

McMASTER UNIVERSITY

Sustainable Development Goals

REPORT | 2022



*Karen Kidd
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**BRIGHTER
WORLD**

ADVANCING HUMAN AND SOCIETAL HEALTH AND WELL-BEING

At McMaster, we are devoted to the cultivation of human potential.

We are committed to taking a collaborative approach to improving people's lives, contributing to global knowledge and finding creative solutions to some of our most complex challenges.

One of the ways we fulfil this commitment is by pioneering groundbreaking research in fields ranging from health care to business, arts and culture to advanced manufacturing. We're empowering the next generation to create a Brighter World.

LAND ACKNOWLEDGMENT

McMaster University recognizes and acknowledges that it is located on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the Dish With One Spoon wampum agreement.

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RESEARCH:



ENGAGEMENT:



TEACHING:



OPERATIONS:





Jennie Vengris, Undergraduate chair, in the School of Social Work, tackles SDG 1 by shedding light on the complex relationship between housing policy and homelessness, and how community-driven responses to poverty-related hunger underscore the need for structural solutions.

End poverty in all its forms everywhere.



Helping those reliant on food banks

Researchers from McMaster University, in collaboration with Hamilton Food Share, conducted a **four-year study** that found approximately one-third of all low-income households in Hamilton, Ontario, use a food bank at least once a year and those households are commonly ones with children. While it may be unsurprising that household income is the key variable associated with food bank use, the analysis found that gross income in households that rely on food banks is 40 to 60 per cent lower than that of an average low-income family. The findings suggest government income supports are not sufficient to provide the basic needs for a household that relies on these programs.



Improved medical access for seniors

Health conditions that come with age coupled with poverty often lead to more trips to the emergency room, and more calls to 911. A team of researchers at McMaster University's Department of Family Medicine developed Community Paramedicine at Clinic — **CP@Clinic** — which sees paramedics hold drop-in sessions in social housing locations where seniors live, assessing risks and providing tailored education. The result? A decrease in 911 calls, strengthened connections with primary health-care providers and improved quality of life for patients. Health Canada has funded a national expansion of the service.



The hidden issue of precarity

Poverty is more than the lack of income and resources to live one day to the next. It means hunger and malnutrition, sub-standard housing, limited access to education and social discrimination. The **Poverty and Employment Precarity in Southern Ontario** research project is a joint university-community initiative led by McMaster University and United Way Toronto & York Region in partnership with more than 30 university, community sector, labour, government and media partners. Its goal has been to gather data on trends in precarious employment and to encourage policy debate and further research. PEPSO has influenced key policy decisions, expanded existing knowledge and served as a foundation for further research.



Collaboration for the goals

McMaster is a partner in the International Association of Universities (IAU) **Cluster on Higher Education and Research for Sustainable Development**, which promotes the role institutions around the world must play in meeting the SDGs and Agenda 2030. The Cluster works on all dimensions of the SDGs, combining economic, social, cultural and environmental sustainability. Led by the University of Ghana, McMaster is focusing on SDG 1 (No Poverty).



A voice at the table

The **McMaster Community Poverty Initiative** brings together faculty, students and staff not just with community groups, but also with people living in poverty. It ensures policy development is fully informed by people with firsthand knowledge about what it means to be poor and to live in Hamilton. As a partner with **Living Wage Hamilton**, MCPI advocates for a minimum wage that allows workers to earn enough to pull themselves and their families out of poverty, which affects health, education levels and the community's economic prosperity.



Tackling food insecurity

No one should have to decide between paying the electricity bill, buying a warm coat and boots for winter, or eating three meals a day. Or two. Or one. The student-run **Food Collective Centre** is dedicated to ensuring that food is always accessible to support food-insecure individuals. Their goals include cultivating stronger food systems on campus and in the surrounding community, and advocating for practices to improve food security.



A symbiotic partnership

Finding affordable housing on a limited income can be an almost insurmountable challenge. The **Symbiosis** initiative through the School of Graduate Studies connects students in need of low-cost or no-cost housing — in exchange for modest help around the house — with seniors who have a spare room and could benefit from extra support and companionship. Both parties are matched, sign agreements and Symbiosis follows up to ensure the cohabitation is harmonious.



A helping hand

When all other avenues have been exhausted, the university provides **emergency financial support** to students in need — including those facing a lack of funds for basic living expenses or required technology for courses, pending eviction and negative circumstances beyond their control.

"I know students who are stressed about the cost of food, and this will make healthy choices free and easily accessible."

Sufal Deb, McMaster science student



End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

2 ZERO HUNGER



Community fridge helps combat campus hunger

McMaster University students in SUSTAIN 3S03: Implementing Sustainable Change worked with the McMaster Student Wellness Centre, MSU Food Collective Centre and others to install the **McMaster Community Fridge**. Stocked by community monetary and in-kind donations, the fridge offers accessible, nutritious and free produce, packaged meals and other food staples. It is open 24/7 for anyone to access. According to a survey by Meal Exchange Canada, two in five Canadian university students experience food insecurity. The study also found that food insecurity negatively impacted the physical and mental health of students, re-emphasizing the importance of initiatives like the community fridge.



A new kind of foodie

The **Student Wellness Centre** has a pantry full of resources to help make healthy, affordable choices, including recipes, tips, food guides and weekly discounts for area grocery stores with a student ID. **Food for Thought**, a working group comprising food enthusiasts from campus and community groups, offers interactive classes for McMaster students with a focus on creating healthy, tasty meals on a budget.



Not-so-secret garden

The community engagement component of the **School of Interdisciplinary Science** brings together students, faculty and community partners. Past projects include the McMaster Teaching & Community Garden, designed to facilitate local food production alongside teaching and learning opportunities; nutrition workshops for Hamilton seniors; creation of a permaculture garden to explore sustainable agriculture; and a partnership with the United Way to create an urban farm for experiential learning.



Empowering the community

Hamilton Community Food Centre (HCFC), a project of the Neighbour to Neighbour Centre (N2N), offers food-based programs that bring people together to grow, cook, share and advocate for good food. **Researcher Tina Moffat** received funding to evaluate the youth food programming at the HCFC, part of a growing movement of food centres across Canada that move beyond charity models of food banks to give food-insecure populations access to nutritious food in a dignified manner.

1,500 pounds

AMOUNT OF SOCIALLY RESPONSIBLE COFFEE PURCHASED BY HOSPITALITY SERVICES



Creating a sustainable food ecosystem

With more than 3.6 million meals served on campus every year, the university has the purchasing power to leverage support for a sustainable food system. McMaster is committed to **buying local**. To that end, 39 per cent of the produce purchased by the university in 2021 was local, a five-per-cent increase over the year before.



Pay it forward

After digging into the data on food insecurity in Hamilton, four undergraduate students came together to create **Loonies for Lunches**, a campaign that offers customers the opportunity to add \$1 to their purchase that would be donated to an initiative that enables students to privately access groceries on an as-needed basis.

3.6m

MEALS SERVED ON CAMPUS

39%

LOCAL PRODUCE PURCHASED BY HOSPITALITY SERVICES



Creating lower price options

Based on student feedback, Hospitality Services offers **Signature Meals**: lower-price meals sold at eateries across campus to increase access for all students who may be experiencing financial limitations. In 2019, approximately 5,200 Signature Meals, which are balanced and include vegetarian options, were purchased at participating **campus locations**.



The reality of climate change

The **McMaster University Centre for Climate Change** studies, among other things, the impact human activities have on the environment. Crop failures and diminishing yields due to weather events can put food security at risk. Water scarcity caused by climate change could lead to wide-scale famine. At the other end of the spectrum, flooding may contaminate food and water sources. Research into the societal impact of climate change provides the necessary information to understand the challenge and develop solutions.



Peer-to-peer support

The student-run **Food Collective Centre**, the university's on-campus food bank, offers a number of supports for students, staff, alumni and Hamilton community partners. The collective advocates for practices to improve food security and is dedicated to ensuring food is always available. It offers programs such as the monthly Good Food Box, filled with affordable, fresh produce, and Lockers of Love, a confidential way to request and receive non-perishable food items and health supplies.



Sheila Singh, director of McMaster's Centre for Discovery in Cancer Research, has discovered how glioblastoma, a lethal brain cancer, can evade treatments.

Ensure healthy lives and promote well-being for all at all ages.

3 GOOD HEALTH AND WELL-BEING



Indigenous health and learning

The **Indigenous Health Learning Lodge** works alongside McMaster University's Faculty of Health Sciences towards creating a learning environment that is culturally safe — to work with humility to enable sustainable systems change and to advance the work around concepts of truth, reconciliation and anti-colonization in all aspects of Indigenous health and well-being. The work of IHLL is based upon six strategic pillars: Indigenous Ways of Knowing; Student Supports and Services; Faculty Leadership and Support; Research; Education and Curriculum, and Administration.

6th IN THE WORLD IN TIMES HIGHER EDUCATION'S IMPACT RANKINGS FOR SDG 3. NUMBER 1 IN CANADA.

