ENVIRONMENTAL LEADERSHIP & CANADA'S POLYTECHNICS

POLYTECHNICSCANADA

Inspiring Climate Action

Rarely do the interests of youth, business and politics converge as they do around the global climate emergency. The social and economic impacts of climate change are increasingly apparent and the desire for collective action has never been stronger. However, questions remain about how to move forward and at whose cost, what solutions warrant investment and from where leadership will come. Canada's polytechnics are ideally placed to contribute to environmental sustainability, propelling the significant effort required from all corners of society.

Sitting at the intersection of talent development and business innovation, Canada's polytechnics are well-positioned to address environmental sustainability in three important ways:

- As publicly funded exemplars of net-zero and eco-friendly buildings, behaviours and experimentation
- As hubs for the development of "green skills" among the thinkers and doers who will drive our sustainability agenda
- As innovation intermediaries, helping businesses rethink their processes, products and systems and adopt new technology

In the following pages, we share just a few of the inspiring examples in practice across Canada's polytechnics.

Leaders in Sustainability

Today's students have high expectations for their post-secondary institutions: they want to study in places that respect the need to reduce the human impact on the environment and they envision themselves as active participants in creating that future. As both magnets for next-generation talent and pillars within their communities, Canada's polytechnics know they must lead by example.

Polytechnic institutions are adopting sustainability strategies that target the entire operation of their campuses, including net-zero infrastructure, zero-waste facilities and the adoption of eco-friendly technologies. Polytechnics are internationally renowned leaders in sustainability, integrating environmental considerations across all aspects of their operations and fostering a culture of responsibility. Polytechnics aren't just preparing learners for a sustainable future, they are living it themselves.

Image provided by Fanshawe

FANSHAWE

Gold-Rated Sustainability Practices

Fanshawe is one of few Canadian colleges to receive a STARS Gold Rating from the Association for the Advancement of Sustainability in Higher Education. STARS (Sustainability Tracking, Assessment & Rating System) measures and encourages sustainability across an institution's operations, including:

- Using the campus as a living, learning laboratory
- Sustainability research and scholarships for students
- Sustainable building operations and maintenance
- Sustainable campus development and new construction
- Waste reduction and diversion initiatives

Examples of these sustainability practices in action are water fill stations, the college's green bin program, integrated solar panels on buildings and a green wall at the institution's downtown campus.

Sheridan

A "Top Green College"

According to the Princeton Review's renowned Guide to 399 Green Colleges (2022), Sheridan is a sustainability leader, integrating environmental awareness into all aspects of teaching, learning, energy, waste and operations. Sheridan's Office for Sustainability was established in 2010 to engage staff and students in initiatives that reflect the institution's core values and identify future goals. For example, the Office is responsible for Zero Waste Sheridan, an initiative to make Sheridan a zero-waste campus and the Integrated Energy and Climate Master Plan, which aims to decrease half of overall energy and carbon emissions by 2030.

Sustainable Seneca

In 2017, a group of cross-college stakeholders united to promote and embed sustainability in Seneca's culture, specifically in conservation and restoration, energy and climate change, green building, transportation, waste reduction and water usage. Recent initiatives include:

- With support from donors, Seneca installed an integrated water, gas and electricity monitoring system in its Centre for the Built Environment. The Energy Dashboard is both a learning tool for students and a way to help Seneca monitor its energy consumption
- A series of textile waste reduction initiatives on campus, such as clothing swaps, vintage fashion sales and a partnership with Diabetes Canada, the City of Markham and the Township of King to provide textile donation bins
- A first-of-its-kind student research project from the School of Fashion that analyzes textile waste down to the fibre level

Limberlost Place

In 2021, George Brown began construction of Ontario's first mass-timber, low-carbon institutional building, Limberlost Place. This energy-efficient 10-storey building will use passive energy strategies and carbon-free energy production to address operational needs. With an innovative mix of passive and active climate control systems, Limberlost Place will require little additional fuel for much of the year. At those times, natural ventilation using operable windows and dual solar chimneys will allow the building to "breathe."

