summer months, and under-representation during winter months. It took place over a two-week period, which happened to experience similar climatic conditions across all three survey years, leading to strong comparability. The 2012 survey had 435 respondents, 2013 had 617 respondents, and 2014 had 313 respondents.

Limitations and Exclusions:

» The data does not include staff from the Federated University and Affiliated Colleges or the Stratford campus.

» The data does not include undergraduate or graduate students.

» As this was a voluntary survey, it is expected that there is a slight bias towards employees who are already using sustainable transportation.

B6 –LAND MANAGEMENT

Scope: All campuses, excluding Federated University and Affiliated Colleges. 2014.

Methodology: Classifications for various land management standards were based on the STARS criteria:

» **Integrated Pest Management**: Uses least-toxic chemicals, minimum use of chemicals, use of chemicals only in targeted locations and only for targeted species, and a phased management approach.

» **Sustainable Landscape Management**: All IPM criteria, plus plant stewardship, soil stewardship, use of environmentally preferable materials, hydrology and water use, materials management and waste minimization, and snow and ice management.

Limitations and Exclusions:

» Federated University and Affiliated Colleges contract out most of their landscape management, so it is not clear whether they follow Integrated Pest Management or Sustainable Land Management strategies.

» Developed areas of North and Northwest campus are managed by a mix of University, City of Waterloo, and private contracts.

» Only 2014 data is presented, as Plant Operations has had a long-standing policy to phase out chemical pesticides. As such there has been limited year-over-year change.

B7 – FOOD

Scope: 2014 only, University of Waterloo Food Services only.

Methodology: Data points on fair trade and local purchases are collected from Food Services based on the purchasing classifications for 2014.

Limitations and Exclusions:

» Neither metric includes campus franchises. STARS methodology requires treating franchises separately, but data is not available for 2014.

» Neither metric includes Federated University and Affiliated Colleges. All four Federated University and Affiliated Colleges manage their catering services independently, and it was not possible to collect data for 2014.

» Fairtrade does not include purchases made by faculty coffee and donut shops, although many have switched or are in the process of switching to Fairtrade providers.

» Fairtrade does not include coffee purchases made by individual departments for staff and faculty lounges.

B8 – PROCUREMENT

RECYCLED CONTENT	<10%	10-29%	30-49%	50-69%	70-89%	90-100%
Per cent of total paper purchases	75.1%	0%	10%	12.6%	0%	2.3%

Scope: Paper purchases made through Procurement and Contract Services, July 2014-June 2015.

Methodology: The University of Waterloo's paper supplier provided information on the percentage of total paper purchases within various tiers of recycled content. The tiers are the same as those used by the STARS 2.0 technical manual.

Limitations and Exclusions:

» This does not include paper sold at retail locations across the campus.

» This does not include paper that departments or individuals purchased separately from Procurement and Contract Services.

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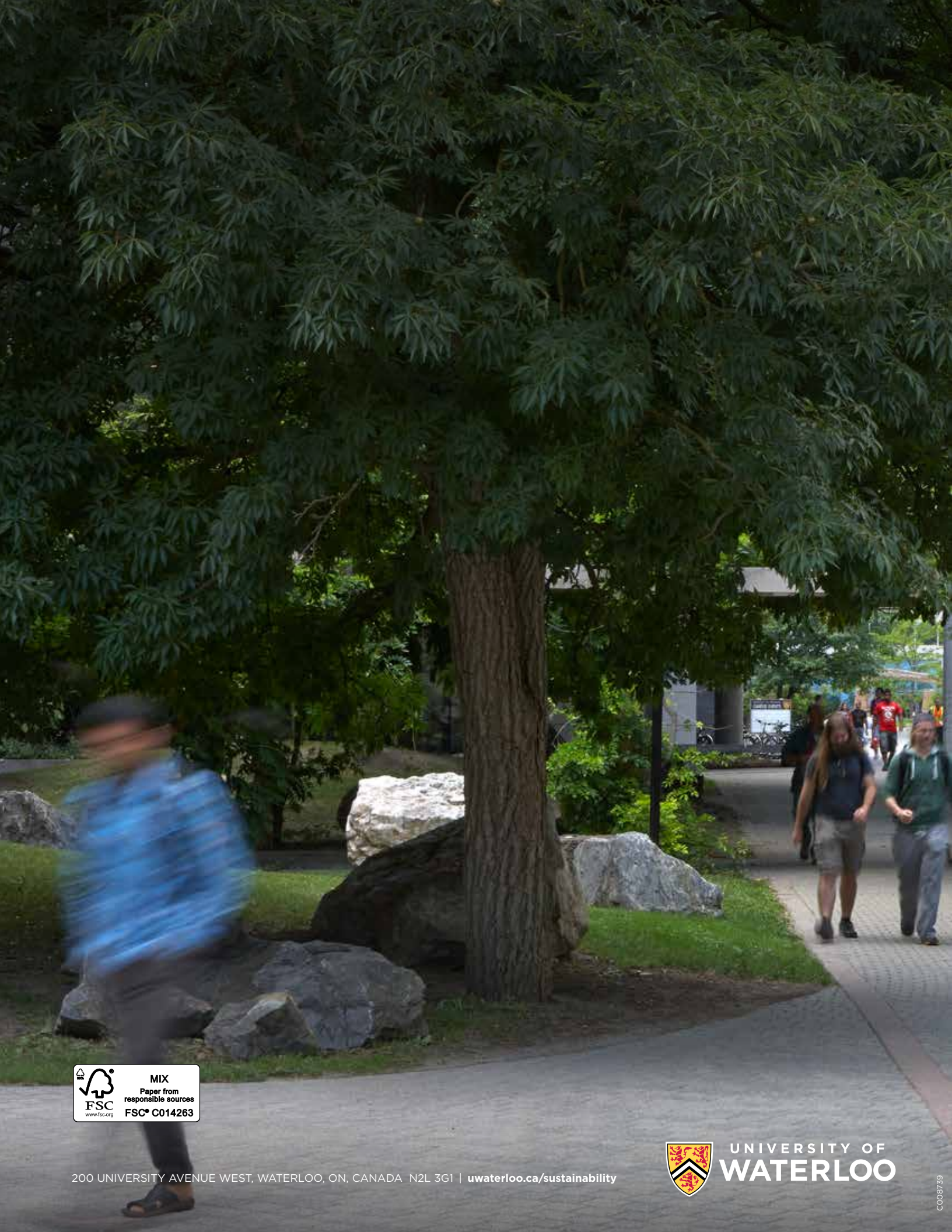

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