

ANNUAL SUSTAINABILITY REPORT 2016





PRESIDENT'S MESSAGE

McMaster is one of Canada's leading research-intensive universities and is dedicated to the advancement of human and societal health and well-being through the art and science of discovery. Our ongoing focus on sustainability is an important aspect of this work and the 8th Annual Sustainability report aims to showcase the initiatives that McMaster has implemented and been engaged in over the past year.

Through the ongoing support of McMaster students, staff, faculty and community members, the University has been able to undertake numerous sustainability initiatives. Over the course of 2015/16, McMaster has continued to participate in programs such as chasing the peak, completed LED lighting retrofits in many buildings, implemented energy efficiency measures in two of McMaster's three highest energy cost and consumption facilities (MDCL and JHE), in addition to implementing various energy efficiency measures in many other campus buildings. The overall result has been to reduce campus GHG emissions by approximately 800 metric tonnes in 2015 and another 900 metric tonnes in 2016, as well as conserving significant amounts of energy and water, and reducing costs.

To be successful, our sustainability initiatives require the participation and support of all members of our community. Events such as Bike to Work Day encourage active participation from across the campus and the newly inaugurated annual Sustainability Day commits to raising awareness, providing information about sustainability, and engaging our students in effecting real change. Thank you to everyone who has contributed to making McMaster University a more sustainable institution. If you are interested in learning more about Sustainability at McMaster, please visit:

<http://www.mcmaster.ca/sustainability/>



Patrick Deane
President and Vice-Chancellor

Annual Report | 2016

Mission Statement

At McMaster, our purpose is the discovery, communication, and preservation of knowledge. In our teaching, research, and scholarship, we are committed to creativity, innovation, and excellence. We value integrity, quality, inclusiveness and teamwork in everything we do. We inspire critical thinking, personal growth, and a passion for lifelong learning. We serve the social, cultural, and economic needs of our community and our society.

Guiding Principles

1. Strengthening the excellence of our research and our graduate education and training while seeking opportunities to integrate research more purposefully into our academic mission;
2. Developing a distinctive, personalized, engaging, and sustainable student experience; and
3. Enhancing the connections between McMaster and the communities we serve, locally, provincially, nationally, and around the globe.

University Sustainability Areas of Focus

- Energy
- Water
- Waste Management
- Green Space
- Health and Well-Being
- Transportation
- Education

Table of Contents | 2016

Energy

- Chasing the Peak 6-7
- J.H.E. & M.D.C.L. Chemistry Wing Demand
Controlled Ventilation 8
- Shut the Sash 9
- LED Retrofit Lighting 10
- Miscellaneous Control Systems 11

Water

- Water Fountain Retrofits 12

Waste

- Waste Diversion 13
- Waste Reduction Plan 14
- E-Waste Recycling 15

Green Space

- McMaster Teaching and Community Garden 16-17

Health and Well-Being

- Annual Campus Sustainability Day 18
- Electronics Collection Day 19
- Health and Safety Week 20
- Sidewalk Sale 21

Transportation

- Annual Bike to Work Day 22
- Bike Share 23
- Electric Vehicle Charging Stations 24

Education

- Facility Services Experiential Learning 25
- Real Time Energy Displays 26
- 11-Year Sustainable Trends 27
- Social Engagement 28
- Academic Sustainability Programs (ASP) 29



Chasing the Peak



Overview

For the third consecutive year, McMaster University, one of the largest energy consumers in Ontario, participated in the Chasing the Peak initiative to build on the success of the past years. The Province of Ontario encourages electricity consumers to help reduce their peak electricity demand to avoid additional generation sources and associated greenhouse gases (GHGs). The university monitors the provincial electricity forecasts available at www.ieso.ca. In addition university staff monitor weather forecasts from other sources to determine the likelihood of a peak hour. The ratio of McMaster’s energy usage to that of Ontario on the top 5 peak hours of the year is used to calculate the following year global adjustment charges. McMaster was successful in reducing energy during the five peak hours in 2016.

Objectives

1. Create awareness of the environmental impact of consumption, as well as the costs of consumption.
2. Reduce peak demand and energy consumption in campus buildings during provincial electrical peak.