Compared to traditional construction materials, sustainably sourced mass timber products will reduce waste by 65 per cent, reduce fossil fuel consumption by 40 to 60 per cent and decrease water and air pollution. Wood has the additional advantage of sequestering carbon absorbed by trees for the lifetime of the building. When complete, Limberlost Place will be home to a research hub focused on sustainable construction, two academic schools and community support spaces.

Image provided by Sheridan

Developing Green Skills & Talent

Strategic workforce development is central to everything Canada's polytechnics do – when the economy pivots, so too do these institutions. Responding to climate change and implementing technology-based solutions will require a workforce equipped with the skills necessary to operate and install alternative energy grids, maintain and repair fleets of electric vehicles and implement the most up-to-date retrofit and green building techniques. Canada's polytechnics are committed to developing a talent pipeline with these skills and the many others necessary to transition to a green economy.

Close connections to employers and a commitment to work-integrated learning position polytechnics to educate and upskill learners throughout their careers, something that will be consistently relevant as technologies change and approaches evolve. Students also have the opportunity to cultivate a sustainability mindset - one open to innovation and ready for collaborative problem-solving.

Image provided by Humber

SAIT

Developing Water Management Professionals

The Southern Alberta Institute of Technology's Integrated Water Management program is a two-year diploma focusing on the skills required to identify local solutions to global water issues. The first of its kind in Canada, the program emphasizes water monitoring program development, data analysis, project management, site assessment and emergency preparedness, among other competencies. Students develop specialized applied knowledge by completing a capstone research project in either water environmental technologies or advanced industry applications. Graduates find work in high-demand fields such as water quality, water damage and restoration, environmental health and safety, natural resource management and waste management, among others.

HUMBER

Advanced Diploma in Sustainability

Humber's Sustainable Energy and Building Technology Advanced Diploma is developing the skilled workforce required to respond to increasingly stringent standards for design, construction and operation in Canada's built environment. Students develop a mix of theoretical and practical skills using state-of-the-art hardware, software and equipment in a hands-on lab environment. An optional work placement offers practical experience in the energy efficiency, green building or sustainable energy industry.

- Emerging employment opportunities that require these specialized skills include:
- Sustainable energy project manager
- Energy auditor/analyst/modeler
- Technical support specialist
- Government energy policy analyst
- Building automation technician
- Business operator/entrepreneur

BCIT BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Incorporating Sustainability into Curricula

The British Columbia Institute of Technology encourages and supports the incorporation of sustainability skills across curriculum. Among them:

- Sustainability is often the focus of student capstone and research projects. In 2019, Computer Systems Technology students were challenged to design an app that could save the world — with impressive results. The apps were later showcased at the Ecocity World Summit
- Courses grappling with sustainability are offered as part of programs ranging from business to engineering. For example, Applied Ethics is a multidisciplinary course that engages students in environmental issues using case studies, encouraging them to develop analysis specific to their field of study
- The BCIT Rivers Institute is a leader in aquatic ecosystem restoration and works closely with environmental education programs at BCIT to offer field-oriented learning and applied research for the next generation of resource stewards and aquatic restoration professionals

KPU KWANTLEN POLYTECHNIC UNIVERSITY

Bachelor of Applied Science & Sustainable Agriculture

Sustainable, local food production is becoming a topic of increasing relevance as consumers, communities and governments seek to understand the human and ecological dimensions of food systems. Kwantlen Polytechnic University's program is developing sustainable agricultural skills and knowledge in its graduates, recognizing they will be in high demand across fields as diverse as planning, resource management, politics and production agriculture. The program offers a comprehensive perspective on:

- The science of agro-ecosystem design and stewardship
- Innovative and ecologically sound crop production methods
- Sustainable farm business management
- The economic, social and environmental challenges facing our food system

Images provided by KPU

Pragmatic Solutions through Applied Research

A big part of accomplishing Canada's ecological goals and ambitions will be about reaching beyond the technology, systems, programs and processes on which we now rely. Pragmatic technology- and innovation-based solutions that businesses, homeowners, governments and non-profit groups can put into action will be critical additions to carbon taxes and other market-based levers.