25th IN THE WORLD FOR CLINICAL AND HEALTH PROGRAMS (TIMES HIGHER EDUCATION)



Aging reimagined

The **McMaster Institute for Research on Aging** seeks to address the complex issues facing an aging population worldwide, while working to engage older adults, their families, health-care providers and other key stakeholders to optimize the health and longevity of the aging population. These efforts include making the university more accessible to seniors and developing practical solutions to reduce the social isolation experienced by older members of the community. **McMaster Optimal Aging Portal** provides an internationally available information-sharing resource for citizens, clinicians, health-care professionals and policymakers on aging, offering the latest scientific evidence on aging and health-care topics for seniors.



An international perspective

The **Population Health Research Institute**, founded by McMaster and Hamilton Health Sciences, is a global health institute and world leader in large clinical trials and population studies. An international network of almost 400 scientists, investigators and research fellows work together to address global health challenges such as cardiovascular disease, poverty-related infectious disease and under-nutrition, Type-2 diabetes, stroke and cognitive decline. To date, more than 1.5 million people have participated in studies in 102 countries.



Black Health Conference addresses health disparities

Black communities are disproportionately impacted by health disparities, research shows, with higher rates of Alzheimer's disease, cardiovascular disease and, in some instances, cancer. Ingrid Waldron, McMaster's HOPE Chair in Peace and Health, together with her research and community partners, organized the **International Black Health Conference** in October 2022. The first of its kind in Canada, the conference aimed to improve Black health outcomes across the African diaspora. The conference attracted researchers, health policymakers, community organizers, government officials and members of diverse Black communities.



A global network of partners

The UN Sustainable Development Goals are fundamental to the work of McMaster's **Global Health Office**, which connects researchers, educators, students and clinicians with global development organizations and funding agencies. For the last decade, the Global Health Office has formed partnerships with institutions and governments in developing countries — advancing the education of female health professionals in Pakistan, improving the health of vulnerable people in Indonesia, and increasing access to health education in underserved communities in the High North regions of Canada and Norway. Educational partnerships for the Doctoral and Master of Science in Global Health span five continents; examples of research areas include data science, health equity, pandemic planning and infectious disease, and refugee health and humanitarian crises.



Leveraging nuclear innovation

McMaster University and the Nuclear Research and Consultancy Group in the Netherlands are collaborating on research in the field of nuclear medicine. Working together, these two globally renowned research reactors will provide the world with the highest quality radioiodine (I-125) for the treatment of prostate and other types of cancers. Now the largest research reactor at a Canadian university, the McMaster Nuclear Reactor is one of a suite of research facilities at McMaster that generate discoveries in medicine, clean energy, nuclear safety, materials and environmental science. It is one of the world's largest suppliers of the medical radioisotope iodine-125, used in the treatment of prostate cancer.



Improving societal health and well-being

The **McMaster Health Forum** is a leading international collaboration centre that works to ensure health systems around the world are strengthened by evidence-informed policymaking. Active for a decade, the forum recently broadened its focus to include social systems and the Sustainable Development Goals. Its 75-plus partners include the World Health Organization, the PanAmerican Health Organization and departments at all levels of government. Its free, searchable databases — **Health Systems Evidence** and **Social Systems Evidence** — are the most comprehensive access points for policymakers, researchers and stakeholders seeking evidence on a wide range of issues, accessed by 13,500 registered users globally.

Professor Allan Downey has created a groundbreaking course that focuses exclusively on Indigenous historians and their work – the first of its kind in Canada, and possibly North America.



Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

4 QUALITY EDUCATION



Utilizing digital storytelling to improve Black students' experiences

Selina Mudavanhu knows there is power in storytelling. As an assistant professor in the Department of Communication Studies and Media Arts, Mudavanhu is convening **two projects** that focus on participants sharing experiences through digital tools. The African Diaspora Program provides funding to African-born scholars living in North America, allowing them the opportunity to collaborate with African institutions. The other project engages Black senior undergraduate students — recruited via the **Black Student Success Centre** — to reflect on and video record their intersectional experiences of studying at McMaster and of living in Canada in bodies racialized as Black.



From the classroom to the world

The **Academic Sustainability Programs Office** oversees the SUSTAIN courses, a suite of five undergraduate courses open to students in all faculties, and offers an Interdisciplinary Minor in Sustainability, with more than 70 courses to choose from. It also operates the Sustainability Internship Program, which allows students to focus on a real-world sustainability project for a course credit.

2.3 million

LIBRARY PATRONS ANNUALLY

1.9 million

PRINT AND ELECTRONIC BOOKS IN COMBINED COLLECTIONS



Learning never stops

Older adults can take advantage of many **learning opportunities** at McMaster. Those 65 years and older — providing they meet admission and prerequisite requirements — may enrol in tuition-free for-credit courses, only paying an application fee. Enrolling as a listener is an option for those who wish to take a course for the joy of learning, but not for credit. McMaster Learning for 55+ offers an affordable lineup of classes geared to this age group, with topics such as arts and literature, science and technology, health, wellness, and business and innovation. The university is also a member of the **Age Friendly University network**, a global body comprising higher-education institutions committed to becoming universally accessible.



A full head of STEAM

The **McMaster Children & Youth University** delivers free programming for children and youth aged seven to 14 in all areas of science, technology, engineering, arts and math (STEAM). The programs — which include a family lecture series, workshops and online activities — are intended to share McMaster research in a way that is fun and accessible to all children and youth. The goal is to empower and academically prepare young people, especially those at a socioeconomic disadvantage, to aspire to a university education. MCYU also works to deepen the university's relationships with schools and organizations in neighbourhoods where high school completion rates are disproportionately low.



Students for sustainability

MacChangers is a co-curricular experiential learning program at McMaster. Students from all Faculties are given the opportunity to propose innovative solutions to the most pressing problems confronting society as identified in the UN SDGs and the City of Hamilton's **Our Commitment to Our Community** strategic plan. Recent projects include reducing paper receipts in local business, designing a new bike lane in the city's core and an online resource to address housing needs.



Bridging the gap

McMaster enjoys a strong, longstanding partnership with Six Nations Polytechnic, including the **SNP-University Consortium Agreement**. Under the agreement, McMaster and five other universities offer credit courses for the first year of a general BA in the Six Nations community, which are then transferrable to any of the participating universities. The program is intended to improve education completion and employment opportunities, as well as support community control of postsecondary education. Since its inception, more than 250 students in the program have successfully completed their undergraduate degrees. In a further expansion of opportunities, students at a partner college who complete two years of Indigenous-focused courses may **continue their education** at McMaster for two years to earn an Honours BA in Indigenous Studies in addition to their college diploma.

77

CANADA RESEARCH CHAIRS

20

WORLD'S MOST HIGHLY CITED RESEARCHERS (CLARIVATE)



Student success network

The made-at-McMaster **Archway** program partners all first-year students with a coach and mentor to provide proactive guidance based on their goals, interests and needs, providing a supportive virtual community during semesters online. The **Student Success Centre** is the go-to resource for programs, services and events to help all students achieve their academic, personal and professional goals. It's where students connect with support for online learning, writing, tutoring and skills development. As part of its **International Student Services** section, the centre hosts orientation and social events intended to help newcomers adjust to life in Canada.



Beth Murray-Davis, scientific director of the McMaster Midwifery Research Centre, is leading an interdisciplinary team with the goal of developing a statement around gendered language that can be used by educators, health-care providers and researchers to support gender-inclusive and gender-equitable language.



Achieve gender equality and empower all women and girls.

5 GENDER EQUALITY



Levelling the playing field

McMaster's Faculty of Engineering incoming undergraduate fall 2022 class is more competitive and includes more women than ever before. Engineering received more than 16,000 applications for its undergraduate programs, a historic high and a five per cent increase over last year's total. The **2022 incoming class** includes a variety of statistics that support the Faculty's EDI Strategy, notably that 40 per cent of students identify as female. Engineers Canada reports that women make up only 22 per cent of engineering undergraduate students in Canada and an even more lacklustre 13 per cent of licensed engineers. Increasing gender parity at McMaster Engineering doesn't only improve students' educational experience; it also prepares a new generation of women engineers to lead.



Empowering women and girls

At McMaster, admissions are based on academic performance, not gender. In recent years, the number of female undergraduates has outnumbered male undergraduates, according to the **McMaster University Fact Book**. For example, 55 per cent of undergraduate students in 2020-21 identified as female, compared to 45 per cent as male. The university has a number of programs that actively recruit female students, particularly in science, technology, engineering and math (STEM) and areas that have traditionally seen lower female enrolment.



Visible and valid

Through its **Equity and Inclusion Office**, the university seeks to foster an environment of inclusion and collegiality that goes beyond non-discrimination and harassment policies. In partnership with Pride at Work Canada, the university celebrates all employees, regardless of gender expression, gender identity and sexual orientation. McMaster's gender-neutral washrooms are open to all on campus and Rainbow and Transgender Pride crosswalks at the main entrance reinforce the importance of making visible and validating the lives of LGBTQ2SI+ community members.



Helping women succeed

Female students can tap into a variety of financial aid, free programs, **scholarships** and bursaries designed to help women succeed. In the 2017-18 fiscal year, more than 55 per cent of scholarships and grants were given to female students, and more than 52 per cent of the university's bursaries went to female students. Scholarships aid Indigenous women, female-identifying students in engineering and business, and those who show community leadership.



