

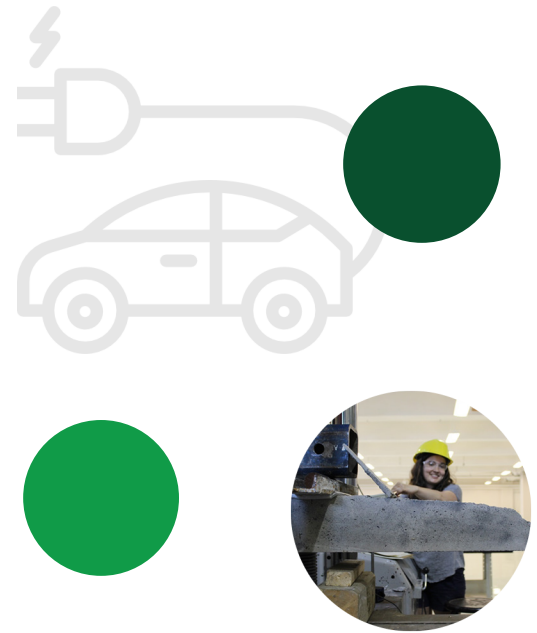
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Introduction

Ontario's regions and municipalities are often at the forefront of climate resilience and adaptation, working locally to help protect their communities.

As municipalities continue to act on climate change and prepare for future impacts, Ontario's universities are forging strong, solutions-driven partnerships within these communities. These critical partnerships enable regions across the province to lead innovation when it comes to combatting climate change.

Whether it is by making infrastructure more resilient, reducing landfill waste, protecting drinking water or effective mitigation and adaption strategies – addressing these challenges will be critical to ensuring Ontarians can continue to live, work and play in the cities and towns they call home.

Ontario's universities will continue to work with local municipalities and industry to implement sustainable, long-term climate change solutions and ensure a better future for our communities and province.

This booklet features some of the many examples of research, innovative programs and work underway at our universities on how towns and cities can adapt and manage the social, economic and infrastructure challenges brought on by climate change.

Also included is the contact information for the university research and program leads, so you can access resources to help address the unique challenges your community is facing.



Mitigating local impacts of climate change through community-based research

Extreme heat management, flood mitigation and shoreline damage are among some of the many ways Ontario's universities are partnering with municipalities to address local impacts of climate change through university research. These solutions are helping ensure municipalities across the province can both mitigate and adapt to unexpected climate events, while ensuring the health and safety of residents and the best outcomes for the environment.



Helping municipalities mitigate shoreline damage

By mitigating damage to shorelines, municipalities can help ensure they continue to be habitable for residents and that ecosystems can adapt to new environmental pressures. Professor Liette Vasseur at Brock University is working together with municipalities to mitigate shoreline damage by helping them plan for a more sustainable future. Currently, Vasseur is collaborating with mayors of municipalities on the Great Lakes and St. Lawrence River to recommend sustainable policies and nature-based strategies that best protect shorelines, such as tree planting, routing drainage water and installations and blockades to protect against waves and ice.

For more information, contact the Department of Biological Sciences, Brock University at 905-688-5550.

Brock University – Brock professor helps municipalities mitigate damage to shorelines and plan for a more sustainable future

Addressing climate change through a holistic approach to health

Tackling today's biggest climate change challenges, such as emerging infectious diseases and food security, requires an interdisciplinary approach – one that considers the interconnectedness of human, plant, animal and environmental health. Researchers at the University of Guelph's One Health Research Institute are leveraging the One Health research approach to work across disciplines and address the most complex animal, human and environmental health problems, such as fighting superbugs, reducing food contaminants, sanitizing waste water and predicting influenza outbreaks.

For more information, contact the University of Guelph at 519-824-4120.

University of Guelph – One planet, One health





Managing critical water resources through watershed research

Studying bodies of water can provide critical insights into climate change. Professor April James and her team at Nipissing University are bringing this research to a local level to help shed light on the relationship between water quality and human impact on the environment in northern Ontario communities. By leveraging computer modelling, field study and lab analysis to study the movement of water, James' research is helping provide a better understanding of local watersheds and how they process water, which will help in planning, conserving and managing the long-term sustainability of fresh water resources.

For more information, contact Nipissing University at 705-474-3450.