CHASING THE PEAK WHAT TO DO:



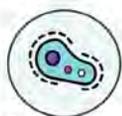
Restrict use of fume hoods and ensure sashes are lowered



Power OFF any unnecessary equipment



Ensure volatile chemicals are properly stored



Do not start new experiments during this hour

Chasing the Peak



This initiative was successful in reducing electricity consumption across all major energy consuming facilities on campus.

Average campus peak demand reduction

4 MW

Total campus electricity consumption reduced

52,700 kWh

Which is equivalent to the electrical demand of 1,014 homes
And the electricity consumption of 1,625 homes in one day

8.96 Tonnes = 8,960 kg
of greenhouse gas emissions were avoided



	2014	2015
Electricity Reduced (kWh)	24,840	52,700
GHG emissions avoided (tonnes)	4.23	8.96



Psychology Building was the overall winner with a 25% reduction of electrical usage

Patrick Burke received the Top Individual Contributor Award

Shut the Sash



Overview

The goal of the initiative is to implement the best operational practices in our laboratories on campus and to reduce energy consumption in labs by shutting fume hood sashes when they are not in use. We work collaboratively with our Researchers and Research Assistants to maintain fume hood doors closed. Facility Services has been performing bi-weekly reviews of fume hoods in every building on campus and producing an inventory of the status of fume hoods sash positions. When a fume hood not in use is left open, it is noted and tagged with a sticker that reminds users to keep the sash shut and also outlines the benefits of doing so. This initiative has been essential to helping the campus conserve energy. It allows us to track improvements and target areas that need to achieve more energy savings.

Objectives

1. Ensure that the sashes on unused fume hoods are shut to maintain safe working conditions for lab personnel.
2. Reduce fume hoods energy cost.

Reporting

Summary of the individual facility results for Shut the Sash is presented in the table below. The biggest improvement was in NRB (40%) followed by ABB (10%).

	Building									
	ABB	JHE	NRB	MDCL	LSB	GSB	ETB	BSB	Spinal	PB
Total Number of fume hoods	317	54	52	37	50	16	20	12	4	4
% Improvement of unused fume hoods being closed	10%	-26%	40%	-14%	-20%	-13%	5%	8%	-25%	-25%

LED Retrofit Lighting

Overview

Building on the success of McMaster’s Facility Services LED lighting retrofit in campus stairwells and corridors, more lighting retrofits were implemented in the Student Residence Buildings.

Reporting

The estimated annual electricity consumption saving is around 985,000 kWh, and the annual GHG avoidance is estimated to be 123 metric tonnes.

<p>Incandescent bulb</p> <ul style="list-style-type: none"> • Gives off 90% of energy as heat, not light • Average lifespan: 750–2,000 hours 		<p>CFL bulb</p> <ul style="list-style-type: none"> • Uses 75% less energy than a traditional incandescent bulb • Average lifespan: 8,000–10,000 hours 		<p>LED bulb</p> <ul style="list-style-type: none"> • Uses 75–80% less energy than a traditional incandescent bulb • Technology still in development, but estimated lifespan is 30,000–50,000 hours 	
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Objectives

1. Improve the lighting in various student residence buildings.
2. Save energy by using more efficient LED bulbs.
3. Reduce lighting maintenance requirements with longer lifespan bulbs.

The expected results of the project include:

- ✓ Expected annual Greenhouse gas emissions avoided: 123 metric tons of CO2 equivalent
- ✓ Expected annual electricity savings: 985,427 kWh

The project included the installation of LED lamps in:

- Matthews Hall
- Moulton Hall
- Wallingford Hall
- Edwards Hall
- Hedden Hall
- Woodstock Hall
- Brandon Hall
- McKay Hall
- Whidden Hall

Miscellaneous Control Systems

Overview

The following miscellaneous control systems retrofits has been implemented in campus buildings:

i. University Hall Controls Retrofit

This project involved upgrading the existing pneumatic and mechanical control system to a digital control system, replacing control valves with two-way pressure dependent valves and installing variable speed drives.

ii. All building mechanical fan belt upgrade

This project involved installing slip reducing fan belts on buildings ventilation and exhaust systems across campus.

iii. All building heating systems set-backs after hours

This initiative involved utilizing the outdoor air reset system to reduce all campus building ventilation and heating systems operation during low occupancy periods on campus.

iv. Central plant/Chilled water plant operational modifications

The project involved operational modifications to plant controls to improve central plant efficiencies and lower energy consumption.