Women in STEM

McMaster hosts many programs, initiatives and activities to encourage young women to consider careers in the STEM fields — Science, Technology, Engineering and Math — such as the Girls in Science Day. The **Faculty of Engineering** offers summer camps, STEM Girls Clubs for elementary students, conferences such as Go ENG Girl and Go CODE Girl for female high school students, and other outreach efforts.

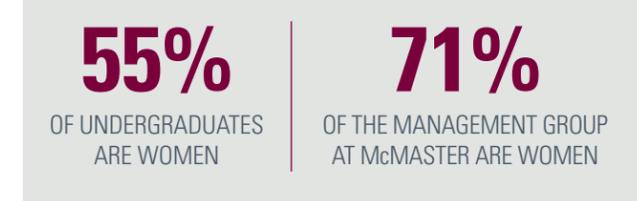


Karen Mossman, Vice-President, Research, was named one of Canada's 100 most powerful women in 2021 by the Women's Executive Network.



Various forms of mentorship

Mentoring and supports bolster the success of women on campus — staff, academics and students at all levels. Some are formalized programs, while others are less structured, as best suits the needs of the individual. These include job shadowing with industry leaders, women in leadership conferences, female-centric associations, and the **McMaster Women in Science and Engineering (WISE) Initiative**.



Burden-free leave

Several made-at-McMaster programs allow faculty to take leave without significant financial or career repercussions, such as the **Life Events Support Program**, which helps mitigate the impact of various leaves (parental, family medical) on research productivity. The university offers numerous child care options: the **Child Care Centre** run by the students' union, open to the young children of undergraduate and graduate students, as well as the community at large; the on-campus **McMaster Children's Centre**; and free child care to participants in the **McMaster Discovery Program**, open to members of the public whose circumstances have not allowed them to benefit from a university education.



Strategic outreach

The DeGroot School of Business' strategic outreach and focus on women has produced an uptick in the number of female students considering business studies and careers. In 2019-20, 60 per cent of the students in the Integrated Business & Humanities program were women; 77 per cent of students in the Master of Finance program were women.

Anthropologist Dawn Martin-Hill leads a globally recognized research project that is helping Indigenous communities gain access to clean, safe water. The secret, she says, is to listen to the true experts — the people in the community.



Ensure availability and sustainable management of water and sanitation for all.

6 CLEAN WATER AND SANITATION



Relationship between place and race for cleaner water

Zahra Tootonsab, who is in her second year of her PhD program in the Faculty of Humanities' **Department of English and Cultural Studies**, is exploring the relationship between place and race, and what it means to live in a healthy environment. Her research focuses on water pollution in Canada and Iran, and how Indigenous knowledges in both places can help inspire environmental activism and promote water security. Tootonsab says she is making difficult connections and having difficult conversations about who we are in Canada and what our relationship is to the land, as well as what Indigenous knowledge can teach us about our relationship with water and the land. In 2022, Tootonsab received a Wilson Leadership Scholar Award.



Clean water for all

Why do almost a billion people go without daily access to safe water? How does climate change affect water-borne illness? And why does half the world's population go without adequate sanitation? The **Water Without Borders** program at McMaster seeks to answer these questions and more.



A silver lining

Rainwater collection systems on campus reduce the university's reliance on municipal water systems, storing the collected water in cisterns. The water is filtered and disinfected for use for both drinking and non-drinking purposes. The **Engineering Technology Building** was designed to reflect the faculty's strategic plan, Engineering a Sustainable Future, and features rainwater harvesting for wastewater flushing and landscape irrigation.



Community-driven solutions

McMaster spreads the word about good water management in a number of ways. McMaster Water Week celebrates water and related research in a community fair atmosphere that hosts area organizations in a variety of fields. **The Rock Garden** in the Royal Botanical Gardens incorporates best practices in sustainable garden design and management, including pollinator-friendly species and drought-tolerant perennials that require less water.



More efficient procedures

According to the **Facility Services Energy Management Plan (2021/22)**, 28 irrigation systems operate on campus based on a schedule — not the most efficient way to operate, if the system waters the grounds while it's raining. A pilot project involving a 10-acre field used an advanced control system that tracks weather data to make adjustments to the schedule as needed. Thus far, the results have been promising.

200+
FREE WATER REFILL STATIONS THROUGHOUT CAMPUS
AT McMASTER UNIVERSITY



High quality H₂O

More than 200 water stations on campus provide free, clean drinking water to students, staff, faculty and visitors. Water bottle refilling stations on campus have eliminated the use of over 20 million water bottles since 2010.



A living lab

The **McMaster University Centre for Climate Change** studies water resources and hydroclimate — vital research, considering the availability of fresh, clean water is expected to decline due to climate change. The **Spencer Creek Watershed** adjacent to campus offers a living laboratory for McMaster researchers to collect data and better understand how land use affects drinking water quality, lake health and biological ecosystems, from the creek to Hamilton Harbour and out into the Great Lakes.



A fundamental human right

Water is necessary to all forms of life, and has been recognized by the United Nations as a fundamental human right that affects everything from physical and mental health to peace and security. As the home of the **United Nations University — Institute for Water, Environment and Health**, McMaster plays a crucial role in resolving water problems and ensuring all have access to this vital resource.



Smart consumption

The university's water consumption has seen a steady decline of more than 61 per cent per student per year from 2002 to 2018. We are committed to reducing our water consumption by five per cent each year, as outlined in **McMaster's 2021/22 Energy Management Plan**. Part of the plan includes employing a rigorous monitoring and metering program and reducing potable water consumption in McMaster's fish research labs by 80 to 95 per cent, saving the equivalent of 16 Olympic sized swimming pools of potable water a year.



“To solve the development goals, we need to act fast, be holistic in our approach, and communicate well.”

*Jim Cotton, Professor,
Mechanical Engineering*



Ensure access to affordable, reliable, sustainable and modern energy.

7 AFFORDABLE AND CLEAN ENERGY



Tackling the energy storage bottleneck

When **Keena Trowell**, assistant professor of mechanical engineering, thinks about the conversation on climate change, she sees a crucial gap. Trowell’s research explores a full transition away from a heavy reliance on hydrocarbon fuels, while taking on a “bottleneck” that she believes evades people’s attention: the storage challenge. While batteries may be one of the first solutions to energy storage that come to mind, battery storage is a relatively expensive way to store energy and there isn’t enough lithium to store energy on the scale needed to fully transition away from fossil fuels. She’s researching a closed loop process of using metals as the energy storage vector.



Teamwork makes the dream work

The mission of the **McMaster Institute for Energy Studies** emphasizes the economic and environmental impacts of all stages in the energy process. MIES researchers come from the sciences, engineering, social sciences and business administration. Its areas of study include the development of semiconductor nanowires for solar energy, combining nanotechnology, photonics and energy technology; affordably reducing the noise and vibration performance of vertical axis wind turbines for deployment in urban areas; increasing the power output of nuclear reactors, which will be used for electricity generation in Canada for decades to come; and fuel cells, the bridge to storing all the power produced by the sun and wind.



Maximize the power

Global energy demands are expected to double in the next 20 years, while the world struggles to reduce greenhouse gas emissions. The need to get every joule possible from renewable energy sources is clear. One tool may be advances in **high-power conversion systems**, as researched in the **Department of Electrical & Computer Engineering**. Even small improvements in efficiency can reap significant rewards when dealing with large-scale wind or solar farms — and potentially lower costs.



Examining our carbon footprint

As part of McMaster’s commitment to a safe and sustainable campus, the university performed a study in 2020 to provide an analysis of the main campus carbon emissions and develop a plan for reaching the goal of net zero carbon emissions. **The Net Zero Carbon Roadmap** explores reducing greenhouse gas emissions and proposes altering methods of power generation, energy conservation measures for our buildings, electrification and heat recovery projects, and fleet transition to electric vehicles. Design element strategies for new construction projects include high performance building envelopes, efficient ventilation, and LED lighting with occupancy sensors. Renewable energy production using photovoltaic installations and carbon capture strategies are also potential future elements of the plan.



Does anyone have a charger?

The university has a **fleet** of 13 electric vehicles as well as free charging stations, but those may need to change, if research in the **Department of Electrical & Computer Engineering** eliminates some of the challenges related to recharging batteries in electric and autonomous vehicles. How about high-power wireless and ultrafast chargers in a **drive-thru charging station**? First a prototype, then some industrial partners. Then, who knows?



Staying on the grid

Producing sustainable, clean energy from solar panels and wind turbines is part of the solution. The **Smart Grid Engineering Lab** lets future engineers study how that energy — often produced at different ranges than current methods — can be fed into existing power grids safely and efficiently without overwhelming the system. At the other end of the grid, the state-of-the-art facility can help determine how to best address the energy demands of electric cars and other emerging technology.



Building sustainable energy systems

We lose as much as 70 per cent of the energy we produce in energy transmission through the electricity, natural gas and pipe oil pathways that supply our communities. **Research by Jim Cotton** in the **Department of Mechanical Engineering** is finding ways to take back that energy through harvesting heat, with sides of improved energy efficiency and reducing greenhouse gas emissions. Initiatives in integrated energy systems research include experimental and computational investigations of heat transfer, thermodynamics and fluid dynamics.