Nipissing University – Dr. James reflects on a decade as Canada Research Chair

Partnering to ensure safe municipal drinking water

Rising temperatures can potentially cause the growth of harmful algae, which could compromise drinking water quality. The Drinking Water Research Group (DWRG) at the University of Toronto is studying how to keep municipal drinking water safe. Led by professors Robert Andrews, Ron Hofmann and Susan Andrews, DWRG works across government and industry to research and address critical drinking water challenges. Some of these projects include, microplastics in drinking water, filtration, emerging pathogens, disinfection of reuse waters, as well as the impact of harmful algae blooms on water quality.

For more information, contact the Department of Civil and Mineral Engineering, University of Toronto at info.civmin@utoronto.ca or 416-978-3099.



University of Toronto – Drinking Water Research Group

Protecting Ontarians from extreme heat

With temperatures rising across the province, extreme heat is set to increase the burden on the health-care system and cost home and business owners more money. New guidance to address irreversible extreme heat developed by the University of Waterloo's Intact Centre on Climate Adaptation (Intact Centre) profiles steps to protect Ontarians who may be most vulnerable to extreme heat. The Intact Centre works with homeowners, communities, governments and businesses to identify and reduce the impacts of extreme weather and climate change through cost-effective practices that will protect residents.

For more information, contact the Intact Centre on Climate Adaptation, University of Waterloo at intact.centre@waterloo.ca or 266-338-9164.

University of Waterloo – The ultimate code red: Preparing Canada for extreme heat



Transforming and commercializing waste to reduce environmental impact

Curbing the rise of greenhouse gases will be critical to reducing the impacts of climate change across the province. The Institute for Chemicals and Fuels from Alternative Resources (ICFAR) at Western University is leading research that could transform waste and by-products, such as biomass residues from agriculture and forestry, organic municipal wastes, plastics and heavy oils, into value-added products with the lowest possible environmental impact and carbon footprint. Some examples of innovative work being conducted at ICFAR include transforming waste into carbonized materials that can be used as soil amendments and fertilizers, as well as an efficient and cost-effective carbon capturing solution.

For more information, contact the Faculty of Science, Western University at science@uwo.ca or 519-661-2111 ext. 89192.

Western University – Transforming waste, industrial by-products to reduce environmental impact

Developing green solutions to urban and suburban challenges

As urban centres in Ontario become more populated, they will need green solutions to building infrastructure, urban planning, environmental governance, and more, to ensure they are climate-resilient. The City Institute at York University (CITY) brings together faculty members, post-doctoral fellows, graduate and undergraduate students and visiting scholars from across the social sciences and the humanities to provide new and innovative approaches to addressing complex urban challenges in Toronto and the Greater Toronto Area, such as renewal and resilience, building the world's longest practical suburban greenway in northwest Toronto and planning the development of urban infrastructure.

For more information, contact The City Institute at York University at city@yorku.ca or 416-650-8125.

York University – [City Institute](#)



Helping local industry adopt sustainable solutions

Ontario's universities are partnering with industry to find solutions to pressing industry challenges that will ultimately impact the communities they operate in, such as finding new and more sustainable methods of delivering products and services or managing operations. By working together, universities are helping ensure industry partners can continue to make a positive impact on their communities – one that will be felt for years to come.

Helping maple syrup operations adapt to climate change

As the domestic and international demand for Ontario maple syrup increases, preventing sugarbush damage as the climate changes will be critical to ensuring the sector continues to thrive. Professor Gerardo Reyes and his team at Lakehead University are partnering with Camphill Communities Ontario (CCO) to develop adaptation strategies that will ensure CCO's maple syrup operation can adapt as the climate changes and even enhance production. To do this, they are examining factors, such as temperature, precipitation, snow cover, foliage health, soil conditions and overall health of the sugarbush, to provide solutions to address unexpected climate change events that could impact ongoing operations and production.

For more information, contact the Faculty of Science and Environmental Studies, Lakehead University at 807-766-7211.

Lakehead University – [Research in action: Sustainability in the face of climate change](#)



Integrating climate change adaptation into municipal and industrial planning

One of the most effective ways to adapt to climate change is to integrate climate strategies into existing planning and policy processes. The Climate Risk Institute (CRI) at Laurentian University is working with government, Indigenous communities and industry to lead and support several projects that help promote, plan and sustain climate change adaptation planning, decision-making and action across diverse regions and stakeholder groups. This includes assessing a northwestern Ontario forest's adaptability to climate change; developing climate change information products for agriculture, municipalities and Indigenous communities in Bruce, Grey and Huron Counties; as well as assessing the climate change risk of abandoned or orphaned mine sites in Ontario. These projects will help in various planning and management processes – from risk management to infrastructure renewal.

For more information, contact the Laurentian University at info@laurentian.ca.