Objectives

1. Reduce energy consumption and operational costs.

Reporting

The estimated reduction in annual electricity consumption from the above measures is 230,000 kWh and the annual GHG emissions avoidance is around 450 metric tonnes.



Water Fountain Retrofits



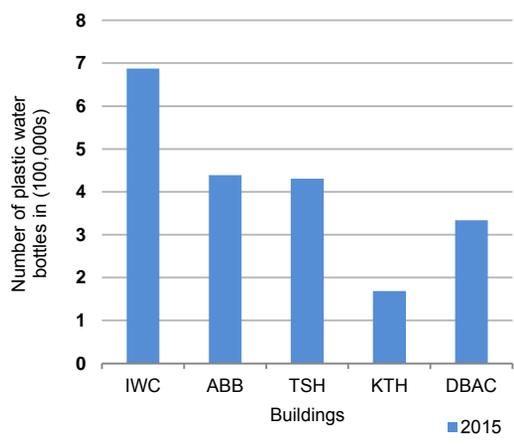
Overview

Since its implementation in 2010, McMaster’s retrofitted water fountains have provided drinking water to campus in an effort to reduce the use of disposable single-use plastic water bottles, and encourage refilling reusable bottles. Each water fountain was retrofitted with a gooseneck spout, bubbler, and chiller. Sensors on each fountain provide an updated number of water bottles saved from landfill by refilling.

Objectives

1. Decrease the number of single-use plastic water bottles being consumed by the campus community by providing the infrastructure to support the refilling of reusable containers.
2. Promote the campus-wide use of reusable containers and water-filling stations.

Highest Buildings in Number of Water Bottles Eliminated



Reporting

The Office of Sustainability and Facility Services have worked in collaboration to provide water fountain stations all over campus. Currently, there are over 100 water stations on campus, and since implementation in 2010 the number of water bottles saved has reached around 5 million in 2015, and went up to 6.9 million water bottles in 2016. This indicates that McMaster University has helped eliminate about 1.9 million water bottles in 2016.

Waste Diversion



Overview

McMaster is constantly looking for opportunities to make progress when it comes to waste management. The rate of diverted waste is the percentage of overall waste that has been diverted from landfills. In 2013 we were able to divert one third of total campus waste. Over the course of the following years we were able to improve our diversion rate, diverting a total of 38% of waste for 2015, and 48% of waste in 2016. This waste diversion is achieved through recycling, reuse, and composting. Facility Services staff members continue to help increase the diversion rate by educating the McMaster community and promoting proper waste disposal.

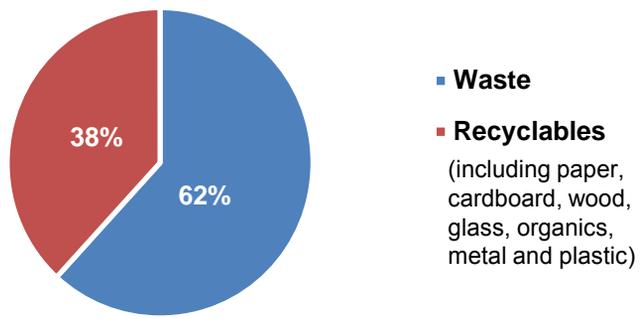
Objectives

1. Measure the 2015 and 2016 diversion rate at McMaster University and track performance.
2. Raise awareness about the importance of disposing waste properly in order to increase the diversion rate.

Reporting

A breakdown of the amount of campus waste produced by McMaster in 2015 and in 2016 can be found in graphs below where it shows that McMaster’s diversion rate has improved by about 20% (from 38% to 48%) over the past two years.

Waste vs. Recyclables





Waste Reduction Plan



this

PAPER, NEWSPAPER AND CARDBOARD



that

GLASS, CANS, MILK CARTONS & ALL PLASTICS



the other

EVERYTHING ELSE GOES IN HERE

Overview

To continue towards increasing the percentage of diverted waste on campus, McMaster University has developed a waste reduction plan and a new waste labeling criteria aimed at enhancing waste diversion and reducing cross-contamination between different types of recycled waste. The outcome of the above bin-labeling system is currently being evaluated by Facility Services and necessary changes will be made to further enhance the diversion rate at McMaster.