Sustainable alternatives

Diesel doesn’t just keep the wheels turning on transport trucks: it’s used to power a generator for electrical components such as a truck’s lift gate and refrigeration unit — and powering one refrigeration unit with diesel produces as much carbon dioxide as seven passenger cars. A team of Master’s students from the **W. Booth School of Engineering Practice and Technology** worked with **Westhill Innovation** to design a light, modular, **easy-to-install system of solar panels** to take advantage of the 440 square feet of unused space on one trailer and use that energy to power the components. As transport trucks turn from diesel to electric power, it’s hoped the solar trailer technology can also extend the range of the vehicles.



Training the next generation

The undergraduate **Power and Energy Engineering Technology** program is all about power — power quality, protection and control; energy management; and renewable energy technologies such as biomass, fuel cells, geothermal, solar and wind. This unique diploma-to-degree program is made for college graduates who wish to power up their education to the next level, as all qualified applicants receive two years’ worth of advanced credit from their previously completed college diploma or university degree.

“Our work involves supporting Canadian newcomers’ employability and helping employers remove barriers in order to create a diverse workforce.”

Andrea Baumann, Associate Vice-President of Global Health



Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.

8 DECENT WORK AND ECONOMIC GROWTH



Filling the gap for skilled trades jobs

Canadians may have noticed that during the pandemic it has been especially difficult to find a technician to look at their furnace or schedule an appointment to have their car repaired in a timely manner. McMaster University’s Mojan Naisani Samani, a PhD candidate with the DeGroote School of Business, and Rick Hackett, Canada Research Chair in Organizational Behaviour & Human Performance, **propose a number of recommendations** to address the current shortage of tradespeople, such as removing obstacles to women and minorities entering the trades; providing more hands-on learning earlier in life to foster interest in the trades, and highlighting role models to show how rewarding a career in the trades can be.



A resumé builder

The Engineering Co-op Program provides undergraduate and graduate students with opportunities to gain valuable work experiences around the globe before they graduate. In 2020-2021, 1,773 undergraduate and 70 graduate students participated in a co-op experience, earning total wages of \$25,536,453 (average of \$50,000/annually).

22nd

IN THE WORLD IN TIMES HIGHER EDUCATION’S IMPACT RANKINGS FOR SDG 8. **2ND** IN CANADA.



Dismantling barriers

McMaster has been consistently recognized as one of Canada’s Best Diversity Employers. The national list focuses on five employee groups: women; visible minorities; persons with disabilities; aboriginal peoples; and lesbian, gay, bisexual and transgender/transsexual peoples. The publication cited the university’s efforts to help employees manage their work-life balance through flexible work options, ongoing employee development opportunities and subsidized memberships for the on-campus health club.



Understanding our labour

The School of Labour Studies offers certificates, undergraduate and graduate programs for students seeking careers in law, community development, policy analysis, teaching, research and more. Members of the **faculty** seek answers to such questions as: How do national dreams propel migrant workers into global circuits of labour? What are the causes and ramifications of work injuries and illnesses among racialized precarious workers? And how do gender identity and sexual orientation affect worker experiences in non-metropolitan cities?



A global perspective

How is the world of work changing in a globalized world? What counts as work and who is a worker? What impact does extreme employment precarity have on the health and well-being of workers? Affiliated with the university’s School of Labour Studies, the **Institute for Work in a Global Society** (WIGS) research group brings a social science perspective to issues of concern to paid and unpaid workers.



An open door policy

McMaster employees are actively encouraged to raise concerns about their working environment, both formally and informally, though the university works with employee groups to identify and resolve issues before they become a problem. Employees may turn to the **Ombuds Office** for confidential help. The **Equity and Inclusion Office** has a broad mandate, but in more narrow terms, it’s there to find and address inequity and exclusion.



Committed to fairness

McMaster is committed to the **International Labour Organization** (ILO), which promotes an end to oppression, exploitation and abuse of workers worldwide. Suppliers, subcontractors and licensees of the university are expected to comply with these standards, including an obligation to respect, promote and realize the principles of fundamental labour rights, freedom of association and the right to collective bargaining, the elimination of all forms of forced or compulsory labour, the effective abolition of child labour, and the elimination of discrimination against women.



Equal pay for equal work

Pay equity and the concept of equal pay for equal work matter to McMaster. Collective bargaining ensures frequent pay equity checks for unionized staff, while faculty pay is analyzed annually to pinpoint — and eliminate — any systemic gender imbalance. For example, in 2015, female faculty across the board were given a **\$3,515 raise** to match their salaries with those of their male colleagues.

McMaster introduced a smudging protocol in 2018, affirming the right of Indigenous faculty, staff and students on campus to engage in smudging, a practice to purify a space and/or to release negative thoughts, emotions and energy.



The McMaster Nuclear Reactor is a world leader in the production of medical isotopes and remains Canada's only major source of neutrons, used for nuclear dating and quality assurance testing of aircraft components, among other applications.

Build resilient infrastructure, promote sustainable industrialisation and foster innovation.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



Sharing nuclear energy innovations with government

In summer 2022, two of McMaster University's nuclear experts were invited to the House of Commons Standing Committee on Science and Research to discuss small modular reactor (SMR) research and development in Canada. Dave Tucker, McMaster's assistant vice-president Research, Nuclear, and McMaster engineering physics professor Dave Novog spoke about the University's leadership in nuclear research and education. The meeting proved an opportunity to highlight McMaster's strengths in nuclear and speak with government leaders about our role in SMR research, training, and development. As Canada's nuclear university, McMaster is looking forward to working with government to advance nuclear energy solutions that can help Canada achieve Net Zero.

IN JUNE 2019, McMASTER BECAME THE FIRST CANADIAN UNIVERSITY TO OFFER DIGITAL DEGREES, ANCHORED BY BITCOIN BLOCKCHAIN TECHNOLOGY. THESE PORTABLE, SECURE TRANSACTIONS ALLOW EMPLOYERS ANYWHERE TO VERIFY ACADEMIC CREDENTIALS.



New solutions

Global disasters have demonstrated the need to create innovative, holistic and interdisciplinary solutions to mitigate seismic risk to the global nuclear infrastructure so many countries depend on. Enter the Natural Sciences and Engineering Research Council CaNRisk Collaborative Research and Training Experience program, or **CaNRisk-CREATE**. The team's mission is to train the next generation of experts to ensure nuclear infrastructure systems are resilient under cascading hazards.



Take the heat

The ICE-Harvest project — Integrated Community Energy and Harvesting Systems — pulls excess heat created by electricity generation and heat production at the community level, then redistributes it where and when it's needed through a combination of heat pumps and absorption chillers. The research born of the project installed at the **Gerald Hatch Centre** will help communities to site, design, optimize and control ICE-Harvest systems to economically achieve greenhouse gas reduction targets and better manage the energy grid.



Sustainable facilities

The **Gerald Hatch Centre** — a living laboratory for researching and applying sustainable building technologies as well as being a student centre for experiential learning — was built to meet a zero-net energy threshold and demonstrate its potential as a **standalone resilient facility**. The **Ron Joyce Centre**, the Burlington site of the DeGroot School of Business, is a LEED Gold certified building, demonstrating sustainable site development, water efficiency, energy efficiency, materials selection and indoor environmental air quality.



From lab to industry

Located just east of the main campus, the **McMaster Innovation Park** supports startups and scale-ups with a focus on life sciences and biotechnology; engineering and advanced manufacturing; and information and communication technology. A bridge between academia and industry, MIP is home to 70 companies, with more than 800 people working on-site. MIP helps students and industry transform ideas from vision to commercial reality, bolstered by the technical prowess of McMaster and other academic institutions.



Canada's research reactor

The **McMaster Nuclear Reactor** is the world's only self-funded research reactor, providing neutrons for research and producing vital medical isotopes. Access to neutrons is essential to support Canadian innovation in medicine, environmental and agricultural science, advanced materials and clean energy technology. The university has **teamed up with Bruce Power**, the world's largest operational nuclear facility — which provides electricity to Ontarians and medical isotopes globally — to develop and promote nuclear technologies in the province.



Sustainable alternatives

The **McMaster Advanced Control Consortium** brings together academics and industry to develop chemical processes that are environmentally friendly, socially acceptable and economical. Under the theme of Sustainable Design, **MACC researchers** are developing more sustainable processes to convert biomass, coal, natural gas, shale oil and nuclear energy into electricity, gasoline, diesel, methanol, dimethyl ether and hydrogen. While not yet in a position to satisfy power demands on a municipal scale, process innovations can reduce carbon dioxide emissions, improve thermal and carbon efficiencies, reduce fossil fuel consumption and increase profitability.



(Emissions) free shipping

The free shipping offered by many online retailers comes with a hidden price few shoppers are aware of when they click the Buy Now button — emissions from more delivery trucks, wear-and-tear on roads, traffic congestion and heavy vehicles through residential areas. **Elkafi Hassini**, a supply chain management expert with the DeGroot School of Business and head of the Smart Freight Centre at McMaster, is working to find ways to make ecommerce more efficient while taking less of a toll on communities. The Smart Freight Centre's \$11-million, four-year initiative **CLUE: City Logistics for the Urban Economy** will see researchers at McMaster and its partners execute 24 projects to bridge the knowledge gaps in Canada's urban freight system.