As innovation intermediaries, Canada's polytechnics possess the significant applied research capacity essential to climate change action. They are both living laboratories for sustainability and hubs for environmentally focused applied research. Polytechnics are recruiting experts to drive a sustainability research agenda, mobilizing knowledge so that best practices can be shared and scaled. Today, polytechnics are helping organizations of all sizes adopt, implement and commercialize new solutions to reduce our carbon footprint across all industrial and social sectors, offering fertile ground for experimentation and setting the stage for wider adoption of those solutions that work best.

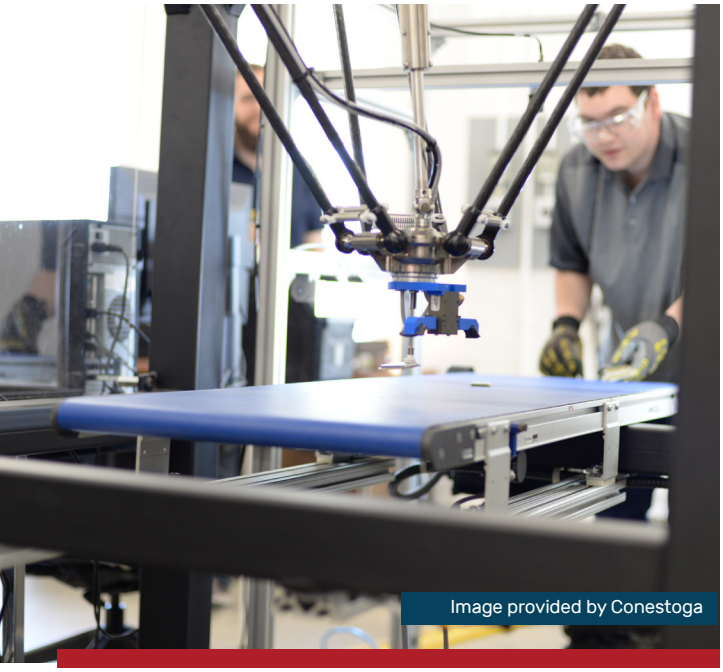

Image provided by Conestoga

NAIT

Testing and Validating Microgrid Technology

The Northern Alberta Institute of Technology partnered with ATCO, Siemens and the Future Energy Systems research program at the University of Alberta to create a "plug-and-play" microgrid where energy companies can test and validate their technologies in realistic field conditions. The facility is designed to help partners discover innovative technologies to generate, manage and store energy while reducing or eliminating greenhouse gas emissions.

CONESTOGA
Connect Life and Learning

Advanced Recycling Technologies for Waste Electrical and Electronic Equipment

Electrical and electronic equipment has become the fastest growing source of solid waste – producing ~ 50 million tonnes annually – only 15 to 20 per cent of which is currently recycled. As Conestoga's former NSERC Industrial Research Chair for Colleges in Advanced Recycling Technologies for Waste Electrical and Electronic Equipment, Dr. Hamid Karbasi worked with faculty, students and industry partners to explore solutions such as:

- The development of working prototype systems to de-manufacture, sort and process computer hard drives, button cell batteries and black plastics
- Studies into the repurposing, remanufacturing and recycling of lithium-ion batteries used in electric vehicles
- Investigating technologies to improve the efficiency of sorting household batteries for recycling
- Robotic sorting of shredded waste electronics

Ecocity Centre of Excellence

The British Columbia Institute of Technology recently announced the opening of its Ecocity Centre of Excellence. The Centre supports applied research and provides the tools, metrics, expert planning and policy advice, and training that cities need to become ecocities modeled on the self-sustaining structure and function of natural ecosystems.

A legacy of the 2019 Ecocity World Summit in Vancouver, the Centre showcases BCIT's leadership as cities consider the best ways to reduce their carbon and ecological footprints. Experience with green roofs and living walls, smart micro-grid technology and ecological restoration supports the development of tools and apps that a city and its citizens can use to rethink food production, buildings, consumables and waste, transportation and water use.