Objectives

1. Use yearly waste audit report to develop ways to increase waste diversion rate and reduce cross-contamination between waste and recyclables

Reporting

Facility Services continues to recycle around 1,200 skids a year in addition to diverting a considerable amount of wood from waste by donating furniture to various organizations, including the *Kayanase Greenhouse* located on the Six Nation Reserve, near Brantford Ontario. We are continuing our efforts to improve our diversion rates by:

- Continuing to recycle glass, metal, cans, wood, paper, cardboards and print cartridges.
- Providing additional education to the McMaster community.
- Promoting the use of refillable water bottles and increasing the number of water filling stations on campus.
- Working with Hospitality Services to switch to sustainable packaging and reduce the amount of packaging.
- Providing information about electronic waste drop-off locations, and continue to offer e-waste collection days.
- Expanding McMaster's composting program to campus eateries, office locations and some central areas.
- Continuing to encourage clothing donations.

In addition to the above, grounds staff have been converting ash trees that have been affected by the ash borer into benches to use on campus.



E-Waste Recycling



Overview

Providing the McMaster community with a number of locations to recycle their old electronics is an important part of our mission to become a more sustainable University. Electronics contain harmful chemicals such as lead and mercury, and are often expensive to dispose of in a responsible manner. Collecting and disposing of electronic waste through the use of our bins keeps this harmful waste from entering landfills. There are multiple designated locations on campus where electronics such as printers, telephones and computers can be dropped off.

For more information and locations, refer to McMaster Office of Sustainability website:

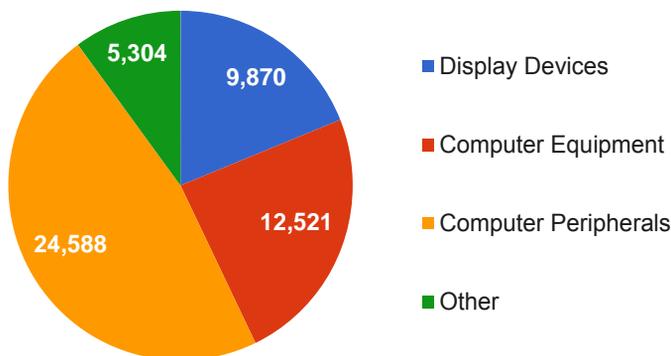
www.mcmaster.ca/sustainability

Objectives

1. To properly dispose of harmful devices to ensure safety
2. Help the McMaster community dispose of electronic waste in a convenient manner.

Reporting

Electronic Waste (in lbs)



TOTAL: 52,283 lbs



Teaching & Community Garden



Overview

The McMaster Teaching and Community Garden is planted, grown and maintained by students in partnership with Facility Services. The garden has provided opportunities for workshops and outreach events, and some of the crops are sold to McMaster students and staff and faculty through the Mac Farm Stand. Students have developed plans to build on the success of the garden including collaborating with local food initiatives, coming up with ideas to improve seed and fertilizer procurement, and refining communications plans to improve outreach.

Objectives

1. Engage students in an opportunity to learn sustainable food experiences
2. Provide McMaster and greater Hamilton communities a clean and sustainable food source



This year, the produce grown in the garden included: **cucumbers, strawberries, tomatoes, onions, carrots, zucchini, eggplant, beets, corn, green beans, melons, sweet peppers, hot peppers, rhubarb.**



Recently, we have begun collaborating with the local Ronald McDonald House and East Meets West Bistro, donating a large portion of our fresh produce to their kitchen staff.



**RONALD McDONALD
HOUSE CHARITIES®**



Annual Campus Sustainability Day



Dr. Mohamed Attalla, Assistant Vice President and Chief Facilities Officer, awarding the *John Hodgins Engineering Building* for having the highest percentage improvement in unused fume hoods being closed in the *Shut the Sash* initiative.