70,000
NUMBER OF CANCER PATIENTS TREATED WORLDWIDE EACH YEAR BY MEDICAL ISOTOPES IODINE-125 AND HOLMIUM-166 PRODUCED BY THE McMASTER NUCLEAR REACTOR.

Bonny Ibhawoh, Vice-Provost (International Affairs) and Founding Director of the Centre for Human Rights and Restorative Justice, has been appointed by the United Nations to monitor and shape a response to inequalities and human rights violations.



Reduce inequality within and among countries.

10 REDUCED INEQUALITIES



Supporting voting accessibility for Indigenous communities

What impact could online voting have in Indigenous communities? This is a question that **Chelsea Gabel**, McMaster University associate professor and Canada Research Chair in Indigenous Well-Being, Community Engagement, and Innovation, and **Nicole Goodman**, associate professor of political science at Brock University, have sought to answer with their research. This involves working with Indigenous communities, incorporating guidance for research design, questions and project outcomes. Using this community-engaged research approach, Gabel and Goodman have found that online voting is appealing to Indigenous communities as a way of enhancing participation, self-determination and governance.



An intersectional approach

The **McMaster Institute for Health Equity** promotes healthier, fairer lives for all by understanding and highlighting the underlying causes of inequity. At the global level, stark inequities are found in health outcomes between countries, but dramatic differences in health status and outcomes are also found within nations – even affluent countries like Canada. The institute draws on McMaster's strengths in interdisciplinary research, knowledge mobilization and community engagement and as one of the top universities in the world for health and medicine.

6,820

FULL-TIME FIRST-GENERATION STUDENTS (ABOUT 21 PER CENT OF McMASTER STUDENTS), MORE THAN 500 INDIGENOUS STUDENTS (1.7 PER CENT), AND 2,465 STUDENTS (7.6 PER CENT) WITH DISABILITIES.



Equity in teaching and practice

The **Michael G. DeGroot School of Medicine** has enhanced the equity streams for its admissions process to include applicants from socio-economically vulnerable backgrounds, Black applicants and Hispanic/Latino applicants, in addition to the equity stream for Indigenous applicants, and is developing and expanding mentorship opportunities. Four minors in the **Faculty of Social Sciences** target areas of potential inequality: Diversity and Equity; Gender, Sexualities and Families; Immigration, Race Relations and Indigenous-Settler Relations; and Asian Studies. As well, the **Faculty of Humanities** offers an interdisciplinary minor in African and African Diaspora Studies.



A deeper understanding

The School of Nursing has created an Equity Community of Practice to build a community of staff and faculty at the School of Nursing dedicated to deepening and affirming their understanding of equity, the recognition of systemic social inequalities that create unfair structural barriers to equal opportunity and meaningful engagement.

2,452

CREDIT TRANSFER STUDENTS (AN INCREASE OF 7.8 PER CENT COMPARED TO 2019-20) FROM 20 ONTARIO UNIVERSITIES AND 20 ONTARIO COLLEGES OF APPLIED ARTS AND TECHNOLOGY.



An international network

McMaster is the host institution for **Academics without Borders** (AWB), a virtual, volunteer-driven NGO that connects academics in the developed world with colleagues and universities in developing countries. With the ongoing engagement of its faculty and staff with AWB, McMaster seeks to support higher education to foster greater prosperity, equity and well-being for all. Recent projects include bolstering rural medicine in Nepal and developing a centre that assists students with disabilities at the State Islamic University in Yogyakarta, Indonesia.



More than just a policy

McMaster's Access Strategy helps undergraduate students from underrepresented groups succeed, from the application process through to graduation. Those groups range from first-generation university students and older learners to racialized minorities or those from low-income families and neighbourhoods. The university's **Equity, Diversity and Inclusion Strategy** sets a course to champion the benefits of diversity and address persistent biases and inequities; and identify and implement best practices to achieve EDI goals by driving cultural, systemic and personal change. The confidential **Employment Equity Census Report**, which invites staff to help the university collect information to assist in decision-making, is in line with this strategy.

12

A COHORT HIRING INITIATIVE OF BLACK ACADEMICS AND SCHOLARS ANNOUNCED NOVEMBER 2020, A STRATEGIC INITIATIVE TO ACCELERATE McMASTER'S EFFORTS TO RECRUIT AND RETAIN A DIVERSE GROUP OF EXCELLENT TEACHERS AND SCHOLARS.



Different ways of learning

The **Indigenous Health Initiative** of the Faculty of Health Sciences collaborates with partners on and off campus to better integrate Indigenous cultural knowledge into educational and research programs within the faculty, while prioritizing the recruitment of Indigenous faculty members and development of a robust cross-faculty Indigenous health curriculum. A number of its members helped form an Indigenous Health Practitioners task force in the fall of 2020, mobilizing to address inequities in care for Indigenous people.



“A truly sustainable community is one that looks after its most vulnerable people and ensures that those with the greatest need have the resources and support to live a whole and healthy and productive life.”

*Professor Jim Dunn,
Director, Canadian Housing
Evidence Collaborative*



Make cities inclusive, safe, resilient and sustainable.

11 SUSTAINABLE CITIES AND COMMUNITIES



Award-winning zero-emission transit project

Riding the bus is great. Riding an electric bus is even greater. A project led by **Moataz Mohamed**, assistant professor of civil engineering at McMaster University, was awarded federal funding in 2022 to develop educational tools and promote best practices to support **zero-emission vehicle (ZEV) fleet adoption awareness in transit**. Natural Resources Canada announced the \$101,775 investment among several projects to reduce pollution from the transportation sector. The McMaster University project will result in the first Canadian interactive information portal for ZEV adoption in transit. The investment, Mohamed said, will help move more than 22 million Canadians in a greener way across hundreds of thousands of kilometres a day.



A healthy day in the neighbourhood

Jim Dunn spent more than a decade studying Regent Park, the largest urban redevelopment project in Canadian history. He found clear evidence that people who are more satisfied with their housing and neighbourhood, and who feel safer and more secure, also enjoy improvements to their overall health. Dunn is the Director of the McMaster Institute for Health Equity, and the Senator William McMaster Chair of Urban Health Equity. His latest work is as the director of the **Canadian Housing Evidence Collaborative**, an ambitious new pan-Canadian research network that brings together researchers, policymakers and individuals with lived experience from across Canada to tackle the complex issues involved in making safe, healthy housing affordable for all Canadians. The network was created to support the National Housing Strategy, a 10-year federal initiative that aims to cut homelessness in half and create housing for those with the greatest need — women and children fleeing abuse, Indigenous youth, people working through mental health conditions or addictions, and others who are marginalized or vulnerable.



Escape to nature

McMaster University is woven deeply into the fabric of the community. The campus sits on 350 acres in Hamilton, Ont. — the City of Waterfalls — in a **nature-rich setting** of waterfalls, valleys, meadows, wetlands and forests. The 30-acre central core of campus is largely reserved for pedestrians and cyclists. The campus is part of a natural trail system managed by the Royal Botanical Gardens and the Conservation Authority. Public art, performances and cultural events are available to the public throughout the year, along with free access to historic buildings, archives, botanical and scientific collections.



Sustainable commuting

With a campus that places a priority on pedestrians, it's only natural that McMaster should encourage sustainable commuting for the entire campus community. Students receive free bus passes for the school year, and transit links on campus connect McMaster to Hamilton, Toronto, Niagara and points beyond. The campus serves as a hub for a city-wide bike share program, which offers students a discounted membership. To reduce the number of cars coming to campus, the university has a carpool program that provides designated parking spots, as well as the opportunity to split the cost of a parking permit between multiple users.



More than a museum

Coins, antiquities, paintings, sculpture, maps — the **McMaster Museum of Art** houses more than 6,000 objects that illustrate the history of art from the late 15th Century to the 21st Century, including a carefully curated collection of Canadian art. The museum is a partner with the Department of Family Medicine in **The Art of Seeing** visual literacy program and offers free lectures, workshops and guided tours for the public for all ages. McMaster's four on-campus **libraries** — Mills Library, Innis Library, H.G. Thode Library and the Health Sciences Library — and their study zones and learning spaces, physical and **digital**, are also fully open to the public without charge. Aside from traditional services, historical archives from cultural figures and collections of rare books, the libraries offer space for podcasting, digital production and a makerspace with 3D printers, laser cutters and other tools for creating.



Hitchhiker's guide to the galaxy

Graduate students, postdoctoral fellows and faculty from the Department of Physics and Astronomy guide shows at the **W.J. McCallion Planetarium** geared to children, families and all those who love to look up and wonder. The interactive presentations are tailored to the age and nature of the audience, touring the Milky Way, the constellations and interesting objects in and beyond our own galaxy. When possible, the show includes current celestial events in the skies over Hamilton.