Laurentian University – [Climate Risk Institute](#)





Bolstering nuclear safety in Pickering

As Ontario Power Generation (OPG) prepares to decommission its nuclear power plant in Pickering over the next decade, ensuring the process is safe for both the environment and communities is critical. Ontario Tech University researchers are partnering with OPG and RMUS Canada to test Spot – a four-legged robot – that will help bolster the safety of the nuclear maintenance program at OPG. Through the program, university researchers are leveraging machine learning and artificial intelligence to analyze the data gathered by Spot and determine if the technology could effectively alert personnel of potential on-site safety hazards. The findings of the research will have a broad impact across industrial applications with the university sharing its findings with industry partners and municipalities across North America.

For more information, contact the Faculty of Engineering and Applied Science, Ontario Tech University at 905-721-8668.

Ontario Tech University – 'Spot' on: Ontario Tech researchers investigating remote-inspection effectiveness of four-legged robot

Creating sustainable cities through thought leadership

A sustainable city improves the quality of life for residents in the face of significant environmental changes by leveraging the power of creative thinking, citizen collaboration and new forms of data and technology. Led by professors Kevin Kee and Brian Ray, the University of Ottawa's Sustainable Cities Initiative explores critical questions and develops compelling solutions to some of our biggest problems from a human sciences lens, such as: how can we live well on a planet with limited resources? The Initiative brings together thought leaders from academia, industry and government to address challenges associated with a warming climate and how we can build a more environmentally and socially sustainable urban future.

For more information, contact the Faculty of Arts, University of Ottawa at arts@uOttawa.ca or 613-562-5973.

University of Ottawa – Faculty of Arts launches sustainable cities initiatives thanks to \$1M donation



Reducing concrete's carbon footprint

Reinforced concrete infrastructure accounts for almost 10 per cent of global carbon dioxide emissions. Working to change this are two Queen's University civil engineering experts Neil Hault and Josh Woods who, together with their academic collaborators and industry partners, are invested in cutting the carbon dioxide emissions generated by concrete production in half. The research considers several approaches, including studying how to better design structures to use less concrete and reduce material consumption and structure weight. Supported by industry and municipal partners, including Arup, Aecon, KPMB Architects, and Lafarge, along with the City of Kingston and the Cement Association of Canada, the research program will help make concrete cleaner.

For more information, contact the Department of Civil Engineering, Queen's University at 613-533-2122.

Queen's University – International effort to reduce concrete's carbon footprint



Studying environmental governance to enhance public policy

Strong municipal environmental policy can help both government and residents address climate change. Professor Christopher Gore at Toronto Metropolitan University is studying the interaction of infrastructure, agriculture, climate change, cities and energy provision to generate new knowledge about environmental governance. By examining municipal policies, systems and processes, Gore evaluates public opinion on environmental issues and brings together government, civil society and industry to reach collective climate change mitigation and adaptation goals through public policy and administration.

For more information contact, Toronto Metropolitan University at 416-979-5000.

Toronto Metropolitan University – Helping government and residents address climate change



Developing Ontario's cleantech innovation ecosystem

The cleantech market is projected to exceed \$3.3 trillion by 2022, according to Export Development Canada. To support this growing sector and diversify the local economy, Trent University is partnering with the City of Peterborough to bring together students, researchers and industry through Cleantech Commons (the Commons) – a hub for collaborative research, innovation, commercialization and entrepreneurship in clean, green and sustainable solutions. To support these new ventures, Trent and the Commons also launched the Trent Enterprise Centre, which is the only cleantech accelerator in Canada with both shared laboratories and pilot facilities to support cleantech start-ups, business growth and commercialization.

For more information, contact Trent University at 705-748-1011.

Trent University – Supporting cleantech start-ups, business growth and commercialization

Addressing equity and accessibility within climate action planning

As an increasing number of municipalities are declaring climate emergencies and developing comprehensive climate action plans, efforts to mitigate climate change can unintentionally create social inequities within communities. Researchers at Wilfrid Laurier University are partnering with stakeholders across Canada, and internationally, to identify, develop and test innovative and practical approaches to addressing climate change in a manner that helps ensure and address equality. Led by Laurier's Viessmann Centre for Engagement and Research in Sustainability (VERiS), the project features a series of workshops that brings together members of equity-seeking groups, community organizations, government, social innovators and academics to help shape and focus the research.

For more information, contact the Viessmann Centre for Engagement and Research Sustainability, Wilfrid Laurier University at veris@wlu.ca.