Renewable Energy Demonstration Project

In Saskatoon, electrical energy created by utilizing landfill gas is powering as many as 1,200 homes, reducing greenhouse gas emissions and generating ~$1.3 million in revenue by selling power to the provincial utility. This effort is powered in part by renewables produced at the Saskatoon Solar Power Demonstration Site.

In addition to supplying power to the landfill, four local organizations, including Saskatchewan Polytechnic, use the 92-solar panel site as a living lab to explore the solar resource at the 52nd parallel. The involvement of Mechanical Engineering Technology students from Saskatchewan Polytechnic means the applied research is also contributing to the education of the future workforce.

Accelerating Innovation in Vehicle Manufacturing

RRC Polytech's Vehicle Technology & Energy Centre undertakes applied research related to vehicle performance, use of renewable fuels, fuel efficiency and emerging technologies, with an emphasis on extreme weather conditions. In 2019, the institution received a federal grant to build an electric vehicle charging station that would run on repurposed bus batteries. In addition to enhancing environmental sustainability, using repurposed batteries in rapid charging stations is predicted to improve performance and reduce operating costs.

RRC Polytech is also home to MotiveLab™, a unique western Canadian facility that allows manufacturers to test the performance of vehicles at extreme temperatures throughout the year. The facility serves Manitoba's heavy vehicle manufacturing industry by helping companies test the performance of alternate fuels, emission reductions, and new materials and components under full loads. Students work collaboratively with industry partners, instructors and research professionals to develop and test equipment used across North America.

Reducing a Heritage Building's Carbon Emissions

Algonquin College's Construction Research Centre (CRC), in partnership with Ottawa's Glebe Community Centre, undertook a project to analyze and reduce carbon emissions for the Centre's 100-year old building. The CRC gathered and complemented existing energy data, made use of thermal imaging to survey the condition of the building envelope and developed a building information model to produce energy simulations. By creating this model, Algonquin was able to recommend the most cost- and resource-efficient solutions for limiting the carbon emissions of this heritage building.

Sustainability A-Team

As Canada reaches toward its domestic and international environmental commitments and goals, collective action is imperative. This is an effort that requires buy-in by individuals, policymakers, businesses, non-profits and educators well into the foreseeable future. And, while no one group has a magic bullet or prescribed set of solutions, it is time to assemble the A-team of leaders and doers. We are confident that Canada's polytechnics are a necessary part of this group.

As applied research hubs, curators of workforce-relevant skills and leaders within their communities, polytechnics sit at the intersection of education and business innovation. Applied research will help Canadians adopt, implement and commercialize the products, technologies and processes to reduce our carbon footprint. Polytechnics are building green skills in tomorrow's workforce, creating an innovation-ready talent pipeline with a sustainability mindset. As publicly funded pillars in local communities, polytechnics are positioned to showcase new technologies, test new systems and lead by example.

Canada's polytechnics are ready to go.

About Us

Polytechnics Canada is the voice of leading, research-intensive, publicly supported polytechnics, colleges and institutes of technology. Our mission is policy advocacy for federal action on innovation and skills.

Polytechnics Canada members play a critical role in enhancing Canada's productivity and innovation. Through their facilities and networks, our members provide meaningful solutions to industry problems and accelerate knowledge transfer. Graduates are job-ready and armed with the skills employers need across sectors.

Close ties to industry make the polytechnic talent pipeline dynamic and responsive to the challenges of developing the future workforce. Polytechnics work with industry to build programs and design curricula, to conduct applied research that helps firms scale and get products to market. They offer students work-integrated learning opportunities and position graduates for careers. Beyond the traditional student, polytechnics embrace those at mid-career who find themselves displaced from the labour market or simply need short-term retooling to refine and modernize their skillsets.

At Polytechnics Canada, we are proud promoters of the polytechnic education model—applied, hands-on and technical; industry-focused and industry-driven. Learn more at polytechnicscanada.ca.

Polytechnics Canada Members

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