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PROJECTS CREATED AT CITYLAB HAMILTON, WHERE McMASTER STUDENTS AND FACULTY WORK WITH THE CITY OF HAMILTON, MOHAWK COLLEGE AND REDEEMER UNIVERSITY TO IDENTIFY AND SOLVE COMPLEX CHALLENGES RELATED TO HEALTHY NEIGHBOURHOODS, CLIMATE CHANGE AND MUNICIPAL EXCELLENCE.



We're all in this together

The Indigenous Circle — Karahakon Kateweienstha (Learning in the Forest) in Mohawk, and Nibwaaajkaawin Teg (Place of Wisdom) in Ojibway — was created under the guidance of McMaster's Indigenous Education Council. Featuring tiered stone around a stage in the form of a medicine wheel, the space represents the interconnectivity of all beings. The area demonstrates the role nature and outdoor spaces play in teaching and learning and signifies the importance of Indigenous knowledge to the growth of the McMaster community. The circle also hosts performances, ceremonies and meetings.

Elkafi Hassini, Associate Dean, Research at the DeGroot School of Business, is working with existing ride share programs to create a system that can fill the gaps and end hunger in Canada.



Ensure sustainable consumption and production patterns.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Reinventing today's materials to build the cars of tomorrow

A collaboration among McMaster researchers, industry partner Nemak and the federal government's CanmetMaterials Technology Laboratory (CMAT) has resulted in the development of a brand-new family of alloys that bonds aluminum with iron to create a high-strength material at least 35 per cent lighter than a traditional aluminum alloy. McMaster's Sumanth Shankar, professor of mechanical engineering, and Xiaochun Zeng, research scientist, share credit for the invention of the material. The **new die casting alloy** is anticipated to bring value to the automotive industry as it searches for novel and cost-effective ways to reduce vehicle mass and move the industry toward greater sustainability.



Ethically sourced materials

McMaster was an early adopter of a policy to ensure that suppliers of goods to the university conduct their businesses ethically. The **Code of Labour Practices** demands they pay dignified living wages, treat women equally, and safeguard health and safety. As well, as one of the first Canadian universities to be a signatory to **The Okanagan Charter**, McMaster has used this collective, international benchmark to promote the health of people, places and our planet.



Building a sustainable future

Sustainability efforts on campus are bolstered by the growing number of students enrolled in some of the innovative academic sustainability programs offered at the undergraduate and graduate level. McMaster's Interdisciplinary Minor in Sustainability offers more than 70 courses from faculties across campus. The Sustainable Future Program provides students with opportunities for interdisciplinary, student-led, community-based and experiential education focused on sustainability. The student-led projects — which tackle everything from waste management practices to promoting a bike buddy program — are tagged in the program's **annual report** with the SDGs they connect with the most.

25%

OF MATERIALS ON CAMPUS RECYCLED/REUSED

26.9%

OF MATERIALS ON CAMPUS COMPOSTED



No more wasted energy

Jim Cotton is a mechanical engineer who's using his research to develop thermal and electrical systems that allow harvesting and sharing of energy that would otherwise be wasted. Cotton's Integrated Community Energy and Harvesting (**ICE-Harvest**) systems embed integrated thermal and electrical generation, as well as storage, within communities, so they can be powered, heated and cooled in a way that's cost-effective and carbon-reduced. ICE-Harvest captures waste heat from various parts of the community, like sports arenas, grocery stores, and big box centres, and transfers this energy to other buildings.

McMASTER WAS ONE OF THE FIRST CAMPUSES IN CANADA TO BAN THE WIDESPREAD USE OF PLASTIC BAGS, PHASING OUT THE USE OF NEARLY 150,000 PLASTIC BAGS.



Spreading the tech

McMaster's ACCESS Tech IT Collection, Reuse, and Donation program accepts computers, smartphones, tablets and other technology from staff, faculty members and students. These items, that otherwise would end up in landfill, are wiped and refurbished for donation for those in need in partnership with a local non-profit. For the technology not suitable for donation, McMaster partners with a local business to safely recycle and dispose of the item. The program holds an annual technology collection event and free pick up of technology, organized by program collaborators including Academic Sustainability Program students and McMaster staff in Facility Services and University Technology Services. The university's libraries also offer recycling bins for batteries, electronics and writing tools such as pens and highlighters. In 2018, McMaster diverted more than 8,500 pounds of electronic waste away from landfills through recycling, a three-fold increase year over year.



No more single use

The **Choose To Reuse** program encourages students, faculty and staff to use reusable mugs and green food containers — and get a discount on their beverage and food purchases — while dining on campus. The fee to join the program was \$5, until Hospitality Services pushed to provide campus residents with a free Choose to Reuse membership card, resulting in a 294-per-cent jump in the use of the green eco-containers from 2018 to 2019.



Committed to composting

Dining facilities at the university use compostable cutlery, coffee cups, paper straws and take-out containers. Products are clearly labelled as compostable to encourage users to dispose of them in organic waste bins across campus. In 2019, **Hospitality Services** added 194,000 compostable coffee cups and eliminated 1.3 million pieces of plastic cutlery. Also, disposable napkins used at campus facilities are made from 100-per-cent post-consumer recycled paper and are fully compostable.



Disposing of used masks

McMaster University's Mills Memorial Library and H.G. Thode Library of Science and Engineering, along with several other buildings throughout campus, were key sites for a **disposable mask recycling pilot** in 2022 aimed at reducing the number of masks entering the waste system. The pilot was a success, and the boxes continue to be found throughout campus, including at these two popular libraries, adding to a lengthy list of recycling streams at McMaster.



Alemu Gonsamo, assistant professor at McMaster's Remote Sensing Laboratory, has shown for the first time how much carbon is stored in Canada's landscape, and how these carbon-rich areas could have an enormous impact on climate change.



Take urgent action to combat climate change and its impacts.



Connecting the dots between climate change and northern communities

Sean Carey, a professor in the School of Earth, Environment and Society and director of the **McMaster Watershed Hydrology Group**, has spent nearly three decades studying the drastic impact of climate change on water levels, land and communities in the Yukon. Local Indigenous communities have always played a role in his work, Carey says, but over time the relationship has become more closely connected. Not only are they sharing knowledge, but they are also guiding his research. Together, their work is critical to maintain long-term measurements to document and guide climate adaptation strategies to the changes that are occurring in northern Canada.



A precarious situation

Findings from **McMaster's Remote Sensing Laboratory** show 405 billion tonnes of carbon is stored in ecosystems across Canada, according to a study led by World Wildlife Canada (WWF-Canada). And, as global temperatures rise and that land decomposes, or is disturbed by human intervention, that carbon could then be released into the atmosphere, accelerating climate change.



Informing public opinion

The **McMaster University Centre for Climate Change** connects science, technology and policy to deliver a broad range of local and global climate change solutions. Aside from understanding the impact of climate change, the centre's goals include exploring perceptions of and responses to climate change, encouraging the application of science in meeting it head-on and developing public policies to meet societal challenges caused by future climate change.



The intersection of community and climate

In Canada's arctic, the safety of Inuit and northerners depends on sea ice, and the movements of fish and caribou are part of daily life. In this environment, the effects of climate change are glaringly evident. But policymakers don't always have the information, the resources or the will to consider the community's experiences of climate change. Geographer Gita Ljubicic and her cross-disciplinary team at StraightUpNorth are closely involved with local communities, co-creating solutions that pair social and environmental research, and Inuit and scientific knowledge in decision making.



A new kind of treetop trek

The forests in eastern North America and around the Great Lakes form a natural carbon sink, meaning they absorb more carbon dioxide from the atmosphere than it releases. Geographer Altaf Arain uses advanced sensors to monitor the energy, carbon dioxide and water fluxes, temperature, soil moisture, tree height and diameter of trees at Turkey Point Observatory to determine which trees and forests are the most resilient in changing environmental conditions. His work here is part of a number of national and international networks that monitor crucial ecosystems, such as North American Carbon Program, Global Fluxnet and Global Water Futures. The data also informs Arain's climate and hydrologic modelling research, which uses advanced technology to discern patterns that help predict climate change.



A university-wide practice

Transforming McMaster's campus into a living laboratory for sustainability is a university priority. Our focus on environmental sustainability runs through every part of the university, from innovative teaching and research to the campus environment and operations. Each year, we publish a **snapshot** of these collective measures to advance environmental sustainability within our institution, the communities that surround us and around the world. **McMaster's Sustainability Strategy** was developed through an engagement process with input provided by students, faculty and staff.



Hitting the road

Climate change and environmental emissions are intertwined with economic prosperity and must be considered for the sustainability of the transportation industry and the planet. The **McMaster Institute for Transportation and Logistics** is a non-profit organization of private and public-sector investors that works with business and government partners to address challenges and brings together the resources, expertise and experience the industry desperately needs. The MITL's key focus areas are research, education and outreach.



A commitment to change

McMaster has pledged with several other leading Canadian universities to work together on climate change initiatives across invested assets, as part of **Investing to Address Climate Change: A Charter for Canadian Universities**. It agrees to incorporate environmental, social and governance factors into investment practices, and to regularly assess the carbon intensity of portfolios and set targets to reduce them. The university has also signed the **United Nations Principles for Responsible Investments**, committing to transparent measurement, carbon-reduction goals and reporting. As part of responsible investing practices, McMaster has pledged a 45-per-cent carbon reduction of the public equities within the investment pool by 2030.