Wilfrid Laurier University – Laurier research centre leads new international partnership to address equity and accessibility within climate action planning



Powering greenhouses with clean technology

As farmers look to expand operations and increase their access to low-carbon energy solutions, they will need innovative and effective clean energy technologies. Professor Rupp Carriveau at the University of Windsor is partnering with the Ontario Greenhouse Vegetable Growers (OGVG) and Kruger Energy to explore the use of existing wind farms to power and heat greenhouses in southwestern Ontario, which boasts the highest concentration of greenhouses in North America. The project proposes building a commercial facility that takes locally captured wind energy and turns it into electricity and hydrogen for greenhouses that can grow fruits and vegetables. This will help municipalities and governments meet the growing energy and food needs of communities across the province in a sustainable way.

For more information, contact the Department of Civil and Environmental Engineering, University of Windsor at 519-253-3000.

University of Windsor – Joint venture to examine potential for wind to power greenhouses



Developing the highly skilled talent needed to address local climate change challenges

Today's students will be tomorrow's leaders in clean technology, adaptation and climate resilience, making critical contributions to climate change policy, research and innovations in their communities. To help municipalities develop the talent it needs to continue to fuel the green economy, many Ontario universities offer work-integrated learning opportunities that will help students address climate change with local, Ontario-made solutions.

Launching new, green community projects

To help the City of Sault Ste. Marie enhance sustainability and waste management, students at Algoma University are working with the municipality to launch projects through CityStudio Sault Ste. Marie. In partnership with Algoma, CityStudio provides students with work-integrated learning experiences, while also helping the city launch new projects, such as a waste management app. Through these opportunities, students are developing critical soft skills, such as creativity and communication, and gaining valuable experience as they prepare to enter the local workforce.

For more information, contact the Academic Dean's Office, Algoma University at dean@algomau.ca or 705-949-2301.

Algoma University – [Algoma U partners with CityStudio Global to bring civic innovation and city-campus collaboration to the Sault](#)



Supporting climate change adaptation in rural Ontario

Ensuring rural municipalities can address their key climate change concerns, such as increased rainfall, snowfall, ice build-up and flooding, is vital to protecting residents and critical infrastructure. Carleton University professors Shawn Kenny and Kathryn Dupré are developing strategies that aim to help rural Ontario municipalities integrate climate change considerations into their asset management plans. This includes strategies to help municipal leaders engage key stakeholders and community members, integrate climate change within the asset management framework, and advance tools, standards, and best practices that can be adapted to inform sustainable and resilient infrastructure.

For more information, contact the Department of Civil and Environmental Engineering, Carleton University at ceeinfo@cunet.carleton.ca or 613-520-2600 ext. 5784 or the Department of Psychology, Carleton University at psychology@carleton.ca or 613-520-2644.

Carleton University – [Studying rural readiness for climate change](#)



Protecting Ontario's forests through work-integrated learning

To help capture carbon dioxide and mitigate the effects of climate change, the McMaster University Carbon Sink Forest initiative launched by McMaster's Centre for Climate Change, is developing a model forest where 1,000 native tree species will be planted to help promote and preserve biodiversity, sustainability and conservation. As a living learning lab, students across biology, ecology, biogeochemistry, hydrology and geomatics will gain critical work-integrated learning experience in the field, gaining exposure to studying and evaluating tree growth, survival rates, GIS mapping and leveraging drones and satellite imagery. This experience will help prepare students to better understand our natural environment, providing key insight into preserving Ontario's many forests.

For more information, contact the Centre for Climate Change, McMaster University at climate@mcmaster.ca or 905-525-9140.

McMaster University – Establish a model forest with McMaster



Training Ontario's future municipal leaders

Providing students with the opportunity to learn about careers in government can help develop a strong public sector talent pipeline that has the tools to introduce critical climate change policy and projects, while providing an invaluable work-integrated learning opportunity. Through a special topics course titled Arts, Designers and City Builders, OCAD University is connecting students with city leaders to help them learn more about municipal issues and policy development. The course is part of a broader program called CivicLabTO that brings together students, faculty, researchers and city staff to conduct research and address urban challenges.

For more information, contact the Office of the Vice-President, Academic and Provost, OCAD University at 416-977-6000.

OCAD University – Partnership with City of Toronto training students to be future municipal leaders

Appendix

See below for more ways to get in touch with Ontario's university climate change researchers and learn more about partnership opportunities.

Mitigating local impacts of climate change through community-based research

Brock University

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Toronto Metropolitan University

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Helping local industry adopt sustainable solutions

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Developing the highly skilled talent needed to address local climate change challenges

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