Overview

On October 29th, 2015, McMaster’s Facility Services department held its annual Campus Sustainability Day in the McMaster University Student Centre. This event gave McMaster an opportunity to highlight its accomplishments in contributing to sustainability through the participation of various university groups.

Objectives

1. Contribute to a culture of sustainability campus by raising awareness about the various initiatives undertaken by McMaster University staff and students.

Reporting

Facility Services staff, and volunteers from a variety of organizations set up booths which display programs and achievements that promote sustainability. Staff spent the day educating campus members about the several programs such as Smart Commute, OPIRG, Hydro One, Community Car Share and Engineers without Borders. Facility Services also distributed awards for the Chasing the Peak and Shut the Sash initiatives.

Electronics Collection Day



Overview

On June 16th, 2016, McMaster’s Facility Services organized an Electronic Waste Collection event. The purpose of the event was to collect a large amount of electronic waste for recycling in order to divert harmful electronic waste from contaminating landfills.

Objectives

1. To provide the McMaster staff, faculty and students an opportunity to conveniently dispose of electronic waste.
2. Ensure that campus waste is collected and recycled in a responsible and sustainable manner.

Reporting

Several members of the McMaster community brought items no longer in use such as desktop computers, laptops, cell phones, keyboards, printers, monitors, and cables. These contributions made the event a great success. As demonstrated in the table below, we were able to collect almost 4,000 LBS of electronic waste for recycling.

Items Collected	
ITEM	WEIGHT
Printers and Peripherals Devices With Plastic	1565 LBS
Printers and Peripherals Devices With Metal	111 LBS
Desktop Computers	1687 LBS
CRT Television	614 LBS
Total	3,977 LBS



Health & Safety Week



Overview

Each year, McMaster Environmental & Occupational Health Support Services (EOHSS) hosts a North American Occupational Health and Safety Week. The week is filled with many informative events such as WHIMS training and a Vendor Fair. The Vendor Fair is an event open to the McMaster Community and consisted of booths by health and safety related organizations and Facility Services.

Objectives

1. Showcase the department's safety practices
2. Educate the community about the importance of work safety.

Reporting

McMaster Facility Services Energy Management and Sustainability department participated in the vendor fair on May 6th 2015, with a booth explaining the proper use of fume hoods. The intent was to ensure that best practices in lab safety, health and sustainability.



Sidewalk Sale



Overview

On September 10th 2015 Facility Services hosted a booth at the annual Sidewalk Sale Welcome Week event. The Energy Management and Sustainability Division educated the McMaster community about the consequences of buying single-use plastic bottles and the benefits of using reusable containers.

Objectives

1. Educate students about sustainable efforts going on throughout the University
2. Encourage students to participate in sustainable practices.



Reporting

Over 20,000 students participated in the event! In 2015, over 300 students signed the pledge and received refillable bottles. There was a draw for people who visited the Facility Services booth, and one lucky student won a brand new tablet.

In 2015, student staff developed a pledge which encouraged the McMaster community to reduce their plastic bottle and water waste. To provide support, those who signed the pledge received a complementary refillable bottle.

Annual Bike to Work Day



Overview

On Monday May 26th, 2015 McMaster participated in the Bike to Work day event. Staff from Facility Services stood at all the school entrances handing out granola bars to reward incoming bikers for choosing a sustainable mode of transportation. Later on in the day facility services also provided bikers with a complementary bike wash and repair.

Objectives

1. Raise awareness about the different sustainable methods of transportation that are available.
2. Encourage the McMaster community to use alternative methods of transportation whenever possible.

Reporting

More than 400 students and University employees took part in Bike to Work Day. Over 200 granola bars were handed out to cyclists and during the event, over 20 bikes were washed and repaired, and prizes were given to 3 participants!



Bike Share



Overview

The SoBi Hamilton Bike Share program provides bicycles around the city for people to use as an easy, affordable and sustainable alternative to commuting. McMaster University currently hosts 5 bike stations (hubs) on campus. Students, faculty and staff are able to purchase a discounted membership which provides access to the bikes located at the Student Centre, the Health Sciences building, Mary Keyes, at Emerson and the Stadium.

Objectives

1. Raise awareness about the importance of reducing fossil fuels.
2. Promote and encourage the use of sustainable alternatives of transportation.