“I dare anyone to go into some of these wetlands in their wildest state and not be completely impressed. It’s actually a sanctuary.”

Pat Chow-Fraser, Professor, Biology



Conserve and sustainably use the oceans, seas and marine resources for sustainable development.



Stopping the harmful effect of sunscreen on ocean life

An international team of scientists that includes Michael Risk, professor emeritus in the **School of Earth, Environment & Society** at McMaster University, has found further evidence that a common UV filter found in some sunscreens is killing coral and other wildlife. The substance in question is a class of compounds known as oxybenzone. Researchers found that in every place there is a bay with corals that humans use, the corals have stopped reproducing — and researchers think it’s the sunscreen. Previous studies have found UV filters like oxybenzone also pose a hazard to marine life. Risk and his colleagues want oxybenzone banned everywhere.



Empowering community voices

McMaster and Ottawa’s Carleton University are home to the **OceanCanada Arctic Ocean Working Group**, which covers Canada, Denmark, Norway, Sweden and the United States. The group’s key goal is the empowerment of community voices in the Arctic region, developing policy-relevant recommendations for protection, conservation and management of coastal and ocean resources. The **United Nations University Institute for Water, Environment and Health** — based out of McMaster — is also a member of OceanCanada.



Thanks for all the fish

In 2019, Hospitality Services decided to no longer support the purchase of fish that was not sustainably sourced. An ordering guide was created for acceptable fish products, which include ASC, MAC and Ocean Wise certified products. According to the **2019 Wellness and Sustainability Overview**, the university purchased 11,000 pieces of sustainably sourced salmon.



A living lab in our backyard

Researchers in the Faculty of Science use the **Cootes Paradise Marsh** — a 1,482-acre marshland at the western edge of Hamilton Harbour — as a living laboratory to explore the impact of effluents and treated wastewater on aquatic life in the marsh. The team hosts information sessions in partnership with the Royal Botanical Gardens to increase public knowledge of water quality and raise awareness of research findings.



The school of fish

The **Aquatic Behavioural Ecology Lab** investigates the evolution of complex breeding systems, social behaviour, reproductive tactics and decision-making in animal societies, primarily using fish as subjects. Like humans, fish are vertebrates, and make good comparative model species to try to uncover the evolution of behaviour. As well, there is a great deal of economic interest in fish as a food resource, as a recreational sport and in the aquarium hobby. ABEL’s three main field locations are Lake Tanganyika — the second deepest lake in the world — in the East African Rift valley; Hamilton Harbour and Lake Ontario; and beaches in the Pacific Northwest.



Looking back to understand the future

The **Fisheries Archaeology Research Centre** investigates long-term trends in fisheries production resulting from environmental change and human exploitation. The work helps address current concerns with global climate and environmental change and the effects of over-fishing in different parts of the world. One major ongoing research program monitors 10,000 years of fish and shellfish use on the coast of British Columbia. A second major area of ongoing research concerns the effect of human colonization in Polynesia on the production and productivity of reef fisheries.



All hands on deck

iWetland, out of the McMaster Ecohydrology Lab, draws information from automated and crowdsourced monitoring stations in the Georgian Bay Biosphere Reserve, the world’s largest freshwater archipelago. Working with provincial parks and First Nations communities, the team hosts events to raise awareness of wetland ecosystems, species at risk and the iWetland citizen science initiative. It also installed a weather station in the Magnetawan First Nation, training MFN staff to operate the equipment.



More than two decades of research

The United Nations University Institute for Water, Environment and Health (UNU-INWEH), hosted at McMaster, is one of 13 UN universities, think tanks aimed at resolving pressing global concerns — in this case, water security. UNU-INWEH, which has been in operation for over 25 years, is helping to bridge the gap between research and policy in the quest to make a difference in the lives of billions. It promises to continue to offer new insights, tools and solutions as the United Nations projects global water demand to increase by more than 50 per cent by 2040.



Micro analysis for macro solutions

A team of researchers in the department of chemical engineering is looking for solutions to large environmental problems using very, very small materials: nanoparticles. One project is a Global Water Futures initiative to resolve the issue of **water quality** on Six Nations of the Grand River. Along with analyzing the contaminants in the water, they’re developing nanocomposite membranes that not only filter water, but also resist getting clogged with biofilms, bacteria and other foulants.



115 acres of land and 950 species are permanently protected through McMaster Forest

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.

15 LIFE ON LAND



Emphasizing ecologically valid data

A team of Canadian researchers, including from McMaster University, studying how boat noise affects ocean toadfish in their near-shore habitats found significant differences between fish behaviour in response to noise in the lab and in the field — differences that might have led strictly lab-based researchers in the wrong direction. As researchers work to understand how humans impact animals and their natural habitats, such as the impact of noise pollution on species, it's critical that the data they use to make these assessments have ecological validity, says **Sigal Balshine**, a professor in the Department of Psychology, Neuroscience and Behaviour at McMaster and a study author.



A picturesque campus

McMaster's historic campus sits on 350 acres in Hamilton and offers **nearby** waterfalls, valleys, meadows, wetlands and forests to explore in Cootes Paradise, McMaster Forest, Webster's Falls and the Niagara Escarpment, a UNESCO biosphere reserve since 1990. **Nature at McMaster** assists with the land management of natural areas related to trails and invasive and native species management on the university's property, runs hiking events, stewardship projects and offers classroom and outdoor learning programming.



Getting back to nature

The McMarsh project was initiated several years ago as a university-wide collaboration aimed at restoring an ecologically sensitive wetland located on Parking Lot M in the west campus. McMarsh is a further expansion of a 30-metre buffer that was established around Parking Lot M in 2017 when 140 native trees and shrubs were planted where paving was removed to reduce the amount of runoff into nearby Coldwater Creek. McMarsh is now part of a larger project which is reimagining a broader portion of the west campus. The Watershed Trust is currently being co-led by the Faculty of Humanities and the Faculty of Science and allows for opportunities for experiential learning and integrated campus community projects in this area of the campus. Plans for McMarsh are currently being reviewed and the Watershed Trust initiative will be explored in more detail through the Campus Master Planning process to begin in the coming year.



Responding to climate change

Geographers at the School of Earth, Environment and Society are investigating how **forest ecosystems** in southeastern Canada function and respond to climate change and extreme weather conditions. Extensive land use changes, agricultural activities and forest harvesting in the Great Lakes region are putting pressure on water resources, as are more frequent extreme weather events and climate change. Funded by a Global Water Futures grant that supports a multidisciplinary team of researchers from multiple universities and other collaborators, the project is intended to help guide municipalities and conservation authorities in developing watershed management strategies to account for shifts in land use and climate change.



5,000 trees and counting

According to the Campus Sustainability Assessment Framework, there are about **5,000 trees** on the main campus, not including the woodland property that surrounds the campus. The university commits to planting new trees every year, often in planting days that bring together community members and students. McMaster typically plants more than 200 trees a year through facilities and student initiatives. All of the **trees** **varietals** on McMaster's campus are mapped using geolocation.



Protecting our buzzy friends

McMaster is proudly home to over 75 solitary bee homes and counting! In 2021, students from a third-year Academic Sustainability Program class project (SUSTAIN 3S03 – Implementing Sustainable Change) successfully supported McMaster's application to become a certified Bee City Campus. McMaster SUSTAIN students and Facility Services are committed to continue protecting pollinators by adding new elements to bee related projects on campus yearly.



Understanding the risks

International research led by **McMaster scientists Mike Waddington and Manuel Helbig** has pinpointed dramatic differences in the ways boreal forests and peatlands regulate water loss. The problem is, most global climate models assume all biome is trees, not the spongy bogs and fens of peatlands, which are prone to drying out as the climate warms. Drier peatlands mean bigger, more intense fires that can release vast amounts of carbon into the atmosphere, accelerating global warming.



A walk through the woods

The 115-acre **McMaster Forest** has been designated by the McMaster Senate and the Board of Governors as environmentally significant natural land to be used for ecologically sensitive teaching, research and recreation purposes. It is an incredibly biodiverse area of mixed forests, old-growth forests, wetlands, meadows, creeks and prairie. Many undergraduate courses use the property, and it's the site of undergraduate and graduate research projects. The public is welcome to visit the forest.

Professor Ingrid Waldron, the HOPE Chair in Peace and Health, studies environmental racism and the physical and mental health impacts of environmental discrimination on Black, Indigenous and immigrant communities.



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



Bringing the voice of the people to the forefront

Master University's Bonny Ibhawoh, the Senator William McMaster Chair in Global Human Rights, along with a team of graduate student research assistants, worked closely with the world's first global citizen assembly to present the **People's Declaration for the Sustainable Future of Planet Earth** at the United Nations Climate Change Conference (COP26) in fall 2021. The team also provided consultation and training to the Global Climate Assembly, which was created by community organizations, scholars, scientists and policy makers from more than 50 countries with the aim of establishing a permanent global citizens' group to address issues including climate change, health and inequality.