Reporting

The table on the right reflects the bike trips made in and out of each campus hub.

In 2015, there were 404 McMaster members registered for SoBi using the McMaster discount.

The average trip distance and time was 1.92 km and 21 minutes respectively in 2015.

HUB	TRIPS IN / OUT
Student Centre	15,513
Health Sciences	11,360
Mary Keyes	5,019
Emerson	7,311
Stadium	2,192
Arthur Bourns	4,304
TOTAL:	45,699



Electric Vehicle Charging Stations



Overview

There are several electric vehicles (EV's) charging stations at McMaster, few of which are in off-campus buildings. Some of them were installed in LEED certified new built buildings. Most recently, three EV's charging stations were installed in Wilson Hall building.

Objectives

1. Facilitate the use of electric vehicles.
2. Contribute to the Province of Ontario efforts to electrify transportation and reduce GHG emissions.

Reporting

More than 15 EV's are registered in Security and Parking Services records on campus. The Sustainability Office will work in collaboration with Security and Parking Services in developing a campus-wide policy for using the EV's chargers.





Facility Services Experiential Learning



Overview

McMaster University's Facility Services department and Office of Sustainability offer student employees a valuable opportunity to work and contribute to McMaster's sustainability goals, while earning an income and valuable hands-on experience in various fields.

Objectives

1. Provide McMaster students an opportunity to help their community grow sustainably, and gain relevant experience.
2. Support a number of academic courses and projects in regards to sustainability.
3. Provide experiential learning opportunities to McMaster students.

Reporting

McMaster University students have been involved in many aspects of the Facility Services department, and have contributed to the success of sustainability initiatives and events. This includes Shut the Sash, Chasing the Peak, the Community Garden, Sustainability Day, E-Waste Collection Day, and engaging students through social media.

Facility Services supports the following courses:

- ✓ SEP 747 Energy Efficient Buildings
- ✓ CIV TECH 3UH3 Utilities Management
- ✓ SEP 746 Design of Sustainable Community Infrastructure



Real Time Energy Displays



Objectives

1. Educate people about McMaster's Sustainability efforts.
2. Encourage participation in sustainability projects and initiatives.

Reporting

The initiative was put in place in 2014 and has since expanded over the last year. Two additional screens have been installed in high traffic areas of campus buildings. We have found that this initiative has created an awareness of energy consumption, and has facilitated behavioral change. Moving forward, the Office of Sustainability plans to maintain this project, and possibly expand it by using social media as another avenue to engage members of the McMaster community.

Overview

Another important project that has recently been completed is the display of real time energy data within facilities. The displays provide building occupants information about individual behaviours, weather and how building design affects energy consumption across campus. The goal of the initiative is to engage the community in meeting conservation targets.

Each building has a *Really Simple Syndication*, more commonly known as RSS Feed. The RSS Feeds collect updated building specific information from the campus energy analysis provider. This information is then communicated campus-wide through electronic displays in user-friendly formats.