A collaborative approach

Olive Wahoush, Associate Professor in the School of Nursing at McMaster University, is co-lead for the Teaching and Learning working group of the **Commonwealth Peace and Reconciliation Network**. The network brings together an interdisciplinary collective of academics, researchers and professional staff from more than 40 universities across the Commonwealth who work in the fields of peace, truth, justice, and reconciliation. Knowledge, capacity and resources can be shared through the network to engage in activities that have a direct impact on university practice and the wider world.



Keeping a watchful eye

In his **role as chair** of the UN Expert Mechanism on the Right to Development, **Bonny Ibhawoh** — who holds the university's Chair in Global Human Rights — works to monitor, evaluate and report on conditions around the world related to the rights of individuals and countries to freely enjoy economic, social, cultural and political progress.



Dedicated to peace

The interdisciplinary **Peace Studies** program is concerned with war and peace, violence and non-violence, conflict and conflict transformation. By focusing attention on problems of conflict, particularly of a violent nature, researchers attempt to improve our methods of analyzing and dealing with these problems. The university also hosts the Hope Chair in Peace and Health. As well as teaching and conducting research, the chair works collaboratively to establish on-campus and community events and programs.



Guiding Canada's response to COVID-19

McMaster researchers are taking leadership roles in Canada's response to the COVID-19 pandemic — from serving on national task forces to conducting research that will influence public policy. Charu Kaushic, professor and scientific director of the Canadian Institutes of Health Research's Institute of Infection and Immunity, is on the national COVID-19 Immunity Task Force, which is charged with establishing priorities and overseeing testing to determine the national spread of the virus. Several researchers also serve on federal panels advising on other elements of the pandemic response.



Knowledge mobilization

Participedia: A Global Partnership to Create and Mobilize Knowledge About Democratic Innovations examines public participation in governance and what forms work best for specific problems and issues, under specific circumstances. The research team, which includes McMaster Chair of Global Human Rights Bonny Ibhawoh as a co-investigator, aims to map this rapidly developing domain of political innovation to create the information base necessary for high-quality research and evidence-based public policy practice.

\$800,000

FUNDING PLEDGED IN 2022 BY McMASTER UNIVERSITY TO SEED TWO NEW FUNDS THAT WILL HELP STUDENTS AND SCHOLARS AT RISK AROUND THE WORLD, INCLUDING IN AFGHANISTAN AND UKRAINE, AMONG OTHER COUNTRIES.



Leaders in training

A new generation of Canadian leaders will be provided with the tools they need to tackle Canada's most complex issues thanks to the ongoing support of former McMaster chancellor L.R. Wilson. The newly founded **Wilson College of Leadership and Civic Engagement** features a unique curriculum nested in the faculties of Humanities and Social Sciences and crossing multiple fields of study. Every student will take part in experiential learning opportunities, including internships and other placements, where they will work with public and private sector leaders.



Being a good neighbour

McMaster University has a main campus in west Hamilton bordered by three residential neighbourhoods and multiple sites in the heart of downtown Hamilton, in Burlington and other communities. Therefore, strong working relationships between McMaster and its surrounding communities are paramount to supporting the vitality and well-being of the university and greater Hamilton area. The President's Advisory Committee on Community Relations provides an open forum for respectful dialogue and ongoing collaboration between the university and our neighbours. As part of the Hamilton Anchor Institution Leadership, McMaster collaborates with the city's other large public- and private-sector members to address Hamilton's complex challenges.



Canada's Global Nexus for Pandemics and Biological Threats builds on McMaster's established position as a world leader in infectious disease research, evidence-based medicine, and advanced manufacturing. Hosted at the university, it is a hub for international networks of experts and partners who can act fast and act together in the face of serious and emerging threats to global well-being.

Strengthen the means of implementation and revitalise the global partnership for sustainable development.



Looking to the past for future best practices

A team of researchers is using modern tech to uncover new insights into settlement patterns, farming and economic practices of ancient Mayan settlements dating back more than 1,000 years. Using high-resolution airborne light detection and ranging technology, researchers analyzed large sites in the Upper Usumacinta River basin of Mexico and Guatemala to uncover ancient dams, irrigation channels and other patterns formed by farmers centuries ago. **Shanti Morell-Hart**, an associate professor of anthropology at McMaster and co-author of the study, said her team will conduct additional excavations in upcoming field seasons to recover botanical residues from ancient artifacts, fields and trash pits. They will collaborate with researchers from other universities who are tracking warfare, water management and the origins of Maya cities.

17 PARTNERSHIPS FOR THE GOALS



Policy in action

Now in its 13th year, the **McMaster Health Forum** is designated as the WHO Collaborating Centre for Evidence-Informed Policy. The Forum's goal is to generate action on the pressing health-system issues of our time. It strengthens health systems — locally, nationally and internationally — and gets the right programs, services and drugs to the people who need them.



Creating a brighter world together

The university has more than 1,900 partnerships with faculty, institutions and communities in 247 countries and regions. The **Global Health Office** works with many of these partners to find new and innovative solutions to critical global health problems. As a result of its efforts, McMaster has advanced the education of female health professionals in Pakistan, improved the health of vulnerable people in Indonesia and, most recently, worked to improve access to higher education in underserved communities in the Far North of Canada and Norway. The university's School of Nursing is designated a **PAHO/WHO Collaborating Centre**, which focuses on global priorities in primary health care.

McMASTER HAS STUDENT EXCHANGE AGREEMENTS WITH MORE THAN 90 POSTSECONDARY INSTITUTIONS WORLDWIDE.



Water world

McMaster is the only university in Canada to serve as host and partner to a United Nations University through the **Institute for Water, Environment and Health** (UNU-INWEH) which acts as the UN think tank on water. Researchers at McMaster play a key role in Global Water Futures, a collaboration driven by four major institutions to transform the way communities, governments and industries in Canada and other cold regions of the world prepare for and manage increasing water-related threats. GWF is the largest university-led freshwater research program ever funded worldwide, in part with a \$77.8-million grant from the Canada First Research Excellence Fund. In 2020, GWF extended funding for two McMaster projects and awarded three new projects funding from a total \$2.4 million. The UNU-INWEH recently received a \$10-million funding extension from the Canadian government.



Embracing change

MacChangers pairs multidisciplinary teams with community members to propose innovative solutions to challenges facing Hamilton, as well as the global community. The non-credit program welcomes students from all faculties to share their expertise and there is no cost to enroll. In alignment with the city's 25-year community vision, past projects include developing a resource hub for housing needs; closing gaps in the cycling path between the university and the downtown core; and reducing exposure to open-air secondhand smoke by promoting a smoke-free section along King William, a popular restaurant row.



Preventing the next pandemic

McMaster launched the **Global Nexus for Pandemics and Biological Threats** to ensure Canada and the world are better able to manage the human and economic devastation of COVID-19 and avert future pandemics. Led by McMaster researchers from many disciplines, the Global Nexus is developing an international network of scientists, clinical health and medical specialists, engineers, social scientists, history and policy researchers, economics and business experts devoted to one goal: preventing future pandemics and mitigating global health threats like antimicrobial resistance. The innovative network has garnered international attention, as well as government and philanthropic support, throughout the pandemic.



Working together

The **McMaster Global annual showcase** turns the spotlight on the university's mission to make global engagement in education and sparking ideas an integral part of its presence in Canada and the world. A host of free activities, lectures and workshops are open to all. McMaster Global is engaged in international partnerships that involve research collaboration, faculty exchanges, student exchanges and mobility agreements and joint supervision of doctoral students.



University Impact Rankings for the SDGs

Established in 2015, the United Nations Sustainable Development Goals set out a vision for countries and institutions worldwide to come together in a concerted effort to end poverty, reduce inequalities, improve health and education, and advance sustainability and economic growth while addressing climate change.

In 2019, Times Higher Education introduced its Impact Rankings, which measure universities' contributions in support of the UN SDGs. In 2022, McMaster University ranked 37th globally out of 1,406 universities from 106 regions across the world, demonstrating McMaster's commitment to advance human and societal well-being locally and globally.

Sustainable Development Goal	Global Ranking	Canada Ranking
Overall Ranking	37	9
SDG 2 – Zero Hunger	56	9
SDG 3 – Good Health and Well-being	6	1
SDG 5 – Gender Equality	105	9
SDG 6 – Clean Water and Sanitation	56	9
SDG 8 – Decent Work and Economic Growth	22	2
SDG 9 – Industry, Innovation and Infrastructure	56	5
SDG 10 – Reduced Inequalities	14	2
SDG 11 – Sustainable Cities and Communities	103	14
SDG 12 – Responsible Consumption and Production	119	13
SDG 16 – Peace, Justice and Strong Institutions	105	12
SDG 17 – Partnerships for the Goals	37	6



McMASTER IS A UNIVERSITY WITH IMPACT

We are **ranked among the top 85 universities globally** and, through our cutting-edge research and world-class teaching and learning, we are focused on advancing human and societal health and well-being – in our community and around the world.

As the pioneers of problem-based learning, we have a rich history of educational innovation. Ranked among **Canada's most research-intensive universities**, we work across disciplines to find creative solutions to complex problems, helping to improve people's lives and build a brighter future for all.

• • •



**BRIGHTER
WORLD**



Communications, Marketing and Public Affairs

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