11-Year Sustainable Trends



Overview

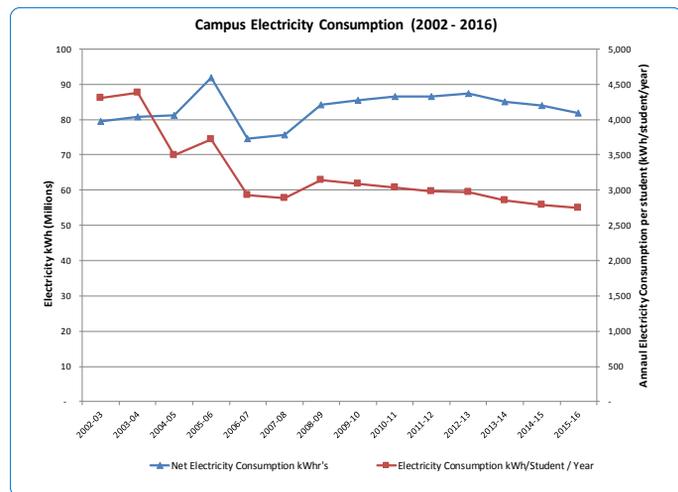
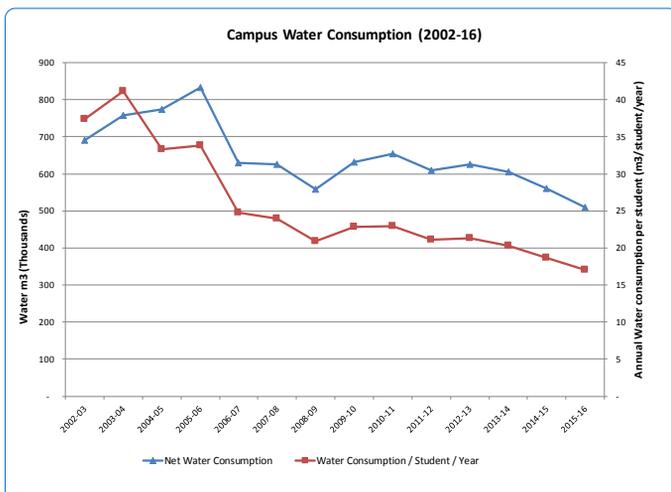
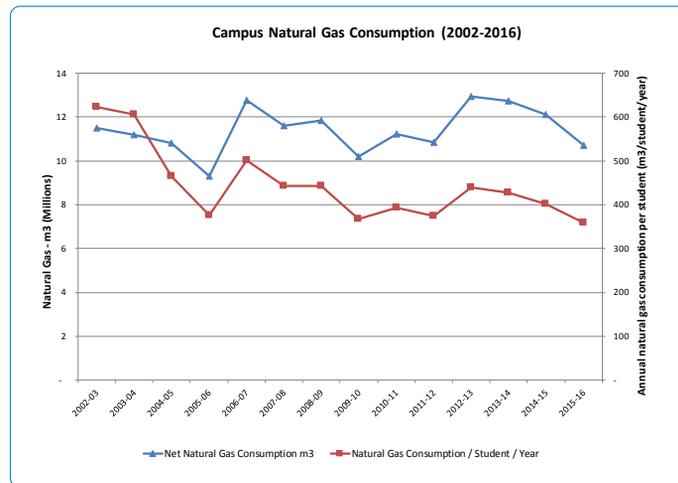
McMaster University's Facility Services has implemented many sustainability initiatives and energy conservation projects which contribute to the progress of campus sustainability. Decreasing water consumption, GHG emissions, and operating costs while improving the carbon footprint and energy management is something that McMaster's Office of Sustainability is committed to.

Objectives

1. Track McMaster's progress in sustainability to measure success.
2. Continue to promote and implement new initiatives to lower McMaster's carbon footprint and improve energy management.

Reporting

Graphs below present the results of energy conservation and sustainability efforts made.





Social Engagement



Overview

McMaster Office of Sustainability has used social media to connect with and inform students. The use of Facebook and Twitter have been a valuable way to reach out to students across campus and involve them in McMaster's Sustainability initiatives

Objectives

1. Reach out to McMaster students in a way that will promote involvement
2. Promote and inform the McMaster community about the department of Sustainability and its initiatives

Reporting

Social media has been a successful way to get in touch with students on campus, and promote involvement in Department of Sustainability initiatives. The McMaster Energy Management and Sustainability Division (EMSD) Facebook has reached out to over 180 students, and the McMaster EMSD Twitter reaches more than 1,000 followers. Through these social media platforms, we are able to inform students and the McMaster community about important information such as recycling tips, events such as e-waste recycling days, and Chasing the Peak days, and important campus initiatives.



Find us on Facebook

McMaster Energy Management and Sustainability Division
<http://Facebook.com/MacEMSD>



Follow us on Twitter

MacEMSD
<http://Twitter.com/MacEMSD>



Academic Sustainability Programs



Overview

The Academic Sustainability programs provide students with unique opportunities in sustainable education.

Objectives

1. Provide students with opportunities to take part in student-led, community-based, and sustainability-focused experiential learning.

To learn more please visit asp.mcmaster.ca or connect with us on social media:

 Facebook: www.facebook.com/MacSustain

 Twitter: twitter.com/MacSustain

 LinkedIn: <https://www.linkedin.com/grp/home?gid=6712552>